

HYBRID WORK: NEW OPPORTUNITIES AND CHALLENGES FOR OCCUPATIONAL SAFETY AND HEALTH

1. Introduction

Home-based remote work, also known as telework, surged during the COVID-19 health crisis and involved up to 40% of European workers in April 2020 (Milasi et al., 2020; Eurofound, 2022b). This collective experience has broken down the cultural and technological barriers that prevented widespread regular telework in the past, triggering a structural shift towards its expansion, and has given rise to the terminology of hybrid work to refer to this form of regular/partial telework (Eurofound, 2022b). While telework will not eliminate work requiring physical presence for many workers, **hybrid forms of work** — in which part of the week is spent in the office and part at home — **are likely to become the norm for a substantial proportion of European workers** in the coming years (Marcus, 2022; Eurofound, 2023b).

The contextual basis for this work is provided by EU-OSHA's overview on digitalisation and OSH and its Healthy Workplaces Campaign 2023-2025 focusing on 'Safe and Healthy Work in the Digital Age'. It will present — based on a literature review and experts' interviews (see Appendix 1 for details) — the cutting-edge scientific knowledge on the impacts of hybrid forms of work on: (i) working conditions and management practices; and (ii) wellbeing, OSH outcomes, and health behaviours in comparison with full-time telework or in-person office work.

2. Definitions of hybrid work

The terminology used to identify the different forms of telework has not yet been fully stabilised (ILO, 2020; EU-OSHA, 2022d). According to the 2002 autonomous European framework agreement on telework, telework is 'a form of organising and/or performing work, using information technology, in the context of an employment contract/relationship, where work, which could be performed at the employer's premises, is carried out away from those premises on a regular basis' (European social partners, 2002). The different forms of remote work partially overlap, and by convention, we will use the following definitions (ILO, 2020; Sostero, 2020; EU-OSHA, 2022d):

- **Remote work** refers to any type of work arrangement where workers work remotely, away from the employer's premises (or a fixed location), using information and communications technologies (ICT) (e.g. networks, laptops, mobile phones and the Internet).¹
- **Telework** is a sub-category of remote work when remote work involving ICTs is performed from home (or more rarely in out-of-the-home-based office spaces dedicated to teleworking). It includes, by definition, only work that entails a formal relationship between an employer and an employee.
- **Hybrid work** is a combination of telework and work at the employer's premises. In this form of work, an employee may work both from the office and from home (or from an out-of-the-home-based office space dedicated to telework or another location such as a café, means of transport, etc.) (Eurofound, 2022b). In practice, hybrid work is mainly performed both from home (telework) and at the employer's premises. The weekly distribution of the teleworking and on-site work periods varies widely (e.g. one, two or more days of telework per week) (Eurofound, 2023b). As teleworkers, hybrid workers use digital technologies and an Internet connection for work 'always' or 'almost all of the time', whichever the location of work.

The following terminology will be used, based on the classification of telework (full-time, hybrid and occasional) of the European Working Conditions (Telephone) Survey (EWCTS) (Eurofound, 2023a):

¹ Remote work will be not considered in this article when work does not involve ICT.

- **'Telework'** will correspond to telework performed full-time or more than 90% of the working time.
- **'Work at the employers' premises'** will correspond to full-time work on site that may involve occasional telework (of a duration of less than 10% of the working time).
- **'Hybrid work'** will be considered as a combination of telework and on-site office work at the employer's premises, with **teleworking periods performed between 10% to 90%** of the working time.

3. Key features of hybrid work

Hybrid forms of work meet two key characteristics: (i) an organisation of the activity coordinating telework and work at the employer's premises, and (ii) a schedule specifying the time, duration and frequency of work in each location (Eurofound, 2023b). They involve various individual and collective activities performed in person or remotely, depending on contextual factors (e.g. companies, occupations, working activities and work situations).

Several forms of hybrid work can be distinguished (Eurofound, 2023b):

- Hybrid work alternating work at the employer's premises and **home-based telework**, with the employee teleworking at least one day per week exclusively at home. The hybrid work model is 'office-first' where employees are expected to be on site most of the time and telework a few days a week, and 'remote-first' where employees telework most of the time and occasionally go to the employer's premises for team building, collaboration and training.
- Hybrid work alternating work at the employer's premises, with work in dedicated remote **out-of-the-home-based office spaces**. These 'third spaces', such as telecentres, satellite offices and coworking spaces, are dedicated to work located outside the company, and (in theory) near the employee's place of residence.
- Hybrid work alternating work at the employer's premises with **mobile work**. These forms of nomadic hybrid work involve frequent business travel with an employee combining different work locations: home (sometimes) and especially means of transport, hotels, cafés, client's premises and so on.

The organisation of hybrid work can be more or less **flexible** — when employees choose their location and hours based on their priorities for the day — or **fixed**, where the organisation sets the days and times employees are allowed to telework or come to the office (Eurofound, 2023b).

Hybrid work combines **several key elements** related to the physical, temporal, technical (virtual/digital), social, organisational, managerial, ergonomic and individual dimensions of the working activities (Beckel and Fisher, 2022; Roquelaure et al., 2022; Eurofound, 2023b) (Table 1):

- The **physical characteristics** (location, workplace, and mobility between/during telework and office work) are major **determinants of the work situation ergonomics** both at home and in the office. They are related to the quality of the home office (e.g. availability of an isolated room), ergonomically designed home workstation, ergonomics of equipment, lighting and environmental conditions at home, without forgetting the ergonomic quality of the office in the employer's premises (e.g. desk for solo work, flex-office, room for collaborative work, room for stand-up meetings).
- The **temporal characteristics** (duration, periodicity, time frequency of telework and work at the employer's premises) **influence the physical and psychosocial exposure** of hybrid workers (e.g. sedentary postures, time pressure, commuting time, work–life balance, etc.).
- The **technical (virtual/digital) characteristics** refer to the various tools, software, digital/virtual tools and procedures to produce products and services, to communicate and collaborate synchronously and asynchronously with others when necessary, or to telework alone. They **determine the work and task characteristics**, which in turn influence the psychosocial factors at work (e.g. task complexity, psychological demand, cognitive overload, technostress, autonomy, operational leeway, etc.).

- The **organisational, social and managerial characteristics** of the hybrid work situation have **cascading effects on the ‘work situation’ level**, on the resulting physical, cognitive, psychosocial and environmental exposure, as well as on the resources that can be mobilised, individually or collectively, to meet the demands of the task, whether at home or in the office. They are related to the following:
 - The **organisation of work**, which **determines the task characteristics** (e.g. missions and roles, procedures) **and activities** during the telework and on-site phases of work (e.g. individual or (virtual) teamwork, work procedures during the telework and in office work periods, flexibility, time distribution, temporal distribution of tasks, synchronous or asynchronous and individual or collective hybrid work, complexity, autonomy, etc.).
 - The **social, managerial and human resources practices**, which **influence individual** (e.g. voluntariness for hybrid norms and values, remuneration policies, career development) **and teamwork** (e.g. (virtual) cooperation, coordination, information sharing, mutual learning) **activities**. They determine the **quality of social support** (e.g. supportive leadership, help and advice from colleagues and supervisors, supervisory control relying on objectives or workers’ surveillance and monitoring), **social relationships and group maintenance** (e.g. development of the work collective to improve collective work, team building for developing trust and cohesion), whether face-to-face, virtual or mixed. They have a major influence on the **functioning and vitality of the working team and psychosocial exposure** (social support, effort–reward balance, organisational justice, emotional demand, etc.) in the case of hybrid work.
- The **ergonomic resources** provided by the organisation (e.g. ergonomic quality of the workstation, digital equipment/interface), as well as the availability of technical support or training (e.g. knowledge transfer, learning of new competences, etc.), **moderate effects on occupational exposure**.
- The **individual characteristics** of the hybrid worker(s) **can moderate or reinforce the effects of occupational exposure on stress, wellbeing and health** depending on the balance between occupational exposure intensity and the workers’ resources. They are related to the sociodemographic (e.g. age, gender, health status, family responsibilities, education), psychological (e.g. personality, boundary preferences) and professional (professional competencies, digital skills, individual motivation, etc.) characteristics of hybrid workers.

