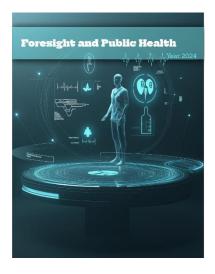
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The Future of Occupational Health: Anticipating Risks in the Evolving Workplace

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ABSTRACT

This study aims to examine emerging occupational health risks in evolving workplace environments and explore strategic interventions to enhance worker well-being, safety, and resilience. A narrative review using a descriptive analysis method was conducted to synthesize recent literature on occupational health challenges, including technological advancements, workplace transformations, and psychosocial risks. Sources published between 2020 and 2025 were reviewed from peer-reviewed journals, policy reports, and health organization databases. The study focused on three primary dimensions: physical risks, psychosocial risks, and environmental and biological hazards. Additionally, policy and regulatory considerations were analyzed to assess gaps and future recommendations for workplace health protections. The study highlights the impact of automation, artificial intelligence, and digitalization on occupational health, identifying increased cognitive workload, digital fatigue, and workplace stress as critical emerging risks. The rise of remote work and gig-based employment has led to concerns regarding ergonomic health, social isolation, and job insecurity. Additionally, climate change and emerging pathogens pose significant health threats to workers in various industries. Current occupational health regulations fail to comprehensively address these challenges, particularly in non-traditional employment settings. Advances in workplace health strategies, including Al-driven health monitoring, flexible work policies, and mental health support programs, show promise in mitigating risks, but their ethical implementation requires careful regulatory oversight. Occupational health risks are evolving alongside technological and workplace transformations, necessitating proactive policies, employer-driven interventions, and enhanced regulatory frameworks. Addressing these challenges requires a multidisciplinary approach that integrates workplace safety, mental health support, and ethical AI governance. Future research should focus on the long-term effects of automation and climate-related occupational risks, ensuring that workplace health policies remain adaptive and inclusive.

Keywords: Occupational health, workplace safety, automation, artificial intelligence, digital fatigue, workplace stress, job insecurity, mental health, workplace policies, occupational risk management.

Introduction

Occupational health is a multidisciplinary field that focuses on protecting and promoting the well-being of workers by addressing physical, psychological, and social factors that influence workplace safety and productivity. Traditionally, occupational health has been concerned with preventing injuries and illnesses caused by hazardous working conditions,

but in recent years, its scope has expanded to include mental health and overall well-being. With the rise of remote work and hybrid models, employees are increasingly facing new challenges such as prolonged screen exposure, musculoskeletal strain, and work-related stress, necessitating a broader approach to workplace health (Steenkamp, 2025). Studies have shown that workplace well-being directly affects employee retention, job performance, and organizational efficiency, emphasizing the need for comprehensive strategies to safeguard worker health in evolving job environments (Smith, 2025).

The nature of workplace environments has undergone rapid changes due to globalization, technological advancements, and shifts in employment structures. The increasing use of automation and artificial intelligence in industries has reduced the prevalence of traditional physical labor but has also introduced concerns regarding job displacement and new forms of occupational stress (Mercado-Aravena, 2025). The rise of the gig economy and remote work has provided employees with flexibility but has also led to concerns about work-life balance, digital overload, and isolation (Kock, 2025). Research indicates that workplace stressors related to job insecurity, high performance expectations, and constant digital connectivity are key contributors to burnout and mental health deterioration (Kanda et al., 2025). Additionally, environmental and social factors, such as air quality in office spaces, workplace discrimination, and lack of proper ergonomic design, continue to impact employee health outcomes (Islam, 2025). These evolving risks highlight the need for updated policies and interventions that align with contemporary workplace structures and employee needs.

Despite growing awareness of occupational health concerns, research has not yet fully addressed the long-term implications of modern workplace transformations. While many studies focus on traditional occupational risks such as physical strain and chemical exposures, fewer have examined the intersection of digitalization, mental health, and workplace safety in depth (Dhanpat, 2025). Furthermore, existing regulatory frameworks often fail to adequately protect workers in non-traditional employment arrangements, such as freelancers and gig workers, leaving gaps in occupational health coverage (Charisi et al., 2025). Another critical gap in research is the lack of cross-industry comparisons that assess how different sectors are adapting to emerging occupational health risks and the effectiveness of workplace interventions (Yudiarti & Basrowi, 2024). Understanding these gaps is essential for developing holistic approaches that ensure workplace safety in both traditional and modern employment settings.

This study aims to explore the future of occupational health by identifying emerging risks in evolving workplaces and assessing their potential impact on employee well-being. By analyzing recent research on occupational health trends, this review will provide insights into how businesses, policymakers, and researchers can proactively address future challenges. The focus will be on integrating mental health considerations, workplace safety measures, and regulatory advancements to create sustainable and healthy work environments. Through a comprehensive discussion of contemporary workplace health dynamics, this study seeks to contribute to ongoing efforts to improve occupational well-being and foster long-term employee resilience.

Methods and Materials

This study employs a narrative review methodology with a descriptive analysis approach to examine the evolving risks in occupational health within the modern workplace. Given the rapid transformations in work environments due to technological advancements, globalization, and socio-economic changes, this review synthesizes recent literature to anticipate future challenges and propose potential interventions. The study does not aim to conduct a systematic review with strict inclusion criteria but instead provides a broad yet critical discussion of emerging occupational health concerns. By exploring literature published between 2020 and 2025, the study identifies key patterns, risk factors, and occupational health trends in contemporary and future workplaces. The scope encompasses various industries, including corporate sectors, manufacturing, healthcare, and gig-based employment, ensuring a comprehensive understanding of occupational health within diverse professional settings.

The data for this narrative review were collected from peer-reviewed journal articles, reports from international health organizations, government policy documents, and reputable industry publications. Sources were obtained from

databases such as PubMed, Scopus, Web of Science, and Google Scholar to ensure academic rigor and relevance. The keywords used for the search included "occupational health risks," "future workplace hazards," "mental health in remote work," "AI and automation in workplace safety," "ergonomics in hybrid work models," and "public health and workplace transformation." The selection criteria focused on articles published between 2020 and 2025 to ensure the study reflects the latest findings and discussions on occupational health trends. Studies were prioritized based on their relevance to emerging occupational health risks, technological and organizational transformations, and preventive strategies for maintaining workplace well-being. Reports from institutions such as the World Health Organization (WHO), International Labour Organization (ILO), and National Institute for Occupational Safety and Health (Kalantari et al.) were also incorporated to provide a regulatory and policy-oriented perspective. Articles that were outdated, regionally limited without generalizability, or lacked empirical evidence were excluded to maintain the integrity and contemporary relevance of the review.

