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Adapting Ergonomics and Human Factors in Remote Work for Employee Well-Being: A Conceptual Study

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ABSTRACT

This study explores the ergonomic factors essential for enhancing employee well-being and performance in remote work environments. Using a qualitative approach, 49 relevant articles from Scopus, EBSCO, Google Scholar and Web of Science were analysed through content analysis. Findings highlight cognitive, physical, and organizational ergonomics as critical to optimizing safety, comfort, and productivity in home office setups. The study also reveals a lack of theory-driven approaches in existing research and proposes a conceptual framework for future empirical validation. These insights offer practical recommendations for organizations to refine remote work policies with a stronger emphasis on ergonomics, promoting a healthier and more productive workforce.

Keywords: Remote working, Ergonomics, Employee wellbeing, Technology adaption, Home office design, Occupational health

INTRODUCTION

The extensive adoption of remote and hybrid work models has transformed the traditional workplace. This shift necessitates re-evaluation of ergonomic and human factors influencing employee well-being and performance. While remote work affords greater flexibility, autonomy, and work-life balance (Choudhury et al., 2021; de Macêdo et al., 2020; Ferrara et al., 2022; Gomes, 2021; Wang et al., 2021), it also presents challenges related to workspace design, cognitive load, and organizational support, which can undermine productivity, job satisfaction, and long-term health (Adisa et al., 2023; Keightley et al., 2023). Issues such as prolonged screen exposure, inadequate workstation setups, and blurred work-life boundaries contribute to musculoskeletal discomfort, digital fatigue, and psychological strain (Oakman et al., 2020; Nakrošienė et al., 2019; Wodajeneh et al., 2022). As remote work becomes the norm in many sectors, adapting ergonomic principles to these evolving conditions is crucial for sustaining workforce engagement and preventing long-term health risks.

Traditionally, ergonomics research has focused on structured office environments, emphasizing physical comfort, injury prevention, and performance optimization (Vink et al., 2006; Vischer, 2007; Dzandu et al., 2023). However, the shift to remote work has led to diverse and often suboptimal home office setups, where employees must manage ergonomic conditions with varying levels of organizational support (Cruz-Ausejo et al., 2023; Wodajeneh et al., 2023). The increasing reliance on digital communication and self-regulation has also heightened the relevance of cognitive ergonomics, which examines information processing demands and mental workload (Kalakoski et al., 2020; Kiran, 2020; Koirala and Maharjan, 2022). Additionally, organizational ergonomics, which focuses on work design and social dynamics, is essential in addressing the isolation and collaboration challenges inherent in remote work (Kowalski and Makowiec-Dabrowska, 2023). Despite these insights, limited research has synthesized these dimensions to provide a comprehensive understanding of remote work ergonomics.

Research shows that poorly adapted ergonomic conditions in remote settings are associated with increased physical discomfort, reduced work engagement, and heightened stress (Charalampous et al., 2019; Kowalski and Makowiec-Dabrowska, 2023). Employees lacking appropriate furniture, display screens, and adjustable seating report higher incidences of musculoskeletal disorders (Shariat et al., 2021). Similarly, excessive cognitive demands from prolonged virtual interactions, multitasking, and constant digital notifications contribute to cognitive overload and burnout (Kiran, 2020; Koirala and Maharjan, 2022). While organizations have introduced virtual wellness programs and flexible work schedules to support remote employees (Kamala et al., 2025; Reznik et al., 2021; Wodajeneh et al., 2023), there is a lack of systematic integration of ergonomic principles into remote work policies. Moreover, research specifically addressing remote work ergonomics remains scarce, and theoretical frameworks in this area are underdeveloped.

To address these gaps, this study explores the ergonomic factors that need adapting to ensure employee well-being and performance in remote work setting and to develop a conceptual framework for future studies that would inform workplace policies and practices. Through the integration of theoretical perspectives with practical applications, this research contributes to discussions on occupational health, digital work transformation, and sustainable workforce management in remote work setting.

