European Agency for Safety and Health at Work

Mental health at work after the COVID-19 pandemic – What European figures reveal

Report

European Agency for Safety and Health at Work

Authors: Nico Dragano, Krisztina Gerö, Morten Sten Wahrendorf - Institute of Medical Sociology, Centre for Health and Society, University Hospital and Medical Faculty, University of Düsseldorf, Germany.

Project management: Sarah Copsey, Maurizio Curtarelli - European Agency for Safety and Health at Work (EU-OSHA).

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Executive Summary

In the spring of 2022, the European Agency for Safety and Health at Work (EU-OSHA) commissioned a Flash Eurobarometer survey (OSH Pulse survey 2022[1]). Over 27,000 employed workers were interviewed on the phone across all EU Member States, plus Iceland and Norway. The aim was to gain insights into the state of occupational safety and health (OSH) in post-pandemic workplaces. A further analysis was made of data on work-related mental health from the OSH Pulse survey and from other European surveys[2] on working conditions and occupational risks that are repeated over time to provide a picture of the situation regarding the mental health of workers before, during and in the ending phase of the COVID-19 pandemic. The aims were to:

- provide a detailed description of the state of work-related mental health in Europe at the end of the pandemic; and
- generate evidence to inform the discussion about the immediate and possible long-term consequences of the pandemic for work-related mental health.

The key findings are given below.[3]

Extent of work-related stress and mental ill health in the 2022 OSH Pulse survey

Prevalence of work-related stress and mental health problems: A relatively high level of self-reported work-related stress and mental health problems[4] was found in both the OSH Pulse (26.8% of respondents reporting stress, depression or anxiety caused or made worse by work and 44% reporting that their work stress had increased as a result of the pandemic) and the analysis of the two other studies on mental wellbeing (European Working Conditions Surveys (EWCS) and the European Survey of Enterprises on New and Emerging Risks (ESENER)). For example, poor mental health was reported by 22.4% of the 2021 European Working Conditions Telephone Survey (EWCTS) survey respondents. This is line with other self-reported work-related stress and mental health problems in the working population pre-pandemic (Eurostat, 2022[5]; GBD 2019 Mental Disorders Collaborators, 2022[6]) and other studies on the mental health of workers during the pandemic (e.g. Hvide and Johnsen, 2022[7]).

The analysis showed that it was already important to address psychosocial risks and work-related mental health within OSH before 2020; however, the pandemic has made this more pressing.

Association between work-related psychosocial risk factors and reported work-related mental health problems: As expected, individual workloads and workplace openness and measures to address stress were associated with employees' mental health in the OSH Pulse survey. All factors studied (exposure to psychosocial risk factors, risk factors related to digital work, lack of measures to address work-related stress) were significantly associated with the presence of poor work-related mental health. The risk factor with the strongest link to mental health was severe time pressure or work overload. This risk factor was also the most reported in the OSH Pulse survey (by 46% of respondents) and appears to be a particular problem in the current world of work. In the ESENER 2019 survey, 45% of establishments

[1] OSH Pulse 2022 survey: https://osha.europa.eu/en/facts-and-figures/osh-pulse-occupational-safety-and-health-post-pandemic-workplaces
See also: https://osha.europa.eu/en/publications/osh-pulse-occupational-safety-and-health-post-pandemic-workplaces

[2] European Working Conditions Surveys (EWCS) and European Working Conditions Telephone Survey (EWCTS): https://www.eurofound.europa.eu/en/surveys/european-working-conditions-surveys-ewcs
Living, working and COVID-19 e-survey (LWCOVID-19): https://www.eurofound.europa.eu/en/surveys/european-quality-life-surveys-eqls
European Survey of Enterprises on New and Emerging Risks (ESENER), ESENER 2019 survey: https://osha.europa.eu/en/facts-and-figures/esener
ESENER 2019 Overview report: https://osha.europa.eu/en/publications/esener-2019-overview-report-how-european-workplaces-manage-safety-and-health

[3] The methodology and its limitations are given in the full report.

[4] No diagnostic data were collected in any of the studies used here, and only short indicator questions were asked. Therefore, the prevalence found must be interpreted with caution and by no means as the prevalence of clinically significant mental illnesses.

[5] Eurostat, EU LFS ad hoc module on accidents at work and work-related health problems 2020: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Self-reported_work-related_health_problems_and_risk_factors_-_key_statistics#Exposure_to_mental_risk_factors_at_work

[6] See: https://pubmed.ncbi.nlm.nih.gov/35026139/

[7] Hvide, H. K., and Johnsen, J., 'COVID-19 and mental health: a longitudinal population study from Norway', *European Journal of Epidemiology*, 2022, Vol. 37, No 2, pp. 167–172.

reported the presence of time pressure as a risk factor.[8] Other factors, such as experiencing harassment, bullying or violence at work, were also associated with considerable poor mental health in the OSH Pulse survey.

Association between increase in stress during the pandemic and exposure to psychosocial risk factors: While nearly 45% of respondents answered that the pandemic increased their stress at work, reporting an increase was significantly more likely among those exposed to poor communication and cooperation, lack of autonomy or influence over work, or time pressure or high workload compared to no exposure to these risk factors. This finding suggests that there may have been a simultaneous increase in different psychosocial risk factors during the pandemic.

Effect of digitalisation: Exposure to psychosocial risk factors related to the use of digitalisation (increased workload, reduced autonomy) showed somewhat weaker associations with poor reported work-related mental health, although they were statistically significant and point to the importance of decent digital work for mental wellbeing. Also, those reporting that the use of digital technologies increased their workload or reduced their work autonomy were more likely to report that work stress increased due to the pandemic than those who answered no to either of these factors (see below).

Positive impact of being able to speak about mental health and workplace measures to address stress at work: Respondents whose workplaces had an open climate for dealing with mental problems (feeling comfortable speaking with managers about mental health), provided information and training on work stress, and consulted on stressful aspects of work had significantly better mental health than respondents whose workplaces did not have these things.

Positive impact of good occupational health and safety measures: The general quality of OSH was particularly important. Respondents with good OSH measures in place in their workplaces reported significantly better mental health than workers reporting that their workplaces did not have good measures to protect health. They were also less likely to report that their work stress had increased during the pandemic. The same positive effect was seen for workplaces that dealt with safety problems promptly.

Country differences in OSH: The additional country comparison showed that employees were less likely to report an increase in work stress due to the pandemic in countries with a higher proportion of companies carrying out OSH risk assessments. Likewise, employees were less likely to report an increase in work stress due to the pandemic in countries with high proportions of workers who reported that they were comfortable to speak about mental health, that their employers provided information and training related to mental health and work stress, or their workplaces had good measures to protect health at work. These results again underscore that it is possible to protect employees from stress if the employer has implemented protective and supportive measures even in the time of a global health crisis. From this perspective, the consistent implementation of OSH regulations is an important element in strengthening the psychological resilience of employees regarding possible future crisis events.

The possible impact of the COVID-19 pandemic on work-related psychosocial factors and mental health

The mental ill health of many workers, which has been known for many decades, persisted or increased during the pandemic. However, the extent to which changes occurred compared to before the pandemic, what the causes were, and whether these changes are likely to remain post-pandemic is another question.

Subjective increase in work stress due to the pandemic and stringency of COVID-19 policy measures: Almost half of the respondents (44%) to the OSH Pulse 2022 survey stated that their work stress had increased because of the pandemic and analysis showed that this increase in stress was associated with poorer mental health. To investigate whether the impact on individual workers' work-related stress was also greater in countries where measures to contain COVID-19 were stricter, the responses by country to the question about an increase in work stress due to the pandemic were compared to the strictness of policy measures in different countries to contain the pandemic using the Stringency index. The Stringency index integrates measures such as the extent of workplace closures, economic data

[8] ESENER 2019 Overview report: https://osha.europa.eu/en/publications/esener-2019-overview-report-how-european-workplaces-manage-safety-and-health

and working from home rules.[9] The results indicated that the strictness of a country's COVID-19 policy measures did have an impact on perceptions of work-related stress. However, this is only a correlation that cannot be interpreted causally. Ultimately, reliable statements about changes over time can only be made on the basis of longitudinal data, where information is available on the individual level at different measurement points in time.

The presence of work-related psychosocial factors and an increase in work stress due to the pandemic: As expected, there was a clear association between the presence of work-related psychosocial factors (e.g. high work demands, lack of control over work or workplace bullying) and an increase in work stress levels due to the pandemic. It is not known to what extent respondents were exposed to these risk factors before the pandemic or if exposure increased during the pandemic. However, workers experience stress when they are under excessive pressure and do not have physical and mental resources to cope with all the demands on them,[10] and workplaces where work overload, bullying, or poor communication and cooperation were already present are unlikely to have been in a good position to manage the unexpected and increased demands brought by the pandemic.

Protective effect of good OSH measures on work-related stress during the pandemic: While the data do not allow firm conclusions to be drawn about the role of good OSH in protecting workers from an increase in work-related stress and mental ill health during the pandemic, they suggest that those working in workplaces with good OSH measures in place and who dealt with OSH problems promptly were less likely to experience an increase in stress during the pandemic. This hypothesis is strengthened by the correlation seen between countries having a lower reported increase in stress (OSH Pulse survey 2022) and companies in those countries being more likely to report having made a comprehensive risk assessment (ESENER 2019).

Changes over time: Nearly 45% of respondents answered that the pandemic increased their stress at work. However, it is not clear from the literature to date what trends actually existed before, during and, as a prediction, after the pandemic. To gain more insight, data from other large-scale European surveys that are repeated over time were used to provide a picture of the situation before, during and in the ending phase of the COVID-19 pandemic. Due to methodological differences between the surveys,[11] only a few indicators that were partially comparable could be identified. Statements about the time before the COVID-19 pandemic were possible using the two waves of the EWCS from 2010 and 2015. Another wave in 2021 (EWCTS) using a different survey methodology, which limits direct comparison, was also examined. The data suggest that there was a higher prevalence of poor (general) mental health during the pandemic than in the previous period. Moreover, most of the work stressors measured were relatively stable before the pandemic, then in the 2021 wave, the prevalence of working at high speed was above those of the pre-pandemic survey waves. On the contrary, a lower prevalence was observed for poor cooperation with colleagues. Little change is seen for all parameters between the waves of the Living, working and COVID-19 (LWCOVID-19) survey carried out between 2020 and 2022, but this study did not have a pre-pandemic measurement.

In summary, there were no clear patterns observable in this analysis that would indicate a pandemic effect. The most likely pattern seems to be continuity, suggesting an evolutionary development rather than a disruptive increase (or decrease) in mental workload, with the exception of certain sectors of work (see below). Regarding the post-pandemic world of work, this would mean that the long-known problem of psychosocial risk factors for the mental health of employees still exists and is an apparently unresolved problem.

[9] Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., Webster, S., Cameron-Blake, E., Hallas, L., Majumdar, S., and Tatlow, H., 'A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker)', Nature Human Behaviour, 2021, Vol. 5, No 4, pp. 529–538.

[10] EU-OSHA – European Agency for Safety and Health at Work, *Healthy workers, thriving companies - a practical guide to wellbeing at work*, 2018. Available at: https://osha.europa.eu/en/publications/healthy-workers-thriving-companies-practical-guide-wellbeing-work

[11] It is important to keep in mind that comparability between the surveys included and of each survey wave was limited. On the one hand, due to the rapid spread of the COVID-19 pandemic, changes in the questionnaire (removed questions compared to preceding waves), mode of data collection (from face-to-face interviews to telephone surveys) and sampling method were made in the latest EWCS wave conducted in 2021. On the other hand, the COVID-19 surveys were distributed online applying non-probability sampling methods, asking respondents about their most recent work experiences (within the last two to four weeks), resulting in generally low comparability with other surveys, including the EWCS. Therefore, we aimed to explore the mental health and psychosocial working conditions of European workers at different time points instead of conducting a trend analysis over time.

Differential findings for different sociodemographic and economic subgroups of workers: As expected, the analyses of the OSH Pulse data revealed that the mental health in some sectors was disproportionally affected by the pandemic. The evaluation of the OSH Pulse data showed a high burden of low mental health in the health and social care sector and a high number of employees indicating that their stress increased due to the pandemic. Furthermore, a high level of work-stress and poor mental health was observed in the education sector, which can be linked to changes such as home-schooling and the related process of rapid digitalisation (e.g. Kotowski et al., 2022[12]). Comparable differences by sectors were also found in the analysis of the 2021 wave of the EWCTS. Special attention must be paid to mental health in the sectors particularly affected. Separate initiatives may be needed to prevent the high level of mental stress in the health and education sectors from becoming entrenched post-pandemic.

Gender: Lower work-related mental wellbeing and less favourable psychosocial working conditions were seen among women compared to men. Women, for instance, were more likely to report that their work stress had increased during the pandemic and were less likely to be well protected by measures of OSH. They also reported more violence or verbal abuse at work and had less autonomy overall than their male colleagues. This replicated the findings of other studies in the pandemic that reported an increase in gender inequalities (e.g. Backhaus et al., 2023[13]). It will be important in the future to prevent these differences from becoming further entrenched.

Differences by occupational position: Higher-qualified workers had higher levels of exposure to potentially harmful psychosocial working conditions and lower mental wellbeing. One explanation for this could be that many occupations in the sectors particularly affected by the pandemic, especially in the health and education sectors, tend to be higher-qualified occupations (e.g. doctors, qualified nursing staff, teachers). However, manual workers reported being less well informed about work-related psychosocial risks by their employers. It could be that these workers are less aware about possible psychosocial risks so tend to report existing problems less often.

Digitalisation and flexibility in the workplace: Two other major issues, digitalisation of work and flexibility in the workplace, were further accelerated by the pandemic and it is likely that these two trends will continue in the future[14] (Battisti et al., 2022). The analyses showed that workers in highly digitalised jobs were more stressed during the pandemic than those with less digitalised work. Since a connection between work stress caused by the use of digital technologies at work (increased workload, reduced autonomy) and mental health was also apparent, it is not unlikely that digitalisation in the pandemic may have played a role in increasing mental stress. However, this assumption could not be directly investigated from the available data. Regarding flexibility in place of work, no evidence was found that working from home (telework) was associated with increased (or decreased) work-related stress. Given the benefits of location-flexible working, this finding supports the continued use of teleworking or hybrid working after the pandemic. However, working in public places (e.g. coffee shops) was associated with increased work stress. So, not every form of place or work flexibility can be recommended without hesitation.

Conclusions

Psychosocial risk factors, work-related stress and poor mental health remain a significant problem in Europe's workplaces and there are indications that work-related stress increased during the pandemic. So, while it was already important to address psychosocial risks and work-related mental health within OSH before 2020, the pandemic has made this more pressing. Some sectors such as healthcare and education were particularly affected. Digitalisation of work is also associated with an increase in exposure to risk factors. The risk factor with the strongest link to mental health was severe time pressure or work overload. It was also the most reported risk factor in the OSH Pulse survey and appears to be a particular problem. On the other hand, while the pandemic had a clear impact on work-related stress, organisations with good OSH measures in place appeared better able to cope with work stress during

[12] Kotowski, S. E., Davis, K. G., and Barratt, C. L., 'Teachers feeling the burden of COVID-19: Impact on well-being, stress, and burnout', *Work (Reading, Mass.)*, 2022, Vol. 71, No 2, pp. 407–415.

[13] Backhaus, I., Hoven, H., Bambra, C., Oksanen, T., Rigó, M., Di Tecco, C., Iavicoli, S., and Dragano, N., 'Changes in work-related stressors before and during the COVID-19 pandemic: differences by gender and parental status', *International Archives of Occupational and Environmental Health*, 2023, Vol. 96, No 3, pp. 421–431.

[14] Battisti, E., Alfiero, S., and Leonidou, E., 'Remote working and digital transformation during the COVID-19 pandemic: Economic-financial impacts and psychological drivers for employees', *Journal of Business Research*, 2022, Vol. 150, pp. 38–50.

the pandemic, as good OSH measures were associated with lower reported increases in work-related stress.

It is not only important to understand what happened during the pandemic and draw conclusions about possible future crises of this kind. It is also crucial to ask which of these changes are permanent and will remain part of the 'normal' post-pandemic world of work, underlining the importance of ongoing monitoring of working conditions together with indicators of mental health, so changes can be recognised at an early stage and forecasts for future developments can be made. This is particularly relevant in times of rapid change such as exists today.

Finally, the data show the importance of addressing work-related psychosocial risks, especially in relation to digitalisation, and the need to integrate addressing work-related psychosocial risks into preparedness plans for future critical events.

1. Introduction: Work-related psychosocial risk factors and workers' mental health during the pandemic

Poor mental health is a critical issue in the European working population. The prevalence of common mental disorders, such as depressive symptoms, anxiety or substance misuse, among the working-age population was already high before the coronavirus disease 2019 (COVID-19) pandemic (Eurostat, 2022; GBD 2019 Mental Disorders Collaborators, 2022), and it seems that it has not reduced since then (Hvide and Johnsen, 2022; Pashazadeh Kan et al., 2021; Pierce et al., 2020; Pierce et al., 2021; Robinson et al., 2021). Mental disorders are not only an elementary public health burden. They are also related to high economic costs due to necessary healthcare and productivity losses as a result of sick leave, disability and reduced work ability (Arias et al., 2022).

The exposure to work-related psychosocial risk factors in the workplace can lead to prolonged work-related stress and can cause anxiety, depression and burnout. Workers experience stress when the demands of their job are excessive and greater than their capacity to cope with them. According to the findings of the EU Labour Force Survey (LFS) ad hoc module 2020 (Eurostat, 2021), 'stress, depression or anxiety' is the second most common group of work-related health problems.[15] The proportion of workers who reported facing risk factors to their mental wellbeing at work was nearly 45%. Similarly, in the most recent European Foundation for the Improvement of Working and Living Conditions (Eurofound) survey, risk factors of high work intensity and unsocial working hours were reported by around four in 10 workers (Eurofound, 2023b). Psychosocial risk factors are frequently reported among establishments in all sectors, confirming that they are present across all activities (EU-OSHA, 2019, 2020). In addition, almost 60% of workplaces across all sectors in the EU-27 reported 'having to deal with difficult customers, patients, pupils' (EU-OSHA, 2020).

Examples of working conditions leading to psychosocial risks include excessive workload, lack of involvement in making decisions that affect the worker, lack of influence over the way the job is done, conflicting demands and lack of role clarity, ineffective communication, poorly managed organisational change, lack of support from management or colleagues, low rewards, job insecurity, psychological and sexual harassment, violence and stress related to the use of digital technologies at work (Duchaine et al., 2020; Eurofound, 2023b; Harvey et al., 2017; Kim and Knesebeck, 2016; La Torre et al., 2019; Madsen et al., 2017; Theorell et al., 2015). At the same time, other work-related factors were found that may have a positive influence on mental wellbeing (psychosocial resources), such as decent and meaningful work or social support from colleagues (Aronsson et al., 2017; Lomas et al., 2017; Sinokki et al., 2009). Thus, a good psychosocial environment enhances good performance and personal development, as well as workers' mental and physical wellbeing. Against this background, the prevention and management of work-related psychosocial risk factors is essential. This includes the prevention of the organisational causes of risk factors in order to equip workers to cope with stressful conditions and support those who have developed work-related stress symptoms returning to work (EU-OSHA, 2015). Employers in the EU have a legal duty to assess all risks to workers' safety and health in the workplace and subsequently plan and implement measures to prevent those risks (EEC Framework Directive 89/391/EEC, 1989), including psychosocial risks.

Work-related mental health, however, it is not a static phenomenon. Just as society and the economy are constantly changing, employment and working conditions, and, thus, the psychosocial working environment and its perception by the workers, also change over time. An analysis of the European Working Conditions Surveys (EWCS) over the period 1995–2015, for instance, suggests that there was a general increase in workplace stressors (e.g. a low level of control and rewards at work), with a particularly steep increase for people in lower-skilled occupations (Rigó et al., 2022). The COVID-19 pandemic is thought to have exacerbated this situation. The onset of the COVID-19 pandemic in early 2020 led to lockdowns, business closures and sudden working from home rules, and the everyday working conditions — and also many other areas of life — of many workers changed in a fundamental way. Moreover, physical distancing and several other preventive measures were introduced in workplaces (either as a consequence of a legal requirement or on a voluntary basis) and may have triggered psychosocial risks. Those workers classed as essential workers with no possibility to telework were working in difficult circumstances (Eurofound, 2023a). This included those working in shops and delivery services, health and social care, transport, slaughterhouses and seasonal farm labour. Many

[15] Various forms of musculoskeletal complaints are the most common health burden.

groups of healthcare workers particularly faced excessive workloads and high emotional burdens during the pandemic, resulting in long-lasting negative outcomes, including burnout and, in the case of frontline workers, post-traumatic stress disorder (Johnson et al., 2020). However, it is important to emphasise that effects of the pandemic were not restricted to essential workers. Nearly all workers were exposed to some kind of pandemic-related changes.

A comprehensive description of the impact of the pandemic on various aspects of psychosocial risk factors and mental health is not yet available. Although a large number of studies have been published on this issue, it is not always clear which of the effects they described were robust and which were causally attributable to the pandemic in any respect. A particular problem is the lack of high-quality longitudinal studies with measurements before, during and post-pandemic that would allow the study of trends. However, a number of factors identified by previous research can be highlighted. We briefly introduce some important findings in the following section, beginning with psychological effects directly related to COVID-19 infections at work and ending with more indirect effects resulting from the various political and economic consequences of the pandemic.

Fear of infection: Exposure to a potentially dangerous agent can be related to considerable mental stress and anxiety and manifest itself in symptoms of depression or post-traumatic stress (Fan et al., 2021). This was a particular issue for those workers who continued to have contact with colleagues, customers or patients during the pandemic because their job could not be done from home or employers did not allow working from home. Essential workers were concerned not only for their own health but also about passing COVID-19 onto family members or vulnerable patients.

Long COVID: Infection due to COVID-19 can result in a number of long-standing impacts on the health of the individual with potentially debilitating effects in some people. Long or post-COVID symptoms include disorders of the respiratory and nervous system, neurocognitive, mental, metabolic, cardiovascular and gastrointestinal disorders, malaise, fatigue, and difficulties with concentration, musculoskeletal pain and anaemia (EU-OSHA, 2021a; OSHwiki, 2020, 2022). A further common symptom (occurring in around 10% of workers) is the condition called ‘brain fog’, a neurocognitive effect of the COVID-19 infection when a worker has difficulty with concentration and memory, usually a temporary effect (Bowyer et al., 2023; Premraj et al., 2022). Additionally, fears over the future with long COVID can lead to anxiety and depression.

Return to the workplace: Post-lockdown brought a new set of challenges for workplaces and pressures on workers, especially if the change was not managed well as businesses opened up again (OSHwiki, 2020). Issues to be addressed included anxiety over the return and fear of infection, resuming work after a period of closure, coping with a high rate of absence, managing workers working from home and hybrid workers, taking care of workers who have been ill, managing changes and keeping workers informed. Some workers will have been dealing with grief over colleagues who died during the pandemic.

Increased work demands: A frequently reported effect was a significant increase in psychological work demands as a result of work intensification directly related to the pandemic. This was obviously the case in the health and social care sector, where a large number of COVID-19 patients had to be cared for under difficult conditions, such as work with elaborate protective measures, including working prolonged hours in personal protective equipment, complex therapies in intensive care units and a high staff absenteeism rate (Britt et al., 2021; Nyberg et al., 2022; van Elk et al., 2022). However, other professions were also affected as the workload increased due to, for example, additional hygiene measures, demands to reorganise work under stay-at-home rules, or the sudden move to home deliveries by supermarkets and other businesses. Many workers had to change their way of working completely, for example, teachers and university lecturers, who had to devise ways of providing classes online. Consequently, studies reported an increase in work demands and a subsequent deterioration in the mental health of all workers, not only those working in health and social care (Knight et al., 2022; Kotowski et al., 2022; Mahmood et al., 2021).

Job and income insecurity: Unemployment, under-employment and precarious employment are known risk factors for mental disorders, and it appeared that job insecurity or job loss during the pandemic was related to an elevated risk of depression and anxiety (Dragano et al., 2022; Hellmann et al., 2023; Wilson et al., 2020). The number of redundancies increased, at least temporarily, in many countries and sectors, or workers had to reduce their working hours tremendously and suffered a corresponding loss of income (Ahmad et al., 2023; Capasso et al., 2022; Larrimore et al., 2022; Ozili and Arun, 2022;

Verick et al., 2022). Such declines in earnings during the pandemic were higher among low-wage workers (Larrimore et al., 2022),

Teleworking: Psychosocial risk factors related to teleworking from home (and places other than the regular workplace) include social isolation, increasing conflicts between work and other life domains, and a general extension of working hours in evenings and on weekends (Awada et al., 2021; Bentley et al., 2016; EU-OSHA, 2021b; Eurofound, 2021b; McDaniel et al., 2021; Oakman et al., 2020). Another issue can be poor communication with supervisors, work teams and colleagues (EU-OSHA, 2021b; OSHwiki, 2021). On the other hand, teleworking from home can be beneficial for some workers if it increases their control over working time and allows them to coordinate their work better with other areas of their lives (Chesley, 2005; Leung and Zhang, 2017). Other benefits can include avoiding commuting to work (EU-OSHA, 2021b).