The descriptive analysis method was applied to synthesize the data collected from various sources, allowing for an interpretative discussion of trends, challenges, and potential solutions in occupational health. The review categorizes findings into three core dimensions: physical health risks, psychosocial risks, and technological impacts on occupational health. Each dimension is critically analyzed based on the literature, identifying common themes, gaps in research, and areas requiring further exploration. The narrative synthesis approach facilitates the integration of multiple perspectives, highlighting patterns in occupational health research without the constraints of quantitative meta-analysis. Furthermore, a comparative analysis was conducted to examine how different industries are adapting to these emerging challenges and whether regulatory frameworks are evolving in response to new workplace risks. The analysis also considers regional variations in workplace health policies and the extent to which global trends are shaping occupational health standards. By structuring the discussion around future risks and policy recommendations, the study contributes to the ongoing discourse on workplace well-being, providing insights for researchers, policymakers, and organizational leaders to develop proactive strategies in occupational health management.

The Changing Nature of Work and Occupational Health

The evolution of work environments in the past decade has been largely shaped by digital transformation, automation, and artificial intelligence. The widespread adoption of smart technologies in various industries has altered traditional job structures, creating a shift from manual labor to digital and knowledge-based work. Artificial intelligence and machine learning have been integrated into organizational processes, reducing human intervention in repetitive tasks but simultaneously introducing new occupational health challenges (Steenkamp, 2025). While automation has enhanced efficiency and reduced exposure to hazardous physical conditions in industries such as manufacturing and logistics, it has also led to an increase in cognitive workload, job displacement concerns, and stress related to technological adaptation (Smith, 2025). Employees in sectors heavily reliant on automation often experience heightened uncertainty regarding job security, which has been linked to mental health challenges such as anxiety and depression (Mercado-Aravena, 2025). Additionally, the demand for continuous upskilling and digital literacy to remain employable in a technology-driven labor market has created significant psychological pressure for workers (Kock, 2025).

The use of artificial intelligence in workplaces has also introduced ethical and psychological concerns related to workplace monitoring and performance assessments. AI-driven surveillance systems are increasingly being used to track employee productivity, behavior, and decision-making patterns, leading to feelings of constant scrutiny and diminished autonomy (Kanda et al., 2025). Research indicates that excessive digital surveillance in the workplace can contribute to employee disengagement and reduced motivation, as workers may perceive such monitoring as intrusive and detrimental to their sense of professional agency (Islam, 2025). Furthermore, the integration of AI-driven decision-making processes in human resources and management has raised concerns about bias, fairness, and the emotional toll of algorithmic evaluations on employees (Dhanpat, 2025). Studies suggest that workers subjected to algorithmic management report higher levels of stress due to reduced human interaction, lack of transparency in evaluations, and

increased job insecurity (Charisi et al., 2025). These factors underscore the need for organizations to develop ethical frameworks that ensure AI integration in workplaces does not compromise employee well-being or mental health.

The rise of remote work, the gig economy, and hybrid workplaces has further redefined the occupational health landscape. The COVID-19 pandemic accelerated the transition to remote work, making it a permanent or semi-permanent model for many industries. While remote work has provided employees with increased flexibility and autonomy, it has also introduced new occupational health risks related to isolation, digital overload, and work-life balance disruptions (Yudiarti & Basrowi, 2024). Many remote workers experience difficulty in maintaining clear boundaries between professional and personal life, leading to extended working hours, higher stress levels, and reduced overall well-being (Ustinova et al., 2024). The lack of in-person social interactions in remote work settings has also contributed to feelings of loneliness, with research showing a correlation between prolonged remote work and declining mental health (Terry, 2024). Additionally, ergonomic concerns associated with home office setups have resulted in an increase in musculoskeletal disorders, particularly among employees who lack proper workstations or ergonomic training (Srivastava et al., 2024).

The gig economy, which consists of independent contractors, freelancers, and temporary workers, has seen exponential growth in recent years, creating both opportunities and challenges for occupational health. Gig workers often lack access to employer-provided health benefits, workplace safety measures, and mental health support systems, making them more vulnerable to health risks (Salim & Basrowi, 2024). Studies indicate that the unpredictability of gig work, coupled with income instability, has contributed to heightened stress, anxiety, and burnout among workers in this sector (S., 2024). The absence of legal protections for gig workers in many regions further exacerbates these issues, leaving them without access to basic workplace rights such as paid sick leave and occupational health resources (Rasheed & Rida, 2024). Additionally, gig workers frequently experience long working hours, excessive workloads, and inadequate rest periods, all of which have been linked to adverse health outcomes (Peace, 2024).

Hybrid work models, which combine in-office and remote work arrangements, have emerged as a popular solution to balance workplace flexibility and productivity. However, these models also present unique occupational health challenges. Employees working under hybrid arrangements often struggle with inconsistent work routines, leading to difficulties in maintaining a structured daily schedule (O'Brien, 2024). Research suggests that employees in hybrid settings may experience increased work-related stress due to the expectation of being constantly available both online and in-office, resulting in cognitive exhaustion and difficulty disconnecting from work (Newsome et al., 2024). Furthermore, hybrid work models have created disparities in workplace engagement, where remote workers may feel excluded from decision-making processes and career advancement opportunities compared to their in-office counterparts (Luintel, 2024). The psychological impact of this divide can lead to decreased job satisfaction and lower levels of professional fulfillment (Kelly et al., 2024).

