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Report 2023.07

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European Trade Union Institute

Insa Backhaus is a Postdoctoral researcher at the Institute of Medical Sociology, Centre for Health and Society, Medical Faculty, Heinrich Heine University, Germany.

Krisztina Gero is a Postdoctoral affiliate and Consultant at the Department of Health Sciences, Bouvé College of Health Sciences, Northeastern University, USA.

Nico Dragano is head of the Institute of Medical Sociology and Speaker of the 'Centre for Health and Society' (CHS), Medical Faculty, Heinrich Heine University, Germany.

Clare Bamba is Professor of Public Health, Population Health Sciences Institute, Newcastle University, United Kingdom.

Brussels, 2023

©Publisher: ETUI aisbl, Brussels

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Print: ETUI Printshop, Brussels

D/2023/10.574/09

ISBN: 978-2-87452-665-7 (print version)

ISBN: 978-2-87452-666-4 (electronic version)



The ETUI is co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the ETUI. Neither the European Union nor the ETUI can be held responsible for them.

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Abstract

This report presents results on psychosocial working conditions and health inequalities using data from the 2010 and 2015 European Working Conditions Surveys and the second wave of the 2020 Living, Working and Covid-19 survey. In brief, mean WHO-5 mental health scores declined between 2010 and 2020, indicating an increase in symptoms of depression during the pandemic. Regarding psychosocial working conditions, we found that the prevalence of job insecurity was slightly lower in the 2020 survey compared with 2010, while the prevalence of temporary contracts increased during the same period. We also found that the percentage of employees feeling that they do not have enough time to get their work done, working in their free time, worrying about work outside of working hours and experiencing work–life conflicts increased over time. Comparisons over time must be interpreted with caution, however, because of the different sampling methods of the studies included here. Educational level appears to be a prominent factor associated with intersectional inequalities in mental health at work, both before and during the Covid-19 pandemic. Across psychosocial working conditions, primarily young women (18–35 years of age) with a primary education presented worse mental health outcomes than their male counterparts or employees with a higher level of education, in general.

1. Introduction

The fast-changing socio-political, economic and technological environment has led to changes in the work environment. While in the nineteenth century, the steam engine revolutionised the working world and determined the way people worked, nowadays, digital transformation and artificial intelligence shape the working day of many workers - a trend that was further accelerated with the onset of the Covid-19 pandemic. A key example includes the increasing number of employees working from home, as well as click and gig-workers and crowd-working (European Commission 2021).

These developments go together with changes in working conditions, for example, in the working environment and aspects of employees' terms and conditions of employment. They can be divided into physical and psychosocial working conditions (Eurofound 2011). Whereas physical working conditions include ergonomic, biological, chemical and other physical factors, such as heavy lifting, psychosocial working conditions include the organisation of work, work content and working time, as well as job security, but also interpersonal relationships at work and work-life balance (Eurofound, 2011; Rugulies, 2019). While many changes in physical working conditions are considered beneficial for workers (for example, jobs are less physically demanding), there is a public debate about whether psychosocial working conditions have worsened over recent years (van der Noordt et al. 2019; Vendramin and Parent-Thirion 2019). For example, employers increasingly expect their employees to be mobile and flexible and to provide services 'on demand', while often subjecting those employees to fixed-term and non-standard work contracts. Consequently, job demands are increasing while insecure employment conditions are becoming more common (Blustein and Guarino 2020; László et al. 2010; Wilson et al. 2020), but clear evidence of such deterioration and the prevalence of working conditions and their trends remains scarce (Burr 2021).

The conditions under which we work, however, have been considered an important driver of health. Adverse working conditions, in particular, can have harmful effects on employees' health and well-being and have been associated with negative health outcomes among the affected employees, including higher rates of morbidity (for example, hypertension or obesity), mortality (such as deaths from cardiovascular disease) and psychiatric morbidity and mortality (including common and severe forms of mental ill-health, suicide and parasuicide) (Bambra 2011b). Furthermore, adverse working conditions also explain parts of the social gradient in health, as

several studies have shown (Hämmig and Bauer 2013; Hoven et al. 2021). A vast amount of research accumulated over recent decades clearly shows that disadvantaged employees (such as those in the lowest paid jobs, with low qualifications or working in insecure employment) have worse health outcomes than more advantaged employees (for example, those in better paid jobs or more favourable employment conditions) (Hoven et al. 2015; Hoven et al. 2021; Hoven and Siegrist 2013). Moreover, within the group of disadvantaged employees, working conditions and their health consequences are not distributed equally, but experienced intersectionally¹ (Bambra 2022; Crenshaw 1989, 2017; Gkiouleka et al. 2018). This means that different (occupational) inequalities tend to intersect (for example, low-income women with children or immigrant workers), leading to cumulative disadvantages. Multiple forms of adverse psychosocial working conditions (such as insecure or high-stress work) seem to be more prevalent amongst certain subpopulations of the workforce (such as low-skilled workers). Early pandemic evidence, for instance, shows that mothers with small children were especially exposed to adverse working conditions (Lonska et al. 2021; Schieman et al. 2021). Hence, different social groups experience different levels of disadvantage or benefit associated with different characteristics. Consequently, social inequalities in health outcomes are cumulative, additive and integrated, leading to different levels of health disadvantage. An inclusive and intersectional lens should therefore be applied when investigating the impact of working conditions on health.

In addition to differences between groups of employees in terms of psychosocial working conditions and health, there are also differences by country. Despite Europe-wide directives on safety and health at work, there are still important differences in the presence of adverse psychosocial working conditions across Europe, linked to differences in Member-State workplace policies and legislation (Lunau et al. 2017; Yarmolyuk-Kröck 2022). For example, in Scandinavian countries, employees are less likely to be exposed to adverse psychosocial working conditions due to the presence of specific health and safety legislation, as well as stronger job security and social security policies, while in Eastern Europe, employees are much more likely to experience adverse working psychosocial conditions, possibly because of a lack of legal regulations (Niedhammer et al. 2012; Yarmolyuk-Kröck 2022).

With this in mind, changes in psychosocial working conditions and their impact on health are likely to affect employees differentially through cumulative and overlapping structures of inequalities, including age, gender, socioeconomic position, geography and political environment. Especially in the context of Covid-19, analyses that investigate intersectional inequalities, are cross-country comparative and determine how policy measures contribute

1. Intersectionality considers that social categories (such as socio-economic status, gender or ethnicity) are mutually constructed and together lead to complex experiences of social inequalities.

to psychosocial working conditions and health, are scarce. Thus, the aim of the present report is threefold:

1. We aim to investigate trends in psychosocial working conditions and mental well-being across Europe.
2. We aim to identify the groups most affected by changes in psychosocial working conditions and poor mental health.
3. We aim to explore cross-country differences and how policies and interventions can help in reducing health inequalities by improving psychosocial working conditions.

The report is structured as follows: Chapter 2 provides the theoretical background, presenting theoretical models conceptualising the effects of an adverse psychosocial work environment on health and well-being. Chapter 3 presents the analytic approach we have used to investigate trends in psychosocial working conditions and psychosocial working conditions related to health inequalities. Chapter 4 presents the results of this analysis. Chapter 5 reflects on these findings and provides an overview of the policy literature on improving health inequalities through the work environment, and puts forward some policy recommendations. Chapter 6 provides conclusions.

2. Theoretical background

The aim of this chapter is to provide a comprehensive overview of existing theories, frameworks and conceptual models that have been used to explain links between the work environment and health. It presents core information on health inequalities and seminal work-stress models, including the Demand-Control-Support model and the Effort-Reward Imbalance model. The chapter provides the rationale of the report and the statistical analysis.

2.1 Health inequalities

‘Health inequality’ refers to systematic differences in health in terms of socioeconomic position (usually measured in terms of income, education or occupational class). Inequalities in health by socioeconomic position are not restricted to differences between the most privileged and the most disadvantaged groups. Health inequalities exist across the entire social gradient (Marmot and Wilkinson 2005). Even before the Covid-19 pandemic, there was emerging evidence that health inequalities were increasing in Europe. While average life expectancy at birth in the European Union (EU) increased from 79.4 years in 2008 to 81.0 in 2016, these increases were smaller among men and women with a lower level of education (Forster et al. 2018). The Covid-19 pandemic has also been extremely unequal socio-economically, in terms of both immediate health and longer-term economic and social impacts (Bambra et al. 2020). For example, in England, during the first wave of the pandemic, 45 per cent of patients admitted to hospital with Covid-19 were from the most deprived 20 per cent of the population (Sapey et al. 2020). German research found that Covid-19 hospitalisation rates varied by employment situation, with the long-term unemployed almost twice as likely to be hospitalised as those in employment (Dragano et al. 2020). In Sweden, the highest excess mortality related to Covid-19 in March, April and May 2020 occurred in areas with the lowest income, lowest education, lowest share of Swedish-born and the lowest share of employment (Calderón-Larrañaga et al. 2020). Occupational inequalities have also been well documented in countries as diverse as England and Sweden, with higher mortality rates in lower occupations (such as construction workers, security guards, factory workers and cleaners) (Bambra et al. 2021). There is also evidence of significantly higher Covid-19 deaths across Europe among ethnic minorities and migrant populations (Bambra et al. 2021).

The causes of these health inequalities – both pre- and post-pandemic – are multiple and there are differing views on them in the literature. Four broad approaches dominate: cultural-behavioural, materialist, psychosocial, and political-economic (Bartley 2017). The latter two theories are of most relevance when considering the work environment and health inequalities.

2.2 Psychosocial work environment

Over the past three decades, the workplace landscape has shifted. Overtly physical demands (such as heavy lifting and carrying) and hazards (such as exposure to noise, vibrations, or hazardous chemicals) associated with industrial employment have been displaced for the majority of workers by psychosocial stressors typical of jobs in the increasingly dominant service sector. The workplace has thus changed from somewhere with a predominantly material influence on health, to one that also has psychosocial effects. The ‘psychosocial work environment’ is a collective way of referring to psychological and social influences on health, such as time pressure, monotonous work, social reciprocity, job control and autonomy, fairness, work demands, and job insecurity, as well as social contact between co-workers and supervisors. On the positive side, the psychosocial work environment can also help to foster feelings of self-efficacy and self-esteem (such as supportive social and managerial networks, feelings of autonomy and control over how work is undertaken and appropriate recognition and reward for contributions made).

A number of conceptual frameworks have been developed to seek to explain the effects of the psychosocial work environment on health. The most popular contemporary theoretical models include (a) the demand-control-support model; (b) the effort-reward imbalance theory; and (c) the organisational-injustice theory (Bambra 2011a; Siegrist and Wege 2020). The next section briefly outlines these three main theoretical approaches.

2.2.1 Demand-control-support model

The demand-control model or the job strain model was first developed by Karasek and Theorell (Karasek 1979; Karasek and Theorell 1990). They hypothesised that jobs with high psychological demands, coupled with low levels of control or decision latitude were associated with increased exposure to stress and related ill-health effects. Psychological demands were conceptualised in terms of time pressure, high work pace, high workload and conflicting demands, while control or decision latitude was defined as including decision authority (control over workload) and skill discretion (variety of work and skill development and utilisation). According to their model, jobs characterised by excessive psychological demands in combination with low control are ‘high stress’ jobs because they do not enable individual autonomy and are often conducted in high pressure contexts, which can lead to an increased risk of stress-related morbidity (Karasek 1979; Karasek and

Theorell 1990). Conversely, work with high demands but also high control is termed ‘active work’ as the worker is able to manage their own workload and has a high degree of choice and autonomy over how the work is undertaken. Karasek and Theorell (1990) suggest that strain and learning are related, so that opportunities to learn new skills mitigate the stress-inducing effects of high-strain inactive jobs. Conversely, ‘passive jobs’, characterised by low demands and low control, are likely to have fewer opportunities for learning. In the late 1980s, Johnson and colleagues extended the Demand-Control model to include the influence of social *support* as a mediating factor in the relationship between high demands, low control and ill health (Johnson and Hall 1988; Johnson et al. 1989). It was suggested that the presence of social support from co-workers and supervisors in the workplace might in some way moderate or act as a buffer to reduce ill-health effects (Stansfeld et al. 1997).

2.2.2 Effort-reward imbalance

This represents an alternative hypothesis, which is centred on the concept of social reciprocity in the work contract (Marmot et al. 2006). Social reciprocity involves ‘mutual co-operative investments based on the norm of return expectancy, where efforts are assumed to be equalised by respective rewards’ (Gouldner 1960; Siegrist 2005). Social reciprocity is at the heart of the work contract: certain tasks or obligations are performed in exchange for equitable rewards. The premise of the effort-reward imbalance model is that psychosocial stress results from a mismatch between the efforts made by workers and the rewards they receive from their employer in terms of pay, esteem, job security and career opportunities (Siegrist 1996). Working with inequitable rewards when balanced against the efforts exerted is thought to induce prolonged stress responses, which can lead to adverse health outcomes (Siegrist et al. 2009). In contrast, where the balance between efforts and rewards is perceived to be more equitable (that is, when sufficient rewards are received), positive emotions are elicited, leading to sustained health and well-being. A failure to equalise efforts and rewards over time results in high stress levels and subsequent stress-related ill health.

2.2.3 Organisational injustice

The organisational injustice theory is more recent. It focuses on issues of fairness, justice and equity in the workplace. This is a significant extension of the demand-control-support and effort-reward imbalance models of the relationship between the psychosocial environment and health because it captures the importance of equity and fairness at work. The emergence of atypical forms of employment (including flexitime, part-time working and precarious work) and changing workforce demographics has increased interest in the notion of organisational justice. It comprises three aspects: procedural justice (related to formal decision-making procedures), distributive justice (the fairness and equity of decisions), and relational justice (the fairness of supervisors’ actions and decisions) (Stansfeld and Candy 2006). High levels

of perceived justice in the workplace invoke a sense of psychological security and cooperation, while low levels are thought to result in demotivation, lack of stability, increased stress and the associated elevated risks for both physical and mental ill-health (Head et al. 2007). Although aspects of the organisational injustice explanation of work-related stress coincide with the other models of psychosocial stress, the concept helps to identify other important constructs which shape the psychosocial work environment, such as *discrimination* (Elovainio et al. 2002), which may have significant influences on the pathway between work stress and ill health.

2.3 Psychosocial work environment and health

There is a very sizeable literature that links the psychosocial work environment (working conditions) with various stress-related physical (for example, cardiovascular disease, diabetes or musculoskeletal conditions) and mental health conditions (such as depressive symptoms, major depression, anxiety) among the general working-age population. For example, there is an extensive international literature on associations between the demand-control-support model and coronary heart disease (Kivimäki et al. 2012; Sara et al. 2018; Taouk et al. 2020). A systematic review, for instance, with coronary heart disease as the outcome, found that the hazard ratio for job strain versus no job strain was 1.23 (95% CI: 1.10–1.37) (Kivimäki et al. 2012). High demands, low control and low social support have also been associated with obesity (Jääskeläinen et al. 2015), metabolic syndrome (Edwards et al. 2012), musculoskeletal disorders (such as lower back pain and upper limb pain) (Lang et al. 2012), and mental ill-health (Fagerlind Ståhl et al. 2018; Oksanen et al. 2010). Research has also shown that effort-reward imbalance or failed reciprocity increases the risk of various stress-related illnesses, including cardiovascular disease (Dragano et al. 2017) and poor mental health (Lunau et al. 2013; Rugulies et al. 2017). Research further suggests that relational injustice at work is related to cardiovascular morbidity and mortality (Elovainio et al. 2006; Kivimäki et al. 2005), sickness absence (Leineweber et al. 2017), and mental ill-health (Lee et al. 2019), as well as risky health behaviours (Kouvonen et al. 2008).

Other adverse conditions that have been linked to poor health include precarious or contingent employment. Precarious or contingent employment is characterised by a lack of security and stability and includes, among other things, informal work, temporary or fixed-term work and contract work (Benach et al. 2014; Benach et al. 2007; Hadden et al. 2007). It has been associated with stress, fatigue, backache and muscular pains, injuries, poor mental health and adverse health-related behaviours (Artazcoz et al. 2005; Ferrie et al. 2002; Kivimäki et al. 2003; Méndez R. et al. 2021).

2.3.1 Inequalities in psychosocial working conditions and health

Evidence shows that psychosocial working conditions are socio-economically patterned, with jobs at the lower end of the socioeconomic hierarchy more likely to entail higher exposure to adverse conditions than those towards the higher end (Bambra 2011b; Hoven et al. 2020; Rigó et al. 2021). Rigó et al. (2021). For instance, note that low status occupations tend to be associated with high job strain (Rigó et al. 2021). Furthermore, the distribution of low control and low support has been shown to follow the social gradient (with high job strain being found in low status workers). Analysis of European Working Conditions Survey data shows that for job demands (repetition, tight deadlines, machine paced, monotonous) and control at work (control over tasks or speed of tasks, consulted about changes), there are stark differences between the highest and lowest occupational positions (Bambra 2011b). For example, in terms of demands at work, monotonous work was around 50 per cent higher among plant and machine operators and assemblers and elementary occupations compared with higher occupations, such as legislators, senior officials and managers (35 per cent), and professionals (<30 per cent). Furthermore, the burden of asymmetry between efforts and rewards also tends to be disproportionately shouldered by lower socioeconomic groups who lack flexibility because of their low skill level or lack of mobility (Siegrist et al. 2004) and precarious work is concentrated among lower income, lower-skilled workers (Bambra 2011b).

2.3.2 Intersectional inequalities in working conditions

Although in health inequality research, intersectionality has developed to become a theoretically well-established concept and has gained prominence, there are still relatively few empirical analyses of intersectionality. Bambra (2022), for example, notes that most health inequality studies focus on one factor at a time, such as gender or education or income, but not do not consider their simultaneous interaction. The intersectional approach puts this dichotomous stance aside and seeks to address inequalities in terms of the cumulative, additive and integrated nature of different elements of social position (for example, class, race, gender). While today there is compelling evidence regarding inequalities in the work experiences of individuals with single disadvantages (such as female, low socioeconomic position), research on how multiple and combined disadvantages – thus intersectionality – affect workplace experiences is scarce. With regard to the working environment, there is a pioneering analysis by Crenshaw (Crenshaw 1989). As early as the late 1980s Crenshaw put forward the idea that the workplace experiences of black women were markedly different from those of white women and black men. Crenshaw (1989) explains this by the negative dual effects of race and gender. Crenshaw (1989) further highlights that black women took the least prestigious and lowest paying jobs and that employers discriminate against black women in terms of pay and promotion. Hence, these early findings from Crenshaw highlight that the intertwined relation between race and gender can substantially affect the personal working environment. However, not

only race and gender but also age, immigration status, educational level and socioeconomic position can be crucial for the work experience (de los Reyes 2017). McDowell et al. (2009) for instance investigated working conditions in London and found differences among migrant workers, with migrants from outside the EU (with no automatic residence and work permit) facing the most precarious working conditions. This finding is supported by more recent research by Lavaysse et al. (2018) who found that individuals facing several stigmatised identities, such as having a minority sexual orientation, being older or a veteran reported greater perceptions of job insecurity. Thus, when looking into inequalities in health and working conditions an intersectional approach should be applied to identify groups at greatest risk.

2.4 Psychosocial work environment and institutional conditions

The psychosocial work environment is not just the result of local employer/organisational factors. Workplaces and working conditions are also influenced by the broader institutional context, including the labour market (for example, un/employment rates), the welfare system (social security rates for people out of work, active labour market policies), and the occupational health and safety legislation (such as the right to flexible working). Thus an individual workplace does not exist in a vacuum, but is shaped by the wider economic, political and social context – and this must be considered when thinking about how work environments impact on health (Siegrist and Theorell) The macro social, political and economic environment, particularly the labour market and levels of social protection (welfare state regimes) (Eikemo and Bambra 2008), influences the psychosocial work environment, as well as the other social determinants of health. For example, the relationship between job insecurity or job loss and poor health is less pronounced in countries with more extensive social security systems, which improve the ability of individuals to cope with stressful events. Epidemiological work which has compared whether relationships between stressful psychosocial work environments and health differ in terms of a country's institutional characteristics, has shown a lower prevalence of hazardous psychosocial working conditions in countries with more comprehensive institutional protections (such as Sweden or Norway). In addition, the effects on health and health inequalities of adverse psychosocial work environments are also lessened in these countries (Dragano et al. 2011; Sekine et al. 2009). Comparative European health research that examined how the psychosocial work environment varies by a country's institutional characteristics, such as a country's welfare regime types, labour policy and economy-related macro indicators,² found that between-country variations in psychosocial work

2. Welfare state regime is a way of categorising the different forms of welfare state capitalism into different types, including Liberal (such as the United Kingdom and Ireland), Conservative (for example, Germany and France) and Social Democratic (including Sweden and Denmark). For a detailed overview see: Eikemo and Bambra (2008).

environments were explained largely by institutional characteristics, with poorer quality work in countries with less emphasis on workers' protection (Dragano et al. 2011). Likewise, the effects of quality of work on depressive symptoms were strongest in countries that provided the least institutional level protections in terms of active labour policies, social protection measures and health and safety legislation. Similarly, Lunau et al. (2020) who investigated the relationship between changes in labour market policies and in work stress found that an increase in active labour market policies (for example, skill enhancement, training programmes) decrease the level of work stress.