Work–life balance: Teleworking during the COVID-19 pandemic blurred the lines between work and home (EU-OSHA, 2021b), which could lead to working longer hours. When lockdown commenced, parents, whether working from home or outside the home, suddenly had to cope with children at home during the day when schools and nurseries closed. A stronger increase in work–life conflict was observed in women — especially mothers — compared to men (Backhaus et al., 2023).

Working with digital technologies: Digitalisation was already transforming many areas of work, in addition to facilitating teleworking from home (Battisti et al., 2022). Changes include the use of robotics and artificial intelligence, platform working, the gig economy and the widespread use of different software tools (Lenaerts et al., 2021; Reinhold et al., 2022; Rosen et al., 2022). While digitally enabled work is not *per se* problematic, companies appear not to be aware of the occupational safety and health (OSH) risks related to its use. According to the Third European Survey of Enterprises on New and Emerging Risks (ESENER 2019), less than a quarter of workplaces in the EU-27 discussed with employees about the potential impact on OSH of the use of digital technologies at work (EU-OSHA. 2020). However, certain types of use may lead to so-called *technostress*, which, in turn, can trigger mental disorders (Berg-Beckhoff et al., 2017; La Torre et al., 2019; Tarafdar et al., 2007). This is partly due to negative psychological impulses that arise from the technology itself. Working with unreliable digital tools (e.g. poor usability), for example, is often perceived as psychologically stressful. In addition, digital work favours the development of other stressors. Digitalisation, for example, can lead to workload increase due to multitasking, a large amount of information or expectations of short reaction times (Chesley, 2014; Stadin et al., 2016). Only a few longitudinal studies have been available so far on the influence of the pandemic on the spread of technostress. However, there seem to be both negative trends, that is, increasing technology-related stress (Camacho and Barrios, 2022; Oksanen et al., 2021), and positive effects, pointing towards psychological relief due to an improved handling of digital technologies in some workers (Andrulli and Gerards, 2023).

Impact on different socioeconomic groups: The relevance of the changes described varies for different groups of employees. Characteristics such as gender, type of occupation or sector of work are important modifiers that are likely to predict whether a person will be exposed to certain psychosocial risk factors. There are several examples in which changes in working conditions during the pandemic and mental health varied subject to such characteristics. Gender, for instance, was associated with several differences in the work-related effects of the pandemic; for example, a stronger increase in work–life conflict for women/mothers (Backhaus et al., 2023) or a reduction in the working time in the early pandemic that was positive for the mental health of men but not of women (Wang et al., 2022). Another important modifier is the socioeconomic position. Declines in earnings (a risk factor for impaired mental health) during the pandemic, for example, were higher among low-wage workers (Larrimore et al., 2022). By contrast, lower-skilled workers less frequently reported an increase in work stress due to the pandemic compared with higher-skilled professionals (EU-OSHA, 2022).

Healthcare workers: The burden on healthcare workers seems to have been particularly high (EU-OSHA, 2022a; Stringhini et al., 2021). They were not only confronted with exceptionally high workloads in extreme circumstances and uncertainty, while dealing with their own fears of infection or of infecting family members, but also with stigmatisation and high emotional demands while caring for seriously ill patients (Fan et al., 2021; Nyberg et al., 2022). According to the European Agency for Safety and Health at Work (EU-OSHA) (2022a), having to deal with difficult patients is the most significant reported risk for this sector, while time pressure is also identified as a significant risk and harassment and violence in the workplace is also a significant problem for the sector.

Medium and small enterprises: In a qualitative study of respondents to ESENER, the most frequently reported psychosocial risks across all countries and sectors in MSEs were high workload, time pressure and working with demanding clients (EU-OSHA, 2022b).

Broader influences on work and the workplace during the COVID-19 pandemic: Stress increased during the COVID-19 pandemic due to work intensification and/or increasing working hours to cover for colleagues who were off sick or to cover for older and more vulnerable colleagues. Stress levels increased due to the uncertain health and economic situation, and possibly the impact of lockdowns. Overall, market disruption, the unpredictability of governmental decisions regarding lockdown and limitations on business operations made MSEs more likely to cut costs and make redundancies, which contribute to the increased level of stress, job insecurity and poorer wellbeing of workers (EU-OSHA, 2022b). However, the extent of economic disruption varied between countries, as individual countries were affected differently by the pandemic and, in addition, the political and the economic measures taken to contain the pandemic and its consequences differed. Studies conducted before the pandemic show that national policies (e.g. OSH legislation) could have an impact on individual psychosocial work environments and, thus, also on mental health in the respective country (Bambra, 2011; EU-OSHA, 2020; Rigó et al., 2022). In this respect, it is conceivable that the consequences of the pandemic for work-related mental health also varied from country to country. The few country-comparative studies (from Europe) during the pandemic show a considerable variation in indicators of poor mental health or a poor psychosocial work environment by country (Ahrendt et al., 2020; EU-OSHA, 2022). However, there is a lack of in-depth studies that shed light on such patterns and identify macro factors that may have had an influence. There is a lack of analyses, for example, looking at whether the possible consequences of the pandemic for workers' mental health would be less if countries had well-developed OSH systems for managing psychosocial stress before the pandemic.

The reports on possible influences of the pandemic on work-related mental health raise questions not only about what happened during the pandemic but also about further developments after the pandemic. However, it is difficult to say at this stage whether the effects described were temporary or if changes will persist post-COVID. Further research with current data and a focus on change is needed, therefore, to assess more effectively what long-term effects of the pandemic on mental health in the workplace can be expected.

1.1. Research questions

At the beginning of 2022, EU-OSHA commissioned a European Flash Eurobarometer survey of workers (OSH Pulse survey) to obtain a rapid assessment or snapshot of their perceptions on a number of OSH issues at that point in time — in the aftermath of the COVID-19 pandemic. The survey included questions about psychosocial risk factors and mental health. Some key findings for psychosocial risks and mental health from the original analysis of the OSH Pulse data (EU-OSHA, 2022d) are presented in Box 1 (see also Appendix Key findings for psychosocial risks and mental health from the OSH Pulse 2022 survey).

Box 1: Key findings for psychosocial risks and mental health from the OSH Pulse 2022 survey

% of respondents experiencing health problems caused or made worse by work:

- overall fatigue – 37%
- stress, anxiety or depression – 27%

% of respondents reporting that work-related stress had increased during the pandemic – 44%

% of respondents reporting being exposed to psychosocial risk factors:

- severe time pressure or work overload – 46%
- poor communication or cooperation within their organisation – 26%
- lack of autonomy, or lack of influence over the pace of work or work processes – 18%
- violence or verbal abuse from customers, patients, pupils, etc. – 16%
- harassment or bullying at work – 7%

Stigma

- 50% of respondents felt that disclosing a mental health condition would have a negative impact on their career;

- 59% of respondents reported that they would feel comfortable speaking to their manager or supervisor about their mental health; and
- 50% of respondents felt that the COVID-19 pandemic had made it easier to talk about stress and mental health at work.

Workplace measures to address stress — % of respondents replying that this measure is available at their workplace

- information and training on wellbeing and coping with stress – 42%
- awareness raising or other activities to provide information – 59%
- access to counselling or psychological support – 38%
- consultation of workers about stressful aspects of work – 43%

Base: all respondents, EU-27

Building on the original analysis, the results were further analysed by country and by sociodemographic characteristics of the workers. This further analysis starts by describing the state of workers' mental health according to the OSH Pulse survey, and then looks specifically at connections between working conditions and mental health in order to pursue the question of which working conditions could have a protective or harmful impact on employees' mental health. In order to get an idea of whether the COVID-19 pandemic may have had an impact on the psychosocial workload, the subjective assessment of workers on this issue was also studied. We also analysed whether certain groups of employees (e.g. by gender, education, industry) were differently exposed to psychosocial risk factors at work and affected by mental health problems.

Country-specific differences in work-related mental health and their determinants were also looked at (data come from the EU-27 plus Iceland and Norway). The analysis attempted to map whether the average work-related mental health status of workers in different countries was associated with macro-level factors, such as pandemic-related national policies or national OSH regulations. This included examining whether an association could be seen between the extent of containment measures (including workplace closure or stay-at-home requirements) and a reported increase in work-related stress due to the pandemic.

The OSH Pulse survey data were collected during the COVID-19 pandemic. The European Foundation for the Improvement of Working and Living Conditions (Eurofound) EWCS and Living, working and COVID-19 (LWCOVID-19) surveys were used to contextualise and discuss the OSH Pulse findings, as these repeat surveys include data collected before, during and at the end of the pandemic.

2. Methods

The main data source is the EU-OSHA OSH Pulse survey (OSH Pulse), a Flash Eurobarometer[16] survey conducted from 25 April to 23 May 2022 in the 27 EU Member States and Iceland and Norway. The sample was drawn using a probabilistic procedure in which phone numbers were randomly generated (random digit dialling). Response rates varied between countries and ranged from 4.2% (Poland) to 31.5% (Bulgaria). A total of 27,250 employed people aged 16 years and older were interviewed by telephone using a standardised questionnaire. The survey included questions on socio-demographic characteristics, employment, health, working conditions and COVID-19-related experiences. Mental health was assessed by a question on **self-rated work-related mental health**. Workers were asked in the OSH Pulse survey whether they had experienced any health problems caused or worsened by work in the last 12 months, with 'stress, depression or anxiety' as one possible category that could be selected.

Respondents were also asked about exposure to five adverse **psychosocial risk factors** that can lead to work-related stress and mental health problems. Specifically, respondents were asked about the presence (yes/no) of the following risk factors: a) severe time pressure or overload of work; b) violence or verbal abuse from, for example, customers, patients, pupils; c) harassment or bullying; d) poor communication or cooperation within the organisation; and e) lack of autonomy or influence over the work pace or process. Additionally, we used two questions that measured whether the use of **digital technologies at work increases the workload, and if it reduces autonomy at work**. One additional item in the survey assessed the **self-perceived impact of the pandemic on work stress**: respondents were asked whether they agreed with the statement (based scale with four response options) that their work stress increased as a result of the pandemic (counting those who 'strongly agree' or 'agree' as a 'yes' category in our analyses). We used five questions to assess workplace **resources** related to preventing psychosocial risks (work culture, such as communication over psychosocial risks and mental health, OSH prevention measures and support measures for workers). The first refers to a positive psychosocial work climate (feel comfortable speaking to the manager or supervisor about one's own mental health). The other four relate to the availability (yes/no) of OSH initiatives: (i) the availability of information and training on wellbeing and coping with stress; (ii) consultation of workers about stressful aspects of work; (iii) safety problems are addressed promptly in the workplace; and (iv) the presence of good measures to protect workers' health in the workplace.[17]

In order to identify subpopulations with a particular burden of psychosocial risk at work and poor mental health, we differentiated our results by several **socio-demographic and employment-related factors** (i.e. sex, age, employment status, working hours, nationality, type of employment, sector of work, location of work (including working from home and mobile work) and digital work; see Table 1 and Table 2 for details).

A supplemental analysis was conducted to study whether country differences are related to country-specific contexts (measured by two macro indicators — stringency of national measures during the pandemic and whether companies carry out OSH risk assessments). This allows us to examine correlations between macro-level factors and country-level (aggregated) indicators of mental health and work-related stress derived from the OSH Pulse survey. The first macro indicator assessed severity of restrictive measures implemented by national governments during the COVID-19 pandemic, as measured by the so-called Stringency index (Hale et al., 2021). This index was based on data from the Oxford COVID-19 Government Response Tracker. On that basis, the Stringency index consists of a composite score that uses the information from nine different pandemic-related policy measures, specifically those that are related to closures and containment measures (e.g. workplace closure, stay-at-home requirements). The final score is standardised and ranges from 0 to 100, with higher values representing stricter policies. We used the country-specific mean score of the same time period of the data collection period of the OSH Pulse survey (25 April to 23 May 2022) for the analyses. Secondly, we included information from EU-OSHA's ESENER and studies with detailed information on OSH workplace risk assessments (WRAs) at the company level (from 45,420 companies in 33 countries), as provided from ESENER 2019. Specifically, we used the data on whether WRAs are regularly carried out and, importantly, if the WRA also includes psychosocial aspects. On that basis, we calculated the

[16] Flash Eurobarometer surveys are ad hoc thematic surveys on matters relating to European affairs, carried out within a short time span and conducted at the request of any service of the European Commission and other contracting authorities.

[17] Questions iii and iv were answered with a 4-point format (strongly agree, agree, disagree, strongly disagree). We dichotomised the responses and comparted workers who strongly agreed or agreed with workers who disagreed or strongly disagreed.

proportion of enterprises that implemented a comprehensive WRA for each country (using weights to adjust for the composition of enterprises in a country).

The OSH Pulse was conducted for the first time in 2022 and so its results are not generalisable to earlier or later stages of the pandemic or the time before the pandemic. We, therefore, conducted a second supplemental analysis with data from two studies carried out by Eurofound with repeated measurements to contextualise the findings from the OSH Pulse survey regarding the time and different populations. The first source is the European Working Conditions Survey (EWCS), a major source of empirical information on working conditions and the health of workers in Europe. The EWCS has been conducted every five to six years since 1990. We used data from three independent waves (2010, 2015 and 2021[18]) with a total of 121,559 respondents in the 27 EU Member States in this paper. The second source is the LWCOVID-19, set up by Eurofound in April 2020 to provide data on the consequences of the pandemic for European workers.[19] By the end of 2022, five survey rounds had been distributed in the EU. Using data from the first three waves conducted in 2020 and 2021, as well as the fifth wave carried out in 2022, 106,431 participants were added to our analyses.[20] Based on information from the EWCS and LWCOVID-19 surveys, we studied low mental wellbeing and psychosocial risk factors (such as not having enough time to get the job done, working at a very high speed, working in free time to meet demands and poor cooperation) at different points in time. Indicators were chosen by identifying items that were measured in a comparable way in the surveys and waves. However, comparability of the questionnaires and the survey methods used in the several waves of the EWCS and LWCOVID-19 surveys was generally low. Thus, a direct comparison between the studies is not feasible. A more detailed description of the methods of this part of the analyses, including references to the respective surveys, can be found in the Appendix Methods.

All analyses were conducted as outlined by a predefined analyses plan,[21] and different statistical procedures were performed.[22] Estimates of descriptive analyses include weights (i.e. post-stratification weights) correcting for deviations in the age, gender and regional distributions, and we also corrected for population size in the case of cross-country analyses (giving countries a weight proportional to their population size).

[18] The 2021 survey (EWCTS survey) was a telephone survey and therefore not directly comparable with the 2010 and 2015 EWCS.

[19] Original source of the data: *Eurofound (2020), Living, working and COVID-19 dataset*, Dublin. https://www.eurofound.europa.eu/en/data-catalogue/living-working-and-covid-19-e-survey

[20] The participants of the LWCOVID-19 surveys were recruited through the internet using no n-probability sampling methods that reduce the representativeness and comparability with other surveys.

[21] All studies were in compliance with the data protection law and the participants gave their consent. The research unit that conducted the analyses only had access to fully anonymised datasets. The concept of analysing secondary data from publicly available anonymised survey data was approved by the Ethics Committee of the Medical Faculty of the Heinrich-Heine University of Düsseldorf, Germany (2018-14-RetroDEuA).

[22] Apart from descriptive statistics (proportions, mean values), we calculated multivariable regression models for in-depth analyses of associations between working conditions and mental health in OSH Pulse. Specifically, we estimated a series of multi-level Poisson regression models with random intercept (individual nested in countries) and robust variance to estimate prevalence rate ratios (PRRs) of poor work-related mental health (Barros and Hirakata, 2003). All multivariable models were adjusted for sex, age, nationality, employment status, working hours, type of occupation and sector of work, and were calculated for each working condition separately. Next, country comparisons were made by correlating macro indicators with aggregated survey data of, for example, the mean prevalence of poor work-related mental health. Importantly, when aggregating survey data, we took into account the composition of the workforce and estimated adjusted country scores ('average adjusted predictions' (Williams, 2012)) based on multivariable Poisson regression that accounted for all individual characteristics named above.

3. Results

3.1. Part A: Work-related mental health and psychosocial factors in the OSH Pulse survey

Poor mental health

The OSH Pulse included 27,250 workers[23] from 29 countries. Their main characteristics are shown in a table in the Appendix (Table A1). In summary, men were slightly over-represented (54% of the sample). The mean age was 43 years, with workers aged 40–54 years being the largest age group (39.1%). Most workers had the nationality of the country in which they were interviewed (92.9%). The following descriptive results were weighted for demographic factors to account for these unbalances in the sample (see Methods).

Using this sample, a core overview of the prevalence of poor mental health was calculated, measured as the self-reported presence of work-related symptoms of depression, anxiety or stress during the past 12 months. A little more than a quarter of all respondents **(26.8%, weighted) reported poor mental health**.

However, it is well known that the mental health of employees is influenced also by demographic and employment characteristics, and that the pandemic has affected employee groups differently (see Introduction). We found the same in our analysis, as there is a considerable variance in the prevalence of poor work-related mental health in relation to respondents' socio-demographic and employment-related characteristics. Table 1 contains the results for socio-demographic variables (sex, age and nationality of respondents). Women (29.5%) and respondents aged 25–39 or 40–54 years (28.8% and 27.3%, respectively) had a higher than average prevalence of poor mental health, while there were no differences between workers of different nationalities.

Table 1: Percentage of work-related poor mental health by age, sex and nationality in the 2022 OSH Pulse survey (EU-27, IS and NO)

	Work-related poor mental health: yes	
	Row % (weighted)	95% CI (weighted)
Sex		
Male (n=14,608)	24.5	[23.4-25.7]
Female (n=12,438)	29.5	[28.2-30.9]
Total (n=27,046)	26.8	[26.0-27.7]
Age groups		
16-24 (n=2,118)	25.0	[21.9-28.4]
25-39 (n=9,096)	28.8	[27.3-30.4]
40-54 (n=10,655)	27.3	[25.9-28.7]
55+ (n=5,381)	23.7	[21.8-25.8]
Total (n=27,250)	26.9	[26.0-27.8]
Nationality		
National (n=25,318)	26.9	[26.0-27.8]
Foreign (n=1,932)	26.2	[22.4-30.3]
Total (n=27,250)	26.9	[26.0-27.8]

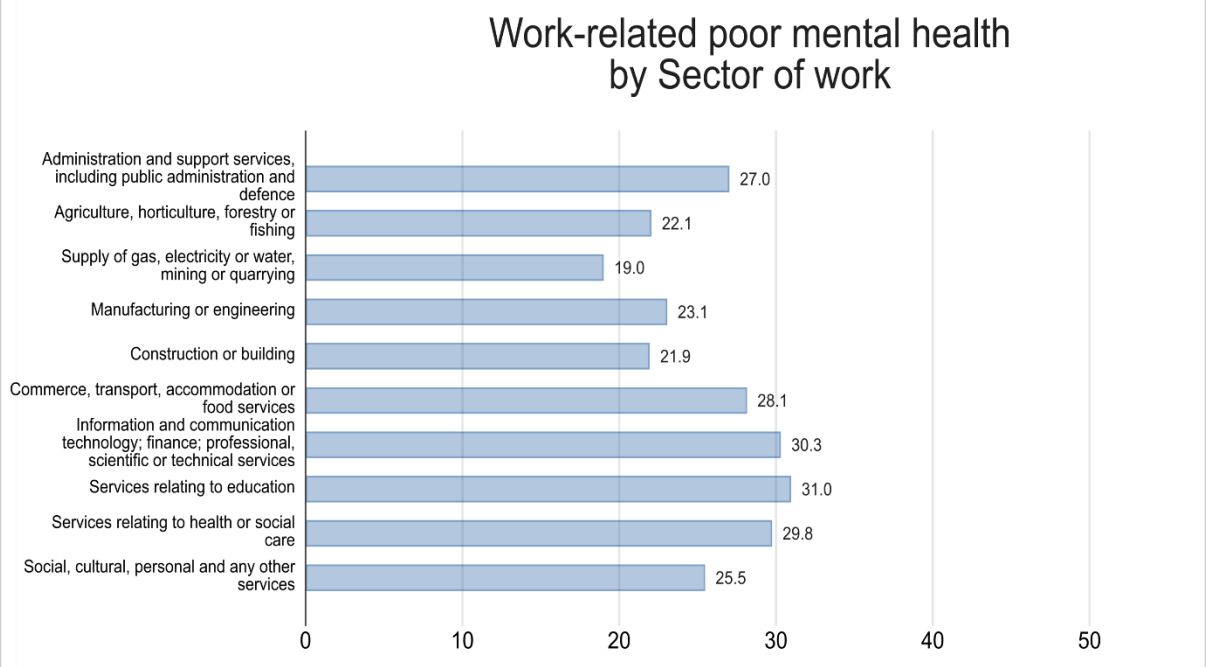
n= number of observations; 95% CI= 95% confidence interval

A considerable variation was also observed in relation to employment characteristics. The prevalence of poor mental health varied significantly between different sectors of work, as shown in Figure 1. The high prevalence of mental health problems among workers from the education sector (31%), the information and communication/finance/technical services sector (30.3%), and the health and social care sector (29.8%) compared to the mean prevalence of 26.8% is of particular interest. These sectors were particularly affected by COVID-19-related changes (e.g. extra work due to rapid digitisation, high patient volume or switch to remote teaching), as described in the Introduction (see also EU-OSHA, 2022a and 2022b). The high mental burden found could reflect this high sector-specific burden of change. By contrast, workers in the primary (agriculture, horticulture, forestry, fishing) and production

[23] Answering questions in the OSH Pulse was voluntary. Some of the 27,250 study participants did not answer all questions. Therefore, the number of observations is reduced by the number of missing values. Thus, we indicated the cases evaluated for each analysis in all tables (see Table 1 for an example). The nonresponse was generally low, thus, a systematic bias of the results is unlikely.

sectors (e.g. supply, manufacturing, construction) had the lowest proportion of mental health problems (22.1% and 19.0%, respectively).

Figure 1: Work-related poor mental health by sector of work (weighted) in the 2022 OSH Pulse survey (EU-27, IS and NO)



Source: EU-Flash Eurobarometer. All values are based on weighted data.

More information on associations between employment-related variables and mental health is provided in Table 2. While the *employment status* (self-employment *versus* dependent employment by type of contract) was not related to mental health, all other indicators were. Regarding *hours worked*, part-time workers had slightly better mental health than full-time workers (24.8% vs 27.4%). The *type of occupation* (e.g. skill level) was also related to different levels of poor mental health. It appeared that workers in professional, technical or higher administrator occupations (28.2%) and workers in clerical, sales or service occupations (27.5%) had more symptoms of poor mental health than skilled, semi-skilled or unskilled workers (23.4%). This pattern is likely to be related to the high mental load in the service sector (see Figure 1). Furthermore, middle management particularly can experience high levels of stress, for example, having to implement decisions over which they have no control. Regarding *work location*, no difference in mental health was found between those who worked in an office (or factory, shop, school, etc.) and those who did telework at home. However, a considerably elevated prevalence of poor work-related mental health was detected in those workers who had to work in public spaces, such as coffee shops (31.3%).

Box 2 shows the OSH Pulse responses regarding changes in exposure to certain psychosocial risk factors related to the use of digital technologies. The additional analysis for this report showed that digital work was closely related to mental health at work. A stepwise increase in poor mental health was found, with the lowest prevalence among those not usually working with digital technologies (20.8%), medium prevalence for those who used digital working tools on a normal basis (27.4%), and the highest prevalence for workers occupied with advanced technologies, such as robots or wearables (28.7%). As mentioned above, the ESENER 2019 findings suggest that employers may not be making the link between digitalisation and health, as less than 25% replied that they discussed the potential impact on OSH of the use of digital technologies at work, although there may be more awareness post-pandemic.

