

Working conditions

# Working conditions and workers' health





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**Authors:** Bettina Kubicek (University of Graz), Matea Paškvan (Statistics Austria), Roman Prem (University of Vienna), Julia Schöllbauer (University of Vienna), Matthias Till (Statistics Austria), Jorge Cabrita (Eurofound), Agnès-Parent Thirion (Eurofound) and Mathijn Wilkens (Eurofound)

**Research manager:** Jorge Cabrita

**Project team:** Jorge Cabrita, Agnès Parent-Thirion and Mathijn Wilkens

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**European Foundation for the Improvement of Living and Working Conditions**

**Telephone:** (+353 1) 204 31 00

**Email:** [information@eurofound.europa.eu](mailto:information@eurofound.europa.eu)

**Web:** [www.eurofound.europa.eu](http://www.eurofound.europa.eu)

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## Country codes EU28 and Norway

AT	Austria	FI	Finland	NL	Netherlands
BE	Belgium	FR	France	PL	Poland
BG	Bulgaria	HR	Croatia	PT	Portugal
CY	Cyprus	HU	Hungary	RO	Romania
CZ	Czechia	IE	Ireland	SE	Sweden
DE	Germany	IT	Italy	SI	Slovenia
DK	Denmark	LT	Lithuania	SK	Slovakia
EE	Estonia	LU	Luxembourg	UK	United Kingdom
EL	Greece	LV	Latvia		
ES	Spain	MT	Malta	NO	Norway

## Country groups

Country group	Countries
Anglophone countries	Ireland, United Kingdom
Baltic countries	Estonia, Latvia, Lithuania
Central-Eastern countries	Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia
Continental countries	Austria, Belgium, France, Germany, Luxembourg, Netherlands
Northern countries	Denmark, Finland, Sweden
Southern countries	Cyprus, Greece, Italy, Malta, Portugal, Spain

## Sectors of activity

Sector	Corresponding NACE Rev. 2 sectors
Agriculture	A Agriculture, forestry and fishing 01–03
Industry	B Mining and quarrying 05–09 C Manufacturing 10–33 D Electricity, gas, steam and air conditioning supply 35 E Water supply; sewerage, waste management and remediation activities 36–39
Construction	F Construction 41–43
Commerce and hospitality	G Wholesale and retail trade; repair of motor vehicles and motorcycles 45–47 I Accommodation and food service activities 55–56
Transport	H Transportation and storage 49–53
Financial services	K Financial and insurance activities 64–66 L Real estate activities 68
Public administration	O Public administration and defence; compulsory social security 84
Education	P Education 85
Health	Q Human health and social work activities 86–88
Other services	J Information and communication 58–63 M Professional, scientific and technical activities 69–75 N Administrative and support service activities 77–82 R Arts, entertainment and recreation 90–93 S Other service activities 94–96 T Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use 97–98 U Activities of extraterritorial organisations and bodies 99

## Occupational groups

The occupational groups mentioned in the report are based on the ISCO-08 categories; shortened forms of these categories have been used throughout the report. The ISCO group ‘armed forces occupations’ has been excluded when breaking down by ISCO group because of insufficient observations. The respondents in this group have been included when presenting a total for all occupations.

Occupational group	Corresponding ISCO-08 group
Managers	1. Managers
Professionals	2. Professionals
Technicians	3. Technicians and associate professionals
Clerks	4. Clerical support workers
Service and sales workers	5. Services and sales workers
Agricultural workers	6. Skilled agricultural, forestry and fishery workers
Craft workers	7. Craft and related trades workers
Plant and machine operators	8. Plant and machine operators and assemblers
Elementary occupations	9. Elementary occupations





# Executive summary

## Introduction

Ensuring the sustainability of pension systems in the context of ageing populations has become a priority: it requires that more people enter employment and that they work longer. At the same time, pressure on workers is rising due partly to ongoing change in how work is organised and performed; in turn, this impacts on the type and nature of risks associated with work. For workers to remain longer in the labour force, work must be made sustainable by reducing health-impairing conditions and fostering health-promoting ones. To this end, understanding the relationships between working conditions and workers' health and well-being is key. This report examines these relationships in the EU28 using data from the European Working Conditions Survey (EWCS).

## Policy context

Improving working conditions has long been a goal of European policies. Safe and healthy working conditions became a social right when the European Charter of Fundamental Rights stated that 'every worker has the right to working conditions which respect his or her health, safety and dignity' (Article 31). The European Pillar of Social Rights, ratified in 2017, reiterated the importance of working conditions by declaring that workers have the right to healthy, safe and well-adapted work environments. In the EU, occupational safety and health is regulated by the 1989 Framework Directive, plus many individual directives that have as basic principles adjusting workplace design, equipment and methods to the individual and minimising monotonous work and negative health impacts. The European Commission has adopted a number of strategic frameworks on health and safety at work; the most recent, covering 2014–2020, aims to ensure that the EU continues to play a leading role in promoting high standards for working conditions, in line with the Europe 2020 Strategy.

## Key findings

Overall, workers in the EU28 report good health and well-being. Chronic health problems are reported by 17% of employees; very few state that these problems impair their daily activities. Men, on average, report better health and well-being, fewer health problems and better sleep quality than women. Country-level differences in health and well-being, although present, are less significant than gender differences.

Individual health is determined by multiple factors, including genetics and lifestyle; for those in employment, working conditions are also important. The relationship between working conditions and workers' health and well-being can be depicted in a model based on EWCS data. This shows that health outcomes are the result of two processes: health-impairing processes (exhaustion) and motivational processes (engagement).

Health-impairing processes are associated with exposure to adverse work demands; motivational processes are associated with access to work resources that support engagement. Work demands tend to increase exhaustion (which is related to poorer health), while work resources imply greater work engagement and well-being. Physical risks and social demands have direct implications for workers' health and well-being; for other working conditions, the impacts are indirect.

EWCS data show no dramatic change over the past 15 years in work demands and resources. While support by supervisors or co-workers has not changed, there is some indication that work intensity and job control have increased slightly since 2010. In addition, emotional demands have increased, underlining the growing importance of psychosocial risks. A positive but slow trend is observed with regard to rewards: more jobs appear to be secure, offering better career perspectives and fair pay.

Workers under 25 are most likely to face high demands, often physical in nature, while having the least access to work resources. However, demands and resources seem to be independent of life stage. By occupation, unskilled jobs carry the highest risks. Employees reporting job insecurity also describe relatively more demands and fewer work resources while displaying less engagement, more exhaustion, poorer well-being and worse performance on health indicators. Employees exposed to workplace downsizing experience more work intensity, more social demands and fewer resources than average. Health sector employees, in particular, face high emotional and social demands, such as dealing with angry clients or patients and emotionally disturbing situations. The construction sector is characterised by high physical risk, work intensity and long hours. Although no exceptional demands are found in the transport and manufacturing sectors, employees in these sectors report relatively poor work resources and below-average engagement.

About 10% of the differences in work demands and resources are attributable to country-level characteristics, including labour market context, social protection systems and work regulation systems, and level of gender equality.

## Policy pointers

**Protection from physical risks and work intensity remains important:** Physical risks and work intensity remain relevant to workers' health and show no signs of diminishing.

**Emotional demands and psychosocial risks are growing in importance:** Employees in health and education sectors (mostly female) face high emotional demands. Those demands are significantly related to exhaustion and, in turn, reduced health and well-being. With the growing need for long-term care in ageing societies, these demands are likely to increase further and, therefore, require particular attention.

**Motivational aspects can be decisive for health and well-being at work:** Job control, social resources and rewarding working experiences have positive effects.

Policy initiatives should go beyond protecting workers from excessive work demands to promoting complementary strategic investments that provide workers with the necessary resources to maintain and improve their health and well-being. Employers should be encouraged to introduce workplace initiatives that focus on motivational aspects of work. Such investments should not, however, replace the redesign of work to limit work demands. Workers and their workplace representatives should be encouraged to participate in finding solutions.

**Improvement of working conditions must acknowledge particular risk groups:** Those in occupations requiring lower skills levels, reporting job insecurity or witnessing workplace downsizing are at greater risk of poor health and well-being, since they tend to report greater demands and fewer resources. Employees in the health and construction sectors deserve special attention due to greater emotional and physical demands, respectively.

**The country level matters for job demands and resources:** High union density, good employment protection and gender equality are associated with reduced demands and more resources; thus, national policies and measures to enhance these areas will likely improve working conditions and so contribute to workers' health and well-being.

# Introduction

Workers' health is a historical social concern. Governments have come to recognise the protection of workers' health as both having intrinsic value and being a means to other societal and economic objectives, such as productivity and economic growth, labour market participation and cost reduction in public health services. Over time, therefore, regulations have been put in place to ensure occupational safety and health.

While the fundamental objective of maintaining workers' well-being and productivity has remained constant for decades, the nature of work is changing constantly. The globalisation of markets and resulting amplified competition, as well as the increasing importance of the service economy and of digital working tools, are some of the most important drivers of change. But the composition of the workforce has also altered. More women are seeking jobs, and the workforce is generally getting older. Also, the nature of health problems has changed with emerging concerns around musculoskeletal disorders and mental health.

The European Working Conditions Survey (EWCS) is one of the very few comparative data sources that collects data on working conditions and on workers' health and well-being. This report aims to provide evidence from the EWCS 2015 to broaden understanding of the complex relationships between working conditions and workers' health and well-being. Except where specifically mentioned, the figures presented in this report are based on data from the EWCS 2015.

Adverse working conditions lead to physical and psychological processes which can impair workers' health and well-being. For example, it is widely accepted that workers with high job demands and limited freedom to make job-related decisions have a significantly increased risk of developing cardiovascular diseases. The analysis presented in this report aims to complement this picture by also addressing factors that improve work engagement and foster personal development and well-being: for example, through recognition, adequate pay and opportunities to exert control and build a career. A model is suggested that accounts for both positive and negative effects of working conditions on employee health and well-being. The model helps to identify those demands and resources that have the greatest impact on workers' health and well-being.

The analysis also attempts to identify which groups of workers are most at risk of experiencing adverse working conditions and impaired health, and highlights country-level characteristics that are related to work demands and work resources. It is hoped that the

accumulated evidence in this report will help policymakers and social partners, as well as companies and other organisations, to contribute to the EU objective of promoting healthy working conditions across its Member States.

## Healthy working conditions – a pillar of European integration

The harmonisation and improvement of working conditions has been a pillar of European integration since the Treaty of Rome, which established the European Economic Community in 1957. Subsequently, Eurofound was set up as a specialised agency for the purpose of contributing to improving living and working conditions, and the European Agency for Safety and Health at Work (EU-OSHA) was established to collect, analyse and disseminate occupational information in Member States to prevent risk and raise awareness about the physical safety and health of workers in the EU (Council of the European Union, 1975, 1994).

According to Article 153 of the Treaty on the Functioning of the European Union, the EU may adopt directives setting out minimum requirements, as well as supporting and complementing the activities of the Member States for the improvement of the working environment to protect workers' health and safety.

Today, occupational safety and health in the EU is regulated on the basis of a framework directive (Council of the European Union, 1989) and 19 different individual directives, plus 6 directives with occupational safety and health relevance. Workplace design, work equipment and work methods need to be adjusted to the individual and minimise monotonous work and negative health impacts.

New challenges for health and safety at work have emerged in light of the reduced stability of employment relationships, new working patterns and an ageing workforce. Ensuring protection against occupational injuries and ill health for all workers, irrespective of their form of employment, and addressing 'grey zones' – such as 'dependent' and 'bogus' self-employment leading to unclear legal situations – offers an important way to reduce precariousness and social costs and improve firms' productivity. Strengthening efforts to reintegrate and rehabilitate workers with health problems requires more involvement by employers in terms of retraining or workplace adaptation. However, enforcing preventive and corrective measures by small enterprises remains a key policy challenge.

Beyond the role of specific directives, safe and healthy working conditions have become a social right. Article 31 of the Charter of Fundamental Rights sets out that '[e]very worker has the right to working conditions which respect his or her health, safety and dignity', and the European Pillar of Social Rights includes the right to a healthy, safe and well-adapted work environment (European Commission, 2017). This suggests a high level of protection of health and safety at work and a working environment adapted to workers' professional needs, which enables them to prolong their participation in the labour market.

The EU's goal of safe and healthy work also reflects its commitment to high employment and economic growth in Europe. Both the Lisbon Strategy, launched in 2000, and the current Europe 2020 Strategy emphasise the role of employment in enabling growth. Given demographic changes, the improvement of working conditions is important to keep workers in the labour force and to allow them to work healthily until retirement. To promote high standards for working conditions, the European Commission has adopted strategic frameworks on health and safety at work. While recognising the administrative burden and compliance costs, the current framework (2014–2020) assumes that investments in health and safety would yield a more than twofold average return in overall growth (European Commission, 2014).

## Guiding questions and structure of the report

Given the importance in European policies of promoting healthy working conditions, this report aims to shed light on the associations between working conditions and workers' health in the EU28. In addition to identifying those working conditions that are most strongly related to health and well-being, the report also considers gender differences and country-level correlates of demands and resources. In particular, the report is structured around the following guiding questions.

### How healthy are workers in the EU?

The report starts by exploring the health and well-being status of workers in the EU28, based on the latest wave of the EWCS (2015). The focus is on various health indicators that were derived from the data set of the EWCS 2015, including self-rated general health, health symptoms, chronic diseases, sickness absence, presenteeism and subjective well-being. These indicators of workers' general health and well-being are complemented by indicators of health-impairing and motivational processes that show how engaged and exhausted workers are at work.

### How do working conditions relate to workers' health?

To better understand the relationship between working conditions and workers' health, several theoretical models have been developed and tested in the literature. These models are combined here into a conceptual framework that takes into account both positive and negative effects of working conditions on workers' health. In particular, working conditions are divided into demands (which require effort and may lead to health impairments) and resources (which help to achieve work goals and tackle adversities at work, and may foster well-being). Furthermore, the conceptual framework assumes that working conditions are related to general health and well-being via health-impairing processes and motivational processes. As indicators of these processes, exhaustion and engagement at work are considered. The conceptual framework is then tested using data from the EWCS 2015 to examine how demands and resources are related to specific health and well-being indicators.

The focus of this analysis is on employees, as many demands and resources (such as supervisory support) are not equally applicable to the self-employed. Once the model is operationalised and tested for employees in the EU28, the second objective is to compare its application to female and male employees: specifically, whether the model fits equally well in describing women's and men's working conditions and health statuses and whether the relationships between working conditions and health and well-being are consistent among women and men. One important advantage of incorporating working conditions and employees' health and well-being in one general model is the possibility of identifying those demands and resources that matter most for health and well-being. Once these influential demands and resources are ascertained, the report examines how they have changed from 2005 to 2015.

### Who is at risk of poor health and well-being?

Paid work matters for employees' health and well-being because it provides recognition and opportunities to exert control and socialise with others. Yet, it also requires effort and depletes employees' physiological and psychological resources. These positive and negative conditions of work are not distributed equally among workers. Furthermore, it is already well established that health and well-being differs across groups of people (Marmot, 2004). To identify those workers who are at risk of experiencing adverse working conditions and poor health, the report examines whether demands, resources, health and well-being vary according to age, life stage, occupation, sector of activity, workplace size, employee representation and voice, exposure to reorganisation, job insecurity, employment status and working time arrangements.

## How can differences across countries be explained?

If demands and resources at work play a role in workers' health and well-being, the question arises as to what measures at a country level may have an impact on those demands and resources. This study uses multilevel modelling techniques to investigate how far

the differences in demands and resources among workers in the EU28 can be explained by the country in which the work is carried out. Moreover, it also analyses whether the differences in demands and resources across countries can be explained by country-level characteristics, such as labour market expenditure, union density and gender equality.



# 1 Health of workers in the EU

Health is more than just the absence of disease or infirmity; rather, it is defined by the World Health Organization as ‘a state of complete physical, mental and social well-being’. Its multidimensional character can be represented by such indicators as self-rated general health, health symptoms and chronic illness, sickness absence and sickness presenteeism, sleep quality and subjective well-being as well as exhaustion from work and engagement at work. Eurofound’s European Working Conditions Survey (EWCS) asks respondents to provide self-assessments for a number of these indicators (for an overview of the health indicators used in this report, see Table A1 in the Annex).<sup>1</sup> According to EWCS data, it appears that most workers are in good health. However, it is important to note that this may reflect a selection bias: workers who are relatively healthy might stay in the labour force, while those with severe health problems may drop out and are therefore not captured by the EWCS.

Previous studies based on EWCS data show consistently better health and well-being for male than female workers (Caroli & Weber-Baghdiguian, 2016; Coupaud, 2017; Eurofound, 2007, 2009; Schütte, Chastang, Parent-Thirion, Vermeylen, & Niedhammer, 2015; Toch et al., 2014). This gender gap is maintained across various health indicators. Women are more frequently absent from work than men in Nordic countries (Antai, Oke, Braithwaite, & Anthony, 2015; Oke,

Braithwaite, & Antai, 2016) as well as in Europe as a whole (Muckenhuber, Burkert, Dorner, Großschädl, & Freidl, 2013). However, there are no gender differences when considering average days of absence (Niedhammer, Chastang, Sultan-Taïeb, Vermeylen, & Parent-Thirion, 2012) or absence with a minimum of seven days (Slany et al., 2014). The gender gap in workers’ health and well-being is also observed for the general population. On average, women report poorer health and, at the same time, have longer life expectancy, though with higher morbidity (Read & Gorman, 2010).

It is also a consistent finding of cross-national research that health and well-being varies between countries (Diener, 2000). Better population health appears to be related to higher levels of gross domestic product and social expenditure as well as to lower inequality (Olsen & Dahl, 2007). In addition to economic prosperity, collective social capital (connections and trustworthiness among individuals; Putnam, 2000) and lifestyle (Cockerham, Snead, & DeWaal, 2002) are important cultural determinants for a healthy population. Typically, Eastern countries are characterised by lower levels of well-being and poorer health statuses than Anglophone, Continental, Northern or Southern countries (Artazcoz et al., 2016; Schütte et al., 2014).

## Box 1: Analysis by country cluster

**Method:** In addition to analysis based on male and female employees, different country groups were examined. Six country groups were considered in order to account for different industrial relations and welfare systems.

**Anglophone:** Ireland, United Kingdom

**Baltic:** Estonia, Latvia, Lithuania

**Central-Eastern:** Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia

**Continental:** Austria, Belgium, France, Germany, Luxembourg, Netherlands

**Northern:** Denmark, Finland, Sweden

**Southern:** Cyprus, Greece, Italy, Malta, Portugal, Spain

The country group analysis was conducted separately for employees and self-employed people in the EU28 Member States. All results are weighted for population totals. In most cases the response format was recoded (for detailed information, see ‘Overview of research methods’ in the Annex).

<sup>1</sup> For consistency with later sections of the report, indicators generally refer to employees. Those who are self-employed are mentioned only when markedly different results were observed.

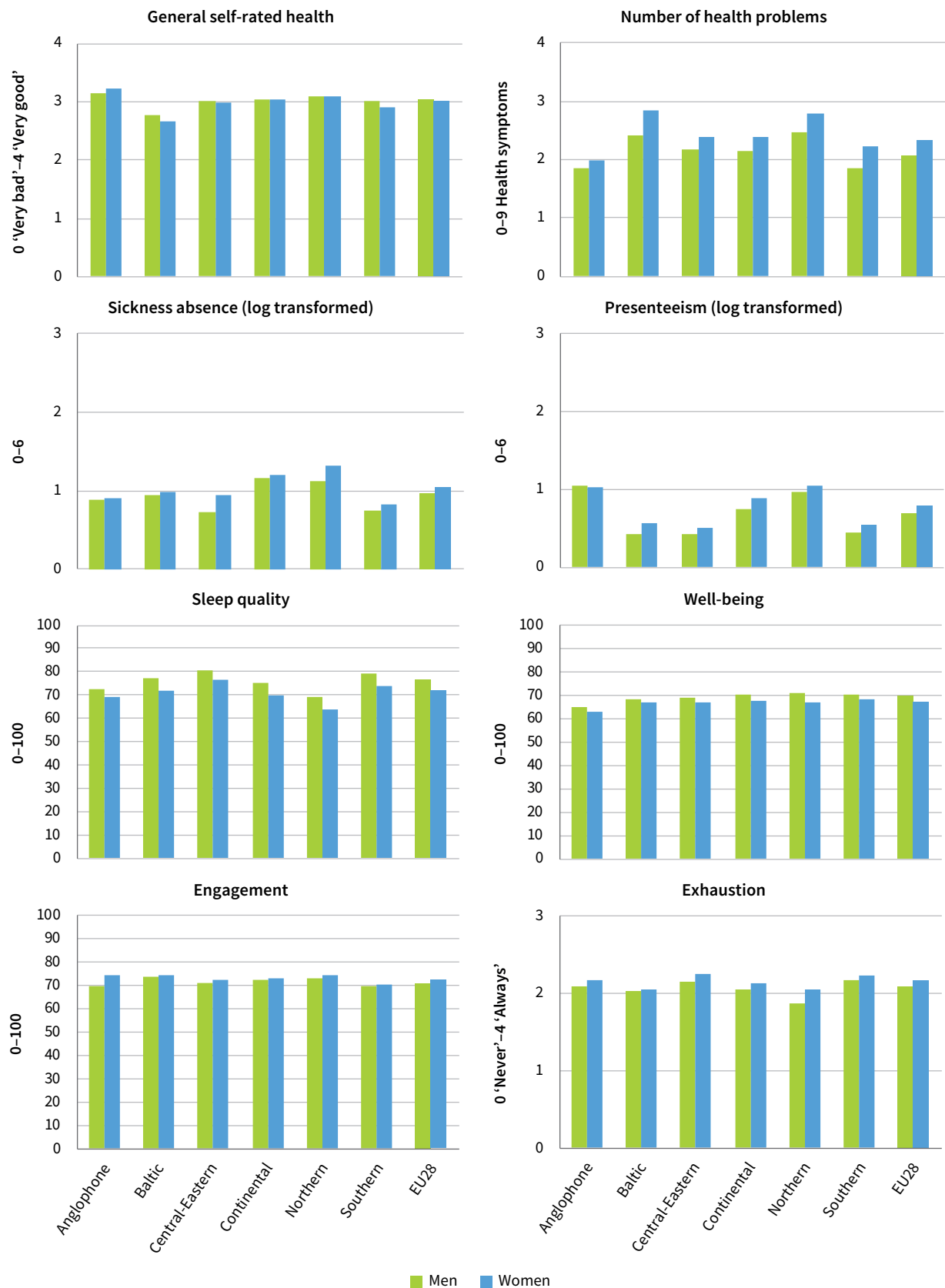
## Self-rated general health

Most workers rate their health as rather good or very good. On a scale from 0 ('My health in general is very bad') to 4 ('My health in general is very good'), workers' average rating is about 3. As Figure 1 shows, it is only in the Baltic country group that the average health rating is somewhat below the EU28 average, while employees in Anglophone countries give the highest ratings of general health. With the exception of the Anglophone countries, women's self-rating of general health is slightly lower than that of men.

Response styles may contribute to positive assessments in self-rated health measures. Due to social desirability, workers may tend to rate their general health as better than it really is. Despite this issue, self-rated health has been shown to be sufficiently correlated with objective health outcomes to serve as a practical approximation to assess workers' health status (Jylhä, 2009). Additional measures such as the reported number of health symptoms or limitations from health problems allow for a more nuanced picture of workers' health (Caroli & Godard, 2016).



Figure 1: Health and well-being by country group and sex



Note: Figures 1–36 refer to employees only, unless otherwise stated.

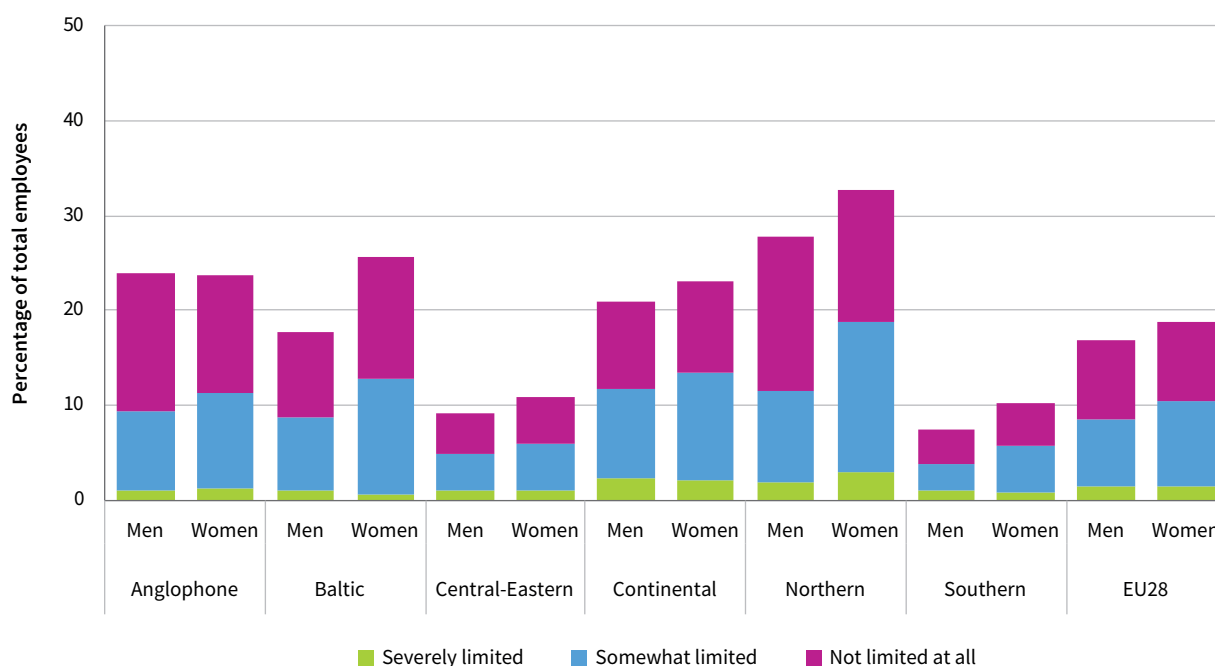
## Health problems

When presented with a list of nine health problems, ranging from hearing problems to muscular pains and fatigue,<sup>2</sup> employees, on average, report having been affected by two in the 12 months preceding the survey (see Figure 1). Again, female employees report slightly more health problems than male employees. With regard to country-level differences, more health problems are reported in the Baltic and Northern countries.