Table 1: Key elements of hybrid work, occupational exposure and OSH issues

Key element of hybrid work	Occupational exposure	OSH issues
<p><u>Physical</u></p> <ul style="list-style-type: none"> ▫ Workplaces (home space/office space): desk for solo work, flex-office, room for collaborative work, stand-up meetings, etc. ▫ Workplace environment (room temperature, lighting, noise, humidity, poor air circulation, etc.) ▫ Workstation ergonomics (home, on-site office) ▫ Locations: home, office at employer’s premises, third places, other workplaces (vehicles, cafés, etc.) ▫ Mobility between workplaces: employer’s premise, home, nomads, etc. <p><u>Temporal</u></p> <ul style="list-style-type: none"> ▫ Duration of telework and work at the employer’s premise 	<p><u>Physical work-related factors</u></p> <ul style="list-style-type: none"> ▫ Sedentary/sitting postures ▫ Spatial constraints (workstation) ▫ Neck postures ▫ Back and lower limb postures ▫ Upper extremity postures and gestures ▫ Reduced commuting time ▫ Reduced business travels <p><u>Psychosocial and organisational work-related factors</u></p> <ul style="list-style-type: none"> ▫ Time pressure ▫ Task complexity ▫ Visual demand ▫ Psychological demand ▫ Cognitive workload ▫ Technostress 	<p><u>Physical health</u></p> <ul style="list-style-type: none"> ▫ Musculoskeletal disorders ▫ Digital eye strain ▫ Falls, injury ▫ Noise exposure <p><u>Mental health</u></p> <ul style="list-style-type: none"> ▫ Psychological well-being ▫ Stress ▫ Mental disorders <p><u>Social and family</u></p> <ul style="list-style-type: none"> ▫ Work-life boundaries ▫ Interpersonal relationships <p><u>Work-related issues</u></p> <ul style="list-style-type: none"> ▫ Weakening of the work-team

Key element of hybrid work	Occupational exposure	OSH issues
<ul style="list-style-type: none"> ▫ Periodicity: timing and scheduling of telework and work at the employer's premise ▫ Time frequency of telework and work at the employer's premise <p><u>Technical (virtual/digital)</u></p> <ul style="list-style-type: none"> ▫ Job contents ▫ Task characteristics ▫ Digital tools and interfaces ▫ Offline asynchronous during telework and on-site work: e-mail, cloud, calendar, shared documents, social media, etc. ▫ Online synchronous during telework and on-site work: call, chatting, whiteboard, teleconference, collaboration platform, etc. <p><u>Social, managerial, and organisational</u></p> <ul style="list-style-type: none"> ▫ Voluntariness to hybrid work ▫ Communication: in-person, mediated ▫ Social relations: supportive leadership and human resources practices, social support, help and advice from colleagues, supervisors, customers ▫ Task oriented processes: information sharing, mutual learning, co-operation, co-ordination ▫ Teamwork and group maintenance-related processes: work-team, team building for developing trust and cohesion ▫ Supervisory control: workers' surveillance and monitoring, <p><u>Ergonomic resources</u></p> <ul style="list-style-type: none"> ▫ Digital tools/interfaces ergonomics ▫ Technical support ▫ Training, knowledge transfer, learning of new competences <p><u>Individual characteristics</u></p> <ul style="list-style-type: none"> ▫ Age, gender, family responsibilities ▫ Economic resources ▫ Education, professional competences, digital skills ▫ Housing, location and physical environment, commuting time, individual room for teleworking ▫ Personality, health status 	<ul style="list-style-type: none"> ▫ Schedule flexibility ▫ Ability to concentrate ▫ Autonomy and operational leeway ▫ Long working hours (boundary crossing) <ul style="list-style-type: none"> ▫ Management practices ▫ Social support ▫ Organizational trust ▫ Professional isolation ▫ Social isolation ▫ Vitality of the work-team ▫ Employee-supervisor relationships ▫ Employee-Co-workers relationships ▫ Employee-customer relationships (violence) ▫ Emotional demand ▫ Effort-reward balance ▫ Organizational justice ▫ Digital incivility (customers, co-workers) ▫ Bullying, violence <ul style="list-style-type: none"> ▫ Blurring work-life boundaries ▫ Work-life balance 	<ul style="list-style-type: none"> ▫ Job satisfaction ▫ Perception on career advancement ▫ Absenteeism ▫ Virtual presenteeism ▫ Job retention – employability of disabled workers <p><u>Health behaviours</u></p> <ul style="list-style-type: none"> ▫ Physical activity ▫ Sedentary behaviour ▫ Sleep ▫ Nutrition ▫ Substance use

Source: Adapted from Beckel and Fisher (2022) and Eurofound (2023b)

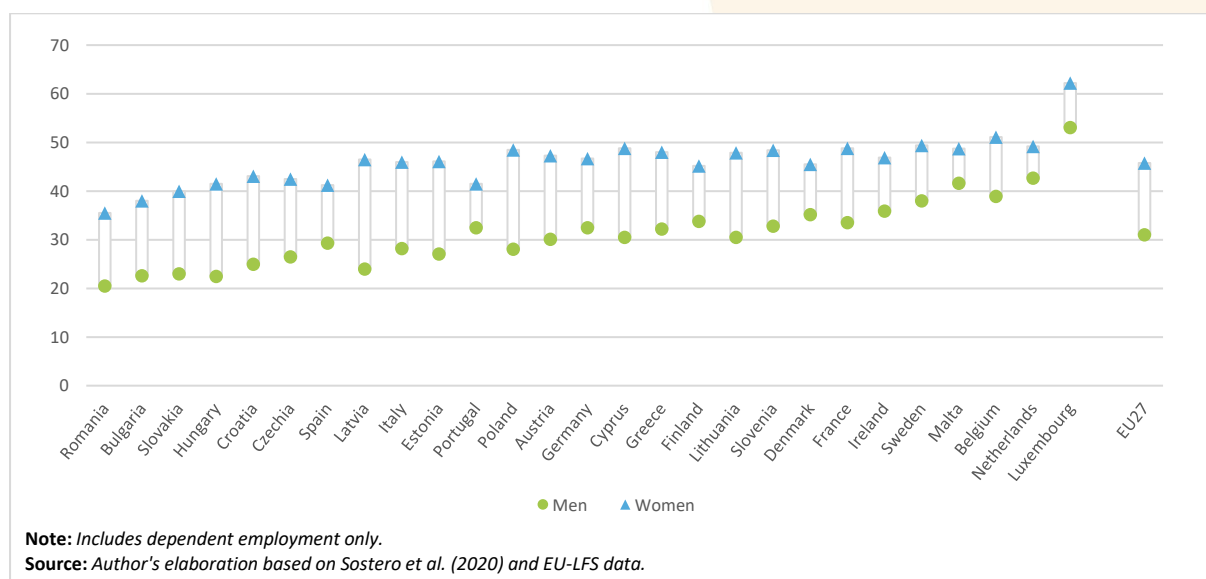
4. Spread of hybrid work in the European workforce

Few EU employees regularly teleworked some days a week before the COVID-19 pandemic (6.2% in 2010 and 9.0% in 2019) (Eurostat, 2022; Marcus, 2022), which involved mainly desk-based jobs and highly qualified white-collar workers (e.g. managers, professionals, desk-based workers) in the information and communication and education sectors. Most volunteered to do hybrid work and spent — except for some occupations (e.g. translators, writers) — a limited amount of time away from the employer's premises (Sostero, 2020; Eurofound, 2023a).

The COVID-19 pandemic has boosted the spread of hybrid work in the EU. According to the Eurofound's repeated 'Living, working and COVID-19' (LWC-19) e-surveys (2020-2022), 34% of workers performed full-time telework and **14% worked in hybrid mode in 2020**. Since then, the prevalence of full-time telework has decreased while that of hybrid work has increased, as **almost one-fifth performed hybrid work** (19% of surveyed men and 18% of surveyed women) in spring 2022. **Hybrid work became the second most common work arrangement in the EU** after full-time work at the employer's premises in 2022 (Eurofound, 2022a). The telework periods represented between 20% (men) and 25% (women) of the total hybrid working time (Eurofound, 2022a). According to EU-OSHA's European OSH Pulse survey conducted between April and May 2022,² 17% of the respondents had worked mostly from home in the previous 12 months (EU-OSHA, 2022b).

Hybrid forms of work can potentially concern a substantial proportion (30-40%) of the European workforce (Dingel and Neiman, 2020; McKinsey Global Institute, 2020; Sostero, 2020; Eurofound, 2022b; Marcus, 2022) (Figure 1). This corresponds to the preference of many employees since the COVID-19 pandemic (Eurofound, 2022b; Kaiser et al., 2022). More than 60% (respondents of the LWC-19 e-survey) wanted to telework at least several times a month (61% for men and 68% for women). Among employees working full-time at the employer's premises, half had chosen this work arrangement, while 36% would have preferred hybrid work and 10% full-time telework (Eurofound, 2022a). Many jobs can be theoretically performed through telework as efficiently as at the office, according to the McKinsey Global Institute: about 20% of the workforce (in the United States, United Kingdom or France) could telework intensively (3-5 days a week), 20% partially (1-3 days a week), and 60% occasionally (a few hours a week) or not at all (McKinsey Global Institute, 2020). These estimates are close to the number of teleworkers identified in real-time surveys in Europe since the COVID-19 pandemic (Eurofound, 2022a). In spring 2022, among workers whose jobs are fully teleworkable, 41% teleworked, 33% adopted a hybrid mode and about a quarter (26%) worked exclusively at the employer's premises (source: LWC-19 e-survey) (Eurofound, 2022a).