Table 2: Percentage of work-related poor mental health by employment-related covariates in the 2022 OSH Pulse survey (EU-27, IS and NO)

	Work-related poor mental health: yes	
	Row % (weighted)	95% CI (weighted)
Employment status		
Self-employed (n=4,290)	26.8	[24.7-29.0]
Employee with a permanent contract (n=19,656)	27.0	[25.9-28.1]
Employee with a temporary contract (n=3,304)	26.4	[24.0-28.9]
Total (n=27,250)	26.9	[26.0-27.8]
Working hours		
Part-time (n=3,951)	24.8	[22.6-27.0]
Full-time (n=23,094)	27.4	[26.4-28.4]
Total (n=27,045)	26.9	[26.0-27.8]
Type of occupation		
Professional, technical or higher administrator occupations (n=12,042)	28.2	[26.8-29.5]
Clerical, sales or service occupations (n=9,305)	27.5	[26.0-29.1]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,496)	23.4	[21.7-25.3]
Total (n=26,843)	27.0	[26.1-27.9]
Sector of work		
Administration and support services, including public administration and defence (n=3,567)	27.0	[24.6-29.5]
Agriculture, horticulture, forestry or fishing (n=897)	22.1	[18.0-26.8]
Supply of gas, electricity or water; mining or quarrying (n=611)	19.0	[14.7-24.2]
Manufacturing or engineering (n=2,739)	23.1	[20.5-25.8]
Construction or building (n=2,299)	21.9	[19.2-25.0]
Commerce, transport, accommodation or food services (n=4,931)	28.1	[26.1-30.3]
Information and communication technology; finance; professional, scientific or technical services (n=4,178)	30.3	[28.0-32.7]
Services relating to education (n=2,033)	31.0	[27.6-34.5]
Services relating to health or social care (n=2,925)	29.8	[27.0-32.6]
Social, cultural, personal and any other services (n=2,512)	25.5	[22.6-28.6]
Total (n=26,692)	27.1	[26.2-28.0]
Location of work		
Your employer's/own business premises (e.g. office, factory, shop, school) (n=17,507)	27.0	[25.9-28.2]
Clients' premises (n=1,637)	26.3	[22.9-29.9]
A car or other vehicle (e.g. train, bus) (n=1,075)	27.3	[23.1-32.0]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,542)	22.5	[19.1-26.2]
Your own home (n=4,743)	27.3	[25.2-29.5]
Public spaces, such as coffee shops, airports (n=585)	31.3	[25.5-37.7]
Total (n=27,089)	26.9	[26.0-27.8]
Digital work		
None (n=2,740)	20.8	[18.3-23.4]
Usual (e.g. computer, laptop, internet) (n=19,268)	27.4	[26.4-28.5]
Advanced (machines or robots and wearables) (n=5,242)	28.7	[26.6-30.9]
Total (n=27,250)	26.9	[26.0-27.8]

n= number of observations; 95% CI= 95% confidence interval

Increase in work-related stress due to the COVID-19 pandemic

Before analysing the associations between psychosocial working conditions and work-related mental health, we explored whether psychosocial risk factors and resources also differed related to the socio-demographic and employment characteristics of the respondents. As an example, Table 3 shows the results of an increase in work-related stress due to the pandemic. **A considerable proportion of respondents felt that their work stress has increased (44.6%).** Similar to mental health, it is important to analyse which groups were particularly affected by the increase in stress caused by the pandemic. The first thing that stands out is that the perception of increasing stress was much more common among women compared to men (50.4% vs 39.5%). This may be due to a number of factors, for example, the high prevalence of women in the health/social care and education sectors and the increased burden of childcare on women workers during lockdown. Age had a smaller effect, although the proportion of workers whose stress increased was higher for the older than for the younger age groups. It is also notable that workers with a nationality other than the country in which they were interviewed reported a pandemic-related increase in stress more often than nationals (6.5% higher prevalence). It is possible that more non-nationals were working in essential jobs, such as healthcare or supermarket deliveries, during the pandemic, and this may have had an influence.

Table 3: Weighted percentage of workers reporting that work stress increased due to the pandemic by covariates in the 2022 OSH Pulse survey (EU-27, IS and NO)

	Work stress increased: yes	
	Row % (weighted)	95% CI (weighted)
Sex		
Male (n=14,414)	39.5	[38.1-40.9]
Female (n=12,269)	50.4	[48.8-52.0]
Total (n=26,683)	44.6	[43.5-45.6]
Age groups		
16-24 (n=2,078)	40.1	[36.2-44.2]
25-39 (n=8,965)	43.7	[41.9-45.5]
40-54 (n=10,527)	45.6	[44.0-47.3]
55+ (n=5,310)	45.4	[42.9-47.8]
Total (n=26,880)	44.5	[43.5-45.6]
Nationality		
National (n=24,984)	44.1	[43.0-45.2]
Foreign (n=1,896)	51.6	[47.0-56.2]
Total (n=26,880)	44.5	[43.5-45.6]
Employment status		
Self-employed (n=4,235)	44.5	[42.0-47.0]
Employee with a permanent contract (n=19,401)	45.1	[43.8-46.3]
Employee with a temporary contract (n=3,244)	42.1	[39.3-45.0]
Total (n=26,880)	44.5	[43.5-45.6]
Working hours		
Part-time (n=3,880)	46.0	[43.3-48.8]
Full-time (n=22,803)	44.3	[43.1-45.4]
Total (n=26,683)	44.6	[43.5-45.7]
Type of occupation		
Professional, technical or higher administrator occupations (n=11,919)	46.2	[44.6-47.8]
Clerical, sales or service occupations (n=9,165)	44.4	[42.6-46.3]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,411)	40.8	[38.6-43.0]
Total (n=26,495)	44.5	[43.4-45.5]
Sector of work		
Administration and support services, including public administration and defence (n=3,511)	44.5	[41.6-47.4]
Agriculture, horticulture, forestry or fishing (n=884)	33.8	[28.9-39.1]
Supply of gas, electricity or water; mining or quarrying (n=605)	38.7	[32.3-45.6]
Manufacturing or engineering (n=2,711)	36.0	[32.9-39.2]
Construction or building (n=2,272)	35.2	[31.8-38.7]
Commerce, transport, accommodation or food services (n=4,869)	43.4	[41.0-45.8]
Information and communication technology; finance; professional, scientific or technical services (n=4,120)	39.2	[36.6-41.9]
Services relating to education (n=2,010)	58.6	[54.7-62.3]
Services relating to health or social care (n=2,889)	59.1	[55.9-62.3]
Social, cultural, personal and any other services (n=2,467)	44.9	[41.4-48.4]
Total (n=26,338)	44.5	[43.5-45.6]
Location of work		
Your employer's/own business premises (e.g. office, factory, shop, school) (n=17,279)	46.6	[45.3-47.9]
Clients' premises (n=1,617)	44.3	[40.2-48.4]
A car or another vehicle (e.g. train, bus) (n=1,062)	40.0	[34.9-45.3]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,522)	37.7	[33.7-41.9]
Your own home (n=4,677)	39.2	[36.8-41.8]
Public spaces, such as coffee shops, airports (n=577)	50.6	[43.8-57.4]
Total (n=26,734)	44.6	[43.5-45.6]
Digital work		
None (n=2,677)	41.1	[37.9-44.3]
Usual (e.g. computer, laptop, internet) (n=19,017)	45.4	[44.1-46.6]
Advanced (machines or robots and wearables) (n=5,186)	43.3	[40.9-45.7]
Total (n=26,880)	44.5	[43.5-45.6]

n= number of observations; 95% CI= 95% confidence interval

Regarding the *employment-related variables*, while an increase in work-related stress due to the pandemic was seen for all groups, some interesting patterns were observed. Increases in work stress were higher for professional (46.2%) or service (44.4%) occupations than for skilled, semi-skilled or unskilled (manual) workers (40.8%), a result that was also found for poor work-related health (see Part A). Large differences appeared between the different sectors of work. Some sectors experienced an increase in stress that was significantly lower than average (e.g. agriculture (33.8%) or construction (35.2%)), while other sectors were affected by a steep increase in stress. Nearly 60% of the workers in the health and social care sector and in education (59.1% and 58.6%, respectively) experienced an

increase in work stress due to the pandemic. This was, for instance, nearly double that of the primary sector (e.g. agriculture, 33.8%). This clear result highlights that the impact of the pandemic on general working conditions was dependent on the type of work performed, and again appears to reflect the specific pressures on the health and social care and education sectors that have been mentioned.

Further differences were observed for the location of work and degree of the digitalisation of work. Working from home was associated with a lower proportion of workers reporting increasing stress due to the pandemic compared to working at the employer's premises (39.2% vs 46.6%). This possibly relates to the increased stress of going into work during the pandemic, especially at the beginning, while dealing with the fear of illness, infection control measures and new ways of working. The highest increase was found for those who had to work in public spaces (50.6%). Digital work was also associated with an increase in work-related stress as a result of the pandemic. While the differences were not pronounced, it was highest for those working, for example, with computers, laptops and the internet (45.4% compared to 41.1% for those whose work did not involve digitalisation). While it is not possible to identify any causal links between digitalisation and an increase in work-related stress during the pandemic, we do know, for example, that many workers had to start using new software for communication, or suddenly change to delivering their services online (teachers being a particular example, as well as client-facing public services).

Exposure to work-related risk factors and measures taken by employers (resources)

Results for the other work-related psychosocial risk factors, risk factors related to digital work and measures put in place by employers can be found in the Appendix. The prevalence of these factors is shown in Table A2. Many respondents experienced severe time pressure (46%), over a quarter (26.4%) reported poor communication or cooperation, 17.7% reported a lack of control over their work, 15.7% experienced violence or verbal abuse from third parties, and 7.3% reported experiencing harassment or bullying from colleagues. As mentioned previously, digitalisation appears to be influencing the exposure to psychosocial risk factors at work. The question regarding whether workload was increased by working with digital technologies was answered 'yes' by about a third of the sample (33.6%), and 19.9% felt that digital technologies reduced their autonomy at work. Mental stress due to digital work is, thus, a common problem in this study, which again underlines the increased importance of this factor for the mental health of employees in modern economies. These technologies are, thus, a central issue for OSH in the contemporary world of work.

Regarding resources, the majority said that they felt comfortable talking to a manager about mental health (61.7%). A somewhat lower prevalence was observed for resources provided by the company to cope with or reduce stress. The percentage of workers who received information and training on wellbeing and coping with stress was 43.3%, and the percentage of those who worked in a company that consults workers about stressful aspects of work was 44.0%. The respondents' opinions on the general quality of OSH measures in their workplace was, however, largely positive. Around 84% said that safety problems are promptly addressed and 83.7% agreed or strongly agreed with the statement that good measures to protect workers' health are present at their workplace.

Associations between socio-demographic and employment-related characteristics and exposure to work-related psychosocial risk factors and resources

Associations with sociodemographic and employment-related characteristics (e.g. sex, age, economic sector) were also examined for all other working conditions and resources to be able to identify differences in the prevalence of risk factors and resources between different groups of workers, similar to the previous analyses (see Appendix Table A3 to A12). The key findings are presented here.

- *Time pressure* was considerably higher than average (46.0%) in workers who worked frequently with digital technologies (49.5%) (Table A3). The sector of work with the highest proportion of workers reporting time pressure was the health and social care sector (51.3%).
- Women experienced more *violence or verbal abuse at work* than men (19.2% vs 12.6%) (Table A4). A higher prevalence of violence was also found in workers with temporary contracts (17.2%). However, the strongest correlation was found in relation to the sector of work. Although an overall average of 15.7% of employees experienced violence, 29.6% of workers in the health sector were affected.
- *A lack of autonomy* (average prevalence 17.7%) was more common in women (19.1%) and in workers of foreign nationality (24.1%). Workers in the healthcare sector reported a lack of

autonomy more frequently than workers in other sectors of work (22.7%). Instead, the self-employed had significantly higher autonomy than employees (11.8% reported a lack of autonomy) (Table A7).

- An *increase in workload due to digital technologies* was strongly associated with the frequent use of these technologies at work. While 19.6% of those who do not regularly use digital tools answered the question with 'yes', the prevalence among the advanced users of digital technologies was 38.5% (Table A8). An increase in workload due to digital technologies was reported most frequently by workers in the education sector (40.4%). Additional information on this issue can be found in Box 1.
- *Speaking about mental health:* Older workers felt less comfortable (59.6%) than younger workers (64.5%) to speak with their manager about mental health (Table A10). High-skilled workers (professional, technical or higher administration occupations) felt slightly more comfortable than workers in other types of occupation (63.2% compared to an average of all workers of 61.8%). Regarding sectors, those who felt least comfortable were in agriculture, horticulture, forestry and fishing (57.5%), social, cultural, personal and other services (57.8%), and construction and building (60.9%), all below the total for all sectors of 61.8%.
- Only 35.5% of skilled, semi-skilled or unskilled workers received *information about or training in stress management*, compared to 48.8% of the respondents from the high skill group (Table A11). Moreover, information/training depends strongly on the sector of work. Low rates were found in agriculture (31.5%) and construction (30.4%) and the highest rates in health and social care (51.6%). Comparable differences were found for the question whether companies consulted their workers about stressful working conditions (Table A12). These differences are of interest because workers in agriculture and construction are also less likely to report psychosocial risk factors than those in health and social care (see previous parts). It is conceivable that this is related to the fact that awareness of such factors is lower in these sectors because they are less frequently addressed, something that is supported by the ESENER 2019 company survey (EU-OSHA, 2019). At the same time, there may be some over-reporting in those sectors where information about psychosocial risks is frequently provided.
- The general assessments of *OSH measures* provided by the employer were more negative for women than for men (Table A13 and A14): women agreed less often than men with the statements that safety problems are promptly addressed and good health protection measures are present at their workplace (81.6% vs 86.1% and 81.3% vs 85.8%, respectively). It is also noteworthy that the self-employed assess OSH measures in their workplace significantly more positively than employees, which indicates different patterns of perception or knowledge of measures implemented in the workplace. When comparing the sectors, it was striking that employees in the education sector had the most negative perception of OSH of all sectors and reported a quick reaction to safety problems and good OSH measures at their workplace significantly less often than the average of all employees. Another striking finding is that employees who worked from home had a better perception of OSH in their company than employees who worked at the workplace. It could be that just being able to work from home during the pandemic was perceived as health protection.

Box 2: OSH Pulse responses on psychosocial factors at work related with the use of digital technologies

The OSH Pulse survey (EU-OSHA, 2022d) investigated the use of digital technologies:

- Only 12% of respondents replied that they did not use digital devices for their work. The main devices used are computers, smart phones and other portable devices.

Of those using digital technologies:

- 30% replied that it allocated tasks, working time or shifts to them;
- 27% replied that their performance was rated by others, such as customers, colleagues, patients through digital technologies;
- a quarter replied that it was used to directly monitor their work or behaviour;
- over half (52%) answered that the use of digital technologies in their workplace determined the speed or pace of their work;

- one in three (33%) replied that these technologies increased their workload;
- over four in 10 respondents (44%) said that digital technology results in them working alone;
- just under four in 10 (37%) that the use of digital technologies increased the surveillance of them at work; and
- finally, 19% of respondents said that the use of digital technologies reduced their autonomy at work.

Base: all respondents, EU-27

3.2. Part B: Associations between work-related psychosocial factors, mental health and an increase in work stress due to the pandemic

Using the responses to the OSH Pulse survey, the study looked at the strength of the associations between poor work-related mental health and the following factors in the workplace at the time of the pandemic: exposure to key psychosocial risk factors (severe time pressure or overload of work; violence or verbal abuse from customers, patients, pupils, etc.; harassment or bullying; poor communication or cooperation within the organisation; lack of autonomy, or lack of influence over the work pace or work process); use of digitalisation; increase in work stress due to the pandemic; and the presence of workplace resources and measures related to preventing psychosocial risks and OSH measures. However, since this study is based on cross-sectional data, it is important to emphasise that only correlations can be considered here and no causal statements can be made.

Most of the psychosocial factors included in the analyses showed a pronounced association with mental health (Table 4). As expected, common work-related psychosocial risk factors were significantly associated with mental health. The table presents the prevalence of poor mental health for individuals with and without the presence of each factor. Prevalence rate ratios (PRRs) are also shown, indicating the strength of the association. They quantify the ratio between the prevalence of poor mental health among employees exposed and not exposed to the respective factor, while adjusting for possible confounding variables.[24] The adjusted PRRs demonstrate that workers who were exposed to psychosocial risk factors had a significantly higher likelihood of reporting poor mental health for all five indicators, with estimates ranging from 1.7 to 2.5. A particularly strong association was found for time pressure, which was associated with a 2.46 higher prevalence of poor work-related mental health. This finding is important because time pressure is a highly prevalent stressor that was experienced by 46% of the sample (see Table A2). A strong association with mental health was also found for harassment and bullying (PRR = 1.95). It is also notable that workers who experienced an increase in work-related stress during the pandemic had a higher rate of poor work-related mental health (PRR = 1.77). While it is not possible to attribute causation, this correlation is significant and can be interpreted as indicating that specific changes in psychosocial factors during the pandemic did indeed have consequences for the mental health of employees.

Table 4: Percentage of work-related poor mental health by psychosocial factors (risks and resources) in the 2022 OSH Pulse survey (EU-27, IS and NO)

	Poor work-related mental health: yes			
	Observations	Row % (weighted)	[CI 95%] of prevalence	Prevalence Rate Ratio*and (CI 95%)
Psychosocial risk factors				
Severe time pressure or overload of work				
No (n=14,799)	2,480	15.0	[14.1-16.0]	1 reference
Yes (n=12,288)	5,188	40.9	[39.4-42.4]	2.46 (2.13,2.85)
Total (n=27,087)				
Violence or verbal abuse from customers, patients, pupils, etc.				
No (n=23,174)	5,895	23.6	[22.7-24.5]	1 reference
Yes (n=4,011)	1,791	44.9	[42.3-47.5]	1.70 (1.55,1.86)
Total (n=27,185)				

[24] To minimise the risk that other factors (e.g. gender differences) had an influence on the result (confounding), PRRs were controlled for several covariates in multivariable regression models (so-called adjustment).

	Poor work-related mental health: yes			
	Observations	Row % (weighted)	[CI 95%] of prevalence	Prevalence Rate Ratio*and (CI 95%)
Harassment or bullying				
No (n=25,259)	6,671	24.7	[23.8-25.6]	1 reference
Yes (n=1,895)	1,002	54.8	[50.9-58.6]	1.95 (1.74,2.19)
Total (n=27,154)				
Poor communication or cooperation within the organisation				
No (n=19,750)	4,510	21.2	[20.3-22.2]	1 reference
Yes (n=7,245)	3,108	42.4	[40.5-44.4]	1.87 (1.71,2.04)
Total (n=26,995)				
Lack of autonomy, or lack of influence over the work pace or processes				
No (n=22,414)	5,518	23.0	[22.1-23.9]	1 reference
Yes (n=4,466)	2,063	44.4	[41.9-47.0]	1.86 (1.70,2.04)
Total (n=26,880)				
Stress and COVID-19				
Work stress increased due to the pandemic				
Not increased (n=15,579)	3,313	19.0	[18.1-20.1]	1 reference
Increased (n=11,301)	4,303	36.8	[35.3-38.3]	1.77 (1.60,1.97)
Total (n=26,880)				
Digitalisation				
Use of digital technologies increases workload				
No (n=17,753)	4,312	23.0	[22.0-24.0]	1 reference
Yes (n=8,836)	3,207	34.6	[32.9-36.3]	1.51 (1.41,1.62)
Total (n=26,589)				
Use of digital technologies reduces autonomy at work				
No (n=20,951)	5,739	26.0	[25.0-27.0]	1 reference
Yes (n=5,542)	1,758	30.6	[28.6-32.7]	1.21 (1.14,1.29)
Total (n=26,493)				
Workplace resources and measures				
Information and training on wellbeing and coping with stress				
No (n=14,930)	4,450	29.4	[28.2-30.6]	1 reference
Yes (n=11,840)	3,159	24.0	[22.7-25.3]	0.86 (0.81,0.92)
Total (n=26,770)				
Consultation of workers about stressful aspects of work				
No (n=15,024)	4,516	29.9	[28.7-31.2]	1 reference
Yes (n=11,648)	3,066	23.4	[22.2-24.8]	0.85 (0.81,0.90)
Total (n=26,672)				
Feeling comfortable to speak with manager about mental health				
Not comfortable (n=8,562)	2,775	29.2	[27.7-30.8]	1 reference
Comfortable (n=17,484)	4,621	25.6	[24.5-26.7]	0.81 (0.75,0.87)
Total (n=26,046)				
Safety problems are addressed promptly				
No (n=3,570)	1,504	42.2	[39.5-44.9]	1 reference
Yes (n=22,869)	5,971	24.0	[23.1-24.9]	0.62 (0.56,0.69)
Total (n=26,439)				
Good measures to protect health available				
No (n=3,965)	1,795	44.6	[41.9-47.3]	1 reference
Yes (n=22,690)	5,736	23.4	[22.5-24.3]	0.57 (0.52,0.62)
Total (n=26, 655)				

* Results from multi-level Poisson regressions (individuals nested in countries); adjusted for sex, age, nationality, employment status, working hours, type of occupation and sector of work

n= number of observations; 95% CI= 95% confidence interval

Those exposed to technology-related psychosocial risk factors were also more likely to report increased work-related stress due to the pandemic than those reporting no to these factors, although the strength of the association was small (control; PRR = 1.21) to medium (workload; PRR = 1.51). In addition, the two measures of actions by employers to address work-related stress were generally related to better mental health, with PRRs ranging from 0.81 to 0.86 in the adjusted regression model (which indicates that the prevalence of poor mental health was lower in workers whose employers provided the respective measures). This generally underscores the importance of a good psychosocial climate at work and workplace health promotion targeting psychosocial risks and stress. The protective effect of general OSH measures was particularly strong. The prevalence of poor work-related mental health was 18.2% lower in workers who had safety issues at their workplace promptly addressed compared to workers at workplaces where this was not the case. The difference was even slightly greater for the statement that good measures to protect health were available. While 23.4% who agreed with this

statement had poor work-related health, 44.6% of those who disagreed also had poor mental health. The importance of good OSH in the workplace, thus, also seems to be elementary for mental health.

As we were particularly interested in possible changes in work-related stress due to the pandemic, we also examined the association with psychosocial risks and resources for this variable (see also part A of the Results section). Table 5 shows corresponding correlations. As expected, there was a clear association between work-related psychosocial factors and an increase in stress levels due to the pandemic. For example, workers who reported exposure to severe time pressure or overload of work were more likely to report that their stress had increased during the pandemic than those who did not report exposure to severe time pressure or overload of work (56% vs 35%). The same trend was seen for all the factors examined, suggesting that many changes in psychosocial working conditions were involved in the overall increase in work stress. However, this interpretation is speculative, as only cross-sectional data were analysed. An association between an increase in work stress and OSH measures was also examined. This showed that workers who had access to workplace prevention and OSH were less likely to report an increase in work stress as a result of the pandemic. Workers who reported that safety problems at their workplace were addressed promptly were less likely to report an increase in work stress due to the pandemic than workers who reported that safety problems were not addressed promptly (43% vs 55%). Likewise, workers who reported that there were good measures to protect health available were less likely to report an increase in work stress due to the pandemic than workers who reported that good measures were not available (43% vs 54%). This suggests that workplaces that had good OSH measures in place appeared to be better able to protect workers from increased work pressures during the pandemic.

