

Chapter 11

The Impact of Digitalisation on the Physical Health of Older Workers



Jeroen Spijker , Hande Barlım , Melina Dritsaki , Yang Gu ,
Nilüfer Korkmaz-Yaylagül , Gunilla Kulla , Eda Orhun ,
Anna Sevcikova , Lavinia Țânculescu-Popa , Brigid Unim ,
and Cristina Maria Tofan

11.1 Introduction

The modern workforce is undergoing two significant and simultaneous transformations: the ageing of its members and the rapid digitalisation of work processes. Across industrialised and emerging economies, older workers (typically defined as those aged 50 years and above) represent a growing share of the labour market, as public policies and personal choices converge to extend working life.

J. Spijker (✉)

Universitat Internacional de Catalunya, Barcelona, Spain

Centre d'Estudis Demogràfics, Bellaterra, Spain

e-mail: jjaspijker@uic.es

H. Barlım

Department of Economics, Gebze Technical University, Gebze, Turkey

e-mail: hbarlin@gtu.edu.tr

M. Dritsaki

Department of Economics, University of Western Macedonia, Kozani, Greece

e-mail: mdritsaki@uowm.gr

Y. Gu

Department of Work, Employment, Management & Organization, University of Leicester,
Leicester, UK

e-mail: yg212@leicester.ac.uk

N. Korkmaz-Yaylagül

Gerontology Department, Faculty of Health Sciences, Akdeniz University, Antalya, Turkey

In this context, the relevance of physical health in an ageing workforce is increasingly important, particularly amidst the expanding digitalisation of the workforce. Companies must now confront the challenge of creating environments in which older employees can thrive, making health promotion an integral component of workforce planning. Prior studies have shown that older workers often experience age-related declines in physical health and cognitive abilities, which can affect their productivity and engagement in the workplace (Calzavara et al., 2020; Kooij et al., 2020). Maintaining good health is relevant for older employees, especially in digital work settings.

Digitalisation in the workplace introduces both risks and opportunities for the physical health of older workers. While digital tools can enhance efficiency and streamline tasks, they can also introduce stressors such as information overload and the necessity for continuous adaptation to new technologies. Research indicates that effective leadership can mitigate some of these risks by promoting health-oriented practices and support (Bregenzer & Jimenez, 2021; Cazan, 2020). For instance, leaders who adopt health-promoting strategies that serve as buffers against the stress associated with digital work environments, thereby enhance the well-being of older employees (Bregenzer & Jimenez, 2021).

Digital technologies also have the potential to facilitate better work conditions. For example, tools such as virtual reality and assistive devices can aid older workers in performing physical tasks more effectively and safely, directly addressing some

G. Kulla

Western Norway University of Applied Sciences, Department of Health and Caring Sciences,
Forde, Norway

e-mail: gunilla.kulla@hvl.no

E. Orhun

School of Business, Al Akhawayn University in Ifrane, Ifrane, Morocco

A. Sevcikova

Faculty of Social Studies, Masaryk University, Brno, Czech Republic

e-mail: asevciko@fss.muni.cz

L. Țănculescu-Popa

Hyperion University, Department of Psychology, Faculty of Psychology and Educational
Sciences, Bucharest, Romania

B. Unim

Department of Cardiovascular, Endocrine-Metabolic-diseases and Ageing, National Institute
of Health, Rome, Italy

e-mail: brigid.unim@iss.it

C. M. Tofan

Psychology and Educational Sciences Department, “Gheorghe Zane” Institute for Economic
and Social Research, Romanian Academy, Iasi Branch, Romania

Department of Sociology, Social Work and Human Resources, Faculty of Philosophy and
Social-Political Sciences, “Alexandru Ioan Cuza” University, Iasi, Romania

physical limitations that come with age (Alves et al., 2023). Such tools not only enhance task performance but also promote greater engagement by allowing older workers to contribute meaningfully to workplace goals, an essential factor in maintaining motivation and well-being (Wang et al., 2024). However, low digital literacy can hinder the use of these tools, making work experiences more difficult and decreasing job satisfaction (Komp-Leukkunen et al., 2022; Obermayer et al., 2022).

To overcome low digital literacy, a transformational approach to digital upskilling is needed within organisations to prepare the workforce for such changes. Implementing training programmes that focus on enhancing digital literacy can cultivate a more adaptable workforce that meets contemporary digital demands. Companies that recognise and address the dual nature of digital technology can create more inclusive and supportive work environments for older employees, which is critical as they navigate longer working lives (Bordi et al., 2018; Mok et al., 2023). Active engagement in continuous learning not only helps employees in adapting to digital changes but also reinforces their health and work motivation (Mok et al., 2023; Pichainarongk & Bidaisee, 2025).

In sum, digitalisation in the workplace is a double-edged sword for the physical health of older workers. While it may contribute to health risks such as musculoskeletal disorders, vision strain, cardiovascular issues, and other health conditions, it simultaneously opens up opportunities for prevention, health promotion, and sustained work ability through digital health interventions and supportive technologies. Based on results from a recently conducted scoping review (Spijker et al., 2025) and other studies, in this chapter we highlight both aspects, describing them as either positive or negative effects of digital transformation on older workers.