Figure 1: Share of European employees in teleworkable employment by gender and country, 2020, EU-27 (%)

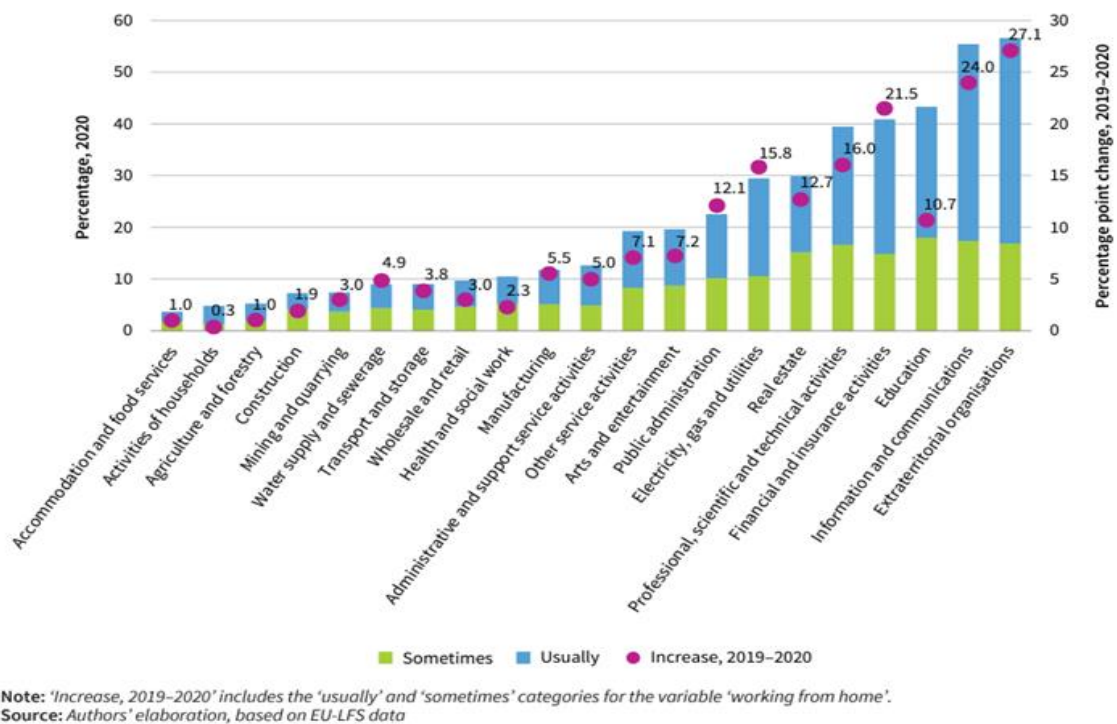


² A representative sample of more than 27,000 employed workers were interviewed between April and May 2022 in all EU Member States, plus Iceland and Norway.

Hybrid work is **unequally distributed across industry sectors and occupations**. It is more prevalent in some service sectors (e.g. information and communication, education, financial intermediation, public administration), while many agricultural, industrial and service jobs (e.g. healthcare) requiring a physical presence cannot be teleworked (Sostero, 2020; Eurofound, 2022a). Hybrid work, as telework, is also **unevenly distributed across occupational groups**, mainly involving professional, technical and higher administrative professions characterised by high income, a permanent employment contract and a high level of qualification (Dingel and Neiman, 2020; Sostero, 2020; EU-OSHA, 2022b; Eurofound, 2022a). In addition, hybrid work arrangements are applied differently in different organisations, with practices depending on their size and sector of activity (Babule and Chappert, 2022).

Most hybrid workers are in ‘teleworkable office jobs’ suitable for white-collar workers, performing skilled teleworkable tasks using ICT, such as administrative, commercial, technical, data recording and processing, creative and design tasks, project participation, collaborative work and so on (Eurofound, 2022a, 2022b, 2023b; Kaiser et al., 2022). During the pandemic, the prevalence of telework differed from sector to sector, with the greatest increases in the prevalence of working from home between 2019 and 2020 found in the service sectors (Eurofound, 2022b) (Figure 2).

Figure 2: Share of European employees working from home by sector, 2020 (%) and 2019-2020 (percentage point change), EU-27



The implementation of hybrid work may introduce or exacerbate — depending on organisational arrangements and contextual factors — other inequalities between workers (e.g. having a good Internet connection or adequate digital equipment, having one's own room, living in crowded or uncrowded accommodation, etc.) (Bérestégui, 2021; Eurofound, 2022b). **As more than half of the European workforce has little or no opportunity to work remotely**, the spread of hybrid work is likely to reinforce social inequalities at work ('teleworkability divide') (Bérestégui, 2021).

- **Age disparities**

Prior to the COVID-19 pandemic, across all age groups, employees aged 60 years and over were most likely to work exclusively from home, while hybrid work was more prevalent among those aged 30-44. Young and relatively uneducated workers at the lower end of the wage scale were more often employed in 'non-teleworkable jobs' requiring a physical presence (Brussevich et al., 2020).

During the pandemic, younger workers (under 25) were less likely to work from home than the core-aged (25–49) and older workers, with the greatest increase in the prevalence of telework (versus the pre-pandemic period) among core-aged employees (Eurofound, 2022b). This uneven age distribution is likely to continue as hybrid work becomes more widespread in the post-pandemic period.

- **Gender disparities**

Prior to the COVID-19 pandemic, the 2015 EWCS shows that there was a **higher share of men performing telework/ICT-mobile work**, which includes hybrid work (54% men vs 46% women) (Eurofound and ILO, 2017). During the pandemic, a **gender effect** also occurred, with full-time telework being more common among women than men, while the frequency of hybrid work was similar (Eurofound, 2022b). Forty-six per cent of women employees in the EU were in teleworkable jobs in 2020, compared with 31% of men. In all countries, the gender gap in teleworkability is positive. The largest gender gaps are observed in Latvia and Poland (Eurofound, 2022b) (Figure 1). Women with children under 12 were more likely to work exclusively at home or in a hybrid setting, compared to those with older children or no children in the household (Eurofound, 2022a, 2022b).

Commuting time savings from the telework days are differently reinvested according to gender (Schütz and Noûs, 2021). **When it is not reinvested in working time, women spend more time on domestic, parental and household tasks.** Men use it to spend more time with their children or for themselves (sports, sleep, etc.). These results indicate a **greater mental burden for women** and a risk of women being reassigned to the domestic sphere. This may explain the poorer work–life balance of women compared to men indicated in some surveys on telework (Eurofound, 2022b; Erb et al., 2022; Antunes et al., 2023). **Hybrid work could therefore reinforce gender stereotypes and an unequal sharing of household tasks and unpaid care** (Babule and Chappert, 2022; ILO, 2023).

5. Implications of hybrid work on working conditions and OSH

5.1. Methodological considerations

Literature on the specific OSH implications of widespread hybrid work as it is in the post-pandemic era, that is with larger groups of workers working simultaneously on-site and at home, **is still scarce.** Schematically, studies of telework conducted before the COVID-19 pandemic report greater positive impact on working conditions (e.g. better work–life balance, reduced commuting time, etc.) and OSH than post-pandemic studies (Tavares, 2017; Vayre, 2019; Marques de Macedo et al., 2020; Athanasiadou and Theriou, 2021; Buomprisco et al., 2021; Furuya et al., 2022; Lunde et al., 2022; Shiri et al., 2022; Wütschert et al., 2022), which may also highlight the risks stemming from hybrid and remote work.

Most studies suffer from significant methodological biases (Oakman et al., 2020; Lunde et al., 2022; Shiri et al., 2022). Selection bias may have occurred due to the often-voluntary choice of telework before 2020. The sudden and unexpected advent of telework in 2020 hastily extended telework without prior preparation, which may have exacerbated negative OSH effects (Oakman et al., 2020; Buomprisco et al., 2021; Reznik et al., 2022). The spread of telework to broader occupational categories during the COVID-19 crisis included less privileged office and administrative workers who are exposed to a less favourable working environment at home (Sostero, 2020). Above all, it is impossible to disentangle the respective effects of telework and those of the economic, social and health contexts related to the COVID-19 crisis (e.g. anxiety generated by the risk of contamination by the SARS-CoV-2 virus, children to be homeschooled and cared for 24 hours a day, etc.) (Chamoux, 2021).

Numerous studies do not take sufficient account of the complexity of hybrid work situations and contextual factors. Indeed, hybrid work involves alternating work in two very different workplaces in terms of work environment, management methods and work organisation that impact the worker's risk exposure: the worker's home and the employer's premises. **Even during the work periods at the employer's premises, the working conditions (e.g. relationships and communication with peers and managers) are different from those when the majority of workers work full-time on site**, as only part of one's co-workers are in the employer's premises and the other part teleworking. The time/space distribution between home and office as well as the content of work in each setting have a major influence on work exposure and therefore on OSH risks. Thus, office-first models of hybrid work

are likely to expose workers to risks in the same way as conventional full-time on-site office working, while remote-first models are like full-time teleworking, and especially since there is little collective on-site working time. Whether on-site work is carried out in isolation, with little face-to-face interaction and much of the interaction with hybrid team members taking place virtually, or whether it is organised in a way to promote team building, collaboration and training will have a major influence on work exposure and OSH risks.

Taking into account these limitations, still, research on occasional/partial telework from before the pandemic can provide useful information that can be extrapolated to hybrid work in the post-pandemic period, considering the health criteria studied (wellbeing, musculoskeletal health (musculoskeletal disorders (MSDs)), mental health, etc.) and work-related (type of activity, work organisation and management practices, etc.) and individual (e.g. age, gender, number of dependent children, etc.) contextual factors.