2.5 Summary

This chapter has set out the importance of the psychosocial work environment to health and examined the unequal socioeconomic distribution of psychosocial working conditions in Europe. It has explored the role of institutional characteristics in cross-European variation in the psychosocial work environment and health relationship. Given this context, and gaps in the current evidence base, it is important to formally assess the contribution that working conditions make to social inequalities in health in Europe. It is also important to examine how working conditions – and their health inequalities impacts – vary across Europe in terms of institutional contexts. Exploring this – pre- and post-Covid – is the focus of this report. The next chapter outlines the data and methods we use to do this.

3. Data and methods

The following chapter provides an overview of the data sources, the sample, the principal variables constructed from the data sets and the methods used in the data analysis.

3.1 Data

To analyse the trends in psychosocial working conditions and their effects on individual health, as well as related sociodemographic health inequalities in Europe, this report used data from Eurofound's 2010 and 2015 European Working Conditions Surveys (EWCS) and the Living, Working and Covid-19 Survey (second wave 2020, June/July) (Covid-19 survey).

European Working Conditions Survey

The EWCS is a periodic cross-sectional survey carried out in 35 European countries every five years by Eurofound since 1990. The survey provides detailed information on workers' working conditions and demographic characteristics. The aim of the EWCS is the long-term observation of working conditions in Europe, collecting information on different aspects of working conditions, risk groups, and working condition trends. It covers various topics such as working hours, work organisation, physical and psychosocial workloads, safety at work, and employee health. For the present study, data from two survey waves were included: 2010 and 2015. Both waves selected participants by drawing a multi-stage, stratified clustered sampling design in each country. The sample size ranged from 1,000 to 4,000 cases per country in wave 5 and from 1,000 to 3,300 in wave 6. A more detailed description of the methodology can be found in the technical reports (Eurofound 2010, 2015).

Living, Working and Covid-19

In addition to the EWCS, data from Eurofound's new survey on 'Living, Working and Covid-19' – asking people living in the European Union (EU) about their working conditions and health during the Covid-19 pandemic – was used (Eurofound 2020). The Covid-19 survey is a three-wave panel study and was launched by Eurofound in April 2020. We use the data from the second wave, which was collected from 22 June to 27 July in 2020, as it contains a more comprehensive assessment than the first survey wave.

The dataset provides detailed information on living and working conditions during the Covid-19 pandemic in EU Member States. Unlike Eurofound's EWCS, the Covid-19 survey applied uncontrolled convenience sampling by distributing the survey link on social media and among Eurofound's contacts and stakeholders targeting hard-to-reach groups (Sandor and Ahrendt 2020). Although this method produces a non-representative sample, a sample weight based on demographic characteristics (that is, gender, age, education, self-defined urbanisation levels) is provided by Eurofound to obtain data representative of the demographic profile of the EU27 as whole and each individual Member State (Eurofound 2020). The sample size ranged from 358 (Luxembourg) to 1,649 (Portugal). While the lengths of the periods the questionnaires refer to are somewhat different – past twelve months in the EWCS vs past month in the Covid-19 survey – the EWCS 2010/2015 and the second wave of the Covid-19 survey are comparable on most items included in the analyses. A more detailed description of the methodology can be found in the technical report (Sandor and Ahrendt 2020).

3.2 Study sample

The combined sample of the 2010/2015 waves of the EWCS and the second wave of the Covid-19 survey from 2020 comprises 93,183 (EWCS 2010: n=34,897; EWCS 2015: n=34,142; Covid-19: n=24,144) respondents from 27 European countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Germany, Estonia, Greece, Hungary, Finland, France, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden. For the analysis, we excluded individuals older than 65 or younger than 18 years (EWCS 2010: n=959; EWCS 2015: n=1360; Covid-19: n=3779); unemployed and retired respondents, as well as full-time homemakers, students, and participants with long-term illness or disability – potential answers (categories) listed as work situation (EWCS) / employment status (Covid-19) in the surveys – or missing data on employment status (EWCS 2010: n=1285; EWCS 2015: n=1644; Covid-19: n=6088); those with missing information on sex or reporting a gender other than male or female (EWCS 2010: n=0; EWCS 2015: n=6; Covid-19: n=179); and respondents with missing data on mental well-being (EWCS 2010: n=539; EWCS 2015: n=248; Covid-19: n=95).

3.3 Variables and measures

The analysis of data in this report is guided by seminal theories of psychosocial risks at work and employee health, such as the JDCA and ERI. In the analyses, we distinguish primarily between demands, resources and job insecurity. We further include other psychosocial risks at work, such as work–life conflict and work–life imbalance. Table 1 provides an overview of the indicators assessed in both the EWCS and the Covid-19 survey.

Psychosocial working conditions

We focused on four domains of psychosocial working conditions: (i) job demands, (ii) job resources, (iii) job insecurity and (iv) other psychosocial working conditions (such as work–life conflict), for which solid evidence on associations with health is available. For all four domains, indicator questions were available in the EWCS and Covid-19 surveys.³ Regarding the comparability of indicators over time, it must be noted that some variables collected are identical in both the EWCS and the Covid-19 survey. Other factors may deviate, however, especially in the period assessed by the survey questions.

Job demands

In the present study, job demands refer to aspects of a job that require sustained psychological effort and can have negative effects on employees' mental health. In the EWCS 2010/2015, job demands were assessed based on the following questions:

1. 'Select the response which best describes your work situation – You have enough time to get the job done.' A binary variable was created for the analyses based on the possible answers: 'rarely'/'never' vs 'always'/'most of the time'/'sometimes'.
2. 'Does your job involve working at very high speed?'/'Does your job involve working to tight deadlines?' For both questions, answer categories were dichotomised into 'all of the time'/'almost all of the time'/'around ¾ of the time'/'around half of the time'/'around ¼ of the time' vs 'almost never'/'never'.
3. 'Over the last 12 months, how often have you worked in your free time to meet work demands?' Possible answers were dichotomised into 'daily'/'several times a week' vs 'several times a month'/'less often'/'never'.

In the Covid-19 survey, job demands were assessed based on the following questions:

1. 'Select the response which best describes your current work situation – You have enough time to get the job done.' Similar to the EWCS 2010/2015 surveys, the following binary variable was created based on the possible answers: 'rarely'/'never' vs 'always'/'most of the time'/'sometimes'.
2. 'Over the last 2 weeks, how often have you worked in your free time to meet work demands?' The answer options included 'every day', 'every other day', 'once or twice a week', 'less often', and 'never'. For the analyses, responses were recoded into a dichotomous variable ('once or twice a week'/'every other day'/'every day' vs 'less often'/'never').

3. The EWCS contained information on a larger number of exposures but the Covid-19 survey included only a limited number of questions on working conditions. Therefore, we had to restrict our analyses to a smaller number of single psychosocial working conditions.

Furthermore, long working hours and changes in working hours were included as a dimension of job demands. In the EWCS 2010/2015 survey, the following questions assessed average working hours and changes in working hours⁴:

1. 'How many hours do you usually work per week in your main paid job?'
2. 'How many hours a week on average do you work in job(s) other than your main paid job?'
3. 'During the last 12 months, has your work changed in any of the following ways – the number of hours you work per week?' Possible answers included 'increased', 'no change', or 'decreased' in the EWCS 2010, and 'increased a lot', 'increased a little', 'no change', 'decreased a little', or 'decreased a lot' in the EWCS 2015.

Answers were regrouped for the EWCS 2015 survey into three categories ('increased', 'no change', and 'decreased') to harmonise it with the EWCS 2010.

In the Covid-19 2020 survey, the following questions assessed average working hours and changes in working hours.

1. 'Last month, how many hours per week did you work on average?'
2. 'During the Covid-19 pandemic, have your working hours ... increased a lot, increased a little, stayed the same, decreased a little, or decreased a lot?'

Answer options were categorised similarly to the EWCS 2010/2015 surveys for better comparability (working ≥ 48 hours vs < 48 hours per week / increased, no change, or decreased working hours).

Job (in)security

Job security is part of ERI and one dimension of reward (Siegrist et al. 2004). Job security was assessed by the following question: 'How likely or unlikely do you think it is that you might lose your job in the next 6 months (EWCS)/3 months (Covid-19 survey)?' The question was rated on a 5-point Likert scale, with 1 being 'very unlikely' and 5 being 'very likely'. For the analysis, answers were grouped into 'job security', consisting of the first three categories, and 'job insecurity', consisting of the last two categories.

Job resources

Job resources were based on indicators of social relations and workplace support. Two questions measured workplace support in the EWCS 2010/2015 and Covid-19 surveys: 'For each of the following statements, please select the

4. Working hours were calculated by summing up the number of hours worked in a respondent's main and other paid jobs per week, then answers were recoded into two categories – based on the European Working Time Directive – to represent long working hours: working ≥ 48 hours/week vs working < 48 hours/week (European Commission 2003).

response which best describes your current work situation – Your colleagues (or peers – Covid-19 survey) help and support you/Your manager helps and supports you.’ Potential answers for both questions included ‘always’, ‘most of the time’, ‘sometimes’, ‘rarely’, or ‘never’, and were dichotomised for the analyses (‘always’/‘most of the time’/‘sometimes’ vs ‘rarely’/‘never’).

Table 1 Psychosocial working conditions and health parameters assessed in the EWCS and Covid-19 surveys

	EWCS 2010	EWCS 2015	Covid-19 wave2 (2020)
Psychosocial working conditions			
Job demands			
Not enough time to get job done	✓	✓	✓
Working at very high speed	✓	✓	–
Working to tight deadlines	✓	✓	–
Working in free time to meet demands*	✓	✓	✓
Long working hours*	✓	✓	✓
Change of working hours*	✓	✓	✓
Job insecurity*	✓	✓	✓
Job resources			
Support from colleagues	✓	✓	✓
Support from manager	✓	✓	✓
Other psychosocial working conditions			
Work-life conflict			
Too tired after work to do household work	–	✓	✓
Job prevents giving time to your family	–	✓	✓
Work-life balance			
Difficult to concentrate on job because of family	–	✓	✓
Family prevents giving time to your job	–	✓	✓
Worrying about work outside of working hours			
Worry about work when not working	–	✓	✓
Experiencing stress	✓	✓	–
Precarious employment			
Temporary contract	✓	✓	✓
Multiple job-holding	✓	✓	–
Health outcome			
Mental well-being	✓	✓	✓
Sociodemographic variables			
Gender	✓	✓	✓
Age	✓	✓	✓
Education*	✓	✓	✓
Work sector*	✓	✓	✓

Notes: * Slight deviations in the measurement of the respective indicators between questionnaires.

Other psychosocial working conditions

– Work–life conflict

Work–life conflict is understood as a form of inter-role conflict that arises when the behavioural demands of the work role conflict with those of the family role (Kossek and Lee 2017). In this regard, work–life conflict is an extension of work–family conflict, reflecting the reality that the work role may interfere with individuals' other personal life roles and interests (Greenhaus and Beutell 1985). Following the framework of resources and demands suggested by Voydanoff (2005), the combination of two questions in the EWCS 2015 and Covid-19 surveys covered conflict originating in the workplace and affecting the non-work domain. The question is 'How often in the last month (Covid-19 survey) / last 12 months (EWCS 2015), have you...' and the statements are: (a) felt too tired after work to do some of the household jobs which need to be done and (b) found that your job prevented you from giving the time you wanted to your family. Answers ranged from 'always' to 'never' on a 5-point Likert scale. For the analyses, a dichotomous variable was created, in terms of which respondents were considered to have a work–life conflict if they answered 'always', 'most of the time', or 'sometimes' to at least one of the two statements (vs 'rarely'/'never' to both).

– Work–life balance

According to Eurofound, work–life balance can be understood as a 'satisfactory state of equilibrium between an individual's work and private life' (Eurofound 2021). The EWCS and the Covid-19 surveys include a set of three questions that measure work–life balance. These include 'How often in the last month (Covid-19 survey)/last 12 months (EWCS 2015), have you: (a) found it difficult to concentrate on your job because of your family responsibilities and (b) found that your family responsibilities prevented you from giving the time you should do your job. Answer options included 'always', 'most of the time', 'sometimes', 'rarely', and 'never'. Responses were dichotomised and respondents were considered to have a work–life imbalance if they answered 'always', 'most of the time', or 'sometimes' to at least one of the two statements (vs 'rarely'/'never' to both).

– Worrying about work outside of working hours

Apart from job-related characteristics (demands, reward), ERI, for example, includes personal characteristics such as worrying about work outside of working hours. Numerous studies have shown that worrying about work outside of working hours can trigger adverse health effects, such as depression. In the present study, worrying about work outside of working hours was measured by asking respondents 'How often in the last month (Covid-19 survey)/last 12 months (EWCS 2015), have you kept worrying about work when you were not working'. Answer options included 'always', 'most of the time', 'sometimes', 'rarely', and 'never'. Responses were dichotomised into 'always'/'most of the time'/'sometimes' vs 'rarely'/'never'.

– Experiencing stress

The EWCS 2010 and 2015 surveys asked participants whether they experience stress in their work. Answer options ranged from ‘never’ to ‘always’ on a 5-point Likert scale, and were dichotomised for the analyses (‘always’/‘most of the time’/‘sometimes’ vs ‘rarely’/‘never’).

Precarious employment

Precarious employment was defined as a deviation from standard employment relations, such as a permanent, full-time working contract. The following indicators were considered for the analyses: temporary contract and multiple job-holding. In the analyses, a temporary contract was a binary variable, defined as having a ‘contract of limited duration’, ‘a temporary employment agency contract’, or ‘no contract’. Multiple job-holding was based on the question ‘Besides your main paid job, do you have any other paid job(s)?’ in the EWCS surveys, and answers were dichotomised into ‘Yes, regular’/‘Yes, occasional’ vs ‘No other paid job’/‘Other’. Multiple job-holding was not assessed in the Covid-19 survey.

Mental well-being

In the EWCS 2010/2015 and Covid-19 surveys, mental well-being was measured using the WHO Five Well-Being Index (WHO-5), a short self-reported measure of current mental well-being (Topp et al. 2015). The WHO-5 consists of five statements, which respondents rate according to a 6-point Likert scale, ranging from 0 (At no time) to 5 (All of the time). The WHO-5 statements include the following: ‘Over the last two weeks, a) I have felt cheerful and in good spirits, b) calm and relaxed, c) active and vigorous, d) I woke up feeling fresh and rested, and e) My daily life has been filled with things that interest me.’ Thus, the total raw score can range from 0 to 25. The score is then multiplied by 4 to produce a final score, where a score of 50 or below represents the worst imaginable mental well-being (risk of depression) and a score above 50 represents the best imaginable well-being (not at risk of depression).

Sociodemographic factors and other control variables

In addition to indicators of psychosocial working conditions, we considered age (continuous), gender (‘male’ vs ‘female’), education (‘primary’, ‘secondary’, or ‘tertiary’), household size (1, 2, 3, 4, or ≥ 5 people in the household), parental status (‘at least 1 child aged <18 years in the household’ vs ‘none’) and economic activity (10 work sectors) as variables that might influence both the perception of psychosocial working conditions and mental well-being.

Education was assessed in the EWCS 2010 and 2015 surveys according to the 2011 International Standard Classification of Education (ISCED). In the Covid-19 survey, three education levels were defined: primary, secondary and tertiary. For the analyses, the EWCS ISCED categories were also regrouped

into primary (pre-primary or primary education), secondary (lower secondary, upper secondary, or post-secondary non-tertiary education), and tertiary (first and second stages of tertiary education) education.

Information on respondents' economic activities was collected according to the first and second revisions of NACE (the 'statistical classification of economic activities in the European Community') in the EWCS 2010 and 2015 surveys, while ten work sectors were listed in the Covid-19 survey. The EWCS survey's NACE rev. 1 categories were grouped into ten sectors for better comparability (European Commission and Eurostat 1996, 2017). Table 2 provides an overview of the work sectors.

Table 2 Economic activities and work sectors

	Work sectors	NACE rev. 1 categories
1.	Agriculture	A Agriculture, hunting and forestry B Fishing
2.	Industry	C Mining and quarrying D Manufacturing E Electricity, gas, and water supply
3.	Construction	F Construction
4.	Commerce and hospitality	G Wholesale and retail trade; repair of motor vehicles and motorcycles H Hotels and restaurants
5.	Transport	I Transport, storage and communication
6.	Financial services	J Financial intermediation
7.	Public administration	L Public administration and defence; compulsory social security
8.	Education	M Education
9.	Health	N Health and social work
10	Other services	O Other service activities P Activities of households Q Activities of extraterritorial organisations and bodies K Real estate activities

3.4 Statistical analyses

Through our statistical analysis of the data we aimed to (a) descriptively investigate trends in psychosocial working conditions and mental health across Europe, (b) identify groups most affected by adverse psychosocial working conditions and poor mental health, and (c) explore whether policies and interventions at national level correlate with the degree of health inequalities in general and inequalities in the psychosocial work environment. Stata version 16 and SAS v.9.4 (SAS Institute) were used to perform the analyses. An α -level of 0.05 was employed to determine statistical significance.

The analyses started by summarising trends in psychosocial working conditions and health across Europe. Specifically, to investigate trends in health-related psychosocial working conditions, we first compared changes in working conditions across the different survey years, using descriptive statistics. We used the missing indicator method to handle missing exposure and covariate data (item missingness: EWCS 2010: 0.0%–7.6%; EWCS 2015: 0.0%–10.75%; Covid-19 2020: 0.0%–14.38%).

To assess the associations between psychosocial working conditions and mental well-being among EWCS respondents, we applied multilevel linear regression analyses with individual-level data (level 1), nested within 54 country-years (level 2), nested within 27 EU countries (level 3). The second level includes two respective periods – 2010 and 2015 – for each of the 27 EU countries, equalling 54 country-years. Taking into consideration the notable differences between the EWCS and Covid-19 survey questions, separate analyses were conducted among the Covid-19 Wave 2 survey participants, employing two-level hierarchical regressions – individuals nested within 27 EU countries – to explore potential changes in the associations between psychosocial working conditions and health during the pandemic. For both the EWCS and the Covid-19 surveys, the following four models were estimated: model 1 was a univariate model (each psychosocial working condition measure was assessed separately); model 2 controlled for age and gender; model 3 was further adjusted for education, household size, parental status and occupation; while model 4 was mutually adjusted for all psychosocial working condition variables, precarious employment, and the covariates. The mutually adjusted model shows the relative importance of all included variables compared with each other.

Multilevel modelling is especially appropriate for data with a hierarchical structure, such as the EWCS and the Covid-19 surveys. All models incorporated survey weights to 1) EWCS: account for the study design and take the relative size of the workforce in each of the 27 EU countries into account; 2) Covid-19 survey: correct for age crossed with gender (12 age/gender categories), education (two categories: tertiary and below tertiary) and urbanisation level (two categories: urban and rural), as well as country population aged 18 and over.

Sociodemographic inequalities

In the present study, we investigated gender, age, education, and sector of work/economic activities to capture the multidimensionality of workers' deprivation as inequalities resulting from these factors continue to pose a challenge in the labour market. For instance, women tend to be overrepresented in occupations such as health care, hospitality and retail, which are characterised by adverse working conditions, such as temporary contracts and low wages. Thus, to identify whether trends and associations between psychosocial working conditions and mental well-being differ between different subgroups of workers, we examined interaction terms between (a) working conditions, gender and survey years, as well as (b) working conditions and occupation. In

addition, to explore the impact of factors intersecting with gender, first, a new variable was created combining gender and education levels with six possible categories:

1. Men with primary education
2. Men with secondary education
3. Men with tertiary education
4. Women with primary education
5. Women with secondary education
6. Women with tertiary education

Then, two- and three-way interaction terms were tested and visualised between (a) age categories (18–35, 36–55, or 56–65 years) and the new ‘gender and education’ variable to estimate predicted probabilities of selected working conditions by employee subgroups; and (b) psychosocial working conditions, age categories, and the ‘gender and education’ variable to assess how the effects of psychosocial working conditions on health might differ depending on the defined subgroups.

Furthermore, to compare trends among the EU27 countries, an additive Psychosocial Working Conditions (PWC) score was created, based on eight parameters, which were assessed both in the EWCS 2015 and the Covid-19 2020 Wave 2 surveys:

1. Job insecurity
2. Not enough time to get job done
3. Working in free time to meet demands
4. Worrying about work outside working hours
5. Work–life conflict
6. Work–life imbalance
7. Long working hours (≥ 48 hours per week)
8. No support from colleagues

The question about the support received from managers was excluded because, in the EWCS surveys, self-employed participants were not asked to answer this question. All included factors were coded as a binary (1 vs 0) variable, where 1 denotes a negative experience. After all eight parameters were summed, the final PWC scores ranged between 0 and 8, with higher scores indicating worse psychosocial working conditions. Because of the small number of respondents – especially in the Covid-19 survey – in certain work sectors in several EU27 countries (such as agriculture), country groups were created for all country comparison analyses, based on (a) welfare state regime type and (b) the Gender Equality Index.

Grouping according to welfare state

Countries were first grouped according to the predominant welfare state regime type. For this purpose, we used the Ferrera classification, as adapted by Bamba and Eikemo (2008). It distinguishes five types of welfare regimes:

Scandinavian, Anglo–Saxon, Bismarckian, Southern European, and Eastern European. The Eastern European group included in this study is large and heterogeneous. Therefore, we divided these countries into two groups: Former Soviet Union (FSU) and Central/Eastern European countries (CEE).