METHODOLOGY

This study took an interpretative orientation. As a qualitative study, document analysis method (Neuendorf and Kumar, 2015) is employed to identify the ergonomic factors that impact the adaptation of remote working to achieve employee wellbeing and performance. The use of document analysis helps uncover current issues from a varied but related documents on a subject (Neuendorf and Kumar, 2015). Document analysis method has

been used in similar qualitative studies such as Keles, McCrae, and Grealish (2020) and Asamoah, Dzandu, and Klapalová (2022).

Data was sourced from electronic databases such as Scopus, EBSCO, Google Scholar and Web of Science. The data analysed include existing publications relevant to ergonomics, remote working and employee wellbeing and performance. The databases were queried using appropriate search strings. For example, the search query used in Scopus was – ("remote or human and factor" AND "remote and working" AND "employee and wellbeing or performance"). This was filtered to include only journal and conference proceeding published in English language, giving a total of 55 documents. After similar searches were conducted on other databases, and subsequent elimination of duplicates, a total of 49 documents were analysed using content analysis techniques. NVivo software was used to code the contents of the documents to arrive at the results for the study.

RESULTS

The study identified cognitive, physical, and organizational ergonomics (Wilson, 2000) factors that require adaptation in remote work environments to enhance employee performance and well-being (Table 1). The following definitions are used to categorise the identified factors into relevant groups. Cognitive ergonomics was defined to include factors that influences mental workload, stress, and job engagement, focusing on how perception, memory, and decision-making interact with work environments (Wilson, 2000; Parasuraman and Hancock, 2001). Physical ergonomics addresses factors that affect comfort, fatigue, and overall health, directly impacting long-term performance (Dul & Weerdmeester, 2008; Karwowski, 2005). Organizational ergonomics pertains to the optimization of sociotechnical systems, including workplace policies, structures, and culture, which influence motivation, retention, and teamwork (Hendrick & Kleiner, 2002; Carayon, 2006). These classifications provide a structured approach to understanding how ergonomic factors collectively shape employee well-being and productivity in remote and hybrid work environments.

Table 1: Categorization of ergonomic factors and their impact on employee well-being and performance.

Ergonomic Category	Key Factors	Effect on Employee Well-being	Effect on Employee Performance	Source (Author, Year)
Cognitive	- Technostress from excessive ICT use (−) - Cognitive load from remote work and digital tools (−) - Job autonomy and self-regulation (+) - Emotional labor and conflict management strategies (−)	- Increased stress and burnout (−) - Reduced psychological well-being (−) - Work engagement maintained through supportive policies (+)	- Increased work engagement when stressors are managed (+) - Higher productivity when employees have autonomy and control (+)	Aguilar-Rodríguez et al. (2023); Ingusci et al. (2021)

Continued

Table 1: Continued

Ergonomic Category	Key Factors	Effect on Employee Well-being	Effect on Employee Performance	Source (Author, Year)
Physical	- Lack of ergonomic office furniture (e.g., chairs) (−) - Increased sitting time and screen exposure. (−) - Poor work environment (e.g., working in bedroom) (−) - Access to natural spaces (+)	- Increased physical strain (−) - Fatigue and health risks. - Restorative benefits from nature reduce stress (+)	- Decline in performance due to discomfort. - Improved focus and engagement when physical needs are met (+)	Larrea-Araujo et al. (2021); Chatterjee et al. (2022); Nguyen (2021)
Organizational	- Work-life balance and boundary management (+) - Social job resources (team collaboration, leadership support) (+) - Perceived organizational	- Increased well-being with positive organizational culture (+) - Reduced turnover intention (+) - Higher job satisfaction (+)	- Enhanced task performance with strong leadership and support (+) - Counterproductive work behaviours reduced through effective internal policies (+)	Othman et al. (2009); Parent-Rocheleau and Parker (2022); Szczepańska and Woszczyna (2023)

NB: (+) = positive effect, (−) = negative effect

Findings underscore the critical role of ergonomic adjustments in home office setups, including their impact on safety, comfort and productivity. These factors contribute significantly to workforce well-being and overall satisfaction. Additionally, the study revealed a lack of ergonomics theory-driven approaches in existing research on ergonomics and remote work. A conceptual framework is developed, proposing general relationships between key constructs for empirical testing and validation.