The psychological and social implications of evolving work environments are becoming increasingly evident as work structures continue to change. Workplace stress, burnout, and mental health disorders have become prominent concerns in modern labor markets, affecting employee performance and overall job satisfaction (Judijanto et al., 2024). Increased reliance on digital communication tools has led to constant connectivity, reducing opportunities for employees to mentally disengage from work-related responsibilities (Judijanto, 2024). Studies indicate that excessive screen time and prolonged exposure to virtual meetings contribute to digital fatigue, cognitive overload, and decreased workplace productivity (Hori et al., 2024). Additionally, the shift toward remote collaboration has altered workplace relationships, leading to challenges in team cohesion, trust-building, and effective communication among colleagues (Hanvold, 2024).

Another significant psychological concern in evolving workplaces is the rise of workplace discrimination and unequal access to career opportunities. The adoption of digital hiring and AI-driven recruitment processes has raised concerns about algorithmic biases that may disadvantage certain demographic groups (Gibson et al., 2024). Remote workers, particularly women and individuals from underrepresented communities, often face barriers in securing promotions and leadership positions due to reduced visibility in organizational networks (Fogarty et al., 2024). The lack of structured mentorship programs and professional development opportunities for remote employees has contributed to workplace

inequality and job dissatisfaction (El-Osta et al., 2024). Addressing these social disparities requires organizations to implement inclusive workplace policies that ensure equal opportunities for all employees, regardless of their work arrangement or geographic location (Arsule & Pawar, 2024).

As workplaces continue to evolve, it is essential for organizations, policymakers, and occupational health professionals to adapt strategies that mitigate the negative effects of digital transformation, automation, and changing work models. The implementation of mental health support programs, workplace wellness initiatives, and ethical AI governance frameworks will play a crucial role in ensuring that occupational health remains a priority in the future of work. Organizations must foster a culture that promotes employee well-being, resilience, and engagement while addressing the emerging risks associated with evolving labor environments. By understanding the implications of technological advancements and structural changes in work settings, stakeholders can develop proactive interventions that enhance employee health, productivity, and overall job satisfaction.

Emerging Risks and Health Challenges

The evolving nature of work has introduced a range of new occupational health risks that require urgent attention. As industries integrate more technology into their operations and employees increasingly adopt remote and hybrid work models, emerging physical, psychosocial, biological, and environmental risks have begun to shape workplace health dynamics. These risks extend beyond traditional workplace hazards, affecting employees in both digital and physical workspaces. The transition toward more sedentary jobs, heightened work-related stress, exposure to industrial and environmental hazards, and the ongoing impact of climate change and global health threats all contribute to a complex and shifting occupational health landscape. Addressing these risks requires organizations, policymakers, and health professionals to adopt forward-thinking strategies that prioritize both physical and mental well-being in modern work environments.

The increased reliance on digital work has led to a rise in ergonomic challenges, particularly among remote and office-based employees. Poorly designed workspaces, lack of ergonomic furniture, and prolonged screen exposure have contributed to musculoskeletal disorders, including chronic back pain, neck strain, and carpal tunnel syndrome (Steenkamp, 2025). Many remote workers, in particular, operate from makeshift home office setups that lack proper ergonomic support, increasing their risk of developing posture-related health conditions over time (Smith, 2025). Studies have found that improper seating arrangements and non-adjustable workstations significantly contribute to musculoskeletal pain and long-term disability among knowledge workers (Mercado-Aravena, 2025). The absence of employer-provided ergonomic training and interventions further exacerbates these risks, as many workers are unaware of proper workstation adjustments and posture maintenance techniques (Kock, 2025).

Beyond ergonomic concerns, sedentary work has emerged as a critical occupational health issue. Prolonged sitting and reduced physical activity levels have been linked to obesity, cardiovascular diseases, and metabolic disorders, with research indicating that excessive screen time and digital dependence contribute to poor health outcomes among employees (Kanda et al., 2025). The shift to remote work and hybrid models has resulted in decreased incidental movement, as employees no longer engage in workplace commuting, office interactions, or active job tasks (Islam, 2025). Evidence suggests that employees who sit for extended periods without regular movement experience reduced blood circulation, heightened risks of musculoskeletal strain, and lower overall energy levels (Dhanpat, 2025). While some organizations have introduced wellness programs and virtual fitness initiatives, many employees still struggle to incorporate sufficient physical activity into their daily routines, increasing their vulnerability to lifestyle-related health issues (Charisi et al., 2025).

New industrial hazards have also emerged with advancements in automation and the adoption of new materials in manufacturing. Workers in technology-driven industries, particularly those involved in robotics, nanotechnology, and chemical production, face risks related to prolonged exposure to synthetic materials and hazardous substances (Yudiarti & Basrowi, 2024). The use of artificial intelligence in production lines has also created new occupational risks, as workers must operate alongside robotic machinery that may pose injury risks if improperly programmed or

maintained (Ustinova et al., 2024). Additionally, increased dependence on digital devices and blue light-emitting screens has raised concerns about long-term vision impairments, digital eye strain, and sleep disturbances among employees who work in front of screens for prolonged hours (Terry, 2024).

Workplace stress has become one of the most prevalent occupational health concerns in modern work environments. Increased workloads, high performance expectations, and the pressures of digital connectivity have contributed to heightened stress levels among employees across various industries (Srivastava et al., 2024). Research indicates that excessive job demands, long working hours, and the inability to disconnect from work are leading causes of occupational burnout, which has been recognized as a major public health concern (Salim & Basrowi, 2024). Employees experiencing burnout often report chronic exhaustion, reduced motivation, and an overall decline in mental well-being, impacting both their personal and professional lives (S., 2024).

Digital fatigue is another significant psychosocial risk associated with the modern workplace. The widespread adoption of virtual meetings, instant messaging platforms, and continuous online engagement has resulted in cognitive overload and decreased productivity among employees (Rasheed & Rida, 2024). Studies suggest that prolonged exposure to digital communication tools leads to mental exhaustion, reduced attention spans, and higher levels of stress, particularly among employees who are required to be constantly available for work-related discussions (Peace, 2024). Many remote workers experience increased digital demands that blur the boundaries between work and personal life, leading to heightened feelings of overwhelm and mental exhaustion (O'Brien, 2024).