11.2 Musculoskeletal Disorders and Digitalisation

Musculoskeletal (MSS) problems are one of the common challenges faced by older workers compared to their younger counterparts (Okunribido et al., 2011). Apart from physiological factors such as decreases in bone density, muscle mass, and strength (Collino et al., 2013), work-related conditions, including repetitive movements, prolonged static postures (Panel on Musculoskeletal Disorders and the Workplace et al., 2001), poor ergonomic stations (Rodrigues et al., 2017), and stress (Schleifer et al., 2002) play a role in these challenges. In this regard, work conditions associated with digitalisation can facilitate and augment the development of MSS symptoms among older workers who are already physiologically vulnerable.

Indeed, there is increasing evidence on the negative outcomes of the integration of digital technologies in the work life on MSS health among older workers. For instance, Shubayr and Alashban (2022) put forth that while the prevalence of MSS among Saudi Arabian radiation technologists is high due to ergonomic conditions like patient transfer, fixed table heights, and prolonged computer or Picture Archiving and Communication System (PACS) use, the likelihood of developing these symptoms increases with age. (Wilson, 2014) lends support to this finding

with qualitative accounts, especially concerning the physical demands associated with patient handling.

On the one hand, telework is another modality that increases MSS risk among older workers. As telework involves using computers in the home setting, it is associated with physical strain resulting from a prolonged static posture, repetitive movements, and extended working hours (Montreuil & Lippel, 2003) as well as poor workstations (Van Yperen & Wörtler, 2017). In fact, Oakman et al. (2023), based on the Australian Employees Working from Home data, found that the frequency of working from home, especially when it surpasses the preferred frequency, increases the likelihood of MSS four times among older adults. In another study focusing on telework, Haddad et al. (2024) found a somewhat high prevalence of MSS (48.7%) among their Lebanese respondents who were university graduate employees. Those who experience back pain are likely to perceive teleworking as disadvantageous. However, according to Damman (2016), digitalisation of the workplace, including teleworking, presents advantages for older workers with mobility issues such as MSS to continue working.

On the other hand, employees' knowledge and skills on digital technologies can help prevent the potential negative health impacts of these technologies. Christensen and Johannessen (2024) examined the health effects of digital technologies among home care workers and demonstrated that it was not the technologies themselves, but rather the quality of training in using them that played a decisive role. This was also found by Burnay et al. (this volume). There are also several initiatives aimed at the health promotion of older workers through digital technologies. In an intervention study by Taieb-Maimon et al. (2012), a photo-feedback system was tested among office workers who use computers. This system periodically displayed the worker's correct posture on their screen to reduce MSS issues. The method significantly improved sitting posture, especially among older workers and those experiencing more pain, and the improvement was sustained over time. Another example of promoting employee health involves accessible health promotion programmes. In a study by Brown et al. (2024), a digitally supported, time-restricted eating-based weight management programme was evaluated. Over a 12-month period, clinically significant outcomes were achieved among participating employees, including weight loss, reduced waist circumference, and improved blood sugar control in diabetic participants. Similarly, in a study by Sell et al. (2016), a personalised ergonomic learning programme was implemented to help preserve the health and work ability of employees. Although the programme did not result in a statistically significant improvement in individual work ability, a marked increase in productivity was observed in a department where all teams participated in the intervention.

In summary, musculoskeletal problems among older workers represent a significant concern in increasingly digitalised work environments. While digital technologies and telework arrangements can exacerbate risks through poor ergonomics, prolonged static postures, and repetitive movements, they also offer opportunities for meaningful interventions. The evidence highlights that the key to minimising MSS risks lies not solely in the technologies themselves, but in how they are implemented, supported, and adapted to the needs of older employees. Health promotion

programmes, ergonomic training, and digital tools designed with age-inclusive principles can help mitigate the adverse effects and support the physical well-being and productivity of older workers. Therefore, a balanced approach that combines technological innovation with proactive health and ergonomic strategies is essential to fostering safer, healthier workplaces for aging workforces.

11.3 Visual Problems and Digitalisation

As the integration of digital technologies intensifies across all sectors of the labour market, questions arise about how this transformation intersects with the ageing workforce—particularly in relation to visual health. The increasing reliance on digital screens for long periods has prompted a growing body of research exploring its consequences, especially for individuals aged 50 years and above. While the evidence remains somewhat mixed, a consistent thread runs through recent studies: the duration and intensity of digital device use often exert a stronger influence on visual health than chronological age alone.

Several studies from diverse cultural and geographic contexts have investigated the phenomenon of computer vision syndrome (CVS), a condition characterised by symptoms such as dryness, burning sensation, blurred vision and eye fatigue. In Libya, a cross-sectional study of computer users aged 45 years and above found a strong association between prolonged screen time (more than 6 h daily) and symptoms of cardiovascular disease (Alturaiki et al., 2023). Italian office workers, irrespective of age, reported similar levels of discomfort, but those who worked longer hours on digital tasks were more likely to experience visual rigours (Cantó-Sancho et al., 2023). These findings suggest that screen time may act as a more critical predictor than age itself.