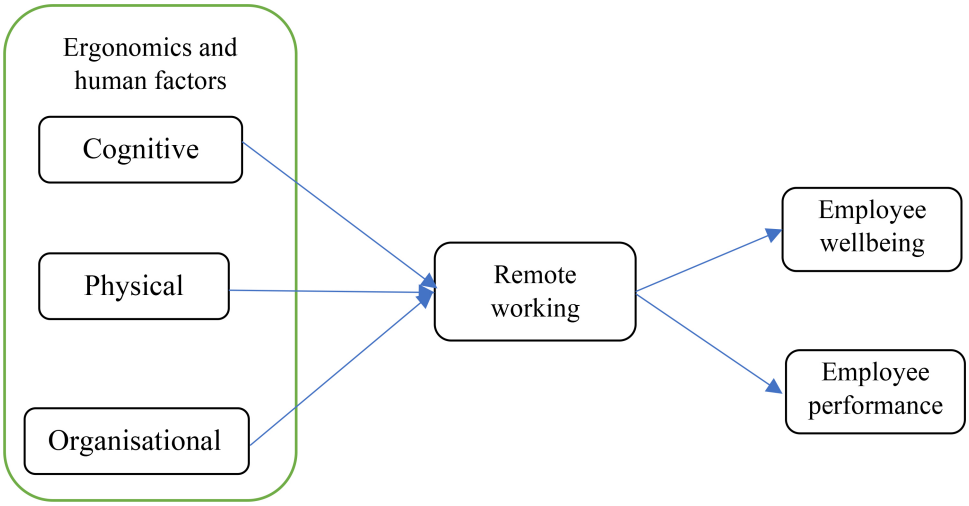

Figure 1: Proposed conceptual model.

The proposed conceptual model posits that ergonomics, and human factors impact how employees adapt remote working to ensure their well-being for optimal performance. Consequently, the following propositions are made:

Proposition 1: Cognitive ergonomics and human factors will have an influence on employees' adoption of remote working.

Proposition 2: Physical ergonomics and human factors will have an influence on employees' adoption of remote working.

Proposition 3: Organisational ergonomics and human factors will have an influence on employees' adoption of remote working.

Proposition 4: Remote working adoption will have an impact on employees' wellbeing.

Proposition 5: Remote working adoption will have an impact on employees' job performance.

THEORETICAL AND PRACTICAL IMPLICATIONS

This study advances the discourse on remote work ergonomics by integrating cognitive, physical, and organizational ergonomics into a unified framework that explains their combined influence on employee well-being and performance. While prior studies has examined these dimensions in isolation, they were primarily grounded in Job Demands-Resources theory (Ingusci et al., 2021; Szczepańska and Woszczyna, 2023), Technology Acceptance Model (Aguilar-Rodríguez et al., 2023; Othman et al., 2009), Work-Life Flow Theory (Chatterjee et al., 2020; Nguyen, 2021), and Socio-Technical Systems (STS) Theory (Parent-Rocheleau and Parker, 2022). However, these studies often lack ergonomics specific theory-driven approach to understanding remote work adaptation. This study addresses this gap by integrating ergonomic and well-being theories to propose a conceptual framework for future empirical validation. In doing so, it contributes to theory-building in digital work transformation and occupational health, laying the foundation for future research on the intersection of ergonomics and remote work sustainability.

Practically, this study proposes ideas for optimizing remote work environments through structured digital detox strategies, ergonomic home office support, and organizational interventions that enhance well-being and productivity. Employers should limit virtual meeting hours, subsidize ergonomic furniture, and promote asynchronous work to reduce cognitive and physical strain. Additionally, fostering psychological safety, virtual team-building, and mentorship programs can mitigate workplace isolation. Policymakers should update occupational health regulations to include remote work ergonomics standards, ensuring employees receive adequate support in flexible work arrangements.

CONCLUSION

This study integrates ergonomic and well-being theories to explain how cognitive, physical, and organizational ergonomics influence employee well-being and performance in remote work environments. It proposed conceptual framework, which serves as a foundation for future empirical

research to guide organizations and policymakers in developing evidence-based ergonomic policies that promote sustainable workforce well-being, engagement, and productivity in the increasing remote working environment.

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