5.2. Hybrid work and physical exposure, health behaviours and physical health

- **Physical activity – sedentary behaviour**

Hybrid work limits physical activity by reducing active travel to and from work on certain days of the week. Intensive use of digital technologies increases sedentary behaviours by promoting the performance of predominantly cognitive and visual tasks performed in prolonged sitting posture without breaks (Trott et al., 2022; Bloom et al., 2023). The telework periods of hybrid work are characterised by longer computer time with more sedentary postures compared to on-site work. On-site work is all the less sedentary when it favours face-to-face standing meetings or collaborative work rather than computer work (Loef et al., 2022; McAllister et al., 2022). **As the proportion of telework increases in hybrid work, the risk of sedentary work will increase, with foreseeable potential health consequences** (e.g. overweight and obesity, sleep disorders, MSDs and cardiovascular diseases) (Di Fusco et al., 2021; Restrepo, 2022).

- **Musculoskeletal disorders**

Sedentary computer work — at home and in the office — is physiologically characterised by **sustained low-intensity activation of the postural muscles** (neck, shoulder, upper and lower back) combined with fine hand movements (Tavares, 2017; Roquelaure, 2018, 2021). These prolonged activities without active breaks can lead to motor units dysfunction, activation of nociceptive pathways and centralisation of pain, which in turn trigger non-specific localised or regional muscular pain syndromes in the neck, shoulder girdle, or upper and lower back (Roquelaure, 2018; EU-OSHA, 2020c; Dzakpasu et al., 2021).

While the effects of telework on MSDs are not consistent in the literature (Marques de Macedo et al., 2020; Oakman et al., 2020; Fadel et al., 2023), **an increased risk of neck and low back pain (LBP) in relation to organisational and ergonomic factors seems to emerge** (Fadel et al., 2023). This can probably be extrapolated to hybrid workers, as three studies — conducted during the COVID-19 health crisis — indicated statistically significant relationships between the weekly frequency of telework and LBP, shoulder stiffness and neck pain. Two studies of Japanese office workers suggest a threshold for increased risk of MSDs of two days per week of telework³ (Tezuka et al., 2022; Matsugaki et al., 2023). According to the French SAPRIS cohort study,⁴ the threshold of increased incident neck pain may be beyond 50% of the working time (per week) spent in telework (Bodin et al., 2023).

The **main work-related risk factors for MSDs** reported in the literature on telework are related to the work environment (e.g. housing lacking dedicated room to telework, lower comfort and poorer ergonomics of the home-based office vs on-site office), physical factors (e.g. increased sedentary behaviour, inappropriate postures), psychosocial factors (e.g. higher quantitative demands, lower job control) and individual factors (e.g. increased physical load from household chores) (Oakman et al., 2020).

³ Odds ratio (OR) for LBP = 1.25 [95% confidence interval (CI) 0.89–1.76] for telework less than 1 day/week, OR = 1.58 [1.16–2.16] for telework 2 to 3 days/week and OR = 1.82 [1.38–2.40] for telework 4 or more days/week.

⁴ The SAPRIS cohort survey [*Santé, perception, pratiques, relations et inégalités sociales en population générale pendant la crise COVID-19* (Health, perception, practices, relationships and social inequalities in the general population during the COVID-19 crisis)] is a sub-cohort nested in the Constances cohort, which is a population-based epidemiological cohort of 200,000 French adults aged between 18 and 69. Available at: <https://www.constances.fr/>

- **Ocular digital stress – eye dryness**

Although computer work does not pose an immediate visual risk, it can lead to digital eye stress (DES) whether in the office or at home (Kaur et al., 2022). DES is characterised by **symptoms of visual fatigue** (e.g. blurred vision, difficulty focusing), eye irritation (e.g. itching, dry eye sensation) and **increased sensitivity to bright lights**. DES is often associated with headaches or neck pain (Kaur et al., 2022). Although there is a lack of studies regarding hybrid work, a **high prevalence of DES can be predicted**, especially when work in the employer's premises is also office work exclusively devoted to computer work.

DES is favoured by a poor working environment whether at home or in the office (e.g. lack of adequate ergonomic equipment, insufficient space at home, presence of reflections on the screen, inappropriate lighting of the working area, poorly positioned screen, too-short eye–screen distance, poor image quality, poor presentation of information, etc.) (Oakman et al., 2020; Wütschert et al., 2022). Work organisation encouraging continuous and prolonged (> 4 hours) use of digital devices without visual breaks (at home and/or in the office) is a major determinant of DES. Certain individual characteristics (e.g. ageing, undetected or uncorrected visual defects such as presbyopia) and corrective lenses not adapted to moderate visual distance during screen work are also sources of visual fatigue (Larese Filon et al., 2019; McKee and Hedge, 2022; Wütschert et al., 2022).

- **Sleeping disorders**

Hybrid work, as telework, can lead to **overwork late into the night**, especially when the telework period schedules are not well established with the manager or when the company works across time zones (WHO and ILO, 2021). Sleeping disorders are more likely to be reported by regular home-based and highly mobile TICTM workers (Eurofound, 2020). This intensive use of digital technologies at bedtime is known to reduce sleep quality and increase daytime sleepiness (Eurofound 2017; AlShareef, 2022).

- **Poor eating habits**

Working from home several days a week can encourage **nutritional errors** by favouring snacking and breaking the rhythm of hybrid workers' meals, with negative impact on the nutritional balance, while working on the employer's premises often allows access to a canteen (Mekanna et al., 2023).

- **Noise exposure**

Exposure to **ambient noise** is evaluated positively or negatively depending on the telework situation. Some teleworkers report an improvement of the noise environment when working from home, compared with working on the employer's premises (flex-office), while others report a deterioration of the noise environment, particularly when the home is noisy, or because of cohabitation with family or housemates during the home-working phase (Natomi et al. 2022; Umishio et al. 2022). Ambient noise level and sound level should be kept as low as possible (WHO and ILO, 2021). The use of safe listening devices such as earphones and headphones can be helpful (WHO and ILO, 2021), while being cautious about the auditory and extra-auditory (e.g. stress) impacts of loud sounds and acoustic pressure effects transmitted in teleconferencing platforms when used for prolonged periods without pauses (Pawlaczyk-Luszczynska et al. 2018). Indeed, the consequences of prolonged and regular use of these tools are the subject of scientific studies investigating the **impact of sound transmitted via teleconferencing platforms on hearing and on health** more generally⁵. This is particularly relevant as hybrid work generally implies an increased amount of time spent in virtual meetings, webinars and the like, even when being at the employer's premises, and in particular in hotdesking/open space offices where headphones are used to minimise disturbances for co-workers. New scientific research⁶ on the effects on auditory systems of aggressively **compressed sound** highlights the connection between substandard sound and negative impact on auditory health and well-being, as well as a correlation between the number of hours worked remotely and the adverse impact on auditory health.

⁵ See International Association of Conference Interpreters (AIIC), Resolution on Sound Quality, 2022. Available at : <https://aiic.org/document/10590/Resolution%20on%20Auditory%20Health%20and%20Sound%20Quality%20v2.pdf>

⁶ Study by Professor Paul Avan, Université de Clermont-Auvergne, for INSERM, on the effects of dynamic range compression of audio signals on the hearing of guinea pigs. Professor Avan's 15- minute presentation at UNESCO's Semaine du Son, January 19, 2022, available at: <https://youtu.be/LHbOzUaSeFI?t=2055>

- **Air quality**

Poor ‘environmental’ quality of the home office (e.g. humidity, poor air circulation, too-high/low temperature, inappropriate lighting) can lead to a **‘sick house syndrome’** resulting in symptoms of eye and respiratory tract irritation, skin irritation, headaches, fatigue and poor sleep quality, as well as decreased work performance (Ekpanyaskul et al., 2022).

- **Physical and accidental risks**

Hybrid work tends to **reduce commuting accidents**, although to a lesser extent than full-time telework. Nevertheless, the home-based office often does not meet the OSH standards of the employer’s premises (Reznik et al., 2022) and exposes hybrid workers to higher risks of accidental slips, falls, fire and electric shocks (WHO and ILO, 2021).

5.3. Hybrid work and psychosocial, organisational factors at work and mental health

5.3.1. Psychosocial and organisational factors at work

The spread of hybrid forms of work is associated with a **set of technical, organisational and managerial transformations** (Aroles et al., 2021; Sonnenschein et al., 2022) that profoundly influence work organisation and the way hybrid work is performed — individually and collectively — both at home and on site.

In contrast to usual office work, a hybrid work organisation involves a **spatiotemporal dispersion of the work teams**, with hybrid employees partly teleworking and partly at the premises — so it’s neither like full-time teleworking (as was mostly the case during the pandemic) nor like having only a few employees occasionally teleworking like before the pandemic. Several members can work simultaneously at different locations (from home, coworking spaces and on site), some working only in a virtual environment (at home and on site) and others alternating virtual and face-to-face work. Depending on organisational modalities, some team members can work isolated from the rest of their colleagues for most of the working time (i.e. not only during telework periods but also on site), while others can benefit from periods of teamwork, with either virtual groups or face-to-face groups.

The **increased flexibility of the workplace** (office/home, or even office/home/coworking space), combined with the reduction in the number of employees present on site at the same time, is accelerating the **architectural trend towards smaller, more shared and more flexible office spaces** (e.g. flex-office, ‘hot-desking’) at the employer’s premises. This reconfiguration no longer makes it possible to physically identify the personal workspace (e.g. own desk for solo work) or the space usually given over to a work team, or even to accommodate all members at the same time (Bloom et al., 2023). These architectural and functional transformations can degrade hybrid working conditions on site, prevent activities (individual or collective) from being carried out on site due to noise pollution (flex-office) or lack of suitable spaces, or even impose ‘forced teleworking’ on certain members of the hybrid team. This encourages **feelings of isolation** (not only at home but also on site), and reduces sense of belonging and trust in the organisation, as well as the cohesion of hybrid teams.