Around 83% of employees report that they do not have any health problems lasting for more than six months (henceforth referred to as chronic health problems). Those 17% of employees who do report chronic health problems tend not to feel limited by these in their daily

routines. Only about 1.5% of all employees report severe limitations in daily activities. The share of employees with limitations due to chronic health problems is considerably higher in Northern and Anglophone countries than in the Central-Eastern and Southern country groups. In line with the aforementioned gender differences in health self-ratings, women are more likely to report chronic health problems than men. These chronic illnesses, however, do not strongly limit their participation in daily activities (Figure 2). Of those who report a chronic health problem, 20% report that their workplace or work activity has been changed to accommodate the illness or health problem and that future adaptation at work will be needed.

**Figure 2: Share of employees with chronic health problems reporting limitations to daily routines, by country group and sex (%)**



**Note:** Employees with chronic health problems are those who, at the time of the survey, reported having an illness or health problem which lasted, or was expected to last, for more than 6 months.

<sup>2</sup> The full list of health problems is: hearing problems; skin problems; backache; muscular pain in shoulders, neck and/or upper limbs (arms, elbows, wrists, hands, etc.); muscular pain in lower limbs (hips, legs, knees, feet, etc.); headaches or eye strain; injury(ies); anxiety; overall fatigue; and other (spontaneous).

## Sickness absence and sickness presenteeism

The number of days workers are absent from work due to health problems is strongly related to health, well-being and even mortality (Marmot, Feeney, Shipley, North, & Syme, 1995; Vahtera, Pentti, & Kivimäki, 2004). Furthermore, sickness absence is associated with high job demands (Niedhammer et al., 2012). The EWCS asks respondents how many days in total they were absent from work due to sick leave or health-related leave in the 12 months prior to the survey. According to the data for 2015, employees are absent from their workplace due to sickness for an average of six days over the course of one year (Figure 3). The average ranges from four days for men in the Central-Eastern countries to nine days for women in the Northern countries. The number of days absent from work due to sickness in the 12 months preceding the survey varies considerably among employees: whereas more than 50% of employees report that they were not absent from work during the last year due to sicknesses, a few employees (N = 13) report more than 300 days of sickness absence. In order to account for this skewed distribution, the data were transformed using a logarithm function. Again, the lowest levels of sickness absence are reported by employees in Southern countries followed by employees in Central-Eastern countries (see Figure 1).

The frequency of long sickness absence (at least 20 days) gives a similar picture (Figure 3). On average, 7–9% of employees in the EU28 report absences of at least 20 days in one year. Employees in Baltic and Continental countries report the highest levels of long-term sickness absence. Those in Southern countries report the lowest level of long-term sickness leave.

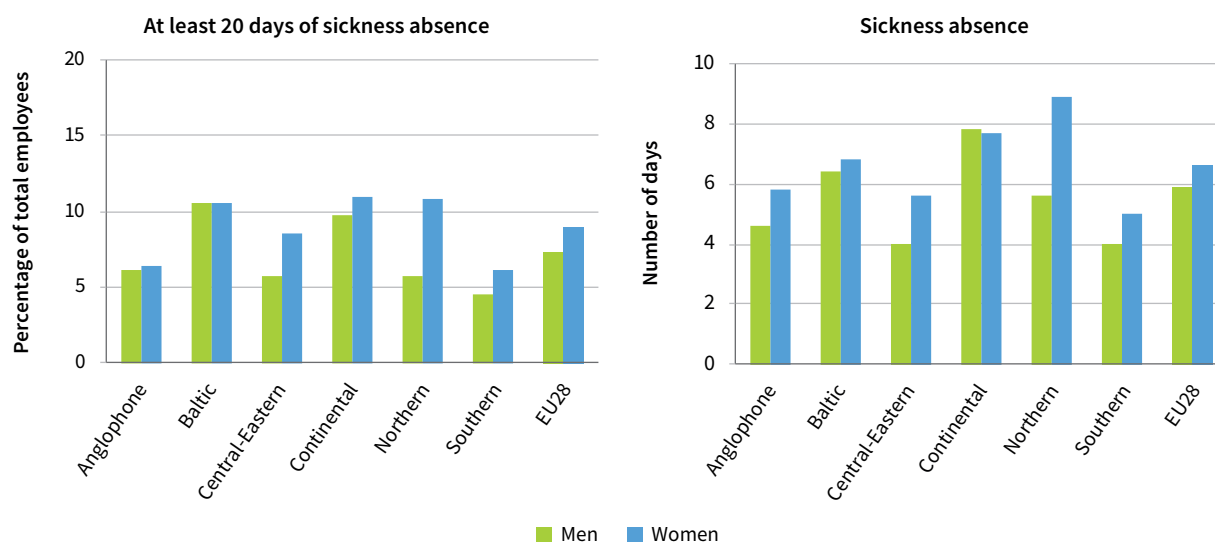
Sickness presenteeism (or just ‘presenteeism’) describes the situation where employees go to work even when they are sick, probably performing below their potential capacity (Miraglia & Johns, 2016). Longitudinal studies indicate that presenteeism may increase the likelihood of health impairments (Skagen & Collins, 2016). On the other hand, presenteeism is positively related to resourceful work characteristics such as rewards and decision authority, indicating that workers feel they have to reciprocate these ‘favours’ by prioritising work over health (D’Errico, Ardito, & Leombruni, 2016).

On average, employees went to work despite being ill on three days. Presenteeism is most frequent in Anglophone and Northern countries and rarely observed in Baltic, Central-Eastern and Southern countries (see Figure 1). In line with other indicators, women are more likely than men to report presenteeism, though Anglophone countries provide an exception to this.

## Sleep quality

Sleep quality can be considered an indicator of health; lack of sleep, in particular, has been found to be associated with coronary heart disease (Cappuccio, Cooper, D’Elia, Strazzullo, & Miller, 2011). Sleep quality may be affected by short peaks in work intensity. The EWCS 2015 included a series of three questions on aspects of sleep-related problems: having ‘difficulty falling asleep’, ‘constantly waking up during sleep’ and ‘waking up with a feeling of exhaustion and fatigue’. Answers to these questions were combined to form an index of sleep quality. The index ranges from 0 to 100, with higher values indicating better sleep quality.

Figure 3: Sickness absence by country group



On average, employees in the EU28 score 70 out of 100 for sleep quality (see Figure 1). This ranges from 64 for women in Northern countries to 80 for men in Central-Eastern countries. In all country groups, men report better sleep quality than women.

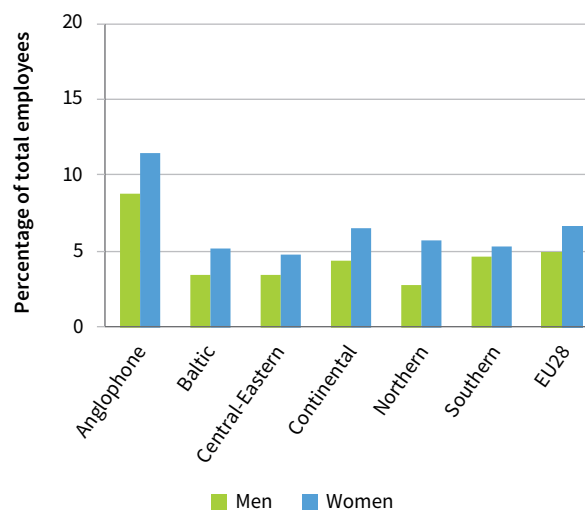
## Subjective well-being

Subjective well-being is increasingly recognised as an important health indicator in research and policy debates (Graham, Laffan, & Pinto, 2018). It reflects a person's overall evaluation of their quality of life, happiness and satisfaction (Topp, Østergaard, Søndergaard, & Bech, 2015). Subjective well-being appears to be an important determinant of productivity at the individual, enterprise and societal levels (Schulte & Vainio, 2010, p. 422).

The EWCS measures emotional and psychological well-being on a scale developed by the World Health Organization (the WHO-5 Well-Being Index). Low scores on the WHO-5 index have been used as a screening instrument to identify enhanced risk of depression (Topp et al., 2015). The index consists of five items assessing people's personal interest in ordinary things, their vitality and their positive affect in general (being happy or in a good mood).<sup>3</sup> The index ranges from 0 to 100. Higher values are indicative of better subjective well-being.

EU28 employees' subjective rating of well-being is 68 out of 100 (see Figure 1). Country scores for subjective well-being are remarkably similar, ranging from 63 among women in Anglophone countries to 71 among men in Continental or Northern countries. Differences are much stronger when low levels of subjective well-being are considered. The percentage of employees who scored below 28 (out of 100), and therefore are considered at risk of depression, ranges from 2.8% (men in Northern countries) to 11.4% (women in Anglophone countries; Figure 4). Overall, low levels of subjective well-being are more common among women (6.6%) than men (4.9%). The highest incidence of poor well-being is found among employees in Anglophone countries (Figure 4).

Figure 4: Risk of depression by gender (%)



**Note:** Percentages indicate those employees whose score for well-being was less than 28: this indicates a risk of depression.

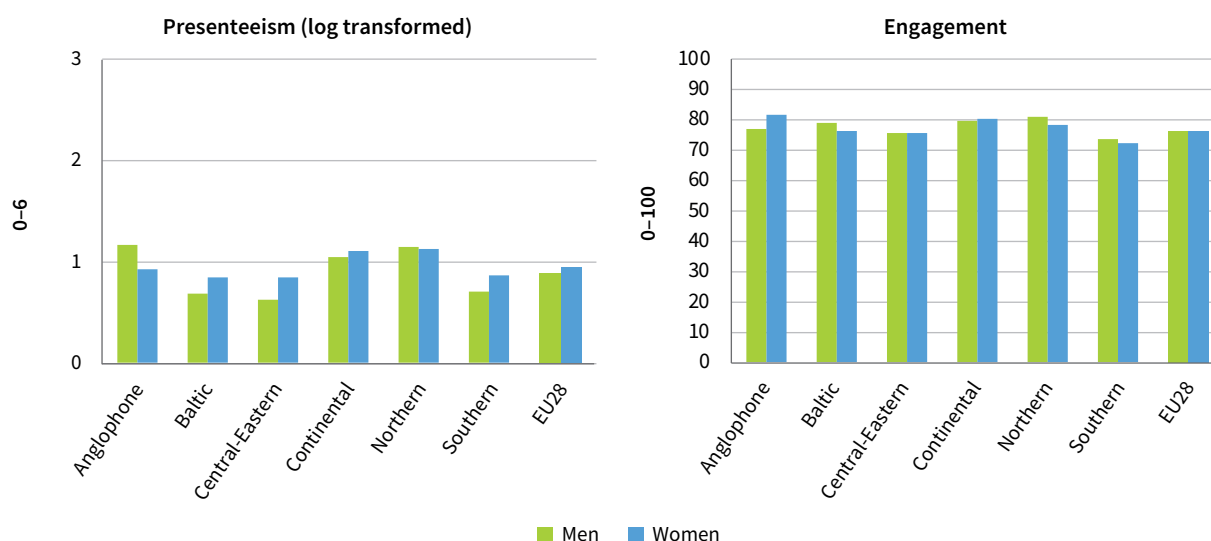
## Work engagement and exhaustion

In addition to the indicators of health and well-being mentioned above, two other well-being indicators that specifically focus on health-impairing and motivational processes in the work context are considered in this report: work engagement and exhaustion. Work engagement is defined as 'a positive, fulfilling, affective-motivational state of work-related well-being' (Bakker, Schaufeli, Leiter, & Taris, 2008, p. 187). Engaged workers show high levels of energy (vigour), are strongly involved with their work (dedication) and have full concentration and are being happily engrossed in their work (absorption). In contrast to this positive state, exhaustion is a core dimension of burnout and reflects its stress component (Maslach, Schaufeli, & Leiter, 2001, p. 397). Exhausted workers lack energy and feel tired even at the beginning of the workday.

In the EWCS, engagement can be measured as an index based on the above three elements: vigour ('At my work

<sup>3</sup> The survey states: 'Please indicate for each of the five statements which is the closest to how you have been feeling over the last two weeks.' The statements are: A. 'I have felt cheerful and in good spirits'; B. 'I have felt calm and relaxed'; C. 'I have felt active and vigorous'; D. 'I woke up feeling fresh and rested'; and E. 'My daily life has been filled with things that interest me'. For each statement, respondents were provided with a frequency scale: 'all the time'; 'most of the time'; 'more than half of the time'; 'less than half of the time'; 'some of the time'; 'at no time'.

Figure 5: Presenteeism and engagement – self-employed workers by country group



I feel full of energy'), dedication ('I am enthusiastic about my job') and absorption ('Time flies when I am working'). Index scores range from 0 to 100, with higher values indicating greater engagement. Exhaustion is captured with a single item ('I feel exhausted at the end of the working day'), with higher values indicating greater exhaustion.

The work engagement index barely differs across country groups. The overall average score is 73 out of the maximum 100, ranging from 69 among men in Southern countries to 74 among women in Anglophone, Baltic and Northern countries (see Figure 1). Likewise, responses to the question on exhaustion indicate only minor variation across countries. Employees are most likely to report being 'sometimes' exhausted from work (with an average value of 2.1 on a scale from 0 to 4). With an average score of 1.9, men in Northern countries are somewhat better off than women in Central-Eastern countries, whose score of 2.3 is almost the same as the EU28 average.

## Specific health outcomes among the self-employed

Most of the health indicators analysed above have very similar results for employees and the self-employed. However, some specific features of self-employed workers are noteworthy: they report lower levels of presenteeism and higher levels of engagement compared to employees (Figure 5). This result is in line with other studies showing that the self-employed are more engaged at work (Gorgievski, Bakker, & Schaufeli, 2010). These authors argue that job content for self-employed people is often highly motivational (also often self-selected) and that work tasks are frequently managerial in nature, both of which contribute to greater engagement.

## Summary

Overall, employees in the EU28 fare rather well with regard to self-rated general health and subjective well-being. Chronic health problems are reported by 17% of employees in the EU28, but only a few state that these health problems impair their daily activities. However, it is important to note that employees who are in good health are more likely to stay in the labour market and therefore to participate in the EWCS than individuals who have severe health problems.

Gender variations in health are quite consistent across different indicators. Men, on average, have higher self-rated health, higher well-being, fewer health symptoms and better sleep quality. Men also tend to report fewer days of sickness absence and fewer days of presenteeism. However, gender gaps in health vary cross-nationally. Health differences and differences in the number of health problems reported by women and men are more pronounced in Baltic and Southern countries. Gender differences in subjective well-being and sleep quality, by contrast, are rather similar across the country groups analysed.

In relative terms, employees in Baltic countries have the worst self-rated health and the highest number of health problems as well as the second-lowest level of subjective well-being. By contrast, workers in the Baltic countries report a relatively high quality of sleep. In Anglophone countries the results are inconsistent: self-rated health is rather high and the number of health problems reported is rather low. At the same time, sleep quality and well-being are rated lower than in other country groups.



## 2 Working conditions, health and well-being

An individual's health and well-being is not determined by a single factor, but rather is influenced by a variety of factors, including genetics, lifestyle, environment, etc. In the context of work, health and well-being are affected by physical risks (e.g. lifting heavy weights) but also psychosocial working conditions (Siegrist & Dragano, 2008). Important aspects of psychosocial working conditions include social support from colleagues and supervisors, work intensity caused by meeting tight deadlines and job control deriving from the opportunity to make decisions about methods of work.

It is important to acknowledge that working conditions may have beneficial as well as negative effects on workers' health and well-being. Several studies have shown the positive influence of work on health, especially on mental health. This is a result of achieving self-affirmation and appreciation as well as having a structured day (Kieselbach, Winefield, Boyd, & Anderson, 2006; McKee-Ryan, Song, Wanberg, & Kinicki, 2005; Murphy & Athanasou, 1999). Unemployed people are more likely to suffer from mental health problems than those who are employed.

Several theoretical models have been formulated to explain health and well-being outcomes among workers.

### Positive effects of job control

At any given level of job demands, workers' well-being can be improved by providing them with control over their jobs. This is the basic implication of the classic Job Demand-Control (JDC) model (Karasek, 1979). Job demands are determined by task requirements, such as the intensity of work that is necessary (Karasek, 1985; Karasek & Theorell, 1990). Workers' perceived control over their work situation is referred to as job control. This includes two aspects: skill discretion (the breadth of skills workers use within their job) and decision authority (the authority of workers to make their own decisions – for instance, with regard to work methods). The original model was later extended in the Job Demand-Control-Support (JDCS) model (Karasek & Theorell, 1990), which considers social support from supervisors and colleagues as an additional factor (Johnson & Hall, 1988).

According to the JDC and JDCS models, demands in the workplace can either be transformed into action or result in strain, depending on the availability of job control and/or social support to workers. The most

adverse situation is unresolved strain caused when employees are confronted with high job demands and low job control and/or social isolation (the strain hypothesis). The negative effects of high job demands on health and well-being, however, could be reduced with high job control and/or high social support (the buffer hypothesis).

Several review papers assessed the empirical evidence for the JDC and JDCS models (Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Van der Doef & Maes, 1998, 1999). Overall, the strain hypothesis received substantial support with respect to health outcomes (cardiovascular disease, negative pregnancy outcomes and (psycho)somatic complaints) and well-being (reduced job satisfaction, emotional exhaustion, depression, impaired mental health and work-related distress). The strain hypothesis received slightly less empirical evidence for musculoskeletal diseases. The buffer hypothesis has been rarely addressed in empirical studies, and the interaction of job demands with job control and/or social support has seldom been found (Häusser et al., 2010; Van der Doef & Maes, 1998).

### Balancing effort and reward in the workplace

If workers' efforts exceed their perceived rewards over a long period of time, this causes stress and has negative health effects. The emphasis on a balance of effort and reward in the workplace is a distinguishing feature of the Effort-Reward-Imbalance (ERI) model (Siegrist, 1996). Rewards can be related to salary, esteem, status control, job security or career opportunities (Siegrist, 1996).

In their review, Tsutsumi and Kawakami found that the ERI model is 'valid for demonstrating a stressful work environment [...] and predicts health conditions among a wide range of working populations' (2004, p. 2335), particularly in the service sector and among employees doing shift work. The hypothesis that high work efforts in combination with low rewards increase the risk of poor health has gained considerable empirical support, even after extensive confounder adjustments (Van Vegchel, De Jonge, Bosma, & Schaufeli, 2005). As reported in two reviews, most studies found that employees working in high-effort-low-reward environments have significantly elevated risk of impaired health and well-being: they report more physical impairments, lower job satisfaction, more emotional exhaustion and more depersonalisation.



Therefore, they are a high-risk group for burnout. A high effort–reward imbalance also goes along with increased sickness absence and higher rates of smoking and alcohol consumption (Tsutsumi & Kawakami, 2004; Van Vegchel et al., 2005).

The ERI model takes different aspects of the work situation into account than the JDC and JDCS models, and the adverse health effects of the ERI components are independent from those of the other two models, suggesting that the models are complementary (Tsutsumi & Kawakami, 2004).

## Role of job resources

The Job Demands-Resources model (JD-R; e.g. Bakker & Demerouti, 2007) is a more flexible framework that integrates and extends the models mentioned above. Instead of a focus on any specific aspect of working conditions, it broadly distinguishes two factors: job demands and job resources. Job demands are defined as

*those physical, psychological, social, or organisational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort or skills and are therefore associated with certain physiological and/or psychological costs.*

(Bakker & Demerouti, 2007, p. 312)

In contrast to the JDC, JDCS and ERI models, job demands in the JD-R model include aspects of the work situation like physical risks and emotional demands. Job resources, on the other hand, are defined as physical, psychological, social, or organisational job aspects that help employees in three key ways (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004):

- reducing job demands and their psychological and physiological costs
- helping employees achieve their work goals
- fostering personal growth

Thus, resources are important in enabling employees to deal with demands, but they are also important in their own right in terms of enhancing motivational states such as engagement at work.

According to this model, the impact of working conditions on workers' health is mediated by health-impairment processes and motivational processes. Job demands exhaust workers' energy, hence impairing their occupational health and causing health problems. But job resources can enhance work engagement, which promotes other positive outcomes such as increased performance and reduced labour turnover.

Studies have shown that job demands such as work intensity or emotional demands are the most important predictors of impaired occupational health (burnout)

and health in general (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). High job demands require sustained effort, which, as an occupational strain response, may cause burnout and in the long run impair health and well-being (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Ebbinghaus, 2002; Hakanen, Bakker, & Schaufeli, 2006). The hypothesised motivational process has also found empirical support (Bakker & Demerouti, 2007; Hakanen, Bakker, & Schaufeli, 2006), with engagement explaining the favourable effects of working conditions on performance, health and well-being (Bakker & Demerouti, 2007). Empirical evidence for the buffering effects of job resources when dealing with high job demands is, however, rather limited (Schaufeli, 2017).

A review analysing 55 empirical studies based on the JD-R model (Crawford, LePine, & Rich, 2010) supports the health-impairment process as well as the motivational process. Job resources have positive relationships with engagement. Moreover, job resources are also negatively related to burnout. These relations are consistent across various types of job resources, such as job control, feedback, development at work, recovery, rewards, recognition, support and skill discretion. High levels of job demands, such as work intensity and emotional demands, are associated with high levels of burnout. Relationships between certain job demands and engagement are not always consistent. This can be explained if one considers that, at least in some situations, certain demands (e.g. work intensity) might be perceived as positive challenges and thus have the potential to trigger motivational processes, whereas other demands (e.g. social demands) are generally perceived as a hindrance or frustration and thus lack motivating effects.

## Findings from the EWCS

Selected assumptions from the above-mentioned models have been investigated in a number of peer-reviewed research papers based on previous rounds of the EWCS. For example, the role of work intensity and job control in determining mental and physical health has been clearly confirmed using data from the EWCS 2005 (Cottini, 2012a) and EWCS 2010 (Van Aerden, Puig-Barrachina, Bosmans, & Vanroelen, 2016). Based on data from the EWCS 2000 and 2005, it was shown that the increasingly popular pattern of working beyond regulated working hours is positively associated with autonomy, but also implies increased mental strain as well as sleep and health problems (Arlinghaus & Nachreiner, 2014). Employees working every day in their private time (compared to employees who never work outside their actual working hours) are more than twice as likely to report work-related health issues.



## Risks for physical and mental health

The effects of both adverse and favourable working conditions on mental health appear, overall, to be greater than on physical health (Cottini, 2012a). Physical risks remain the strongest predictors of the (physical) health of employees in manual occupations (Toch et al., 2014). For example, posture-related risks are clearly related to lower limb pain. But even if workers do not face physical risks, the pace of work and carrying out repetitive tasks can still result in lower limb pain (García, Graf, & Läubli, 2017). There is also some indication that work-related lower and upper limb pain is associated with jobs where employees face high quantitative demands at work (Farioli et al., 2014). Quantitative demands include aspects of work intensity, such as working at very high speed and/or to tight deadlines, and aspects of work extensity (hours worked per week, or long working days).

Research specifically on cardiovascular disease showed that 18% of disease variance can be explained by effort–reward imbalance experienced by workers and 4% by job strain as defined by the JDC model (Niedhammer, Sultan-Taïeb, Chastang, Vermeylen, & Parent-Thirion, 2014).

Other research shows that supervisor support (feedback, encouragement to participate, resolution of conflicts, etc.) accounts for a substantial proportion of explained variance of physical (musculoskeletal) and mental (psychosomatic) health symptoms (Montano, 2016). In general, poor mental health was explained mainly by job strain (18%), followed by effort–reward imbalance (15%) and job insecurity (5%) as argued in the JDC and ERI models (Niedhammer et al., 2014). Similarly, EWCS data on healthcare professionals show that health-related symptoms, such as hearing problems, skin conditions, backache, muscular problems, headache, anxiety and overall fatigue, are more strongly influenced by receiving supervisor support than having support from colleagues (García-Herrero et al., 2017; Lopez-García, Herrera, Fontaneda, Báscones, & Mariscal, 2017). Furthermore, testing the JDC and JDCS models, the authors highlight that stress among healthcare workers is highest under working conditions with high job demands and low job control. In the case of high job demands and high job control, health impairment drops drastically. In neither situation (high job demands combined with either low or high job control) do supervisor support and recognition serve as important resources.

It has also been found that unfavourable interpersonal relationships (e.g. work dependencies, interruption of work tasks, discrimination) have stronger long-term effects than work intensity (measured by repetitive tasks, high work speed, tight deadlines, etc.; Coupaud,

2017). The negative influence of discrimination on health-related variables was also shown by Cottini (2012a), who found that workers experiencing discrimination at work report significantly more health complaints.

## Frequency of sickness absence

Higher (physical and psychological) demands lead to more sickness absence. In contrast, high job control decreases sickness absence (Muckenhuber et al., 2013). Another study expands on these results with the strongest association found between bullying and sickness absence (Niedhammer et al., 2012). Moreover, and with regard to both sexes, high psychological demands, discrimination, low career perspectives and work–life imbalance pose additional risks with regard to sickness absence.

Alali et al. (2017) show that absence due to work-related accidents, in particular, is related to shift work, whereas relationships between sickness absence and contract type, long working hours and having multiple jobs are not significant. The authors further argue that shift work is related to sleeping problems, which, in turn, may lead to more accidents. Generally, they report that shift work is related to poorer self-rated health and decreased work–life balance. In another study, the effects of shift work and working overtime (more than 40 hours per week) have the highest impact on health problems (Cottini, 2012a). The results also indicate that social demands, such as bullying and discrimination, as well as a high level of differing demands, increase workers' sickness absence.