A broader physiological perspective is offered by a large study conducted in Japan, which found a link between prolonged use of Information and communication technology (ICT) and ocular axial elongation—a marker associated with myopic progression. Workers aged 56–60 years were particularly affected when using digital devices for more than four hours a day; however even one hour of daily screen time was associated with modest changes across age groups (Honda et al., 2019). In contrast, findings from the China Health and Retirement Longitudinal Study (CHARLS)—which included both working and non-working individuals aged 45 years and above—indicated an opposite trend: between 2011 and 2018 regular internet users were significantly less likely to have developed visual impairment (hazard ratio (HR) 0.83 after controlling for sociodemographic factors). However, the authors noted that this outcome could be influenced by a sample selection effect, as healthier or more socioeconomically advantaged individuals are more likely to use the internet as even in 2018 only 12.3% of the study sample used the internet (Li et al., 2023).

While most studies have focused on the physiological and ergonomic dimensions of digital strain, the Wilson et al. (2014) study highlighted another, but equally

important, critical dimension: structural inequalities in access to eye care. Although the study did not specifically focus on workers, it found that non-citizens in the US had significantly lower chances of achieving optimal corrected vision and faced a greater risk of legal blindness (defined as 20/200 vision or worse in respondent's better-seeing eye) than native-born Americans.

Taken together, these findings call for a more integrated and inclusive approach to the working life in the digital age. Protecting visual capacity throughout life is not only a question of ergonomics or screen time management, but also of equal access to care, culturally sensitive monitoring tools and design of workplaces that are age-friendly. As older workers continue to work in an increasingly digitalised environment, their ability to participate fully and in a healthy way with digital instruments will depend on both technological adaptation and structural support.

11.4 Cardiovascular and Metabolic Health in the Context of Digitalised Workplaces

The global shift to working from home brought about by the COVID-19 pandemic has transformed work structures by offering new flexibility to employees. At the same time, however, it has raised significant public health concerns. The most important among these is the rise in sedentary behaviour, a main risk factor for metabolic disorders and cardiovascular diseases, including coronary heart disease (CHD). For instance, a large Japanese cohort study by Zaitzu et al. (2024) provides critical insight into how these risks vary by age. Among workers aged 20–49 years, especially those in top-level office jobs such as management and engineering fields, home-based work turned out to be the main contributor to CHD incidence, doubling the caseload, accounting for 32% of the observed occupational differences. Contributing factors included greater job-related stress, reduced physical activity, and more frequent smoking, most likely exacerbated by the lack of workplace restrictions. These results put into question assumptions, particularly common in Western contexts, that high-ranking professionals have low cardiovascular risk. On the contrary, younger and top-level workers may face paradoxically elevated health risks, illustrating how the health effects of remote work are mediated by cultural, occupational, and behavioural factors. In contrast, the CHD and hypertension risk of adults aged 50–65 years did not manifest a noticeable increase. This segment of the population could profit from having a more familiar health regime, more self-determination, and less stress while adapting to new working conditions. Thus, the findings emphasise the role of age in the interpretation of the impact of remote work on health and underscore the need to develop targeted approaches that address these age-related differences.

In the Li et al. (2023) study on internet use among both workers and non-workers aged 45 years and above in China, daily internet use was associated with a reduced risk of hypertension (HR 0.78), stroke (HR = 0.69), and digestive disease (HR 0.73)

compared to nonusers. As the authors suggest, digital engagement (e.g. for health information or social interaction) can therefore also have positive effects on health outcomes of middle-aged and older individuals.

Further support comes from the Roczen Program, a digital time-restricted eating (TRE) intervention involving 660 workers from the United Kingdom (UK) public sector (mostly women, with an average age of 47 years and an average body mass index of 35 kg/m²) (Brown et al., 2024). Over 12 months, participants who remained in the programme exhibited all-round improvements in metabolic health: average weight loss was 9 kg, with half losing at least 10% of their body weight; those with type 2 diabetes reduced HbA1c levels (~11 mmol/mol); and reductions in waist circumference were also observed. There were reductions in binge eating and increases in cognitive restraint (the ability to consciously control food intake), both factors that can improve metabolic health in the long-term, and other improvements in eating behaviours. Systolic blood pressure also typically had modest reductions, which are clinically related to a decreased risk of cardiovascular events. Although outcomes by age were not disaggregated, the intervention offers promise across age groups—helping older workers with higher risks for diabetes and cardiovascular disease improve glycaemic and blood pressure control and enabling younger workers to manage their weight and empowering them to make lifestyle changes to prevent future chronic conditions.

In summary, these studies demonstrate the dual functionality of ‘digital life’; both as a potential health risk and an effective prevention mechanism. Remote work, particularly among younger, high-status/professionally mobile employees, may increase vulnerability to cardiovascular disease due to behavioural changes such as reduced physical activity, increased sedentary time, heightened occupational stress, and lifestyle disruptions. These risks underscore the need to closely monitor how work environments mediated by digital technology can inadvertently harm health.

Conversely, the digital sphere also offers valuable opportunities for prevention and health management. Regular internet use, access to health-related information, and participation in structured digital health interventions—such as the Roczen Program—can support positive behavioural change, promote physical well-being, and help manage or prevent chronic conditions.

As digital technologies become entrenched in both work and everyday life, the pressing task for policymakers, healthcare systems, and employers is to focus on the protective potential of digital tools while minimising the potential harms. Measures to do so will require targeted, age-appropriate strategies that acknowledge the heterogeneous health consequences of digital life and enable healthier habits for all sectors of the workforce.