1. Scandinavian (Denmark, Finland and Sweden)
2. Anglo–Saxon (Ireland)
3. Bismarckian (Austria, Belgium, France, Germany, Luxembourg and Netherlands)
4. Southern European (Cyprus, Greece, Italy, Malta, Portugal and Spain)
5. Former Soviet Union (Estonia, Latvia and Lithuania)
6. Central/Eastern European (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia)

Grouping according to the Gender Equality Index

The Gender Equality Index⁵ is a composite indicator that measures gender equality across the EU over time. It was developed by the European Institute for Gender Equality (EIGE) and is based on the EU policy framework to assist in monitoring the progress of gender equality across the EU over time. The index ranges from 1 to 100, with higher scores representing better gender equality. In 2020 the EU average was 67.4 and currently countries can be grouped as follows:

1. above EU average (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, Netherlands, Spain and Sweden);
2. below EU average (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia).

For the country trend analyses, (a) two-way interaction terms between country groups and the PWC score, (b) three-way interaction terms among country groups, the PWC score and sex/age groups, as well as (c) three-way interaction terms among country groups, the PWC score and work sectors were tested using linear regression models based on the EWCS 2015 and the Covid-19 2020 Wave 2 survey data. The models were adjusted for age.

3.5 Summary

The purpose of this chapter was to outline the research methodology used to investigate psychosocial working conditions–related health inequalities in Europe. A detailed description of the study participants, variables and statistical approach was provided.

5. <https://eige.europa.eu/gender-equality-index/2021/compare-countries>

4. Results

4.1 Sample characteristics

Table 3 provides an overview of the sample characteristics in 2010, 2015 and 2020. In 2010, the participants' mean age was 40.9 (SD= 10.5). Around 45 per cent identified as female and 95 per cent had at least a secondary education. In 2015, the respondents' mean age was 42.6, (SD= 10.7) with 48 per cent identifying as female and 97 per cent having at least a secondary education. In 2020, participants were slightly older, with a mean age of 44.2 (SD= 10.4). A total of 49 per cent were female and 93 per cent reported having at least a secondary education (Table 3). In 2010, the highest proportion of respondents worked in the industry (18 per cent), the commerce and hospitality sector (18 per cent), or provided other services (16 per cent). The corresponding proportions were 17, 20 and 18 per cent, respectively, in 2015; and 11, 11 and 32 per cent, respectively, in 2020 (Table 3).

Table 3 Sample characteristics for the EWCS 2010 and 2015 and Covid-19 Wave 2 survey

	EWCS 2010 (N=31 110) N# (%)	EWCS 2015 (N=30 012) N (%)	Covid-19 2020 (N=14 003) N (%)
Gender			
Female	15 681 (44.8)	15 316 (48.0)	9798 (49.1)
Male			
Age (Mean (SD*))	40.95 (10.5)	42.59 (10.7)	44.16 (10.4)
18–35 years	9747 (34.1)	8494 (29.4)	2664 (27.5)
36–55 years	17 320 (55.4)	16 744 (56.4)	7871 (52.1)
≥56 years	4043 (10.5)	4774 (14.2)	3468 (20.4)
Education ^a			
Primary	1447 (4.5)	1044 (2.7)	257 (3.8)
Secondary	19 880 (65.6)	18 753 (66.7)	3312 (57.7)
Tertiary	9711 (29.7)	10 141 (30.4)	10 075 (35.4)
Work sector ^b			
Agriculture	1170 (5.02)	1156 (3.83)	150 (1.33)
Industry	4890 (17.90)	4740 (17.31)	1091 (11.36)
Construction	2232 (7.96)	1874 (6.56)	368 (3.65)
Commerce / hospitality	6345 (18.22)	6148 (19.55)	1167 (10.88)

	EWCS 2010 (N=31 110) N# (%)	EWCS 2015 (N=30 012) N (%)	Covid-19 2020 (N=14 003) N (%)
Work sector^b			
Transport	1949 (6.63)	2021 (6.79)	408 (5.23)
Financial services	976 (3.06)	847 (2.68)	665 (3.99)
Public administration	2136 (6.35)	1784 (6.10)	2183 (10.84)
Education	2717 (8.11)	2388 (7.31)	1909 (8.08)
Health	3302 (10.12)	3066 (11.33)	1620 (10.11)
Other services	5125 (15.81)	5689 (17.64)	4088 (31.73)

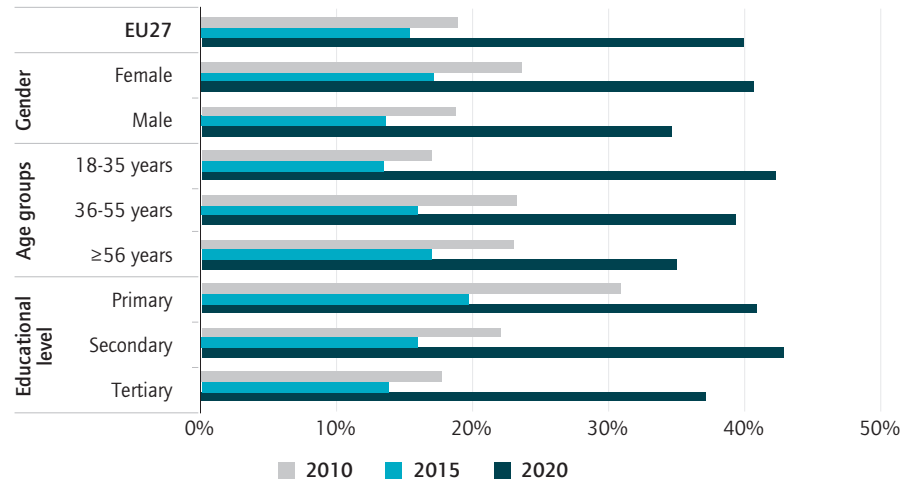
Notes: a) EWCS 2010: n=72 cases missing, EWCS 2015: n=74 cases missing, Covid-19 survey: n=359 cases missing, b) EWCS 2010: n=268 cases missing, EWCS 2015: n=299 cases missing, COVID-19 survey: n=354 cases missing; #=number; *SD=standard deviation

4.2 Trends in mental well-being

The mean WHO-5 well-being score decreased significantly from 68.9 (SD= 18.4) in 2015 to 53.7 (SD= 18.2) in 2020. Specifically, in 2020, two in five adults (40 per cent) on average across EU countries were at risk of depression; while in 2010 it was one in five adults (19 per cent) (Figure 1). The burden of poor mental health, however, was also not equally distributed. Female respondents more often reported being at risk of depression than male respondents and this gap increased between 2010 and 2020 (Figure 1). A significant difference in the proportion of risk of depression was also noted for educational level and age groups. Throughout the years, those with a lower level of education showed worse mental health than those with a higher level. As for age groups, in 2010 and 2015, older employees were more likely to report low mental well-being than younger ones. During the pandemic, however, this trend was reversed, with a higher proportion of younger respondents (that is, 18–35 years of age) being at risk of depression compared with those aged 56 years or older.

There were also large differences in the prevalence of the risk of depression between the EU Member States (Figure 2). In 2010, respondents from Latvia (31 per cent) and Lithuania (39 per cent) were the most likely to report low mental well-being. In contrast, respondents from Denmark (6 per cent), Ireland (9 per cent), Spain (9 per cent) and the Netherlands (10 per cent) were the least likely to be at risk of depression. During the pandemic, the countries with the highest proportion of respondents at risk of depression were Italy (39 per cent) and Romania (49 per cent). Finland (28 per cent), Denmark (29 per cent) and the Netherlands (30 per cent), on the other hand, had the smallest proportions of respondents at risk of depression.

Figure 1 Proportion of respondents at risk of depression, EU27 (%)

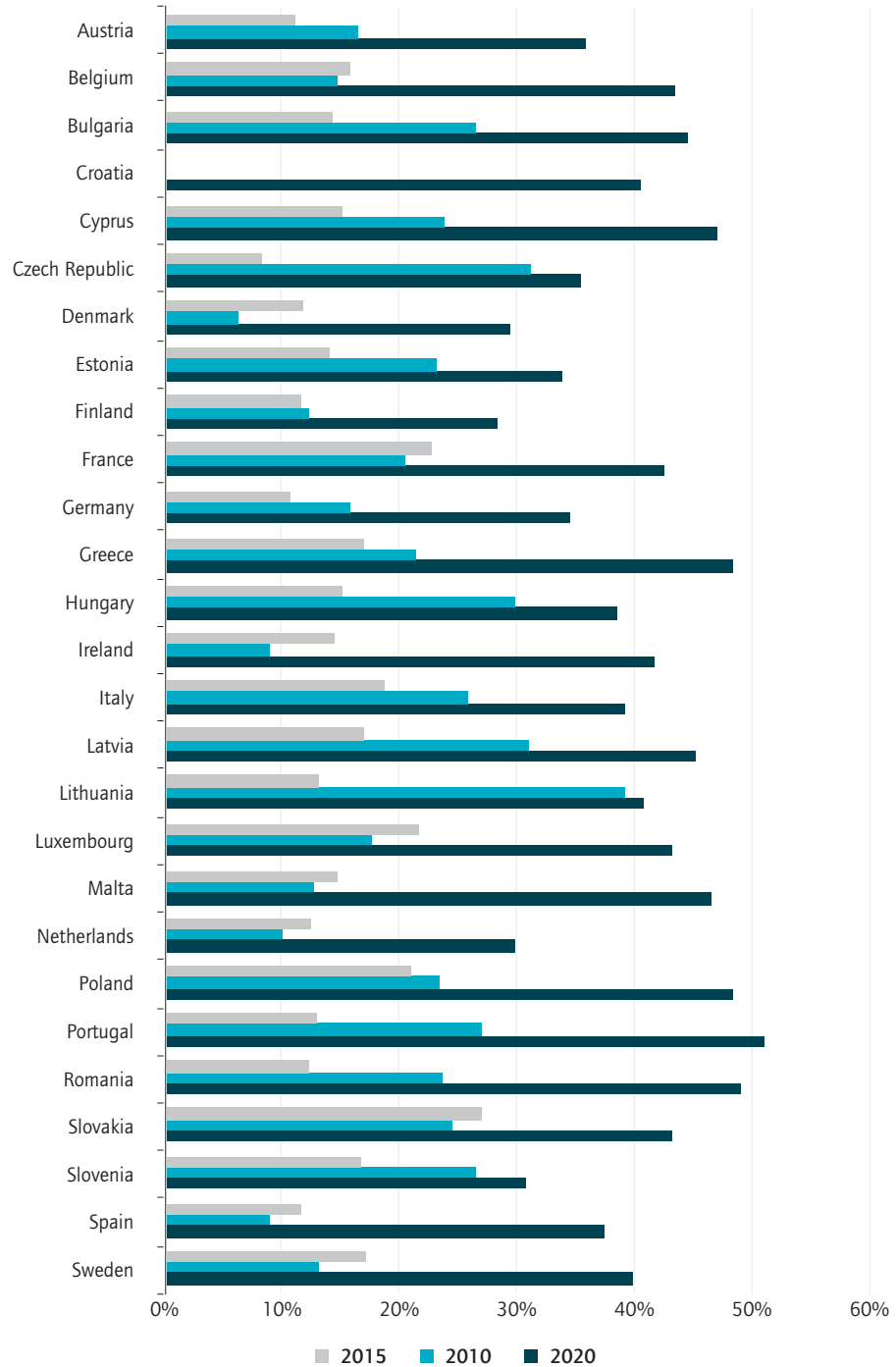


Note: Percentages are weighted; differences across countries may reflect, at least in part, differences in Covid-19-related measures; risk of depression was measured using the WHO-5 mental-well-being index; for the present analysis a binary variable was used with a WHO-5 mental-well-being index score of ≤ 50 representing signs of risk of depression.

4.3 Trends in working conditions

The proportion of respondents feeling job insecurity decreased from 15 to 8 per cent between 2010 and 2020, while the prevalence of having a temporary contract increased from 14 to 15 per cent during the same period. The percentage of employees feeling that they do not have enough time to get their job done rose from 9 per cent in 2010 to 12 per cent in 2020. An increase was also noted in working in free time, which increased by 17 per cent between 2010 and 2020 (Table 4). Work-life conflict and also work-life imbalance increased nearly 12 per cent and 6 per cent, respectively, between 2015 and 2020. A slight increase, from 16 to 18 per cent, in the proportion of respondents working 48 hours or more per week could be observed from 2015 to 2020. However, compared with 2015, there was a marked increase in the percentage of employees reporting decreased current working hours during the pandemic (7 per cent in 2015 vs 37 per cent in 2020). Changes in social relations at the workplace were observed during the same period. An increased proportion of respondents reported having received support from colleagues (79 per cent in 2015 vs 81 per cent in 2020), while the prevalence of receiving support from managers slightly decreased between 2015 and 2020 (67 per cent in 2015 vs 62 per cent in 2020).

Figure 2 Prevalence of risk of depression by country in 2010, 2015 and 2020



Note: Percentages are weighted; differences across countries may reflect at least in part differences in Covid-19-related measures; depressive symptoms were measured using the WHO-5 mental-well-being index; for the present analysis a binary variable was used with a WHO-5 mental-well-being index score of ≤ 50 representing risk of depression.

Table 4 Trends in working conditions

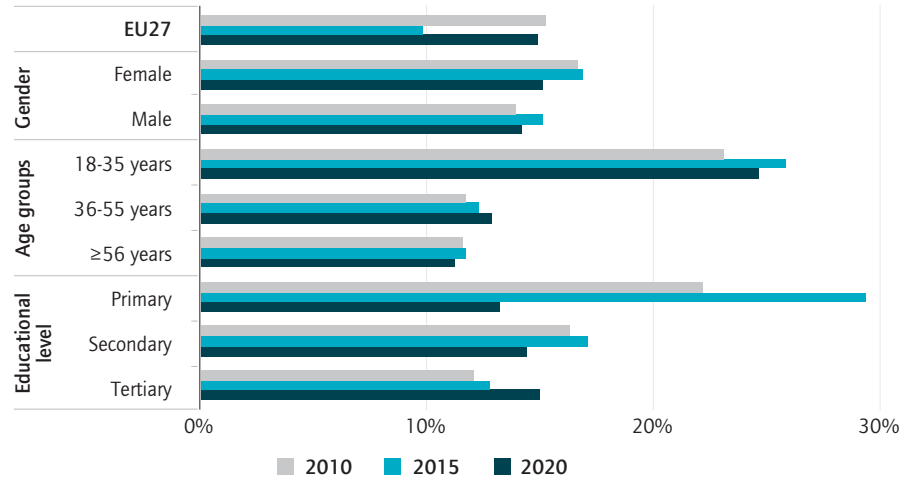
	EWCS 2010 (N=31 110) N (%)	EWCS 2015 (N=30 012) N (%)	Covid-19 2020 (N=14 003) N (%)
Psychosocial working conditions			
Job demands			
Not enough time to get job done	2694 (8.7)	2724 (9.6)	1854 (12.2)
Working at very high speed	18 459 (61.7)	18 432 (62.0)	–
Working to tight deadlines	18 635 (61.6)	18 776 (63.3)	–
Working in free time to meet demands	4607 (14.7)	2649 (7.7)	5746 (32.0)
Long working hours	5047 (16.7)	4924 (15.6)	2918 (18.5)
Change in working hours			
Increase	5059 (17.7)	5719 (20.2)	4627 (25.8)
Decrease	3505 (10.0)	1987 (6.6)	4138 (36.6)
Job insecurity	5618 (15.3)	4518 (14.5)	925 (7.9)
Job resources			
Support from colleagues	25 099 (78.7)	24 183 (78.7)	11 611 (80.6)
Support from manager	21 109 (64.1)	21 110 (66.5)	8974 (62.3)
Other psychosocial working conditions			
Work–life conflict	–	19 495 (63.3)	10 840 (75.1)
Work–life imbalance	–	7771 (27.2)	4986 (33.5)
Worrying about work outside of working hours	–	12 945 (39.7)	8435 (57.0)
Experiencing stress	20 338 (67.8)	19 591 (66.8)	–
Precarious Employment			
Temporary contract	4774 (14.0)	4816 (15.0)	1803 (15.4)
Multiple job-holding	2369 (7.1)	2354 (7.5)	–

Figure 3 offers a descriptive picture of having a temporary contract by gender, age categories and education levels. Clearly, it was not equally distributed. The proportion of respondents having a temporary contract was higher among female employees and those aged 18–35 years throughout the period from 2010 to 2020. However, while among EWCS 2010 and 2015 respondents those with a primary level of education were the most likely to have a temporary contract, in the Covid-19 survey this was true for employees with tertiary education (Figure 3).

Further analysis estimating predicted probabilities of having a temporary contract by age, sex and education confirmed that in the EWCS surveys, young respondents (18–35 years) were the most likely to have a temporary contract, regardless of education level, closely followed by women and men with primary education aged 36 to 55 years. The results were somewhat similar among Covid-19 survey participants. In 2020, however, young men and women (18–35 years) with primary education had relatively low predicted probabilities of having a temporary contract compared with respondents with higher educational attainment in the same age group. In addition, among respondents aged 36 to 55 years, men with primary education had the lowest,

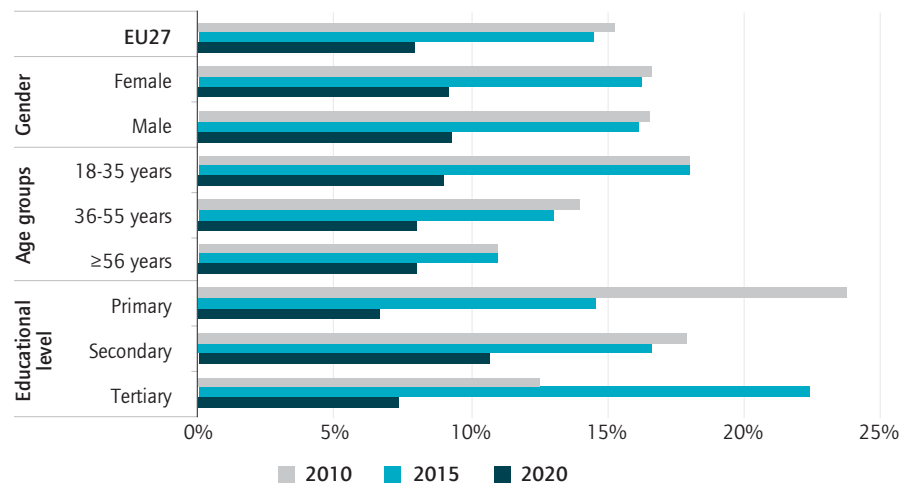
while women with primary education had the highest predicted probability of having a temporary contract.

Figure 3 Trends in having a temporary contract by sociodemographic characteristics



Furthermore, over the years, younger employees aged 18 to 35 years of age worried about losing their job more often (18 per cent in 2010 and 2015, and 9 per cent in 2020) compared with persons aged 36 to 55 years (14 per cent in 2010, 13 per cent in 2015, and 8 per cent in 2020) and persons aged ≥56 years (11 per cent in 2010 and 2015, and 8 per cent in 2020) (Figure 4).

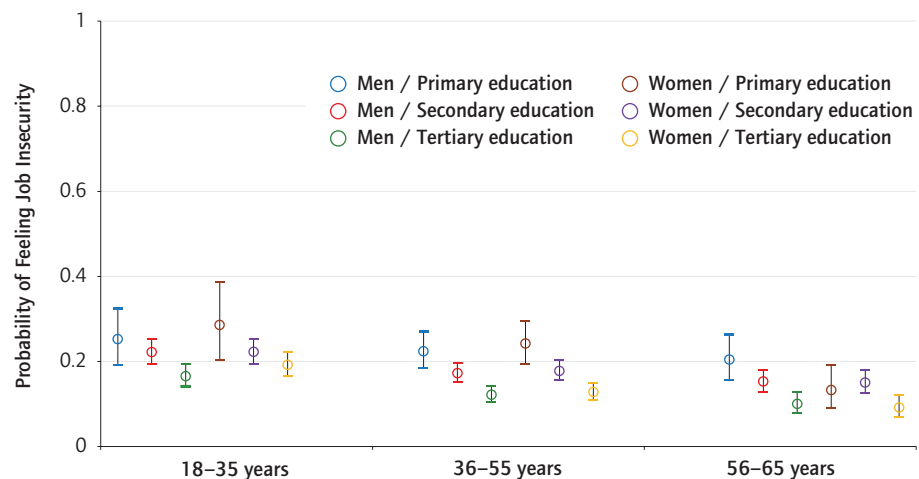
Figure 4 Trends of job insecurity by sociodemographic characteristics



In the EWCS surveys, the estimated predicted probabilities of job insecurity also showed that young men and women (18–35 years) had higher probabilities of feeling job insecurity compared with their counterparts with the same educational level aged 36 years or older. In addition, in the first (18–35 years) and second (36–55 years) age groups, men and women with primary education showed the highest predicted probabilities of job insecurity, while in the oldest age group (56–65 years) this was true only for men with primary education (Figure 5). During the pandemic, the predicted probabilities of feeling job insecurity were generally lower and more evenly distributed among different subgroups – based on age, sex and education – compared with 2010 and 2015, while women aged 18 to 35 years with primary or secondary education showed the highest probabilities of job insecurity (Figure 6).