The **technical, organisational and managerial transformations** required for hybrid work have cascading effects on social relationships, relational dynamics within hybrid working teams and exposure to psychosocial stressors, as well as on wellbeing and mental health. The recent systematic reviews — which mainly concerned telework before and during the COVID-19 pandemic — report contrasting effects on exposure to work-related psychosocial factors and stress levels (Oakman et al., 2020; Lunde et al., 2022; Shiri et al., 2022; Antunes et al., 2023). We lack perspective on hybrid work in the post-pandemic context. The resulting exposure to psychosocial and organisational factors will depend on the hybrid work modalities, work organisation and management practices, as well as contextual factors.

- **Hybrid work productivity**

Hybrid employees often believe in being as effective when teleworking (two or more days per week) as when they are on site (Hallépée and Mauroux, 2019; Bloom et al., 2023). Overall, surveys among employees and employers in various EU Member States show that telework had a positive effect on productivity and performance (Eurofound 2022b). Even though we lack the hindsight to evaluate it in

the long term, the **impact of hybrid work organisation on productivity will depend on the activity performed** (routine, creative, etc.), **working conditions, management practices, and the ratio of time spent at home or at the employer's premises**. An increase in productivity can be expected in some telework situations as a consequence of enhanced worker motivation, but also hidden overtime work due to more blurred boundaries between private and professional life (OECD, 2021; Choudhury et al., 2022).

- **Hybrid workers' autonomy**

Not all employees want to telework, even if they could, and not all those who could telework are always permitted to do so (Eurofound, 2023a). **Hybrid work should therefore be an individual, voluntary and reversible option**, whatever the worker's age, gender and qualifications. Extrapolating from the knowledge on telework, it is likely that, among the characteristics of hybrid work organisation (modalities, periodicity, intensity, characteristics of the tasks performed), the voluntary nature of the individual choice plays a moderating role in its effects on psychosocial factors and mental health (Beckel and Fisher, 2022).

Work in multiple workplaces with ever-changing hybrid work configurations and work teams combining remote and on-site colleagues and managers **requires greater autonomy, but also flexibility and significant adaptability** on the part of hybrid workers, as well as strong organisational and relational skills (Aroles et al., 2021; Kaiser et al., 2022). Some studies point out greater autonomy, resulting in increased job satisfaction (Niebuhr et al., 2022; Reznik et al., 2022; Sonnenschein et al., 2022; Antunes et al., 2023; Bloom et al., 2023).

Managers should, as much as possible, tailor hybrid work arrangements to individual preferences as some workers report that they rely on interactive communication and support from colleagues within the corporate setting to alleviate work-related stress, while others report the benefits of being away from a high-stress corporate setting (Reznik et al., 2022).

- **Hybrid work intensity and 'technostress'**

The **gain in autonomy can be counterbalanced by an intensification of the work**, especially when the managerial culture of hybrid teams is dominated by competition, self-management or excessive performance targets (Babule and Chappert, 2022; Eurofound, 2023a). This can lead to **overwork**, as reported by the 2021 EWCTS, which indicated that nearly half of hybrid workers worked during free time (Eurofound, 2022a, 2023a). High work intensity also plays a role in sleeping disorders among teleworkers (Eurofound 2017, 2020).

The implementation of hybrid work organisations can **intensify work activities** through the intensive use of digital technologies both at home and at the employer's premises. Moreover, hybrid work can also entail additional work/tasks, sometimes with physical implications, to switch from one work setting to the other (e.g. preparing and carrying working documents to work from home). The dispersal of hybrid teams performing multi-task activities increases work intensity through increased asynchronous communications and information processing. The use of various simultaneous communication channels leads to performing several tasks/assignments at the same time (emails, chats, video calls, etc.) — whether at home or at the employer's premises — and often **excessive time pressure** and overtime work due to constant connection and multitasking under tight deadlines. Intensive virtual interactions (e.g. videoconferencing with less face-to-face communications) contribute to cognitive overload, digital fatigue (e.g. 'zoom fatigue'), mental exhaustion and **technostress** (Camacho and Barrios, 2022). This **digital work 'intensification'** occurs during all the working periods (at home and on site) and all the more so if the on-site work does not support a diversity of tasks by promoting non-digital activities (Tavares, 2017; Cetrulo et al., 2022; Niebuhr et al., 2022; Reznik et al., 2022; Sonnenschein et al., 2022; Urzi Brancati et al., 2022; Antunes et al., 2023). Some authors also warn about a decrease in creative idea generation and collective creativity capacity linked to a narrowing of the cognitive scope in videoconferencing (Brucks and Levav, 2022). Hybrid workers may also be confronted with complex digital technologies that they cannot always manage in the event of a technical problem. They should receive **adequate technical support and training** to better cope with such situations.

By reintroducing periods of on-site face-to-face work, hybrid work can help moderate the technostress observed in full-time teleworkers, as **stress symptoms** appear to be correlated with the weekly amount of telework (Niebuhr et al., 2022). For example, higher work intensity and pressure was associated with telework uniquely beyond three days per week during the first lockdown in France (Beatriz et al., 2021; Erb et al., 2022). Appropriate management practices — at the individual level (e.g. providing ICT

training, technical support, etc.) and organisational level (providing sufficient autonomy, promoting an innovation-oriented organisational culture or social support, etc.) — may contribute to limiting technostress (Niebuhr et al., 2022; Reznik et al., 2022; Sonnenschein et al., 2022).

- **Teamwork**

The technical, social and organisational transformations induced by hybrid work profoundly influence **work relationships**, as well as relational dynamics within hybrid work teams (Aroles et al., 2021; Kaiser et al., 2022; Antunes et al., 2023).

In the context of hybrid work, telework phases are characterised — compared to on-site work — by longer computer time and lack of in-person communication, with on-site work often being preferred for organising meetings or collaborative work (Loef et al., 2022; McAllister et al., 2022). Hybrid work increases messaging and video calls, even when all employees are in the office, reflecting a **move towards more electronic communication** as the standard way of communicating in the organisation (Bloom et al., 2023).

Despite the hyperconnectivity, **hybrid work tends to reduce social interactions at work**, especially informal interactions, whether with colleagues or superiors (EU-OSHA, 2021c; Eurofound 2022b), even at the employer's premises because of the asynchronous presence of the hybrid workforce. This contributes to reinforcing the **feeling of isolation from the rest of the colleagues**, whether working from home or at the employer's premises. According to a relatively old meta-analysis, the frequency of telework is a key factor, with the negative effects on relations with colleagues appearing beyond 2.5 days of telework per week (Gajendran and Harrison, 2007). The more hybrid workers work remotely, the more likely they are to be isolated. Hybrid work favours **more formal and instrumental links with work collectives**, thus **reducing the vitality of the work team** (Taskin, 2021).

Teamwork is an important resource for achieving production objectives in terms of quantity and quality, while preserving quality of life and health at work. Yet, hybrid work transforms teamwork of hybrid employees — whether during telework or on site — compared to the teamwork performed by full-time teleworkers or office workers working at the employer's premises (Caroly and Barcellini, 2014). General speaking, on-site office work offers more opportunities than telework for face-to-face communication and preserves the physical contiguity that seems necessary for **collaboration, creative processes, knowledge sharing and innovation** (Taskin and Bridoux, 2010; Cihuelo and Piotrowski, 2021; Taskin, 2022). This is confirmed by certain studies that indicate that knowledge sharing is lower when the frequency of telework increases (Gajendran and Harrison, 2007; Taskin and Bridoux, 2010). However, **the time spent working in teams is invested differently from the usual on-site work**. In the absence of sufficient face-to-face time, or even adequate shared workspaces (e.g. room for collaborative work, stand-up meetings), **teamwork is shortened and refocused on operational aspects to the detriment of informal aspects**. These informal moments of teamwork (e.g. collectively discussing the criteria for a job well done) are important for group cohesion, the meaning of work and, more generally, quality of life at work. The hybridisation of work tends to **weaken the existence of work communities within organisations and reduce teamwork**, leading to a decline in vitality and even dislocation of the 'work team'. This fragmentation of face-to-face activities and reduced capacity of teamwork can be detrimental in terms of organisational commitment and organisational trust between colleagues and managers (Waizenegger et al., 2020). The work organisation needs to ensure that hybrid workers have sufficient opportunities for face-to-face communication, collegial exchange and social support to enhance work teams with efficient teamwork (Caroly and Barcellini, 2014; Carillo et al., 2021).

- **Human resources management practices**

Hybrid work has a major impact on management practices, as managing activity and dispersed teams from a distance is not self-evident (Babule and Chappert, 2022; Ipsen et al., 2022; Eurofound, 2023b). This requires more management time than a fully on-site or remote workforce (Bloom et al., 2023).