11.5 Other Chronic Non-communicable Diseases and Digitalisation

Older workers increasingly face chronic non-communicable diseases (NCDs) as they age, and the rise of digital tools in daily life has complex implications for these health outcomes. The aforementioned Chinese study by Li et al. (2023) also found that daily internet users compared to nonusers exhibited significantly lower HR of developing arthritis, rheumatism, chronic lung disease, and asthma, ranging from 0.69 to 0.78. This apparent protective effect strengthened with more frequent usage, suggesting a possible dose–response relationship. Possible factors explaining this association, as supported by earlier studies cited by the authors, include the ability to access health information online, which may encourage individuals to adopt healthier behaviours. In addition, regular internet use can enhance communication and interaction among middle-aged and older adults, strengthening their interpersonal relationships. These improved social connections may have both direct and indirect effects on health-related behaviours and overall well-being. Similarly, older adults who engage frequently in online activities tend to maintain better functional health and independence, as digital access enables them to manage their health needs more effectively and remain socially connected.

These findings align with cross-sectional European data; in Poland, older internet users had a lower prevalence of chronic illnesses and disabilities than their offline counterparts (Duplaga, 2021). Notably, those with serious chronic conditions or frailty were less likely to be online in the first place, suggesting a ‘healthy user’ effect whereby healthier seniors are more digitally active. This selection effect complicates interpretation but underscores a consistent pattern: digital engagement tends to be linked with better physical health status among older individuals.

While the balance of recent evidence leans toward positive links between digital tool use and health in older adults, it is important to acknowledge mixed findings and potential confounders. Not all studies find uniformly beneficial effects. Excessive sedentary screen time, for example, could contribute to physical inactivity and weight gain. Most available data are observational; thus, causality cannot be definitively established. Longitudinal evidence strengthens confidence that ICT use precedes certain health benefits, but experimental or interventional studies are still needed.

In summary, emerging international research indicates that digitalisation in the lives of older workers is double-edged but predominantly associated with better chronic health outcomes. Regular use of the internet and other digital tools has been linked to lower risks of multiple chronic NCDs—ranging from cardiovascular and respiratory conditions to arthritis and depressive symptoms—as well as improved cognitive aging and reduced frailty.

11.6 Other Physical Symptoms and Digitalisation

Research studies have demonstrated that the workplace environment is closely related to a worker's physiological well-being (Srinivasan et al., 2023; Wilson, 2014). Among environmental risk factors, sound level is considered a significant contributor to adverse health outcomes, including hypertension, coronary heart disease, stroke, diabetes, and disturbances in communication, rest, and sleep (Van Kempen et al., 2017; WHO Regional Office for Europe, 2018). Occupational noise refers to disruptive or harmful sounds present in the workplace that can hinder normal activities. This noise often comes from machinery, equipment, and tools used in industrial operations. In these settings, workers are often exposed to persistent or sudden bursts of noise that can surpass levels capable of causing hearing damage, potentially leading to hearing loss and other health issues (Kanu et al., 2025). In accordance with the evidence on the effects of personal listening devices on permanent hearing loss from leisure noise, the WHO Guideline Development Group recommend a yearly average guideline exposure level of 70 dB from all noise sources combined (WHO Regional Office for Europe, 2018), while long-term exposures, through headsets, to noise (sounds) at levels of >85 dB, similar to such exposures from other sources, are associated with the risk of noise-induced hearing loss (Pawlaczyk-Luszczynska et al., 2022).

Some of the physiological effect of noise exposure other than hearing loss, especially lack of attention, interferences with memory, and sleep impairment are also related to the performance (productivity) that workers will have at their workplaces. Older workers are often more vulnerable to these noise exposure effects as many have already experienced some degree of 'natural' hearing loss as a result of the aging process. Additionally, older individuals may also be more psychologically sensitive to noise, making them more prone to stress or discomfort in noisy environments (Arezes et al., 2015). According to the Eurotrak surveys and other estimations, in 2021–2023, on average, an estimated 11% of the population of the European Union, Norway, Switzerland, and UK, or 59 million people, had hearing loss (Laureyns et al., 2024). Among the population of 65 years and above, this proportion rises to 20.7%. Luxemburg and Ireland are at the lower end with a prevalence of self-reported hearing loss of 7% (and 15% among adults aged 65 years and above). Italy has the highest percentage of the population aged 65 years and above (23.8%), and a high prevalence of self-reported hearing loss of the general population (12.5%). Croatia and Bulgaria have the highest prevalence of self-reported hearing loss, 15.1% and 15.6% respectively. According to a study performed in the United States, the overall hearing loss prevalence in 1999–2018 was 19.1%. The prevalence of hearing loss decreased for individuals aged 20–69 years from 15.6% in 1999–2000 to 14.9% in 2015–2016; for those adults aged 70 years and above the prevalence decreased from 79.9% in 2005–2006 to 64.5% in 2017–2018. Participants with hearing loss were likely to be older, male, non-Hispanic white, and to have not completed high school. Mild hearing loss was more prevalent among those aged 20–79 years (Mo et al., 2024).