Splitting employees with sickness absence into two groups – one with short absence (fewer than 20 days) and one with long absence (more than 20 days) – reveals similar results. Analysis of data from German-speaking countries in the EWCS 2005 shows that posture-related risks (such as painful working positions) are positively related to short- and long-term sickness absence due to musculoskeletal disorders (Canjuga, Hämmig, Bauer, & Läubli, 2010). While resources such as the opportunity to take days off reduced long-term sickness absence due to musculoskeletal disorders, job resources like autonomy or social support from co-workers and supervisors had no significant impact on long-term sickness absence. However, another study measuring long-term sickness absence indicates that quantitative demands, emotional demands, fewer opportunities for development, workplace violence, shift work, lack of career perspectives and – contradictory to prior studies – difficult social relationships (e.g. role conflicts, poor quality of leadership, low social support or a low sense of community) are associated with sickness absence of more than seven days (Slany et al., 2014).

## Impact of working conditions on well-being

The correlation between long working hours and self-rated health and subjective well-being (measured by the WHO-5) differs between country types (Artazcoz et al., 2016). For Anglophone countries, consistent associations between working hours and health status are reported for both sexes. In Continental and Southern countries, a consistent relationship between long working hours and poor health is evident only for women.

Schütte et al. (2014) also analysed the effects of work characteristics on employee well-being, operationalised with the WHO-5. The researchers included a wide range of work characteristics simultaneously and adjusted the model for covariates. Hence, it was shown that the well-being of both sexes is influenced by a wide range of job demands (quantitative demands, emotional demands, role conflict, bullying, discrimination, job insecurity and work–life imbalance) and resources (participation, development, meaning of work, role clarity, social support, quality of leadership by supervisors, sense of community and career perspectives). This is in line with another study showing that low job control, as well as high time pressure and environmental and posture-related risks, are related to poor work-related well-being measured by different indicators (Van Aerden, Moors, Levecque, & Vanroelen, 2015). In detail, job control and possibilities for development contribute substantially to explaining differences in subjective well-being (Schütte et al., 2014). Moreover, several studies confirm the importance of job control and social support with regard to work-related stress (Gonzalo, 2016). This highlights the importance of considering job demands, job control and social support when analysing the effects of demands and resources on workers' health and well-being, as suggested by the JDCS model.

## Conceptual framework for analysing health outcomes

The analysis of EWCS data in this report is guided by an integrative conceptual framework that fulfils four tasks:

- it reflects influential theories of work and employee health and well-being (JDC, JDCS, ERI and JD-R models)
- it considers empirical data captured in EWCS data
- it derives from objective working conditions (rather than individual differences in coping) to facilitate extraction of policy implications from the results
- it uses psychometric scales where possible (provided that satisfactory reliability is achieved)

This framework distinguishes between demands and resources. Demands refer to aspects of the job that require sustained physical and/or psychological effort or skills and have psychological and physiological costs (Bakker & Demerouti, 2007). Here are some examples of work demands that are captured in the EWCS.

- **Physical risks** include ambient risks (exposure to loud noise; working at unusual temperatures), biochemical risks (exposure to smoke, fumes or vapours; handling of chemical products or infectious materials) and posture-related risks (working in tiring or painful positions; moving people or heavy loads).
- **Quantitative demands** include aspects of work intensity (working at very high speed and/or to tight deadlines) as well as work extensity (hours worked per week; long workdays).
- **Emotional demands** include aspects of work where one has to handle angry clients, patients, or pupils, or work in emotionally disturbing situations.
- **Social demands** include exposure to various adverse social conditions characterised by humiliating, abusive and/or violent behaviours (harassment or discrimination).

Resources are defined as aspects that (1) reduce job demands and/or their costs, (2) help in achieving one's work goals and/or (3) foster personal growth (Bakker & Demerouti, 2007). Here are some examples of resources at work that are captured in the EWCS.

- **Social resources** include the social support of supervisors and co-workers (provision of help and feedback) as well as recognition (for doing a good job, for instance).
- **Work resources** include job control (the opportunity for workers to make decisions about their own workflow, work methods and work speed), skill discretion (the job involving complex tasks, solving of unforeseen problems and learning new things) and participation (employees can influence decisions that are important for their work; they are consulted before objectives for their work are set).
- **Organisational resources** include organisational justice (work being distributed fairly, employees being treated fairly, and employees having trust in their management).
- **Rewards** such as career prospects and opportunities for personal development, fair pay and job security can also be considered resources at work based on the effort–reward imbalance model (Siegrist, 1996).

Previous empirical studies based on EWCS data suggest that the cumulative effect of demands and resources should be assessed jointly rather than relying on

separate analyses. On average, one-third of mental health problems that result from work can be explained by adverse working conditions, such as work intensity, shift work, long working hours and low job control (Cottini & Lucifora, 2013). The association between job demands and workers' mental states appears greater when resources and demands are controlled for simultaneously than when single psychosocial working characteristics are considered individually.

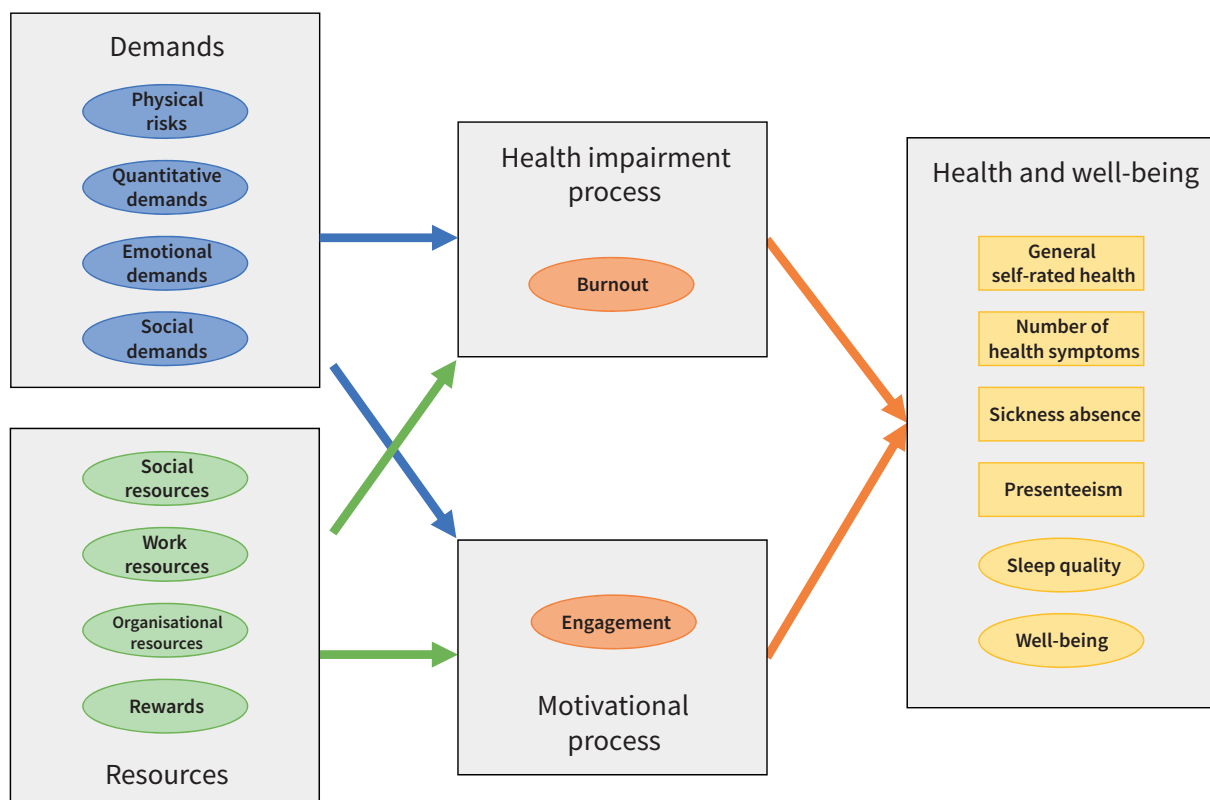
Restricted models such as the JDC, JDCS and ERI simplify interpretations by highlighting certain aspects of working conditions, but they fail to capture the complex reality of today's working world (Bakker & Demerouti, 2007). Given the richness of the data from the EWCS, the JD-R is considered a more suitable alternative here. This approach mentions 'high work pressure, an unfavourable physical environment, and emotionally demanding interactions with clients' as examples of job demands (Bakker & Demerouti, 2007, p. 312). Hence, it appears appropriate to include physical risks and quantitative and emotional demands.

In addition, social demands are shown to be relevant in other studies.

On the resources side, Bakker and Demerouti provide examples such as 'pay, career opportunities, job security ... supervisor and co-worker support, team climate ... role clarity, participation in decision making ... skill variety, task identity, task significance, autonomy, performance feedback' (2007, p. 312). Based on these examples, social resources, work resources, organisational resources and rewards may be identified as elements for the framework model.

Several health outcomes have been considered. These include: self-rated general health, number of health symptoms reported, sickness absence, presenteeism, sleep quality and well-being. Relationships of demands and resources to workers' health and well-being can be formulated – as in the dual processes of the JD-R model – through a health-impairment process as well a motivational process (see Figure 6).

Figure 6: Integrative conceptual framework (initial version)



Source: Authors' elaboration

## Box 2: Method for testing conceptual framework

In order to test the conceptual framework with EWCS data, several steps were taken. First, the framework model had to be 'operationalised' by selecting items and indices to represent the different variables within it. During this process, the variables in the framework had to be slightly adapted to obtain a well-fitted measurement model. Next, the structural part of the model was tested. This again led to some minor adaptations. Finally, the measurement model and the structural part of the model were tested for equivalence across both sexes. The results of these processes are described throughout the following text. The statistical analyses relied on structural equation modelling techniques and focused on data from the EWCS 2015 for employees in the EU28 Member States working 20 or more hours per week (for detailed information, see 'Overview of research methods' in the Annex).

### Operationalisation and testing of conceptual framework

The theoretical elements of the model can be referred to as constructs (or latent variables), as they are defined (constructed) by more than one question. It was possible to map all constructs to either single EWCS questions or indices based on multiple EWCS questions.<sup>4</sup> However, the initially selected questions and indices did not fit well.<sup>5</sup> Consequently, the measurement model had to be slightly adapted,<sup>6</sup> and certain indicators were eliminated from the model. Considerable improvements were also achieved by splitting quantitative demands into two separate constructs (work intensity and work extensity) and

combining work resources and organisational resources into a single construct. Poor correlation between the three questions selected originally for burnout suggested multidimensionality, so the health-impairment process was instead specified through a single question on exhaustion.<sup>7</sup>

After these modifications, the measurement model was reasonably in accordance with the EWCS 2015 data.<sup>8</sup> Figure 7 illustrates the adapted version of the conceptual framework model, and Table 1 provides a brief description of the items used in the final operationalisation (for additional information, refer to Tables A2 and A3 in the Annex).

<sup>4</sup> A full overview of the items and indices initially selected can be found in Table A2 in the Annex.

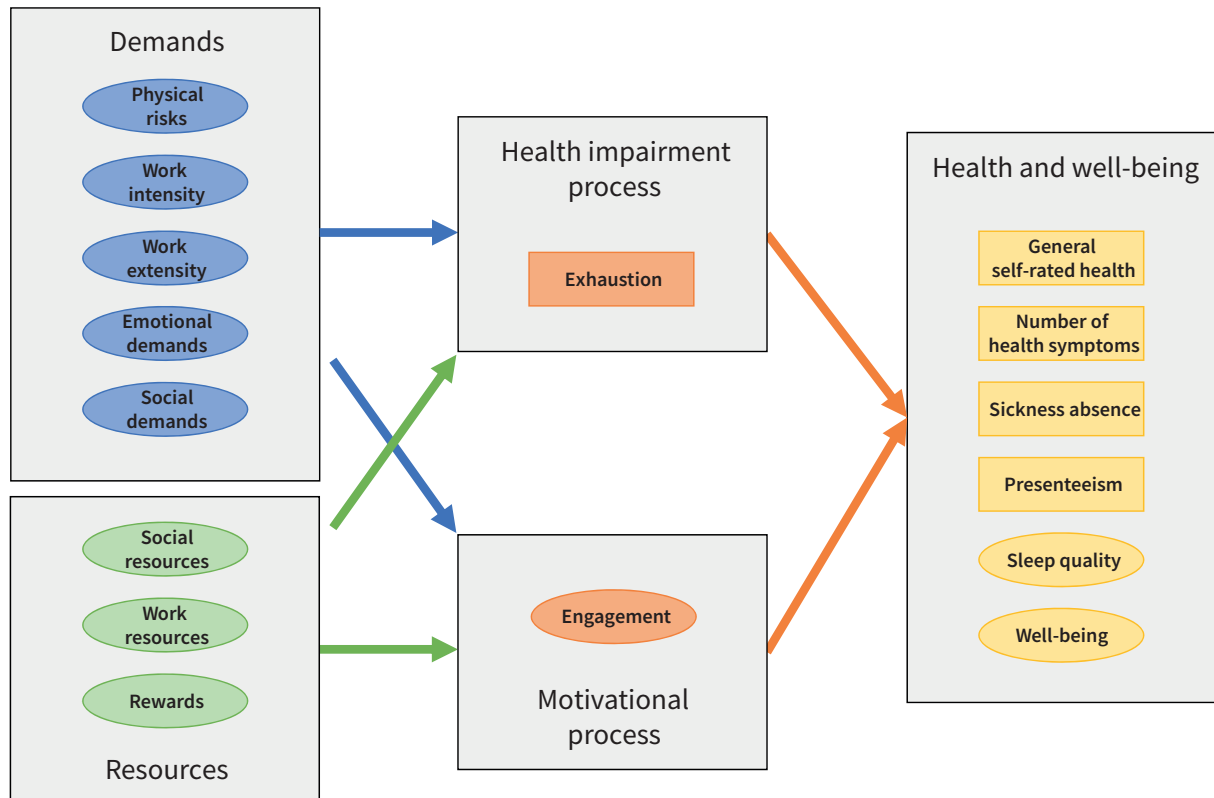
<sup>5</sup> Given the large sample size, it was not surprising that the chi-square test of model fit was significant. However, the model fit indices were not satisfactory (see Hu & Bentler, 1999). The values of the comparative fit index (CFI) and the Tucker-Lewis index (TLI) were not only below the threshold of .950 that would have indicated a good model fit, but also below the threshold of .900 that would have indicated an acceptable fit (for CFI and TLI, higher values indicate a better model fit). The root mean square error of approximation (RMSEA) missed the threshold of .050 usually considered necessary for an acceptable fit, whereas the standardised root mean square residual (SRMR) did fall below the threshold of .080 that indicates a good model fit (for RMSEA and SRMR, lower values indicate a better model fit).

<sup>6</sup> An overview of the items and indicators used in the adapted measurement model can be found in Table A3 in the Annex.

<sup>7</sup> Moreover, measurement errors were allowed to be correlated in two cases: (1) ambient risks and biochemical risks, which often occur together; (2) a sleep quality question and a well-being question that each refer to energy (either available or not available) when waking up.

<sup>8</sup> Given the large sample size, the chi-square test of model fit remained significant. However, the model fit indices were satisfactory. For an overview of fit indices, see Table A4 in the Annex.

Figure 7: Integrative conceptual framework (adapted version)



Source: Authors' elaboration

Table 1: Integrative elements of the different model components

Demands	
Physical risks	Ambient, biochemical and posture-related risks
Work intensity	Working at very high speed or to tight deadlines
Work extensity	Weekly working hours; long working days
Emotional demands	Handling angry clients and emotionally disturbing situations
Social demands	Harassment and discrimination
Resources	
Social resources	Support from colleagues; support from supervisors; recognition; justice in organisation
Work resources	Control over job; skill discretion; participation
Rewards	Fair pay; career prospects; job security
Motivational and health-impairing processes	
Exhaustion	Feeling exhausted at the end of the working day
Engagement	Full of energy (vigour); enthusiasm (dedication); time flies (absorption)
Health and well-being	
Self-rated general health	Appraisal of one's general health as 'very bad', 'bad', 'fair', 'good' or 'very good'
Number of health problems	Hearing problems, skin problems, muscular pain, backache, headaches/eye strain, injury(ies), anxiety, overall fatigue
Sickness absence	Days absent from work due to sick leave or health-related leave
Presenteeism	Days worked while sick
Sleep quality	Difficulty falling asleep, waking up during sleep, feeling of exhaustion and fatigue
Well-being	Feeling cheerful, calm, active, fresh and rested; life filled with interesting things

Note: For more detailed information, please refer to Table A3 in the Annex.

## Estimating the association between demands and resources and health

The measurement model provides the foundation for the specification of what is referred to as a structural model, which also specifies the assumed relationships between constructs (direct paths instead of assuming mutually correlated constructs are tested). As hypothesised in the conceptual framework model, a model was initially specified without direct paths from demands and resources to health and well-being outcomes. However, the initial structural model, assuming all effects to be mediated by exhaustion and engagement, was significantly less appropriate for EWCS data than the (adapted) measurement model.<sup>9</sup>

As a compromise, only selected direct effects were added to the model. Adding a direct path from social demands to health seemed particularly plausible given that social demands appeared to explain only a small fraction of exhaustion and engagement indicators (standardised coefficients below .10). Likewise, a direct path from physical risks to the number of health symptoms was included. After applying these adaptations to the structural part of the model, the level of model fit compared to the measurement model was acceptable.<sup>10</sup> The adapted structural model resembles the EWCS data almost as well as the adapted measurement model. The resulting relationships are summarised in Figure 8 (very small standardised parameters, below .10, are not shown). For further details, please refer to Tables A5 and A6 in the Annex.

All demands except social demands show a positive association with exhaustion. Exhaustion, in turn, shows the expected adverse relationships with all of the health and well-being outcomes. It should be noted that the association between exhaustion and sickness absence is positive and statistically significant (see Table A5 in the Annex). However, its effect is only small and, therefore, not displayed in Figure 8. Overall, exhaustion appears to mediate between most demands and health and well-being outcomes. Nonetheless, the presence of exhaustion may be insufficient to capture all aspects of the health-impairment process. The fact that direct paths were required indicates that exhaustion does not fully capture the adverse physiological effects of physical risks on workers, nor the adverse psychosocial effects of social demands.

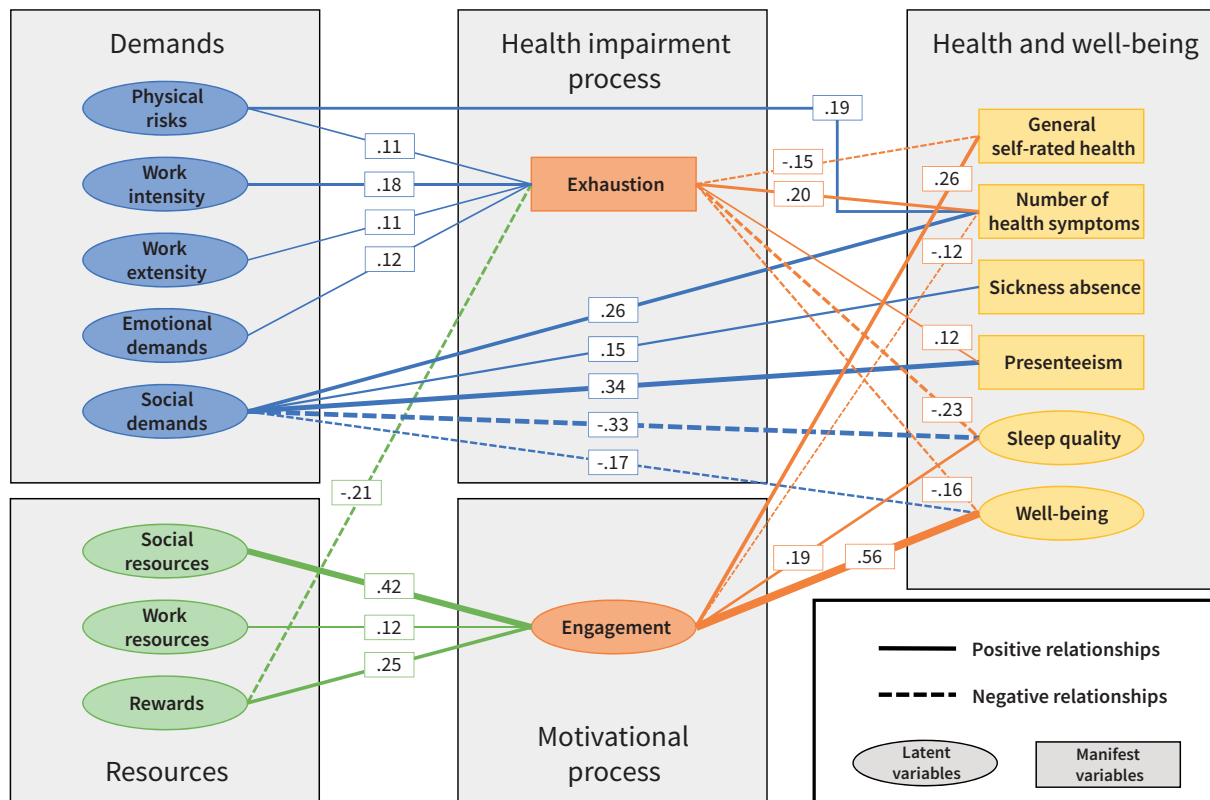
All resources exhibit a positive association with engagement. Engagement, in turn, has the postulated favourable relationships with all of the health and well-being outcomes. Although the relationships between engagement and sickness absence and presenteeism were negative and statistically significant (see Table A5 in the Annex), their effect sizes were too small to be shown in Figure 8. Overall, engagement as an indicator of the proposed motivational process linked all resources with health and well-being outcomes. It should be noted, however, that rewards has a negative association with exhaustion and that, consequently, the favourable relationships between this resource and health and well-being outcomes are explained not only through higher engagement but also through lower exhaustion.

<sup>9</sup> Usually it is decided whether the model's fit with the data is significantly less than that of the (adapted) measurement model by way of a chi-square difference test. However, this test is sensitive to sample size and thus would not lead to correct interpretations if applied to the large EWCS sample. Meaningful differences between models may be identified by way of comparing CFI values and assuming that differences below 0.010 are negligible (e.g. Cheung & Rensvold, 2002). In this case, the difference in CFI values is 0.017.

<sup>10</sup> The difference in CFI values is 0.006 – lower than for the (adapted) measurement model.



Figure 8: Associations between demands and resources and workers' health and well-being



**Note:** The thickness of the lines indicates the strength of the estimated paths. For clarity, paths with standardised estimates of an absolute value smaller than 0.10 are omitted. For additional information, see the key embedded in the figure.

**Source:** Authors' elaboration

### Validity of the model for women and men

Gender equality in the workplace is an important issue and remains relevant even as rates of women's employment continue to grow in all EU Member States (EU-OSHA, 2013). Findings from the EWCS 2010 revealed that gender gaps still persist across many aspects of the labour market. Women and men are employed in different occupations and industries, and under different contracts; their pay is often different and they spend different amounts of time on paid work (Eurofound, 2013).

Previous analyses of EWCS data also suggest that the associations between job demands and job resources, on the one hand, and health and well-being, on the other hand, could be different for female and male workers. For example, work intensity and physical risks are shown to have differential effects on physical health for women and men (Cottini, 2012b). Whereas high work intensity is more harmful for men, physical risks impair women's physical health to a greater degree. Furthermore, men's well-being seems to suffer more from jobs characterised by long working hours (more than 48 per week) and limited job control

(Cottini, 2012b). Women's well-being, on the other hand, is poorer when their jobs lack opportunities for participation (Schütte et al., 2014). With regard to health problems, low pay status (i.e. perceived unfairness regarding salary) is more detrimental for men's health, whereas women's health is more affected by bad working conditions (Cottini, 2012b). Also the effects of job demands and resources on sickness absence seem to differ: for men, low job autonomy (i.e. low skill discretion, low decision authority and low decision latitude) increases sickness absence, whereas women are more frequently absent when they experience bullying or work shifts (Niedhammer et al., 2012). No gender differences are found with regard to the effects of discrimination on physical and mental health (Cottini, 2012b).

Given differences among female and male employees reported in previous research based on EWCS data, this report systematically examines gender differences in response patterns as well as in associations between work demands, work resources and employees' health and well-being.

### Box 3: Method for multi-group analysis

Comparisons between women and men were conducted using multi-group analysis. This is typically performed in two steps. In the first step, a measurement model is assessed for use with the subgroups. This comparison tests whether the operationalisation of constructs works equally well for all subgroups. In the second step, the structural part of the model is examined to test whether associations between constructs are equally strong for subgroups. (For detailed information, see 'Overview of research methods' in the Annex.)

The assessment of the model led to the conclusion that the elements considered are equally relevant for men and women (see Table A7 in the Annex). That is, there are no gender-specific response patterns. It can also be safely assumed that the relationships between working conditions and health point in the same directions and are of a similar strength for both sexes (see Table A8 in the Annex).

From an occupational health perspective, this implies that improving working conditions will have equally positive effects for women and men. In other words, men and women fare equally well under similar working conditions. According to the model presented here, health and well-being appear to be associated with universal, gender-invariant physiological and psychological mechanisms. On a policy level, it should therefore be a priority to reduce demands and improve resources at work for women and men.<sup>11</sup>

Although associations between demands, resources and various health indicators are similar, the distribution of

these variables varies among women and men. Female employees tend to be confronted more with social demands (harassment and discrimination) and emotional demands (handling angry people and being in emotionally disturbing situations). In contrast, conventional stressors such as exposure to physical risks and high work extensity (long working days and weekly working hours) are more frequent among men (see Table 2). These results reflect primarily the unequal distribution of men and women across sectors. In general – and disregarding smaller country-specific differences within the EU28 – construction, transport, industry and agriculture are male-dominated sectors and associated with higher levels of physical risk, work intensity and work extensity (Eurofound, 2013). With the exception of the Baltic countries, women's jobs are typically in the health and social services, retail and hospitality sectors, where emotional demands are high (EU-OSHA, 2013; see also Figure 27).