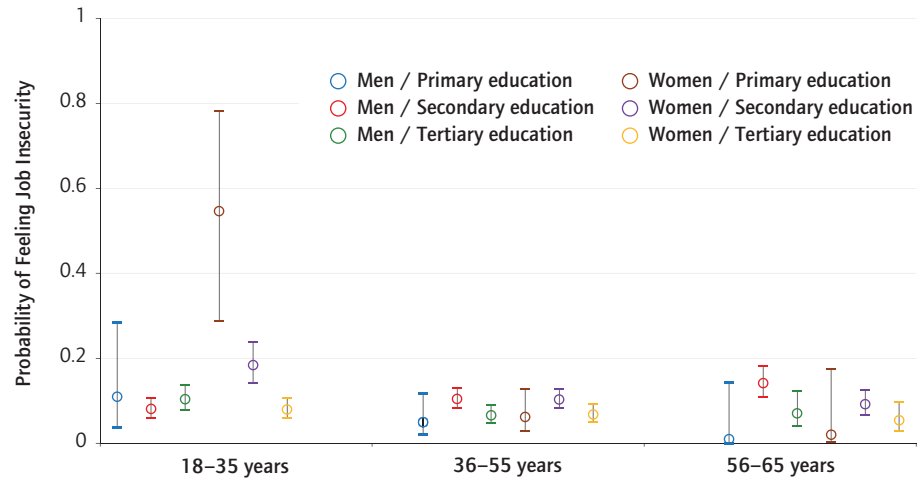
Significant differences were also noted between EU Member States. While job insecurity decreased in the EU27 countries between 2010 and 2020, there are large differences between countries. In 2010, Lithuania (41 per cent) and Estonia (35 per cent) had the highest proportions of respondents expressing job insecurity, whereas the proportions were lowest in Denmark (9 per cent), Austria (10 per cent) and Luxembourg (10 per cent). During the pandemic, in 2020, the proportions were highest in Bulgaria (20 per cent) and Malta (18 per cent) and lowest in Austria (3 per cent), Denmark (4 per cent), Hungary (5 per cent) and Poland (6 per cent) (Figure 7).

Figure 5 Predicted probabilities for job insecurity by sociodemographic characteristics for the EWCS survey



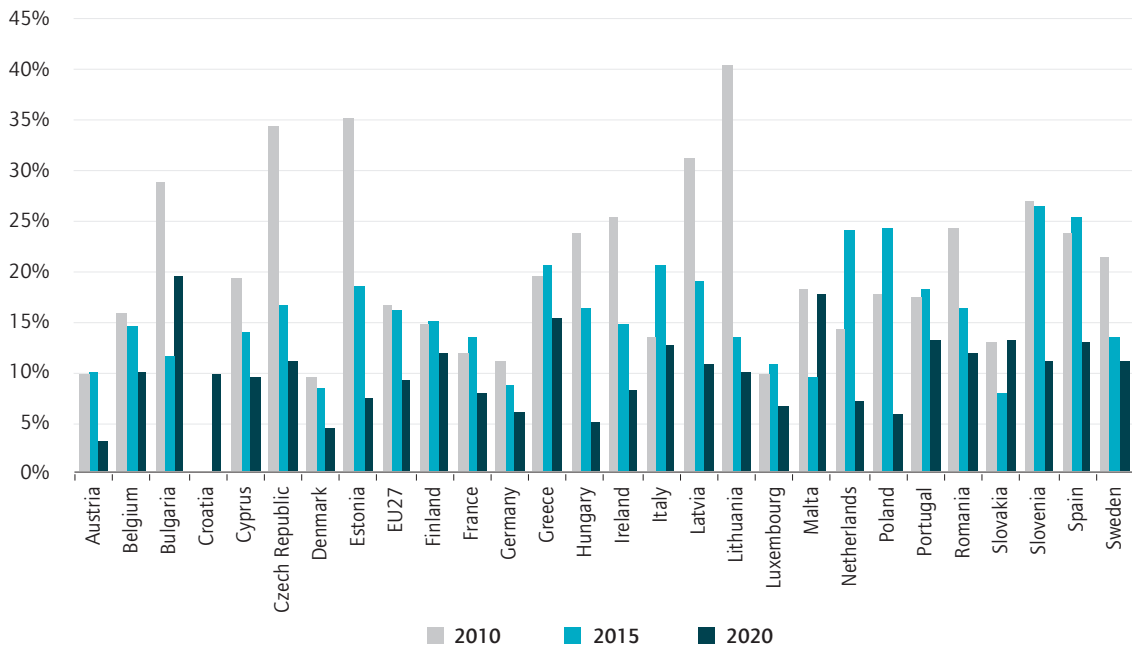
Note: Predicted probabilities based on a pooled multilevel analysis of the EWCS sample (2010 and 2015) with interaction terms between age groups and sex/education groups.

Figure 6 Predicted probabilities for job insecurity by sociodemographic characteristics during Covid-19 pandemic



Note: Predicted probabilities based on a multilevel analysis of the Covid-19 survey with interaction terms between age groups and sex/education groups.

Figure 7 Job insecurity by country



Note: Percentages are weighted; differences across countries may reflect at least in part differences in Covid-19 related measures.

4.4 Working conditions, sociodemographic factors, and mental well-being

Table 5 presents effect estimates with 95 per cent confidence intervals (CIs) for the associations between mental well-being and working conditions and sociodemographic characteristics among respondents of the EWCS 2010 and 2015 surveys located in the EU27 countries.

The results for the unconditional means model show that 4.2 per cent of the variance in WHO-5 scores occurs at the country-year level, while 0.3 per cent occurs at the country level (data not shown). In the multivariable-adjusted models (Table 5, Model 3), all examined measures related to psychosocial working conditions were statistically significantly associated with mental well-being. Among psychosocial working conditions, insufficient time to get the job done was associated with a -10.20 point decrease, work-life conflict with a -9.87 point decrease, work-life imbalance with a -9.13 point decrease, worrying about work outside of working hours with a -7.83 point decrease, experiencing stress with a -7.48 point decrease, and feeling job insecurity with a -5.38 point decrease in WHO-5 well-being scores. Receiving support from colleagues or a manager, on the other hand, was associated with a 5.61 point and a 7.66 point increase in well-being scores, respectively, and thus with better mental health.

When examining sociodemographic characteristics, being a woman or older than 35 years of age was associated with a -2.75 point and a -2.52 to -2.67 point lower well-being score, respectively. Having low (primary) education and working in the transport sector also showed strong negative associations with mental health (-3.85 points and -2.02 points, respectively) (Table 5, Model 3).

The corresponding effect estimates among Covid-19 Wave 2 survey participants were -7.60 for insufficient time, -12.04 and -9.72 for work-life conflict and imbalance, respectively, -10.85 for worrying about work outside of working hours, -11.64 for job insecurity, 9.99 for receiving support from colleagues, 10.07 for receiving support from a manager, -4.99 for women, 1.35 to 4.01 for being older than 35 years of age, -2.83 for primary education, and -5.44 for working in the commerce and hospitality sector (Table 6, Model 3).

Table 5 Multilevel models for mental well-being for the EWCS 2010 and EWCS 2015 surveys

WHO-5 Score (EWCS 2010 / 2015) (N=61,122)	Model 1		Model 2		Model 3	
	Estimate*	95% CI	Estimate*	95% CI	Estimate*	95% CI
Psychosocial working conditions						
Job demands						
(Not) enough time to get job done	-10.16	(-10.70, -9.62)	-10.14	(-10.68, -9.60)	-10.20	(-10.74, -9.66)
Working at very high speed	-4.38	(-4.71, -4.05)	-4.77	(-5.10, -4.44)	-4.67	(-5.01, -4.34)
Working to tight deadlines	-3.64	(-3.96, -3.31)	-4.05	(-4.38, -3.73)	-4.00	(-4.34, -3.67)
Working in free time to meet demands	-3.17	(-3.67, -2.67)	-3.11	(-3.61, -2.61)	-3.63	(-4.14, -3.12)
Long working hours – ≥48 hours/week	-1.36	(-1.79, -0.93)	-1.66	(-2.10, -1.22)	-1.67	(-2.11, -1.22)
Working hours change – Ref.: No change						
Increase	-2.68	(-3.09, -2.28)	-2.98	(-3.39, -2.58)	-3.13	(-3.53, -2.72)
Decrease	-4.59	(-5.16, -4.02)	-4.63	(-5.20, -4.06)	-4.44	(-5.01, -3.87)
Job insecurity	-5.30	(-5.74, -4.85)	-5.55	(-6.00, -5.11)	-5.38	(-5.82, -4.93)
Job resources						
Support from colleagues ²	6.08	(5.55, 6.62)	5.80	(5.28, 6.33)	5.61	(5.08, 6.14)
Support from manager	7.93	(7.49, 8.36)	7.85	(7.41, 8.28)	7.66	(7.22, 8.10)
Other psychosocial working conditions						
Work–life conflict¹	-9.87	(-10.32, -9.43)	-9.82	(-10.26, -9.37)	-9.87	(-10.32, -9.42)
Work–life (im)balance¹	-9.11	(-9.59, -8.62)	-9.05	(-9.54, -8.56)	-9.13	(-9.62, -8.64)
Worrying about work outside of working hours						
Worrying about work ¹	-7.48	(-7.94, -7.02)	-7.39	(-7.85, -6.93)	-7.83	(-8.29, -7.36)
Experiencing stress	-7.33	(-7.67, -6.99)	-7.30	(-7.64, -6.97)	-7.48	(-7.81, -7.14)
Precarious employment						
Temporary contract	-1.15	(-1.60, -0.70)	-1.85	(-2.31, -1.39)	-1.79	(-2.26, -1.33)
Multiple job-holding	-2.06	(-2.66, -1.45)	-2.25	(-2.85, -1.65)	-2.46	(-3.07, -1.86)
Sociodemographic variables						
Gender – Female	-2.15	(-2.47, -1.83)	-2.18	(-2.50, -1.86)	-2.75	(-3.10, -2.41)
Age – Ref.: 18–35 years						
36–55 years	-2.58	(-2.93, -2.23)	-2.56	(-2.91, -2.21)	-2.52	(-2.87, -2.16)
≥56 years	-2.82	(-3.35, -2.29)	-2.88	(-3.41, -2.35)	-2.67	(-3.21, -2.12)
Education – Ref.: Tertiary						
Secondary	-0.83	(-1.18, -0.48)	-0.94	(-1.29, -0.59)	-0.49	(-0.87, -0.11)
Primary	-5.03	(-5.93, -4.12)	-4.34	(-5.25, -3.43)	-3.85	(-4.79, -2.92)
Work sector – Ref.: Public administration						
Agriculture	-0.50	(-1.47, 0.46)	-0.79	(-1.75, 0.17)	-0.21	(-1.18, 0.77)
Industry	-1.21	(-1.92, -0.49)	-1.87	(-2.59, -1.16)	-1.69	(-2.41, -0.97)
Construction	-0.18	(-1.02, 0.66)	-1.54	(-2.39, -0.70)	-1.27	(-2.12, -0.42)
Commerce / hospitality	-0.18	(-0.89, 0.53)	-0.63	(-1.34, 0.08)	-0.43	(-1.15, 0.28)
Transport	-1.36	(-2.22, -0.51)	-2.20	(-3.06, -1.35)	-2.02	(-2.88, -1.16)
Financial services	0.48	(-0.62, 1.57)	0.19	(-0.90, 1.29)	0.12	(-0.97, 1.21)
Education	0.62	(-0.21, 1.45)	1.18	(0.35, 2.01)	0.96	(0.12, 1.79)
Health	-0.35	(-1.13, 0.42)	0.38	(-0.40, 1.17)	0.39	(-0.39, 1.17)
Other services	-0.55	(-1.28, 0.17)	-0.68	(-1.40, 0.04)	-0.58	(-1.30, 0.14)

Note: Model 1 is univariate / Model 2 is age- and sex-adjusted / Model 3 is further adjusted for education, household size, parental status, and work sector. *Effect estimates are unstandardised; ¹The variable is not available in EWCS 2010. Results are based on 2-level hierarchical models where observations (level 1) are nested within countries (level2) (N=30,012); ²After controlling for age and sex, there is no (or not enough) variation for the country-level random effects to be estimated. Model 2 and 3 results are based on 2-level hierarchical models, where observations (level 1) are nested within country-years (level2).

Table 6 Multilevel models for mental well-being for the Covid-19 Wave 2, 2020 survey

WHO-5 Score (COVID-19 / 2020 Wave 2) (N=14,003)	Model 1		Model 2		Model 3	
	Estimate*	95% CI	Estimate*	95% CI	Estimate*	95% CI
Psychosocial working conditions						
Job demands						
(Not) enough time to get job done	-7.09	(-8.13, -6.05)	-7.11	(-8.13, -6.08)	-7.60	(-8.63, -6.58)
Working at very high speed	-	-	-	-	-	-
Working to tight deadlines	-	-	-	-	-	-
Working in free time to meet demands	-3.76	(-4.49, -3.02)	-3.75	(-4.48, -3.01)	-4.54	(-5.29, -3.80)
Long working hours – ≥48 hours/week	1.40	(0.51, 2.29)	1.12	(0.23, 2.00)	1.25	(0.37, 2.13)
Working hours change – Ref.: No change						
Increase	-2.10	(-2.97, -1.22)	-1.53	(-2.40, -0.66)	-1.98	(-2.85, -1.11)
Decrease	-4.07	(-4.87, -3.28)	-4.00	(-4.79, -3.21)	-3.59	(-4.38, -2.79)
Job insecurity	-12.16	(-13.42, -10.90)	-12.05	(-13.31, -10.80)	-11.64	(-12.90, -10.39)
Job resources						
Support from colleagues ²	10.56	(9.64, 11.48)	10.49	(9.58, 11.41)	9.99	(9.08, 10.90)
Support from manager	10.40	(9.58, 11.22)	10.31	(9.50, 11.12)	10.07	(9.26, 10.88)
Other psychosocial working conditions						
Work–life conflict	-12.78	(-13.55, -12.00)	-12.27	(-13.05, -11.50)	-12.04	(-12.81, -11.27)
Work–life (im)balance	-9.38	(-10.10, -8.67)	-8.97	(-9.68, -8.26)	-9.72	(-10.45, -8.98)
Worrying about work outside of working hours						
Worrying about work	-11.35	(-12.04, -10.66)	-11.03	(-11.72, -10.34)	-10.85	(-11.55, -10.16)
Experiencing stress	-	-	-	-	-	-
Precarious employment						
Temporary contract	-1.48	(-2.45, -0.51)	-0.65	(-1.62, 0.32)	-0.72	(-1.69, 0.25)
Multiple job-holding	-	-	-	-	-	-
Sociodemographic variables						
Gender – Female	-4.55	(-5.25, -3.86)	-4.70	(-5.39, -4.00)	-4.99	(-5.71, -4.28)
Age – Ref.: 18–35 years						
36–55 years	1.23	(0.42, 2.04)	1.52	(0.71, 2.32)	1.35	(0.53, 2.18)
≥56 years	3.24	(2.24, 4.24)	3.55	(2.55, 4.54)	4.01	(2.99, 5.03)
Education – Ref.: Tertiary						
Secondary	-1.43	(-2.17, -0.69)	-2.39	(-3.14, -1.64)	-1.86	(-2.64, -1.08)
Primary	-2.40	(-4.24, -0.55)	-3.56	(-5.39, -1.72)	-2.83	(-4.67, -0.99)
Work sector – Ref.: Public administration						
Agriculture	-0.07	(-3.13, 3.00)	0.31	(-2.73, 3.35)	0.18	(-2.86, 3.21)
Industry	-2.04	(-3.48, -0.61)	-2.86	(-4.28, -1.43)	-2.20	(-3.64, -0.76)
Construction	0.16	(-1.88, 2.19)	-1.13	(-3.15, 0.90)	-1.23	(-3.27, 0.80)
Commerce / hospitality	-6.02	(-7.47, -4.58)	-5.99	(-7.43, -4.56)	-5.44	(-6.90, -3.98)
Transport	-0.23	(-2.02, 1.55)	-1.85	(-3.63, -0.06)	-1.01	(-2.81, 0.79)
Financial services	2.60	(0.63, 4.56)	2.01	(0.07, 3.96)	2.30	(0.35, 4.25)
Education	1.01	(-0.54, 2.57)	1.59	(0.05, 3.14)	1.55	(0.01, 3.08)
Health	-1.94	(-3.41, -0.47)	-1.29	(-2.76, 0.17)	-1.10	(-2.57, 0.37)
Other services	-3.80	(-4.98, -2.61)	-3.75	(-4.92, -2.57)	-3.58	(-4.76, -2.40)

Note: Model 1 is univariate / Model 2 is age- and sex-adjusted / Model 3 is further adjusted for education, household size, parental status, and work sector. *Effect estimates are unstandardised.

When all exposure variables – including all psychosocial working condition variables and precarious employment – were assessed simultaneously in the same model, with covariate adjustment, the associations between mental health and working to tight deadlines, working in free time, having a temporary contract and multiple job-holding became statistically insignificant (Table 7, Model 4b). While the point estimates became attenuated, however, all other examined factors – as well as the sociodemographic variables – remained significantly associated with WHO-5 scores. Among psychosocial working condition measures, having insufficient time to get the job done (–8.00 points), work–life conflict (–5.57 points), work–life imbalance (–4.55 points), experiencing stress (–4.35 points) and decreased working hours (–3.47 points) showed the strongest negative associations with mental well-being (Table 7, Model 4b). As for sociodemographic factors, having low (primary) education and being female was associated with a –4.90 point and a –2.14 point decrease in WHO-5 scores, respectively, while working in agriculture (1.68 points), education (1.54 points), or in the health sector (1.10 points) was associated with better mental health compared with public administration work (Table 7, Model 4b).

Similarly, among Covid-19 Wave 2 survey respondents, working in free time was no longer statistically significantly associated with mental health after mutual adjustment. During the pandemic, work–life conflict (–8.53 points), job insecurity (–7.87 points), worrying about work (–7.36 points) and work–life imbalance (–5.12 points) showed the strongest negative associations with mental health among the assessed psychosocial working conditions (Table 8, Model 4). Having low (primary) education or being female was also associated with lowered WHO-5 scores (–3.45 points and –3.38 points, respectively), while working in education (3.68 points) was still linked to better mental well-being (Table 8, Model 4).

When testing for statistical interactions with sex among EWCS 2010 and 2015 participants (Table S1), we observed stronger negative associations between primary education (–3.57 points; p for interaction=0.0001), working at very high speed (–1.18 points; $p<0.001$), working in free time (–1.30 points; $p=0.01$), worrying about work outside of working hours (–1.30 points; $p=0.005$), work–life conflict (–1.42 points; $p=0.003$), work–life imbalance (–1.60 points; $p=0.002$), long working hours (–0.92 points; $p=0.049$), increased working hours (–1.07 points; $p<0.01$) and experiencing stress (–1.22 points; $p<0.001$) and mental well-being among women compared with men. Receiving support from colleagues showed a weaker positive association with mental health among women compared with men (–1.38 points; $p=0.01$). Moreover, women with secondary education had higher WHO-5 score estimates compared with men with the same education level (1.06 points; $p=0.003$).

Table 7 Mutually adjusted multilevel models for mental well-being for the EWCS 2010 and EWCS 2015 surveys

WHO-5 Score (EWCS 2010 / 2015)	Model 4a (N=61,122)		Model 4b (N=30,012)	
	Estimate*	95% CI	Estimate*	95% CI
Psychosocial working conditions				
Job demands				
(Not) enough time to get job done	-6.90	(-7.43, -6.36)	-8.00	(-8.71, -7.28)
Working at very high speed	-2.04	(-2.43, -1.66)	-1.49	(-2.02, -0.95)
Working to tight deadlines	-0.73	(-1.11, -0.34)	0.37	(-0.17, 0.90)
Working in free time to meet demands	-1.15	(-1.67, -0.64)	0.76	(-0.05, 1.58)
Long working hours – ≥48 hours/week	0.04	(-0.42, 0.50)	0.98	(0.35, 1.61)
Working hours change – Ref.: No change				
Increase	-1.61	(-2.01, -1.21)	-0.73	(-1.26, -0.20)
Decrease	-3.48	(-4.04, -2.93)	-3.47	(-4.30, -2.64)
Job insecurity	-3.69	(-4.14, -3.24)	-2.28	(-2.90, -1.66)
Job resources				
Support from colleagues	3.13	(2.58, 3.67)	2.93	(2.19, 3.66)
Support from manager	5.52	(5.07, 5.96)	5.63	(5.02, 6.23)
Other psychosocial working conditions				
Work–life conflict¹	–	–	-5.57	(-6.06, -5.08)
Work–life (im)balance¹	–	–	-4.55	(-5.05, -4.04)
Worrying about work outside of working hours				
Worrying about work ¹	–	–	-2.94	(-3.43, -2.46)
Experiencing stress	-6.11	(-6.46, -5.76)	-4.35	(-4.83, -3.86)
Precarious employment				
Temporary contract	-0.57	(-1.03, -0.10)	-0.61	(-1.24, 0.02)
Multiple job-holding	-1.90	(-2.48, -1.32)	-0.68	(-1.47, 0.10)
Sociodemographic variables				
Gender – Female	-2.59	(-2.93, -2.26)	-2.14	(-2.60, -1.68)
Age – Years	-0.14	(-0.15, -0.12)	-0.10	(-0.12, -0.08)
Education – Ref.: Tertiary				
Secondary	-1.06	(-1.43, -0.70)	-1.53	(-2.03, -1.03)
Primary	-4.08	(-4.98, -3.18)	-4.90	(-6.26, -3.54)
Work sector – Ref.: Public administration				
Agriculture	0.30	(-0.66, 1.27)	1.68	(0.32, 3.03)
Industry	0.09	(-0.61, 0.78)	-0.57	(-1.52, 0.39)
Construction	0.51	(-0.31, 1.34)	-0.61	(-1.77, 0.54)
Commerce / hospitality	0.69	(-0.01, 1.38)	0.08	(-0.87, 1.02)
Transport	0.17	(-0.65, 1.00)	0.01	(-1.12, 1.14)
Financial services	1.22	(0.17, 2.27)	-0.28	(-1.74, 1.17)
Education	1.47	(0.66, 2.28)	1.54	(0.42, 2.65)
Health	1.45	(0.70, 2.20)	1.10	(0.08, 2.12)
Other services	0.60	(-0.10, 1.30)	0.13	(-0.82, 1.08)

Note: Model 4a is a three-level model based on EWCS 2010 and 2015, including all variables listed in the table, as well as household size and parental status; Model 4b is a two-level model based on EWCS 2015, including all variables listed in the table, as well as household size and parental status; *Effect estimates are unstandardised; ¹The variable is not available in EWCS 2010.