Table 5: Increase in work stress due to the pandemic by psychosocial factors (risks and resources) in the 2022 OSH Pulse survey (EU-27, IS and NO)

	Work stress increased due to the pandemic: yes			
	Observations	Row % (weighted)	[CI 95%] of prevalence	Prevalence Rate Ratio*and (CI 95%)
Psychosocial risk factors				
Severe time pressure or overload of work				
No (n=14,589)	4,942	35.1	[33.7-36.4]	1 reference
Yes (n=12,145)	6,306	55.8	[54.3-57.3]	1.50 (1.40,1.62)
Total (n=26,734)	11,248			
Violence or verbal abuse from customers, patients, pupils, etc.				
No (n=22,858)	8,961	41.5	[40.4-42.6]	1 reference
Yes (n=3,962)	2,312	60.8	[58.2-63.3]	1.40 (1.32,1.49)
Total (n=26,820)	11,273			
Harassment or bullying				
No (n=24,916)	10,181	43.3	[42.3-44.4]	1 reference
Yes (n=1,874)	1,077	59.2	[55.3-63.0]	1.32 (1.24,1.41)
Total (n=26,790)	11,258			
Poor communication or cooperation within the organisation				
No (n=19,477)	7,575	40.8	[39.6-42.1]	1 reference
Yes (n=7,166)	3,623	55.0	[53.0-57.0]	1.30 (1.24,1.37)
Total (n=26,643)	11,198			
Lack of autonomy, or lack of influence over the work pace or processes				
No (n=22,106)	8,668	41.2	[40.0-42.3]	1 reference
Yes (n=4,418)	2,464	59.5	[57.0-62.0]	1.40 (1.33,1.47)
Total (n=26,524)	11,132			
Digitalisation				
Use of digital technologies increases workload				
No (n=17,497)	6,560	39.6	[38.3-40.9]	1 reference
Yes (n=8,746)	4,486	54.2	[52.3-56.0]	1.32 (1.24,1.40)
Total (n=26,243)	11,046			
Use of digital technologies reduces autonomy at work				
No (n=20,688)	8,392	43.2	[42.0-44.4]	1 reference
Yes (n=5,475)	2,606	49.7	[47.4-52.1]	1.21 (1.15,1.26)
Total (n=26,163)	10,998			
Workplace resources and measures				
Information and training on wellbeing and coping with stress				
No (n=14,738)	6,213	44.2	[42.8-45.6]	1 reference
Yes (n=11,693)	4,941	45.2	[43.6-46.9]	1.00 (0.97,1.03)
Total (n=26,431)	11,154			

	Work stress increased due to the pandemic: yes			
	Observations	Row % (weighted)	[CI 95%] of prevalence	Prevalence Rate Ratio*and (CI 95%)
Consultation of workers about stressful aspects of work				
No (n=14,837)	6,266	44.7	[43.3-46.1]	1 reference
Yes (n=11,496)	4,812	44.5	[42.9-46.2]	0.98 (0.95,1.01)
Total (n=26,333)	11,078			
Feeling comfortable to speak with manager about mental health				
Not comfortable (n=8,467)	3,774	45.5	[43.7-47.3]	1 reference
Comfortable (n=17,288)	7,068	44.0	[42.6-45.3]	0.93 (0.89,0.98)
Total (n=25,755)	10,842			
Safety problems are addressed promptly				
Not promptly (n=3,527)	1,832	55.4	[52.6-58.2]	1 reference
Promptly (n=22,601)	9,168	42.6	[41.4-43.7]	0.82 (0.78,0.85)
Total (n=26,128)	11,000			
Good measures to protect health available				
No (n=3,919)	2,003	53.7	[51.0-56.5]	1 reference
Yes (n=22,412)	9,083	42.8	[41.6-43.9]	0.82 (0.78,0.85)
Total (n=26,331)	11,086			

* Results from multi-level Poisson regressions (individuals nested in countries); adjusted for sex, age, nationality, employment status, working hours, type of occupation and sector of work

n= number of observations; 95% CI= 95% confidence interval

3.3. Part C: Country comparisons – European figures

We now turn to country comparisons and explore the country variation of work-related mental health and the increase in stress due to the pandemic. These factors are put into relation with country level (or macro-level) indicators related to the extent on the one hand of public interventions in social and economic life in response to the pandemic (Stringency index) and on the other hand of workplace-level OSH measures (WRAs). In this way, two assumptions were investigated. Firstly, we examined whether higher levels of psychosocial work stress were also reported in countries in which particularly strict measures to contain the pandemic prevailed at the time of the OSH Pulse survey (particularly workplace-related measures, such as workplace closures). If the basic assumption that the pandemic also had far-reaching consequences for the psychosocial health of workers is correct, such an association should be recognisable. Secondly, the hypothesis was examined that work-related mental health during the pandemic was better in those countries where a larger number of workplaces had already taken measures to manage psychosocial stress before the pandemic.

Figure 2: Prevalence of work-related poor mental health (adjusted for workforce composition) by country in the 2022 OSH Pulse survey (EU-27, IS and NO)

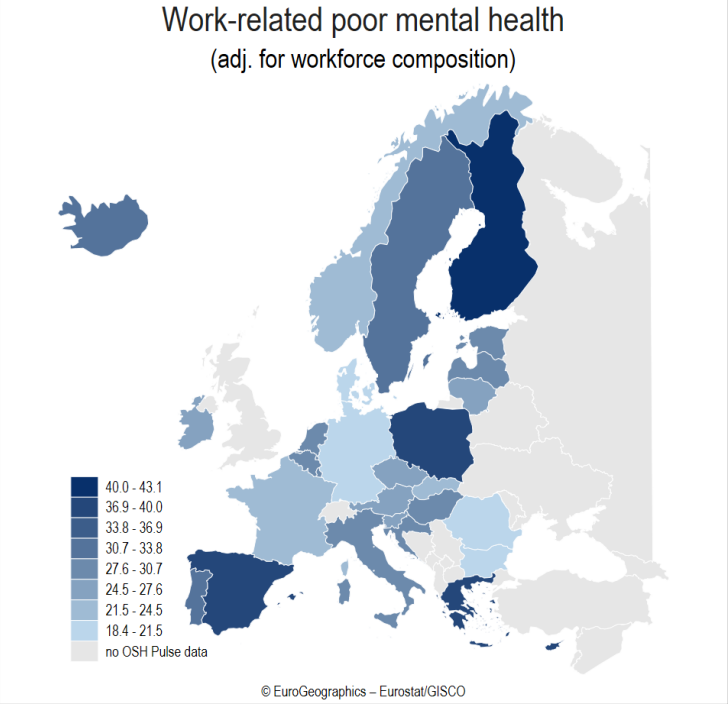
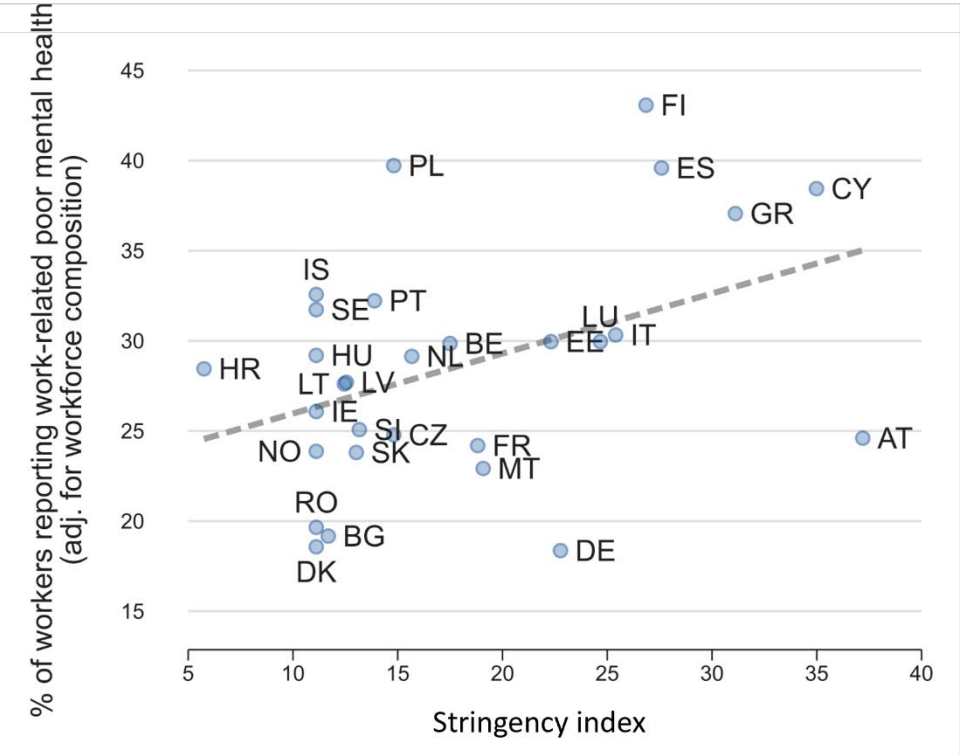


Figure 2 displays country-specific percentages of poor mental health and their distribution across Europe.[25] Large differences in the country-specific prevalence of poor work-related mental health were generally evident. The prevalence was highest in the three southern countries: Greece, Cyprus and Spain, together with Poland and Finland, while we observe the lowest scores in Bulgaria, Romania, Germany and Denmark.

Figure 3 explores whether the variation in poor mental health observed in the country is possibly related to the extent of pandemic-related interventions in the same country. More specifically, we inspected whether mental health tends to be poorer in countries with stricter policies during the observation period of the pandemic, by displaying values for poor mental health (country-specific prevalence of work-related poor mental health) together with the respective value of the country in the Stringency index (an indicator for the strictness of containment measures at the time of the survey). The dotted line represents the resulting association among all countries (the so-called fitted regression line), where an increasing line indicates that higher values of one dimension (e.g. poorer mental health) are accompanied by higher values of the other dimension (e.g. stricter policies).

Figure 3: Adjusted prevalence of workers who reported poor mental health in the 2022 OSH Pulse survey and the stringency of national COVID-19 policies (EU-27, IS and NO)



Source: EU-Flash Barometer and Oxford COVID-19 Government Response Tracking.

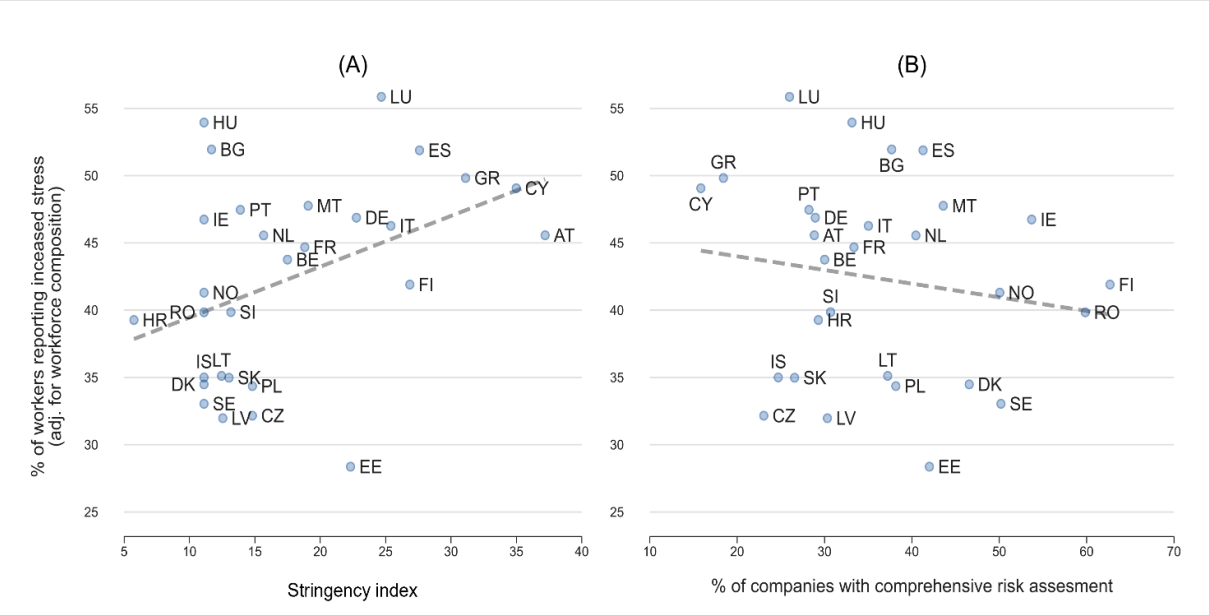
It turned out that associations are generally positive, suggesting that countries with stricter policies during the observation period of the pandemic (i.e. policies related to workplace closures and containment measures) also tended to have higher levels of poor work-related mental health. This finding suggests that there may have been an impact of the pandemic or the necessary containment measures on work-related mental health. However, it is not known whether those countries that implemented more stringent measures during the pandemic already had higher rates of reported poor mental health prior to the pandemic.

[25] Importantly, the aggregated country scores taken from the 2022 OSH Pulse survey are all adjusted for sex, age, nationality, employment status, working hours, type of occupation and sector of work (based on Poisson regression models and predicted country scores) to account for workforce composition and its role in work-related mental health (e.g. higher levels of poor mental health due to a pronounced service sector in a country).

Figure 4 panel A explores this association further. It shows the proportion of workers who reported that the pandemic made their work stress increase by country. This was again correlated with the Stringency index, which corresponds with the assumption of a pandemic effect on psychosocial working conditions.

We were also interested in studying a possible buffering effect of OSH measures. Figure 4 panel B shows a correlation between the prevalence of a reported increase in stress in the OSH Pulse survey and that of having a comprehensive risk assessment in a country's workplaces (taken from ESENER 2019 (see Methods)). Having a risk assessment in place can be seen as a measure of the extent to which companies were ready to deal with occupational risks including psychosocial risks at the beginning of the pandemic. The correlation between the two factors suggests that good systems for managing mental stress could have been an important protective factor during the pandemic. This finding is compatible with the finding above that OSH Pulse respondents reporting that their workplaces had good OSH measures in place or responded promptly to OSH problems were less likely to report that their stress increased during the pandemic.

Figure 4: Adjusted prevalence of workers reporting increased stress during the pandemic in the OSH Pulse survey and macro indicators (country-level Stringency index (panel A) and % of companies with workplace risk assessments (panel B)) (EU-27, IS and NO)

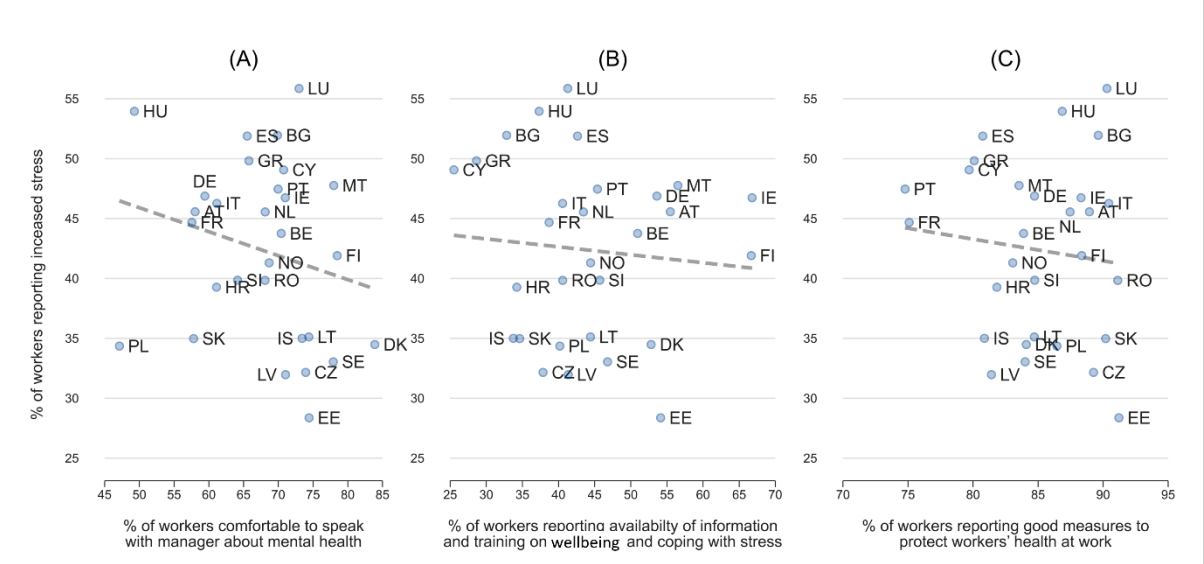


Source: EU-Flash Eurobarometer, ESENER 3 (2019) and Oxford COVID-19 Government Response Tracker.

However, these are cross-national comparisons that do not fully consider country specificities (e.g. various cultural or economic factors, including different welfare systems and the existence of public schemes to support workers directly affected by the restrictive measures or facing declining or loss of income).

In order to further corroborate these findings with data, we have conducted additional analyses in which variables from the OSH Pulse survey are aggregated at the country level and evaluated together (instead of also using external macro indicators as in the previous analyses). Respective findings are shown below (Figure 5). We generally see that countries with high proportions of workers who reported that they were comfortable to speak about mental health were also the countries where the increase in stress as a consequence of the pandemic was comparatively low (panel A). The same was true for countries where an increased proportion of workers reported the availability of information and training on wellbeing and coping with stress (panel B), and in countries where a good proportion of workers reported good measures to protect health at work (panel C).

Figure 5: Prevalence of workers reporting increased stress during the pandemic and prevalence of workers reporting different workplace resources (feeling comfortable to speak with manager about mental health (panel A), availability of information and training on wellbeing and coping with stress (panel B), and good measures to protect health at work (panel C)), all taken from the OSH Pulse survey and adjusted for workforce composition (EU-27, IS and NO)



Source: EU-Flash Eurobarometer, all values are adjusted for workforce composition.

3.4. Part D: Results from other surveys – contextualising a possible impact of the COVID-19 pandemic on work-related mental health

The OSH Pulse survey was conducted at one point in time in the first quarter of 2022, therefore, the question arises to what extent the findings are stable over time. This question can only be answered indirectly. We have concentrated here on analysing data from other European studies that have carried out measurements at different points in time. These also include measurements from the time before the pandemic. This presentation gives, at least, a first impression of the possible temporal development of work-related mental health before and during the pandemic. However, it is important to note that the two European studies used here (EWCS and LWCOVID-19[26]) did not ask the same questions as the OSH Pulse survey. Moreover, the LWCOVID-19 survey measured general mental health instead of work-related mental health as in the OHS Pulse survey and the impact of work on health in the EWCS. A direct comparability of, for example, the prevalence of poor mental health is, thus, not given. Estimating the prevalence of low mental wellbeing based on the WHO-5 Well-being Index[27] (WHO-5; for further details, see Appendix Methods), the percentage of EWCS respondents reporting poor mental health varied between 15.3% and 19.1% (EWCS 2015 and 2010, respectively) before the COVID-19 pandemic (Table 6). In 2021, during the pandemic, poor mental health was reported by 22.4% of 2021 EWCTS survey respondents.[28] The LWCOVID-19 survey data allow to estimate poor mental wellbeing for 39.4% of participants in the second wave of the survey and for 54.7% of participants in the third wave of the survey. However, it is important to note that the EWCS, the EWCTS and the LWCOVID-19 surveys are not directly comparable due to fundamental differences in methods. Furthermore, the

[26] The EWCS included 121,559 workers (EWCS 2010: n=32,249; EWCS 2015: n=31,004; EWCTS 2021: n=58,306) while the LWCOVID-19 surveys comprised 106,431 participants (Wave 1: n=44,621; Wave 2: n=14,436; Wave 3: n=26,020; Wave 5: n=21,354) from the 27 EU Member States. Norway and Iceland were not a part of either survey and we restricted this supplemental analysis to the EU-27 countries.

[27] Mental wellbeing was assessed in the EWCS and LWCOVID-19 surveys using the WHO-5, a measure calculated from five self-reported statements (1. feeling cheerful and in good spirits; 2. feeling calm and relaxed; 3. feeling active and vigorous; 4. woke up feeling fresh and rested; and 5. my daily life is filled with interesting things). The final WHO-5 score ranges between 0 and 100, where lower scores represent worse mental wellbeing. A cut-off score of ≤50, which was used in previous studies as a screening diagnosis of clinical depression, was employed to define low mental wellbeing.

[28] European Working Conditions Telephone Survey (EWCTS) 2021: In order to reflect the changes in the survey methodology starting from 2021 — using computer-assisted telephone interviewing instead of face-to-face interviews — a slight change in the survey name was introduced. Also because of different methodology, the EWCS and the EWCTS surveys are not directly comparable.

LWCOVID-19 survey was not based on probabilistic sampling, and overestimation of mental problems due to self-selection is likely.

The prevalence of low mental wellbeing also varied significantly between work sectors, showing different patterns from survey to survey as well as from survey wave to survey wave (Table 7). The prevalence of poor mental health in the EWCS surveys conducted before the COVID-19 pandemic (2010 and 2015) was highest among workers in the primary sector (agriculture, horticulture, forest, fishing: 22.9% in 2010 and 15.9% in 2015), the administration and support services sector (19.6% in 2010 and 16.2% in 2015), and parts of the production sector, such as manufacturing or engineering, in the 2010 wave (21.7%), and supply, mining or quarrying in the 2015 wave (20.5%). In the EWCS 2010 and 2015 surveys, workers in the information and communication/finance/technical services sector had the lowest proportion of low mental wellbeing (16.1% in 2010 and 13.9% in 2015), as well as in EWCS 2015 respondents working in the education sector (13.9%). A different pattern in the burden of mental stress among sectors can be identified when looking at data from the 2021 EWCTS. In line with the OSH Pulse data, the proportion of workers with poor mental health was highest in the health and social care sector (24.9%), the information and communication/finance/technical services sector (23.8%), and the education sector (23.8%), while participants working in the primary sector (agriculture, horticulture, forest, fishing: 19.9%) and parts of the production sector (supply and construction: 16.7% and 18.8%, respectively) had the lowest proportion of mental health problems.

The highest proportion of workers with low mental wellbeing in the LWCOVID-19 surveys generally belonged to the commerce, transport, accommodation or food services sector (44.1% in Wave 2, 59.5% in Wave 3 and 58.5% in Wave 5), while respondents in the education sector and the information and communication/finance/technical services sector showed a comparably lower prevalence of mental health problems in most waves examined (28.2% and 28.3% in Wave 2 and 45.2% and 48.7% in Wave 5, respectively). However, comparing the different waves of the LWCOVID-19 survey, the sharpest increase in poor mental health could also be observed in the education and the information and communication/finance/technical services sectors, with its prevalence almost doubling between the second and third survey rounds (from 28.2% and 28.3% in Wave 2 to 50.5% and 53.3% in Wave 3, respectively). This is partly in line with the OSH Pulse and EWCTS 2021 findings, indicating an excessive negative change in mental health in these work sectors between 2020 and 2021. In addition, a similar negative shift could be seen in the health and social care sector throughout the pandemic, with the highest prevalence of low mental wellbeing reported in 2022 among workers in these professions (39.9% in Wave 2, 46.9% in Wave 3 and 50.5% in Wave 5), while other work sectors (except the primary sector) showed a positive change — a decreasing prevalence of poor mental health — between 2021 (Wave 3) and 2022 (Wave 5).

The prevalence of selected psychosocial factors among participants of the EWCS 2010, EWCS 2015, EWCTS 2021 and LWCOVID-19 surveys was also assessed (Table 6). The most notable findings were related to time pressure, which is in line with the results observed in the OSH Pulse survey. Around one-third of the EWCS respondents (33.3% in EWCS 2010 and 33.9% in EWCS 2015) reported working regularly at a very high speed before the COVID-19 pandemic. This number was 49.1% among the workers in the EWCTS 2021 survey. Similarly, close to half of the OSH Pulse respondents across the EU (46.0%) reported experiencing severe time pressure or an overload of work, making this indicator the most often recorded psychosocial risk factor in both the EWCS surveys and the 2022 OSH Pulse survey (Table A2). Psychosocial risk factors, such as not having enough time to get the job done and poor cooperation, were less common in all EWCS and LWCOVID-19 survey populations examined (8.8% to 9.6% and 5.6% to 8.5%, respectively, in the EWCS surveys, and 12.3% and 13.2%, respectively, in the LWCOVID-19 Wave 2 survey).