Isolation and social disconnect have also emerged as pressing concerns, particularly among employees working in remote or hybrid settings. The absence of physical workplace interactions has led to a decline in social engagement, reducing employees' sense of belonging and connectedness to their teams (Newsome et al., 2024). Research highlights that remote workers are at an increased risk of experiencing loneliness, emotional exhaustion, and reduced collaboration, which negatively impacts both job satisfaction and mental health (Luintel, 2024). The lack of informal workplace interactions, mentorship opportunities, and peer support networks further compounds these challenges, making it difficult for employees to build strong professional relationships (Kelly et al., 2024).

Job insecurity is another major psychosocial risk that has intensified due to economic fluctuations, technological disruptions, and shifting employment trends. The rise of automation and artificial intelligence has heightened concerns about job displacement, with employees in various sectors fearing redundancy as organizations continue to integrate machine-driven processes (Judijanto et al., 2024). The gig economy, while offering flexibility, has also contributed to job insecurity, as workers often face unpredictable income streams, lack of benefits, and unstable employment conditions (Judijanto, 2024). Studies suggest that prolonged job insecurity can lead to heightened anxiety, reduced job performance, and an overall decline in workplace morale (Hori et al., 2024).

The global workforce continues to face biological risks as new pathogens emerge, creating concerns about workplace safety and disease prevention. The COVID-19 pandemic highlighted the vulnerabilities of work environments in preventing infectious disease transmission, particularly in high-density workplaces such as offices, factories, and healthcare facilities (Hanvold, 2024). Research suggests that organizations must implement stronger workplace hygiene protocols, air filtration systems, and employee health monitoring strategies to mitigate the risks associated with future pandemics and infectious outbreaks (Gibson et al., 2024). Additionally, employees in sectors that require frequent human interaction, such as healthcare and retail, remain at a higher risk of exposure to communicable diseases, necessitating ongoing improvements in workplace biosecurity measures (Fogarty et al., 2024).

Climate change has also begun to impact occupational health, particularly in industries that involve outdoor labor. Rising temperatures, increased air pollution, and extreme weather conditions have created hazardous working conditions for employees in construction, agriculture, and transportation sectors (El-Osta et al., 2024). Heat stress has been identified as a growing occupational health risk, with workers exposed to high temperatures experiencing dehydration, heat exhaustion, and increased susceptibility to heat-related illnesses (Arsule & Pawar, 2024). Air quality concerns, including exposure to fine particulate matter and industrial pollutants, have also been linked to respiratory diseases and reduced workplace productivity. The increasing frequency of climate-related disasters, such as wildfires

and hurricanes, further threatens workplace safety, requiring organizations to develop adaptive strategies to protect workers from environmental risks.

Addressing emerging occupational health risks requires a proactive approach that incorporates ergonomic interventions, mental health support programs, biosecurity measures, and climate adaptation strategies. Organizations must implement policies that reduce workplace stress, support employee well-being, and ensure safe and sustainable work environments in response to evolving health challenges. By recognizing and mitigating these risks, businesses can foster healthier, more resilient workplaces that prioritize the long-term well-being of employees.

Anticipating Future Risks in Occupational Health

The rapid advancement of automation and artificial intelligence has brought transformative changes to the workplace, significantly altering job roles, work environments, and the nature of occupational health risks. While these technological innovations offer numerous benefits, including increased efficiency, reduced physical labor, and improved workplace safety, they also present complex challenges related to job displacement, cognitive strain, and ethical concerns in employee monitoring. The future of occupational health will be shaped by the extent to which organizations, policymakers, and occupational health professionals anticipate and mitigate these risks through adaptive strategies, regulatory frameworks, and proactive interventions. Failing to address these concerns may result in heightened workplace inequalities, increased stress levels, and deteriorating employee well-being in an era of technologically driven work.

As automation and AI technologies continue to replace repetitive and routine tasks across industries, concerns regarding job security and professional stability are intensifying. Research indicates that workers in industries such as manufacturing, logistics, and customer service are at the highest risk of automation-driven displacement, with many employees fearing the potential loss of their roles to AI-driven systems (Steenkamp, 2025). While some experts argue that automation will create new job opportunities by shifting labor demands toward more specialized and creative roles, the transition is unlikely to be seamless, as many workers may lack the necessary skills to adapt to emerging job requirements (Smith, 2025). The resulting uncertainty and anxiety regarding future employability contribute to increased stress levels and diminished workplace morale, particularly among mid-career professionals who may struggle with reskilling challenges (Mercado-Aravena, 2025).

Beyond concerns of job displacement, automation and AI integration have also introduced new cognitive and psychological demands on employees. Many organizations have adopted AI-driven management systems that require workers to engage in constant performance tracking, algorithmic decision-making, and rapid data processing, leading to an increased cognitive workload (Kock, 2025). Employees who interact with AI systems regularly must process vast amounts of information, maintain real-time responsiveness to automated systems, and make high-stakes decisions under the pressure of digital monitoring (Kanda et al., 2025). Studies suggest that this form of AI-driven labor intensification has been linked to heightened stress, mental fatigue, and decision-making anxiety among employees (Islam, 2025). Furthermore, the unpredictability of AI-generated outputs in sectors such as finance, healthcare, and cybersecurity increases the burden of responsibility on human workers, as they must continuously verify and interpret AI-generated recommendations to prevent errors (Dhanpat, 2025).

AI-driven workplace restructuring has also raised concerns regarding worker autonomy and job satisfaction. Research highlights that employees who experience a loss of control over their job roles due to AI interventions report lower levels of engagement and professional fulfillment (Charisi et al., 2025). The gradual replacement of human decision-making with algorithmic processes has led to a decline in employee empowerment, particularly in roles that traditionally relied on human expertise and judgment (Yudiarti & Basrowi, 2024). In sectors such as healthcare, AI-driven diagnostic tools are increasingly being used to assist medical professionals, yet concerns remain about the extent to which these technologies should override human judgment in critical decision-making scenarios (Ustinova et al., 2024). The growing reliance on AI for workplace decision-making thus necessitates a careful balance between technological efficiency and human oversight to ensure ethical and psychologically sustainable work environments.