Table 8 Mutually adjusted multilevel models for mental well-being for the Covid-19 Wave 2, 2020 survey

WHO-5 Score (Covid-19 / 2020 Wave 2)	Model 4 (N=14,003)	
	Estimate*	95% CI
Psychosocial working conditions		
Job demands		
(Not) enough time to get job done	-2.23	(-3.21, -1.25)
Working at very high speed	-	-
Working to tight deadlines	-	-
Working in free time to meet demands	0.11	(-0.65, 0.87)
Long working hours – ≥48 hours/week	2.50	(1.66, 3.33)
Working hours change – Ref.: No change		
Increase	0.59	(-0.25, 1.44)
Decrease	-1.33	(-2.08, -0.58)
Job insecurity	-7.87	(-9.07, -6.67)
Job resources		
Support from colleagues	5.58	(4.66, 6.50)
Support from manager	5.72	(4.90, 6.55)
Other psychosocial working conditions		
Work-life conflict	-8.53	(-9.31, -7.76)
Work-life (im)balance	-5.12	(-5.84, -4.40)
Worrying about work outside of working hours		
Worrying about work	-7.36	(-8.06, -6.66)
Experiencing stress	-	-
Precarious employment		
Temporary contract	1.83	(0.93, 2.74)
Multiple job-holding	-	-
Sociodemographic variables		
Gender – Female	-3.38	(-4.03, -2.73)
Age – Years	0.11	(0.08, 0.13)
Education – Ref.: Tertiary		
Secondary	-1.81	(-2.53, -1.09)
Primary	-3.45	(-5.12, -1.77)
Work sector – Ref.: Public administration		
Agriculture	0.46	(-2.31, 3.24)
Industry	0.05	(-1.27, 1.38)
Construction	2.21	(0.32, 4.09)
Commerce / hospitality	-1.40	(-2.75, -0.04)
Transport	1.27	(-0.38, 2.92)
Financial services	0.69	(-1.09, 2.46)
Education	3.68	(2.28, 5.08)
Health	0.59	(-0.75, 1.93)
Other services	-1.05	(-2.14, 0.05)

Note: Model 4 is a two-level model including all variables listed in the table, as well as household size and parental status; *Effect estimates are unstandardised.

As for the Covid-19 Wave 2 survey participants, similar stronger negative associations could be observed among women compared with men between primary education (−11.29 points; $p < 0.0001$), long working hours (−5.14 points; $p < 0.0001$), increased working hours (−2.51 points; $p < 0.01$) and mental well-being (Table S2). However, worrying about work outside of working hours (3.35 points; $p < 0.0001$ for women), work–life conflict (1.72 points; $p = 0.03$ for women) and having a temporary contract (7.69 points; $p < 0.0001$ for women) showed a stronger negative association with mental well-being among men. At the same time, being older than 35 years of age (−3.29 points for 36–55 years and −3.89 points for ≥ 56 years; $p < 0.0001$) and having secondary education (−2.67 points; $p = 0.0004$) showed a stronger negative association with WHO-5 scores among women. In addition, women receiving support from their colleagues (2.46 points; $p < 0.01$) or manager (4.31 points; $p < 0.0001$) had higher well-being score estimates compared with their male counterparts in the Covid-19 survey.

4.5 Occupational differences: modification by work sectors

We have explored potential modification by occupation by implementing interaction terms between 10 work sectors, sociodemographic factors and psychosocial working conditions. The public administration sector was used as the reference.

In the EWCS 2010/2015 surveys, the mental well-being of those working in the public administration sector was the most affected by job demands such as insufficient time to get the job done, working at very high speed and working in free time. However, working to tight deadlines showed the strongest negative association with WHO-5 scores among respondents in the financial services sector ($p = 0.03$). In contrast, among Covid-19 survey participants, a stronger negative association was observed between mental health and insufficient time to get the job done in the agriculture ($p < 0.01$) and construction ($p = 0.04$) sectors; as well as between mental health and working in free time in the financial services ($p < 0.0001$), agriculture ($p = 0.02$), construction ($p < 0.001$), industry ($p = 0.002$), commerce/hospitality ($p < 0.01$) and other services ($p = 0.03$) sectors when compared with public administration.

As for working hours, in the EWCS 2010/2015 surveys, those working in education ($p < 0.0001$) were the most negatively affected by ≥ 48 hours of work per week, while in the Covid-19 survey, this held true for respondents from the public administration sector. Decreased working hours showed the strongest negative association with mental health among EWCS 2010/2015 respondents from the construction sector ($p < 0.01$) and among Covid-19 survey participants from the construction ($p < 0.0001$) and industry ($p = 0.0003$) sectors. In addition, in the Covid-19 survey, increased working hours also showed a stronger negative association with health among respondents in the construction ($p < 0.0001$), financial services ($p < 0.001$), commerce/hospitality

($p < 0.01$), industry ($p < 0.01$) and education ($p = 0.02$) sectors compared with those in public administration.

Among EWCS 2010/2015 respondents, job insecurity affected respondents providing financial ($p = 0.01$) or other services ($p = 0.002$) the most, while among Covid-19 Wave 2 2020 participants, apart from the other services sector ($p = 0.03$), the strongest negative association between job insecurity and mental well-being was observed in the construction sector ($p = 0.03$). In addition, in the Covid-19 survey, respondents in the financial services ($p = 0.0003$), construction ($p < 0.0001$), industry ($p < 0.0001$), health ($p < 0.0001$), commerce/hospitality ($p < 0.0001$) and other services ($p < 0.0001$) sectors seemed to be particularly sensitive to the negative mental health effects of having a temporary contract.

Among EWCS 2010/2015 respondents, those in the public administration sector benefitted the most from the positive mental health effects of receiving workplace support, while those in the health ($p = 0.004$) and commerce/hospitality ($p = 0.02$) sectors benefitted the least from receiving support from colleagues, while those in the construction sector ($p = 0.003$) benefitted the least from receiving support from managers. In contrast, in the Covid-19 survey, participants in agriculture benefitted the most from receiving support from colleagues ($p < 0.0001$), while participants from the construction sector greatly benefitted from receiving support from colleagues ($p < 0.0001$) and from managers as well ($p < 0.001$).

The mental health effects of work–life conflict and work–life imbalance were most prominent in the public administration sector among EWCS 2010/2015 respondents, and in the construction sector ($p < 0.0001$) among Covid-19 survey participants. Worrying about work showed the strongest negative association with health among respondents in the financial services sector ($p = 0.02$) in the EWCS 2010/2015 surveys, and among those in the construction ($p < 0.0001$) and commerce/hospitality ($p < 0.0001$) sectors in the Covid-19 survey. Experiencing stress also showed a strong negative association with mental well-being among EWCS 2010/2015 respondents in the financial services sector ($p < 0.001$) and in industry ($p = 0.02$).

4.6 Gender, age and educational differences: an intersectional analysis

The following section presents an intersectional analysis for psychosocial working conditions and mental well-being separately for the participants of the EWCS and the Covid-19 surveys. Briefly, we found that being young, being a woman and having only primary education were associated with poorer mental well-being. Furthermore, among the explored sociodemographic factors potentially modifying the effects of psychosocial working conditions on mental health, primary education appears to be the most prominent driver of inequalities before and during the Covid-19 pandemic.

Job insecurity

In the EWCS surveys, the three-way interaction term between job insecurity, gender-and-education, and age was not statistically significant ($p=0.2811$). In the Covid-19 survey ($p=0.0037$), respondents reporting job insecurity tended to have lower mean well-being scores regardless of age, sex and education when compared with those who felt their job was secure. Furthermore, job insecurity showed the strongest negative association with WHO-5 scores among women with primary education in the first age group (18–35 years), women with primary education and men with secondary education in the second age group (36–55 years), and men with primary education in the third age group (56–65 years) (Figure 8).

Figure 8 Intersectional analysis for mental well-being and job insecurity during the Covid-19 pandemic



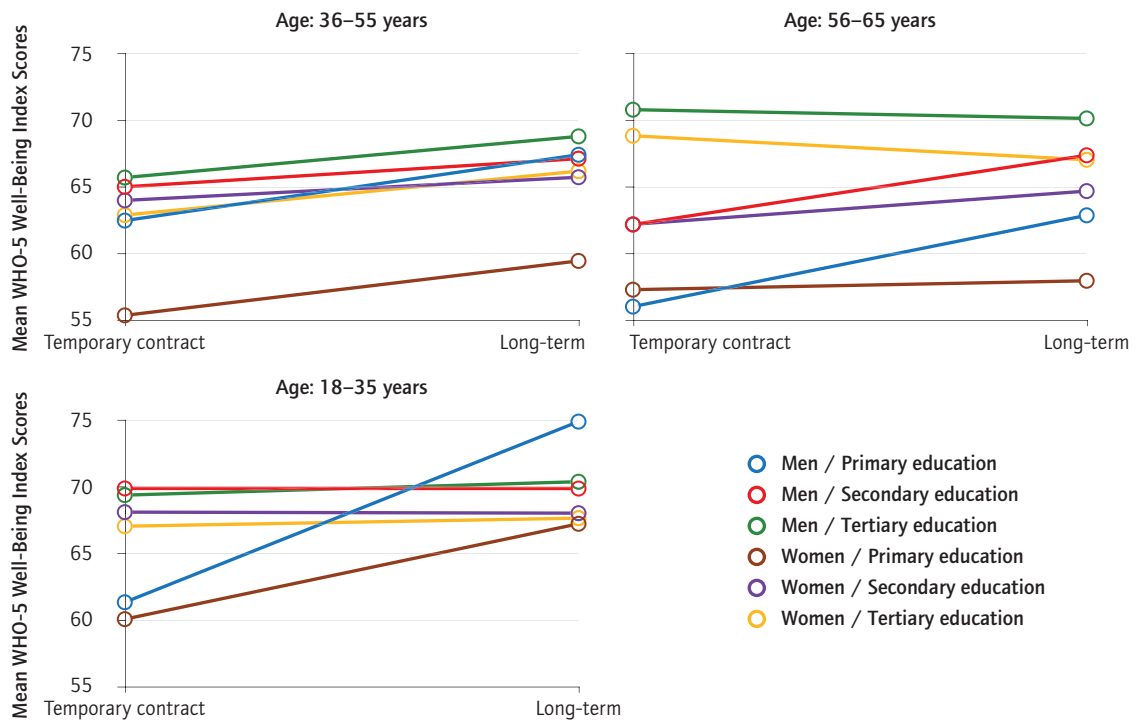
Notes: The figure presents the significant three-way interaction analysis for mental well-being and job insecurity among employees participating in the Covid-19 survey ($n=11,690$; gender-and-education: $n=359$ cases missing; job insecurity: $n=1954$ cases missing) ($p=0.0037$); higher WHO-5 scores indicate better mental well-being.

Temporary contract

The three-way interaction term between having a temporary contract, gender-and-education, and age was significant in the EWCS surveys ($p=0.0025$). Among respondents aged 18 to 35 years, having a temporary contract showed a negative association with mental health for men and women with primary education, but not for other gender-and-education groups. In the second age

group (36–55 years), the strongest negative association between having a temporary contract and poor WHO-5 scores could also be observed among men and women with primary education. However, the slopes for all gender-and-education groups were quite similar. Among participants aged 56 to 65 years, having a temporary contract was negatively associated with well-being scores among men with primary or secondary education and women with secondary education, while the opposite – a positive association – could be observed among men and women with tertiary education (Figure 9).

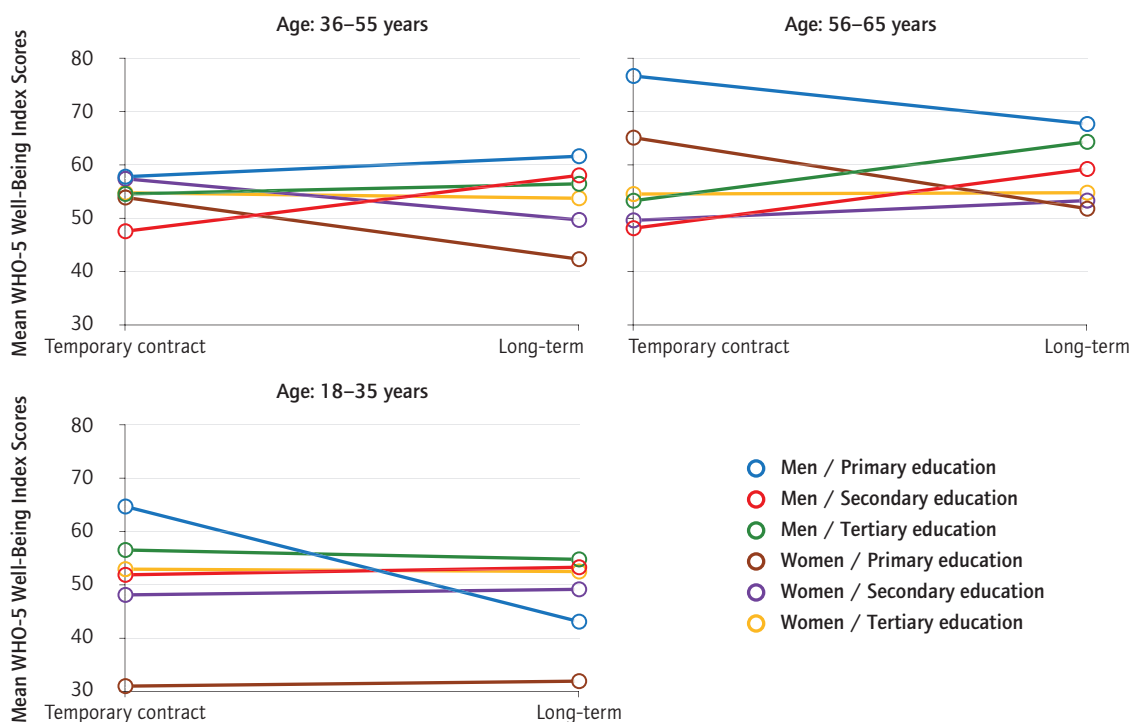
Figure 9 Intersectional analysis for mental well-being and temporary contracts in 2010 and 2015



Notes: The figure presents the three-way interaction analysis for mental well-being and temporary contracts among employees participating in the EWCS 2010/2015 (n=60,830; gender-and-education: n=147 cases missing; temporary contract: n=145 cases missing) (p=0.0025); higher WHO-5 scores indicate better mental well-being.

During the Covid-19 pandemic, having a temporary contract was positively associated with mental health (that is, better mental health) among men with primary education in the 18 to 35 age group, among women with primary or secondary education in the 36 to 55 age group, and among men and women with primary education in the 56 to 65 age group (p for interaction= <0.0001) (Figure 10). A negative association between having a temporary contract and well-being was more prominent among men with primary or secondary education in the second age group (36–55 years) and men with secondary or tertiary education in the third age group (56–65 years) (Figure 10).

Figure 10 Intersectional analysis for mental well-being and temporary contracts during the Covid-19 pandemic



Notes: The figure presents the three-way interaction analysis for mental well-being and temporary contracts among employees participating in the Covid-19 survey (n=11,774; gender-and-education: n=359 cases missing; temporary contract: n=1870 cases missing) (p<=0.0001); higher WHO-5 scores indicate better mental well-being.

Not enough time to get the job done

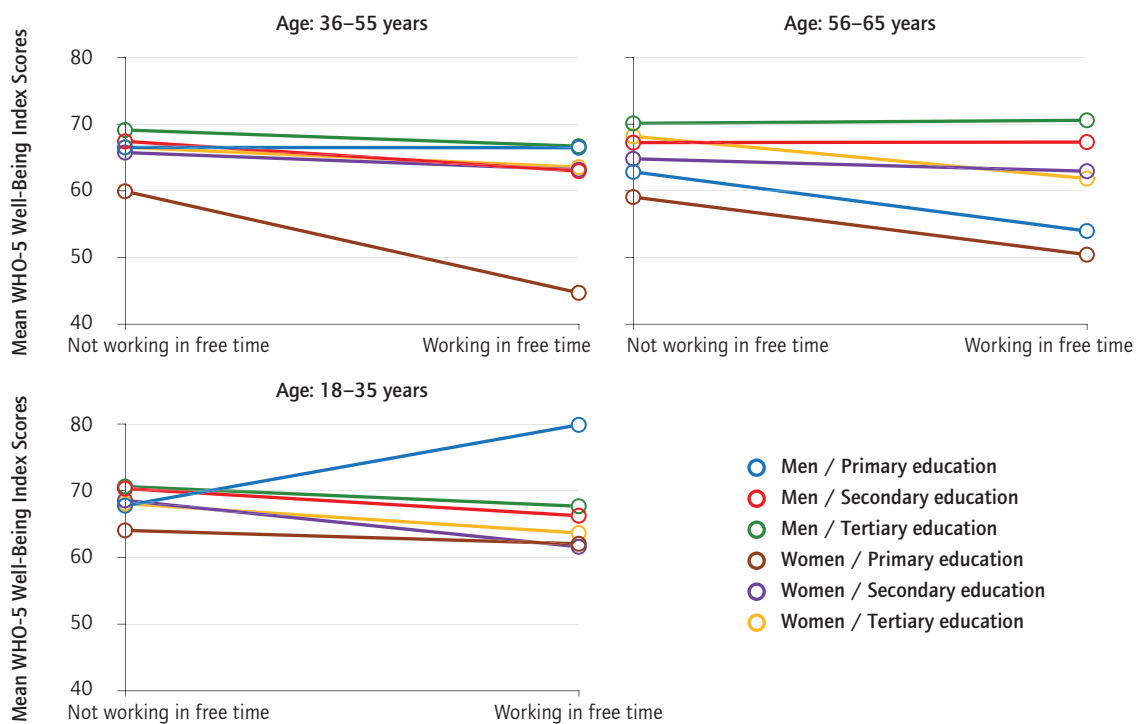
In the EWCS surveys (p=0.0002), respondents having insufficient time to get their job done tended to have lower mean well-being scores regardless of age, sex, and education when compared with those who had enough time. However, the opposite was observed – a positive association between insufficient time and mean WHO-5 scores – among men with primary education aged 56 to 65 years. In addition, the negative association between insufficient time and health was prominent among women with primary education in the first (18–35 years), but not in the second (36–55 years) and third (56–65 years) age groups. Among respondents of the Covid-19 survey (p<0.0001), the observed patterns were similar to those of the EWCS surveys. However, the positive association between insufficient time and health in the 56 to 65 age group could be observed in men with secondary education rather than in men with primary education.

Working in free time to meet demands

Respondents of the EWCS surveys (p<0.0001) working in their free time tended to have lower mean well-being scores regardless of age, sex and

education when compared with those who did not work in their free time. An exception could be observed – working in free time was associated with better mental health – among men with primary education in the youngest age group (18–35 years). Working in free time showed the strongest negative association with WHO-5 scores among women with primary education in the second age group (36–55 years) and men and women with primary education in the third age group (56–65 years) (Figure 11)

Figure 11 Intersectional analysis for mental well-being and working in free time in 2010 and 2015



Notes: The figure presents the three-way interaction analysis for mental well-being and working in free time among employees participating in the EWCS 2010/2015 (n=59,422; gender-and-education: n=147 cases missing; working in free time: n=1553 cases missing) (p<0.0001); higher WHO-5 scores indicate better mental well-being.