However, the increase in flexible work arrangements and in dispersed workforce to manage has been accompanied by a massive deployment of surveillance and monitoring as well as algorithmic worker management and corresponding digital systems and tools. The amplified use of surveillance and the feeling of being (constantly) monitored leads to increased OSH risks, in particular psychosocial risks such as reduced work autonomy, work intensification, and increased level of stress and anxiety and reciprocal mistrust between workers and management with serious consequences for the wellbeing of workers (EU-OSHA, 2022a; EU-OSHA, ongoing).

Direct line managers play a key role and should be supported by senior management and internal support services to help them implement hybrid work arrangements with management practices adapted to hybrid work teams (Ipsen et al., 2022; Eurofound, 2023b). The multiplicity of hybrid work arrangements, workplaces, work situations and contextual factors is **renewing management practices and transforming the activity of managers**, especially direct line managers. The situation is even more complex for managers because work teams (both remote and face-to-face) are constantly reconfigured throughout the working day. Managers therefore need to rethink the work team in a more dynamic way, taking into account its remote and face-to-face dimensions. To do this, they need to consider the actual work activities of hybrid teams so they can adapt their management methods to both remote and face-to-face work. In addition, they should ensure a fair distribution of teleworkable and non-teleworkable tasks between employees to avoid effort/reward imbalance and organisational injustice (Bérastégui, 2021), by giving them sufficient leeway in the choice of whether or not to work in hybrid mode, their hybrid work schedule, and the methods, procedures and communication channels to be used (Eurofound, 2023b).

- **Digital incivilities and cyberbullying**

Some customers, colleagues or supervisors tend to be ruder or less polite when communicating digitally than when face-to-face. Like digital workers, **hybrid workers may be exposed to digital incivilities and even cyberbullying and harassment** (Antunes et al., 2023). Digital incivilities refer to 'repeated, low-intensity behaviours of non-compliance with the rules of exchange in professional relations, mediated by digital devices, the harmfulness of which can be assessed over the long term' (Carayol and Laborde, 2022). These negative behaviours are often linked to organisational factors, such as excessive time constraints and lack of autonomy and control over work. They often reveal unfavourable working conditions, management practices and 'corporate culture'. Reminding or training in the rules of individual and collective use of digital technologies contributes to the prevention of digital incivilities and cyberbullying.

5.3.2. Wellbeing, mental health and work–life balance

The effects of hybrid work on job satisfaction, wellbeing and mental health at work, and work–life balance are, as for telework, **differentiated (both positive and negative) depending on the work situation, contextual factors** (e.g. gender, number of dependent children, age, type of activity, level of digital literacy, etc.) **and the health criteria** considered (Furuya et al., 2022).

- **Job satisfaction**

Job satisfaction of teleworkers/hybrid workers is diversely assessed in the literature (Leddet and Castel, 2021). Some studies point to a **high level of satisfaction due to greater autonomy and a better work–life balance** (Niebuhr et al., 2022; Reznik et al., 2022; Sonnenschein et al., 2022; Bloom et al., 2023). Other studies nuance the positive effects on job satisfaction because of **frequent overtime, lack of interaction, and greater social and professional isolation** during telework (Vayre and Pignault, 2014; Bentley et al., 2016). Job satisfaction is likely to vary non-linearly with the intensity of telework, with higher job satisfaction with partial telework (2-3 days per week) and lower job satisfaction with intense teleworking (most days per week) or occasional (one day per week or less) telework (Golden et al., 2006; Virick et al., 2010). In addition, the **voluntary nature of hybrid work** and the **predictability of the hybrid work schedule** positively influence job satisfaction. Clear spatial and temporal organisation of hybrid work, organisational support, and opportunities for direct and non-digital communication during telework and on-site periods can probably mitigate the negative effects of hybrid work (e.g. social isolation in case of too-frequent/long telework period), decrease the psychological pressure and promote job satisfaction of hybrid workers (Bentley et al., 2016; Ipsen et al., 2022).

- **Work–life balance**

Social and family issues such as work–life conflict and work–life balance **are of particular importance for hybrid workers**. A multivariate combination of factors probably influences the work–life balance of hybrid employees, which explains the heterogeneity of the literature (Camacho and Barrios, 2022; Elbaz et al., 2022; Vitória et al., 2022; ILO, 2023).

According to some studies, hybrid work — with different telework arrangements (less than 1 day, 1-2 days, 3-4 days per week) — may have **greater positive effects on work–life balance than full-time telework** (ILO, 2023). This may be explained by greater temporal flexibility and greater autonomy in managing work–life balance (Juchnowicz and Kinowska, 2021; Elbaz et al., 2022).

However, **hybrid work does not always make it possible to better articulate working times and cope with family, social and professional demands** (Elbaz et al., 2022). This is particularly true in the case of over-investment and increased reporting of one's activity to managers in order to combat the invisibility of remote activity, particularly among women (Babule and Chappert, 2022). There is also a clear gender divide (Eurofound, 2022b). Indeed, women report worse teleworking conditions and more difficulties in balancing work and personal life than men, primarily due to additional workload as a result of unpaid caring responsibilities (Eurofound, 2022b).

The **causes of over-connection need to be investigated**: work–life conflicts could be caused by a schedule that is not set or decided in advance by the worker, or is decided by the employer but only communicated to the worker at short notice; atypical schedules are common, such as meetings that start earlier or later by videoconference than face-to-face; and the right to disconnect may not be respected. Although it is important to leave some flexibility, setting up clear hybrid work schedules, so that it is known in advance which days are devoted to telework, can reduce the difficulties of planning domestic and family tasks (e.g. dropping the children off at school before going to the office) and coordinating with the partner. **Unpredictable working hours or short-term changes** on the part of the employer can disrupt personal organisation and lead to work–life conflicts. **Organisational culture** plays a major role: a better work–life balance is observed when the work organisation clearly defines the conditions for implementing telework periods, provides the necessary equipment, promotes workers' autonomy and encourages managers to support teleworkers (Elbaz et al., 2022).

- **Wellbeing and mental health**

Hybrid work may have greater positive effects on wellbeing and quality of life than full-time telework (Juchnowicz and Kinowska, 2021), although findings are inconsistent in the pre-pandemic literature (Furuya et al., 2022). Subsequently, the COVID-19 pandemic crisis context probably exacerbated the negative effects of telework on mental health due to increased levels of anxiety, stress, depression, burnout, aggression and violence without it being possible to differentiate its effects from the pandemic context (Chirico et al., 2021; Gualano et al., 2023).

Recent systematic reviews report **contrasting effects on mental health** during telework (Oakman et al., 2020; Lunde et al., 2022; Shiri et al., 2022). Most of the studies carried out before the pandemic involved full-time teleworkers. Few studies have specifically addressed medically characterised mental health disorders, whether work-related or not, and the effects of telework on mental health seem to be modest (Shiri et al., 2022). There is still a **lack of hindsight to assess precisely the impact of hybrid work on mental health**, even if we can expect a lesser impact on technostress, social relationships and organisational support than in the case of full-time telework (Vitória et al., 2022).

6. Implications in terms of risk assessment, surveillance, preventive approaches and intervention

One of the key challenges of hybrid work will be to globally adapt the surveillance and prevention of OSH risks not only during the telework periods but also during the on-site office work periods.

6.1. Risk assessment and surveillance

- **Epidemiological surveillance**

Epidemiological surveillance should be based on **up-to-date data** to monitor, in the medium and long term, the spread of hybrid work and its impact on workers' wellbeing and OSH, according to sectors, occupations, occupational categories and groups at risk (e.g. older or disabled workers) (EU-OSHA, 2020a). Epidemiological surveillance should be adapted to the **variety of risk factors in the more diverse, dispersed and constantly changing workforce**. Job exposure matrices specifically developed for telework/hybrid work may be useful tools to complement questionnaire or interview surveys (Vergara and Gibb, 2022).

- **Risk assessment of hybrid work situations**

Risk assessment is an employer obligation under the OSH Framework Directive.⁷ As a major step in preventive intervention, it must be **based on a participatory approach and check all the specific risks linked to hybrid work situations both remotely and on site**. Particular attention needs to be paid to workers working in hybrid mode for the first time and to **new recruits** who are less supervised by colleagues or managers because of the dispersion of teams or asynchronous working. Similarly, risk assessment must also take into account **non-teleworking workers**, to whom the workload can be transferred in the event of 'degraded' hybrid work situations.

Monitoring occupational exposures and assessing risks associated with hybrid work in the office and at home (or in coworking spaces) are particularly difficult. The EU-OSHA checklist on telework (EU-OSHA, 2022c) and the EU-OSHA Online interactive Risk Assessment (OiRA) tool developed in 2023 to assess the risks of telework⁸ can be used to assess the risks of hybrid work linked to the telework periods.

There is for now **little evidence of the usefulness of digital technologies** (e.g. mobile applications, wearable devices): (i) to monitor postures and movements, eye strain or stress levels remotely and/or on site; (ii) to provide real-time biofeedback (e.g. via a mobile application); and (iii) to encourage hybrid workers to adapt lighting conditions, take more regular breaks or engage in physical activity (EU-OSHA, 2022e). In addition, this type of digital monitoring and surveillance raises many ethical, data protection and OSH issues (EU-OSHA, 2022a). It is imperative to ensure that overly strict and rigid monitoring does not increase stress. Data collection must strictly comply with the specific regulation of the country and with the best practices in terms of ethics, data protection, security, privacy and OSH (WHO and ILO, 2021; EU-OSHA, 2022e).