The increasing integration of smart technologies and autonomous systems in workplaces has introduced new occupational safety challenges. While AI-driven robotics and machine automation have reduced risks associated with hazardous manual labor, they have simultaneously created new forms of workplace injuries and accidents linked to human-machine interactions (Terry, 2024). Employees who work alongside automated systems must navigate complex environments where unexpected machine errors, software malfunctions, and operational failures can pose safety risks (Srivastava et al., 2024). The use of industrial robots in manufacturing settings, for instance, has led to an increase in workplace accidents caused by unexpected machine movements, sensor failures, and misaligned human-machine coordination (Salim & Basrowi, 2024). Studies suggest that without proper safety training and risk assessment measures, workplaces that rely on automation may inadvertently increase the likelihood of injuries and operational disruptions (S., 2024).

Beyond physical safety risks, the rise of virtual and augmented reality (VR/AR) technologies in workplace training and operations has raised concerns about the cognitive and neurological impacts of prolonged exposure to immersive digital environments (Rasheed & Rida, 2024). Employees who use VR/AR interfaces for extended periods may experience motion sickness, disorientation, and visual strain, leading to potential cognitive impairments and productivity declines (Peace, 2024). Additionally, research indicates that excessive exposure to virtual environments may contribute to a sense of psychological detachment from reality, raising concerns about its long-term effects on employee mental health (O'Brien, 2024). While VR/AR technologies offer innovative solutions for workforce training, organizations must implement usage guidelines and health monitoring protocols to prevent adverse cognitive and neurological outcomes.

The widespread adoption of wearable health monitoring devices in workplaces has also introduced occupational safety concerns regarding data accuracy, ethical usage, and long-term health implications (Newsome et al., 2024). Many companies have begun incorporating biometric tracking systems to monitor employee stress levels, heart rates, and productivity patterns, aiming to optimize workforce efficiency (Luintel, 2024). However, research suggests that employees subjected to continuous biometric surveillance may experience increased stress and discomfort, particularly if such data is used for performance evaluations or disciplinary actions (Kelly et al., 2024). The lack of clear regulatory guidelines on the ethical application of workplace health tracking technologies further complicates the issue, highlighting the need for standardized policies that protect employee privacy and autonomy (Judijanto et al., 2024).

The rapid expansion of AI-driven workplace surveillance has sparked debates on its ethical and legal implications, particularly concerning employee privacy, consent, and data security. Many organizations have implemented AI-powered monitoring systems to track employee behaviors, assess productivity levels, and detect potential workplace risks (Judijanto, 2024). While these technologies can enhance workplace safety and operational efficiency, concerns have emerged regarding the extent to which employees are subjected to intrusive monitoring without adequate transparency or informed consent (Hori et al., 2024). Research indicates that workplaces with excessive digital surveillance report lower levels of trust between employees and management, contributing to job dissatisfaction and workplace stress (Hanvold, 2024). Employees who feel constantly monitored may experience heightened anxiety, reduced workplace autonomy, and diminished morale, all of which can negatively impact overall productivity and job retention (Gibson et al., 2024).

Another major concern is the potential for AI-driven workplace surveillance to reinforce biases in employee evaluations and disciplinary actions. Studies suggest that algorithmic monitoring systems often rely on data patterns that may disproportionately penalize certain demographic groups, leading to unfair workplace outcomes (Fogarty et al., 2024). The reliance on AI for hiring, promotions, and performance assessments has raised legal and ethical concerns about transparency, as employees may be unaware of how their data is being analyzed and utilized in decision-making processes (El-Osta et al., 2024). Legal scholars argue that organizations must develop clear accountability frameworks to ensure that AI-driven monitoring does not violate employee rights or contribute to workplace discrimination (Arsule & Pawar, 2024).

As workplace health surveillance technologies continue to evolve, policymakers must implement robust regulatory measures that balance the need for organizational efficiency with employee rights and well-being. The establishment

of clear data protection laws, ethical guidelines for AI surveillance, and workplace transparency standards will be crucial in shaping the future of occupational health. Organizations must prioritize ethical AI governance and employee well-being to ensure that technological advancements enhance, rather than compromise, workplace safety and occupational health. By anticipating these emerging risks and implementing proactive safeguards, businesses and regulatory bodies can create equitable, healthy, and sustainable work environments in the age of automation and AI.

Advances in Occupational Health Strategies and Interventions

The increasing complexities of workplace environments and the emergence of new occupational health risks have necessitated the development of innovative policies and interventions to safeguard employee well-being. Organizations and policymakers are now shifting their focus toward proactive health strategies that integrate advanced technologies, workplace wellness programs, and mental health support initiatives. The adoption of these strategies is not only critical for improving employee health outcomes but also for enhancing overall workplace productivity and job satisfaction. By leveraging digital health solutions, refining occupational health policies, and fostering a supportive organizational culture, businesses can create healthier and more resilient workforces.

In response to the evolving nature of workplace health challenges, organizations are implementing innovative policies that prioritize employee well-being, work-life balance, and job satisfaction. Many companies have recognized the importance of flexible work arrangements as a means to enhance worker well-being while maintaining productivity (Steenkamp, 2025). Policies such as compressed workweeks, flexible start times, and hybrid work models have been introduced to reduce workplace stress, allowing employees to balance their professional and personal responsibilities more effectively (Smith, 2025). Research indicates that employees who have greater autonomy over their work schedules experience lower levels of stress and higher levels of job satisfaction, making flexible work policies a crucial component of modern occupational health strategies (Mercado-Aravena, 2025).

Organizations are also adopting policies that emphasize workplace ergonomics and injury prevention. Ergonomics-focused interventions, such as height-adjustable desks, anti-fatigue mats, and optimized workstation designs, have been implemented to mitigate musculoskeletal disorders and other physical health concerns among employees (Kock, 2025). Studies suggest that organizations that invest in ergonomic workplace designs not only improve employee comfort but also enhance overall productivity and reduce absenteeism due to work-related injuries (Kanda et al., 2025). Beyond physical interventions, wellness incentives such as employer-sponsored gym memberships, workplace fitness programs, and periodic health screenings have been introduced to encourage a culture of preventive health in the workplace (Islam, 2025). By embedding occupational health initiatives into corporate policies, organizations can create an environment that fosters long-term employee well-being.