Table 6: Weighted percentage of low mental wellbeing and psychosocial risk factors among EWCS (2010, 2015 and EWCTS 2021)* and LWCOVID-19 (Rounds 1–3 and 5)* survey respondents (EU-27)

	EWCS 2010 (n=32,249)	**EWCS 2015** (n=31,004)	**EWCTS 2021** (n=58,306)	**LWCOVID-19 2020 April–June** (n=44,621)	**LWCOVID-19 2020 June–July** (n=14,436)	**LWCOVID-19 2021 February–March** (n=26,020)	**LWCOVID-19 2022 March–May** (n=21,354)
	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]
Low mental wellbeing	19.1 [18.5-19.8]	15.3 [14.7-16.0]	22.4 [21.8-22.9]	48.6 [47.4-49.9]	39.4 [37.2-41.6]	54.7 [53.2-56.3]	51.8 [50.0-53.6]
yes (n)	(6,661)	(4,725)	(12,996)	(20,583)	(5,530)	(13,176)	(10,015)
Working at very high speed	33.3 [32.5-34.2]	33.9 [33.0-34.7]	49.1 [48.4-49.7]	X	X	X	X
yes (n)	(10,264)	(10,441)	(28,895)				
Worked in free time	15.2 [14.5-15.9]	7.9 [7.4-8.3]	16.4 [15.9-16.9]	33.5 [32.3-34.7]	33.0 [31.0-35.0]	33.1 [31.7-34.6]	32.7 [31.0-34.3]
yes (n)	(4,772)	(2,729)	(10,443)	(17,932)	(5,911)	(10,579)	(7,872)
Don't have enough time to get the job done	8.8 [8.3-9.3]	9.6 [9.1-10.1]	X	X	12.3 [10.9-13.6]	X	X
yes (n)	(2,793)	(2,781)			(1,882)		
Poor cooperation	7.7 [7.2-8.2]	8.5 [7.9-9.0]	5.6 [5.3-6.0]	X	13.2 [11.6-14.8]	X	X
yes (n)	(1,976)	(1,902)	(2,100)		(1,640)		

*** Prevalence is not directly comparable between the two studies due to differences in the sampling methods (see Appendix)**

n= number of observations; 95% CI= 95% confidence interval

Table 7: Weighted percentage of low mental wellbeing by sector of work among EWCS (2010, 2015 and EWCTS 2021)* and LWCOVID-19 (Rounds 1–3 and 5)* survey respondents (EU-27)

	Low mental wellbeing (WHO-5 Well-Being Index)						
	EWCS 2010 (n=32,249)	**EWCS 2015** (n=31,004)	**EWCTS 2021** (n=58,306)	**LWCOVID-19 2020 April–June** (n=44,621)	**LWCOVID-19 2020 June–July** (n=14,436)	**LWCOVID-19 2021 February–March** (n=26,020)	**LWCOVID-19 2022 March–May** (n=21,354)
Sector of work	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)
Administration and support services, incl. public admin., defence	19.6 [17.4-21.8] (3,265)	16.2 [14.2-18.2] (3,521)	22.1 [20.5-23.8] (6,243)	X	34.5 [29.2-39.8] (2,207)	51.0 [46.7-55.2] (3,966)	49.8 [44.9-54.8] (2,545)
Agri- and horticulture, forestry, fishing	22.9 [19.6-26.3] (1,253)	15.9 [12.6-19.2] (1,154)	19.9 [15.7-24.1] (1,117)	X	39.2 [21.6-56.7] (155)	39.0 [26.1-52.0] (346)	57.8 [44.4-71.3] (317)
Supply of gas, electricity, water; mining, quarrying	16.5 [12.2-20.8] (683)	20.5 [14.4-26.5] (489)	16.7 [13.7-19.8] (1,314)	X	37.5 [30.8-44.2]† (1,106)	52.5 [47.3-57.8] † (2,077)	52.3 [47.2-57.4] † (2,144)
Manufacturing or engineering	21.7 [19.7-23.6] (4,430)	15.5 [13.8-17.1] (4,419)	22.5 [21.1-23.9] (7,785)				
Construction or building	18.4 [16.1-20.8] (2,212)	15.8 [13.3-18.2] (2,068)	18.8 [16.7-20.8] (3,475)	X	40.7 [27.3-54.1] (387)	56.2 [47.5-64.9] (853)	46.1 [37.5-54.7] (871)
Commerce, transport, accommodation or food services	19.4 [18.1-20.8] (8,202)	15.2 [13.9-16.5] (8,032)	21.8 [20.6-23.0] (11,932)	X	44.1 [38.1-50.2] (1,606)	59.5 [55.3-63.8] (2,975)	58.5 [54.0-63.0] (2,702)
ICT[$], finance; professional, scientific or technical services	16.1 [14.0-18.2] (2,901)	13.9 [11.9-16.0] (2,974)	23.8 [22.5-25.0] (10,565)	X	28.3 [19.8-36.8] (686)	53.3 [44.9-61.8] (1,163)	48.7 [40.2-57.3] (899)

	Low mental wellbeing (WHO-5 Well-Being Index)						
	EWCS 2010 (n=32,249)	**EWCS 2015** (n=31,004)	**EWCTS 2021** (n=58,306)	**LWCOVID-19 2020 April–June** (n=44,621)	**LWCOVID-19 2020 June–July** (n=14,436)	**LWCOVID-19 2021 February–March** (n=26,020)	**LWCOVID-19 2022 March–May** (n=21,354)
Sector of work	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)
Services relating to education	17.8 [15.2-20.3] (2,804)	13.9 [11.8-16.0] (2,701)	23.8 [22.1-25.4] (5,689)	X	28.2 [22.8-33.5] (1,959)	50.5 [45.7-55.2] (3,559)	45.2 [40.0-50.4] (2,798)
Services relating to health or social care	17.7 [15.6-19.8] (3,275)	15.2 [13.1-17.2] (3,129)	24.9 [23.3-26.5] (6,149)	X	39.9 [33.2-46.6] (1,661)	46.9 [42.2-51.5] (2,714)	50.5 [44.7-56.2] (2,047)
Social, cultural, personal and any other services	18.4 [16.0-20.8] (2,375)	15.7 [13.2-18.1] (2,254)	22.4 [19.9-24.9] (3,414)	X	43.9 [39.9-47.9] (4,193)	57.6 [54.8-60.4] (7,283)	51.7 [48.4-55.0] (5,999)
Total (n)	19.1 [18.5-19.8] (31,400)	15.3 [14.7-16.0] (30,741)	22.4 [21.8-22.9] (57,683)	X	39.5 [37.3-41.8] (13,960)	54.1 [52.5-55.8] (24,936)	51.9 [50.0-53.7] (20,322)

*** Prevalence is not directly comparable between the two studies due to differences in the sampling methods (see Appendix)**

† The list of work sectors in the LWCOVID-19 surveys included 'Industry' as an answer category, without differentiating between the 'Supply of gas, electricity or water, mining or quarrying' and 'Manufacturing or engineering' sectors

$ Information and communication technology (ICT)

n= number of total observations per sector in the different waves of the two studies; 95% CI= 95% confidence interval

A considerable proportion of the EWCS, EWCTS and LWCOVID-19 survey respondents also reported working in their free time to meet work demands. While before the pandemic a temporary improvement could be observed between 2010 and 2015 (15.2% in 2010 and 7.9% in 2015), the prevalence of working in free time was reported by 16.4% of the EWCTS respondents in 2021. Correspondingly, the proportion of workers reporting working in their free time to meet work demands was notably high in the LWCOVID-19 surveys, ranging from 32.7% in Wave 5 to 33.5% in Wave 1. Moreover, the highest prevalence of working in free time was reported among workers from the education sector (Table A15). The higher prevalence observed during the pandemic might be linked to substantial changes in the education sector, such as home-schooling and digitalisation.

When exploring associations between psychosocial risk factors and mental health (Table 8), the prevalence of low mental wellbeing in all surveys and survey waves was consistently higher among respondents regularly working at a very high speed, working in their free time, not having enough time to get their job done and receiving poor cooperation. The difference was especially notable for lack of time and poor cooperation. Around one-third (28.8% in 2010 and 32.9% in 2015) of the EWCS and half (51.7%) of the LWCOVID-19 Wave 2 participants reporting a lack of time to get their job done had poor mental health. However, a considerably lower percentage (18.1% in EWCS 2010, 13.4% in EWCS 2015 and 37.5% in LWCOVID-19 Wave 2) reported low mental wellbeing among respondents without work-related time concerns. Similar — though even more striking — findings could be observed for workplace support. The prevalence of workers with poor mental health ranged from 25.0% (EWCS 2015) to 62.1% (LWCOVID-19 Wave 2) among those receiving poor cooperation in contrast to 14.6% (EWCS 2015) to 35.6% (LWCOVID-19 Wave 2) among respondents with adequate support. Furthermore, the second most often reported psychosocial risk factor among the indicators explored in the OSH Pulse survey was poor communication or cooperation within the organisation (26.4%) (Table A2).

Table 8: Weighted percentage of low mental wellbeing by psychosocial risk factors among EWCS (2010, 2015 and 2021)* and LWCOVID-19 (Rounds 1–3 and 5)* respondents (EU-27)

	Low mental well-being (WHO-5 Well-Being Index. score ≤50)						
	EWCS 2010 (n=32,249)	**EWCS 2015** (n=31,004)	**EWCTS 2021** (n=58,306)	**LWCOVID-19 2020 April–June** (n=44,621)	**LWCOVID-19 2020 June–July** (n=14,436)	**LWCOVID-19 2021 February–March** (n=26,020)	**LWCOVID-19 2022 March–May** (n=21,354)
	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]	Weighted % [95% CI]
Working at very high speed							
yes	20.6 [19.4-21.9]	19.2 [18.0-20.4]	26.8 [25.9-27.6]	X	X	X	X
no	18.3 [17.5-19.1]	13.4 [12.6-14.1]	18.2 [17.5-18.9]	X	X	X	X
Worked in free time							
yes	23.3 [21.2-25.4]	23.3 [20.6-26.0]	29.2 [27.7-30.7]	48.8 [46.7-50.9]	44.4 [40.8-48.0]	59.7 [57.3-62.2]	57.8 [54.8-60.8]
no	18.2 [17.4-18.9]	14.6 [14.0-15.3]	21.0 [20.4-21.6]	48.1 [46.5-49.7]	36.1 [33.4-38.9]	51.7 [49.7-53.8]	48.4 [46.2-50.6]
Don't have enough time to get the job done							
yes	28.8 [26.0-31.6]	32.9 [30.1-35.7]	X	X	51.7 [45.7-57.6]	X	X
no	18.1 [17.4-18.8]	13.4 [12.8-14.1]	X	X	37.5 [35.2-39.8]	X	X
Poor cooperation							
yes	31.5 [28.4-34.7]	25.0 [22.0-27.9]	40.6 [37.3-43.8]	X	62.1 [55.8-68.5]	X	X
no	17.7 [17.0-18.4]	14.6 [13.9-15.3]	21.6 [21.0-22.2]	X	35.6 [33.3-37.9]	X	X

*** Prevalence is not directly comparable between the two studies due to differences in the sampling methods (see Appendix)**

n= number of observations; 95% CI= 95% confidence interval

4. Discussion

This discussion paper assesses the state of workers' mental health in the European workforce at a late stage of the COVID-19 pandemic. This was done by analysing data from the OSH Pulse survey on work-related mental health and also from other European surveys with repeated measurements to provide a picture of the situation before, during and in the ending phase of the COVID-19 pandemic. The research aims were to:

- provide a detailed description of the state of work-related mental health in Europe at the end of the pandemic; and
- generate scientific evidence that may inform the discussion about the immediate and possible long-term consequences of the pandemic for occupational mental health.

Extent of work-related stress and mental ill health in the 2022 OSH Pulse survey

Several hypotheses can be derived from the previous research summarised in the Introduction regarding these aspects.

Prevalence of work-related stress and mental health problems will be high: Firstly, it was expected that work-related stress and poor work-related mental health would be a common problem, as there was already a high prevalence of self-reported work-related stress and mental health problems in the working population before the pandemic (Eurostat, 2022; GBD 2019 Mental Disorders Collaborators, 2022). This assumption was confirmed in our analyses of self-reported work-related mental health, which is in line with other studies on the mental health of workers during the pandemic (Hvide and Johnsen, 2022; Pashazadeh Kan et al., 2021; Pierce et al., 2020; Pierce et al., 2021; Robinson et al., 2021). A relatively high level of self-reported work-related stress and mental health problems[29] was found in both the OSH Pulse survey (26.8% of respondents reporting stress, depression or anxiety caused or made worse by work and 44% reporting that their work stress had increased as a result of the pandemic) and the analysis of the two other studies on mental wellbeing. The analysis shows that it was already important to address psychosocial risks and work-related mental health within OSH before 2020, however, the pandemic has made this more pressing.

Association between work-related psychosocial risk factors and reported work-related mental health problems: On a more general level, it was expected that individual workloads and resources would be associated with employees' mental health, as these factors are known risk or protective factors for mental illness (Duchaine et al., 2020; Harvey et al., 2017; Kim and Knesebeck, 2016; La Torre et al., 2019; Madsen et al., 2017; Theorell et al., 2015). This assumption was also confirmed in the OSH Pulse survey. All factors studied (psychosocial risk factors, stress related to digital work, resources) were significantly associated with the presence of poor work-related mental health. The risk factor with the strongest link to mental health was severe time pressure or work overload. This risk factor is widespread in the OSH Pulse sample, and in the EWCTS, time pressure and work overload related variables were more prevalent than other risk factors.[30] It therefore seems to be a particular problem in the current world of work, and it would be advisable to conduct further research to determine whether and why the workload is so high in many workplaces and how this could be counteracted. And there may be a lack of awareness among employers of the risk of time pressure — in ESENER 2019, only 45% of establishments reported the presence of time pressure as a risk factor (EU-OSHA, 2019). Other factors, such as experiencing harassment, bullying or violence at work, were also associated with considerable poor mental health.

Association between increase in stress during the pandemic and exposure to psychosocial risk factors: Exposure to poor communication and cooperation, lack of autonomy or influence over work, time pressure or high workload were all associated with a higher increase in stress due to the pandemic compared to no exposure. While nearly 45% of respondents answered that the pandemic increased their stress at work, the increase was significantly more in those exposed to these psychosocial risk factors. This finding suggests that there may have been a simultaneous increase in different psychosocial risk factors during the pandemic.

[29] However, and this is important to emphasise, no diagnostic data were collected in any of the studies used here, and only short indicator questions were asked. In this respect, the prevalence found must be interpreted with caution and by no means as the prevalence of clinically significant mental illnesses.

[30] In the EWCTS, adverse social behaviour had the strongest link to mental health while time pressure and work overload related variables were more prevalent than other risk factors.

Effect of digitalisation: Digital stress showed somewhat weaker associations with mental health, which were, nevertheless, statistically significant and point to the importance of decent digital work for mental wellbeing (Berg-Beckhoff et al., 2017; La Torre et al., 2019; Tarafdar et al., 2007). However, respondents reported that digitalisation increased their exposure to various OSH factors that are psychosocial risk factors (e.g. increased workload).

Positive impact of resources/OSH measures: Another important finding is that employees whose organisations had specific resources to deal with work-related mental stress had significantly better mental health than those without these resources. Positive effects were found for an indicator of an open climate in dealing with mental problems (feeling comfortable speaking with managers about mental health), as well as for behavioural prevention (information and training) and organisational measures (consultation on stressful aspects of work). However, the general quality of OSH was also of particular importance. Respondents whose organisations had general health protection measures in place had significantly fewer mental health problems than workers in workplaces with no sufficient health and safety protection.

Country differences in OSH: The additional country comparison, which shows that the mental health of employees was better on average in countries with a high proportion of companies with measures to prevent mental stress, complements these findings. These results again underscore that it is possible to reduce stress among employees with targeted measures by the employer even in the time of a global health crisis. From this perspective, the consistent implementation of OSH regulations is an important element in strengthening the psychological resilience of employees regarding possible future crisis events.

The possible impact of the COVID-19 pandemic on work-related psychosocial factors and mental health

In this regard, it can first be stated that the fundamental problem of mental ill health of many workers, which has been known for many decades, persisted or increased during the pandemic. However, the extent to which changes have occurred compared to the time before the pandemic, what the causes were, and whether these changes are likely to remain post-pandemic is another question. Within the limits of the methodological restrictions (see below), we pursued this question in the analyses using different approaches.

Subjective increase in stress due to the pandemic: Firstly, the subjective assessment of the workers surveyed in the OSH Pulse on pandemic-related changes in their working conditions was used as an indicator of change. Almost half of the respondents stated that their work stress had increased as a result of the pandemic. This increase in stress was also associated with poorer mental health, as our correlation analyses showed. To provide further evidence, responses to the question about an increase in work stress were compared between the countries involved in the study and differences were related to the strictness of policy measures to contain the pandemic. This was done using the Stringency index, which also integrates numerous measures that have a direct impact on the world of work (e.g. extent of workplace closures, economic data, working from home rules) (Hale et al., 2021). The hypothesis that we derived from previous research on associations between country characteristics and psychosocial working conditions was that the impact on individual workers was also greater in countries where the measures were stricter (Bambra, 2011; Rigó et al., 2022). This was indeed the case, which could indicate that pandemic-related changes in social and economic life had an impact on individual working conditions. However, methodologically, it should be noted that this is only a correlative relationship that cannot be interpreted causally. Ultimately, reliable statements about changes over time can only be made on the basis of longitudinal data, where information is available on the individual level at different measurement points in time.

As expected, there was a clear association between the presence of work-related psychosocial factors and an increase in stress levels due to the pandemic (e.g. high work demands, lack of control over work or workplace bullying). It is not known to what extent respondents were exposed to these risk factors before the pandemic or if exposure increased during the pandemic. However, workers experience stress when they are under excessive pressure and do not have physical and mental resources to cope with all the demands on them (EU-OSHA, 2018) and workplaces where work overload, bullying, or poor communication and cooperation were already present are unlikely to have been in a good position to manage the unexpected and increased demands brought by the pandemic.

Protective effect of good OSH measures on work-related stress during the pandemic: While the data do not allow firm conclusions to be drawn on the role of good OSH in protecting workers from an increase in work-related stress and mental ill health during the pandemic, they suggest that those working in workplaces with good OSH measures in place and who dealt with OSH problems promptly were less likely to experience an increase in stress during the pandemic. This hypothesis is strengthened by the correlation seen between countries having a lower reported increase in stress and companies in those countries being more likely to report having made a comprehensive risk assessment.

Changes over time: Nearly 45% of respondents answered that the pandemic increased their stress at work. However, longitudinal data that would allow the study of changes over time on an individual level are largely missing for Europe. There are also only a few time-series studies in which surveys are repeated at regular intervals with new samples to enable the observation of trends in the prevalence of work-related factors. These few also have the problem that the methods (e.g. question wording) are often changed between the survey waves, so that comparability over time is limited. All this also applies to the period of the pandemic. The measurement of changes in psychosocial risk factors over the course of the pandemic and the impact on mental health has been repeatedly called for but has only actually been carried out in very few studies (Knight et al., 2022). In this respect, it is not clear from the literature to date what trends actually existed before, during and, as a prediction, after the pandemic. We have used our own analyses of two large surveys (EWCS — including the EWCTS in 2021 and LWCOVID-19) with repeated measurements for this survey, even though the methods of the two surveys are not comparable, and even though the methods were partly changed within the surveys.[31] In the end, only a few indicators that were, at least partially, comparable could be identified. Statements about the time before the COVID-19 pandemic were possible with the EWCS, for which two waves were available in 2010 and 2015. Another wave was examined in 2021, but with a different survey methodology. The data suggest that there was a higher prevalence of poor (general) mental health during the pandemic than in the previous period. Moreover, most of the work stressors measured were relatively stable before the pandemic, then in the 2021 wave, the prevalence of working at high speed was above those of the pre-pandemic survey waves. On the contrary, a lower prevalence was observed for poor cooperation with colleagues. There is little change in all parameters between the waves of the LWCOVID-19 survey, but this survey did not have a pre-pandemic measurement. In summary, there were no really clear patterns observable in this analysis that would indicate a pandemic effect. The most likely pattern seems to be continuity, suggesting an evolutionary development rather than a disruptive increase (or decrease) in mental workload (with the exception of certain sectors of work, see next paragraph). Regarding the post-pandemic world of work, this would mean that the long-known relevance of psychosocial risk factors for the mental health of employees still exists and is an apparently unresolved problem.

Differential findings for different socio-demographic and economic subgroups of workers: Another way to examine the effects of the pandemic was to take a theory-based look at expected differences in stress and poor mental health in relation to socio-demographic and occupational characteristics. We argued in the Introduction that certain professions and sectors were particularly likely to be affected by increasing mental stress. The health sector was mentioned as an example (Fan et al., 2021; Nyberg et al., 2022). Regarding sectoral differences, this assumption was confirmed in the evaluation of the OSH Pulse data with a high burden of low mental health in the health and social care sector and a high number of employees indicating that their stress increased due to the pandemic. Furthermore, a high level of work-stress and poor mental health was observed in occupations in the education sector, which can be linked to changes such as home-schooling and the related process of rapid digitalisation (Knight et al., 2022; Kotowski et al., 2022; Mahmood et al., 2021). Comparable differences by sectors were also found in our supplemental analysis of the 2021 wave of the EWCS. Against this background, special attention must be paid to further developments in the sectors particularly affected. Separate initiatives may be needed to prevent the high level of mental stress in the health and education sectors from

[31] It is important to keep in mind that comparability between the surveys included and of each survey wave, was limited. On the one hand, due to the rapid spread of the COVID-19 pandemic, changes in the questionnaire (removed questions compared to preceding waves), mode of data collection (from face-to-face interviews to telephone surveys) and sampling method were made in the latest EWCS wave conducted in 2021. On the other hand, the COVID-19 surveys were distributed online applying non-probability sampling methods, asking respondents about their most recent work experiences (within the last two to four weeks), resulting in generally low comparability with other surveys, including the EWCS. Therefore, we aimed to explore the mental health and psychosocial working conditions of European workers at different time points instead of conducting a trend analysis over time.

becoming entrenched during the pandemic. The European Parliament, for example, had already pointed out the special situation in the health sector in 2021 and brought up initiatives to improve working conditions (Samek Lodovici et al., 2022).

We also examined other differences that were expected according to previous research (see Introduction). Firstly, the results suggest a gender gap with lower work-related mental wellbeing and less favourable psychosocial working conditions among women compared to men. Women, for instance, were more likely to report that their work stress had increased during the pandemic and were less likely to be well protected by measures of occupational health and safety. They also reported more violence or verbal abuse at work and had less autonomy overall than their male colleagues. This replicated the findings of other studies in the pandemic that reported an increase in gender inequalities (Backhaus et al., 2023; Wang et al., 2022). It will be important in the future to prevent these differences from becoming further entrenched. We also studied differences by occupational position. It turned out that higher-qualified workers had higher levels of exposure to potentially harmful psychosocial working conditions and lower mental wellbeing. One explanation for this could be that many occupations in the sectors particularly affected by the pandemic, especially in the health and education sectors, tend to be higher-qualified occupations (e.g. doctors, qualified nursing staff, teachers). However, we also found that manual workers were less well informed about work-related psychosocial risks by their employers. It could, therefore, also be that these workers are less aware about possible psychosocial risks and, thus, tend to report existing problems less often.

Digitalisation and flexibilisation: Two other major issues were the digitalisation and flexibilisation of work, which were further accelerated by the pandemic and it is likely that these two trends will continue in the future (Battisti et al., 2022). This could have had an effect, as the analyses showed that workers in highly digitalised jobs were more stressed during the pandemic than those with less digitalised work. Since a connection between stress caused by the use of digital technologies at work (increased workload, reduced autonomy) and mental health was also apparent, it is not unlikely that digitalisation in the pandemic may have played a role in increasing mental stress. However, this assumption could not be directly investigated with the cross-sectional data available here. Regarding flexibilisation of work, we looked particularly at the place of work and found no evidence that working from home (telework) was associated with increased (or decreased) mental stress. Given the benefits of location-flexible working, this is an important finding as it argues for the retention of flexible concepts even after the pandemic. However, it was also found that working in public places (e.g. coffee shops) was associated with increased stress. In this sense, not every form of flexibility can be recommended without hesitation.

5. Conclusion

In summary, the COVID-19 pandemic was a formative event for workers' mental health. Although not all possible consequences for psychosocial working conditions and mental health have been researched, some essential mechanisms can be identified, as this analysis shows. However, it is not only important to understand what happened during the pandemic and draw conclusions about possible future crises of this kind. It is also crucial to ask which of these changes are permanent and will remain part of the 'normal' post-pandemic world of work. For this reason, it is especially necessary to continuously monitor the distribution of potentially health-damaging working conditions together with indicators of mental health in the future. On this basis, changes can be recognised at an early stage, and forecasts for future developments can be made. This is particularly relevant in times of rapid change such as ours.

Psychosocial risk factors, work-related stress and poor mental health remain a significant problem in Europe's workplaces. There are indications that work-related stress increased during the pandemic. Digitalisation of work is also associated with an increase in exposure to some risk factors. Organisations that had risk assessments in place appeared better able to cope with the pandemic (lower increases in work-related stress). The data show the importance of addressing work-related psychosocial risks, especially in relation to digitalisation, and the need to integrate addressing work-related psychosocial risks into preparedness plans for future critical events.