**Table 2: Differences in job demands and resources, men and women**

Difference to men	
Demands	
Emotional demands	↑ ↑
Social demands	↑
Physical risks	↓
Work intensity	↓
Work extensity	↓ ↓
Resources	
Social resources	None
Rewards	None
Work resources	None

**Notes:** The table refers to employees in the EU28 Member States who work 20 or more hours per week. Based on factor scores: ↑ = higher factor score than men; ↓ = lower factor score than men. Double arrows represent particularly strong differences (exceeding 0.3).

<sup>11</sup> It is important to note, however, that the model considered here excludes issues related to work-life balance, which often imply additional demands – in particular, associated with childcare and care of elderly or sick relatives.



## Changes in job demands and resources

Job quality was rather stable in the EU15 in the period between 1995 and 2010, when measured by average skill discretion (i.e. complexity, problem-solving, use of technology, learning new things) and job control (i.e. workers having choice regarding their tasks/methods/rate of work; see Green et al., 2013).<sup>12</sup> Likewise, exposure to physical risks such as noise or high temperatures remained largely unchanged. Work intensity, captured by high working speed, tight deadlines and work dependency, increased slightly over time (Green et al., 2013; Greenan, Kalugina, & Walkowiak, 2014; Lopes, Lagoa, & Calapez, 2014). A sustainable improvement was observed for working time quality, which was reflected in declining work hours and falling rates of work at unsocial hours, such as at night (Green et al., 2013).

The Eurofound report *Trends in job quality in Europe* suggests that both working time quality and training have significantly improved (Eurofound, 2012). In contrast to these positive trends, work seems to be getting less complex and more intense, as indicated by declines in skills and discretion from 1995 to 2005 (though these were reversed in 2010) as well as increases in physical demands and work intensity (measured by pace of work and task interdependence), which increased from 1995 up to 2005 and slightly decreased in 2010. The partly divergent results could be explained by the fact that the indices used to measure trends in working conditions consisted of different variables. For instance, the index for skills and discretion was based on items focusing on opportunity to participate (applying one's own ideas at work, influencing decisions etc.) in the Eurofound report

*Convergence and divergence of job quality in Europe 1995–2010* (2015) report but not in the paper by Green et al. (2013).

A comparison of the EWCS 2015 with the 2010 and 2005 waves displays generally small and even non-significant differences over time in relationships between job demands and resources and employee health and well-being (Figure 9). Typically, differences over time in the relationship between work intensity and social resources do not exceed one percentage point. Rewards, such as fair pay and career perspectives, has improved significantly in 2015 compared to 2005 and 2010,<sup>13</sup> and jobs seem to be more secure.<sup>14</sup> Employees also report significantly more job control (over methods of work, order of tasks, speed of work and taking a break when desired). In contrast, work is significantly more emotionally demanding in 2015 compared to 2010. Only two questions on social resources can be compared for 2015 and the previous wave (as question wording and response formats changed before 2010): receiving social support from the supervisor and from co-workers. These remained practically unchanged during this period.

Improvements in job control as well as rewards suggest that work in the EU28 has become more sustainable since the global economic crisis.<sup>15</sup> At the same time, work is slightly more intense and more demanding emotionally compared to 2010, whereas social support has remained stable; this combination suggests increased psychosocial risk. Increasing the productivity of individuals and of organisations is among the essential objectives of the Europe 2020 Strategy for growth. However, the implied skill acquisition and enhanced job control still seems to be challenged by global transformations such as rising job insecurity in the aftermath of the global economic crisis.

### Box 4: Method for examining trends

In order to examine recent trends in demands and resources, data from 2005, 2010 and 2015 were analysed. This focused solely on employees in the EU28 Member States who work more than 20 hours per week. Weighting was used to provide representative results. The items used were, as far as was possible, identical over the years; however, in some cases, question wording or response format changed slightly (for detailed information, see 'Overview of research methods' in the Annex).

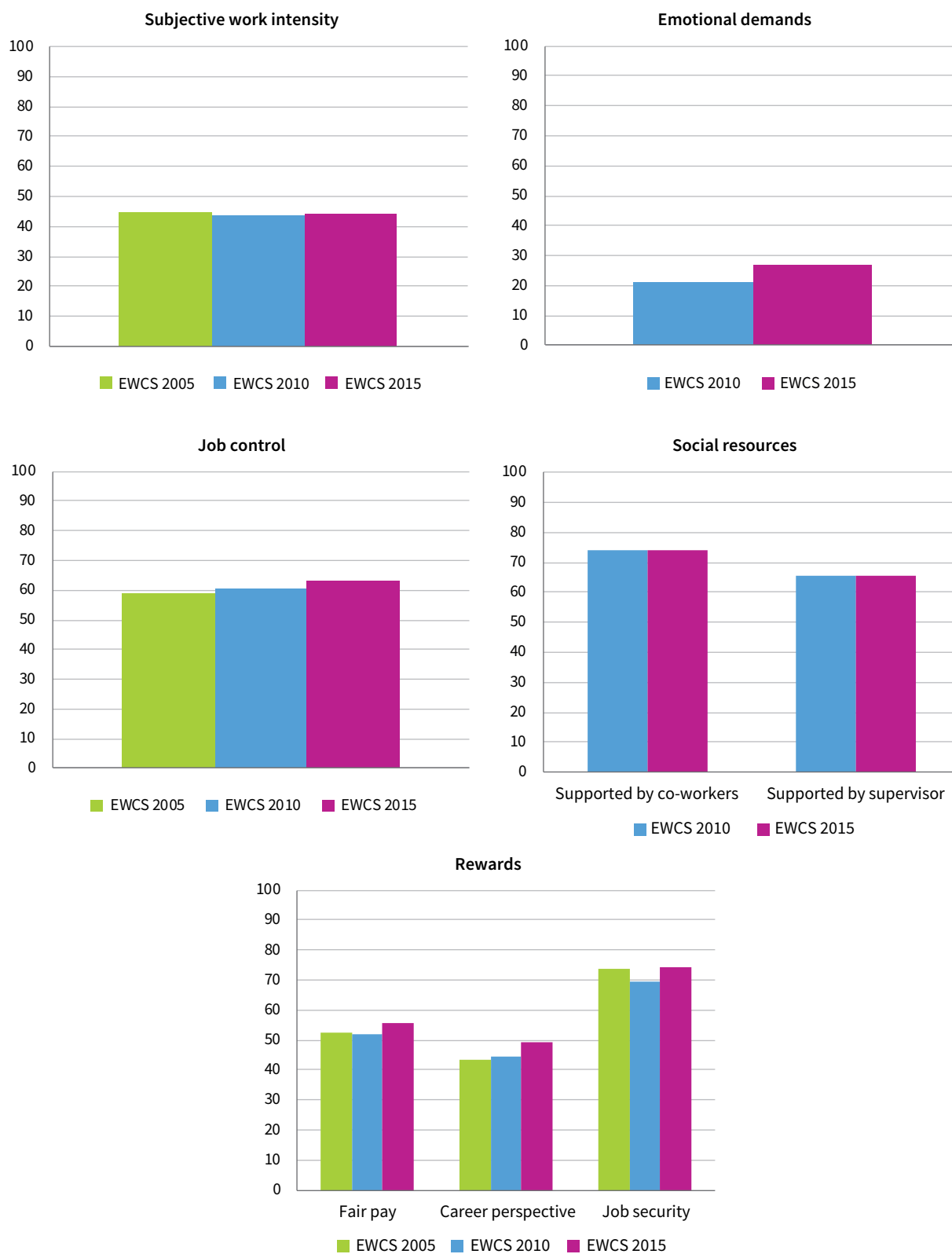
<sup>12</sup> The EU15 comprises those countries that were EU Member States prior to the accession of the 10 then-candidate countries in 2004.

<sup>13</sup> This may partly reflect changes in questions and response formats.

<sup>14</sup> A significant change from 2010 to 2015 may reflect changes in the response format.

<sup>15</sup> 'Sustainable' in the sense that working conditions support people in engaging and remaining in work throughout an extended working life.

Figure 9: Trends in selected work demands and resources (%)



**Note:** Percentages are of employees working at least 20 hours per week.

## Summary

The integration of various theoretical models (such as the JDC, the JDCS and the ERI) seems to reflect the complex realities of employees' working conditions and their links to health and well-being rather well. All demands and resources considered in the model developed on basis of the EWCS 2015 data shows direct and/or indirect associations with the health indicators considered. Furthermore, work-related well-being as reflected in employee exhaustion and engagement partly explains how well-designed jobs – characterised by high rewards, high work and social resources and suitable levels of demands – translate into better health. Whereas job demands are linked to higher levels of exhaustion (which, in turn, are related to poorer health), job resources are associated with higher levels of work engagement (which, in turn, are related to better health and well-being).

There are interesting findings with regard to social demands and physical risks. They seem to exert their negative effects on health via mechanisms that were not, or only partly, captured in the model. As social

demands have only an indirect relation to health indicators, they seem neither to deplete employees' energy resources nor to impair employee motivation. It is conceivable that they might impair employees' affect. Being confronted with harassment or violent behaviour at work may spark negative emotions such as anger or anxiety, which are related to poorer health and well-being in the medium to long term (Cantisano, Domínguez, & Depolo, 2008). Physical risks, although related to exhaustion, may exert their negative effects on health via additional physiological processes not specified in the model. In summary, by showing that physical risks and social demands have a direct association with health and well-being indicators, the analysis indicates that exhaustion does not fully capture the adverse physiological effects of working conditions.

The model developed on the basis of EWCS data is equally relevant for men and women. Consequently, it can be assumed, on the basis of the model constructed, that women's and men's health and well-being are determined by the same job demands and resources, and through the same psychological and physiological processes.



# 3 Risk factors for poor health and well-being

Poor health and well-being is associated with certain working conditions, notably those demands and resources in the model described in the previous chapters. A comparison of how groups of workers score on those demands and resources can therefore reveal health risks which are shared collectively by broader groups of workers. Personal characteristics, such as age, life stage or sex, can be distinguished from job-related characteristics, such as occupation, sector or workplace size. Finally, organisational aspects may be identified by job security, exposure to restructuring, workers' representation or working time arrangements (see Table A9 in the Annex for a detailed description).

## Personal characteristics

Overall, job demands and resources are more similar across personal characteristics than job-specific characteristics. This confirms the assumption that workers' health is partly job specific and generally not a purely personal matter.

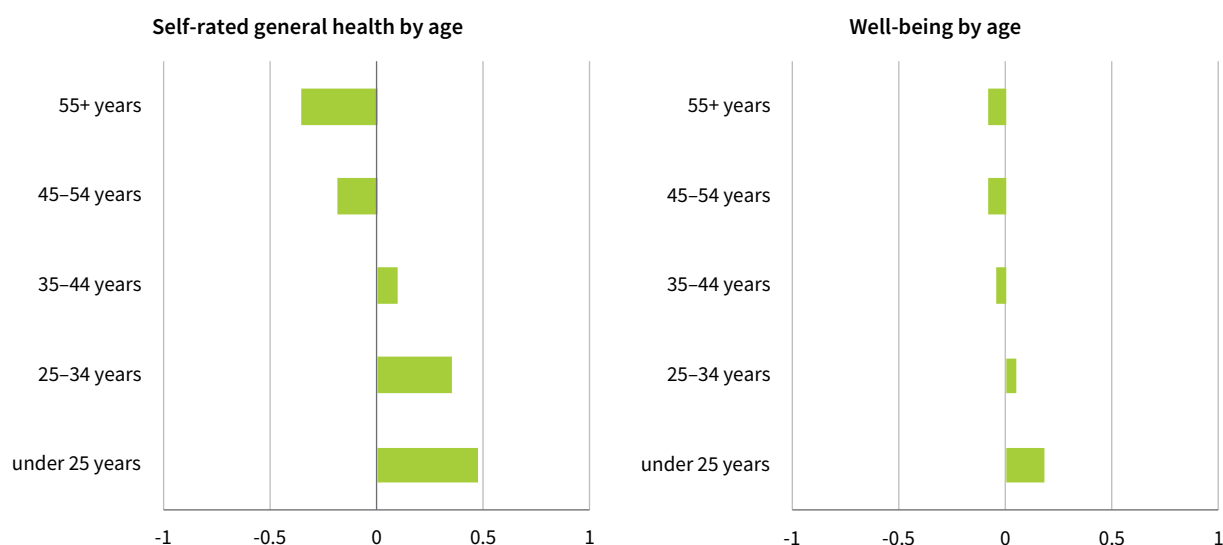
### Impact of age

As expected, workers under 25 report better health and enjoy better well-being than older workers (see Figure 10). However, they are also facing more physical risks and more pressure from high work intensity than older workers. Given the work resources available to them, younger workers' opportunities to shape their own work are limited. At the same time, younger workers score considerably above average on social resources and rewards, while their exposure to work extensity and social and emotional demands is clearly below average (see Figure 11).

## Box 5: Method for factor scores

The model of demands and resources can be used to calculate factor scores for each individual. These scores represent an index which combines the information from several questions into one number. Indicators based on a single question are transformed in a similar fashion with scores expressed in standard deviations from mean zero instead of the original response format (see Table A9 in the Annex). As some demands and resources are more dispersed than others, this standardisation ensures that the scale is comparable for all variables. On average, scores are zero.<sup>16</sup> Groups with a negative score are below the total average. About two-thirds of all scores can be expected to be in an interval from -1 to 1. Scores which differ by two standard deviations occur only very rarely, which means that large groups will usually be found close to the average. Given the sample size of the EWCS, almost all differences are statistically significant, and it is useful to highlight those risk groups placed furthest away from the horizontal axis in the graphs shown. For consistency, only results for employees working 20 hours or more per week in the EU28 are presented, with population weights applied accordingly.

<sup>16</sup> As standardisation has been applied to unweighted factor scores, weighted means are not exactly zero.

**Figure 10: Self-rated general health and well-being by age group**

**Note:** Figures 10–36 present standardised scores. Mean = 0; standard deviation = 1.

General health is rated lower with age (see Figure 10) even though demands among workers above 55 are below average (Figure 11). It is unclear, however, if older workers are perhaps often spared from certain job demands because of a health condition. What is clear is that older workers' scores in terms of rewards are slightly below average.

### Job demands on parents

The variation of health status across different life stages mirrors the pattern observed with age (Figure 12). Although life stage appears somewhat more relevant than chronological age, exposure to job demands and access to job resources are still relatively independent of the individual's living situation (Figure 13). This result

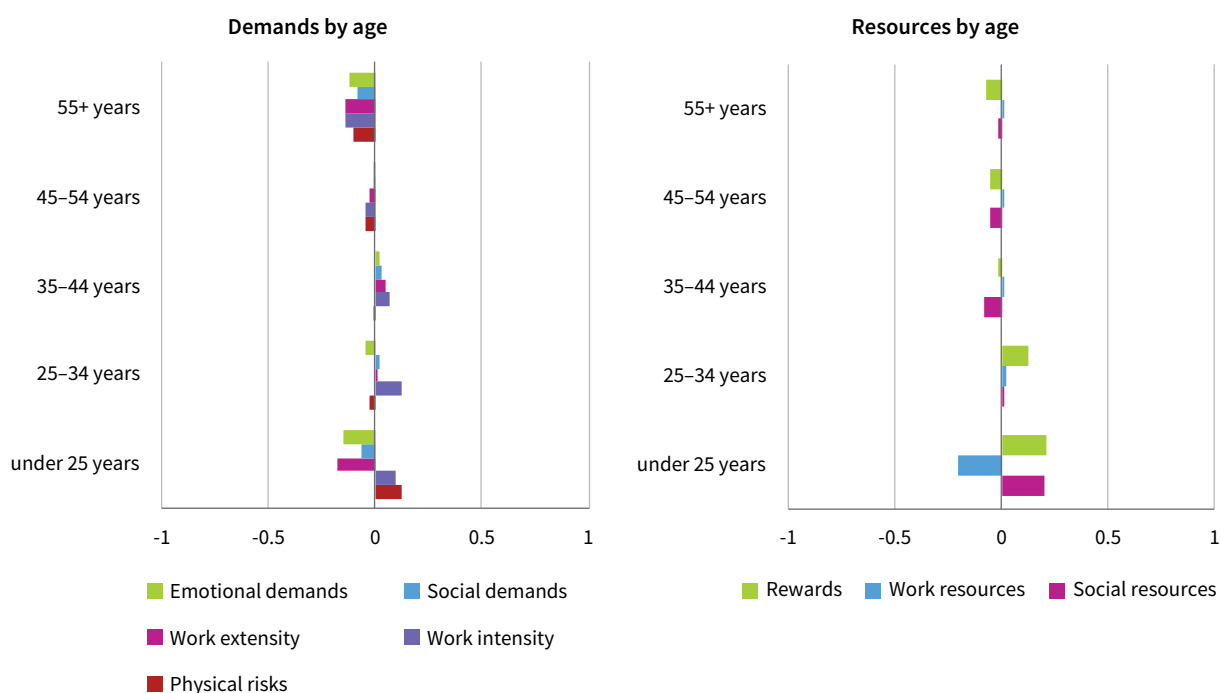
**Figure 11: Job demands and resources by age group**

Figure 12: Self-rated general health by life stage

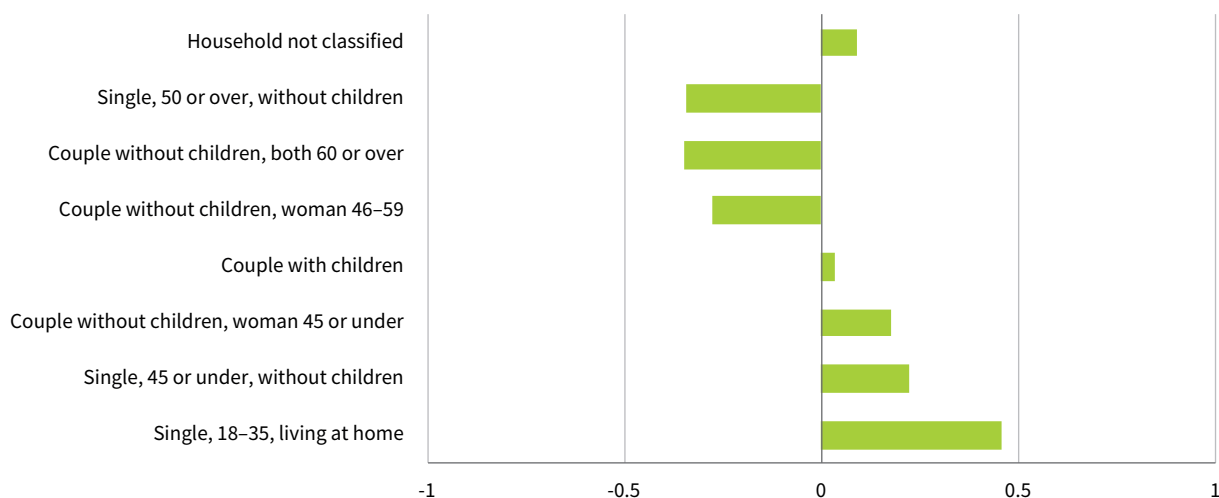
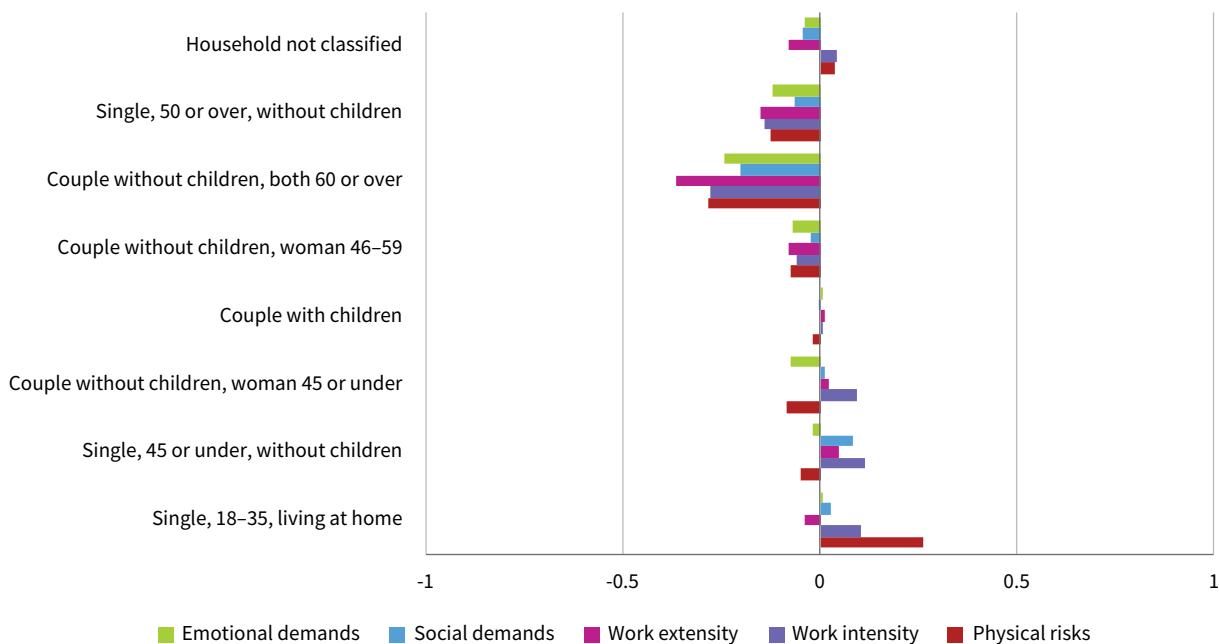


Figure 13: Job demands by life stage



confirms that the definition of job demands successfully distinguishes job-related from family-related determinants of workers' health and well-being. In particular, parents with children have to meet just the same job demands as workers living in households without children. However, working parents are simultaneously confronted with considerable demands from additional unpaid work related to care. For example, among couples whose youngest child is under seven, the additional unpaid work amounts to 19 hours for men and 39 hours for women on average per week (Eurofound, 2017, p. 117).

## Job characteristics

When looking for groups of workers that might deserve particular attention because they are more likely to be at risk of poorer health and well-being given their exposure to certain job demands and resources, it is important to take into consideration job characteristics such as occupational group, job (in)security, type of employment contract and working time arrangements. These aspects are analysed in more detail next.

Figure 14: Self-rated general health by occupational group



### Low-skilled occupations

The existence of occupational differences in health outcomes has been known for a long time (Caplan, Cobb, French, Van Harrison, & Pinneau, 1975). Results from the EWCS confirm that poor health outcomes are more frequent in occupations that do not require higher skill levels (see Figure 14).

Lower ranks in the skills hierarchy of occupations are especially prone to physical risks at work, but also less favourable educational, economic and job opportunities. They often have unhealthy lifestyles including smoking, alcohol consumption and having a high body mass index (Marmot, 2005; Rosengren, Wedel, & Wilhelmsen, 1988; Tenkanen, Sjöblom, Kalimo, Alikoski, & Härmä, 1997).

Interestingly, a 'skills effect' can be observed with regard to engagement (see Figure 15), implying that unskilled occupations have lower levels of engagement. This is consistent with limited job control, skill discretion and participation among unskilled occupations. Elementary occupations also show the highest levels of exhaustion.

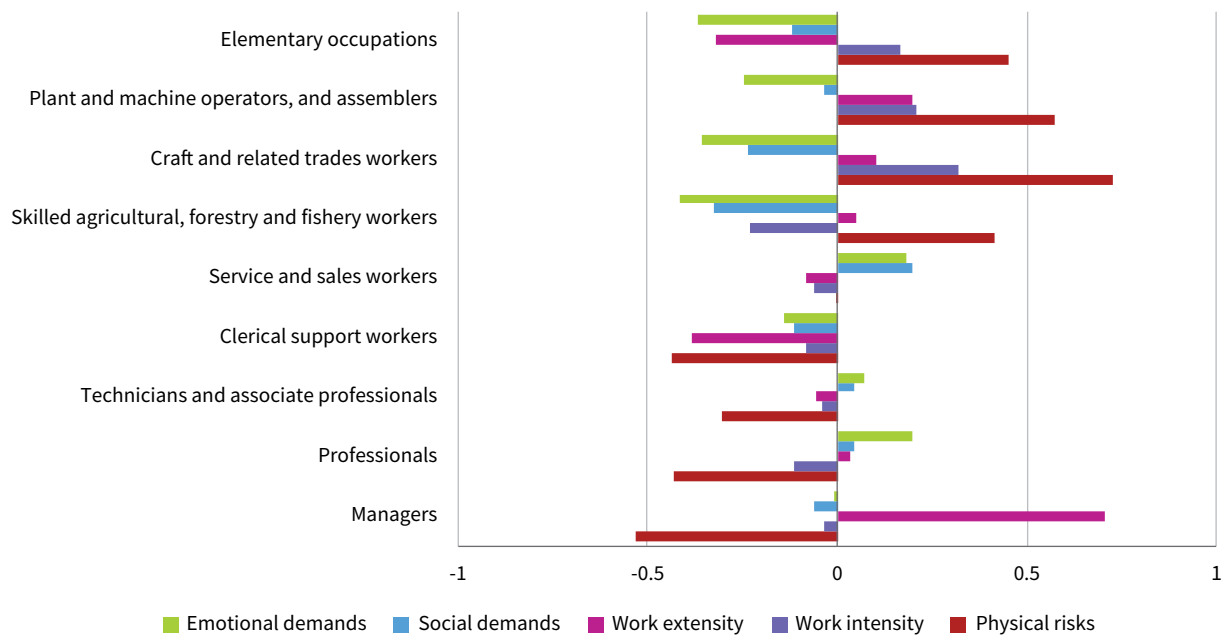
Craft and related trade workers report the highest physical risks, while managers seem hardly affected (Figure 16). On the other hand, managers appear as a clear risk group when work extensity is concerned, reflecting the long hours of work reported by this group. Professionals as well as service and sales workers report higher emotional demands, such as handling angry clients and being exposed to disturbing situations, whereas employees from all other occupations are less exposed to emotional demands.