Although previous research on environmental noise has focused mostly on industrial settings (e.g., manufacturing, construction), moderate levels of workplace sound also has affects in other workplace settings. For instance, Wilson (2014) reported on hearing loss among radiation technologists of both women and men, aged 50 years and above in British Columbia. The respondents in the study expressed frustration over constant workplace noise and its negative impact on the work environment. The radiologists also complained about aches/pains and worsening eyesight affecting their work, especially when using progressive lenses. Findings on sound levels and well-being are supported by Srinivasan et al. (2023) who analysed the effect of sound levels on 231 public institution workers in the United States, aged from 30 to 60+ and found that sound levels at or above 50 dBA increase variability in anxiety levels. Factors such as age, body mass index, high blood pressure and intensive computer use contributed to interpersonal differences in the sound-wellbeing association.

A recent study conducted in Poland included 213 employees—21 workers of the furniture industry, 15 court transcribers and 177 call centre operators—aged 19–55 years, who had been working with headsets for up to 25 years. The workers were exposed to daily noise levels ranging from 57 to 96 dB, with 1.4% of the call centre operators experiencing levels exceeding 85 dB. A notable impact of age, gender, daily noise exposure, and job tenure on hearing test results was observed among call centre operators and transcribers. The most significant factors were age and gender, whereas the impact of daily noise exposure level was less evident (Pawlaczyk-Łuszczynska et al., 2022).

In recent years, significant advancements in noise reduction and control systems have emerged, driven by a growing awareness and scientific evidence of the health risks associated with noise exposure, as well as the implementation of stricter regulations. A wide range of solutions are now available to minimise occupational noise exposure. Technically, these solutions generally fall into two categories: passive and active.

Passive noise control, also known as classical methods, relies on the mechanical properties or acoustical behaviour of materials. These include insulation, silencers, vibration mounts, damping treatments, absorptive materials like ceiling tiles, and conventional mufflers (commonly used in the automotive industry). While often effective, passive methods do not always provide sufficient sound attenuation. Moreover, they can be bulky, heavy, and costly, making them impractical for certain challenging environments or specific applications.

Active noise control (ANC), by contrast, is an emerging and promising technology in acoustics. ANC systems work by generating sound waves that cancel out unwanted noise and have been successfully implemented in personal devices like headsets. However, current ANC technology is mainly limited to small, personal areas and it is less effective in cancelling high-frequency noise or operating in larger environments. Recent innovations have aimed to develop ANC solutions for localised personal zones, such as car seats, although this technology is still evolving (Arezes et al., 2015).

11.7 Discussion and Conclusion

The evidence reviewed in this chapter illustrates the dual nature of digitalisation for the physical health of older workers. Across domains such as musculoskeletal disorders, visual health, cardiovascular and metabolic outcomes, and other chronic conditions, findings reveal both opportunities and risks. On the one hand, technological tools—ranging from virtual reality systems (Alves et al., 2023) to posture-feedback software (Taieb-Maimon et al., 2012) and digital health programmes (Brown et al., 2024)—can help reduce age-related constraints, extend working life and increase participation. Yet, the same digitalisation processes may exacerbate existing vulnerabilities, particularly when combined with inadequate ergonomics (Montreuil & Lippel, 2003; Rodrigues et al., 2017), low digital literacy (Komp-Leukkunen et al., 2022), and prolonged sedentary behaviour (Zaitis et al., 2024). This tension underscores the need for nuanced, context-specific strategies that account for diverse experiences of older workers.

From a critical point of view, one limitation of current research is its inconsistent treatment of age as a determining factor. Some studies identify clear age-related patterns, such as cardiovascular risk differences between younger and older remote workers (Zaitis et al., 2024). Others, notably in visual health, suggest that usage patterns (e.g., prolonged screen exposure) are more influential than chronological age itself (Cantó-Sancho et al., 2023; Honda et al., 2019). This implies that age often acts more as a proxy for interrelated factors—such as accumulated occupational exposure, health status or digital competence—than as a direct cause of the disease. A more sophisticated analytical approach, incorporating life-course perspectives and multilevel determinants, would provide a more robust basis for targeted interventions.

Much of the evidence remains observational, raising questions about causality, despite promising intervention outcomes. For instance, the positive link between Internet use and health (Duplaga, 2021; Li et al., 2023) may reflect selection bias, as healthier individuals are more likely to use digital tools. Conversely, adverse effects—such as increased musculoskeletal symptoms in high-frequency teleworking (Oakman et al., 2023)—may be mediated by modifiable factors, including workstation design or task organisation.

In increasingly digitalised workplaces, employers have a central responsibility to mitigate health risks among older workers. This involves not only recognising the unique vulnerabilities associated with aging—such as musculoskeletal (MSS) decline, visual impairments, and cardiovascular risks—but also implementing systematic interventions to address these challenges. Regular occupational health assessments—including vision, MSS, and cardiovascular screening—should be a standard component of workplace health programmes (Li et al., 2023; Okunribido et al., 2011). Furthermore, employers should also provide (older) workers training in the safe and effective use of digital technologies, as inadequate skills can exacerbate work-related stress and physical health risks (Christensen & Johannessen, 2024; Komp-Leukkunen et al., 2022).

Ergonomic workplace adaptations are essential to supporting the physical well-being of older employees. Workstations should meet established ergonomic standards and be adjustable to accommodate older employees, including adjustable chairs, desks, monitor stands, and adequate lighting (Rodrigues et al., 2017). Assistive technologies such as virtual reality systems and voice-activated tools can support task performance while minimising physical strain (Alves et al., 2023). For teleworkers, organisations should supply guidelines and resources for ergonomically sound home offices to reduce risks of MSS disorders associated with poor workstation design (Montreuil & Lippel, 2003; Oakman et al., 2023).