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Appendices

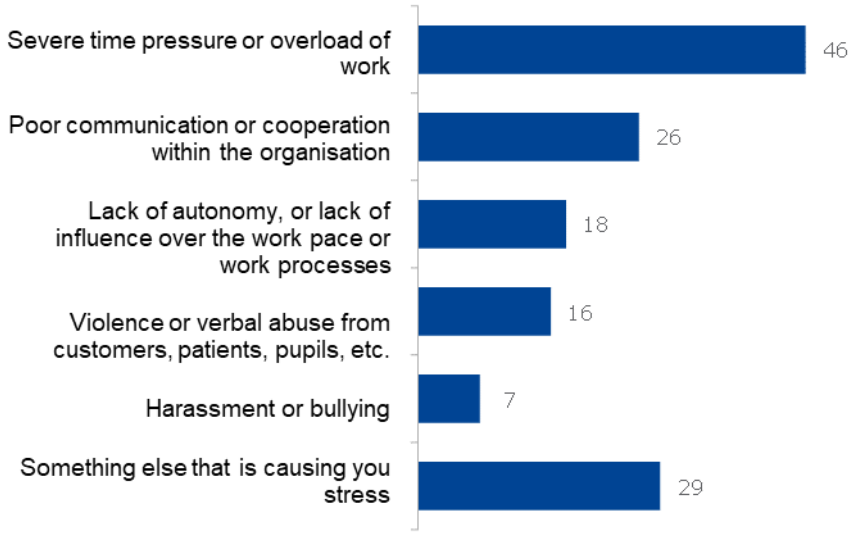
Appendix 1: Key findings for psychosocial risks and mental health from the OSH Pulse 2022 survey (EU-27)

Source: EU-OSHA (2022d)

Exposure to psychosocial risk factors

- 46% of respondents across the EU answer that they are exposed to severe time pressure or overload of work; 26% say the same about poor communication or cooperation within their organisation and 18% about a lack of autonomy, or lack of influence over the pace of work or work processes.
- Violence or verbal abuse from customers, patients, pupils, etc. is mentioned by 16% of respondents across the EU, and 7% say they are exposed to harassment or bullying at work.
- In line with the EU average results, the largest share of respondents across all countries answer that they are exposed to severe time pressure or overload of work. This risk factor is mentioned by 31% of respondents in Romania and 32% in Lithuania, and then increases to more than 50% in Cyprus, Slovenia, France, Finland, the Netherlands, Greece and Iceland.
- Respondents working in medium-sized (20-249 employees) and large companies (250+ employees) are the most likely to be exposed to severe time pressure or overload of work (50%); this figure decreases to 46% in small companies (10-49 employees) and to 39% in micro companies (<10 employees).

Would you say that at work you are exposed to the following factors? (% **'Yes'**)

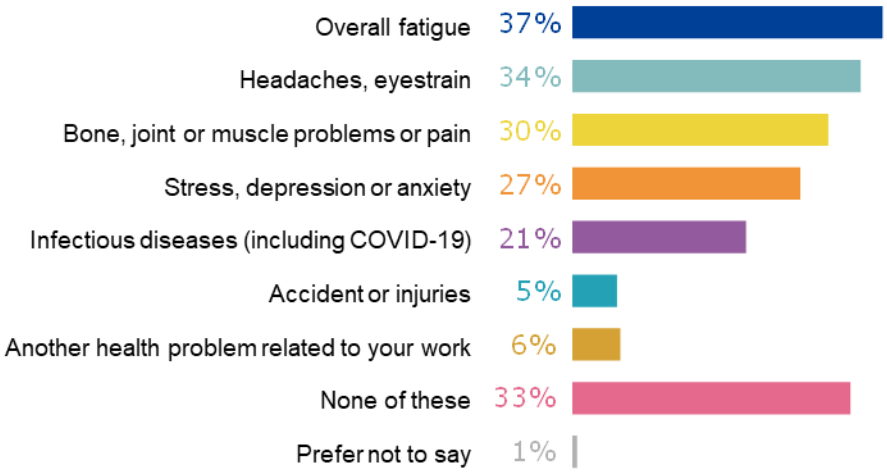


Base: all respondents, EU-27 (n=25,683)

Health issues

- Across the EU, overall *fatigue* is the most-cited health issue caused or made worse by work (37%), followed by headaches and eyestrain (34%), bone, joint or muscle problems or pain (30%), *stress, depression and anxiety* (27%), and infectious diseases (including COVID-19) (21%).
- In 17 of the 27 EU Member States, and in Iceland, the most frequently (or joint most-frequently) listed work-related health problem is *overall fatigue*. The proportion indicating this health problem is the highest in Poland (62%), followed by Lithuania (52%), Spain and Latvia (both 51%).

In the last 12 months, have you experienced any of the following health problems caused or made worse by your work? [MULTIPLE ANSWERS] (%)



Base: all respondents, EU-27 (n=25,683)

Mental health in the workplace

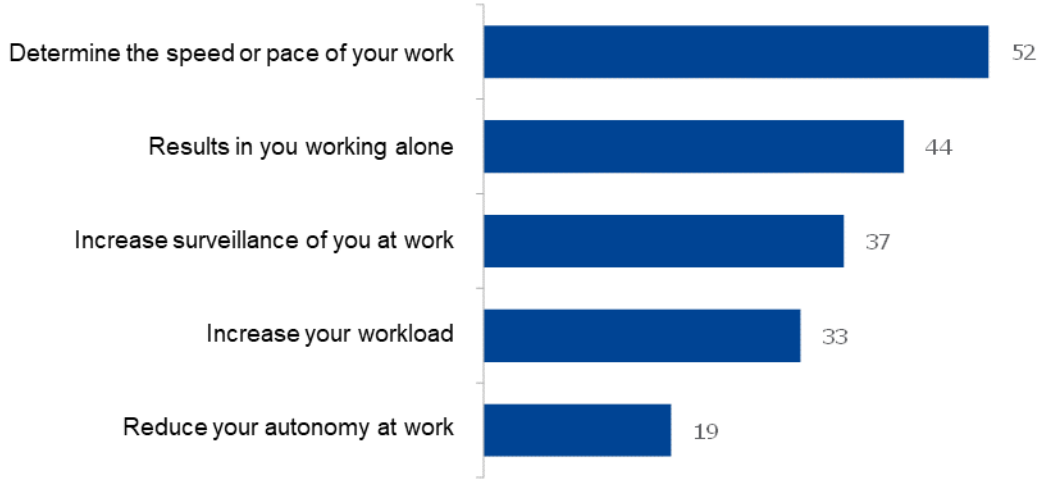
- Respondents across the EU are divided in their view whether disclosing **a mental health condition would have a negative impact on their career**: 16% 'strongly agree' and 34% 'agree' vs 13% who 'strongly disagree' and '32%' who 'disagree'. Nonetheless, close to six in 10 respondents agree that **they would feel comfortable speaking to their manager or supervisor about their mental health** (18% 'strongly agree' and 40% 'agree').
- In 11 Member States, a majority of respondents agree that **disclosing a mental health condition would have a negative impact on their career**. The proportion agreeing with this statement is particularly high in Italy (63%), Cyprus (66%), Greece (66%) and France (68%).
- Lower-educated respondents are not as comfortable speaking to their manager about mental health issues than respondents with a higher level of education. While 53% of respondents who completed their education by age 15 agree with this statement, this figure goes up to 59% for respondents who stayed in education longer.
- More than four in 10 respondents across the EU agree that **their work stress has increased as a result of the COVID-19 pandemic** (16% 'strongly agree' and 28% 'agree'). About one in two respondents agree that the **COVID-19 pandemic has made it easier to talk about stress and mental health at work** (11% 'strongly agree' and 40% 'agree').
- In Malta, 72% of respondents agree that the COVID-19 pandemic has made it easier to talk about stress and mental health at work; other countries at the higher end of the country ranking include Italy (63%) and Spain (64%).
- Available initiatives to prevent psychosocial risks and mental health issues in the workplace include **access to counselling or psychological support** (mentioned 38%), **information and training on wellbeing and coping with stress** (42%), and **consultation of workers about stressful aspects of work** (43%). Initiatives aiming at reducing mental health risks in the workplace tend to be more common in larger companies.
- The largest variation across countries is seen for access to counselling or psychological support (from 24% in Cyprus and Portugal to 74% in Finland).

Digital technologies at the workplace

- 30% of respondents across the EU say that their organisation uses digital devices to **automatically allocate tasks or working time or shifts** to them.
- A slightly lower number (27%) reply that digital devices are used to **have their performance rated by third parties** (e.g. customers, colleagues, patients etc.) and 25% to **supervise or monitor their work and behaviour**.

- Automatically allocating tasks or working time or shifts is most common for skilled, semi-skilled or unskilled manual workers and farm workers (32%), followed by workers in clerical, sales or service jobs (26%); this figure decreases to 22% for workers in professional, technical or higher administrator jobs.
- 52% of respondents across the EU answer that the use of digital technologies in their workplace determines the speed or pace of their work and 33% reply that these technologies increase their workload.
- 57% of professional, technical or higher administrator occupations and 54% of clerical, sales or service occupations report that the use of digital technologies determines the speed of their work, compared to 42% of skilled, semi-skilled or unskilled manual workers and farm workers; a similar pattern of differences is also seen for increasing one's workload.
- 44% say that digital technology results in them working alone and 37% that the use of digital technologies increases surveillance of them at work.
- Finally, 19% of respondents say that the use of digital technologies reduces their autonomy at work.

Would you say that the use of digital technologies in your workplace …? (% **'yes'**)



Base: all respondents, EU-27 (n=25,683)

Appendix 2: Methods

European Working Conditions Survey (EWCS)

The EWCS is a periodic cross-sectional survey established by Eurofound in 1990, providing detailed information on demographic characteristics and different aspects of working conditions of employees and the self-employed across Europe. For the current report, data were drawn from three survey waves, conducted in 2010, 2015 and 2021, respectively. Participants were selected using random probability sampling methods. The target population was individuals aged 15 and older (16 and over in 2021, as well as in Bulgaria, Norway, Spain and the United Kingdom in 2010 and 2015, due to the minimum legal working age being higher in these countries), whose usual place of residence was in the territory of the selected countries and who did any work for pay or profit during the week that preceded the beginning of the interview. Interviews were conducted face to face (Computer Assisted Personal interviewing [CAPI]) until 2021, when Computer Assisted Telephone Interviewing (CATI) was utilised due to the rapid spread of COVID-19 in the preceding year. The sample size ranged from 1,000 to 4,001 per country in 2010, 1,000 to 3,300 in 2015 and 988 to 4,233 in 2021. A more detailed description of the methodology can be found in the technical reports (Eurofound, 2010, 2015, 2021a).

Living, working and COVID-19 (LWCOVID-19 survey)

Through five waves conducted between 2020 and 2022, the LWCOVID-19 survey collected information from individuals living in the EU about their daily lives, working conditions and health during the COVID-19 pandemic. Launched by Eurofound in April 2020 as an e-survey, the online questionnaires were available via a weblink to anyone aged 18 or older with access to the internet. The e-survey recruited respondents applying non-probability sampling methods such as snowball sampling among Eurofound's contacts and stakeholders as well as social media advertisements, producing a non-representative raw sample. Therefore, to obtain data that is representative of the demographic profile of the 27 EU Member States (Iceland and Norway were not part of the survey), the sample was weighted based on age, sex, education and self-defined urbanisation levels. For our analyses, we used data from the first (9 April 2020 to 11 June 2020), second (22 June 2020 to 27 July 2020), third (15 February and 30 March 2021), and fifth (24 March and 2 May 2022) survey waves. The sample size ranged from 358-2,332 per country in the second round (the wave with the lowest number of respondents) to 608-8,768 per country in the first round (the wave with the highest number of respondents). A more detailed description of the methodology can be found elsewhere (Eurofound, 2020, 2021a; Parent-Thirion et al., 2017).

Study sample

We excluded from the analyses of EWCS and LWCOVID-19 survey respondents younger than 16 years, unemployed and retired respondents, full-time homemakers, students, participants with long-term illness or disability, and those with missing data on employment status, leaving a total of 227,990 participants (EWCS 2010: n=32,249; EWCS 2015: n=31,004; EWCTS 2021: n=58,306; LWCOVID-19 Wave 1: n=44,621; LWCOVID-19 Wave 2: n=14,436; LWCOVID-19 Wave 3: n=26,020; LWCOVID-19 Wave 5: n=21,354) from the 27 EU Member States.

Variables and measures

The overall comparability between surveys and survey waves was generally low. While many OSH Pulse survey questions of interest were unavailable in the EWCS and LWCOVID-19 surveys, the framing of other inquiries and the lengths of the examined periods the questionnaires referred to differed from survey to survey, as well as wave to wave. After careful consideration, we selected one measure of mental health based on five questions on wellbeing (WHO-5 Well-Being Index) and four indicators of psychosocial risk factors (such as not having enough time to get the job done, working at a very high speed, working in free time to meet demands, and poor cooperation) for further analyses.

Mental health

In the EWCS and LWCOVID-19 surveys, mental wellbeing was assessed using the WHO-5 Well-Being Index (WHO-5) (Topp et al., 2015). The WHO-5 is a measure calculated from five self-reported questions with possible answers ranging from 0 (at no time) to 5 (all of the time) on a 6-point Likert scale. The WHO-5 consists of the following statements: 'Over the last two weeks I have 1) felt cheerful and in good spirits, 2) calm and relaxed, 3) active and vigorous, 4) I woke up feeling fresh and rested, and 5) My daily life has been filled with things that interest me'. Summing the scores of all items, the

raw total score ranges between 0 and 25. The raw total score is then multiplied by 4, leading to a final score of 0 to 100, where lower scores represent worse mental wellbeing. Using a cut-off score of ≤50, we explored the presence of low mental wellbeing among EWCS and LWCOVID-19 study participants at different time points. In previous studies, the WHO-5 cut-off score of ≤50 as a 'screening diagnosis' of depression showed a mean sensitivity of 0.87 for DSM-IV depression and a mean specificity of 0.76 for DSM-IV major depression (Topp et al., 2015).

Psychosocial risk factors

After careful evaluation, four indicators of psychosocial risk factors were assessed based on the EWCS, EWCTS and LWCOVID-19 surveys. The first three represented job demands requiring sustained psychological effort, potentially leading to negative mental health effects:

1) Working at a very high speed – 'Does your job involve working at very high speed?' Answer categories were dichotomised into 'all of the time'/'almost all of the time'/'around ¾ of the time' vs 'around half of the time'/'around ¼ of the time'/'almost never'/'never' in the EWCS 2010 and 2015 surveys, and 'often'/'always' vs 'never' /'rarely' /'sometimes' in the EWCTS 2021 survey. The LWCOVID-19 questionnaires did not include this inquiry.

2) Not having enough time to get the job done – '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'. This indicator was available in the EWCS 2010, EWCS 2015 and LWCOVID-19 Wave 2 surveys.

3) Working in free time to meet demands – 'Over the last 12 months (EWCS 2010)/Since you started your main paid job (EWCS 2015 and EWCTS 2021)/Over the last 2 weeks (LWCOVID-19 Wave 1)/Over the last month (LWCOVID-19 waves 2-5), how often have you worked in your free time to meet work demands?' In the EWCS 2010, possible answers were dichotomised into 'nearly every day'/'once or twice a week' vs 'once or twice a month'/'less often'/ 'never'. Similarly, a binary variable was created for the EWCS 2015 and EWCTS 2021 surveys: 'daily'/'several times a week' vs 'several times a month'/'less often'/'never'. As for the LWCOVID-19 surveys, responses were also recoded into a dichotomous variable: 'every day'/'every other day'/'once or twice a week' vs 'less often'/'never'.

The fourth indicator represented (a lack of) job resources based on social relations and workplace support, available in all included EWCS waves and the second round of the LWCOVID-19 survey:

4) Poor cooperation – '…select the response which best describes your current work situation - Your colleagues (colleagues or peers in LWCOVID-19 Wave 2) help and support you/Your manager helps and supports you'. Potential answers for both questions included 'always', 'most of the time'('often' in EWCTS 2021), 'sometimes', 'rarely', or 'never', and were dichotomised for the analyses ('rarely'/'never' vs 'always'/'most of the time'/'sometimes'). Respondents were receiving poor cooperation when neither their colleagues nor their managers supported them.

Control variables

We included socio-demographic factors such as age (16-24 years, 25-39 years, 40-54 years, and 55 years or older) and sex (male or female), as well as the sector of work (10 sectors based on the second revision of NACE [the 'statistical classification of economic activities in the European Community']), in our analyses as variables that might affect both mental health and the perception of psychosocial risk factors.

Statistical analysis

To assess the mental health and psychosocial risk factors of the EWCS, EWCTS and LWCOVID-19 survey respondents, we calculated weighted percentages of low mental wellbeing as well as indicators of job demands and resources at different time points between 2010 and 2022. To identify potentially vulnerable groups, we also explored the mental health of European workers by sector of work and psychosocial risk factors. Focusing on (the lack of) job resources, we further examined the weighted prevalence of poor cooperation among EWCS survey participants in each of the 27 EU Member States, using regression models adjusted for sex, age category and sector of work. SAS v.9.4 (SAS Institute) was used to perform the analyses employing an α-level of 0.05 to determine statistical significance.

Appendix 3: Tables

Table A1: Description of socio-demographic and employment-related characteristics in the OSH Pulse sample (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Observations	Col. % (unweighted)	Col. % (weighted)	95%-CI (weighted)
Sex				
Male	14,608	54.0	53.6	[52.5,54.6]
Female	12,438	46.0	46.4	[45.4,47.5]
Total	27,046	100.0	100.0	
Age groups				
16-24	2,118	7.8	7.7	[7.1,8.3]
25-39	9,096	33.4	32.6	[31.6,33.6]
40-54	10,655	39.1	38.7	[37.7,39.7]
55+	5,381	19.7	21.1	[20.2,22.0]
Total	27,250	100.0	100.0	
Nationality				
National	25,318	92.9	94.1	[93.6,94.6]
Foreign	1,932	7.1	5.9	[5.4,6.4]
Total	27,250	100.0	100.0	
Employment status				
Self-employed	4,290	15.7	16.5	[15.7,17.3]
Employee with a permanent contract	19,656	72.1	68.9	[67.9,69.9]
Employee with a temporary contract	3,304	12.1	14.6	[13.9,15.4]
Total	27,250	100.0	100.0	
Working hours				
Part-time	3,951	14.6	18.5	[17.7,19.4]
Full-time	23,094	85.4	81.5	[80.6,82.3]
Total	27,045	100.0	100.0	
Type of occupation				
Professional, technical or higher administrator occupations	12,042	44.9	43.1	[42.1,44.2]
Clerical, sales or service occupations	9,305	34.7	36.2	[35.1,37.2]
Skilled, semi-skilled or unskilled workers (incl. farm workers)	5,496	20.5	20.7	[19.9,21.6]
Total	26,843	100.0	100.0	
Sector of work				
Administration and support services, including public administration and defence (NO)	3,567	13.4	14.3	[13.5,15.1]
Agriculture, horticulture, forestry or fishing (A)	897	3.4	3.9	[3.5,4.3]
Supply of gas, electricity or water, mining or quarrying (BDE)	611	2.3	2.4	[2.1,2.7]
Manufacturing or engineering (C)	2,739	10.3	9.8	[9.2,10.4]
Construction or building (F)	2,299	8.6	8.0	[7.5,8.6]
Commerce, transport, accommodation or food services (GHI)	4,931	18.5	16.5	[15.8,17.2]
Information and communication technology; finance; professional, scientific or technical services (JKM)	4,178	15.7	14.6	[13.9,15.3]
Services relating to education (P)	2,033	7.6	8.5	[7.9,9.2]
Services relating to health or social care (Q)	2,925	11.0	12.7	[11.9,13.4]
Social, cultural, personal and any other services (RS+LTU)	2,512	9.4	9.4	[8.8,10.1]
Total	26,692	100.0	100.0	
Location of work				
Your employer's/your own business' premises (office, factory, shop, school, etc.)	17,507	64.6	65.7	[64.7,66.7]
Clients' premises	1,637	6.0	6.2	[5.7,6.7]
A car or another vehicle (e.g. train, bus)	1,075	4.0	3.5	[3.1,3.8]
An outside site (e.g. construction site, agricultural field, streets of a city)	1,542	5.7	5.6	[5.2,6.1]
Your own home	4,743	17.5	16.9	[16.1,17.7]
Public spaces such as coffee shops, airports, etc.	585	2.2	2.1	[1.9,2.4]
Total	27,089	100.0	100.0	

	Observations	Col. % (unweighted)	Col. % (weighted)	95%-CI (weighted)
Digital work				
None	2,740	10.1	11.4	[10.7,12.1]
Usual (computer, laptop, internet, etc.)	19,268	70.7	72.1	[71.2,73.1]
Advanced (machines or robots & wearables)	5,242	19.2	16.5	[15.8,17.2]
Total	27,250	100.0	100.0	
Country name				
Belgium	1,000	3.7	n/a	
Bulgaria	1,046	3.8		
Czechia	1,000	3.7		
Denmark	1,006	3.7		
Germany	1,003	3.7		
Estonia	1,002	3.7		
Ireland	1,008	3.7		
Greece	1,002	3.7		
Spain	1,000	3.7		
France	1,003	3.7		
Croatia	1,003	3.7		
Italy	1,000	3.7		
Republic of Cyprus	502	1.8		
Latvia	1,001	3.7		
Lithuania	1,004	3.7		
Luxembourg	505	1.9		
Hungary	1,006	3.7		
Malta	504	1.8		
Netherlands	1,008	3.7		
Austria	1,008	3.7		
Poland	1,009	3.7		
Portugal	1,020	3.7		
Romania	1,009	3.7		
Slovenia	1,007	3.7		
Slovakia	1,000	3.7		
Finland	1,015	3.7		
Sweden	1,012	3.7		
Iceland	562	2.1		
Norway	1,005	3.7		
Total	27,250	100.0		

Table A2: Description of working conditions and resources in the OSH Pulse sample (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Observations	Row % (weighted)	CI 95% (weighted)
Severe time pressure or overload of work			
No	14,799	54.0	[53.0,55.1]
Yes	12,288	46.0	[44.9,47.0]
Total	27,087	100.0	
Violence or verbal abuse from customers, patients, pupils, etc.			
No	23,174	84.3	[83.6,85.0]
Yes	4,011	15.7	[15.0,16.4]
Total	27,185	100.0	
Harassment or bullying			
No	25,259	92.7	[92.1,93.2]
Yes	1,895	7.3	[6.8,7.9]
Total	27,154	100.0	
Poor communication or cooperation within the organisation			
No	19,750	73.6	[72.7,74.5]
Yes	7,245	26.4	[25.5,27.3]
Total	26,995	100.0	
Lack of autonomy, or lack of influence over the work pace or work processes			
No	22,414	82.3	[81.4,83.1]
Yes	4,466	17.7	[16.9,18.6]
Total	26,880	100.0	
Use of digital technologies increases workload			
No	17,753	66.4	[65.4,67.4]
Yes	8,836	33.6	[32.6,34.6]
Total	26,589	100.0	
Use of digital technologies reduces autonomy at work			
No	20,951	80.1	[79.3,80.9]
Yes	5,542	19.9	[19.1,20.7]
Total	26,493	100.0	
Feeling comfortable to speak with manager about mental health			
Not comfortable	8,562	38.3	[37.2,39.4]
Comfortable	17,484	61.7	[60.6,62.8]
Total	26,046	100.0	
Information and training on wellbeing and coping with stress			
No	14,930	56.7	[55.7,57.8]
Yes	11,840	43.3	[42.2,44.3]
Total	26,770	100.0	
Consultation of workers about stressful aspects of work			
No	15,024	56.0	[54.9,57.0]
Yes	11,648	44.0	[43.0,45.1]
Total	26,672	100.0	
Safety problems are addressed promptly at workplace			
No	3,570	16.0	[15.2,16.8]
Yes	22,869	84.0	[83.2,84.8]
Total	26,439	100.0	

	Observations	Row % (weighted)	CI 95% (weighted)
Good measures to protect health at workplace			
No	3,965	16.3	[15.6,17.2]
Yes	22,690	83.7	[82.8,84.4]
Total	26,655	100.0	

Table A3: Associations between socio-demographic and employment-related characteristics and the prevalence of severe time pressure or overload of work (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Severe time pressure or overload of work: yes		
	Observations	Row % (weighted)	CI 95%
Sex			
Male (n=14,511)	6,377	43.8	[42.5-45.2]
Female (n=12,376)	5,834	48.5	[46.9-50.1]
Total (n=26,887)	12,211	46.0	[45.0-47.1]
Age groups			
16-24 (n=2,105)	828	37.8	[34.1-41.7]
25-39 (n=9,046)	4,134	46.3	[44.5-48.1]
40-54 (n=10,588)	5,013	47.6	[46.0-49.3]
55+ (n=5,348)	2,313	45.4	[43.0-47.9]
Total (n=27,087)	12,288	46.0	[44.9-47.0]
Nationality			
National (n=25,167)	11,464	46.0	[45.0-47.1]
Foreign (n=1,920)	824	44.9	[40.4-49.5]
Total (n=27,087)	12,288	46.0	[44.9-47.0]
Employment status			
Self-employed (n=4,257)	1,956	44.6	[42.1-47.2]
Employee with a permanent contract (n=19,544)	8,958	47.2	[46.0-48.5]
Employee with a temporary contract (n=3,286)	1,374	41.5	[38.7-44.3]
Total (n=27,087)	12,288	46.0	[44.9-47.0]
Working hours			
Part-time (n=3,938)	1,554	40.6	[37.9-43.3]
Full-time (n=22,946)	10,660	47.3	[46.2-48.4]
Total (n=26,884)	12,214	46.1	[45.0-47.1]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,962)	5,685	49.0	[47.4-50.6]
Clerical, sales or service occupations (n=9,260)	4,044	43.7	[41.9-45.5]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,463)	2,400	44.0	[41.8-46.2]
Total (n=26,685)	12,129	46.0	[45.0-47.1]
Sector of work			
Administration and support services, including public administration and defence (NO) (n=3,557)	1,658	48.5	[45.6-51.3]
Agriculture, horticulture, forestry or fishing (A) (n=890)	403	47.1	[41.6-52.6]
Supply of gas, electricity or water, mining or quarrying (BDE) (n=604)	250	44.9	[38.2-51.8]
Manufacturing or engineering (C) (n=2,718)	1,188	43.2	[40.0-46.4]
Construction or building (F) (n=2,287)	1,011	46.2	[42.6-49.8]
Commerce, transport, accommodation or food services (GHI) (n=4,900)	2,136	43.2	[40.9-45.6]
Information and communication technology; finance; professional, scientific or technical services (JKM) (n=4,148)	1,890	47.1	[44.4-49.8]
Services relating to education (P) (n=2,025)	988	47.2	[43.3-51.0]
Services relating to health or social care (Q) (n=2,912)	1,486	51.3	[48.1-54.6]
Social, cultural, personal and any other services (RS+LTU) (n=2,498)	1,048	40.2	[36.9-43.6]
Total (n=26,539)	12,058	46.0	[45.0-47.1]

