The Impact of Physical Risks and Physical Activity Requirements on Employees' Health, Well-being, and Satisfaction

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Abstract

The physical and social work environment determines employees' health, well-being, and job satisfaction. The present study uses artificial neural network analysis to evaluate the impact of physical hazards and physical activity demands on these health-related outcomes. The results show that improving hazardous working conditions and reducing physical strain would significantly improve workers' health, well-being, and job satisfaction. The study highlights the importance of preventing physical workplace risks, such as noise exposure and harmful environmental factors, to achieve better employee outcomes. Overall, the research supports the premise that improving the physical work environment may lead to greater employee satisfaction and well-being—findings that have significant implications for organizational policies.

Key words: physical risks, physical activity requirements, employees' health, well-being, employees' satisfaction
J.E.L. classification: O15, O33

1. Introduction

In contemporary, fast-changing, diversified work environments, workers' health, well-being, and job satisfaction have become very important for both organizational effectiveness and personal fulfillment.

Research shows that many things in the workplace – physical hazards, demands of physical effort and quality of social relationships – affect employees' physical and mental health (OECD, 2013). For organizations aiming to enhance productivity and performance, understanding the complex relationships among these factors and their effects is essential (Bocean, 2011; Vărzaru & Vărzaru, 2015a, 2015b).

Physical risks in the workplace—those hazards that directly threaten employees' physical health—have evolved over the last few decades. Technological advances, along with shifts in regulations and job roles, have mitigated certain traditional risks while introducing new ones. Modern workplace risks may include exposure to hazardous substances, extreme temperatures, high noise levels, and social risks like bullying, harassment, and discrimination (OECD, 2014).

While specific physical risks can vary by industry, their impact on health and wellness is often considerable, especially when combined with high physical demands. Physical demands refer to tasks that require sustained physical effort, like prolonged standing, lifting heavy loads, or working in strenuous conditions. These demands are often unavoidable in specific industries, but when coupled with limited autonomy or low social support, they can lead to fatigue, injury, and decreased job satisfaction (OECD, 2016).

Given the complexity of these issues, this paper will evaluate the impact of physical risks and physical activity requirements on employees' health, well-being and satisfaction. By using existing literature and exploring the intersection of physical and social workplace environments, this study will provide an overall understanding of how these factors interact and the implications for organizational practices (Bocean, 2009). It will examine how physical risks and activity demands affect employee outcomes and how social support in the workplace can mitigate these effects. This research will contribute to the growing body of knowledge on workplace health and safety by highlighting the need to address both physical and social risks in modern work environments (Bocean, 2007; Sitnikov, C.C. and Bocean, C.G., 2010, 2013; Vărzaru and Vărzaru, 2013a, 2013b; Wright and Nishii, 2013; Vărzaru et al., 2013; Vărzaru and Vărzaru, 2016; Ganster and Rosen, 2013).

2. Theoretical background

One of the most significant aspects of a workplace that influences employees' health, well-being, and job satisfaction is the physical environment. The interaction with people who create a hostile atmosphere, along with the physical and social characteristics of the workplace, can substantially affect employee outcomes, irrespective of the hazardous nature of the work itself (OECD, 2013). These effects encompass physical risks and physical activity demands, critical challenges to employee health, well-being, and job satisfaction (Wilkinson., 2022).

Physical risks in the workplace refer to the extent to which job-related activities expose employees to conditions that may harm their physical health. Workers' perceptions of these risks are often shaped by their past experiences, as the impact of physical hazards can vary over time (Jermier et al., 1994; Wright & Nishii, 2013). Several common risk factors have been identified, particularly in manual labor environments. These hazards include exposure to extreme temperatures, high noise levels, harmful chemicals, infectious agents, workplace accidents, and even second-hand smoke (OECD, 2014; Bocean et al., 2021).

Both physical and social risks in the workplace affect not only employees' physical health but also their mental well-being, often creating a more challenging work environment. Research indicates that employees exposed to these risks are more likely to experience stress, anxiety, and burnout, reducing job satisfaction and overall job performance (LaMontagne et al., 2007; Bocean et al., 2023). Additionally, prolonged physical tasks without proper ergonomic support have been linked to musculoskeletal issues, increasing workers' health risks (Ganster & Rosen, 2013).