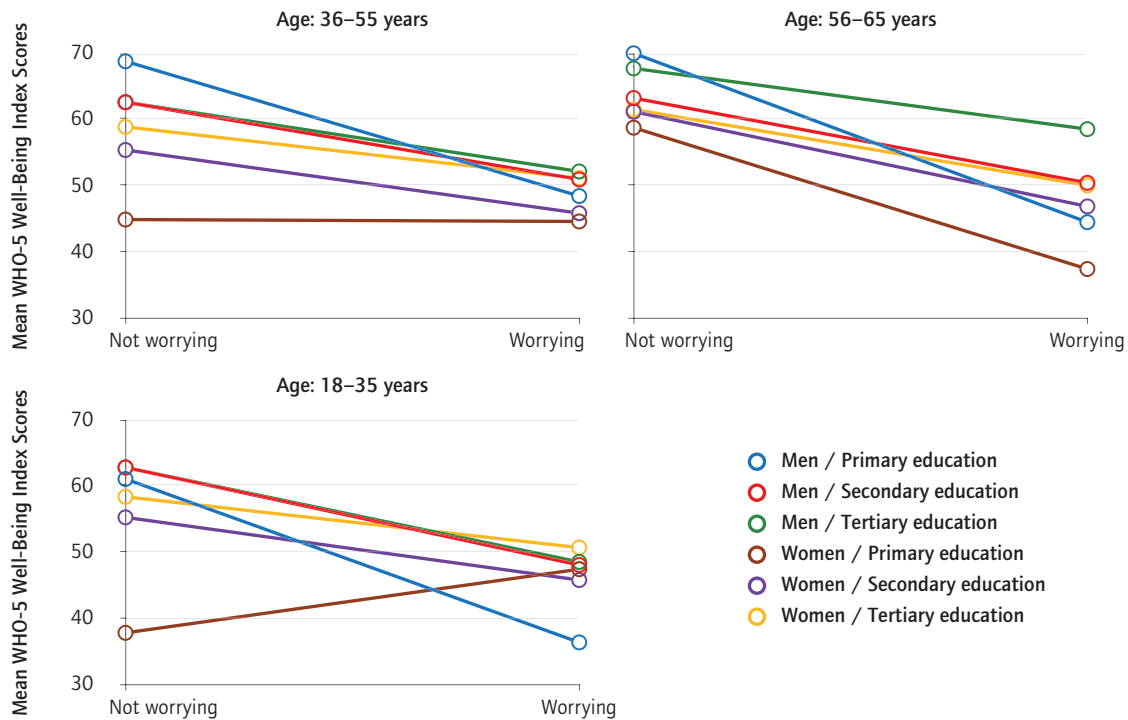
In the Covid-19 survey (p=0.003), respondents working in their free time also tended to have lower mean well-being scores than those who did not work in their free time. The strongest association between working in free time and lower mean well-being scores was found for young women aged 18 to 35 years with primary education. Conversely, among women with primary education in the oldest age group (56–65 years), working in free time was positively associated with mental health, and thus better mental health.

Worrying about work outside of working hours

In both the EWCS 2015 (p=0.0013) and the Covid-19 survey (p=0.0006), worrying about work was negatively associated with mental health in all age

and gender-and-education groups. The only exception are younger women (18–35 years) with primary education during the Covid-19 pandemic. Here a positive association between worrying about work and WHO-5 scores was observed (Figure 12). Specifically, during the Covid-19 pandemic, worrying about work showed the strongest negative association with well-being among men with primary education regardless of age (Figure 12), while in the EWCS 2015 survey, the strongest negative association with well-being was observed among women with primary education aged 56 to 65 years.

Figure 12 Intersectional analysis for mental well-being and worrying about work outside of working hours during the Covid-19 pandemic

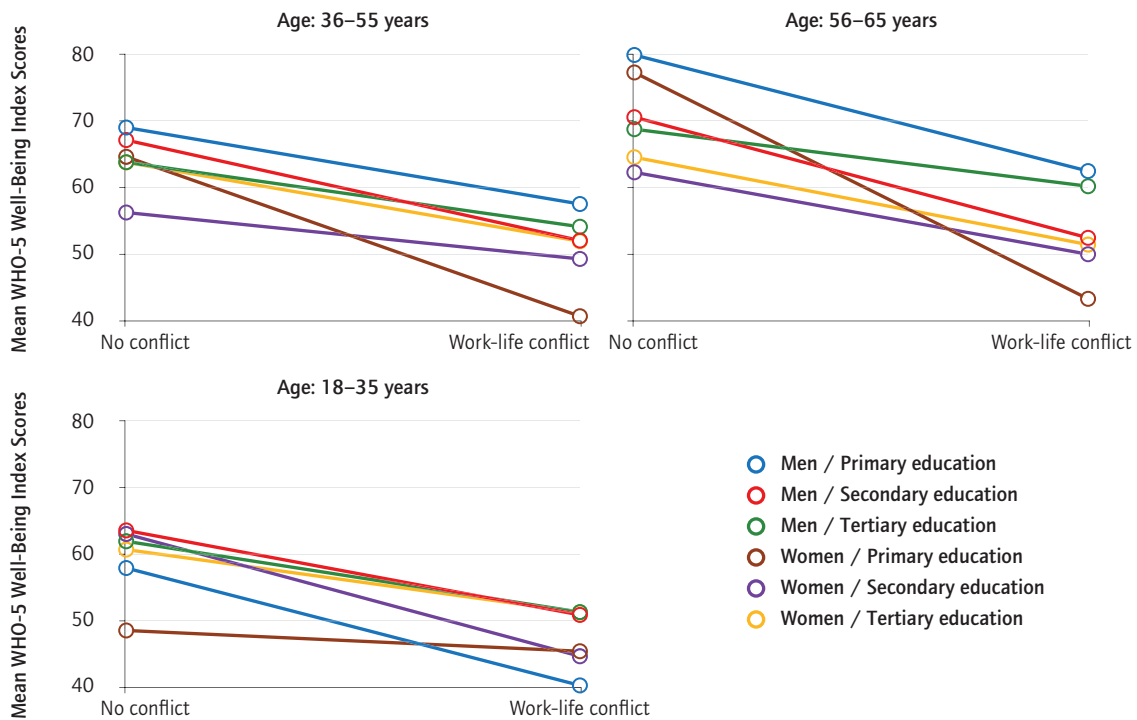


Notes: The figure presents the three-way interaction analysis for depressive symptoms and worrying about work outside of working hours (that is, worrying about work when not working) among employees participating in the Covid-19 survey (n=13,543; gender-and-education: n=359 cases missing; worrying about work: n=101 cases missing) (p=0.0006); higher WHO-5 scores indicate better mental well-being.

Work-life conflict

Work-life conflict showed a negative association with mental well-being regardless of age, gender and education in both the EWCS 2015 (data not available in 2010) (p=0.0209) and Covid-19 (p<0.0001) surveys. The most prominent negative association between work-life conflict and health could be observed among women with primary education aged 56 to 65 years in the EWCS 2015 survey (data not available in 2010), and women with primary education aged 36 to 55 or 56 to 65 years in the Covid-19 survey (Figure 13).

Figure 13 Intersectional analysis for mental well-being and work–life conflict during the Covid-19 pandemic

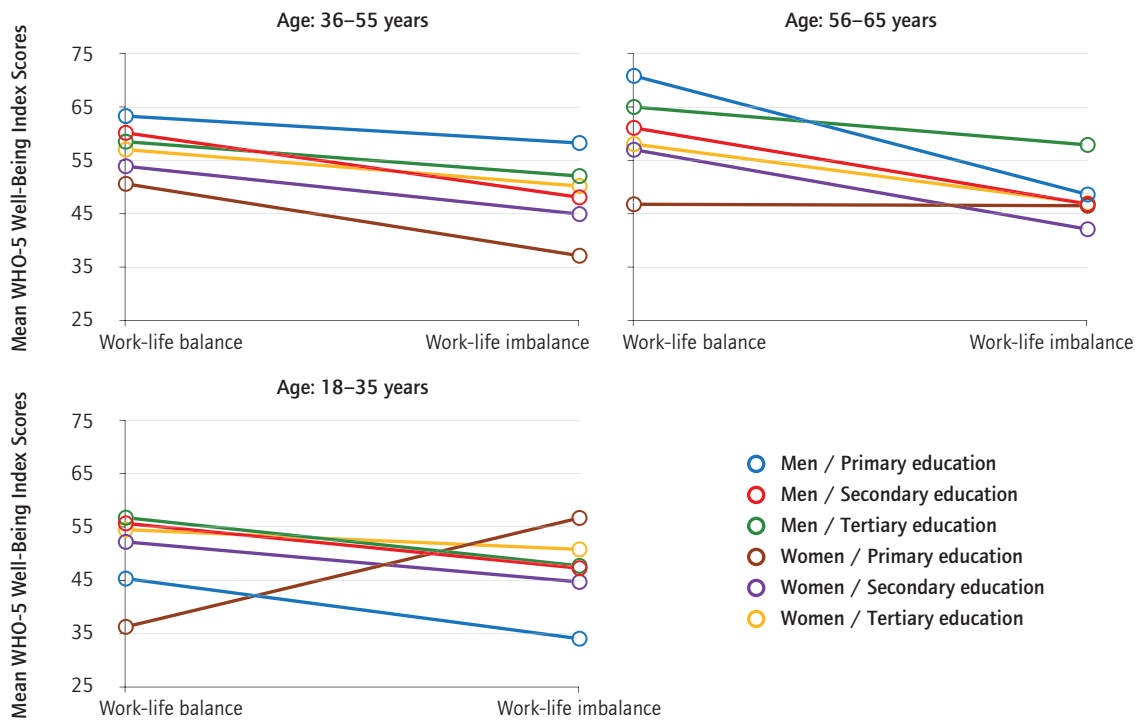


Notes: The figure presents the three-way interaction analysis for mental well-being and work–life conflict among employees participating in the Covid-19 survey (n=13,598; gender-and-education: n=359 cases missing; work–life conflict: n=46 cases missing) (p<0.0001); higher WHO-5 scores indicate better mental well-being.

.Work–life balance

In the EWCS 2015 survey (p<0.0001), work–life imbalance was negatively associated with mental well-being in all age and gender-and-education groups. In 2015, work–life imbalance showed the strongest negative association with health among men with primary education in the youngest age group (18–35 years) and women with primary education in the oldest age group (56–65 years). While in the Covid-19 survey (p<0.0001), work–life imbalance also tended to be negatively associated with WHO-5 scores in all examined groups, a strong positive association could be observed between work–life imbalance and mental health among women with primary education aged 18 to 35 years. In the second age group (36–55 years), however, work–life imbalance showed a strong negative association with mental health among women with primary education, while in the third age group (56–65 years), a similar association could be observed among men with primary education (Figure 14).

Figure 14 Intersectional analysis for mental well-being and work-life balance during the Covid-19 pandemic

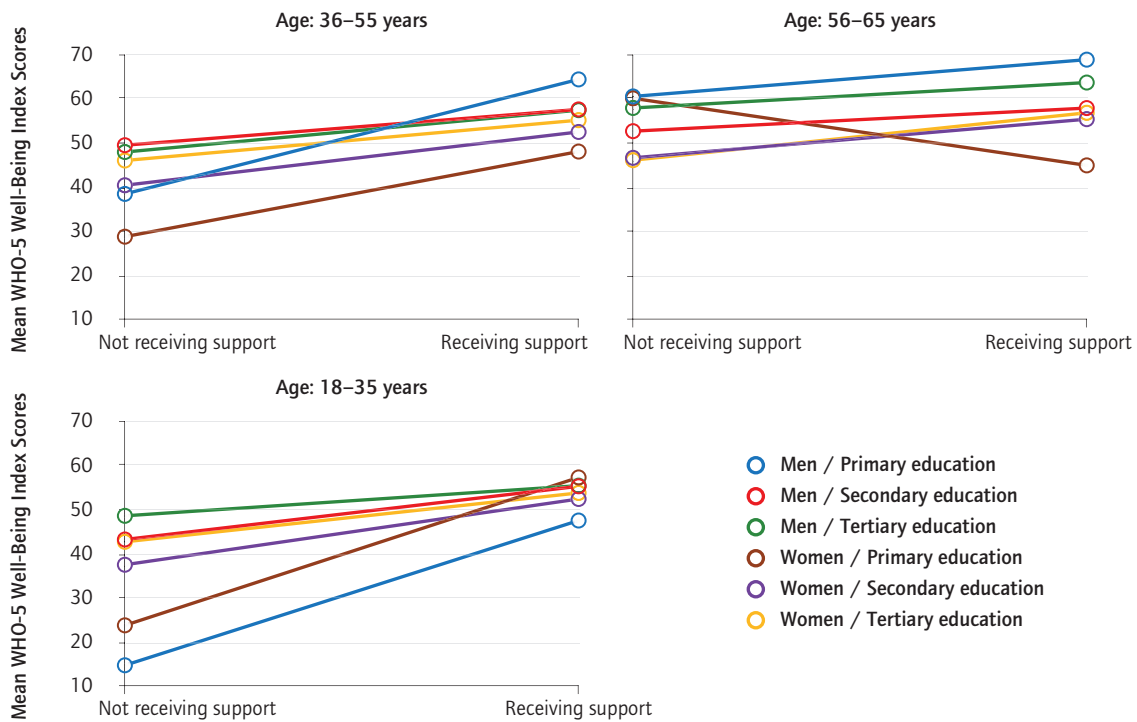


Notes: The figure presents the three-way interaction analysis for mental well-being and work-life imbalance among employees participating in the Covid-19 survey (n=13,495; gender-and-education:n=359 cases missing; work-life imbalance: n=149 cases missing) (p<0.0001); higher WHO-5 scores indicate better mental well-being.

Receiving support from colleagues or managers

In all examined age and gender-and-education groups, receiving support from colleagues or managers was generally associated with better mental health in both the EWCS and the Covid-19 survey. However, in the oldest age group (56–65 years), a negative association between receiving support from colleagues and well-being scores was observed among women with tertiary education in the EWCS surveys and among women with primary education in the Covid-19 survey. Among respondents of the Covid-19 survey, in the first (18–35 years) and second (36–55 years) age groups, receiving support from colleagues showed the strongest positive association with mental well-being for men and women with primary education (Figure 15).

Figure 15 Intersectional analysis for mental well-being and receiving support from colleagues during the Covid-19 pandemic



Notes: The figure presents the three-way interaction analysis for mental well-being and workplace support among employees participating in the Covid-19 survey (n=13,307; gender-and-education: n=359 cases missing; support from colleagues: n=337 cases missing) (p=0.0013); higher WHO-5 scores indicate better mental well-being.

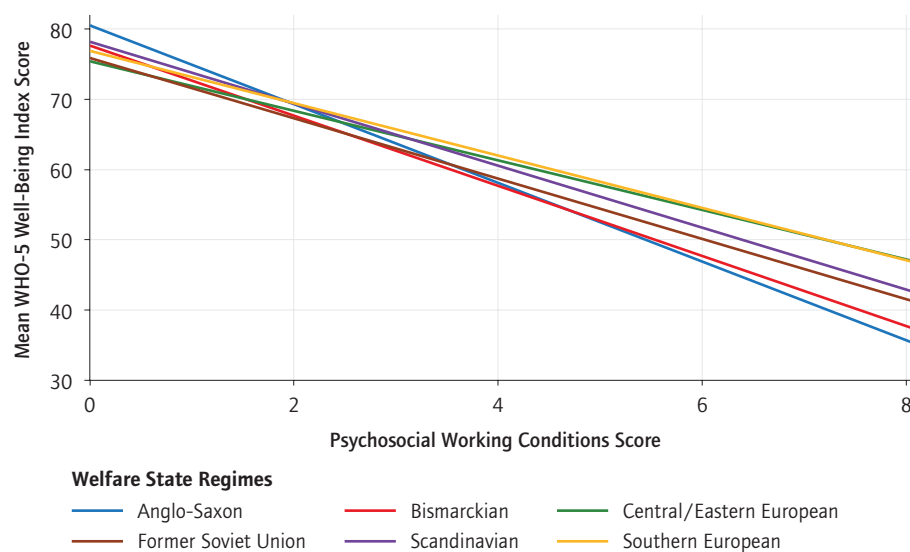
4.7 Country differences

We investigated whether differences in psychosocial working conditions and mental well-being exist by type of welfare-state regime or progress of gender equality.

We found a consistent association between adverse psychosocial working conditions and mental health across European countries in both 2015 and 2020. However, the results suggest differences by welfare state regime. Specifically, according to Figure 16, it appears that experiencing multiple adverse psychosocial working conditions was associated most strongly with poorer mental well-being in countries following the Anglo-Saxon and Bismarckian welfare state regimes, whereas countries following the Scandinavian, Southern European and Central/Eastern European regimes seemed somewhat protective against the negative effects of adverse working conditions (Figure 16). This pattern, however, is different during the Covid-19 pandemic, when countries following the Central/Eastern European approach had worse mental health outcomes (Figure 17).

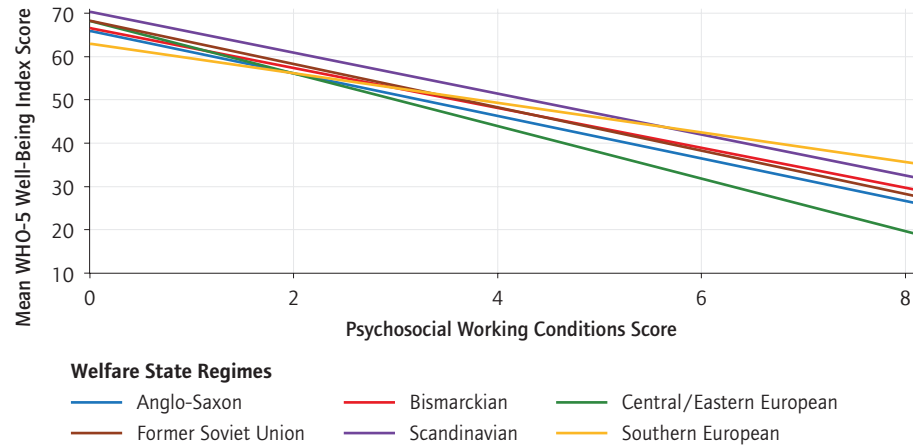
Turning to the findings on gender equality. First, we find a strong negative association between the psychosocial working conditions score and mental health in all EU countries in both waves, but generally lower mean WHO-5 well-being scores during the Covid-19 pandemic in 2020 than in 2015. With regard to gender equality, Figure 18 suggests that in 2015 the association between the psychosocial working conditions score and mental health was stronger in countries scoring above the EU average of the gender equality index (p-value for interaction <0.0001) (Figure 18), while in 2020, at first glance, it seems that there is no difference between countries (p-value for interaction=0.5943) (Figure 19). However, an inspection by age reveals a shift during the Covid-19 pandemic for the youngest age group (18-35 years of age). Specifically, during the Covid-19 pandemic younger adults living in countries with lower gender equality were more susceptible to the negative effects of adverse psychosocial working conditions on mental health (p-value for interaction=0.0315) (analysis not presented in the report).

Figure 16 Mental well-being and psychosocial working conditions score in Europe in 2015



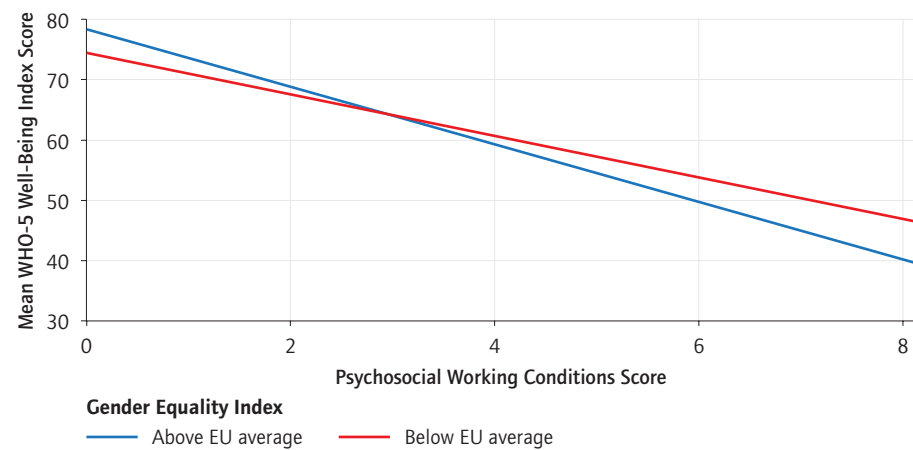
Note: The PWC score consists of eight working conditions (job insecurity, not enough time to get job done, working in free time to meet demands, worrying about work outside of working hours, work-life conflict, work-life imbalance, long working hours, no support from colleagues) and ranges from 0 to 8, with higher scores indicating worse psychosocial working conditions. Higher WHO-5 scores indicate better mental well-being.

Figure 17 Mental well-being and psychosocial working conditions score in Europe during the Covid-19 pandemic



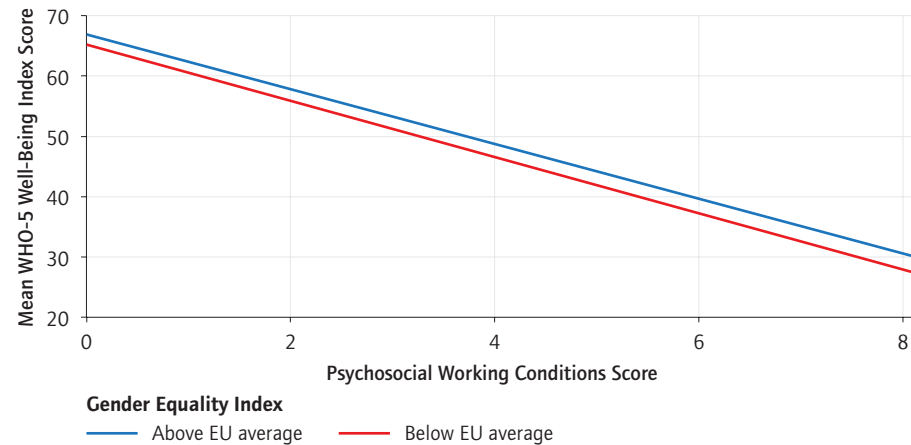
Note: The PWC score consists of eight working conditions (job insecurity, not enough time to get job done, working in free time to meet demands, worrying about work outside of working hours, work–life conflict, work–life imbalance, long working hours, no support from colleagues) and ranges from 0 to 8, with higher scores indicating worse psychosocial working conditions. Higher WHO-5 scores indicate better mental well-being.