Promoting active work habits is another preventive strategy. Employers should encourage regular movement throughout the workday by supporting micro-breaks, posture changes, and physical activity. Digital reminders, posture correction software, and activity tracking devices can facilitate the integration of these practices into daily routines (Taieb-Maimon et al., 2012). Access to digital health programmes, such as virtual exercise sessions or time-restricted eating initiatives, can also support cardiovascular and metabolic health by addressing key risk factors linked to sedentary work and ageing (Brown et al., 2024; Zaitis et al., 2024).

Building digital literacy and promoting inclusive technology are equally important. Tailored training programmes should be developed to strengthen older workers' confidence and competence in using workplace technologies, reducing the risk of exclusion and associated stress (Bordi et al., 2018; Mok et al., 2023). Actively involving older employees in the design and evaluation of workplace technologies helps ensure their diverse visual, cognitive, and physical needs are met (Alves et al., 2023). Such participatory approaches contribute to more inclusive digital work environments (Komp-Leukkunen et al., 2022).

Policy frameworks must also prioritise age-friendly digital workplaces. Governments and organisations should establish standards that encourage the development and adoption of accessible and adaptable digital tools, such as adjustable font sizes on monitors to accommodate age-related vision decline (Wilson, 2014). Policies mandating employer-provided ergonomic assessments and interventions for both on-site and remote work are vital. In this context, blended work may be especially beneficial for older workers who wish to remain in employment for financial or social motives, but are limited by health conditions or care responsibilities (Damman, 2016). Furthermore, initiatives that promote lifelong learning and upskilling in digital competencies are critical to ensuring that older workers can fully engage with evolving technologies (Mok et al., 2023). Finally, equitable access to digital health promotion programmes and assistive technologies must be guaranteed through regulatory measures ensuring these resources are both affordable and widely available (Li et al., 2023).

In conclusion, future research should prioritise longitudinal and intervention-based studies to clarify causal pathways, while practice should focus on integrating technological innovation with ergonomic, inclusive, and health-promoting policies. Without such integration, digitalisation risks widening, rather than closing, health inequalities in an ageing workforce whose diverse needs and skills are often under-recognised.

References

- Alturaiki, H. M., Alnajjar, J. S., Alibrahim, I. A., Almuhsayn, F. A., El Gaddafi, M. W., Almarzoq, M. A., Alturaiki, F. M., & Aleid, S. S. (2023). Computer vision syndrome among the general population in the eastern region of Libya: Prevalence and risk factors. *Cureus*, 15(11), e48777. <https://doi.org/10.7759/cureus.48777>
- Alves, J., Lima, T. M., & Gaspar, P. D. (2023). Novel design of assistive technologies based on the interconnection of motion capture and virtual reality systems to foster task performance of the ageing workforce. *Designs*, 7(1), 23. <https://doi.org/10.3390/designs7010023>
- Arezes, P., Pereira, G., Kroger, M., & Sampaio, P. (2015). Mitigating the impact of occupational noise exposure for elderly workers: Setting the functional requirements for an ANC system. *Procedia Manufacturing*, 3, 4565–4571. <https://doi.org/10.1016/j.promfg.2015.07.473>
- Bordi, L., Okkonen, J., Mäkinemi, J.-P., & Heikkilä-Tammi, K. (2018). Communication in the digital work environment: Implications for wellbeing at work. *Nordic Journal of Working Life Studies*, 8(S3). <https://doi.org/10.18291/njwls.v8iS3.105275>
- Bregenzner, A., & Jimenez, P. (2021). Risk factors and leadership in a digitalized working world and their effects on employees' stress and resources: Web-based questionnaire study. *Journal of Medical Internet Research*, 23(3), e24906. <https://doi.org/10.2196/24906>
- Brown, A., Dobbie, L. J., Falvey, L., Patel, D. C., Kwan, J. T., Steinmo, S., Chow, L., & McGowan, B. M. (2024). Real-world data of a digitally enabled, time-restricted eating weight management program in public sector workers living with overweight and obesity in the United Kingdom: A service evaluation of the Roczen program. *Obesity Science & Practice*, 10(1), e730. <https://doi.org/10.1002/osp4.730>
- Burnay, N., Patyan, L., & Pierre, A. (this volume). Digitalisation and older family home care workers in Belgium and Hungary: When ethical debates erase age at work. In C. Krekula, D. Šoitū, & M. Lakomý (Eds.), *Older workers in a digital era*. Springer.
- Calzavara, M., Battini, D., Bogataj, D., Sgarbossa, F., & Zennaro, I. (2020). Ageing workforce management in manufacturing systems: State of the art and future research agenda. *International Journal of Production Research*, 58(3), 729–747. <https://doi.org/10.1080/000207543.2019.1600759>
- Cantó-Sancho, N., Porru, S., Casati, S., Ronda, E., Seguí-Crespo, M., & Carta, A. (2023). Prevalence and risk factors of computer vision syndrome—Assessed in office workers by a validated questionnaire. *PeerJ*, 11, e14937. <https://doi.org/10.7717/peerj.14937>
- Cazan, A.-M. (2020). The digitization of working life: Challenges and opportunities. *Psihologia Resurselor Umane*, 18(1), 3–6. <https://doi.org/10.24837/pru.v18i1.457>
- Christensen, J. O., & Johannessen, H. (2024). Is new tech a pain in the neck? The impact of introducing new technologies in home-care on neck pain: A prospective study. *BMC Public Health*, 24(1), 734. <https://doi.org/10.1186/s12889-024-18252-z>
- Collino, S., Martin, F.-P., Karagounis, L. G., Horcajada, M. N., Moco, S., Franceschi, C., Kussmann, M., & Offord, E. (2013). Musculoskeletal system in the old age and the demand for healthy ageing biomarkers. *Mechanisms of Ageing and Development*, 134(11–12), 541–547. <https://doi.org/10.1016/j.mad.2013.11.003>
- Damman, M. (2016). Blended work and employment participation of older workers: A further discussion. *Work, Aging and Retirement*, 2(4), 384–389. <https://doi.org/10.1093/workar/waw022>
- Duplaga, M. (2021). The association between internet use and health-related outcomes in older adults and the elderly: A cross-sectional study. *BMC Medical Informatics and Decision Making*, 21(1), 150. <https://doi.org/10.1186/s12911-021-01500-2>
- Haddad, C., Zakhour, M., Sacre, H., Karam, J., El Khatib, S., Akel, M., & Salameh, P. (2024). Perceived advantages and drawbacks of teleworking during the economic crisis and COVID-19: A cross-sectional study among university degree holders. *Archives of Environmental & Occupational Health*, 79(2), 91–105. <https://doi.org/10.1080/19338244.2024.2366815>
- Honda, T., Nakagawa, T., Watanabe, Y., Hayashi, T., Nakano, T., Horie, S., & Tatemichi, M. (2019). Association between information and communication technology use and ocular axial length