	Severe time pressure or overload of work: yes		
	Observations	Row % (weighted)	CI 95%
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,403)	7,939	45.6	[44.2-46.9]
Clients' premises (n=1,630)	760	46.2	[42.2-50.3]
A car or another vehicle (e.g. train, bus) (n=1,067)	500	47.4	[42.2-52.7]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,533)	678	46.3	[42.1-50.6]
Your own home (n=4,715)	2,080	47.1	[44.6-49.7]
Public spaces such as coffee shops, airports, etc. (n=583)	264	45.8	[39.1-52.6]
Total (n=26,931)	12,221	46.0	[44.9-47.0]
Digital work			
None (n=2,722)	1,069	37.6	[34.5-40.7]
Usual (computer, laptop, internet, etc.) (n=19,160)	8,701	46.5	[45.2-47.7]
Advanced (machines or robots & wearables) (n=5,205)	2,518	49.5	[47.1-52.0]
Total (n=27,087)	12,288	46.0	[44.9-47.0]

Table A4: Associations between socio-demographic and employment-related characteristics and the prevalence of violence or verbal abuse from customers, patients, pupils, etc. (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Violence or verbal abuse from customers, patients, pupils, etc.: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,570)	1,802	12.6	[11.7-13.5]
Female (n=12,411)	2,169	19.2	[18.0-20.5]
Total (n=26,981)	3,971	15.7	[14.9-16.4]
Age groups			
16-24 (n=2,109)	350	17.6	[14.7-20.9]
25-39 (n=9,076)	1,397	17.3	[16.0-18.7]
40-54 (n=10,632)	1,531	14.6	[13.5-15.8]
55+ (n=5,368)	733	14.4	[12.8-16.1]
Total (n=27,185)	4,011	15.7	[15.0-16.4]
Nationality			
National (n=25,262)	3,723	15.7	[14.9-16.5]
Foreign (n=1,923)	288	15.9	[12.8-19.6]
Total (n=27,185)	4,011	15.7	[15.0-16.4]
Employment status			
Self-employed (n=4,281)	502	11.8	[10.3-13.4]
Employee with a permanent contract (n=19,611)	2,939	16.3	[15.4-17.2]
Employee with a temporary contract (n=3,293)	570	17.2	[15.2-19.5]
Total (n=27,185)	4,011	15.7	[15.0-16.4]
Working hours			
Part-time (n=3,942)	677	17.3	[15.4-19.3]
Full-time (n=23,038)	3,312	15.4	[14.6-16.2]
Total (n=26,980)	3,989	15.7	[15.0-16.5]
Type of occupation			
Professional, technical or higher administrator occupations (n=12,020)	1,598	14.9	[13.8-16.1]
Clerical, sales or service occupations (n=9,284)	1,612	17.5	[16.3-18.9]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,479)	729	13.7	[12.2-15.3]
Total (n=26,783)	3,939	15.6	[14.9-16.4]
Sector of work			
Administration and support services, including public administration and defence (NO) (n=3,563)	554	16.8	[14.8-19.0]
Agriculture, horticulture, forestry or fishing (A) (n=895)	89	12.3	[9.0-16.7]
Supply of gas, electricity or water, mining or quarrying (BDE) (n=609)	49	7.6	[4.8-11.9]
Manufacturing or engineering (C) (n=2,731)	186	6.9	[5.6-8.6]
Construction or building (F) (n=2,294)	219	9.4	[7.6-11.5]
Commerce, transport, accommodation or food services (GHI) (n=4,919)	855	18.7	[16.9-20.6]
Information and communication technology; finance; professional, scientific or technical services (JKM) (n=4,170)	390	10.2	[8.7-11.9]
Services relating to education (P) (n=2,028)	385	19.7	[16.9-22.9]
Services relating to health or social care (Q) (n=2,919)	852	29.6	[26.7-32.5]

	Violence or verbal abuse from customers, patients, pupils, etc.: yes		
	Obs.	Row % (weighted)	CI 95%
Social, cultural, personal and any other services (RS+LTU) (n=2,504)	357	13.3	[11.3-15.7]
Total (n=26,632)	3,936	15.7	[15.0-16.5]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,466)	2,763	16.8	[15.8-17.8]
Clients' premises (n=1,630)	269	16.8	[14.0-20.1]
A car or another vehicle (e.g. train, bus) (n=1,070)	231	26.1	[21.6-31.1]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,541)	196	14.9	[12.1-18.2]
Your own home (n=4,735)	389	7.9	[6.7-9.3]
Public spaces such as coffee shops, airports, etc. (n=584)	140	24.9	[19.6-31.0]
Total (n=27,026)	3,988	15.7	[14.9-16.4]
Digital work			
None (n=2,731)	376	14.0	[12.0-16.4]
Usual (computer, laptop, internet, etc.) (n=19,224)	2,871	16.3	[15.4-17.2]
Advanced (machines or robots & wearables) (n=5,230)	764	14.1	[12.6-15.8]
Total (n=27,185)	4,011	15.7	[15.0-16.4]

Table A5: Associations between socio-demographic and employment-related characteristics and the prevalence of harassment or bullying at work (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Harassment or bullying: yes		
	Observations	Row % (weighted)	CI 95%
Sex			
Male (n=14,556)	893	6.2	[5.6-7.0]
Female (n=12,397)	975	8.5	[7.6-9.4]
Total (n=26,953)	1,868	7.3	[6.7-7.8]
Age groups			
16-24 (n=2,108)	145	6.9	[5.3-9.0]
25-39 (n=9,073)	623	6.8	[6.0-7.7]
40-54 (n=10,617)	744	7.5	[6.7-8.5]
55+ (n=5,356)	383	7.9	[6.6-9.3]
Total (n=27,154)	1,895	7.3	[6.8-7.9]
Nationality			
National (n=25,241)	1,731	7.1	[6.6-7.7]
Foreign (n=1,913)	164	10.7	[8.1-14.0]
Total (n=27,154)	1,895	7.3	[6.8-7.9]
Employment status			
Self-employed (n=4,270)	224	4.3	[3.4-5.3]
Employee with a permanent contract (n=19,598)	1,385	7.7	[7.1-8.4]
Employee with a temporary contract (n=3,286)	286	8.9	[7.4-10.6]
Total (n=27,154)	1,895	7.3	[6.8-7.9]
Working hours			
Part-time (n=3,932)	304	8.6	[7.2-10.3]
Full-time (n=23,017)	1,579	7.1	[6.5-7.7]
Total (n=26,949)	1,883	7.4	[6.8-7.9]
Type of occupation			
Professional, technical or higher administrator occupations (n=12,004)	747	6.9	[6.1-7.8]
Clerical, sales or service occupations (n=9,279)	697	7.6	[6.7-8.6]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,467)	416	7.4	[6.4-8.7]
Total (n=26,750)	1,860	7.3	[6.7-7.8]
Sector of work			
Administration and support services, including public administration and defence (NO) (n=3,553)	270	8.7	[7.2-10.4]
Agriculture, horticulture, forestry or fishing (A) (n=897)	58	7.8	[5.1-11.8]
Supply of gas, electricity or water, mining or quarrying (BDE) (n=611)	36	6.0	[3.6-10.0]
Manufacturing or engineering (C) (n=2,733)	147	6.3	[4.8-8.2]
Construction or building (F) (n=2,288)	138	5.8	[4.3-7.7]
Commerce, transport, accommodation or food services (GHI) (n=4,913)	327	7.1	[5.9-8.5]
Information and communication technology; finance; professional, scientific or technical services (JKM) (n=4,161)	208	4.4	[3.5-5.5]
Services relating to education (P) (n=2,029)	171	8.7	[6.8-11.0]

	Harassment or bullying: yes		
	Observations	Row % (weighted)	CI 95%
Services relating to health or social care (Q) (n=2,914)	317	10.3	[8.5-12.3]
Social, cultural, personal and any other services (RS+LTU) (n=2,503)	184	7.0	[5.5-9.0]
Total (n=26,602)	1,856	7.3	[6.8-7.9]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,449)	1,256	7.5	[6.9-8.3]
Clients' premises (n=1,627)	135	7.8	[5.9-10.3]
A car or another vehicle (e.g. train, bus) (n=1,071)	96	12.3	[9.0-16.5]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,538)	108	7.3	[5.3-9.9]
Your own home (n=4,728)	214	4.4	[3.6-5.5]
Public spaces such as coffee shops, airports, etc. (n=584)	73	12.0	[8.4-16.8]
Total (n=26,997)	1,882	7.3	[6.8-7.8]
Digital work			
None (n=2,725)	194	6.5	[5.1-8.3]
Usual (computer, laptop, internet, etc.) (n=19,203)	1,314	7.2	[6.6-7.9]
Advanced (machines or robots & wearables) (n=5,226)	387	8.3	[7.0-9.8]
Total (n=27,154)	1,895	7.3	[6.8-7.9]

Table A6: Associations between socio-demographic and employment-related characteristics and the prevalence of poor communication or cooperation within the organisation (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Poor communication or cooperation within the organisation: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,474)	3,894	25.5	[24.3-26.7]
Female (n=12,322)	3,297	27.4	[26.0-28.8]
Total (n=26,796)	7,191	26.4	[25.5-27.3]
Age groups			
16-24 (n=2,100)	512	22.6	[19.6-26.0]
25-39 (n=9,031)	2,534	28.3	[26.8-29.9]
40-54 (n=10,554)	2,896	27.1	[25.7-28.6]
55+ (n=5,310)	1,303	23.4	[21.4-25.5]
Total (n=26,995)	7,245	26.4	[25.5-27.3]
Nationality			
National (n=25,081)	6,750	26.3	[25.4-27.3]
Foreign (n=1,914)	495	27.1	[23.3-31.2]
Total (n=26,995)	7,245	26.4	[25.5-27.3]
Employment status			
Self-employed (n=4,233)	784	15.0	[13.4-16.7]
Employee with a permanent contract (n=19,477)	5,515	28.7	[27.6-29.9]
Employee with a temporary contract (n=3,285)	946	28.1	[25.6-30.7]
Total (n=26,995)	7,245	26.4	[25.5-27.3]
Working hours			
Part-time (n=3,911)	999	25.8	[23.5-28.3]
Full-time (n=22,888)	6,195	26.6	[25.6-27.6]
Total (n=26,799)	7,194	26.4	[25.5-27.3]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,936)	3,173	25.9	[24.5-27.3]
Clerical, sales or service occupations (n=9,226)	2,464	26.2	[24.7-27.8]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,436)	1,492	27.7	[25.7-29.7]
Total (n=26,598)	7,129	26.4	[25.5-27.3]
Sector of work			
Administration and support services, including public administration and defence (NO) (n=3,538)	1,022	27.6	[25.1-30.2]
Agriculture, horticulture, forestry or fishing (A) (n=884)	203	24.5	[19.8-29.9]
Supply of gas, electricity or water, mining or quarrying (BDE) (n=603)	166	25.8	[20.4-32.0]
Manufacturing or engineering (C) (n=2,716)	777	29.1	[26.2-32.1]
Construction or building (F) (n=2,281)	584	24.9	[22.0-28.0]
Commerce, transport, accommodation or food services (GHI) (n=4,885)	1,242	24.9	[22.8-27.0]
Information and communication technology; finance; professional, scientific or technical services (JKM) (n=4,155)	1,051	24.4	[22.3-26.7]
Services relating to education (P) (n=2,010)	524	25.4	[22.3-28.8]

	Poor communication or cooperation within the organisation: yes		
	Obs.	Row % (weighted)	CI 95%
Services relating to health or social care (Q) (n=2,895)	931	32.5	[29.5-35.6]
Social, cultural, personal and any other services (RS+LTU) (n=2,481)	608	23.0	[20.3-26.0]
Total (n=26,448)	7,108	26.5	[25.5-27.4]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,353)	4,708	27.5	[26.4-28.7]
Clients' premises (n=1,621)	435	25.3	[22.0-28.9]
A car or another vehicle (e.g. train, bus) (n=1,065)	297	26.3	[22.1-30.9]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,523)	402	25.6	[22.0-29.7]
Your own home (n=4,696)	1,195	22.6	[20.6-24.7]
Public spaces such as coffee shops, airports, etc. (n=581)	167	26.7	[21.4-32.7]
Total (n=26,839)	7,204	26.4	[25.5-27.3]
Digital work			
None (n=2,708)	629	24.0	[21.3-26.9]
Usual (computer, laptop, internet, etc.) (n=19,093)	5,243	26.8	[25.7-27.9]
Advanced (machines or robots & wearables) (n=5,194)	1,373	26.3	[24.2-28.4]
Total (n=26,995)	7,245	26.4	[25.5-27.3]

Table A7: Associations between socio-demographic and employment-related characteristics and the prevalence of lack of autonomy, or lack of influence over the work pace or work processes (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Lack of autonomy: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,418)	2,289	16.5	[15.5-17.6]
Female (n=12,264)	2,143	19.1	[17.9-20.5]
Total (n=26,682)	4,432	17.7	[16.9-18.6]
Age groups			
16-24 (n=2,090)	320	14.1	[11.5-17.2]
25-39 (n=8,983)	1,452	17.5	[16.2-18.9]
40-54 (n=10,522)	1,835	18.8	[17.5-20.2]
55+ (n=5,285)	859	17.4	[15.6-19.4]
Total (n=26,880)	4,466	17.7	[16.9-18.6]
Nationality			
National (n=24,990)	4,102	17.3	[16.5-18.2]
Foreign (n=1,890)	364	24.1	[20.2-28.6]
Total (n=26,880)	4,466	17.7	[16.9-18.6]
Employment status			
Self-employed (n=4,230)	499	11.8	[10.3-13.5]
Employee with a permanent contract (n=19,395)	3,371	19.1	[18.1-20.1]
Employee with a temporary contract (n=3,255)	596	18.1	[16.0-20.5]
Total (n=26,880)	4,466	17.7	[16.9-18.6]
Working hours			
Part-time (n=3,899)	697	19.8	[17.7-22.0]
Full-time (n=22,783)	3,741	17.3	[16.4-18.2]
Total (n=26,682)	4,438	17.7	[16.9-18.6]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,904)	1,897	16.8	[15.6-18.1]
Clerical, sales or service occupations (n=9,191)	1,558	18.4	[17.0-19.9]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,388)	938	18.4	[16.7-20.3]
Total (n=26,483)	4,393	17.7	[16.9-18.6]
Sector of work			
Administration and support services, including public administration and defence (NO) (n=3,518)	641	19.5	[17.3-22.0]
Agriculture, horticulture, forestry or fishing (A) (n=880)	108	14.9	[11.1-19.9]
Supply of gas, electricity or water, mining or quarrying (BDE) (n=600)	107	20.4	[15.2-26.7]
Manufacturing or engineering (C) (n=2,691)	450	16.7	[14.4-19.2]
Construction or building (F) (n=2,271)	329	16.3	[13.7-19.3]
Commerce, transport, accommodation or food services (GHI) (n=4,863)	770	15.6	[14.0-17.4]
Information and communication technology; finance; professional, scientific or technical services (JKM) (n=4,140)	611	15.5	[13.6-17.5]
Services relating to education (P) (n=2,010)	369	20.5	[17.5-23.8]

	Lack of autonomy: yes		
	Obs.	Row % (weighted)	CI 95%
Services relating to health or social care (Q) (n=2,884)	605	22.7	[19.9-25.6]
Social, cultural, personal and any other services (RS+LTU) (n=2,480)	380	16.0	[13.6-18.8]
Total (n=26,337)	4,370	17.7	[16.9-18.6]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,281)	2,969	18.3	[17.3-19.4]
Clients' premises (n=1,617)	274	19.4	[16.2-23.1]
A car or another vehicle (e.g. train, bus) (n=1,058)	196	20.9	[16.8-25.6]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,503)	234	15.2	[12.2-18.8]
Your own home (n=4,692)	648	14.5	[12.9-16.4]
Public spaces such as coffee shops, airports, etc. (n=576)	120	20.2	[15.4-26.1]
Total (n=26,727)	4,441	17.7	[16.9-18.5]
Digital work			
None (n=2,670)	423	17.3	[14.9-20.1]
Usual (computer, laptop, internet, etc.) (n=19,032)	3,155	17.2	[16.3-18.1]
Advanced (machines or robots & wearables) (n=5,178)	888	20.4	[18.4-22.6]
Total (n=26,880)	4,466	17.7	[16.9-18.6]

Table A8: Associations between socio-demographic and employment-related characteristics and the prevalence of workers who report that the use of digital technologies increases workload (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Use of digital technologies increases workload: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,255)	4,621	32.9	[31.6-34.2]
Female (n=12,145)	4,144	34.3	[32.8-35.9]
Total (n=26,400)	8,765	33.6	[32.6-34.6]
Age groups			
16-24 (n=2,055)	630	26.7	[23.4-30.3]
25-39 (n=8,895)	2,849	32.7	[31.0-34.4]
40-54 (n=10,410)	3,519	34.5	[32.9-36.1]
55+ (n=5,229)	1,838	35.9	[33.6-38.3]
Total (n=26,589)	8,836	33.6	[32.6-34.6]
Nationality			
National (n=24,738)	8,195	33.5	[32.5-34.6]
Foreign (n=1,851)	641	34.8	[30.4-39.4]
Total (n=26,589)	8,836	33.6	[32.6-34.6]
Employment status			
Self-employed (n=4,179)	1,360	31.7	[29.4-34.1]
Employee with a permanent contract (n=19,221)	6,453	34.7	[33.5-35.9]
Employee with a temporary contract (n=3,189)	1,023	30.6	[28.0-33.4]
Total (n=26,589)	8,836	33.6	[32.6-34.6]
Working hours			
Part-time (n=3,844)	1,172	28.7	[26.3-31.3]
Full-time (n=22,551)	7,611	34.7	[33.7-35.8]
Total (n=26,395)	8,783	33.6	[32.6-34.7]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,787)	4,125	36.1	[34.5-37.6]
Clerical, sales or service occupations (n=9,117)	2,989	34.0	[32.2-35.7]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,292)	1,617	28.6	[26.7-30.7]
Total (n=26,196)	8,731	33.8	[32.8-34.8]
Sector of work			
Administration and support services, including public administration and defence (NO) (n=3,488)	1,226	37.8	[35.0-40.7]
Agriculture, horticulture, forestry or fishing (A) (n=876)	247	28.3	[23.6-33.5]
Supply of gas, electricity or water, mining or quarrying (BDE) (n=599)	218	34.6	[28.4-41.4]
Manufacturing or engineering (C) (n=2,667)	825	32.0	[29.0-35.1]
Construction or building (F) (n=2,233)	649	31.1	[27.8-34.7]
Commerce, transport, accommodation or food services (GHI) (n=4,814)	1,543	30.2	[28.1-32.5]
Information and communication technology; finance; professional, scientific or technical services (JKM) (n=4,083)	1,349	33.4	[30.9-36.0]
Services relating to education (P) (n=1,988)	785	40.4	[36.6-44.2]

	Use of digital technologies increases workload: yes		
	Obs.	Row % (weighted)	CI 95%
Services relating to health or social care (Q) (n=2,853)	1,079	37.7	[34.6-40.9]
Social, cultural, personal and any other services (RS+LTU) (n=2,455)	750	29.3	[26.3-32.6]
Total (n=26,056)	8,671	33.8	[32.8-34.8]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,116)	5,776	33.9	[32.7-35.2]
Clients' premises (n=1,585)	530	34.2	[30.4-38.2]
A car or another vehicle (e.g. train, bus) (n=1,049)	355	32.8	[28.1-37.9]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,491)	451	27.8	[24.2-31.8]
Your own home (n=4,624)	1,468	34.0	[31.6-36.5]
Public spaces such as coffee shops, airports, etc. (n=573)	208	34.2	[28.3-40.7]
Total (n=26,438)	8,788	33.6	[32.6-34.6]
Digital work			
None (n=2,566)	564	19.6	[17.1-22.3]
Usual (computer, laptop, internet, etc.) (n=18,877)	6,393	34.6	[33.4-35.8]
Advanced (machines or robots & wearables) (n=5,146)	1,879	38.5	[36.1-40.9]
Total (n=26,589)	8,836	33.6	[32.6-34.6]

Table A9: Associations between socio-demographic and employment-related characteristics and the prevalence of workers who report that use of digital technologies reduces autonomy at work (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Use of digital technologies reduces autonomy at work: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,230)	3,030	20.8	[19.7-22.0]
Female (n=12,069)	2,454	18.6	[17.4-19.9]
Total (n=26,299)	5,484	19.8	[19.0-20.7]
Age groups			
16-24 (n=2,051)	478	25.5	[22.0-29.4]
25-39 (n=8,892)	1,861	19.3	[18.0-20.7]
40-54 (n=10,353)	2,144	19.2	[17.9-20.5]
55+ (n=5,197)	1,059	20.0	[18.1-22.1]
Total (n=26,493)	5,542	19.9	[19.1-20.7]
Nationality			
National (n=24,636)	5,066	19.6	[18.8-20.5]
Foreign (n=1,857)	476	23.9	[20.1-28.1]
Total (n=26,493)	5,542	19.9	[19.1-20.7]
Employment status			
Self-employed (n=4,155)	896	19.7	[17.8-21.8]
Employee with a permanent contract (n=19,131)	3,952	19.4	[18.4-20.4]
Employee with a temporary contract (n=3,207)	694	22.4	[20.0-24.9]
Total (n=26,493)	5,542	19.9	[19.1-20.7]
Working hours			
Part-time (n=3,827)	786	20.8	[18.5-23.2]
Full-time (n=22,481)	4,720	19.7	[18.8-20.6]
Total (n=26,308)	5,506	19.9	[19.1-20.7]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,758)	2,370	19.0	[17.8-20.3]
Clerical, sales or service occupations (n=9,067)	1,939	20.8	[19.4-22.3]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,274)	1,162	20.3	[18.6-22.2]
Total (n=26,099)	5,471	19.9	[19.1-20.8]
Sector of work			
Administration and support services, including public administration and defence (NO) (n=3,492)	690	18.9	[16.8-21.3]
Agriculture, horticulture, forestry or fishing (A) (n=875)	209	23.8	[19.3-29.1]
Supply of gas, electricity or water, mining or quarrying (BDE) (n=588)	142	23.5	[18.3-29.8]
Manufacturing or engineering (C) (n=2,643)	583	20.1	[17.7-22.7]
Construction or building (F) (n=2,230)	465	21.3	[18.4-24.5]
Commerce, transport, accommodation or food services (GHI) (n=4,779)	1,157	21.2	[19.3-23.2]
Information and communication technology; finance; professional, scientific or technical services (JKM) (n=4,098)	779	19.1	[17.1-21.2]
Services relating to education (P) (n=1,983)	350	17.0	[14.3-20.1]
Services relating to health or social care (Q) (n=2,823)	591	20.4	[17.8-23.3]
Social, cultural, personal and any other services (RS+LTU) (n=2,444)	462	18.3	[15.8-21.2]
Total (n=25,955)	5,428	19.9	[19.1-20.7]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,020)	3,617	20.4	[19.4-21.5]
Clients' premises (n=1,583)	336	20.6	[17.6-24.0]
A car or another vehicle (e.g. train, bus) (n=1,034)	267	19.4	[15.8-23.5]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,487)	328	21.2	[17.9-24.9]
Your own home (n=4,653)	815	17.0	[15.1-19.0]