Workplace risks generally fall into two categories: objective hazards, which include tangible dangers like physical threats or exposure to toxic substances, and subjective risks, such as the psychological effects associated with bullying, discrimination, or harassment (Bhui et al., 2012). While a substantial body of research exists on the physical risks, less attention has been paid to the interactive effects of physical and social risks. Those exposed to both types of risks, for instance, are more liable to suffer from mental health problems such as anxiety and depression, which the individual and the organization have to bear huge costs (Galea et al. 2004).

Physical activity requirements at work refer to the extent to which employees are required to perform tasks that involve physical effort (Wilton, 2022). Examples include standing or walking for extended periods, working in tiring postures, or lifting and transporting heavy objects. Although these demands might not pose immediate health risks, they can harm employees' well-being in the medium and long term, particularly when combined with low decision-making autonomy and insufficient social support (OECD, 2016).

Studies on the impact of physical activity demand on employee health suggest that prolonged standing, repetitive motions, and heavy lifting can lead to chronic physical conditions, such as back pain, arthritis, and cardiovascular issues (Vischer, 2007). Moreover, excessive physical demands have been linked to employee exhaustion and dissatisfaction, particularly in occupations with low control over work schedules and a lack of appropriate rest periods (Bluyssen et al., 2011a).

Research also shows that psychosocial factors can exacerbate the impact of physical activity demands. Employees who experience high physical demands alongside job insecurity, poor social support, or bullying are more likely to report adverse health outcomes, including heightened levels of stress and reduced life satisfaction (Parkyn and Wall, 2020). This fact is especially problematic in industries where physical exertion is a core component of the job, such as construction,

manufacturing, and healthcare. These employees often face a higher risk of work-related injuries, which can further affect their mental and physical well-being.

3. Research methodology

This research investigates the impact of physical risks and physical activity demands on employee health, well-being, and job satisfaction through a multilayer perceptron (MLP) artificial neural network model, as other researchers (Nicolescu. and Vărzaru, 2020; Vărzaru, 2022a, 2022b, 2022c, 2022d; Rotea et al., 2023). The study utilized a quantitative approach, collecting data through a structured questionnaire designed to capture various physical risks and activity demands present in the workplace. The data collection process involved administering the questionnaire to a selected sample of employees across different industries, ensuring a diverse representation of work environments and job roles.

The input variables of the MLP model included a range of physical risk factors and activity demands associated with workplace conditions. The output variables include health, well-being, and employee satisfaction (Table no. 1).

Table no. 1 Selected variables

Input variables	Output variables
Working in dangerous conditions (RF11)	Feeling good about one's health (SF68)
Working in unhealthy conditions (RF12)	Protecting oneself and others from illness (SF69)
Exposure to the risk of serious injury or accidents (RF13)	Working in a safe environment (SF70)
Exposure to infectious materials or chemicals (RF14)	Feeling good overall (BA71)
Exposure to noise or vibrations (RF15)	Finding meaning and purpose in work (BA72)
Exposure to extreme temperatures (RF16)	Pride in one's work (BA73)
Exposure to second-hand tobacco smoke (RF17)	Personal satisfaction with work (SA74)
Performing heavy physical labor (CAF18)	Contentment with career progression (SA75)
Returning home exhausted from work (CAF19)	Feeling empowered to make important decisions (SA76)

Source: elaborated by the authors using data processed with SPSS v.27

The questionnaire, structured to measure these variables, was distributed to a sample of employees in sectors known for high levels of physical risk and physical demands, such as manufacturing, construction, and healthcare. Three hundred eighty-three respondents participated in the study, providing insights into their work environments and physical and psychological challenges. Respondents were asked to rate the extent to which they were exposed to each of these conditions using a Likert scale, ranging from 1 (never) to 5 (always). This approach allowed for quantifying physical risks and activity demands experienced by employees.