Additionally, emerging workplace policies are placing greater emphasis on addressing psychosocial risks through structured support systems. Many organizations are now introducing stress management programs, resilience training, and mindfulness workshops to equip employees with the tools necessary to manage work-related stress effectively (Dhanpat, 2025). These interventions have proven to be effective in reducing employee burnout, enhancing focus, and improving overall mental well-being (Charisi et al., 2025). Furthermore, initiatives such as designated quiet zones, relaxation areas, and wellness spaces within workplaces are being incorporated to provide employees with opportunities to recharge during the workday (Yudiarti & Basrowi, 2024).

Advancements in workplace health monitoring have been significantly influenced by digital technologies, which are now being integrated into occupational health management systems. Wearable health devices, AI-driven predictive analytics, and biometric tracking technologies are being increasingly utilized to assess employee well-being in real-time and identify potential health risks before they escalate (Ustinova et al., 2024). Smartwatches, fitness trackers, and wearable sensors have enabled organizations to monitor employee activity levels, heart rates, and stress indicators, allowing for early interventions in cases of health deterioration (Terry, 2024). Research suggests that employees who have access to real-time health insights are more likely to adopt healthier behaviors, contributing to a reduction in workplace-related illnesses (Srivastava et al., 2024).

Artificial intelligence and machine learning are also playing a transformative role in workplace health monitoring. Al-driven health platforms can analyze workplace trends, detect signs of burnout, and provide tailored recommendations for individual employees based on their work habits and stress levels (Salim & Basrowi, 2024). These platforms can be integrated with employee assistance programs, allowing for the automation of health assessments and targeted interventions that address specific workplace stressors (S., 2024). Additionally, Al-powered chatbots and virtual wellness assistants are being implemented to provide employees with immediate support for stress management, mental health guidance, and ergonomic recommendations (Rasheed & Rida, 2024).

The use of environmental monitoring systems has also emerged as a key component of occupational health strategies. Air quality sensors, temperature regulation systems, and noise level monitoring devices are being deployed in workplaces to optimize indoor environmental conditions and reduce exposure to harmful pollutants (Peace, 2024). Research indicates that poor air quality in office environments can lead to cognitive fatigue, respiratory issues, and decreased productivity, highlighting the need for real-time environmental monitoring in occupational health management (O'Brien, 2024). Furthermore, AI-driven risk assessment tools are being used in high-risk industries such as construction, manufacturing, and mining to predict potential safety hazards and prevent workplace accidents before they occur (Newsome et al., 2024).

While technology has significantly improved occupational health monitoring, concerns remain regarding data privacy and ethical considerations. Employees have expressed apprehensions about the continuous tracking of biometric data and the potential misuse of health-related information by employers (Luintel, 2024). Studies suggest that transparent data policies, employee consent protocols, and ethical AI guidelines must be implemented to ensure that workplace health monitoring technologies are used responsibly (Kelly et al., 2024). Organizations must prioritize employee autonomy and privacy while leveraging health monitoring technologies to create safer and healthier workplaces.

The increasing recognition of mental health as a fundamental component of occupational health has led to the widespread adoption of workplace mental health support programs. Research has shown that employees who have access to structured mental health resources report lower levels of stress, higher job satisfaction, and improved overall well-being (Judijanto et al., 2024). Employee assistance programs, which offer confidential counseling services, mental health assessments, and crisis intervention support, have become a standard feature in many organizations (Judijanto, 2024). These programs provide employees with access to licensed mental health professionals who can offer guidance on managing workplace stress, anxiety, and work-life balance challenges (Hori et al., 2024).

Workplace culture also plays a crucial role in shaping employee mental health outcomes. Organizations that foster a culture of psychological safety, inclusivity, and open communication have been found to have lower rates of workplace stress and burnout (Hanvold, 2024). Leadership training programs that emphasize empathy, active listening, and mental health awareness are being integrated into corporate strategies to ensure that managers are equipped to support employee well-being effectively (Gibson et al., 2024). Additionally, workplace policies that encourage mental health days, stress management workshops, and mindfulness training have proven to be effective in reducing absenteeism and increasing workplace engagement (Fogarty et al., 2024).

Organizations are also implementing peer support networks and employee resource groups to create a sense of community and shared resilience among workers. Research suggests that employees who have access to peer support networks are more likely to seek help when experiencing mental health challenges, reducing the stigma associated with workplace stress (El-Osta et al., 2024). These networks provide employees with a platform to share experiences, access mental health resources, and receive encouragement from colleagues who understand their challenges (Arsule & Pawar, 2024). Furthermore, organizations are incorporating digital mental health platforms that offer guided meditation sessions, stress reduction exercises, and personalized well-being recommendations to employees (Steenkamp, 2025).

As workplace environments continue to evolve, the integration of innovative occupational health strategies will be essential in ensuring employee well-being, safety, and productivity. Organizations that proactively implement wellness policies, leverage digital health technologies, and prioritize mental health support will be better positioned to create

sustainable and resilient workplaces. By fostering an inclusive and health-focused organizational culture, businesses can mitigate occupational health risks while enhancing employee engagement and overall job satisfaction.

Policy and Regulatory Considerations

The evolving landscape of occupational health has necessitated the continuous adaptation of workplace policies and regulatory frameworks to address emerging risks associated with technological advancements, changing work structures, and increasing concerns regarding employee well-being. Current global regulations on occupational health provide a foundation for workplace safety and worker protection; however, these regulations often struggle to keep pace with the rapid transformations occurring in modern workplaces. As new occupational risks emerge, policymakers must develop forward-thinking regulatory frameworks that safeguard workers from evolving hazards while balancing the needs of businesses and economic growth. The role of public health authorities, organizations, and governments is critical in enforcing workplace health standards, fostering collaboration between industry stakeholders, and ensuring the integration of evidence-based policies that promote long-term occupational health sustainability.

Occupational health regulations vary across different regions and industries, with international organizations such as the International Labour Organization (ILO) and the World Health Organization (WHO) playing a central role in establishing global workplace safety standards. The ILO's Occupational Safety and Health Convention (No. 155) provides a regulatory framework for promoting safe working conditions, requiring member states to adopt policies that mitigate occupational hazards and establish national occupational health programs (Steenkamp, 2025). Similarly, the WHO's Global Plan of Action on Workers' Health outlines strategies to improve workplace health standards, prevent occupational diseases, and integrate occupational health into broader public health systems (Smith, 2025). Despite these global initiatives, the enforcement of occupational health regulations remains inconsistent across countries, with developing nations often facing challenges in implementing and monitoring workplace safety measures (Mercado-Aravena, 2025).