6.2. Prevention and management of OSH risks

Employers have equivalent OSH responsibilities whether workers work at home or on their premises (see EU-OSHA (2021b) for details). However, the opportunities and challenges of hybrid work in terms of OSH prevention and management differ from those of full-time telework and full-time on-site work. Indeed, it is necessary to consider the frequent changes in work environment (at home or at the employer's premises), the work organisation and management practices specific to hybrid work, as well as contextual factors. Consequently, the OSH prevention and management strategies usually recommended in the context of full-time on-site office work and those recently developed in the context of full-time telework must be adapted to hybrid work, even if they remain valid in their broad outlines in most OSH cases.

- **Physical/temporal features**

Workspaces should be adapted to hybrid work, both at home and on the employer's premises. The private nature of premises during part of the working week (home, coworking spaces) complicates access and the deployment of prevention measures for legal and privacy reasons. The application of OSH regulations is therefore more complicated in the case of hybrid work than for usual work at the employer's premises.

Employers should ensure that the **ergonomic characteristics of private premises** (furniture, noise, lighting, etc.) are as close as possible to the generally higher ergonomic standards of on-site workspaces. This can be done by drawing on the recommendations developed for full-time telework, which remain largely applicable to hybrid work carried out at home (see EU-OSHA (2022c) and OiRA for telework⁹).

Hybrid work reinforces the need for **ergonomic offices adaptable to a wider variety of users** (gender, size, skills, work habits, etc.) **and uses** (office work, face-to-face/virtual meetings, stand-up meetings, etc.) at the employer's premises. For example, **rooms suitable for face-to-face or hybrid meetings** are needed, as well as **teamwork spaces** because of the priority given to teamwork and team building during periods of on-site work (Eurofound, 2023b). Some organisations are therefore encouraging multifunctional offices to meet the specific needs of individuals and teams while making more efficient

⁷ Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work. Available at: <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A31989L0391>

⁸ Available at: <https://oiraproject.eu/en/oiraproject>

⁹ Available at: <https://oiraproject.eu/en/oiraproject>

use of premises. However, it is necessary to ensure that these flexible spaces do not expose workers to physical and psychosocial OSH risks (noise, lack of privacy, loss of professional identity, etc.).

Workspace design should be combined with **organisational measures to encourage regular breaks, physical activity and dynamic posture** (e.g. sit-stand chair, height-adjustable desk) to avoid prolonged sitting postures and sedentary behaviour both at home and at the employer's premises in order to prevent health disorders associated with increased sedentarism such as MSDs, cardiovascular diseases and so on, as well as DES (Marques de Macedo et al., 2020; Robertson and Mosier, 2020; Emerson et al., 2021; EU-OSHA, 2021b; Wütschert et al., 2022).

- **Social, managerial and organisational features**

Managing a hybrid work team requires **renewed organisational and management practices** (Xie et al., 2019; Eurofound, 2023b; Grobelny, 2023). The main challenge for senior and line managers is to adapt work organisation and management practices to the whole collective of dispersed hybrid workers by approaching the situation of the hybrid team collectively, while being sensitive to weak individual signals that might reflect difficult work and life situations for some members (Babule and Chappert, 2022). Managers must therefore **consider the various contextual factors of the work situations in the home-based and on-site offices**, as well as individual preferences, and adapt their communication, management practices and strategies to each context.

Management practices must allow for **development of sufficient operational leeway** by ensuring the regulation of activities as close as possible to hybrid teams and work situations that are constantly reconfigured by the hybrid teams (e.g. throughout the working week or even day). Promoting management with **reasonable objectives and precise definitions of objectives with clear assessment criteria** can strengthen the autonomy and responsibility of hybrid workers without encouraging overtime, unlike strict monitoring and control of performances during remote and/or on-site work (Ipsen et al., 2022; Kaiser et al., 2022).

The adoption of **supportive leadership and management practices** will help to maintain hybrid team cohesion through improving informal communications, help and advice from supervisors and/or colleagues. This can help build trust within the organisation and reduce feelings of social isolation (Bérastégui, 2021; EU-OSHA, 2021b; Kniffin et al., 2021; Antunes et al., 2023), while not multiplying communication channels to avoid cognitive overload and technostress. **Providing opportunities for direct communication, collegial exchange and social support** may help to maintain the quantity and quality of social interactions (Carillo et al., 2021) and counterbalance the side effects of hybrid work (social isolation, lack of communication, lack of support, etc.). It will be critical to assess the extent to which working at the employer's premises in the context of hybrid work with appropriate support (career mentoring, coaching, collegial task support from supervisors and co-workers, organisation) can limit the negative effects of telework on social relationships at work and occupational stress.

Managers, especially direct line managers, should be trained to acquire new managerial skills and adapt their practices (Ipsen et al., 2022) to provide effective organisational support to hybrid workers. **Training strategies** will require guidelines on topics such as communication, fairness and inclusion, as well as recommendations on, for example, operational efficiency and promoting employee engagement in hybrid environments (Eurofound, 2023b).

- **Technical features/ergonomic resources**

It is recommended to **provide ergonomic equipment, digital tools and interfaces suitable to hybrid work** both at home and the office (EU-OSHA, 2021b). To prevent physical and psychosocial OSH disorders, the organisation must disseminate — remotely and on site — **ergonomic recommendations** for the workstation design and the use of digital tools (for example, through practical sessions to present the recommendations via videoconference or on site). To improve appropriate usage of digital tools, collaborative digital work and efficient work organisation, it is necessary to ensure the dissemination of recommendations for office work, asynchronous offline communications (email, cloud, shared documents, etc.) and synchronous online communications (call, chatting, teleconference, collaboration platform).

The provision of specific **managerial and technical support and assistance services** (e.g. for telephone, Internet and equipment) for home use and, if necessary, at the employer's premises is another key measure. In addition, **training and knowledge transfer of hybrid employees** can help them — especially when implementing a hybrid work organisation — acquire new digital, communication and organisational skills to improve individual and collective working strategies and

reduce psychosocial stress (WHO and ILO, 2021; EU-OSHA, 2022d; Vleeshouwers et al., 2022; Eurofound, 2023b; Grobelny, 2023).

To this end, the existing recommendations applicable in the context of full-time telework can to a large extent be applied to hybrid work (EU-OSHA, 2021b). In addition, the employer must establish hybrid work policies and procedures that support hybrid workers (e.g. for the purchase of equipment, technology, including software, furniture and office supplies).

The spread of **hybrid work can reinforce or diminish gender equality depending on contextual factors, work organisation and management practices**. As shown during the COVID-19 pandemic, hybrid work is not necessarily favourable for gender equality and women may be at a disadvantage when working according to a hybrid mode. **Raising awareness and training managers on gender inequalities** and providing support (e.g. adequate childcare facilities) will be important issues, as well as ensuring equity in wellbeing (e.g. with adequate private/work–life boundary) and career progression among women and men (Babule and Chappert, 2022; Eurofound, 2023b).

Clear guidelines must be issued by the employer **to ensure that OSH measures are effective when hybrid workers telework or work on site**. Given the diversity of potential effects on OSH of hybrid work (e.g. social isolation, difficulties in communication and team management, psychosocial risks, sedentary lifestyle, etc.), **preventive measures must be comprehensive, including organisation of work and training and information for managers and employees**, and must involve all stakeholders (EU-OSHA, 2021a, 2021b; WHO and ILO, 2021).

7. Implications in terms of regulation and public policies

7.1. Regulation and public policies

Hybrid work, as telework, is not regulated at EU level through hard-law mechanisms but through the **EU Framework Agreement on Telework** (2002), which is an autonomous agreement between the European social partners. In June 2022, the European social partners agreed to revise the 2002 framework agreement on telework, which will help to better regulate hybrid work in several areas, such as the right to disconnect, equipment costs, communication, energy costs, OSH, and equal treatment of teleworkers and those working only at the employer's premises (EU-OSHA, 2023; Eurofound, 2023b). The EU social partner agreement resulting from the ongoing negotiations will have the force of a directive.

Promoting the **'right to disconnect'** would make it possible to counter the deleterious effects of digital technologies (e.g. blurred work–life boundaries) and the organisational changes related to hybrid work.

At the national level, EU Member States regulate telework either through statutory legislation or by social dialogue and collective bargaining (EU-OSHA, 2021b). The experience of extensive telework during the COVID-19 pandemic crisis has necessitated an adaptation of the regulations. This has been done at national level for telework during the crisis in some countries (EU-OSHA, 2021b). A medium- and long-term reassessment of their impact in the context of hybrid work will be necessary.

In terms of regulatory developments **more specific to OSH**, since the outbreak of the pandemic, only a few Member States have developed new legislation on telework and OSH addressing issues such as the workplace risk assessment and its enforcement, coverage of employees' accident insurance, and/or to the prevention of psychosocial risk and health problems such as eye strain (EU-OSHA, 2023). These developments have followed different directions in different Member States: while in some countries OSH enforcement has been strengthened by providing company's OSH professionals with access to teleworkers' workplaces to inspect compliance with OSH obligations, in other countries employers have been exempted from previous OSH obligations (EU-OSHA, 2023). In a larger number of Member States regulatory provisions, including collective agreements, have been introduced and address teleworkers' isolation, a major psychosocial risk related to telework, although the provisions are not always very specific (EU-OSHA, 2023; Eurofound 2022c). Other Member States have specific provisions related to the prevention of MSDs in telework. In general, in spite of these positive developments for OSH, the regulatory provisions introduced provide only general recommendations.