- elongation among middle-aged male workers. *Scientific Reports*, 9(1), 17489. <https://doi.org/10.1038/s41598-019-53423-8>
- Kanu, L. K., Lwara, S. M. K., & Meng, X. (2025). Impacts of workplace noise exposure and mitigation strategies: A scoping review. *Discover Public Health*, 22(1), 1–27.
- Komp-Leukkunen, K., Poli, A., Hellevik, T., Herlofson, K., Heuer, A., Norum, R., Solem, P. E., Khan, J., Motel-Klingebiel, A., & Rantanen, V. (2022). Older workers in digitalizing workplaces: A systematic literature review. *The Journal of Aging and Social Change*, 12(2), 37–59. <https://doi.org/10.18848/2576-5310/CGP/v12i02/37-59>
- Kooij, D. T. A. M., Zacher, H., Wang, M., & Heckhausen, J. (2020). Successful aging at work: A process model to guide future research and practice. *Industrial and Organizational Psychology*, 13(3), 345–365. <https://doi.org/10.1017/iop.2020.1>
- Laureyns, M., Bisgaard, N., Bobeldijk, M., & Zimmer, S. (2024). Getting the numbers right on hearing loss hearing care and hearing aid use in Europe. Joint AEA/EFHOH/EHIMA report. Retrieved July 1, 2025, from <https://www.ehima.com/wp-content/uploads/2024/03/Getting-the-numbers-right-on-Hearing-Loss-Hearing-Care-and-Hearing-Aid-Use-in-Europe-2024.pdf>
- Li, P., Zhang, C., Gao, S., Zhang, Y., Liang, X., Wang, C., Zhu, T., & Li, W. (2023). Association between daily internet use and incidence of chronic diseases among older adults: Prospective cohort study. *Journal of Medical Internet Research*, 25, e46298. <https://doi.org/10.2196/46298>
- Mo, F., Zhu, S., Jia, H., Xia, Y., Lang, L., Zheng, Q., Yuan, X., Wu, S., Bai, Y., Yang, W., Wang, L., & Chen, Q. (2024). Trends in prevalence of hearing loss in adults in the USA 1999–2018: A cross-sectional study. *BMC Public Health*, 24(1), 976. <https://doi.org/10.1186/s12889-024-18426-9>
- Mok, I., Mackenzie, L., & Thomson, K. (2023). The experiences of human resource professionals in managing career development of an ageing workforce: A narrative thematic analysis. *Qualitative Research in Organizations and Management: An International Journal*, 18(1), 67–83. <https://doi.org/10.1108/QROM-09-2021-2217>
- Montreuil, S., & Lippel, K. (2003). Telework and occupational health: A Quebec empirical study and regulatory implications. *Safety Science*, 41(4), 339–358.
- Oakman, J., Lambert, K. A., Weale, V. P., Stuckey, R., & Graham, M. (2023). The effect of preference and actual days spent working from home on stress and musculoskeletal pain in older workers. *International Archives of Occupational and Environmental Health*, 96(8), 1113–1121. <https://doi.org/10.1007/s00420-023-01992-7>
- Obermayer, N. D., Csizmadia, T. D., & Banász, Z. D. (2022). Companies on thin ice due to digital transformation: The role of digital skills and human characteristics. *International and Multidisciplinary Journal of Social Sciences*, 11(3), 88–118. <https://doi.org/10.17583/rimcis.10641>
- Okunribido, O. O., Wynn, T., & Lewis, D. (2011). Are older workers at greater risk of musculoskeletal disorders in the workplace than young workers? – A literature review. *Occupational Ergonomics*, 10(1–2), 53–68. <https://doi.org/10.3233/OER-2011-0192>
- Panel on Musculoskeletal Disorders and the Workplace, Commission on Behavioral and Social Sciences and Education, National Research Council, & Institute of Medicine. (2001). *Musculoskeletal disorders and the workplace: Low back and upper extremities*. National Academies Press.
- Pawlaczyk-Luszczynska, M., Dudarewicz, A., Zaborowski, K., & Zamojska-Daniszevska, M. (2022). Noise exposure and hearing status among employees using communication headsets. *International Journal of Occupational Medicine and Environmental Health*, 35(5), 585–614. <https://doi.org/10.13075/ijomeh.1896.01817>
- Pichainarongk, S., & Bidaisee, S. (2025). Assessment of quality of life and work motivation among the aging workforce in Suphan Buri, Thailand. *Journal of Population and Social Studies [JPSS]*, 33, 544–561. <https://doi.org/10.25133/jpssv332025.029>
- Rodrigues, M. S. A., Leite, R. D. V., Lelis, C. M., & Chaves, T. C. (2017). Differences in ergonomic and workstation factors between computer office workers with and without reported musculoskeletal pain. *Work*, 57(4), 563–572. <https://doi.org/10.3233/WOR-172582>