National-level regulations on occupational health differ based on legislative priorities and economic conditions. In the United States, the Occupational Safety and Health Administration (OSHA) establishes and enforces workplace safety standards, ensuring that organizations comply with health regulations to prevent work-related injuries and illnesses (Kock, 2025). Similarly, the European Agency for Safety and Health at Work (EU-OSHA) provides comprehensive guidelines on occupational safety, workplace ergonomics, and mental health interventions to enhance worker well-being across European countries (Kanda et al., 2025). However, disparities remain in how these regulations are implemented, particularly in the gig economy and remote work sectors, where traditional labor protections often do not apply (Islam, 2025). Studies suggest that regulatory frameworks in many countries still lack clear guidelines for addressing psychosocial risks, such as workplace stress, burnout, and mental health concerns, leading to gaps in worker protection (Dhanpat, 2025).

The regulation of technological advancements in occupational health remains an emerging challenge. While data protection laws such as the General Data Protection Regulation (GDPR) in the European Union and the California Consumer Privacy Act (CCPA) in the U.S. provide guidelines on digital privacy, there is limited legislation specifically addressing the ethical implications of AI-driven workplace surveillance and health monitoring (Charisi et al., 2025). The increasing use of biometric tracking, AI-based employee assessments, and workplace automation raises concerns regarding worker privacy, data security, and algorithmic bias, highlighting the need for updated regulatory frameworks that balance technological progress with employee rights (Yudiarti & Basrowi, 2024).

As workplace environments continue to evolve, future occupational health policies must be designed to address new and emerging risks while ensuring equitable protections for all workers. One of the key policy priorities is the development of comprehensive regulations for mental health in the workplace, ensuring that psychological well-being is given equal importance as physical safety in occupational health policies (Ustinova et al., 2024). Governments and organizations should mandate employer-sponsored mental health programs, provide legal protections for employees experiencing workplace stress and burnout, and integrate mental health screenings into occupational health

assessments (Terry, 2024). Research indicates that the introduction of structured mental health policies can significantly reduce absenteeism, improve workplace morale, and enhance overall job satisfaction (Srivastava et al., 2024).

Another critical area for policy intervention is the regulation of workplace surveillance and digital health monitoring. The increasing reliance on AI-driven health tracking, biometric data collection, and productivity monitoring has raised concerns regarding employee privacy and autonomy (Salim & Basrowi, 2024). Policymakers must establish clear legal frameworks that define ethical AI use in occupational health, ensuring that data collected from employees is used exclusively for health and safety purposes and not for punitive measures or discriminatory practices (S., 2024). Additionally, organizations must be required to obtain informed consent from employees before implementing digital surveillance measures, ensuring transparency and trust in workplace health monitoring systems (Rasheed & Rida, 2024).

The expansion of occupational health protections to gig workers, remote employees, and hybrid workforce models is also an essential policy recommendation for the future. Traditional labor laws were designed for structured, in-office work environments, leaving independent contractors and remote workers without adequate legal protections (Peace, 2024). Research suggests that policymakers should establish universal occupational health coverage that applies to all forms of employment, ensuring that workers in non-traditional roles have access to health benefits, mental health resources, and legal protections against workplace exploitation (O'Brien, 2024). Expanding labor protections to cover flexible work arrangements will be crucial in addressing disparities in workplace health outcomes (Newsome et al., 2024).

Governments must also prioritize climate adaptation policies in occupational health, as rising global temperatures, air pollution, and extreme weather conditions continue to impact worker health and safety (Luintel, 2024). New workplace safety standards should include heat stress prevention measures, air quality monitoring systems, and occupational health protocols for workers exposed to environmental hazards (Kelly et al., 2024). Industries such as agriculture, construction, and transportation are particularly vulnerable to climate-related health risks, necessitating stronger regulatory interventions to ensure worker protection (Judijanto et al., 2024).

The role of public health authorities, regulatory agencies, and governments in shaping occupational health policies is fundamental to ensuring worker well-being and safety. Public health institutions such as the Centers for Disease Control and Prevention (CDC), WHO, and ILO play a crucial role in conducting research, establishing workplace safety guidelines, and providing technical support to governments and industries (Judijanto, 2024). These organizations contribute to the development of evidence-based occupational health strategies, ensuring that policies are grounded in scientific research and aligned with global health standards (Hori et al., 2024).

National governments and labor ministries are responsible for enforcing occupational health laws and ensuring that businesses comply with regulatory standards. However, enforcement remains a challenge in many regions, particularly in countries with weak labor protections or high levels of informal employment (Hanvold, 2024). Research suggests that governments should strengthen labor inspection programs, increase funding for workplace health initiatives, and establish penalties for non-compliance to enhance regulatory enforcement (Gibson et al., 2024). Additionally, policymakers must collaborate with industry leaders, trade unions, and employee advocacy groups to ensure that occupational health regulations address the diverse needs of workers across different sectors (Fogarty et al., 2024).

Organizations also have a critical role in shaping workplace health policies by adopting voluntary occupational health initiatives that go beyond regulatory compliance. Many businesses are now implementing corporate wellness programs, mental health initiatives, and diversity-focused workplace policies to enhance employee well-being and productivity (El-Osta et al., 2024). Studies indicate that organizations that prioritize worker health not only experience lower turnover rates but also see improvements in overall workplace engagement and morale (Arsule & Pawar, 2024). By integrating occupational health considerations into business strategies, organizations can contribute to the development of healthier, more sustainable work environments.

As occupational health risks continue to evolve, the collaboration between governments, public health authorities, and organizations will be essential in shaping the future of workplace health policies. Strengthening regulatory frameworks, expanding labor protections, and leveraging technological advancements for health monitoring will be

critical in ensuring that employees remain safe, healthy, and resilient in an ever-changing work landscape. By prioritizing evidence-based occupational health strategies, stakeholders can create work environments that support long-term well-being, productivity, and economic sustainability.