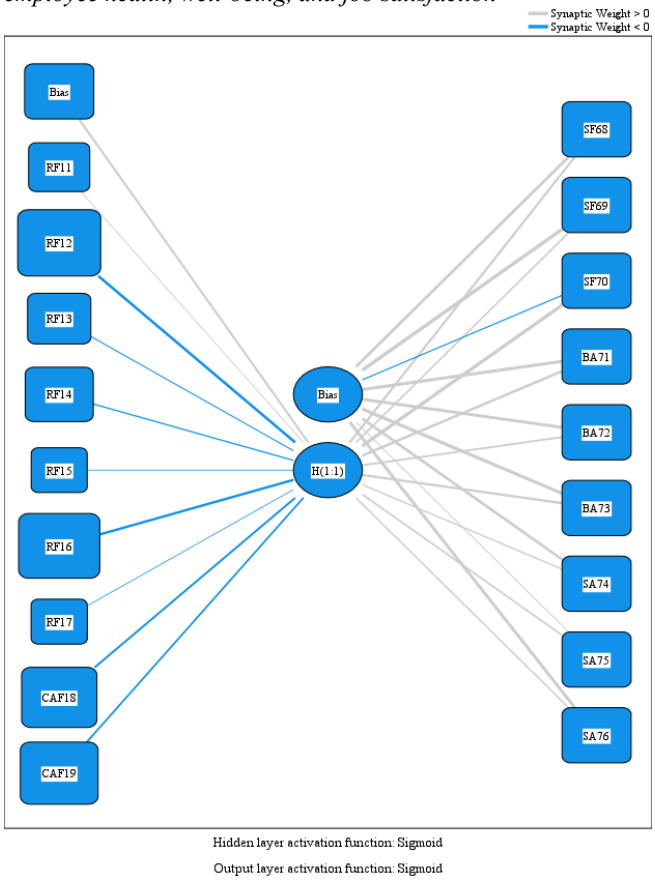
The collected data were analyzed using an MLP neural network model in SPSS version 27. The model examines the relationships between physical risks, activity demands (input variables), and employee health, well-being, and job satisfaction (output variables). The paper hypothesis is that Improving the physical working environment leads to better health outcomes, higher well-being, and enhanced job satisfaction. The MLP model was selected because it captures complex, non-linear relationships between variables. The model included a hidden layer representing employee well-being, hypothesized to mediate the relationship between the input variables and the outcomes of interest.

4. Findings

In order to evaluate the impact of physical risks and physical activity demands on employee health, well-being, and job satisfaction, we employed artificial neural network analysis. The multilayer perceptron (MLP) model includes an input layer with variables representing physical risks and physical activity demands (RF11-RF17, CAF18, CAF19) and an output layer with variables representing employee health, well-being, and satisfaction (SF68-SF70, BA71-BA73, SA74-SA76). Between these two layers, a hidden layer representing employee well-being (referred to as the "well-being" variable) influences health, well-being, and job satisfaction. The activation functions of both the hidden and output layers are sigmoid. Figure no. 1 illustrates the relationships established

between the model's layers.

Figure no. 1. The MLP model evaluating the impact of physical risks and physical activity demands on employee health, well-being, and job satisfaction



Source: elaborated by the authors using data processed with SPSS v.27

Table no. 2 presents the model parameters and the importance of the input variables in exerting their influence.

Table no. 2 MLP Model parameters for evaluating the impact of physical risks and physical activity demands on employee health, well-being, and satisfaction

Predictor		Predicted										
		Hidden Layer 1	Output Layer									Normalized Importance
		H(1:1)	SF68	SF69	SF70	BA71	BA72	BA73	SA74	SA75	SA76	
Input Layer	(Bias)	0.737										
	RF11	-0.017										0.8%
	RF12	-1.192										66.0%
	RF13	-0.074										3.7%
	RF14	-0.454										24.1%
	RF15	-0.482										26.0%
	RF16	-1.298										81.5%
	RF17	-0.009										0.4%
	CAF18	-1.555										100.0%
	CAF19	-1.351										81.6%
Hidden Layer 1	(Bias)		1.204	1.637	-0.174	1.509	1.201	1.406	1.227	0.355	1.184	
	H(1:1)		0.942	1.176	1.238	0.762	0.993	0.923	0.776	0.890	1.129	

Source: elaborated by the authors using data processed with SPSS v.27

The MLP model reveals that reducing physical risks, heavy working conditions, and exhaustion improves employees' health, well-being, and satisfaction. The analysis demonstrated that physical demands (performing heavy physical labor - CAF18, physical and mental exhaustion - CAF19, and exposure to extreme temperatures - RF16) significantly impacted health and well-being, with these variables showing high normalized importance. Other variables, such as exposure to accident risks (RF15) and unhealthy working conditions (RF14), significantly influenced the model's results.