The **revision of OSH directives** (e.g. minimum safety and health requirements for the workplace (89/654/EEC), work with display screen equipment (90/270/EEC)) and the new EU Strategic Framework on Health and Safety at Work 2021-2027 may open opportunities to expand the scope for

improving OSH protection and prevention to all workers using new digital devices (e.g. laptops, smartphones, tablets, etc.) during hybrid work.

7.2. Compensation for occupational diseases

The lists of recognised occupational diseases are the responsibility of each Member State, with the diseases and compensation criteria varying from one country to another.

- **Musculoskeletal disorders**

Data collected at national level indicate that MSDs are the most commonly recognised occupational diseases in France, Italy and Spain. However, the lists of recognised diseases, recognition practices and reporting systems vary considerably from one Member State to another (EU-OSHA, 2020b). The current medical criteria of the tables or lists of occupational diseases only refer to specific disorders (definable by objective diagnosis criteria), such as rotator cuff tendinopathy and carpal tunnel syndrome (ILO, 2022). The circumstances of occupational exposure giving entitlement to compensation only take into account biomechanical overloads (Eurogip, 2016).

However, the MSDs encountered in teleworkers/hybrid workers are mainly non-specific shoulder, cervical or low back pain. These multifactorial disorders can be assessed by subjective methods (questioning, functional scales, etc.), while neurophysiological or imaging examinations contribute little or nothing to the diagnosis. The circumstances of exposure are multifactorial, characterised by sedentary computer work, that do not correspond to the classic definition of biomechanical overload (Eurogip, 2016). Therefore, the **compensation system needs to be adapted to the spread of hybrid work**, with evolving criteria for compensation, as regards both the medical criteria and the risk exposure criteria.

- **Mental health disorders**

In many countries, mental health disorders are rarely compensated as occupational disease. Some disorders may be compensated in some countries when certain medical and exposure criteria are met (e.g. post-traumatic stress disorders, depression). We lack hindsight on work situations in a hybrid work context.

In the context of widespread hybrid work, it is necessary to pave the way for reflection on the revision of compensation criteria in most Member States (EU-OSHA, 2021a). The same applies for other health problems (e.g. DES) encountered in teleworkers, as they are not included in an occupational disease table or list (ILO, 2022).

7.3. Hybrid work – return to work and prevention of job disintegration after chronic disease

Hybrid work, as well as telework, **can contribute to job retention after health difficulties** that may compromise functional capacities and work ability or lead to long absences from work due to sick leave (Athanasiadou and Theriou, 2021). Hybrid work may be an option that **promotes return to work after/with various forms of chronic diseases**, as observed in the context of the pandemic among workers with high-risk conditions for severe forms of COVID-19 (Godeau et al., 2021). Beyond the pandemic context, hybrid work may be an interesting way of encouraging workers with chronic diseases or disabilities to stay at work as long as the worker can rely on a properly adapted home workstation provided by the employer. It can help maintain or re-establish a connection with the work community, and at the same time can contribute to avoiding fatigue or the difficulties associated with transport between home and the workplace.

However, we still lack the hindsight to assess the impact of hybrid work in terms of job retention and the advantages (reduced fatigue, possible autonomy in managing working time) and the potential disadvantages (e.g. social isolation, lack of career development) for workers with chronic diseases or disabilities. In addition, telework/hybrid work can lead to 'virtual presenteeism', with employees continuing to work from home (at least part-time) while they are ill. This can affect their recovery and compromise their long-term health (Eurofound, 2019). Several studies illustrate this phenomenon by showing that teleworkers have fewer sick days than those who work in the office.

Hybrid work could also be **used to support the end of careers** as a process of early retirement by helping the transition of active people at the end of their careers. However, this type of work organisation has not yet been evaluated in this specific context (Fondation Jean Jaurès, 2022).

8. Conclusion

New forms of hybrid work create **new challenges** for OSH prevention and management, while at the same time offering the **opportunity to improve OSH** if properly implemented, managed and regulated.

With **well-designed hybrid work organisations**, both at home and at the employer's premises, hybrid work is likely to **retain many of the advantages of full-time telework** (e.g. autonomy, work–life balance) **while reducing some of its disadvantages** (e.g. technostress, social isolation, reduced work team cohesion, etc.). This will vary according to the context of the work situations (e.g. voluntary nature of the choice of hybrid work, participative and supportive management, workers' autonomy, etc.). However, information on the impact of hybrid work on working conditions and OSH is lagging behind its spread in the post-pandemic EU. Above all, we still lack the hindsight to precisely **assess the medium- and long-term impacts** of hybrid forms of work **on working conditions, OSH, and related gender and social inequalities in health**.

Further research is needed to fill in the gaps on the OSH effects of hybrid work and the actions required to properly implement it.

- Research is needed to **quantify the evolution of hybrid work** by industry and occupation, company characteristics, employment status and gender. Future studies should focus on longitudinal approaches and consider ergonomic and work organisation factors as well as workers' socio-economic status.
- We need to fill the **gap in knowledge on sound work organisation and management practices**, as well as sound OSH management, for the hybrid workforce. One of the main challenges will be to look at hybrid work holistically from a dynamic perspective that considers individual and collective activities both at home and at the employer's premises. There is a need to **broaden the perspective of hybrid work** — which is too often seen as an individual activity experienced as a benefit (e.g. choice of hybrid work according to individual preferences) — and to adopt a multidimensional and ergonomic perspective that includes the **collective organisational and social** (team and work organisation) dimensions.
- **Further multidisciplinary research** (epidemiology, occupational health, ergonomics, work and organisational psychology, management, etc.) is imperative to improve the detailed understanding of hybrid work situations and to precisely assess their **impact on business organisation, work organisation and management practices, including OSH management practices**. The impact of hybrid work on **the quality of teamwork** (e.g. creativity) **and the vitality of the work team** (e.g. cohesion of the hybrid work teams) must also be monitored and assessed in the medium and long term.
- Research needs to be pursued to **assess the medium and long-term impacts of hybrid forms of work on individual and collective working activities and health outcomes** (MSDs, mental health, sleep disorders, sedentarism, etc.) in various hybrid contexts. In the current state of knowledge, we lack studies of good methodological quality to determine the impact of the regularity and predictability of the hybrid work schedule and precisely define **favourable thresholds of telework in hybrid mode** (1, 2, 3 or more weekly days) in terms of health and wellbeing (Antunes et al., 2023). It remains necessary to distinguish the effects of hybrid work itself from the effects of the reorganisation of the employer's premises for economic reasons (e.g. flex-office), which can produce effects independently of hybrid work, as well as those linked to the new forms of management (e.g. algorithmic management). The mechanisms involved in the effects of hybrid work on workers' physical and mental health need to be elucidated (Vleeshouwers et al., 2022).

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Appendix 1. Methodology

A **two-step interdisciplinary methodological approach** was used to synthesise knowledge on hybrid forms of work and their impact (i) on working conditions and management practices and (ii) on wellbeing and OSH in the scientific literature from different disciplines (epidemiology, psychology, neurobiology, biomechanics, ergonomics, sociology, technology, law studies and management).

- **Literature review:** Due to the relatively small number of available studies, a narrative review was conducted using the following scientific databases in February 2023:
 - (i) **the effects of hybrid work on working conditions and management practices:** PsycArticles, Sage Journals, Cairn, ScienceDirect and Google Scholar; and
 - (ii) **the effects of hybrid work on wellbeing, OSH and health behaviours** (wellbeing, occupational health, sedentary lifestyle, musculoskeletal disorders, eye disorders, sleep disorders, addictions and eating disorders, mental health disorders, accidents and physical risks): PubMed, Web of Science, Embase, Cairn, EBSCO and Google Scholar.

In addition, the review took into account reports from international agencies on OSH (EU-OSHA, HSE, IRSST, INRS, NIOSH, etc.), public statistics, economics, law and labour (OECD, ILO, Eurofound, European Commission, European Trade Union Institute, Eurostat), universities (MIT, Harvard), and publications from major consulting companies (McKinsey, etc.).

- **Interviews with experts and stakeholders:** The results of the literature review were discussed and supplemented with several hybrid/telework experts from different disciplines:

Name	Expertise	Institution
Agnès AUBLET-CUVELIER	Occupational health, ergonomics	French National Research and Safety Institute (INRS), France
Karine BABULE	Human resources, ergonomics	French National Agency for the Improvement of Working Conditions (Anact), France
Pierre BÉRASTÉGUI	Ergonomics, work psychology	European Trade Union Institute (ETUI), Belgium
Sandrine CAROLY	Ergonomics	Grenoble-Alpes University, France
Thomas COUTROT	Economics, statistics	Institute of Economic and Social Research (Ires), France (associated researcher)
Florence CROS	Work psychology	Lyon 2 University, France
Marc MALENFER	OSH foresight	French National Research and Safety Institute (INRS), France
Sophie PRUNIER-POULMAIRE	Ergonomics	University Paris Nanterre, France

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