Figure 18 Mental well-being and psychosocial working conditions score by country level of gender equality in 2015



Note: The PWC score consists of eight working conditions (job insecurity, not enough time to get job done, working in free time to meet demands, worrying about work outside of working hours, work–life conflict, work–life imbalance, long working hours, no support from colleagues) and ranges from 0 to 8, with higher scores indicating worse psychosocial working conditions. The Gender Equality Index is a composite indicator that measures gender equality across the EU over time. The index ranges from 1 to 100, with higher scores presenting better gender equality. Higher WHO-5 scores indicate better mental well-being.

Figure 19 Mental well-being and psychosocial working conditions score by country level of gender equality during the Covid-19 pandemic



Note: The PWC score consists of eight working conditions (job insecurity, not enough time to get job done, working in free time to meet demands, worrying about work outside of working hours, work–life conflict, work–life imbalance, long working hours, no support from colleagues) and ranges from 0 to 8, with higher scores indicating worse psychosocial working conditions. The Gender Equality Index is a composite indicator that measures gender equality across the EU over time. The index ranges from 1 to 100, with higher scores presenting better gender equality. Higher WHO-5 scores indicate better mental well-being.

4.8 Summary

Psychosocial working conditions are a crucial determinant of mental health. In the present study, several adverse psychosocial working conditions were significantly associated with poorer mental well-being. A supportive work environment, in the sense of receiving support from managers and colleagues, was associated with better mental health. These findings were not evenly distributed, however, and by looking simultaneously at psychosocial working conditions, mental well-being and sociodemographic characteristics, it was possible to classify groups of employees most affected by adverse psychosocial working conditions and poor mental health. These include:

- women;
- young adults;
- employees with a primary level of education; and
- young and middle aged-women with a primary level of education.

Furthermore, the findings also suggest that countries following the Scandinavian or the Southern European welfare state regimes are somewhat more protective against the impact of adverse working conditions on health than countries following the Anglo Saxon approach.

5. Discussion

The aim of the present report is to investigate trends in psychosocial working conditions and their impact on health and to identify whom they most affect and how they vary by institutional context. Although limitations apply to data sets used and comparing prevalence rates must be done with caution, the report provides a first indication of trends in psychosocial working conditions and their impact on health. First, we detected that employees' mental health declined considerably between 2010 and 2020. Second, we found evidence of an increase in harmful psychosocial working conditions, which were in turn associated with an increase in poor mental health. Third, we identified intersectional inequalities in working conditions and mental health. This chapter provides a discussion of the main findings, concludes with implications for practice and provides policy recommendations.

Main findings

- Employee mental well-being was lower in 2020 than in 2010.
- Inequalities in working conditions and mental well-being are multifaceted. Individuals facing multiple disadvantages are most affected.
- The impact of poor working conditions on mental health is greater among less educated and female employees.
- Mental health and working conditions vary by welfare state regime.
- Workplace support could be a potential buffer against the impact of poor working conditions on health.
- Interventions and policies should adopt an intersectional approach and target those most at risk of adverse outcomes.

5.1 Trends in mental health

The prevalence estimates of mental health from 2020 suggest that employees' mental health has worsened during the past decade. In particular, we found that between 2010 and 2020, poor WHO-5 mental health scores increased by 21 per cent. These findings are in line with recent international studies and reports (Santomauro et al. 2021; WHO 2022), which noted a stark increase in the global prevalence of depression by 25 per cent in the first year of the Covid-19 pandemic (WHO 2022). While key contributors highlighted in the

reports were unprecedented stress and social isolation, it is also possible that worsened psychosocial working condition contributed to this increase. Our findings suggest that particularly job insecurity, work–life conflict and worrying about work outside of working hours were associated with poor mental health. As outlined in the theoretical background of this report, there is a well established literature on the impact of insecure and poor working conditions on mental health. As an example, precarious employment – including temporary, fixed-term work or contract work – has been associated with impaired mental well-being, including depression and anxiety (Demiral et al. 2022; Moscone et al. 2016). It must be noted, however, that our prevalence estimates are based on data from two separate cross-sectional surveys and that data quality may vary, which may lead to an over- or underestimation of our results. Nonetheless, employees’ mental health must be taken seriously as they might hamper their workforce participation. While mental ill health can be a barrier to becoming employed in the first place, it can also pose significant challenges to maintaining employment and be both a consequence of and a risk for unemployment (van der Noordt et al. 2019).

5.2 Trends in working conditions

Our findings suggest that psychosocial working conditions – such as insufficient time to get the job done, working to tight deadlines and increased working hours – have deteriorated, echoing previous research (Greenan et al. 2014; Lopes et al. 2014; Rigó et al. 2021, 2022). Specifically, Lopes et al. (2014) showed in an analysis of European data that work autonomy has declined and work pressure has increased in most EU countries since 1995, and Rigó et al. (2021) found that work stress increased from 1995 to 2015. Rigó et al. (2021) further noted that the increase in work stress was driven mainly by psychological demands. This observation has been explained in the literature by profound changes in work organisation (such as flexible work and remote working), digitalisation and the introduction of new technologies, as well as general changes in European labour markets (Rigó et al. 2022).

We further found that changes in working conditions differed by country and institutional context. These findings are again in keeping with prior literature showing differences in the deterioration of working conditions by country and institutional context (Rigó et al. 2022). Rigó et al. (2022) found that employees in countries with less effective labour market policies were more affected by increasing job strain between 1995 and 2015 than employees in countries with more successful policies. Another important finding is the rise of precarious employment (such as temporary contracts and multiple job-holding). Although we detected only a slight increase in the proportion of people reporting holding multiple jobs and having a temporary contract previous reports have noted that multiple job-holding and having a temporary contract has increased significantly over recent years (Conen 2020; ter Weel 2018).

5.3 Adverse psychosocial working conditions and mental health

The present report also set out to examine the association between adverse psychosocial work conditions and mental well-being. In keeping with previous research and as put forward in the theoretical background, we found a significant association with several indicators of psychosocial working conditions and poor mental well-being. Specifically, we found that, across the survey years, insufficient time to get the job done, worrying about work outside of working hours, job insecurity, work–life conflict and work–life imbalance were associated with poorer mental health. This is congruent with previous studies that investigated the link between psychosocial working conditions and poor mental health among workers (Fan et al. 2019; Lunau et al. 2013; Rugulies et al. 2017; Schütte et al. 2014; Stansfeld and Candy 2006). Schütte et al. (2014), for instance, investigated the associations between psychosocial working conditions and psychological well-being among employees in 34 European countries and demonstrated that adverse psychosocial work conditions, such as high job insecurity (OR: 1.95, 95% CI: 80–2.13), high work–life imbalance (OR: 2.23; 95% CI: 2.04–2.44) and low social support (OR: 2.11, 95% CI: 1.94–2.30), were significantly associated with lower psychological well-being.

5.4 Country differences

We found a consistent association between adverse psychosocial working conditions and poor mental health across European countries. However, it seems that the magnitude of the association differs by welfare state regime, with some welfare state types being more protective than others against the adverse effects of poor working conditions on health. Particularly for 2015, the findings suggest that countries following the Scandinavian and Southern European welfare state approaches did better with regard to psychosocial working conditions–related mental health outcomes than countries following the Anglo-Saxon and Bismarckian approaches. For 2020, we see more pronounced associations for poor mental health and adverse psychosocial working conditions in Eastern European countries, presumably due to the less developed work–family reconciliation policies in these countries (Matysiak and Węziak-Białowolska 2016).

Overall, Eastern European countries have, for instance, low coverage of early childhood care services and offer fewer possibilities for flexible working hours, which can help employees to reconcile their family life and work (EIGE 2015; Nieuwenhuis and van Lancker 2020). This was also the case during the Covid-19 pandemic. The findings for 2015 are somewhat contradictory compared with those for 2022. Specifically, the findings for the Bismarckian and Eastern European welfare state regimes go somewhat against our expectation that welfare state regimes with higher levels of social protection (the Scandinavian and Bismarckian regimes) will have comparatively better mental health than those with lower levels of social

protection (that is, Anglo-Saxon, Eastern European) (Bambra et al. 2014). These inconsistencies in our findings are in line with existing literature providing heterogeneous findings. Dragano et al. (2011), for instance, found a stronger association between work stress and depressive symptoms in the least generous European welfare states, whereas the findings of Salaveczet and colleagues (2010) suggest that associations between work stress and health are similar in Eastern and Western European countries.

Turning to the results on gender equality, it must be noted that findings were mixed and not as pronounced as expected. Specifically, while in 2015 the association between the psychosocial working conditions score and mental health was stronger in countries with greater gender equality, during the Covid-19 pandemic in 2020, this observation shifted. Particularly younger adults living in countries with less gender equality (i.e., Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia) were more affected by adverse psychosocial working conditions on mental health. This is important because these are countries that are characterised by less generous welfare policies, a gender-segregated labour market and a lack of policies to combine family life and work – which played an important role during the pandemic.

Consequently, it is likely that a country's wider societal structure plays an important role in work stress and mental health and may buffer against adverse psychosocial working conditions (Bambra et al. 2014; Dragano et al. 2011). Studies using European data imply that work stress is more strongly associated with poor mental health in countries with less generous welfare states and less developed labour and social security systems (Bambra et al. 2014; Dragano et al. 2011; Lunau et al. 2013).

5.5 Gender and intersectional inequalities in adverse psychosocial working conditions and mental health

To deepen our understanding of who is most exposed to harmful working conditions and thereby likely to experience poor mental health, we applied a gender and intersectional perspective. The findings are twofold. First, we identified that women more often reported poor working conditions and mental health than men. Second, we found that other sociodemographic factors on top of gender intersect and impact working conditions and mental health.

Specifically regarding gender inequalities, we found that adverse working conditions and poor mental health were reported more frequently by women. Over the years, it seems, women were more likely than men to have a temporary contract, report work–life imbalance and work–life conflict and show signs of depression. The unequal distribution of poor working conditions

(Buckingham et al. 2020) and poor mental health between women and men has also been noted in prior studies (EIGE 2021; van der Noordt et al. 2019). A key explanation that can be found in the literature is related to segregated labour markets, with women overrepresented in sectors that are low status and characterised by high work-related stress (Kjellsson 2021; Sterud 2014), and therefore harmful to women's mental health.

Despite EU-wide efforts, including the adoption of directives such as the directive on transparent and predictable working conditions, or the directive on work–life balance for parents and carers, which aim to promote gender equality, gender inequality in working conditions remains a serious issue across the EU (Casse et al. 2021; European Commission 2022). Even today women are overrepresented in sectors characterised by unfavourable pay and working conditions (ILO 2018; Kjellsson 2021; Sterud 2014). According to an ILO report, women are on average paid about 20 per cent less per hour than men (ILO 2018). A policy brief by the same organisation also noted that about 4 per cent of women's employment was destroyed as a result of the pandemic compared with only 3 per cent for men (ILO 2021). Another explanation for the observed inequalities may be the disproportionate amount of time women spend in domestic work and caregiving roles. For example, at the beginning of the pandemic, both fathers and mothers had to reorganise work and domestic duties (for example, childcare), but research now shows that mothers in particular increased their unpaid care hours (Xue and McMunn 2021; Zoch et al. 2021) and decreased their paid working hours (Collins et al. 2020; Matteazzi and Scherer 2021; Xue and McMunn 2021). The additional time spent in unpaid care work probably limited women's ability to keep their jobs, resulting in additional stress and consequently mental ill health for women (Adisa et al. 2021; Beaugard et al. 2018).

Turning to the findings on intersectional inequalities, we found that in addition to being a woman, the interaction of being young and having a lower education made it more likely that someone would experience poor working conditions and health. Although male employees and those with lower levels of education were clearly affected by the pandemic and poor working conditions, it is less educated younger female employees who were particularly vulnerable to poor mental health and harmful working conditions. Specifically, female employees with a lower level of education and aged 18–35 years more frequently show signs of depression across various working conditions compared with not only older and more educated men but also older and more educated women. Thus, it appears that the combination of being female, young and less educated might lead to a heightened vulnerability to harmful working conditions and poor mental health. These findings are novel because this is the first study – to the best of our knowledge – to examine changes in intersectional inequalities in working conditions and mental health before and during the pandemic. The very few studies that are available focus either on intersectional inequalities in working conditions or on intersectional inequalities in health (Fuller and Qian 2021; Qian and Fuller 2020). Nonetheless, these studies support our findings by determining intersectional inequalities in employment gaps among parents and specifically mothers with lower educational levels (Fuller and Qian 2021;

Qian and Fuller 2020). Intersecting inequalities based on a person's gender, age and level of education are thus a determinant of both a person's exposure to and experience of adverse working conditions and poor health.

5.6 Workplace support as a potential buffer

In our study, we found that receiving support from a manager or colleagues was associated with better mental health. This finding is in line with previous reports demonstrating the importance of organisational support and a good organisational climate for workers' mental health (Thorsteinsson et al. 2014). We observed the strongest effects of workplace support among less educated employees. Both female and male employees with a primary level of education seemed to benefit more from colleagues' support than employees with a higher level of education. However, the positive effect of manager support was gendered. Especially during the Covid-19 pandemic, women with a primary level of education seemed to benefit the most from receiving manager support, regardless of age. As noted above, women and people with a lower level of education tend to be overrepresented in jobs that are low-paid, part-time and less rewarded. These jobs were the most affected during the pandemic and were accompanied by higher levels of work–life conflict. In fact, Fuller and Qian (2021) have shown that conflicts between employment and childcare were most challenging for less educated women. Organisational support has been proved to play a moderating role on stress, specifically in times of experiencing work–life conflict (Kossek et al. 2011). Thus, especially in the pandemic, workplace support can be important. Furthermore, according to the buffer hypothesis, social support can be key to buffering stress and the adverse effects of a stressful situation – such as the Covid-19 pandemic. Consequently, support experienced during the pandemic might potentially offset the adverse effects of high job demands and low rewards on mental health.

5.7 Strengths and limitations

There are several limitations to the analysis. First, prevalence rates are based on survey data, and varying data quality may lead to over- or underestimations. For instance, while both the EWCS and the Covid-19 survey were conducted by Eurofound, Eurofound applied a different sampling procedure in the Covid-19 survey than in their regular EWCS. Thus, results of the trend analysis should be interpreted with caution. Second, the analysis was based on cross-sectional data, preventing us from making inferences about causal relationships. Third, mental health was self-assessed, which could have led to reporting bias. However, the WHO-5 index has been determined to be an appropriate screening instrument for depressive disorders in epidemiological studies (Sischka et al. 2020; Topp et al. 2015). Fourth, although we tested pre-defined hypotheses and our primary exposures were all psychosocial working conditions, we did assess several exposure factors, which might have led to a multiple comparisons problem, potentially biasing our estimates. However,

given the exploratory nature of our study (to examine which psychosocial working conditions affect individual health the most), not adjusting for multiple comparisons while still reporting all CIs is consistent with expert recommendations (Althouse 2016; Rothman 2014). Last, despite the careful weighting of all analytical models because of the low number of participants with a primary education in the Covid-19 survey (N=257), the results of the intersectional analysis should be interpreted with caution.

Despite these limitations, the present report also has some strengths and provides a unique analysis. Specifically, the report benefits from the use of three large, population-based surveys that included questions on several indicators of adverse psychosocial working conditions and mental health. We used two waves of the EWCS and novel data on psychosocial working conditions during the Covid-19 pandemic. This allowed us to analyse long-term trends in psychosocial working conditions over ten years and during a period of extensive change. In addition, by using data from the EWCS and the Covid-19 survey, we were able to conduct analyses for psychosocial working conditions and health in 27 EU countries and by conducting cross-country comparative analyses. Last, we applied a robust statistical approach by using multilevel models to take account of the hierarchical structure of the data.

5.8 Policy conclusions

These findings call for a reflection on policy recommendations. Our analysis has found a strong relationship between key elements of the psychosocial work environment and health inequalities across Europe. There were also key inequalities by education, age, gender and intersectionality. We also found that the psychosocial work environment had a greater impact on health in certain countries. We have established the extent of inequalities in the psychosocial work environment and the association with health inequalities. This section addresses what can be done to reduce these health inequalities through policies and interventions to improve the psychosocial work environment. It does this by drawing on theoretical and empirical insights from the occupational health inequalities policy literature.

5.8.1 Reducing health inequalities: insights from theory

There are *three key levels* of action at which workplace policies and interventions could be implemented to reduce health inequalities (Whitehead 2007)⁶:

6. Whitehead (2007) also discusses individual-level interventions but notes that these *are not effective* in reducing health inequalities and hence have been excluded from this report. From a workplace perspective, such interventions would include: strengthening individual employees through person-based approaches (for example, offering counselling and education) to increase an individual's skill and capacity to cope with their employment conditions.

- **strengthening workplace communities** through improving social and managerial support at work or providing more involvement in workplace decision-making;⁷
- **improving working conditions** through changes to workplace organisation, such as redesigning working practices and processes;⁸
- **promoting healthy labour market policies** which shape the organisation, the workplace, and individual circumstances, such as unemployment rates, job security, wages, sickness absence payments, retirement age and unemployment benefits.⁹

5.8.2 Reducing health inequalities: evidence from practice

From the theory, we get a sense of what *could or should* work to reduce health inequalities by changing the psychosocial work environment through action across these key levels. This section presents evidence of effectiveness from real world evaluations of the health effects of policies and interventions that have been implemented at different levels to reduce inequalities. In this way we hope to ascertain what works in practice, not just in theory. We summarise the best available evidence from systematic reviews,¹⁰ and synthesise the impacts on health and health inequalities of interventions that change the psychosocial work environment. This sets the state of the art against the evidence base, focusing on three intervention levels: strengthening workplace communities; improving working conditions; and promoting healthy labour market policies.

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7. These interventions are aimed at strengthening communities through building social cohesion and mutual support. Health inequalities are theorised to be caused by social exclusion, isolation, lack of control, dignity and powerlessness in more disadvantaged groups and communities. Interventions tend to try to increase social interactions within and between communities (Whitehead 2007).
 8. These interventions aim to improve material living conditions such as housing, sanitation, workplaces, and access to health care, across the population but particularly among the most disadvantaged. They are based on identifying the cause of health inequalities as including greater exposure among some social groups to more health-damaging environments (Whitehead 2007).
 9. These interventions identify the causes of health inequalities to be the macroeconomic, cultural and environmental conditions in a country, which in turn influence the living and working conditions of communities and individuals. The interventions therefore try to promote healthier macro policies, for example, to reduce poverty, decrease income inequalities, or improve labour market policies. These policies are multi-sectoral and impact the whole population (Whitehead 2007).
 10. Systematic reviews are an established method of locating, appraising and synthesising the findings of multiple primary studies. Systematic reviews are therefore able to present the overarching findings of multiple studies. They appraise the quality of included studies and are usually considered to be the highest level of evidence in public and occupational health and related fields, including clinical medicine.

5.8.3 Strengthening workplace communities

In our analysis, social support was associated with better mental well-being. Those most negatively impacted in terms of mental health were: women, young adults, employees with only a primary level of education and, from an intersectional perspective, young and middle aged women with only a primary level of education. We also found that managerial support was an important modifying factor. However, we observed that managerial support decreased from 67 per cent in 2015 to 62 per cent in 2020. Consequently, our results suggest that interventions should focus on fostering workplace social and managerial support – particularly for these high-risk groups – by strengthening workplace communities. Following Karasek (1993), these require micro-organisational changes to work tasks, including job enrichment and enlargement (increasing task variety) and collective coping and decision-making (increasing team working). Team working interventions give workers more collective responsibility and decision-making power. This intervention type is also designed to enhance collective coping and provide social support within the workplace. Karasek (1993) hypothesised that task restructuring interventions would improve levels of job control and social support, although job demands may also be high. Given the literature on the psychosocial work environment and health (as outlined in Chapter 2) and the results of our analysis (Chapter 3), it can further be hypothesised that interventions that improve the psychosocial work environment in this way would also have a beneficial effect on health and health inequalities.

The most comprehensive assessment of the health effects of changes to the psychosocial work environment brought about by the reorganisation of work task structures comes from a systematic review of interventions that increase task variety (for example, enabling workers to be involved in a set of tasks requiring a wider variety of skills, instead of being responsible for a single task and reliant on a small range of skills) and team working (for example, workers are given more collective responsibility and decision-making power collectively) (Bambra et al. 2007). This review also explored whether the health effects differed by socio-economic status (such as occupational grade, income, job status) and synthesised the results of eight primary studies that examined task-variety interventions and seven studies that evaluated team working. It found that some of the interventions that improved the psychosocial work environment by increasing task variety had a small positive effect on health. The team working interventions tended to improve the psychosocial work environment in most studies, although not for all workers, but the health effects were less apparent. This review concluded that changes in the levels of job control appeared to be a more important factor for health than changes in levels of social support. Interventions that altered levels of control tended to report significant changes in self-reported mental and physical health: decreased levels of control almost invariably resulted in adverse health outcomes and, albeit to a lesser extent, increased levels of control resulted in improved health outcomes. When the interventions increased demand and decreased control, this negatively affected health, and increases in workplace support had minimal mediating effects. Implementing

such interventions requires collaboration between employers and workforce representatives, such as trade unions. Enhancing workplace social support could be an important factor for trade unions to focus on – especially with regard to those groups that, our results suggest, would most benefit – women, young adults, employees with only a primary level of education and, from an intersectional perspective, young and middle aged-women with only a primary level of education.