Figure 15: Engagement and exhaustion by occupational group





Figure 16: Job demands by occupational group



As Figure 17 shows, job resources are also unevenly distributed among occupational groups. Workers in elementary occupations – along with plant and machine operators, and assemblers – are the least

resourced. In contrast, managers fare best in all three elements – rewards, work resources, and social resources.

Figure 17: Job resources by occupational group



## Job security and insecurity

Job insecurity can be defined as the subjectively experienced threat of involuntary job loss (Cheng & Chan, 2008). According to the EWCS 2015, the majority of employees perceive their job as secure. However, around 10% agree or strongly agree that they might lose their job within the next six months. The analysis shows that the possibility of losing their job coincides with less favourable job demands (see Figure 18). Employees reporting their job as insecure, for instance, also report levels of work intensity and physical risk higher than those who feel their job is secure. Differences with

regard to resources are especially visible.<sup>17</sup> Employees experiencing high job insecurity have fewer social as well as work-related resources. This means that these employees face greater job insecurity, have fewer possibilities to participate, are less supported by their supervisors and colleagues, have less control over their work and have less skill variety in their jobs.

Even if job insecurity does not necessarily imply that employees will lose their jobs, research shows that high levels of perceived job insecurity have detrimental consequences for employees' health and well-being (Cheng & Chan, 2008; Sverke, Hellgren, & Näswall, 2002).

Figure 18: Job demands and resources by job insecurity

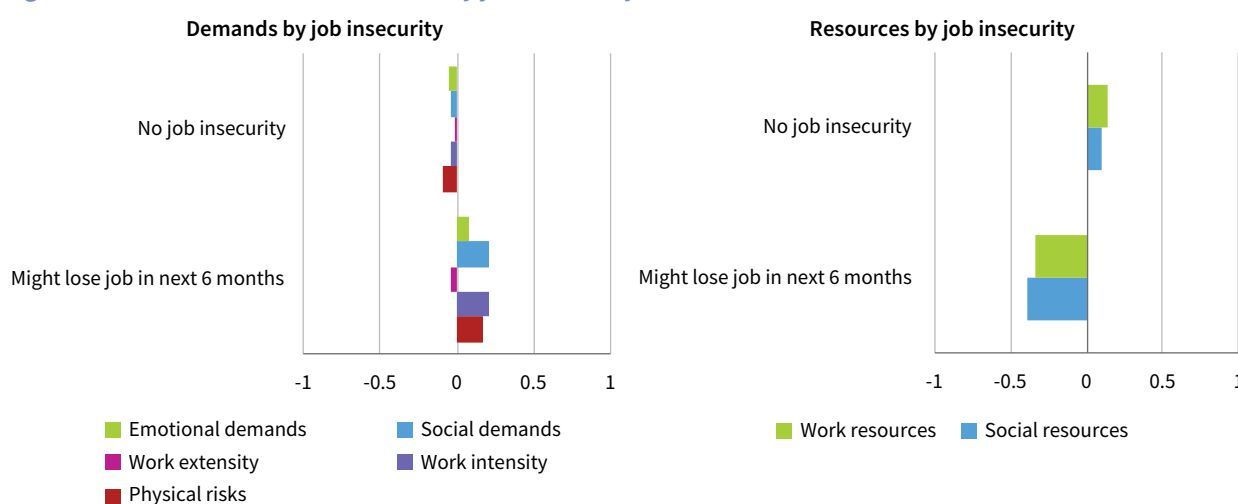
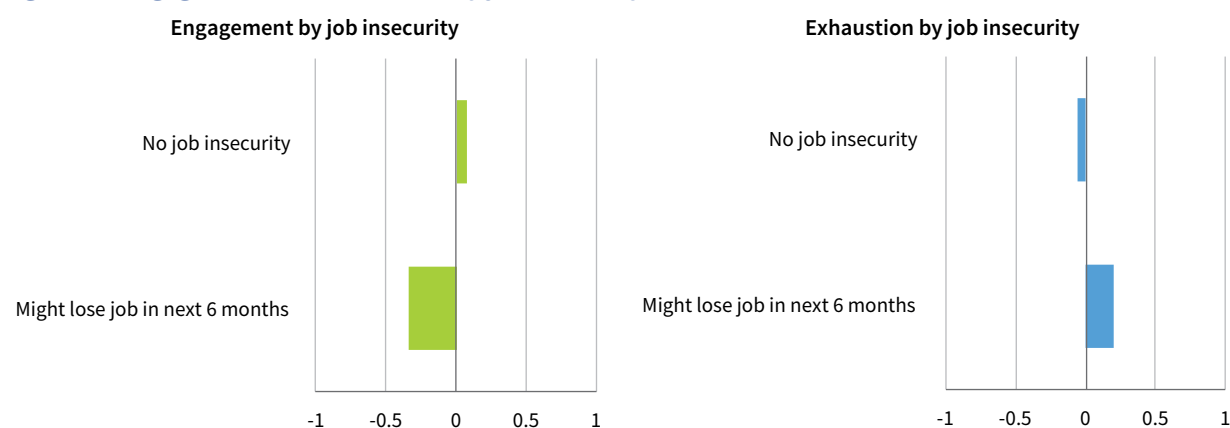


Figure 19: Engagement and exhaustion by job insecurity



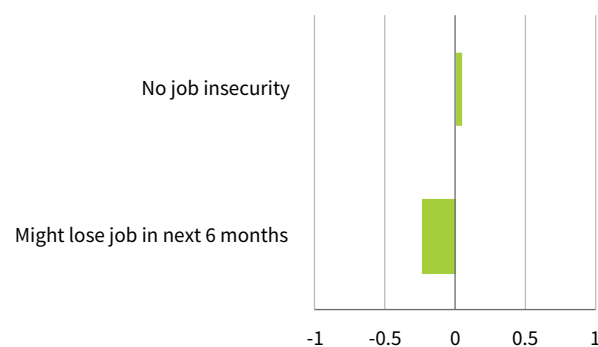
<sup>17</sup> Rewards cannot be reported, since a secure job (variable y15\_q89g) is part of the reward scale.

Analysis of the EWCS 2015 indicates that employees perceiving their job as less secure also feel slightly more exhausted and slightly less engaged, and generally report lower than average well-being (see Figures 19 and 20). Those employees also report that their quality of sleep as well as their general health is slightly worse than employees who report their jobs as being secure (see Figure 21). Workers who are exposed to job insecurity may hence be identified as another risk group.

### Employment contract

Temporary employment is often defined as precarious employment and captured as an objective form of job insecurity (Pearce, 1998). Employees with a temporary contract have consistently greater job insecurity (De Witte & Näswall, 2003). Although effects are relatively small in the EWCS 2015, results suggest that employees with fixed-term contracts have greater work intensity, more physical risks and less access to social

Figure 20: Well-being by job insecurity



resources, work resources and rewards than employees with indefinite contracts (see Figure 22). Employees with no contract or other type of contract report higher physical risks, and their jobs offer lower levels of social resources and work resources, and less in the way of rewards.

Figure 21: Sleep quality and self-rated general health by job insecurity

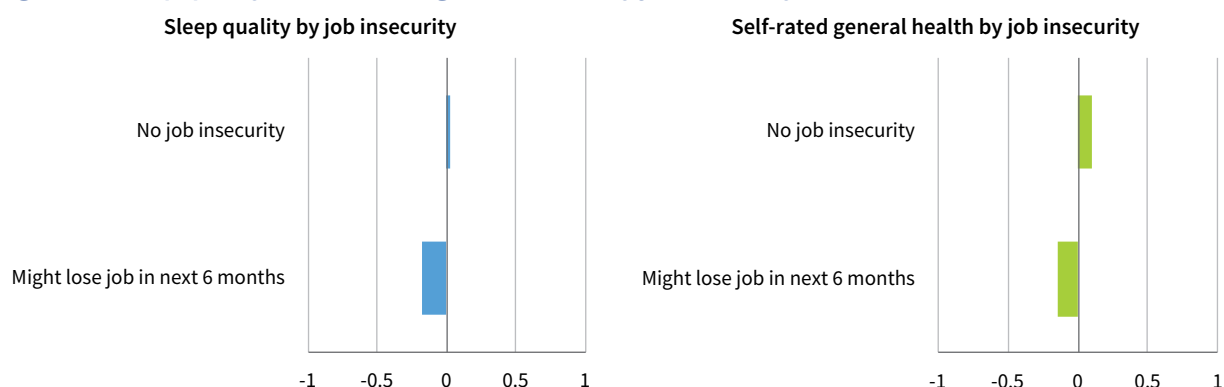
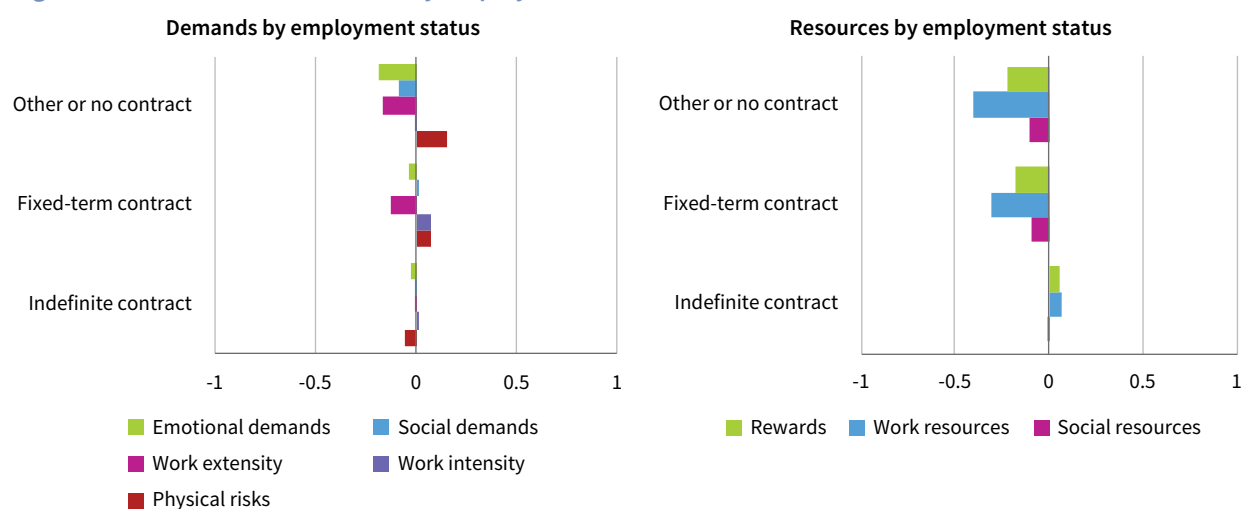


Figure 22: Demands and resources by employment status



## Working time demands

In the EU, duration and organisation of working time is regulated according to the Working Time Directive in order to ensure minimum safety and health requirements (Council of the European Union, 2003). Also at national, sectoral and company levels, social partners' collective bargaining constitutes an important determinant of working time, as do negotiations at the individual level (Eurofound, 2016).

Working time demands imply significant differences with regard to health and well-being as well as other work demands and resources. High working time demands can be defined by the following:

- working days of at least 10 hours in duration
- low working time regularity (different number of working hours every day and/or week as well as varying starting and finishing times)

- working at night
- working on weekends
- low working time predictability (employees not knowing in advance when or how much they will work)

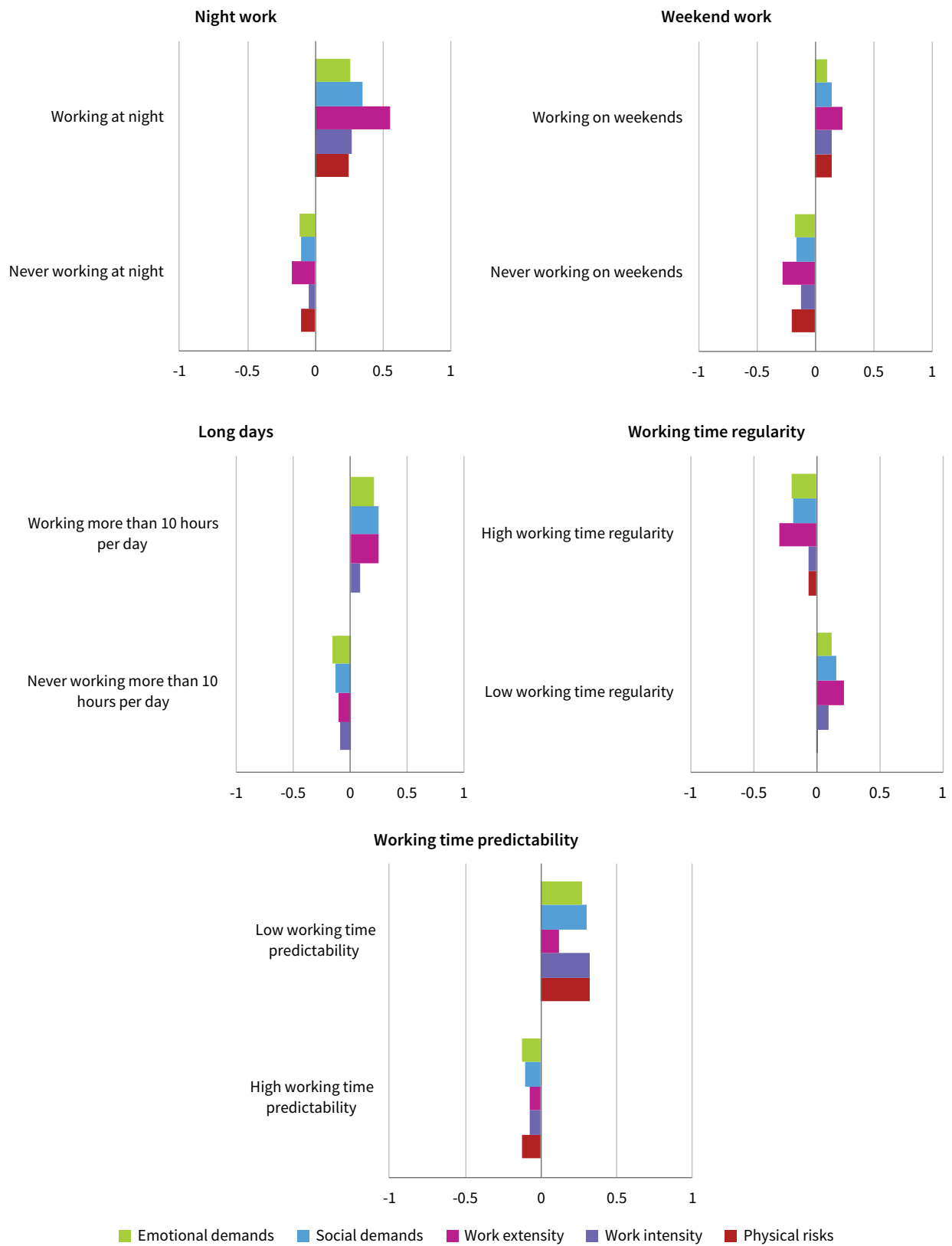
Such demands have implications for employees' health. For instance, a meta-analytical review shows that long hours are positively associated with physiological and psychological health issues (Sparks, Cooper, Fried, & Shirom, 1997).

Results show that employees facing high working time demands also face significantly higher physical risks and work intensity and extensity, as well as greater emotional and social work demands (Figure 23).<sup>18</sup>

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<sup>18</sup> Since the work demand 'work extensity' is defined by working time, the working time-specific group differences with regard to work extensity are not reported when looking at long days in Figure 23.

Figure 23: Demands by different aspects of working time demands



Looking at resources, the associations are diverse and small in size (Figure 24). Employees that work at night, work on weekends or have less working time predictability report slightly fewer social resources (social support, recognition and justice) and work resources, as well as fewer rewards. In other words, they assess their

career prospects as lower, their wages as more unfair and their job as more insecure than do workers with greater working time predictability and workers who do not work at nights or on weekends. In contrast, working long days is associated with more work resources such as job control, participation and skill variety.

Figure 24: Resources by different aspects of working time demands

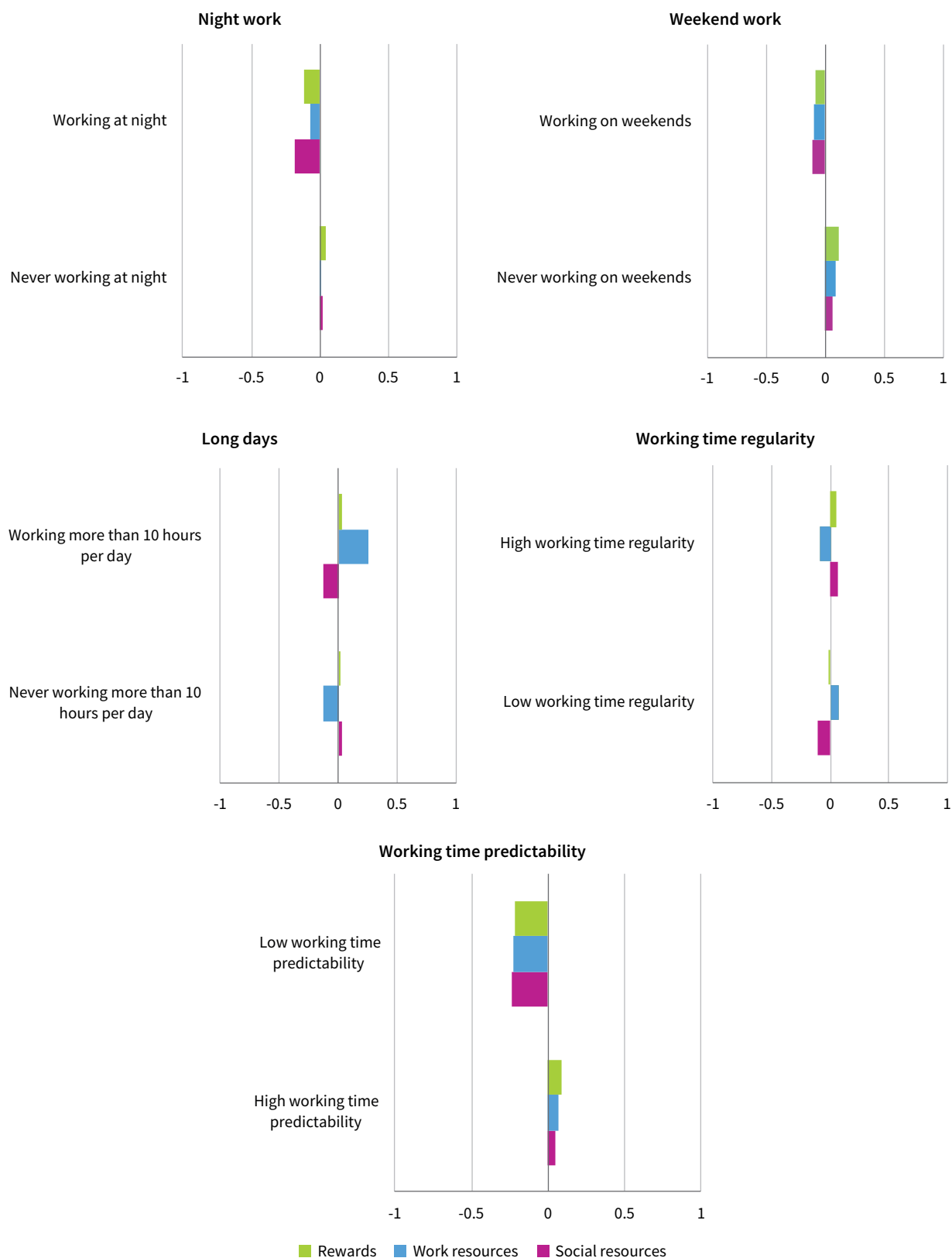
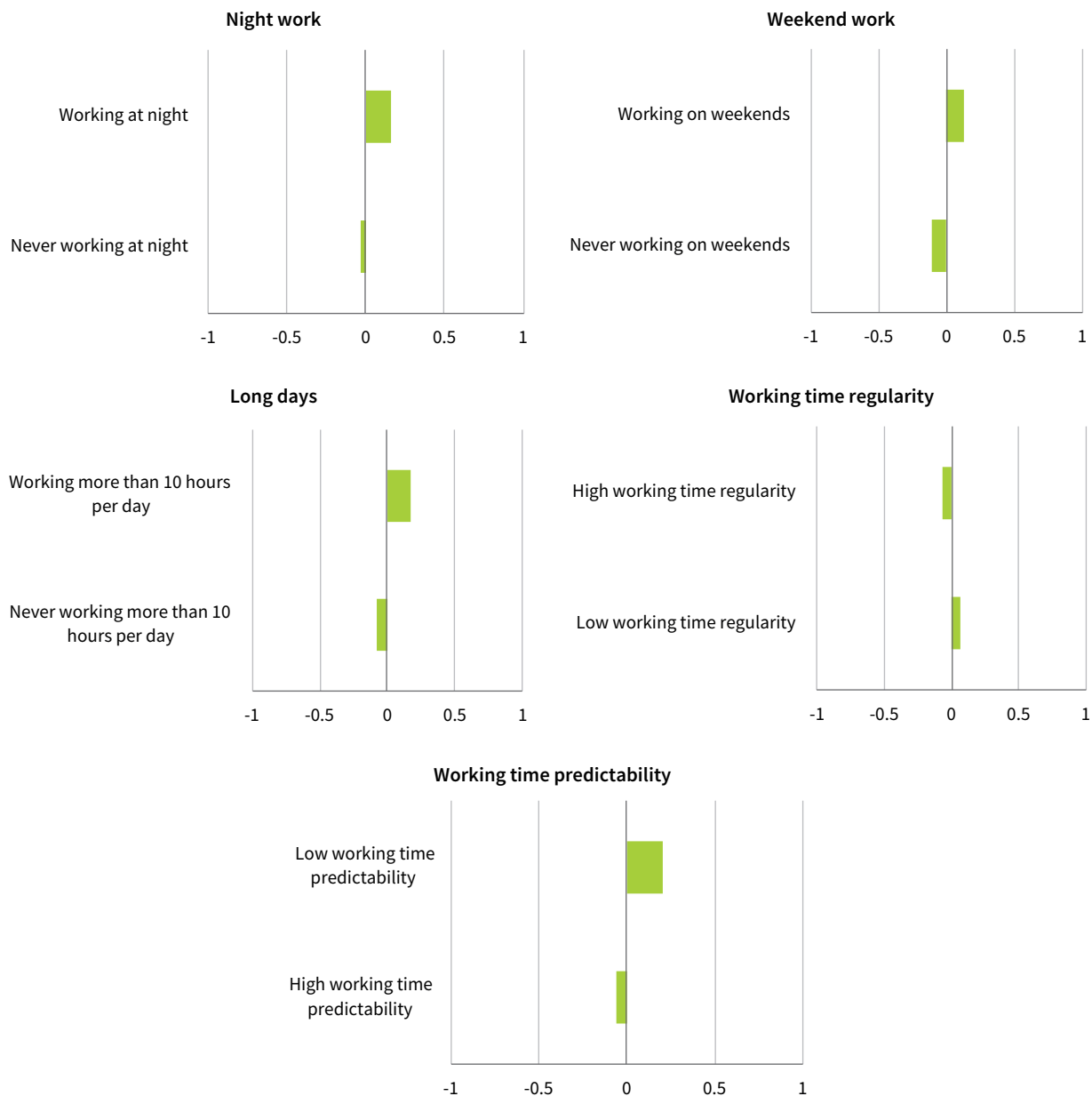


Figure 25: Exhaustion by different aspects of working time demands

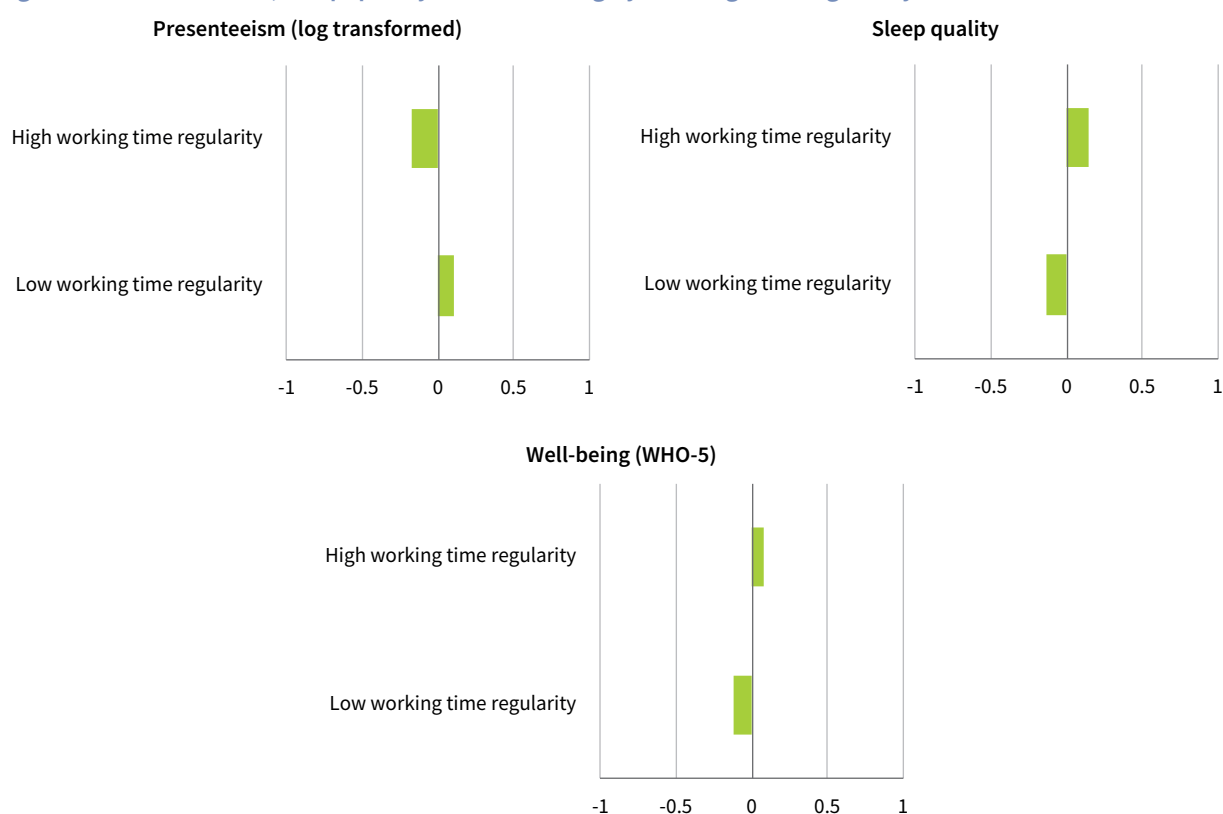


All working time demands are slightly but significantly related to increased exhaustion (see Figure 25).