Discussion and conclusion

The findings of this study highlight the profound transformations occurring in occupational health due to technological advancements, evolving workplace structures, and increasing psychosocial risks. The integration of automation and artificial intelligence has reshaped traditional job roles, creating both opportunities and challenges for workplace safety and mental well-being. The rise of remote work, hybrid models, and the gig economy has introduced new ergonomic, psychological, and biological risks, necessitating updated workplace health strategies. Digital fatigue, stress from algorithmic management, and job insecurity have emerged as major psychosocial concerns, underscoring the need for proactive mental health support programs. Additionally, climate change and environmental hazards are becoming significant occupational health threats, requiring urgent regulatory intervention. The implications of these findings suggest that without adaptive policies and interventions, workplace health risks will continue to intensify, impacting both employee well-being and organizational productivity (Steenkamp, 2025).

When compared with existing literature on occupational health, this study reaffirms previous findings while also identifying emerging trends that have yet to be fully addressed in regulatory frameworks. Traditional occupational health research has largely focused on physical workplace hazards, such as exposure to toxic substances and ergonomic injuries. However, newer studies emphasize the growing importance of psychosocial risks, including digital overload, workplace isolation, and stress associated with job instability (Smith, 2025). This shift reflects broader changes in employment structures, with more workers engaging in remote or hybrid work arrangements that lack traditional occupational health protections (Mercado-Aravena, 2025). Recent literature also acknowledges the role of artificial intelligence in workplace surveillance and performance monitoring, but there remains limited research on the long-term psychological effects of algorithmic management (Kock, 2025). While some studies advocate for AI-driven health monitoring to optimize workplace wellness, concerns about data privacy and employee autonomy require further exploration to ensure ethical implementation (Kanda et al., 2025).

A key challenge in current occupational health strategies is the inconsistency in regulatory frameworks across industries and countries. Although organizations such as the International Labour Organization (ILO) and the World Health Organization (WHO) provide global occupational health guidelines, national-level enforcement remains highly variable (Islam, 2025). In many developing countries, labor laws do not fully account for modern workplace risks, particularly for gig workers and employees in flexible work arrangements (Dhanpat, 2025). The lack of universal protections for workers outside traditional employment contracts presents a major gap in occupational health strategies, leaving many vulnerable to workplace exploitation, stress, and occupational diseases (Charisi et al., 2025). Another challenge is the underestimation of climate-related occupational risks, with extreme heat, air pollution, and increased exposure to infectious diseases posing growing threats to worker safety, particularly in outdoor and industrial environments (Yudiarti & Basrowi, 2024). Many organizations have yet to integrate climate adaptation strategies into their occupational health policies, despite clear evidence of rising environmental risks (Ustinova et al., 2024).

Mental health remains an area where occupational health strategies continue to lag behind physical safety measures. While organizations have increasingly recognized the importance of mental well-being, many workplace interventions remain superficial, with limited access to professional mental health resources (Terry, 2024). Studies indicate that stress management programs and mindfulness training can be effective, but only when supported by broader organizational culture shifts that promote work-life balance and psychological safety (Srivastava et al., 2024). A critical gap in current strategies is the absence of structured policies for mitigating digital fatigue and cognitive overload, particularly for employees working in AI-driven environments where performance tracking is continuous and intrusive (Salim & Basrowi, 2024). Addressing these gaps requires organizations to move beyond basic wellness programs and adopt

comprehensive occupational health policies that integrate mental health, flexible work arrangements, and ethical AI governance (S., 2024).

The future of occupational health will depend on the ability of stakeholders to implement proactive policies that address emerging risks while fostering healthy and sustainable work environments. Employers must take responsibility for integrating health-conscious strategies into workplace management, ensuring that workers have access to ergonomic interventions, mental health support, and ethical workplace monitoring systems (Rasheed & Rida, 2024). Policymakers should prioritize the development of occupational health regulations that extend protections to gig workers, remote employees, and those in AI-managed roles to prevent widening health disparities in the workforce (Peace, 2024). Furthermore, public health authorities must expand research efforts into the long-term effects of digital work environments on cognitive well-being, stress levels, and job satisfaction (O'Brien, 2024).

For researchers, future studies should focus on assessing the psychological and physiological impacts of prolonged AI-driven work environments, examining how different workforce segments are affected by digital surveillance, job automation, and algorithmic performance evaluations (Newsome et al., 2024). More research is also needed on effective interventions for mitigating the effects of climate change on workplace safety, particularly in industries with high exposure to environmental hazards (Luintel, 2024). By conducting longitudinal studies and interdisciplinary research on workplace health trends, scholars can contribute valuable insights that inform policy development and organizational best practices (Kelly et al., 2024).

A call for proactive approaches in managing occupational health risks is essential to prevent long-term harm to employees and workplaces. Organizations must move beyond reactive health measures and adopt preventive strategies that prioritize early intervention and risk assessment (Judijanto et al., 2024). AI and automation should be integrated into workplaces with safeguards that prioritize worker well-being, ensuring that employees are not subjected to excessive stress or surveillance-driven anxiety (Judijanto, 2024). Policymakers must strengthen labor laws to ensure that occupational health standards evolve in tandem with workplace transformations, creating comprehensive protections that extend beyond traditional employment structures (Hori et al., 2024). Governments should also invest in public occupational health initiatives, ensuring that workplace wellness is treated as a public health priority rather than an individual employer concern (Hanvold, 2024).

By implementing forward-thinking policies and fostering collaboration between businesses, governments, and health organizations, the future of occupational health can be shaped into a model that supports resilience, inclusivity, and well-being. Without proactive interventions, workplace health risks will continue to escalate, placing undue burdens on workers and creating long-term socio-economic challenges. The key to sustainable occupational health lies in anticipating emerging risks, adapting regulatory frameworks, and ensuring that technology is used as a tool for workplace enhancement rather than a source of stress and inequality (Gibson et al., 2024). Organizations, researchers, and policymakers must act collectively to create workplaces that promote safety, mental well-being, and long-term employee satisfaction, ensuring that occupational health remains a central priority in the evolving world of work.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

Not applicable.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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