5.8.4 Improving working conditions

Our trend analysis in this report found that several indicators of a healthy psychosocial working environment (such as work–life imbalance, work–life conflict) worsened between 2010 and 2020. This trend has also been observed in previous studies. Thus, it is recommended to introduce interventions and policies that focus on improving working conditions. Particularly, these interventions should centre on improving working conditions through changes to workplace organisation, such as redesigning working practices and processes. Again, our result suggest that this may reduce health inequalities if disproportionately benefitting high-risk groups. Following Karasek (1993), these macro-organisational changes are designed to increase workers' opportunities to make decisions about their work environment, their hours of work, and/or participate in wider workplace decision-making. Examples of these interventions would include workers' councils (as are common in Germany), or problem-solving committees of workers or their representatives. These are considered to operate at a macro-organisational level because managerial structures and workplace hierarchies may need to change in order to accommodate an increase in worker participation and control.

The evidence on the impacts of these interventions on health and health inequalities is summarised in a systematic review by Egan et al. (2007) which examined the health effects of 'participatory' or 'problem-solving' committees of employee representatives.¹¹ It concluded that interventions that improved workplace control and/or workplace support tended to improve employee health. Health improvements did not occur when either control or support worsened. Interventions that reduced demands also improved health, but sometimes health improved even when the intervention appeared to increase demands, as long as control increased (Egan et al. 2007). This reinforces the findings of our analysis that social support is an important – and modifiable – workplace factor that potentially drives health inequalities over time.

With regard to the findings of increased work–life imbalance and work–life conflict, organisations should consider implementing work–family specific policies allowing for flexible work arrangements and greater control over working hours. The importance of control over working hours as a way of

11. The other 12 studies were of participatory interventions implemented in combination with individual-level interventions, ergonomic improvements, or organisational downsizing.

improving working conditions and reducing work–life conflict was also examined in a systematic ‘Cochrane review’ of flexible working (Joyce et al. 2010). This review examined a wide range of flexible work interventions, including self-scheduling, overtime, gradual/partial retirement, involuntary part-time work, remote working and fixed-term contracts. It synthesised the results of ten primary studies, none of which examined health inequalities. It found that interventions that offered flexibility favouring the employee and over which the employee had more control tended to have beneficial effects on health and well-being (including: blood pressure and heart rate; tiredness; mental health, sleep duration, sleep quality and alertness; self-rated health status) and no ill health effects were noted. Overall, increasing employee control over working hours had some positive health effects.

5.8.5 Promoting healthy labour market policies

These interventions focus on promoting healthy labour market policies that shape the organisation, the workplace and individual circumstances, such as unemployment rates, job security, wages, sickness absence payments, retirement age, and unemployment benefits. Our results suggest that the wider institutional context modifies the health effects of adverse psychosocial working conditions, particularly in terms of gender equality context. Evidence of the health effects of such policies is also relatively meagre and here we summarise the results of two reviews by Hillier-Brown et al. (2019) and Simpson et al. (2021).

In their review of social protection policies, Hillier-Brown et al. (2019) found a small evidence base of six systematic reviews (reporting 50 unique primary studies) of the health impacts of these policies. Some of these reviews looked at income maintenance and poverty relief policies, finding some evidence that increased unemployment benefit generosity may improve mental health and reduce health inequalities. Others looked at active labour-market policies (such as welfare-to-work programmes), finding some evidence that return-to-work initiatives may lead to short-term health improvements, but that in the longer term these can lead to declines in mental health. Simpson et al. (2021) synthesised the results of 38 studies of the effects on mental health – and inequalities in mental health – of changes to social security policies (including benefit generosity and benefit eligibility) in high-income countries. They found that, overall, policies that improved social security benefit eligibility/generosity were associated with improvements in mental health, as reported by 14 of the included studies. Social security policies that reduced eligibility/generosity were related to worse mental health, as reported by eleven studies. Ten studies found no effect for either policies contracting or expanding welfare support. Fourteen studies also evaluated the impact on mental health inequalities and found that contractionary policies tend to increase inequalities, whereas expansionary policies had the opposite effect.

5.8.6 Integrating an intersectional lens

Our analysis suggests that inequalities in health and working conditions are complex and multifaceted. They appear to be an outcome of overlapping and intersecting sociodemographic determinants. We found that female, young or low educated employees were more likely to have poor mental well-being. However, our analysis also discovered that groups with multiple disadvantages – such as low educated, young women – exhibited even worse mental health and experienced more harmful working conditions than more advantaged employees. It is therefore recommended that policies and interventions apply an intersectional lens, which takes into account the cumulative nature of different workplace risks to health for certain population groups. Promising entry points for workplace interventions could include the creation of more inclusive work environments and enhancing workplace social support. Specifically, interventions could focus on creating bridging social capital, which fosters the connection between people across different socioeconomic positions and thereby increases a sense of belonging and workplace support. Furthermore, our findings suggest that poor working conditions affect employees' mental well-being differently according to their life stage (age). This was particularly the case when employees had a temporary contract. The mental well-being of young and less educated individuals appeared to be more affected by the impact of having a temporary contract compared with older and more educated workers. Consequently, labour market interventions and policies should remain sensitive to employees' life-stages. These interventions and policies may potentially – as highlighted above – centre on work–family specific policies, increased autonomy and flexibility. Overall, integrating the intersectionality approach allows organisations and employee representatives (trade unions) to tackle the many facets of inequality associated with the social determinants of health, and thus take a more nuanced approach to reducing inequalities in both working conditions and health.

5.9 Summary

Table 9 provides a summary of the insights from theory and evidence from practice presented in this section on the effects of psychosocial work environment interventions on improving health and reducing health inequalities. This shows how different interventions can be implemented at different levels – community, organisation, society – to improve workplace health and reduce health inequalities.

Table 9 Summary of improving the psychosocial work environment to improve health and reduce health inequalities

	Community	Organisation	Societal
	Strengthening workplace communities	Improving working conditions	Promoting healthy labour market policies
Results from data analysis	Levels of support from managers decreased between 2015 and 2020	Women, young people, low educated experienced the worst working conditions before and during the pandemic	Lower country-level gender equality increased the impact of negative working conditions on mental health during the pandemic
Insights from theory	Improving social support at work or providing more involvement in workplace decision-making improves health	Increasing control over working practices, processes and hours improves health	Improving unemployment rates, job security, wages, unemployment benefits enhances employee health
Evidence from practice	Task structure work reorganisation: task variety and team working to increase social support and employee job control	Work reorganisation: participatory committees, control over hours of work	Welfare system interventions: unemployment insurance generosity, income maintenance and poverty relief policies, active labour-market policies
Effects on health and inequalities	<ul style="list-style-type: none"> + increasing task variety had a positive effect on health ± team working interventions had some health effects + increasing job control was beneficial for health ± increasing social support had few health effects - increased demands were detrimental for health 	<ul style="list-style-type: none"> + increasing control had effects on health and inequalities + improved workplace support increased employee health + reduced demands improved health + flexible working favouring the employee had beneficial health effects - flexible working favouring the organisation had negative health effects 	<ul style="list-style-type: none"> + active labour-market policies may lead to short-term health improvements + policies that improve social security benefit eligibility/generosity improve mental health - policies that reduce eligibility or generosity worsen mental health - contractionary policies increase health inequalities + expansionary policies reduce health inequalities
Integrating an intersectionally sensitive approach <ul style="list-style-type: none"> - raising awareness about intersectional inequalities - creating an inclusive working environment - life stage and targeted interventions 			

6. Conclusion

This report presents results on psychosocial working conditions, their impact on health and intersectional inequalities, as well as policy recommendations. We found that less educated employees, women and younger employees were most affected by adverse psychosocial working conditions and poor mental health outcomes. However, these inequalities operated intersectionally, with mental health worst among younger, low educated women. We also found evidence that mental health deteriorated more in countries with lower levels of gender equality. In order to prevent the further worsening of mental health among workers in Europe and to adjust to changing psychosocial working conditions, comprehensive policy action should be taken at three levels: strengthening workplace communities, improving working conditions, and promoting healthy labour market policies.

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List of abbreviations

CI	Confidence interval
Covid-19	Coronavirus disease 2019
EU	European Union
Eurofound	European Foundation for the Improvement of Living and Working Conditions
EWCS	European Working Conditions Survey
PWC	Psychosocial Working Conditions Score
SD	Standard deviation
WHO	World Health Organization
WHO-5	World Health Organization Five Well-Being Index

Supplemental material

Table S1 Interaction terms for the EWCS 2010 and 2015

WHO5 Score (EWCS 2010 / 2015) (N=61,122)	Model 2			Model 3		
	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value
Sociodemographic variables						
Gender*Age – Ref.: Male / 18–35 years						
Female / 36–55 years	0.21	(-0.48, 0.91)	0.5374	0.19	(-0.51, 0.89)	0.5867
Female / ≥56 years	-0.80	(-1.86, 0.25)	0.1316	-0.68	(-1.74, 0.38)	0.2023
Gender*Age*Survey year – Ref.: Male / 18–35 years / 2010[†]						
Female / 36–55 years / 2015	0.01	(-1.39, 1.41)	0.9920	0.07	(-1.33, 1.46)	0.9253
Female / ≥56 years / 2015	1.84	(-0.30, 3.98)	0.0898	1.77	(-0.37, 3.90)	0.1022
Education*Sex – Ref.: Male / Tertiary						
Female / Secondary	1.16	(0.48, 1.85)	0.0012	1.06	(0.37, 1.76)	0.0032
Female / Primary	-3.66	(-5.41, -1.91)	<.0001	-3.57	(-5.33, -1.82)	0.0001
Education*Sex*Survey year – Ref.: Male / Tertiary / 2010[†]						
Female / Secondary / 2015	0.44	(-0.95, 1.82)	0.5269	0.69	(-0.98, 1.78)	0.5625
Female / Primary / 2015	3.19	(-0.46, 6.83)	0.0849	3.28	(-0.36, 6.92)	0.0762
Precarious employment						
Temporary contract*Sex – Ref.: Male / Long-term contract						
Female / Temporary contract	0.36	(-0.54, 1.25)	0.4248	0.41	(-0.48, 1.31)	0.3578
Temporary contract*Sex*Survey year – Ref.: Male / Long-term contract / 2010[†]						
Female / Temporary contract / 2015	0.98	(-0.85, 2.81)	0.2809	1.00	(-0.82, 2.82)	0.2697
Multiple job*Sex – Ref.: Male / One paid job						
Female / Multiple job	-0.02	(-1.23, 1.19)	0.9768	-0.07	(-1.28, 1.14)	0.9083
Multiple job*Sex*Survey year – Ref.: Male / One paid job / 2010[†]						
Female / Multiple job / 2015	-1.84	(-4.32, 0.64)	0.1388	-1.91	(-4.38, 0.56)	0.1239
Psychosocial working conditions						
Job demands						
(Not) enough time to get job done*Sex – Ref.: Male / Enough time to get job done						
Female / Not enough time to get job done	0.01	(-1.06, 1.08)	0.9871	-0.14	(-1.21, 0.93)	0.7928
(Not) enough time to get job done*Sex*Survey year – Ref.: Male / Enough time to get job done / 2010[†]						
Female / Not enough time to get job done / 2015	-0.91	(-3.08, 1.26)	0.4016	-0.86	(-3.02, 1.31)	0.4280
Working at very high speed*Sex – Ref.: Male / Not working at very high speed						
Female / Working at very high speed	-1.12	(-1.76, -0.47)	0.0011	-1.18	(-1.82, -0.53)	0.0006
Working at very high speed*Sex*Survey year – Ref.: Male / Not working at very high speed / 2010[†]						
Female / Working at very high speed / 2015	0.12	(-1.19, 1.42)	0.8574	0.22	(-1.08, 1.52)	0.7358
Working to tight deadlines*Sex – Ref.: Male / Not working to tight deadlines						
Female / Working to tight deadlines	-0.33	(-0.98, 0.32)	0.3083	-0.44	(-1.09, 0.22)	0.1852
Working to tight deadlines *Sex*Survey year – Ref.: Male / Not working to tight deadlines / 2010[†]						
Female / Working to tight deadlines / 2015	-0.65	(-1.96, 0.67)	0.3236	-0.51	(-1.82, 0.81)	0.4400
Working in free time to meet demands*Sex – Ref.: Male / Not working in free time						
Female / Working in free time	-1.12	(-2.12, -0.12)	0.0288	-1.30	(-2.30, -0.30)	0.0116
Working in free time to meet demands*Sex*Survey year – Ref.: Male / Not working in free time / 2010[†]						
Female / Working in free time / 2015	0.78	(-1.32, 2.87)	0.4618	0.53	(-1.56, 2.63)	0.6123
Long working hours*Sex – Ref.: Male / <48 hours/week						
Female / Working ≥48 hours/week	-1.06	(-1.98, -0.14)	0.0246	-0.92	(-1.48, -0.004)	0.0490

WHO5 Score (EWCS 2010 / 2015) (N=61,122)	Model 2			Model 3		
	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value
Psychosocial working conditions						
Job demands						
Long working hours*Sex*Survey year – Ref.: Male / <48 hours/week / 2010 [†]						
Female / Working ≥48 hours/week / 2015	2.80	(0.95, 4.65)	0.0039	2.78	(0.93, 4.62)	0.0040
Change of working hours*Sex – Ref.: Male / No change						
Female / Increase	-1.08	(-1.88, -0.28)	0.0089	-1.07	(-1.87, -0.27)	0.0092
Female / Decrease	0.05	(-1.09, 1.19)	0.9336	0.01	(-1.13, 1.15)	0.9894
Change of working hours*Sex*Survey year – Ref.: Male / No change / 2010 [†]						
Female / Increase / 2015	1.57	(-0.04, 3.19)	0.0557	1.49	(-0.12, 3.10)	0.0690
Female / Decrease / 2015	2.50	(0.16, 4.85)	0.0364	2.48	(0.14, 4.82)	0.0382
Job insecurity						
Job insecurity*Sex – Ref.: Male / No job insecurity						
Female / Job insecurity	-0.35	(-1.23, 0.53)	0.4271	-0.40	(-1.28, 0.48)	0.3684
Job insecurity*Sex*Survey year – Ref.: Male / No job insecurity / 2010 [†]						
Female / Job insecurity / 2015	-1.55	(-3.32, 0.23)	0.0862	-1.42	(-3.20, 0.35)	0.1127
Other psychosocial working conditions						
Worrying about work*Sex – Ref.: Male / Not worrying						
Female / Worrying about work [‡]	-1.28	(-2.17, -0.39)	0.0058	-1.30	(-2.19, -0.41)	0.0052
Work–life conflict*Sex – Ref.: Male / No Work–life conflict						
Female / Work–life conflicted [‡]	-1.27	(-2.17, -0.37)	0.0068	-1.42	(-2.31, -0.52)	0.0028
Work–life balance*Sex – Ref.: Male / No work–life imbalance						
Female / Work–life imbalance [‡]	-1.49	(-2.46, -0.52)	0.0034	-1.60	(-2.57, -0.64)	0.0017
Experiencing stress*Sex – Ref.: Male / Not experiencing stress						
Female / Experiencing stress	-1.03	(-1.69, -0.37)	0.0030	-1.22	(-1.88, -0.56)	0.0006
Experiencing stress*Sex*Survey year – Ref.: Male / Not experiencing stress / 2010 [†]						
Female / Experiencing stress / 2015	0.64	(-0.71, 1.98)	0.3413	0.61	(-0.73, 1.95)	0.3613
Job resources						
Support from colleagues*Sex – Ref.: Male / No support from colleagues [§]						
Female / Support from colleagues	-1.26	(-2.31, -0.20)	0.0206	-1.38	(-2.44, -0.32)	0.0116
Support from colleagues*Sex*Survey year – Ref.: Male / No support from colleagues / 2010 [†]						
Female / Support from colleagues / 2015	1.27	(-0.85, 3.40)	0.2342	1.34	(-0.78, 3.46)	0.2101
Support from manager*Sex – Male / No support from manager						
Female / Support from manager	0.15	(-0.71, 1.01)	0.7296	0.17	(-0.69, 1.03)	0.6868
Support from manager*Sex*Survey year – Male / No support from manager / 2010 [†]						
Female / Support from manager / 2015	2.76	(1.03, 4.49)	0.0023	2.82	(1.09, 4.54)	0.0019

Note: Model 2 is age-adjusted / Model 3 is further adjusted for education, household size, parental status, and occupation; [†] 2-level hierarchical model with individual observations nested within countries; questionnaire year is included in the fixed part of the model; [‡] Variable not available in the EWCS 2010 questionnaire (N=30,012).

Table S2 Interaction terms for the COVID-19 survey

WHO5 Score (COVID-19 / 2020 Wave 2) [†] (N=14,003)	Model 2			Model 3		
	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value
Sociodemographic variables						
Gender*Age – Ref.: Male / 18–35 years						
Female / 36–55 years	-3.83	(-5.43, -2.23)	<.0001	-3.29	(-4.90, -1.69)	0.0001
Female / ≥56 years	-4.87	(-6.85, -2.89)	<.0001	-3.89	(-5.86, -1.91)	0.0002
Education*Sex – Ref.: Male / Tertiary						
Female / Secondary	-2.75	(-4.19, -1.32)	0.0003	-2.67	(-4.10, -1.24)	0.0004
Female / Primary	-11.62	(-15.22, -8.03)	<.0001	-11.29	(-14.89, -7.69)	<.0001
Precarious employment						
Temporary contract*Sex – Ref.: Male / Long-term contract						
Female / Temporary contract	8.55	(6.65, 10.45)	<.0001	7.69	(5.79, 9.59)	<.0001
Multiple job*Sex – Ref.: Male / One paid job						
Female / Multiple job	-	-	-	-	-	-
Psychosocial working conditions						
Job demands						
(Not) enough time to get job done*Sex – Ref.: Male / Enough time to get job done						
Female / Not enough time to get job done	1.08	(-1.00, 3.15)	0.3001	0.97	(-1.09, 3.02)	0.3458
Working at very high speed*Sex – Ref.: Male / Not working at very high speed [‡]						
Female / Working at very high speed	-	-	-	-	-	-
Working to tight deadlines*Sex – Ref.: Male / Not working to tight deadlines [‡]						
Female / Working to tight deadlines	-	-	-	-	-	-
Working in free time to meet demands*Sex – Ref.: Male / Not working in free time						
Female / Working in free time	1.79	(0.34, 3.25)	0.0170	1.02	(-0.43, 2.47)	0.1630
Long working hours*Sex – Ref.: Male / <48 hours/week						
Female / Working ≥48 hours/week	-5.01	(-6.77, -3.24)	<.0001	-5.14	(-6.89, -3.39)	<.0001
Change of working hours*Sex – Ref.: Male / No change						
Female / Increase	-2.73	(-4.47, -1.00)	0.0025	-2.51	(-4.24, -0.78)	0.0051
Female / Decrease	-1.26	(-2.83, 0.31)	0.1138	-0.58	(-2.15, 0.99)	0.4613
Job insecurity						
Job insecurity*Sex – Ref.: Male / No job insecurity						
Female / Job insecurity	1.54	(-0.96, 4.04)	0.2212	2.02	(-0.47, 4.51)	0.1098
Other psychosocial working conditions						
Worrying about work*Sex – Ref.: Male / Not worrying						
Female / Worrying about work	3.61	(2.26, 4.95)	<.0001	3.35	(2.01, 4.68)	<.0001
Work–life conflict*Sex – Ref.: Male / No Work–life conflict						
Female / Work–life conflicted	2.17	(0.62, 3.72)	0.0075	1.72	(0.17, 3.26)	0.0304
Work–life balance*Sex – Ref.: Male / No work–life imbalance						
Female / Work–life imbalance	1.25	(-0.17, 2.67)	0.0818	0.96	(-0.44, 2.37)	0.1742
Experiencing stress*Sex – Ref.: Male / Not experiencing stress [‡]						
Female / Experiencing stress	-	-	-	-	-	-

WHO5 Score (EWCS 2010 / 2015) (N=61,122)	Model 2			Model 3		
	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value
Job resources						
Support from colleagues*Sex – Ref.: Male / No support from colleagues						
Female / Support from colleagues	3.05	(1.22, 4.88)	0.0016	2.46	(0.64, 4.28)	0.0090
Support from manager*Sex – Male / No support from manager						
Female / Support from manager	4.94	(3.32, 6.55)	<.0001	4.31	(2.70, 5.92)	<.0001

Note: Model 2 is age-adjusted / Model 3 is further adjusted for education, household size, parental status, and work sector; † Results are based on a 2-level hierarchical model in which observations are nested within countries; One wave of the COVID-19 Survey was included (wave 2), therefore, interaction terms for survey year could not be analysed; ‡ Variable not available in the COVID-19 Fall questionnaire.

D/2023/10.574/09

ISBN: 978-2-87452-665-7 (print version)

ISBN: 978-2-87452-666-4 (electronic version)



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