These findings support the hypothesis that improving physical working conditions would improve health outcomes. Reducing exposure to risks such as noise, chemicals, or hazardous conditions and decreasing the demands for intense physical activity could enhance employees' well-being. Such measures could positively affect employee satisfaction, as the model's output variables show positive influences between well-being and satisfaction.

5. Conclusions

The results of this study highlight the significant influence that physical risks and physical activity demands have on employee health, well-being, and job satisfaction. By employing a multilayer perceptron (MLP) model, we demonstrated that reducing exposure to hazardous working conditions, physical labor intensity and exhaustion can substantially improve employee outcomes.

The analysis revealed that specific factors, such as exposure to accident risks, noise, vibrations, and unhealthy environments, have a profound negative impact on employee well-being and health. The high importance of these variables in the model underscores the need for targeted interventions in the workplace to mitigate their effects. Moreover, the findings validate the hypothesis that improving the physical working environment leads to better health outcomes, higher well-being, and enhanced job satisfaction. Reducing physical demands and minimizing exposure to hazardous conditions should be prioritized by organizations aiming to foster a healthier and more satisfied workforce.

The study also demonstrates the value of artificial neural networks in analyzing complex relationships between workplace factors and employee outcomes. The MLP model used in this research provided nuanced insights into how changes in physical risks and demands, directly and indirectly, affect employee well-being, offering a robust methodological approach for future research.

In conclusion, the implications of this research are clear: improving physical work conditions is beneficial for employee health and satisfaction and overall organizational performance. Policymakers and organizational leaders should focus on reducing physical risks and demands to enhance the well-being of their workforce, ultimately creating a more productive and positive work environment.

6. References

- Bocean, C.G., 2007. *The Impact of Active Labour Market Policies in Romania*, [online] Available at: < https://mpra.ub.uni-muenchen.de/10397/> [Accessed 9 March 2024].
- Bocean, C.G., 2009. *Managementul performanţelor personalului [Personnel performance management*. Bucharest: Tribuna Economică.
- Bocean, C. G., 2011. Project-based organization-an integrated approach, *Management & Marketing-Craiova*, 9(2), pp. 265-273.
- Bocean, C.G., Puiu, S. and Vărzaru A.A. 2021. Paradigm Shifting-The Use of Mobile Communications at Work and the Subsequent Effects. *Electronics*, 10(22), 2747. https://doi.org/10.3390/electronics10222747
- Bocean, C. G., Popescu, L., Vărzaru, A. A., Avram, C. D. and Iancu, A., 2023. Work-Life Balance and Employee Satisfaction during COVID-19 Pandemic. *Sustainability*, 15(15), 11631. https://doi.org/10.3390/su151511631
- Bhui, K., Dinos, S., Stansfeld, S. and White, P., 2012. A synthesis of the evidence for managing stress at work: A review of the reviews reporting on anxiety, depression, and absenteeism, *Journal of Environmental and Public Health*, 2012, pp. 1-21. https://doi.org/10.1155/2012/515874