	Use of digital technologies reduces autonomy at work: yes		
	Obs.	Row % (weighted)	CI 95%
Public spaces such as coffee shops, airports, etc. (n=568)	145	22.4	[17.6-28.0]
Total (n=26,345)	5,508	19.9	[19.1-20.7]
Digital work			
None (n=2,566)	454	14.3	[12.1-16.7]
Usual (computer, laptop, internet, etc.) (n=18,795)	3,869	19.8	[18.9-20.8]
Advanced (machines or robots & wearables) (n=5,132)	1,219	23.8	[21.8-26.0]
Total (n=26,493)	5,542	19.9	[19.1-20.7]

Table A10: Associations between socio-demographic and employment-related characteristics and the prevalence of workers who feel comfortable to speak with manager about mental health (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

		Feeling comfortable to speak with manager about mental health: yes	
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=13,876)	9,372	62.4	[61.0-63.8]
Female (n=11,977)	8,000	61.0	[59.4-62.6]
Total (n=25,853)	17,372	61.7	[60.7-62.8]
Age groups			
16-24 (n=2,063)	1,434	64.5	[60.4-68.4]
25-39 (n=8,805)	6,057	63.5	[61.7-65.2]
40-54 (n=10,160)	6,773	60.7	[59.1-62.4]
55+ (n=5,018)	3,220	59.6	[57.0-62.1]
Total (n=26,046)	17,484	61.7	[60.6-62.8]
Foreigner			
Not foreigner (n=24,206)	16,237	61.8	[60.7-62.9]
Foreigner (n=1,840)	1,247	59.6	[54.9-64.2]
Total (n=26,046)	17,484	61.7	[60.6-62.8]
Employment status			
Self-employed (n=3,629)	2,302	57.9	[55.1-60.7]
Employee with a permanent contract (n=19,201)	13,083	62.9	[61.6-64.1]
Employee with a temporary contract (n=3,216)	2,099	59.9	[57.0-62.7]
Total (n=26,046)	17,484	61.7	[60.6-62.8]
Working hours			
Part-time (n=3,749)	2,477	60.7	[57.9-63.4]
Full-time (n=22,128)	14,907	62.0	[60.8-63.1]
Total (n=25,877)	17,384	61.7	[60.7-62.8]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,510)	7,852	63.2	[61.6-64.8]
Clerical, sales or service occupations (n=8,921)	5,977	60.9	[59.1-62.7]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,239)	3,414	60.3	[58.1-62.6]
Total (n=25,670)	17,243	61.8	[60.7-62.8]
Sector of work			
Administration and support services, including public administration and defence (NO) (n=3,439)	2,280	61.4	[58.4-64.2]
Agriculture, horticulture, forestry or fishing (A) (n=816)	527	57.5	[51.7-63.2]
Supply of gas, electricity or water, mining or quarrying (BDE) (n=598)	408	62.2	[55.0-68.8]
Manufacturing or engineering (C) (n=2,644)	1,789	63.6	[60.4-66.8]
Construction or building (F) (n=2,177)	1,443	60.9	[57.2-64.5]
Commerce, transport, accommodation or food services (GHI) (n=4,697)	3,140	62.2	[59.7-64.6]
Information and communication technology; finance; professional, scientific or technical services (JKM) (n=4,023)	2,775	64.4	[61.7-67.0]
Services relating to education (P) (n=1,969)	1,322	62.2	[58.3-66.0]

	Feeling comfortable to speak with manager about mental health: yes		
	Obs.	Row % (weighted)	CI 95%
Services relating to health or social care (Q) (n=2,817)	1,899	62.0	[58.7-65.2]
Social, cultural, personal and any other services (RS+LTU) (n=2,352)	1,576	57.8	[54.1-61.4]
Total (n=25,532)	17,159	61.8	[60.8-62.9]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=16,796)	11,230	61.3	[60.0-62.7]
Clients' premises (n=1,544)	1,020	61.6	[57.2-65.8]
A car or another vehicle (e.g. train, bus) (n=1,027)	656	60.0	[54.5-65.2]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,454)	945	60.3	[55.9-64.6]
Your own home (n=4,525)	3,170	64.6	[62.1-67.1]
Public spaces such as coffee shops, airports, etc. (n=561)	371	58.1	[51.0-64.9]
Total (n=25,907)	17,392	61.7	[60.7-62.8]
Digital work			
None (n=2,612)	1,656	58.9	[55.6-62.1]
Usual (computer, laptop, internet, etc.) (n=18,438)	12,388	62.0	[60.8-63.3]
Advanced (machines or robots & wearables) (n=4,996)	3,440	62.3	[59.8-64.8]
Total (n=26,046)	17,484	61.7	[60.6-62.8]

Table A11: Associations between socio-demographic and employment-related characteristics and the prevalence of workers who received information and training on wellbeing and coping with stress (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Information and training on wellbeing and coping with stress: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,348)	6,170	43.1	[41.7-44.5]
Female (n=12,223)	5,593	43.5	[41.9-45.1]
Total (n=26,571)	11,763	43.3	[42.2-44.3]
Age groups			
16-24 (n=2,070)	891	42.1	[38.1-46.2]
25-39 (n=8,932)	3,974	43.4	[41.6-45.2]
40-54 (n=10,479)	4,677	43.2	[41.5-44.8]
55+ (n=5,289)	2,298	43.6	[41.2-46.1]
Total (n=26,770)	11,840	43.3	[42.2-44.3]
Nationality			
National (n=24,887)	10,964	43.2	[42.1-44.3]
Foreign (n=1,883)	876	44.1	[39.6-48.8]
Total (n=26,770)	11,840	43.3	[42.2-44.3]
Employment status			
Self-employed (n=4,220)	1,286	28.7	[26.4-31.1]
Employee with a permanent contract (n=19,345)	9,176	47.1	[45.9-48.4]
Employee with a temporary contract (n=3,205)	1,378	41.2	[38.4-44.1]
Total (n=26,770)	11,840	43.3	[42.2-44.3]
Working hours			
Part-time (n=3,865)	1,522	40.0	[37.3-42.8]
Full-time (n=22,710)	10,258	44.1	[43.0-45.2]
Total (n=26,575)	11,780	43.4	[42.3-44.4]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,855)	5,841	48.8	[47.2-50.4]
Clerical, sales or service occupations (n=9,175)	3,882	41.0	[39.2-42.8]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,348)	1,943	35.5	[33.4-37.7]
Total (n=26,378)	11,666	43.2	[42.2-44.3]
Sector of work			
Administration and support services, including public administration and defence (n=3,509)	1,795	48.7	[45.8-51.6]
Agriculture, horticulture, forestry or fishing (n=883)	289	31.5	[26.4-36.9]
Supply of gas, electricity or water, mining or quarrying (n=602)	306	53.7	[46.9-60.4]
Manufacturing or engineering (n=2,680)	1,196	48.2	[45.0-51.5]
Construction or building (n=2,266)	731	30.4	[27.2-33.7]
Commerce, transport, accommodation or food services (n=4,847)	1,764	34.1	[31.8-36.4]
Information and communication technology; finance; professional, scientific or technical services (n=4,118)	2,187	52.0	[49.3-54.7]
Services relating to education (n=1,994)	961	44.8	[40.9-48.7]
Services relating to health or social care (n=2,876)	1,479	51.6	[48.3-54.8]

	Information and training on wellbeing and coping with stress: yes		
	Obs.	Row % (weighted)	CI 95%
Social, cultural, personal and any other services (n=2,460)	907	33.1	[29.9-36.5]
Total (n=26,235)	11,615	43.3	[42.2-44.3]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,203)	7,416	42.3	[41.0-43.6]
Clients' premises (n=1,604)	612	39.3	[35.2-43.4]
A car or another vehicle (e.g. train, bus) (n=1,053)	358	32.1	[27.4-37.3]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,513)	516	34.9	[30.9-39.1]
Your own home (n=4,669)	2,652	55.1	[52.6-57.7]
Public spaces such as coffee shops, airports, etc. (n=575)	226	31.1	[25.5-37.4]
Total (n=26,617)	11,780	43.3	[42.2-44.3]
Digital work			
None (n=2,659)	835	29.5	[26.6-32.6]
Usual (computer, laptop, internet, etc.) (n=18,943)	8,418	44.0	[42.7-45.2]
Advanced (machines or robots & wearables) (n=5,168)	2,587	49.5	[47.0-51.9]
Total (n=26,770)	11,840	43.3	[42.2-44.3]

Table A12: Associations between socio-demographic and employment-related characteristics and the prevalence of workers who work in organisation that consults workers about stressful aspects of work (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Consultation of workers about stressful aspects of work: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,305)	6,262	44.7	[43.3-46.1]
Female (n=12,167)	5,321	43.5	[41.9-45.1]
Total (n=26,472)	11,583	44.1	[43.1-45.2]
Age groups			
16-24 (n=2,049)	928	49.2	[45.1-53.3]
25-39 (n=8,907)	3,942	44.7	[42.9-46.5]
40-54 (n=10,443)	4,522	42.6	[40.9-44.2]
55+ (n=5,273)	2,256	43.9	[41.5-46.4]
Total (n=26,672)	11,648	44.0	[43.0-45.1]
Nationality			
National (n=24,796)	10,797	43.8	[42.8-44.9]
Foreign (n=1,876)	851	47.7	[43.1-52.4]
Total (n=26,672)	11,648	44.0	[43.0-45.1]
Employment status			
Self-employed (n=4,201)	1,369	31.9	[29.5-34.4]
Employee with a permanent contract (n=19,280)	8,874	47.0	[45.8-48.2]
Employee with a temporary contract (n=3,191)	1,405	43.7	[40.8-46.7]
Total (n=26,672)	11,648	44.0	[43.0-45.1]
Working hours			
Part-time (n=3,838)	1,604	45.8	[43.0-48.5]
Full-time (n=22,640)	9,979	43.8	[42.7-44.9]
Total (n=26,478)	11,583	44.2	[43.1-45.2]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,820)	5,616	48.5	[46.9-50.1]
Clerical, sales or service occupations (n=9,124)	3,909	43.4	[41.6-45.2]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,336)	1,955	36.4	[34.2-38.6]
Total (n=26,280)	11,480	44.2	[43.1-45.2]
Sector of work			
Administration and support services, including public administration and defence (n=3,507)	1,664	45.3	[42.4-48.2]
Agriculture, horticulture, forestry or fishing (n=873)	292	32.9	[27.9-38.3]
Supply of gas, electricity or water, mining or quarrying (n=599)	299	52.2	[45.4-59.0]
Manufacturing or engineering (n=2,690)	1,187	47.9	[44.6-51.2]
Construction or building (n=2,248)	770	34.6	[31.2-38.1]
Commerce, transport, accommodation or food services (n=4,823)	1,864	36.3	[34.0-38.7]
Information and communication technology; finance; professional, scientific or technical services (n=4,095)	2,085	51.8	[49.1-54.5]
Services relating to education (n=1,996)	880	44.2	[40.4-48.1]
Services relating to health or social care (n=2,861)	1,443	52.7	[49.5-55.9]

	Consultation of workers about stressful aspects of work: yes		
	Obs.	Row % (weighted)	CI 95%
Social, cultural, personal and any other services (n=2,447)	935	38.7	[35.3-42.2]
Total (n=26,139)	11,419	44.1	[43.0-45.1]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,158)	7,419	44.0	[42.8-45.3]
Clients' premises (n=1,600)	642	39.8	[35.8-43.9]
A car or another vehicle (e.g. train, bus) (n=1,049)	374	35.2	[30.1-40.5]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,504)	529	35.1	[31.1-39.2]
Your own home (n=4,640)	2,373	51.7	[49.1-54.2]
Public spaces such as coffee shops, airports, etc. (n=572)	257	36.8	[30.7-43.3]
Total (n=26,523)	11,594	44.1	[43.1-45.1]
Digital work			
None (n=2,648)	868	32.7	[29.6-35.8]
Usual (computer, laptop, internet, etc.) (n=18,866)	8,241	44.5	[43.3-45.7]
Advanced (machines or robots & wearables) (n=5,158)	2,539	49.7	[47.3-52.2]
Total (n=26,672)	11,648	44.0	[43.0-45.1]

Table A13: Associations between socio-demographic and employment-related characteristics and the prevalence of workers who work in organisation where safety problems are addressed promptly (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Safety problems are addressed promptly: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,199)	12,431	86.1	[85.1-87.1]
Female (n=12,045)	10,280	81.6	[80.3-82.9]
Total (n=26,244)	22,711	84.1	[83.2-84.8]
Age groups			
16-24 (n=2,048)	1,766	84.7	[81.5-87.5]
25-39 (n=8,839)	7,655	83.3	[81.9-84.7]
40-54 (n=10,354)	8,933	83.9	[82.6-85.2]
55+ (n=5,198)	4,515	85.1	[83.2-86.8]
Total (n=26,439)	22,869	84.0	[83.2-84.8]
Nationality			
National (n=24,578)	21,268	84.0	[83.2-84.9]
Foreign (n=1,861)	1,601	83.6	[79.8-86.9]
Total (n=26,439)	22,869	84.0	[83.2-84.8]
Employment status			
Self-employed (n=4,067)	3,699	90.5	[88.8-92.0]
Employee with a permanent contract (n=19,201)	16,490	83.1	[82.1-84.0]
Employee with a temporary contract (n=3,171)	2,680	81.5	[79.0-83.7]
Total (n=26,439)	22,869	84.0	[83.2-84.8]
Working hours			
Part-time (n=3,777)	3,233	82.5	[80.3-84.6]
Full-time (n=22,476)	19,478	84.3	[83.4-85.2]
Total (n=26,253)	22,711	84.0	[83.2-84.8]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,661)	10,155	84.3	[83.0-85.5]
Clerical, sales or service occupations (n=9,036)	7,826	84.2	[82.8-85.6]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,352)	4,555	83.5	[81.7-85.1]
Total (n=26,049)	22,536	84.1	[83.3-84.9]
Sector of work			
Administration and support services, including public administration and defence (n=3,461)	2,944	80.1	[77.5-82.5]
Agriculture, horticulture, forestry or fishing (n=882)	782	88.5	[84.2-91.7]
Supply of gas, electricity or water, mining or quarrying (n=601)	530	90.8	[86.5-93.8]
Manufacturing or engineering (n=2,690)	2,364	86.4	[84.0-88.6]
Construction or building (n=2,242)	1,973	86.7	[83.9-89.1]
Commerce, transport, accommodation or food services (n=4,803)	4,207	85.1	[83.3-86.9]

	Safety problems are addressed promptly: yes		
	Obs.	Row % (weighted)	CI 95%
Information and communication technology; finance; professional, scientific or technical services (n=4,012)	3,577	87.7	[85.7-89.4]
Services relating to education (n=1,966)	1,640	78.7	[75.2-81.9]
Services relating to health or social care (n=2,846)	2,345	80.4	[77.6-82.9]
Social, cultural, personal and any other services (n=2,408)	2,052	83.5	[80.6-86.0]
Total (n=25,911)	22,414	84.0	[83.2-84.8]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,078)	14,666	82.9	[81.8-83.9]
Clients' premises (n=1,569)	1,349	85.4	[82.0-88.2]
A car or another vehicle (e.g. train, bus) (n=1,056)	886	82.6	[78.2-86.2]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,512)	1,314	85.9	[82.4-88.8]
Your own home (n=4,506)	4,047	87.9	[86.0-89.5]
Public spaces such as coffee shops, airports, etc. (n=566)	478	84.2	[78.4-88.6]
Total (n=26,287)	22,740	84.0	[83.2-84.8]
Digital work			
None (n=2,654)	2,220	79.9	[77.1-82.5]
Usual (computer, laptop, internet, etc.) (n=18,665)	16,117	83.9	[82.9-84.8]
Advanced (machines or robots & wearables) (n=5,120)	4,532	87.3	[85.5-88.9]
Total (n=26,439)	22,869	84.0	[83.2-84.8]

Table A14: Associations between socio-demographic and employment-related characteristics and the prevalence of workers who work at a workplace where good measures to protect health are present (n= number of observations; CI= 95% confidence interval) (EU-27, IS and NO)

	Good measures to protect health: yes		
	Obs.	Row % (weighted)	CI 95%
Sex			
Male (n=14,304)	12,387	85.8	[84.7-86.8]
Female (n=12,153)	10,139	81.3	[79.9-82.5]
Total (n=26,457)	22,526	83.7	[82.9-84.5]
Age groups			
16-24 (n=2,082)	1,756	83.2	[79.9-86.1]
25-39 (n=8,916)	7,598	83.8	[82.4-85.1]
40-54 (n=10,437)	8,891	83.7	[82.3-84.9]
55+ (n=5,220)	4,445	83.6	[81.7-85.4]
Total (n=26,655)	22,690	83.7	[82.8-84.4]
Nationality			
National (n=24,769)	21,063	83.6	[82.8-84.5]
Foreign (n=1,886)	1,627	83.9	[80.0-87.1]
Total (n=26,655)	22,690	83.7	[82.8-84.4]
Employment status			
Self-employed (n=4,076)	3,576	87.9	[86.0-89.5]
Employee with a permanent contract (n=19,357)	16,435	83.2	[82.2-84.2]
Employee with a temporary contract (n=3,222)	2,679	81.1	[78.7-83.3]
Total (n=26,655)	22,690	83.7	[82.8-84.4]
Working hours			
Part-time (n=3,819)	3,165	80.9	[78.6-83.0]
Full-time (n=22,645)	19,373	84.3	[83.4-85.2]
Total (n=26,464)	22,538	83.7	[82.9-84.5]
Type of occupation			
Professional, technical or higher administrator occupations (n=11,779)	10,109	83.5	[82.2-84.7]
Clerical, sales or service occupations (n=9,094)	7,712	83.6	[82.1-84.9]
Skilled, semi-skilled or unskilled workers (incl. farm workers) (n=5,391)	4,550	84.6	[82.9-86.1]
Total (n=26,264)	22,371	83.7	[82.9-84.5]
Sector of work			
Administration and support services, including public administration and defence (n=3,499)	2,984	83.9	[81.6-85.9]
Agriculture, horticulture, forestry or fishing (n=881)	758	84.9	[79.9-88.8]
Supply of gas, electricity or water, mining or quarrying (n=602)	543	89.9	[84.9-93.4]
Manufacturing or engineering (n=2,702)	2,371	85.9	[83.3-88.2]
Construction or building (n=2,260)	1,956	86.1	[83.1-88.6]
Commerce, transport, accommodation or food services (n=4,833)	4,094	83.2	[81.3-85.0]

	Good measures to protect health: yes		
	Obs.	Row % (weighted)	CI 95%
Information and communication technology; finance; professional, scientific or technical services (n=4,081)	3,588	88.0	[86.2-89.7]
Services relating to education (n=1,979)	1,557	73.5	[69.8-77.0]
Services relating to health or social care (n=2,861)	2,378	83.0	[80.5-85.2]
Social, cultural, personal and any other services (n=2,419)	1,992	80.1	[77.0-82.9]
Total (n=26,117)	22,221	83.6	[82.8-84.4]
Location of work			
Your employer's/your own business' premises (office, factory, shop, school, etc.) (n=17,195)	14,550	83.2	[82.1-84.2]
Clients' premises (n=1,596)	1,363	82.6	[79.0-85.7]
A car or another vehicle (e.g. train, bus) (n=1,050)	862	80.1	[75.4-84.0]
An outside site (e.g. construction site, agricultural field, streets of a city) (n=1,512)	1,291	84.5	[80.9-87.6]
Your own home (n=4,579)	4,032	86.8	[84.9-88.5]
Public spaces such as coffee shops, airports, etc. (n=570)	466	82.8	[77.4-87.1]
Total (n=26,502)	22,564	83.7	[82.9-84.5]
Digital work			
None (n=2,661)	2,198	80.2	[77.3-82.8]
Usual (computer, laptop, internet, etc.) (n=18,842)	15,973	83.3	[82.4-84.3]
Advanced (machines or robots & wearables) (n=5,152)	4,519	87.4	[85.7-89.0]
Total (n=26,655)	22,690	83.7	[82.8-84.4]

Table A15: Weighted percentage of EWCS (2010, 2015 and EWCTS 2021)* and LWCOVID-19 (Rounds 1–3 and 5)* survey respondents working in free time to meet work demands by sector (EU-27)

	Worked in free time to meet work demands: yes						
	EWCS 2010 (N=32,249)	**EWCS 2015** (N=31,004)	**EWCTS 2021** (N=58,306)	**COVID-19 2020 April–June** (N=44,621)	**COVID-19 2020 June–July** (N=14,436)	**COVID-19 2021 February–March** (N=26,020)	**COVID-19 2022 March–May** (N=21,354)
Sector of work	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)
Administration and support services, incl. public admin. and defence	9.8 [8.1-11.4] (3,233)	5.1 [3.9-6.2] (3,505)	13.5 [12.2-14.8] (6,251)	X	37.1 [31.2-43.0] (2,194)	36.6 [32.6-40.7] (3,957)	29.1 [24.5-33.7] (2,536)
Agri- and horticulture; forestry; fishing	33.4 [29.1-37.6] (1,145)	17.3 [13.5-21.1] (1,045)	31.2 [26.4-35.9] (1,076)	X	25.0 [13.6-36.3] (149)	32.5 [19.3-45.8] (341)	39.6 [25.1-54.1] (304)
Supply of gas, electricity or water; mining, quarrying	8.8 [5.4-12.3] (677)	6.7 [3.2-10.1] (490)	11.9 [9.0-14.8] (1,320)	X	23.7 [18.5-28.8]† (1,103)	20.1 [16.4-23.7]† (2,066)	24.1 [19.9-28.3]† (2,122)
Manufacturing or engineering	10.8 [9.3-12.4] (4,408)	4.0 [3.2-4.9] (4,387)	10.2 [9.2-11.2] (7,821)				
Construction or building	13.2 [11.1-15.2] (2,183)	7.3 [5.7-8.9] (2,035)	12.7 [11.0-14.4] (3,492)	X	45.7 [32.4-59.0] (388)	29.0 [21.0-37.0] (852)	28.1 [20.9-35.3] (869)
Commerce, transport, accommodation or food services	12.9 [11.7-14.0] (8,089)	6.2 [5.4-7.1] (7,950)	13.6 [12.7-14.6] (11,907)	X	24.8 [19.7-30.0] (1,587)	25.1 [21.4-28.8] (2,930)	31.4 [26.9-35.9] (2,641)
ICT[$]; finance; professional, scientific or technical services	19.3 [16.8-21.7] (2,855)	9.3 [7.7-10.9] (2,923)	18.5 [17.4-19.7] (10,515)	X	27.8 [19.5-36.2] (685)	35.8 [28.0-43.5] (1,161)	34.7 [27.2-42.2] (894)

	Worked in free time to meet work demands: yes						
	EWCS 2010 (N=32,249)	**EWCS 2015** (N=31,004)	**EWCTS 2021** (N=58,306)	**COVID-19 2020 April–June** (N=44,621)	**COVID-19 2020 June–July** (N=14,436)	**COVID-19 2021 February–March** (N=26,020)	**COVID-19 2022 March–May** (N=21,354)
Sector of work	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)	Weighted % [95% CI] (n sector#)
Services relating to education	29.6 [26.3-32.9] (2,778)	22.5 [19.8-25.1] (2,676)	35.6 [33.7-37.4] (5,678)	X	49.4 [42.5-56.4] (1,939)	54.1 [49.3-59.0] (3,508)	47.4 [42.2-52.7] (2,768)
Services relating to health or social care	13.0 [10.8-15.2] (3,250)	5.7 [4.5-6.9] (3,092)	15.3 [13.9-16.7] (6,162)	X	23.8 [19.2-28.3] (1,648)	27.3 [23.4-31.1] (2,709)	26.1 [21.6-30.7] (2,020)
Social, cultural, personal and any other services	13.9 [11.9-15.9] (2,303)	8.6 [6.7-10.4] (2,172)	19.8 [17.4-22.3] (3,372)	X	37.2 [33.3-41.1] (4,142)	35.1 [32.3-37.9] (7,198)	36.0 [32.7-39.3] (5,898)
Total (n)	15.2 [14.5-15.9] (30,921)	7.9 [7.4-8.3] (30,275)	16.4 [15.9-16.9] (57,594)	X	33.1 [31.0-35.2] (13,835)	32.7 [31.3-34.2] (24,722)	32.6 [30.9-34.3] (20,052)

*** Prevalences are not directly comparable between the two studies due to differences in the sampling methods (see Appendix)**

† In the Living, working and COVID-19 surveys, the list of work sectors included 'Industry' as an answer category, without differentiating between the 'Supply of gas, electricity or water, mining or quarrying' and 'Manufacturing or engineering' sectors.

§ Information and communication technology (ICT)

n= number of total observations per sector in the different waves of the two studies

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European Agency for Safety and Health at Work

Santiago de Compostela 12
48003 Bilbao, Spain
E-mail: information@osha.europa.eu

https://osha.europa.eu

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