Regarding workers' health and well-being, lower working time regularity is related to more presenteeism, poorer sleep quality and poorer subjective well-being, as indicated by the WHO-5, although there are only weak statistical associations between the variables (Figure 26). A previous Eurofound report, *Working time patterns for sustainable work*, explored the issue using data from the EWCS 2015; it showed that workers'

control over their working time, as well as regular working times, has a positive impact on workers' well-being. It also found that atypical working hours (such as shift, night or weekend work) and long working hours are not necessarily negatively related to workers' well-being. It has been suggested that workers with high job control may choose long and atypical working times for themselves; such working time arrangements are detrimental for a good work-life balance but not for workers' well-being directly (Eurofound, 2017).

Figure 26: Presenteeism, sleep quality and well-being by working time regularity



With respect to working time issues and workers' general health, health problems and sickness absence, the results are ambiguous. Long working days, limited working time regularity and weekend work, for instance, are associated with a slightly higher number of reported health problems. However, the differences with regard to self-rated general health or sickness absence are very small in size (even if in the right direction). High levels of predictability and of night work are related to slightly better self-rated general health and fewer health symptoms, and differences regarding sickness absence are weaker once again. Other research is in line with those results, showing, for instance, that the relationship between working time issues and sickness absence is inconclusive (Bernstrøm & Houkes, 2018). The authors see possible explanations in the healthy worker selection effect, as well as in differences in job characteristics and in job motivation. In contrast, the associations between unpredictable working hours and long working hours and poorer health, poorer well-being and poorer sleep quality are rather uniform and unequivocal, even if the effect sizes are very small (Ganster, Rosen, & Fisher, 2018; Scholarios, Hesselgreaves, & Pratt, 2017).

## Organisational characteristics

A number of organisational characteristics are associated with particular risk to workers of experiencing poor health and well-being; they affect both the job demands workers are exposed to and the resources at their disposal. These characteristics include sector of activity, workplace size, extent of worker representation and participation, and exposure to restructuring or reorganisation.

### Sector of economic activity

Health outcomes and exhaustion show almost no differences by sector of economic activity. Nonetheless, different sectors are associated with specific demands (Figure 27). Employees in the health sector are particularly exposed to emotional and social demands, while the construction sector is characterised by increased physical risk, work intensity and work extensity. While in the health sector increased demands may be partly compensated by above-average work resources, access to resources for construction workers is average (Figure 28). It is also important to note that workers in the industry and transport sectors have poorer access to resources and score correspondingly low on work engagement (Figure 29).



Figure 27: Job demands by sector of activity

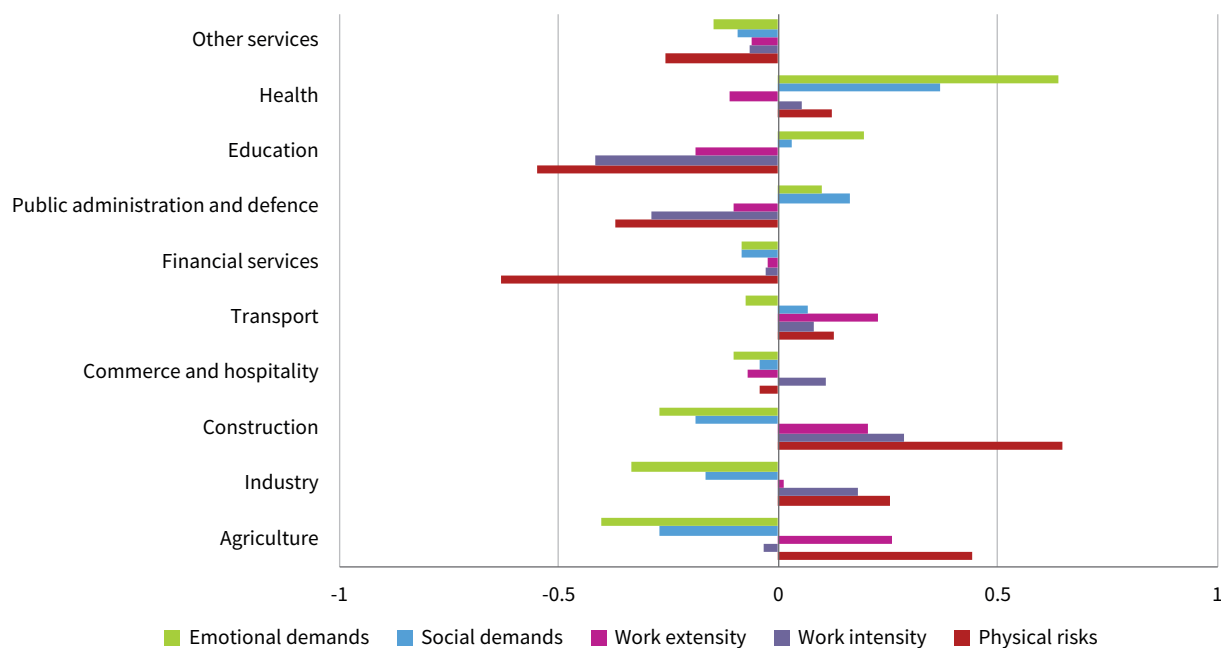


Figure 28: Job resources by sector of activity

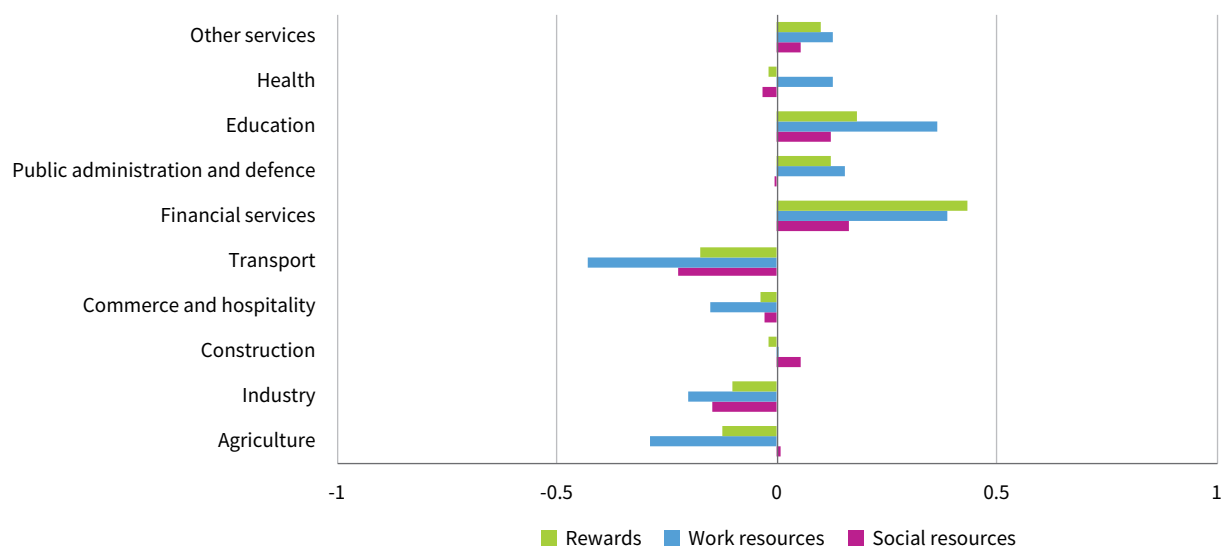


Figure 29: Engagement by sector of activity

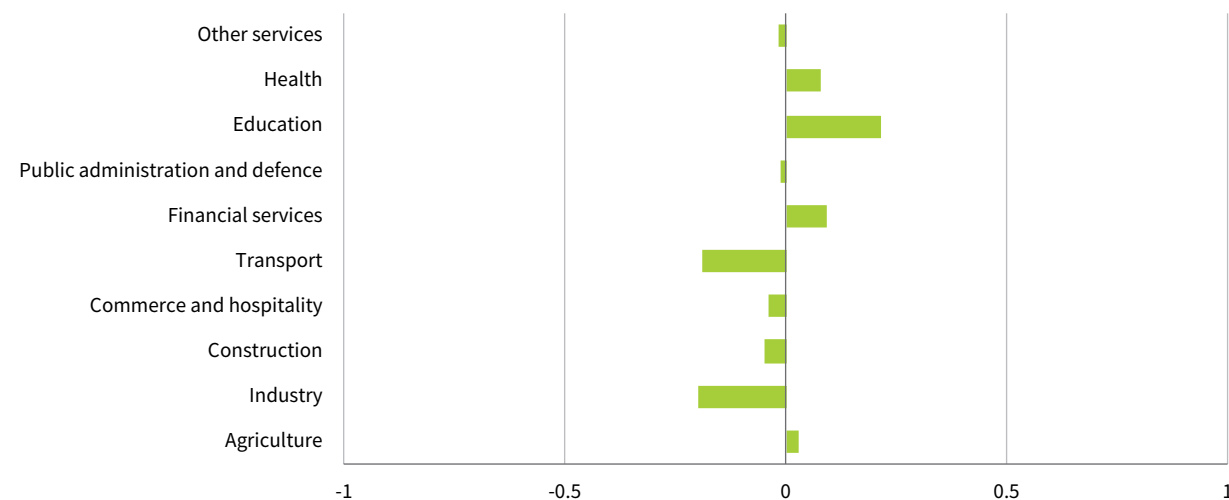
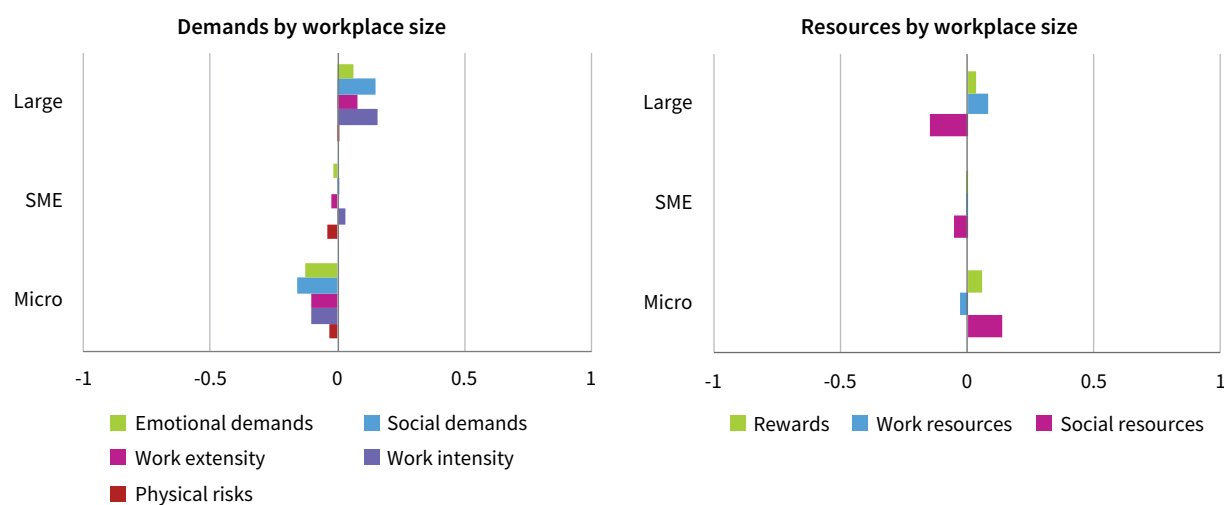


Figure 30: Job demands and resources by workplace size



## Workplace size

Workplace size as an organisational characteristic seems to be a weaker indicator for specific risk groups. Employees working in large enterprises (with 250 or more employees) report more demands than those in small and medium-sized enterprises (10–249 employees) and micro enterprises (1–9 employees); however, differences between groups are relatively small (see Figure 30).

## Worker representation

The EWCS collects information on existing formalised employee representation in the workplace, such as works councils, trade union representatives, and health and safety committees. In addition, workers are asked

whether regular meetings are held in which they can express their views about what is happening in their organisations.

Overall, results show very little association between representation mechanisms and demands, resources and health or well-being. The existence of a health and safety committee does appear to be associated with slightly better work resources (job control, skill discretion and participation), but also slightly above-average job demands (see Figure 31).

When workers are asked whether they have regular meetings in which they can express their views, this yields a similar pattern: workers who cannot make themselves heard tend to have less in the way of

Figure 31: Job demands and resources by type of employee representation

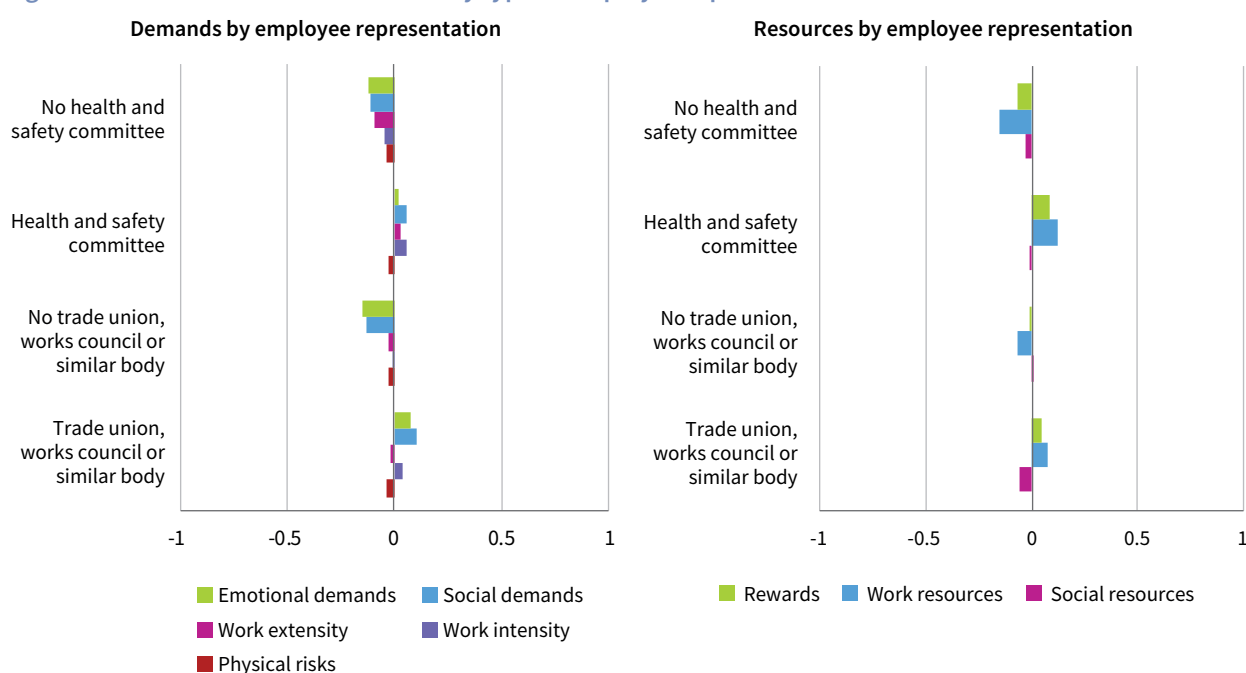
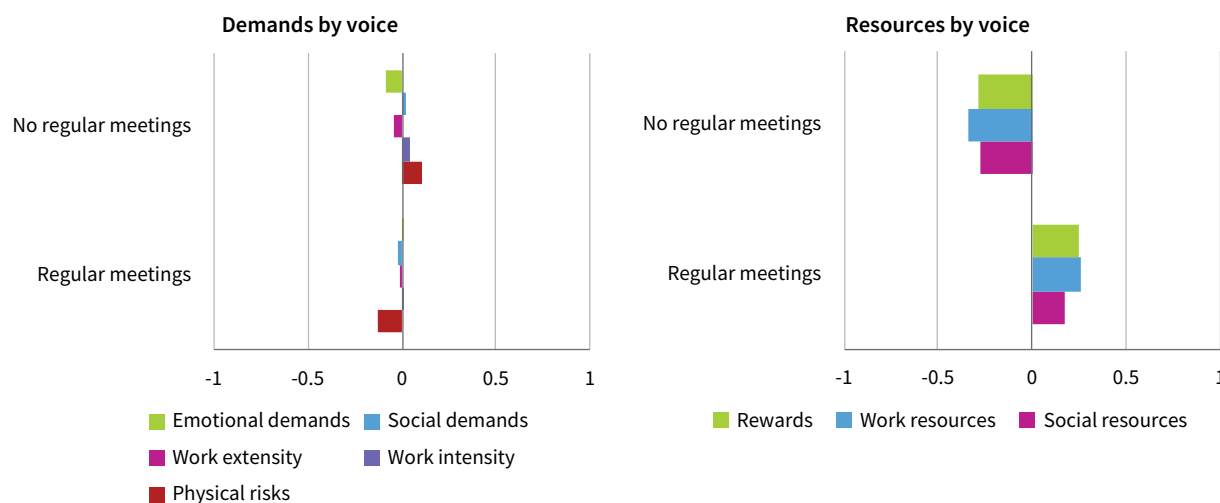


Figure 32: Job demands and resources by degree of employee voice



rewards, fewer social resources and fewer work resources (see Figure 32). In line with the model used, employees with a voice are also more engaged and report slightly better well-being than employees without access to regular meetings.

### Restructuring

Organisational downsizing is associated with changes in work characteristics such as increased physical risks, less skill discretion and fewer possibilities for participation (Kivimäki, Vahtera, Pentti, & Ferrie, 2000).

In the EWCS 2015, employees who report downsizing in their workplace (defined as a reduction in the number of employees at the workplace during the three years prior to the survey) are also exposed to slightly more physical risks and greater work intensity (see Figure 33). At the same time, downsizing seems to have a significant impact on job resources, especially co-worker/supervisor support, recognition and organisational justice, as aspects of social resources and rewards seem to suffer incrementally as the reduction in employees in the workplace increases (see Figure 34).

Figure 33: Job demands by change in number of employees in the workplace

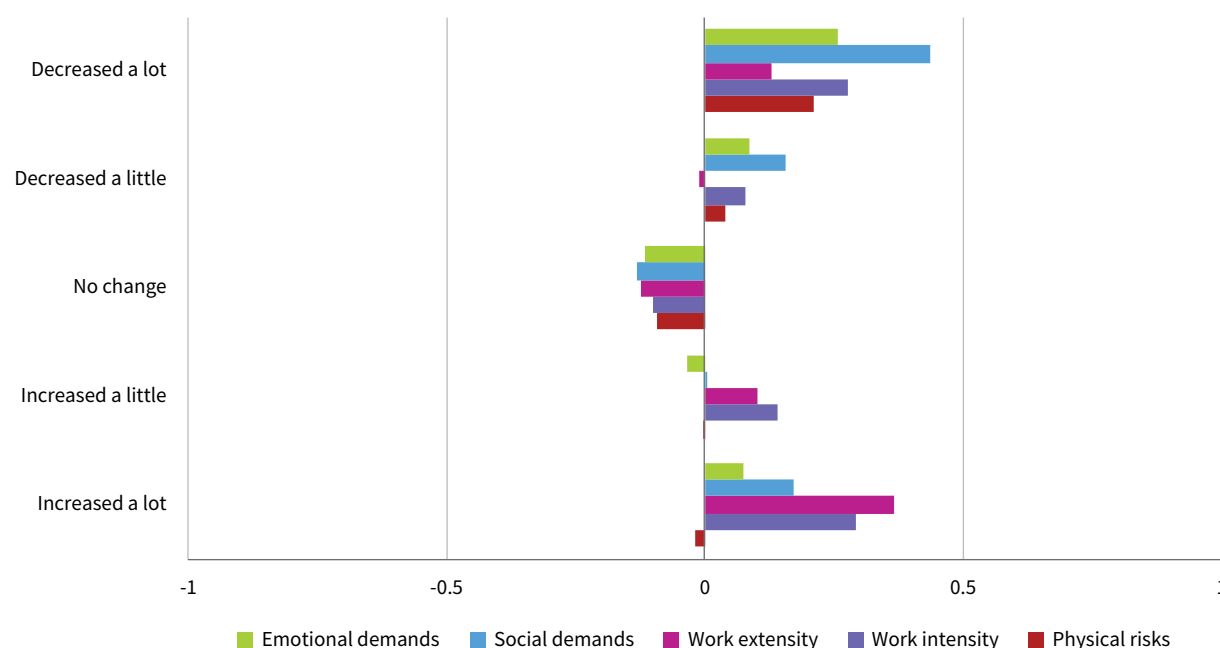
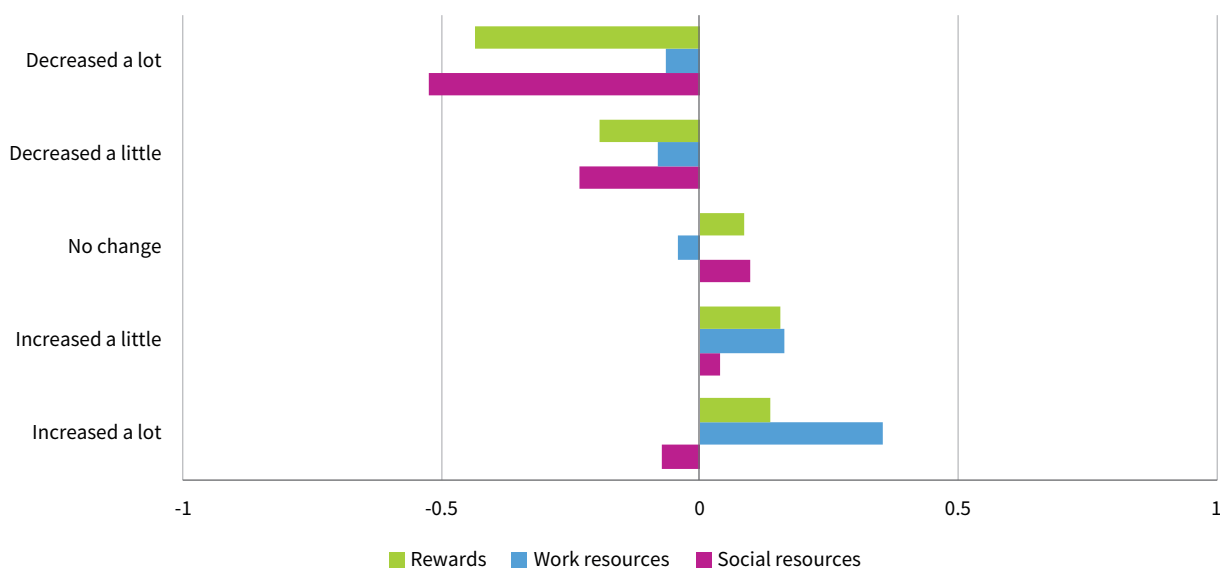


Figure 34: Job resources by change in number of employees in the workplace

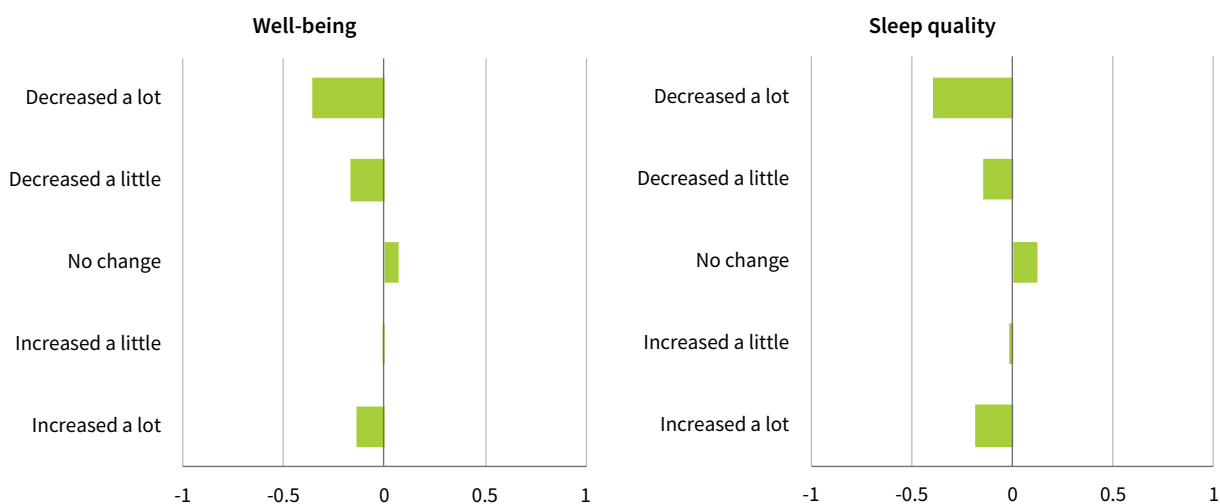


Downsizing often also implies a risk of impaired health among employees who retain their jobs (Kivimäki et al., 2001; Vahtera, Kivimäki, & Pentti, 1997). According to the EWCS 2015, employees who experience downsizing are more prone to report sleeping problems and poorer well-being (see Figure 35). Those workers also tend to report presenteeism more often (see Figure 36). Even if the differences with regard to other health indicators

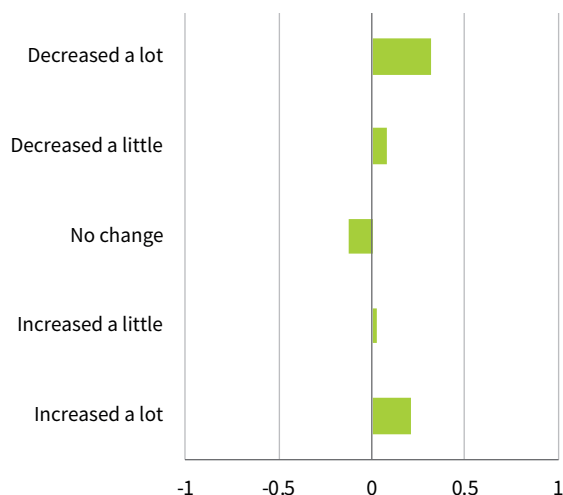
are rather small, employees who face downsizing may be highlighted as a potential risk group.