- Schleifer, L. M., Ley, R., & Spalding, T. W. (2002). A hyperventilation theory of job stress and musculoskeletal disorders. *American Journal of Industrial Medicine*, 41(5), 420–432. <https://doi.org/10.1002/ajim.10061>
- Sell, L., Lund, H., Holtermann, A., & Sjøgaard, K. (2016). The effect on work ability of a tailored ergonomic learning program. *Work*, 53(2), 357–366. <https://doi.org/10.3233/WOR-152228>
- Shubayr, N., & Alashban, Y. (2022). Musculoskeletal symptoms among radiation technologists in Saudi Arabia: Prevalence and causative factors. *Acta Radiologica*, 63(4), 497–503. <https://doi.org/10.1177/02841851211004428>
- Spijker, J. J. A., Barlin, H., Dritsaki, M., Gu, Y., Klavina, A., Korkmaz Yaylagul, N., Kulla, G., Mercan, M. A., Orhun, E., Sevcikova, A., Unim, B., Yildizer, G., & Tofan, C. M. (2025). The impact of digital technology on the physical health of older workers: A scoping review. *JMIR Aging*, 8, e78406. <https://doi.org/10.2196/78406>
- Srinivasan, K., Currim, F., Lindberg, C. M., Razjouyan, J., Gilligan, B., Lee, H., Canada, K. J., Goebel, N., Mehl, M. R., Lunden, M. M., Heerwagen, J., Najafi, B., Sternberg, E. M., Kampschroer, K., & Ram, S. (2023). Discovery of associative patterns between workplace sound level and physiological wellbeing using wearable devices and empirical Bayes modeling. *npj Digital Medicine*, 6(1), 5. <https://doi.org/10.1038/s41746-022-00727-1>
- Taieb-Maimon, M., Cwikel, J., Shapira, B., & Orenstein, I. (2012). The effectiveness of a training method using self-modeling webcam photos for reducing musculoskeletal risk among office workers using computers. *Applied Ergonomics*, 43(2), 376–385. <https://doi.org/10.1016/j.apergo.2011.05.015>
- Van Kempen, E., Casas, M., Pershagen, G., & Foraster, M. (2017). *Cardiovascular and metabolic effects of environmental noise: Systematic evidence review in the framework of the development of the WHO environmental noise guidelines for the European region*. RIVM Report 2017-0078. Bilthoven, The Netherlands: RIVM. Available from: <https://www.rivm.nl/bibliotheek/rapporten/2017-0078.pdf>
- Van Yperen, N. W., & Wörtler, B. (2017). Blended working and the employability of older workers, retirement timing, and bridge employment. *Work, Aging and Retirement*, 3(1), 102–108. <https://doi.org/10.1093/workar/waw036>
- Wang, C., Zhang, Y., & Feng, J. (2024). How do older employees achieve successful ageing at work through generativity in the digital workplace? A self-affirmation perspective. *Journal of Occupational and Organizational Psychology*, 97(4), 1475–1501. <https://doi.org/10.1111/joop.12525>
- WHO Regional Office for Europe. (2018). *Environmental noise guidelines for the European region*. WHO Regional Office for Europe.
- Wilson, F. A., Wang, Y., Stimpson, J. P., Kessler, A. S., Do, D. V., & Britigan, D. H. (2014). Disparities in visual impairment by immigrant status in the United States. *American Journal of Ophthalmology*, 158(4), 800–807. e805. <https://doi.org/10.1016/j.ajo.2014.07.007>
- Wilson, J. (2014). Old hands, new terrain: Examining the concerns and challenges of the mature radiation therapist in British Columbia. *Journal of Medical Imaging and Radiation Sciences*, 45(3), 283–290. <https://doi.org/10.1016/j.jmir.2014.05.002>
- Zaitsu, M., Ishimaru, T., Tsushima, S., Muramatsu, K., Ando, H., Nagata, T., Eguchi, H., Tateishi, S., Tsuji, M., & Fujino, Y. (2024). Incidence of coronary heart disease among remote workers: A nationwide web-based cohort study. *Scientific Reports*, 14(1), 8415.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