Interestingly, in situations where the number of employees has increased significantly, there also tends to be clearly above-average levels of all job demands, except physical risks. This situation, however, is somewhat compensated for by higher rewards and greater work resources.

Figure 35: Well-being and sleep quality by change in number of employees in the workplace



**Figure 36: Presenteeism by change in number of employees in the workplace**



**Note:** *Presenteeism (log transformed).*

## Summary

The analysis of the EWCS 2015 shows that exposure to job demands and access to job resources are relatively independent from the stage at which individuals are in the life cycle. The exception is the group of young workers, under 25 years of age, who are found to face the greatest demands, often of a physical nature, while having the least access to work resources.

Some job characteristics are strongly associated with certain demands and resources. Employees in occupations requiring lower levels of skills, such as craft and related workers, plant and machine operators and assemblers as well as employees in elementary occupations, have a higher risk of poorer health and well-being as their work is characterised by rather high demands and relatively low levels of resources. Those same occupational groups report the lowest levels of general health.

Employees reporting job insecurity are a risk group because they also report lower levels of job resources, more demands and worse health indicators, but also less engagement, more exhaustion and poorer well-being. In addition, the analysis shows that, although the associations are relatively weak, employees with fixed-term contracts experience greater intensity, more physical risks and less access to job resources than employees with indefinite contracts.

Confirming the vast literature on the subject, analysis of the EWCS data also finds that working time duration and organisation play an important part in influencing employees' health and well-being. Employees reporting greater working time demands – night work, weekend work, long days, irregular and less predictable hours – also face significantly higher physical risks and work intensity as well as greater emotional and social demands. At the same time, while the effects seem weaker, individuals who work at night, work at weekends or have a lower working time predictability report slightly fewer social resources (social support, recognition and justice in the workplace), fewer work resources, and relatively poor rewards.

With regard to sector, employees working in construction and – to some extent – those in agriculture are confronted with relatively high demands. This may be explained by the 'skills' effect or by the prevalence of blue-collar workers in these sectors. Job demands also seem to increase with the size of the workplace, being greater in larger workplaces.

The analysis shows very little connection between workers' representation mechanisms and demands, resources or health and well-being. The existence of a health and safety committee does, however, appear to be associated with slightly better work resources (job control, skill discretion and participation), but also slightly above-average job demands.

Employees who witness downsizing in their workplaces are further confronted with higher demands and fewer resources. Interestingly, those whose workplace has expanded in terms of number of employees report higher job demands than average, but also more job resources.

The analysis in this section identified a series of associations between personal, job-related and organisational characteristics; job demands and resources; exhaustion and engagement; and workers' health and well-being. These confirm (and are confirmed by) many of the corresponding causal links already established within the literature.



## 4 Country characteristics, working conditions and health

The main goal of this chapter is to examine to what extent country-level characteristics – such as labour market specificities, trade union presence and influence, and gender equality – play a role in influencing the association between working conditions and workers' health and well-being.

A prerequisite for explaining differences in working conditions across countries is that (average) job demands and job resources actually differ between countries. Initial results from the multilevel modelling indicated that this is the case. However, less than 10% of the variance in the demands and resources are explained by the EU28 country that workers live in.<sup>19</sup> Although this might seem low, it is not completely unexpected, as there are many potential factors that have an influence on working conditions; not all of them are related solely to the country one lives in. Job demands and resources might differ more strongly between different companies or different occupations than between countries. For example, physical risks or emotional demands might depend more on the sector one is employed in than the country where one lives.

Even if these results indicate that more than 90% of the differences in job demands and resources stem from some other factors (like the sector workers are employed in, specific aspects of the companies that employ them, and their occupation), there are still meaningful differences between countries that can potentially be explained by country-level variables.

### Relevant country-level indicators

Indicators were selected in order to understand better the extent to which country-level characteristics may be associated with job demands and resources and, therefore, their influence over workers' health and well-being. The goal was to include indicators that reflect labour market context, social protection systems, industrial relations systems and regulation of work as well as gender equality at a country level. Overall, seven different country-level variables were selected.

**Total labour market expenditure as a percentage of the gross domestic product:** This was obtained from Eurostat [table *Imp\_ind\_exp*], the European Commission's labour market policy database. Labour market policy interventions are defined as public interventions in the labour market that aim to ensure the market functions effectively and correct disequilibria. Such interventions can be distinguished from other general employment policy interventions in that they act selectively to favour particular groups in the labour market.

**Temporary employees as a percentage of total employees:** This was obtained from Eurostat [table *lfsa\_etgar*] – the European Union Labour Force Survey. Temporary employees are defined as those who declare themselves as having a fixed-term employment contract or a job which will terminate if certain objective criteria are met, such as completion of an assignment or return of an employee who was temporarily replaced.

### Box 6: Method for multilevel modelling

To assess the extent to which country-level characteristics are able to explain differences in job demands and resources across countries, a multilevel modelling technique was applied. First, it was tested whether job demands and resources actually differ between countries. Then, it was investigated whether seven selected country-level characteristics are able to explain the differences in job demands and resources between countries. The analyses focused on data from the EWCS 2015 and included employees in the EU28 Member States working 20 hours or more per week. (For detailed information, see 'Overview of research methods' in the Annex.)

19 See Table A10 in the Annex.

**In-work at-risk-of-poverty rate:** This was obtained from Eurostat [table *tesov110*] (based on the European statistics on income, social inclusion and living conditions), which reflects the share of persons who are at work and have an equivalised disposable income below the risk-of-poverty threshold, set at 60% of the national median equivalised disposable household income (after social transfers).

**Employment protection of regular workers:** This was based on the OECD Employment Protection Database [code EPRC\_V3], a summary indicator concerning the regulations for individual dismissals in regular contracts and additional provisions for collective dismissals that incorporates 13 detailed data items.

**Union density:** This was based on the *ud* variable from the ICTWSS 5.1 database, which expresses the union density rate as the proportion of net union membership (equal to total union membership minus union members outside the active, dependent and employed labour force) with respect to the number of wage earners in employment (Visser, 2016).

**Uncoordinated bargaining of wage setting:** This too was obtained from the ICTWSS 5.1 database (Visser, 2016). The variable type was recoded into a binary variable, indicating either uncoordinated bargaining in

a country or some form of coordinated bargaining. Coordinated bargaining comprises various forms ranging from pattern bargaining to state-imposed bargaining.

**Gender equality:** This was obtained from the index score of the EIGE Gender Equality Index, a composite indicator that measures gender gaps between women and men across six core domains (work, money, knowledge, time, power and health). It considers that gaps to the detriment of either women or men are equally problematic.

## Predicting job demands and resources from country-level variables

The results from multilevel analyses are summarised in Table 3.<sup>20</sup> It should be noted that, due to the small sample size at the country level (28 countries), associations between country-level variables and working conditions had to be rather strong so as to ensure that they are not due to chance (to reach statistical significance, standardised estimates must have an absolute value of 0.35 or higher).

**Table 3: Summary results of multilevel analyses: Predicting job demands and resources from country-level variables**

	Physical risks	Work intensity	Work extensity	Emotional demands	Social demands	Social resources	Work resources	Rewards
<b>Country-level variables</b>								
Total labour market expenditure as a percentage of the gross domestic product			↓				↑	↑
Temporary employees as a percentage of total employees								
In-work at-risk-of-poverty rate	↑ ↑						↓	
Employment protection for regular workers			↓ ↓					
Union density		↑ ↑					↑	↑ ↑
Uncoordinated bargaining of wage setting			↑					
Gender equality					↑ ↑		↑ ↑	↑

**Notes:** ↑ = statistically significant positive relationship; ↓ = statistically significant negative relationship; double arrows highlight the most relevant country-level variable for a specific demand or resource. Green arrows refer to the desirable direction of change; red arrows refer to the undesirable direction of change.

<sup>20</sup> For more details, see Table A11 in the Annex.



Countries with higher total labour market expenditure as a percentage of gross domestic product (GDP) record less work extensity, greater work resources and greater rewards. The share of temporary employees as a percentage of total employees shows no meaningful relationship with country-level work characteristics. A higher in-work at-risk-of-poverty rate in a country is associated with more physical risks and fewer work resources, whereas better employment protection for regular workers is associated with less work extensity. Interestingly, countries with higher union density record both greater work resources and rewards, and greater work intensity. At the country level, uncoordinated bargaining of wage setting is associated with more work extensity (corresponding to longer working hours). Finally, in countries with greater gender equality, workers also report more social demands, more work resources and more rewards.

It runs counter to intuition that union density be associated with higher work intensity: it might be assumed that a high union density should be related to improved working conditions and thus workers should be required to work at very high speed and/or to tight deadlines less often. It seems also counter-intuitive that a country's gender equality level be associated with more social demands: one might think that in countries with more gender equality, workers are less often exposed to adverse social behaviours such as harassment and discrimination. A possible explanation for these counter-intuitive findings is that although country-level variables from 2012 were used to predict work demands and resources in 2015, in a strict sense, the analyses only show correlation and do not prove causation. It seems plausible that in countries where workers experience high work intensity, they are more likely to organise in unions to improve their working conditions. Similarly, it also seems plausible that the association between gender equality and social demands stems from workers in more gender-equal countries being more aware of the issues at stake and, therefore, more likely to identify certain adverse social behaviours in the workplace, such as harassment or discrimination.

Another somewhat counter-intuitive finding is that the share of temporary employees as a percentage of total employees is not significantly associated with any work characteristics. One might assume that in countries with relatively more temporary employees, working conditions would be relatively poor and rewards in particular, including job security, would be low.

A possible explanation for not finding any significant relationships in this case might be that, on average, only about 10% (country-level median = 9.85%) of employees are in temporary employment. Although a higher relative number of temporary employees could theoretically also affect the working conditions of workers with a contract of unlimited duration, this would most probably be more strongly related to the working conditions of temporary employees. As the majority of workers have contracts of unlimited duration, the relative number in temporary employment might not be associated strongly enough with country-level work demands and resources to reach statistical significance.

The results show that all but two work characteristics are significantly predicted by at least one of the selected country-level variables. Emotional demands and social resources could not be predicted by any of the variables used. It should be noted that these work characteristics also show the smallest variation at country level.<sup>21</sup> Thus, emotional demands and social resources are associated with factors that are not situated at the country level. In fact, it seems likely that emotional demands depend on the nature of the job rather than the country one lives in: for example, dealing with angry clients may be a common demand for shop attendants and call centre workers, and facing emotionally disturbing situations might be especially relevant in healthcare professions. Moreover, it is more plausible that the availability of social resources is more strongly dependent on organisation within a company or a team and, therefore, presents very small differences between countries.

For some work characteristics, more than one country-level variable was found to be a statistically significant predictor. From that, it can be asked: which country-level variable(s) is/are (still) able to predict the respective work demands or resources when the other statistically significant predictors are controlled for? Thus, if more than one country-level variable was identified as a predictor of a specific work demand or resource, these were subsequently tested together in a multilevel model with multiple predictors to identify their combined effects. Since physical risks are only associated with the in-work at-risk-of-poverty rate, work intensity is only associated with union density, social demands are only associated with gender equality, and emotional demands as well as social resources are not associated with any of the selected country-level variables, no further analyses were required for these work characteristics.

21 See Table A10 in the Annex.

As work extensity is predicted by three country-level variables (total labour market expenditure as a percentage of the gross domestic product; employment protection for regular workers; and uncoordinated bargaining of wage setting), all three predictors were combined in a single multilevel model. When controlling for the effects of the other two predictors, only employment protection for regular workers remains a statistically significant predictor of country-level work extensity. Similarly, when testing simultaneously all four predictors of work resources (total labour market expenditure as a percentage of the gross domestic product; in-work at-risk-of-poverty rate; union density; and gender equality), only gender equality remains a statistically significant predictor of country-level work resources. Finally, when testing simultaneously all three predictors of rewards (total labour market expenditure as a percentage of the gross domestic product; union density; and gender equality), union density still shows the strongest association with country-level rewards; however, none of the three country-level variables remains a statistically significant predictor when the other two predictors are controlled for.

## Summary

According to the analysis of the EWCS data, less than 10% of the variance in job demands and resources can be explained by the EU28 country where workers live. This indicates that policies to improve working conditions and workers' health and well-being might be more effective if they are tailored to the demands and resources of particular risk groups defined by their specific job and organisational characteristics.

Nevertheless, the analyses show that the labour market context, the social protection systems in place, the regulation of work and the level of gender equality of countries are related to the levels of job demands and job resources. This indicates that more general policies also constitute potential levers for supporting the improvement of working conditions and workers' health and well-being.

Increases in total labour market expenditure are likely to have beneficial effects on work resources and rewards, and on work extensity. Employment protection of employees seems especially relevant when trying to reduce work extensity, whereas union density is especially relevant to improving work rewards. In more gender-equal countries, workers report having more work resources and rewards, but they also report more social demands. Implementing measures that aim to combat in-work at-risk-of-poverty seems to go hand-in-hand with reduction of physical risks. This might be effective because workers not at risk of poverty are less likely to accept jobs with greater physical risks that might endanger their health and well-being. Finally, although the trends mentioned earlier in this report point to an increase in emotional demands, the analyses did not reveal any levers at the country level to counteract this trend. Again, this highlights the importance of having measures to improve working conditions and workers' health and well-being tailored to the demands and resources of specific risk groups.

## 5 Conclusions

The analysis of the European Working Conditions Survey (EWCS) presented in this report confirms a clear link between working conditions and the health and well-being of workers. This relationship can be depicted in a model, which shows that some working conditions, like exposure to physical risks or social demands at work, have a direct impact on health outcomes and well-being. The influence of other working conditions on health and well-being is of an indirect nature. These factors either influence motivation and engagement at work, leading to higher levels of well-being, or they contribute to exhaustion, which is associated with poorer health and well-being.

Among the factors contributing to exhaustion, work extensity (long working hours), is one of the most important. But work intensity (the level of demands in the job) is also a contributing factor. The importance of **working time** for health and well-being of workers is recognised by policymakers and has been addressed in European legislation. The 2003 European Working Time Directive established minimum standards for working hours, covering maximum weekly working hours, minimum rest periods and breaks, annual leave, night work and shift work. However, as analysis of the EWCS shows, work intensity and the flexibility of working time arrangements can also impair working time quality and should hence be addressed. Social dialogue or collective bargaining at different levels could be one way to introduce improvements.

The findings in this report also indicate that **work arrangements** have the potential to support better health and well-being outcomes through improving motivation and engagement. One factor that plays a key role in this respect is job control. However, the findings also show that even enhanced job control will be insufficient without social support from colleagues – especially supervisors. Furthermore, it is crucial to reward the work done, either by ensuring adequate pay or through other forms of recognition and rewards, such as good career perspectives and a secure job. These findings call for potential interventions at EU level that go beyond protection from excessive work demands. Complementary actions, measures and investments that provide workers with access to the resources that boost their engagement should also be promoted. Greater job control in the workplace is a case in point. Despite the fact that its importance has been highlighted in research for many years, job control remains barely recognised or reflected in policy actions that aim to maintain and improve workers' health and well-being. There are strong arguments to encourage initiatives at the workplace level that focus on job control and other motivational aspects of work.

**Physical hazards** have a direct effect on workers' health and well-being; the legal framework on workers' occupational safety and health presented Framework Directive 89/391/EEC (and its individual directives), which seeks to protect workers against these risks. However, emotional demands at work also need to be addressed: these also have a direct effect on health and well-being. Women, because they often work in sectors like health or education, are especially exposed to the psychosocial risks associated with these emotionally demanding jobs. In the context of ageing societies and services-dominated economies, it becomes more pressing to address these risks as the incidence of exposure increases.

The importance persists of distinguishing different **risk groups** and addressing their specific needs when devising policy interventions. The findings in this report reiterate that risk exposure depends on employees' occupation or sector. Employees in the health sector, for instance, face greater emotional demands, whereas employees in construction and agriculture are confronted with greater physical risks. Employees in lower-skilled occupations, such as craft workers, plant or machine operators and other elementary occupations, also deserve particular attention.

The findings also indicate that some key risk groups are defined by certain **job characteristics**. In line with the existing literature on the topic, the EWCS analysis shows that those more often working long days, nights, weekends and irregular or unpredictable hours face greater physical risks, greater work intensity, greater emotional demands (handling angry clients or facing emotionally disturbing situations) and greater social demands (experiencing harassment or discrimination). Job insecurity is also related to greater demands and fewer resources and, consequently, is associated with poorer health and well-being. Additionally, analysis of the EWCS data shows that employees witnessing downsizing in their workplaces are more likely to be confronted with greater demands while having less access to job resources; this, again, is likely to impact negatively on their health.

When **country-level factors** of potential importance for the relationship between working conditions and workers' health and well-being are considered, analysis shows that higher union density, greater employment protection and more gender equality are associated with higher rewards, more work resources and less work extensity. Member States should, therefore, be encouraged to invest in initiatives that boost union density, employment protection and gender equality, and so contribute to a healthier workforce in the medium and long term.

At **company level**, employers should be encouraged to provide their employees with more opportunities to participate effectively to shape what happens in their workplace. A greater voice for employees is associated with other favourable working conditions, more engaged employees and better overall well-being. In particular, such interventions should be designed so as to create well-resourced work environments for the risk groups mentioned above, such as workers in elementary occupations or those who experience company downsizing.

Overall, the findings point beyond a 'traditional', narrower framework of occupational safety and health. They highlight the importance of including psychosocial risks, such as emotional demands, in the equation (along with motivational aspects of work). This calls for initiatives that aim to improve access to resources while also promoting jobs designed in such way that associated demands are reduced. This requires transversal coordination between different policy fields such as safety and health and work organisation, which can contribute to a higher quality of working life in the medium to long term.

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# Annex

## Overview of research methods

### European Working Conditions Survey: Data and methodology

The main data source for the analyses in this report was the European Working Conditions Survey (EWCS) 2015. In addition, data from the 2005 and 2010 surveys were included for the trends analysis. Data from the 28 EU Member States only was used.

The EWCS assesses and quantifies the working conditions of employees and the self-employed, analyses relationships between different aspects of working conditions, identifies groups at risk and issues of concern, and monitors progress and trends. The survey aims to contribute to European policy development, particularly regarding quality of work and employment issues. The EWCS has been carried out by Eurofound every five years since 1991.

The fieldwork for the EWCS 2015 was carried out between February and December 2015. While analysis reported here is restricted to the EU28 countries, in total, some 43,850 workers in 35 European countries were interviewed (i.e. the EU28, the 5 candidate countries for EU membership – Albania, North Macedonia, Montenegro, Serbia and Turkey – as well as Norway and Switzerland). For more information on the methodology, see: <http://www.eurofound.europa.eu/surveys/european-working-conditions-surveys/sixth-european-working-conditions-survey-2015/ewcs-2015-methodology>.

### Descriptive analysis of health indicators

Analysis was carried out separately for employees and self-employed workers, defined by a series of questions (see Table A1). Countries were grouped into six broad geographical areas, taking into account the type of industrial relations, the welfare state system, working time regulation and gender contracts (for more details, see Eurofound, 2017, pp. 5–6): Anglophone (Ireland, the United Kingdom), Baltic (Estonia, Latvia, Lithuania), Central-Eastern (Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia), Continental (Austria, Belgium, France, Germany, Luxemburg, the Netherlands), Northern (Denmark, Finland, Sweden), and Southern (Cyprus, Greece, Italy, Malta, Portugal, Spain).

Health and well-being indicators were measured by single items (self-rated general health, presenteeism, sickness absence, exhaustion), by indices based on different items (well-being, engagement, sleep quality) or, in the case of health problems, by aggregation of different items (see Table A1). The scales indicating well-being, sleep quality and engagement have good internal consistency (subjective well-being – Cronbach's Alpha = .88; sleep quality – Cronbach's Alpha = .81; engagement – Cronbach's Alpha = .73), indicating high quality. For nearly all scales, items were recoded so that high values indicate stronger agreement. Where at least two items were answered, the mean value was used. Well-being, for instance, was based on the mean value of five items. Afterwards the mean value was converted to an index from 0 to 100. A value of 0 on the sleep quality scale, for instance, indicates that a person has daily sleeping problems, whereas a value of 100 indicates the person never has sleeping issues or has very good quality sleep. Or, looking at engagement, a value of 0 indicates the lowest possible engagement and a value of 100 indicates that the person is totally engaged. To ensure that the results could be considered representative for workers in Europe, weighting was applied using the *w5\_eu28* variable. This cross-national weighting ensures that results for each country are represented according to the size of the country's in-work population.<sup>22</sup>

### Structural equation models

A theoretical model was formulated to address how working conditions may be associated with or determine health outcomes. This model was carefully tested using the EWCS data. The model excludes self-employed people and those working less than 20 hours per week in their main paid job. This resulted in a sample size of 26,968 employees that could be used in analyses in Mplus (Muthén & Muthén, 1998). As the main interest was in relationships between variables, no weighting factors were used in the structural equation modelling (SEM) analyses. As data for the variable 'sex' was missing for seven individuals, the SEM analyses testing for differences between men and women were conducted with a sample size of 26,961 employees.

22 For more information, see Eurofound (2015b).

All model components were assessed using confirmatory factor analysis and multiple regression. These methods were applied simultaneously in a structural equation model. This technique provides information on how closely the model fits to the empirical data in order that the quality of alternative specifications can be assessed.

In a first step, single questions and indices calculated from multiple questions were selected for the model and tested in what is known as a measurement model.<sup>23</sup> Based on the results, the framework was adapted so that the indices provided an acceptable fit of the measurement model with EWCS data.

The measurement model only provides the foundation for the specification of a structural model that shows the assumed relationships between constructs. Thus, in a next step, the structural part of the model was specified. Demands and resources were assumed to predict exhaustion and engagement, and exhaustion and engagement were assumed to predict health and well-being outcomes. To keep the specification as simple as possible, no direct paths from demands and resources to health and well-being outcomes were specified at this stage. Demands and resources were allowed to be correlated with other demands and resources. Health and well-being outcomes were also allowed to correlate with each other. Technically, this model is more parsimonious than the measurement model, in which all possible relationships were admitted. This implies that it resembles the empirical data less well than the (adapted) measurement model. The objective was to formulate a model with a structural part as close to the integrative conceptual framework as possible that performs similarly to the (adapted) measurement model. This was achieved by now allowing for some direct paths from demands to health and well-being outcomes.

It is essential to ensure that male and female respondents share the same understanding of the variables which were used to measure the latent constructs. Only when so-called measurement

invariance is established is it justified to attribute any observed group differences to true differences in working conditions. Invariance tests rule out differences being simply the result of different psychometric responses to the questionnaire (Putnick & Bornstein, 2016).

Measurement invariance was tested by comparing the model fit for separate specifications for men and women.<sup>24</sup> Invariance is assumed if the model fit is within recommended cut-off values and if the fit indices of a model in which parameters must be equal for women and men are not statistically worse than the fit indices of a model that allows these parameters to differ for women and men.<sup>25</sup>

Firstly, configural invariance is tested by simply comparing the basic organisation of the latent factors (or constructs) and their indicators in both sex groups when those are estimated without constraints (see, e.g. Cheung & Rensvold, 2002). This means that item intercepts and variances, as well as factor loadings and variances, are freely estimated for women and men. Only factor means are constrained to zero. If the configuration is invariant, the same variables (or items) measure the same underlying constructs in both groups. Secondly, the test for metric invariance assesses whether each variable shares the same weight for each latent construct across groups (Schmitt & Kuljanin, 2008).

Both configural and metric invariance are a prerequisite for testing differences in associations between latent constructs across groups (Vandenberg & Lance, 2000). If measurement invariance between women and men can be established, there is justification for comparing associations between constructs (i.e. all demands and resources as well as health and well-being indicators) in order to assess structural equivalence across women and men.<sup>26</sup>

Structural equivalence is assessed by comparing a model that constrains all associations to be equal across women and men to a model that allows different associations.

23 Items that were used to calculate indices were added as auxiliary variables in the analyses to improve model estimation in case of missing values.

24 Putnick & Bornstein (2016) recommend the chi-square ( $\chi^2$ ) fit index and four alternative fit indices (i.e. RMSEA, SRMR, TLI and CFI; see Table A7 in the Annex) to assess model fit.

25 Due to the size and complexity of the model and the size of the EWCS sample, chi-square tests were not robust enough to compare with each other (see the advantages and disadvantages as reported by Putnick & Bornstein, 2016). Rather, the two sex groups were compared by calculating the difference of the CFI indices of the unconstrained and the constrained models ( $\Delta$ CFI), because the CFI is not sensitive to sample size or model size (e.g. Meade, Johnson, & Braddy, 2008; Putnick & Bornstein, 2016). A  $\Delta$ CFI smaller than or equal to .010 indicates invariance across the two groups (Chen, 2007; Cheung & Rensvold, 2002).

26 A third test would have been to assess scalar invariance. Scalar invariance means that the levels of observed variables are equivalent and that mean differences in latent constructs can be interpreted (Schmitt & Kuljanin, 2008). As the interest in this case was on differences in associations between constructs, but not in mean level differences, scalar invariance was not tested.

## Trend analysis

To answer the question of how work demands and resources have changed over time, three waves of data were compared: 2005, 2010 and 2015. Again, this analysis was limited to employees of the EU28 working at least 20 hours per week (even though Croatia was not a Member State in 2005, it was included in the analysis). The ‘definition’ of self-employed relied on respondents’ self-assessment (Q7: ‘Are you working as an employee or are you self-employed?’). In order to ensure that results based on the data from the 2015 survey could be considered representative for workers in Europe, all results were weighted (by *w5\_eu28*).

The measures used were, as far as possible, the same as those used in the structural equation model. However, in the case of social resources and emotional demands, not all items had been measured in the earlier waves, so only single items were used as indicators.

In some cases question wording changed as new waves of the survey were carried out. Emotional demands, for instance, was measured in 2015 by asking, ‘Does your main job involve handling angry clients, customers, patients, pupils, etc.’; this item was modified slightly from 2010, when the survey asked, ‘Does your main job involve handling angry clients?’ There was no item covering emotional demands in 2005. Fair pay was measured in 2015 by using the statement ‘Considering all my efforts and achievements in my job, I feel I get paid appropriately’, whereas in 2010 and 2005 the wording for this measurement was ‘I am well paid for the work I do’. Career perspective, social support of co-workers and supervisors, work intensity, job control and job security, on the other hand, were measured with the same items in each of the survey waves used in analysis of trends (see Table A3 for the wording).

In other cases, response formats changed slightly. For instance, in 2015 the response format for rewards (career perspective, fair pay and job security) was ‘strongly agree’, ‘tend to agree’, ‘neither agree nor disagree’, ‘tend to disagree’ and ‘strongly disagree’; in 2010 and 2005 this was slightly different: ‘strongly agree’, ‘agree’, ‘neither agree nor disagree’, ‘disagree’ and ‘strongly disagree’. For work intensity, social support from co-workers, social support from supervisor, job control and emotional demands, response formats did not change across the different waves of the survey.

For subjective work intensity and job control, an index based on the specific items (see Table A3 for the wording of each item) was computed if at least two items had been answered. All results illustrated in this report were converted to an index of 0 to 100, where a value of 0 indicates, for instance, that a person has no job control at all/has never had an intense job and a

value of 100 indicates that a person has as much job control as possible/has an intense job all of the time.

## Multilevel modelling

Multilevel modelling techniques were applied to examine the extent to which differences in working conditions can be explained by country-level characteristics such as labour market expenditure, union density and gender equality, among others. Multilevel modelling allows for analysis of data at different aggregate levels simultaneously (e.g. working conditions at the level of individual workers as well as at country level).

The analyses were based on EU28 data from the EWCS 2015 as well as data for country-level variables obtained from other data sources. As in the structural equation modelling (see above), the model excluded those who were self-employed and workers who report working less than 20 hours per week in their main paid jobs, resulting in a sample size of 26,968 employees that could be used in the analyses in Mplus (Muthén & Muthén, 1998). Values for the country-level variables were obtained from different sources and matched with the factor scores obtained from the (adapted) measurement model. Country-level variables from 2012 were used as they preceded the EWCS 2015 data and allowed the potential impact of working conditions over the years to be taken into account. If values for 2012 were missing, values from earlier/later years were used and (if possible) the 2012 value was interpolated from those values. It should be noted that the 2012 gender equality index was calculated in part using data from the EWCS 2010. However, data overlap is considered negligible because most overlapping variables are not part of the model used here and, moreover, the index expresses women’s relative values in comparison to all workers and does not use raw values from the EWCS.

In a first step, intraclass correlations (ICCs) were estimated to find out which portion of the variance in work characteristics could be potentially explained by country-level variables. Next, country-level variables were used to predict the observed differences in working conditions between countries. Although the EWCS data set provides a large amount of data at the level of individual workers, the data points at country level are limited. By definition, analyses of the EU28 countries only include data on 28 countries, which is much smaller than the number of data points available for individual workers. Simulation studies have shown that in such cases, it is advisable to use Bayesian estimation approaches instead of the usual frequentist maximum likelihood estimation approach to reduce biases related to the relatively small sample size at the country level (Stegmüller, 2013). Thus, the Bayes estimation with flat (non-informative) priors was used.

Additionally, to increase the chance of identifying statistically significant predictors of working conditions at country level, separate analyses were conducted for each country-level variable, predicting each demand or resource separately. If more than one country-level

variable was identified as a predictor of a specific work demand or resource, these were subsequently tested together in a multilevel model with multiple predictors to identify their combined effects.

**Table A1: How healthy are workers in the EU?**

Operationalisation of the analysis	
Constructs	Indicators
Self-rated general health	Health in general (Q75)
Number of health symptoms	Sum score (based on Q78a–i)
Chronic illness	Constructed variable based on items: illness or health problem lasting more than six months (Q76); limitation of daily activities because of illness or health problems (Q77)
Sickness absence	Logarithmised item ( $\ln(1+Q82)$ )
	Metric item (Q82) 1–365 days
	At least 19 days of sick leave (Q82)
Presenteeism	Logarithmised item ( $\ln(1+Q84b)$ or 0 if Q84a = 'No')
Sleep quality	Mean of items: no difficulty falling asleep (Q79a); not waking up repeatedly during sleep (Q79b); not waking up with a feeling of exhaustion and fatigue (Q79c)
Well-being	Mean of items: feeling cheerful and in good spirits (Q87a); feeling calm and relaxed (Q87b); feeling active and vigorous (Q87c); waking up feeling fresh and rested (Q87d); life filled with interesting things (Q87e)
	Well-being score below 28 based on mean value
Exhaustion	I feel exhausted at the end of the working day (Q90d)
Engagement	Mean values of: vigour (Q90a); dedication (Q90b); absorption (Q90c)
Split variables	Indicators
Self-employed vs employed	Constructed variable based on items: working as employee or self-employed (Q7); paid salary or wage (Q8a); category/categories which apply to main job (Q8b1–7)
Sex	Sex (Q2a)
Country groups	<ol style="list-style-type: none"> <li>1. 'Anglophone countries' – Ireland, United Kingdom</li> <li>2. 'Baltic countries' – Estonia, Latvia, Lithuania</li> <li>3. 'Central-Eastern countries' – Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia</li> <li>4. 'Continental countries' – Austria, Belgium, France, Germany, Luxembourg, Netherlands</li> <li>5. 'Northern countries' – Denmark, Finland, Sweden</li> <li>6. 'Southern countries' – Cyprus, Greece, Italy, Malta, Portugal, Spain</li> </ol>

**Notes:** Most items were recoded so that higher values indicate stronger agreement. Mean values were computed if at least two items were answered. For more details of the questions in the EWCS, please consult the survey's questionnaire: <https://www.eurofound.europa.eu/surveys/european-working-conditions-surveys/sixth-european-working-conditions-survey-2015/ewcs-2015-questionnaire>

Table A2: Operationalisation of the initial measurement model

Constructs	Indicators	Standardised factor loading
Physical risks	Ambient risks index (mean of Q29b–d)	.743
	Biochemical risks index (mean of Q29e–i)	.688
	Posture-related risks index (mean of Q29a, Q30a–c, e)	.752
Quantitative demands	Work intensity index (mean of Q49a–b)	.471
	Long weekly working hours (Q24: < 48 hrs vs ≥ 48 hrs)	.305
	Long working days (Q37d)	.364
	Non-social working hours (Q44)	.475
	Working during free time (Q46)	.395
	Not enough time to get job done (Q61g)	.512
Emotional demands	Handling angry clients (Q30g)	.590
	Emotionally disturbing situations (Q30h)	.774
	Hide feelings (Q61o)	.422
Social demands	Harassment index (mean of Q80a–d, Q81a–c)	.726
	Discrimination index (mean of Q72a–g)	.353
Social resources	Colleague social support index (mean of Q61a, Q70e, Q89d)	.596
	Supervisor social support index (mean of Q61b, Q63a–f)	.782
	Recognition index (mean of Q70a–b, Q89c)	.868
Work resources	Job control index (mean of Q54a–c, Q61f)	.544
	Skill discretion index (mean of Q53c, e–f, Q61i)	.632
	Participation index (mean of Q61c–d, n)	.823
Organisational resources	Organisational justice index (mean of Q61l, Q70d, f)	.825
	Health and safety information (Q33)	.288
Rewards	Fair pay (Q89a)	.610
	Career perspective (Q89b)	.628
	Job security (Q89g)	.250
Burnout	Exhaustion (Q90d)	.436
	Cynicism (Q90e)	.257
	Reduced efficacy (Q90f)	.265
Engagement	Vigour (Q90a)	.761
	Dedication (Q90b)	.736
	Absorption (Q90c)	.506
Self-rated general health	Health in general (Q75)	N/A
Number of health symptoms	Sum score (based on Q78a–i)	N/A
Sickness absence	Logarithmised item ( $\ln(1+Q82)$ )	N/A
Presenteeism	Logarithmised item ( $\ln(1+Q84b)$ ) or 0 if Q84a = 'No')	N/A
Sleep quality	No difficulty falling asleep (Q79a)	.747
	Not waking up repeatedly during sleep (Q79b)	.756
	Not waking up with a feeling of exhaustion and fatigue (Q79c)	.770
Well-being	Feeling cheerful and in good spirits (Q87a)	.780
	Feeling calm and relaxed (Q87b)	.774
	Feeling active and vigorous (Q87c)	.813
	Waking up feeling fresh and rested (Q87d)	.768
	Life filled with interesting things (Q87e)	.671

**Notes:** Most items were recoded so that higher values indicate stronger agreement. Before calculation of indices, the items used were recoded to have a common range. Standardised factor loadings range from –1 to 1 and indicate how well an indicator measures its construct. A value of –1 means that the indicator measures the opposite of the construct perfectly; a value of 0 means that the indicator is unrelated to the construct; and a value of 1 means that the indicator measures the construct perfectly. If standard factor loadings were not available, the respective indicator was used as a manifest variable in the measurement model. All standardised factor loadings are statistically significant at  $\alpha = 5\%$ . Recognition may theoretically be considered a reward. Empirically, however, recognition appears to have a stronger correlation with other social resources than with rewards and has thus been specified as a social resource. This specification also yields a marginally better fit.



Table A3: Operationalisation of the adapted measurement model

Constructs	Indicators	Standardised factor loading
Physical risks	Ambient risks index (mean of Q29b–d)	.604
	Biochemical risks index (mean of Q29e–i)	.557
	Posture-related risks index (mean of Q29a, Q30a–c, e)	.913
Work intensity	Working at very high speed (Q49a)	.866
	Working to tight deadlines (Q49b)	.757
Work extensity	Weekly working hours (Q24)	.593
	Long working days (Q37d)	.736
Emotional demands	Handling angry clients (Q30g)	.561
	Emotionally disturbing situations (Q30h)	.839
Social demands	Harassment index (mean of Q80a–d, Q81a–c)	.738
	Discrimination index (mean of Q72a–g)	.360
Social resources	Colleague social support index (mean of Q61a, Q70e, Q89d)	.594
	Supervisor social support index (mean of Q61b, Q63a–f)	.787
	Recognition index (mean of Q70a–b, Q89c)	.879
	Organisational justice index (mean of Q61l, Q70d, f)	.838
Work resources	Job control index (mean of Q54a–c, Q61f)	.547
	Skill discretion index (mean of Q53c, e–f, Q61i)	.626
	Participation index (mean of Q61c–d, n)	.820
Rewards	Fair pay (Q89a)	.628
	Career perspective (Q89b)	.637
	Job security (Q89g)	.263
Exhaustion	Exhaustion (Q90d)	N/A
Engagement	Vigour (Q90a)	.772
	Dedication (Q90b)	.742
	Absorption (Q90c)	.516
Self-rated general health	Health in general (Q75)	N/A
Number of health symptoms	Sum score (based on Q78a–i)	N/A
Sickness absence	Logarithmised item ( $\ln(1+Q82)$ )	N/A
Presenteeism	Logarithmised item ( $\ln(1+Q84b)$ or 0 if Q84a = 'No')	N/A
Sleep quality	No difficulty falling asleep (Q79a)	.759
	Not waking up repeatedly during sleep (Q79b)	.764
	Not waking up with a feeling of exhaustion and fatigue (Q79c)	.751
Well-being	Feeling cheerful and in good spirits (Q87a)	.796
	Feeling calm and relaxed (Q87b)	.786
	Feeling active and vigorous (Q87c)	.826
	Waking up feeling fresh and rested (Q87d)	.766
	Life filled with interesting things (Q87e)	.688

**Notes:** Most items were recoded so that higher values indicate stronger agreement. Before calculation of indices, the items used were recoded to have a common range. The measurement errors of the ambient risks index and the biochemical risks index as well as items Q87d and Q97c were allowed to correlate. Standardised factor loadings range from –1 to 1 and indicate how well an indicator measures its construct. A value of –1 means that the indicator measures the opposite of the construct perfectly; a value of 0 means that the indicator is unrelated to the construct; and a value of 1 means that the indicator measures the construct perfectly. If standard factor loadings were not available, the respective indicator was used as a manifest variable in the measurement model. All standardised factor loadings are statistically significant at  $\alpha = 5\%$ . Of all indicators, job security stands out as having the weakest factor loading. Omitting this indicator does not substantially alter any paths in the structural model – the relatively strong negative association of rewards with exhaustion remains (also see Table A5). Because of its strong political and theoretical relevance, job insecurity has been kept in the specification. Recognition may theoretically be considered a reward. Empirically, however, recognition appears to have a stronger correlation with other social resources than with rewards and has thus been specified as a social resource. This specification also yields a marginally better fit.



Table A4: Fit indices of initial and adapted versions of the measurement and structural models

Results from structural equation modelling				
	Initial measurement model	Adapted measurement model	Initial structural model	Adapted structural model
$\chi^2$ (df)	53,791 (748)	24,339 (512)	30,092 (560)	26,370 (553)
p	< .001	< .001	< .001	< .001
RMSEA	.051	.042	.044	.042
SRMR	.062	.037	.047	.039
TLI	.825	.910	.898	.910
CFI	.855	.931	.914	.925

Note: Number of observations = 26,968.

Table A5: Path coefficients from the (adapted) structural model

Predictor	Outcome	Standardised estimate	p-value
Physical risks	Exhaustion	.113	< .001
	Engagement	.012	.141
	Number of health symptoms	.194	< .001
Work intensity	Exhaustion	.177	< .001
	Engagement	-.022	.005
Work extensity	Exhaustion	.108	< .001
	Engagement	-.022	.006
Emotional demands	Exhaustion	.118	< .001
	Engagement	-.004	.709
Social demands	Exhaustion	.010	.483
	Engagement	.063	< .001
	Self-rated general health	-.090	< .001
	Number of health symptoms	.257	< .001
	Sickness absence	.154	< .001
	Presenteeism	.341	< .001
	Sleep quality	-.329	< .001
	Well-being	-.168	< .001
Social resources	Exhaustion	.007	.635
	Engagement	.423	< .001
Work resources	Exhaustion	.002	.862
	Engagement	.119	< .001
Rewards	Exhaustion	-.205	< .001
	Engagement	.245	< .001
Exhaustion	Self-rated general health	-.145	< .001
	Number of health symptoms	.204	< .001
	Sickness absence	.050	< .001
	Presenteeism	.120	< .001
	Sleep quality	-.225	< .001
	Well-being	-.158	< .001

Predictor	Outcome	Standardised estimate	p-value
Engagement	Self-rated general health	.257	< .001
	Number of health symptoms	-.121	< .001
	Sickness absence	-.097	< .001
	Presenteeism	-.026	.002
	Sleep quality	.185	< .001
	Well-being	.556	< .001

**Notes:** The measurement part of the model was based on the adapted measurement model. Standardised estimates range from -1 to 1 and indicate how well a construct is able to predict another when controlling for the other predicting constructs in the model. A value of -1 means that the predictor and the outcome are perfectly negatively related (i.e. higher values of the predictor go along with lower values of the outcome); a value of 0 means that the predictor is not related to the outcome; and a value of 1 means that the predictor and the outcome are perfectly positively related (i.e. higher values of the predictor go along with higher values of the outcome). All standardised estimates with a p-value of .05 or less are statistically significant at alpha = 5%.

**Table A6: Explained variance from the (adapted) structural model**

Outcome	R <sup>2</sup>	p-value
Exhaustion	.195	< .001
Engagement	.460	< .001
Self-rated general health	.129	< .001
Number of health symptoms	.266	< .001
Sickness absence	.049	< .001
Presenteeism	.156	< .001
Sleep quality	.276	< .001
Well-being	.459	< .001

**Notes:** Values for explained variance (R<sup>2</sup>) range from 0 to 1 and indicate how much of the variance of the respective outcome variable is explained by the combination of all other variables that act as predictors of the respective outcome variable in the model (also see Table A5). A value of 0 indicates that none of the variance is explained by the predictors, and a value of 1 indicates that all of the variance is explained by the predictors. Explained variances with a p-value of .05 or less are statistically significant at alpha = 5%.

**Table A7: Fit indices and model comparison results of invariance tests**

Results from configural and metric invariance tests		
Measurement model	M1. Configural invariance	M2. Metric invariance
Constrained equal	Factor means fixed to 0	Factor means fixed to 0, factor loadings
Not constrained equal	Factor loadings	
$\chi^2$ (df)	25,040 (1,024)	25,284 (1,045)
p-value	< .001	< .001
RMSEA	.042	.041
SRMR	.037	.038
TLI	.909	.910
CFI	.930	.929
Compared to model		M1
$\Delta$ CFI		-.001
Decision		Accept

**Note:** Number of observations = 26,961 (males = 12,970; females = 13,991).

Table A8: Fit indices and model comparison of structural invariance test

Results from comparing regression paths		
Structural model	M3. Baseline	M4. Structural invariance
Constrained equal for women and men	Factor loadings	Factor loadings, regression paths and covariances
Not constrained equal for women and men	Regression paths and covariances	
$\chi^2$ (df)	27,519 (1,127)	28,068 (1,206)
p-value	< .001	< .001
RMSEA	.042	.041
SRMR	.040	.042
TLI	.909	.913
CFI	.923	.922
Compared to model		M3
$\Delta$ CFI		-.001
Decision		Accept

Note: Number of observations = 26,961 (males = 12,970; females = 13,991).

Table A9: Who is at risk of experiencing adverse working conditions and impaired health and well-being?

Operationalisation of the analysis	
Constructs	Indicators
Physical risks	Factor scores of the model – based on ambient risks (Q29b–d); biochemical risks (Q29e–i); posture-related risks (Q29a, Q30a–c, e)
Work intensity	Factor scores of the model – based on manifest indicators: high speed of work (Q49a); tight deadlines (Q49b)
Work extensity	Factor scores of the model – based on manifest indicators: working hours (Q24); long working days (Q37d)
Emotional demands	Factor scores of the model – based on manifest indicators: handling angry clients (Q30g) and emotionally disturbing situations (Q30h)
Social demands	Factor scores of the model – based on manifest indicators: harassment index (Q80a–d, Q81a–c) and discrimination index (Q72a–g)
Social resources	Factor scores of the model – based on manifest indicators: colleague social support index (Q61a, Q70e, Q89d); supervisor social support index (Q61b, Q63a–f); recognition index (Q70a–b, Q89c); organisational justice index (Q61l, Q70d, f)
Work resources	Factor scores of the model – based on manifest indicators: job control index (Q54a–c, Q61f); skill discretion index (Q53c, e–f, Q61i); participation index (Q61c–d, n)
Rewards	Factor scores of the model – based on manifest indicators: fair pay (Q89a); career perspective (Q89b); job security (Q89g)
Exhaustion	Standardised mean of the exhaustion item (Q90d)
Engagement	Factor scores of the model – based on manifest indicators: vigour (Q90a); dedication (Q90b); absorption (Q90c)
Self-rated general health	Standardised mean of the item 'health in general' (Q75)
Number of health symptoms	Standardised sum score (Q78a–i)
Sickness absence	Logarithmised item ( $\ln(1+Q82)$ )
Presenteeism	Logarithmised item ( $\ln(1+Q84b)$ or 0 if Q84a = 'No')
Sleep quality	Factor scores of the model – based on manifest indicators: no difficulty falling asleep (Q79a); not waking up repeatedly during sleep (Q79b); not waking up with a feeling of exhaustion and fatigue (Q79c)
Well-being	Factor scores of the model – based on manifest indicators: feeling cheerful and in good spirits (Q87a); feeling calm and relaxed (Q87b); feeling active and vigorous (Q87c); waking up feeling fresh and rested (Q87d); life filled with interesting things (Q87e)

Operationalisation of the analysis	
Split variables	Indicators
Age	Age of person (Q2b)
Life stage	Constructed variable based on: age (Q2b); sex and age of partner/child/parent/daughter- or son-in-law/grandchild/brother or sister/other relative/other non-relative (Q3a2–10; Q3b2–10); relationship to the other person (Q3c2–10)
Sex	Sex of person (Q2a)
Occupation	International Standard Classification of Occupation (isco_08_1)
Industry	Activity of companies and organisations (nace10)
Workplace size	Constructed variable based on: people working at your workplace/local site (Q16a); employees in your business (Q16b)
Representation	Existence of a trade union, works council or similar committee representing employees (Q71a)
	Existence of a health and safety delegate or committee (Q71b)
Voice	Existence of a regular meeting in which employees can express their views about what is happening in the organisation (Q71c)
Reorganisation	Whether the number of employees in the workplace changed – increased/stayed the same/decreased (Q19)
Job security	Job security (Q89g) – constructed groups: 'Might loose job' ('I might lose my job in the next six months' – tend to agree/strongly agree); 'No job insecurity' ('I might lose my job in the next six months' – tend to disagree/strongly disagree)
Employment status	Constructed variable based on: working as an employee (Q7); paid salary or wage (Q8a); category of main paid job (Q8b1–7); kind of employment contract (Q11)
Working time demands	Measured by working days of at least 10 hours, low working time regularity, working at night and at weekends as well as low working time predictability (see below)
Working days of at least 10 hours	Long working days – more than 10 hours per day at least once a month (Q37d)
Working time regularity	Constructed variable based on: working the same number of hours every day (Q39a); working the same number of days every week (Q39b); working the same number of hours every week (Q39c); fixed starting and finishing times (Q39d)
Working at night	Working at night for at least two hours between 22:00 and 05:00 at least once a month (Q37a)
Working on weekends	Working on Saturday or Sunday at least once a month (Q37b–c)
Working time predictability	Set time arrangements (Q42); regular changes in working time arrangements (Q43)

**Note:** Most items were recoded so that higher values indicate stronger agreement. For the factor scores and standardised means, a high negative value means that compared to the average, the specific group has fewer of those demands/resources/etc.; a value of 0 represents the average (mean value) of the sample; and a high positive value means that compared to the average, the specific group has more of the specific indicator.

**Table A10: Intraclass correlations at the EU28 country level**

Degree of country clustering of demands and resources			
Demands	ICC	Resources	ICC
Physical risks	.032	Social resources	.028
Work intensity	.057	Work resources	.084
Work extensity	.027	Rewards	.036
Emotional demands	.019		
Social demands	.024		

**Note:** ICC values range from 0 to 1. An ICC value of 1 indicates that all of the differences between workers are explained by the country they live in – in other words, an ICC of 1 means that all workers in each country report exactly the same level of the respective demand or resource. Thus, observed differences in the respective demand or resource would only stem from differences between countries. In contrast, an ICC value of exactly 0 indicates that there are no differences between countries and that all the differences in levels of the respective demand or resource stem from some other source(s) that is/are not located at the country level. An ICC of 0 thus indicates that none of the variance in the respective demand or resource is explained by the country one lives in.

Table A11: Summary of results from multilevel analyses

Predictors (country-level variables)	Physical risks	Work intensity	Work extensity	Emotional demands	Social demands	Social resources	Work resources	Rewards
Total labour market expenditure as a percentage of gross domestic product	-.16	.24	<b>-.48</b>	-.16	.25	.24	<b>.37</b>	<b>.35</b>
Temporary employees as a percentage of total employees	.08	.14	-.34	.09	-.03	-.12	-.09	-.13
In-work at-risk-of-poverty rate	<b>.59</b>	.32	.00	.13	-.32	.06	<b>-.45</b>	-.26
Employment protection for regular workers	.06	-.19	<b>-.78</b>	-.10	-.06	-.08	-.28	-.21
Union density	-.15	<b>.42</b>	.04	.02	.29	.23	<b>.48</b>	<b>.51</b>
Uncoordinated bargaining of wage setting	.28	-.14	<b>.56</b>	.25	-.18	-.26	-.34	-.34
Gender equality	-.32	.18	-.09	-.07	<b>.65</b>	.17	<b>.73</b>	<b>.50</b>

**Notes:** Standardised estimates from separate multilevel analyses predicting single working conditions from single country-level variables are shown. Numbers in bold are significant at alpha = 5%.





This report uses European Working Conditions Survey data to examine working conditions and their implications for worker's health. Ensuring the sustainability of work in the context of ageing populations implies a greater number of people in employment who can remain in the workforce for longer. The report examines the interplay between work demands –which carry an increased risk of exhaustion – and work resources – which support workers in greater engagement and well-being. The findings indicate that physical risks have not increased but remain important, while emotional demands have increased, underlining the growing importance of psychosocial risks at work. Changes over time suggest that although the risk of poor health is concentrated in certain occupations, those occupations traditionally considered to be protected are increasingly exposed to risks that are likely to affect workers' health and well-being.

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