- Bluyssen, P. M., Aries, M. and van Dommelen, P, 2011. Comfort of workers in office buildings: The European HOPE project', *Building and Environment*, 46(1), pp. 280-288. https://doi.org/10.1016/j.buildenv.2010.07.024
- Galea, S., Nandi, A. and Vlahov, D., 2004. The social epidemiology of substance use, *Epidemiologic Reviews*, 26(1), pp. 36-52. https://doi.org/10.1093/epirev/mxh007
- Ganster, D. C. and Rosen, C. C., 2013. Work stress and employee health: A multidisciplinary review, *Journal of Management*, 39(5), pp. 1085-1122. http://dx.doi.org/10.1177/0149206313475815
- Jermier, J. M., Knights, D. and Nord, W. R., 1994. *Resistance and power in organizations*. New York: Routledge.
- LaMontagne, A. D., Keegel, T., Louie, A. M., Ostry, A. and Landsbergis, P. A., 2007. A systematic review of the job-stress intervention evaluation literature, 1990–2005, *International Journal of Occupational and Environmental Health*, 13(3), pp. 268-280. https://doi.org/10.1179/oeh.2007.13.3.268
- Nicolescu, M.M. and Vărzaru, A.A. 2020. Ethics and disclosure of accounting, financial and social information within listed companies. Evidence from the Bucharest stock exchange. 2020 Basiq International Conference: New Trends in Sustainable Business and Consumption, 2020, pp. 73-80.
- OECD, 2013. *Employment Outlook*. Paris: OECD Publishing.
- OECD, 2014. *Health at a Glance: Europe 2014*. Paris: OECD Publishing.
- OECD, 2016. *Health Workforce Policies in OECD Countries*. Paris: OECD Publishing.
- Parkyn, M. and Wall, T. 2020. Workplace Stress Management. In: Leal Filho, W., Wall, T., Azul, A.M., Brandli, L., Özuyar, P.G. (eds) *Good Health and Well-Being.* Encyclopedia of the UN Sustainable Development Goals. Springer, Cham. https://doi.org/10.1007/978-3-319-95681-7_27
- Rotea, C.C., Ploscaru A.-N., Bocean C.G., Vărzaru A.A., Mangra M.G. and Mangra G.I., 2023. The Link between HRM Practices and Performance in Healthcare: The Mediating Role of the Organizational Change Process, *Healthcare*, 11(9), 1236. https://doi.org/10.3390/healthcare11091236
- Sitnikov, C.S. and Bocean, C. G., 2010. New approaches of consumers' protection in terms of management systems' international standards evolution, *Amfiteatru Economic*, *12*(28), pp. 360-372.
- Sitnikov, C.S. and Bocean, C.G., 2013. Relationships among social and environmental responsibility and business, *Amfiteatru Economic,* 15, pp. 759-768.
- Vărzaru, D.C. and Vărzaru, A.A., 2016. The Contribution of the Human Resources Information System to Human Capital Performance Management within the Organization. *Ovidius University Annals, Economic Sciences Series*, XVI(1), 2016, pp.429-434.
- Vărzaru, M. and Vărzaru, A.A., 2013a. Knowledge management and organizational structure design process. *Annales Universitatis Apulensis: Series Oeconomica*, 15(2), pp. 716-724. http://dx.doi.org/10.29302/oeconomica.2013.15.2.35
- Vărzaru, M. and Vărzaru, A.A., 2013b. *Leadership Style and Organizational Structure in the Context of Mintzberg's Vision*. Proceedings of the 7th International Management Conference: New Management For The New Economy, pp. 466-475
- Vărzaru, M., Vărzaru, A.A., and Albu, C.C. 2013. *Knowledge Management and Organisational Structure: Mutual Influences*. Proceedings of 13th European Conference on Knowledge Management (ECKM), Univ Politecnica Cartagena, Spain, pp.1255-1261.
- Vărzaru, M. and Vărzaru, A.A., 2015a. Design and implementation of a management control system. *Finance: Challenges of the Future*, 17, pp.195-200.
- Vărzaru, D.C. and Vărzaru A.A., 2015b. Adjusting the human resources information system to the requirements of using the balanced scorecard. *Annals of the University of Craiova, Economic Sciences Series*, 2, pp.222-238.
- Vărzaru, A.A., 2022a. Assessing the Impact of AI Solutions' Ethical Issues on Performance in Managerial Accounting. *Electronics*, 11(14), 2221. https://doi.org/10.3390/electronics11142221
- Vărzaru, A.A., 2022b. Assessing Digital Transformation of Cost Accounting Tools in Healthcare. *International Journal of Environmental Research and Public Health*. 19(23), 15572. https://doi.org/10.3390/ijerph192315572
- Vărzaru AA., 2022c. An Empirical Framework for Assessment of the Effects of Digital Technologies on Sustainability Accounting and Reporting in the European Union. *Electronics*, 11(22), 3812. https://doi.org/10.3390/electronics11223812
- Vărzaru A.A., 2022d. An Empirical Framework for Assessing the Balanced Scorecard Impact on Sustainable Development in Healthcare Performance Measurement. *International Journal of Environmental Research and Public Health*, 19(22), 15155. https://doi.org/10.3390/ijerph192215155
- Vischer, J.C., 2007. The effects of the physical environment on job performance: towards a theoretical model of workspace stress, *Stress and Health*, 23, pp. 175-184. https://doi.org/10.1002/smi.1134

- Wilkinson, A., 2022. *Human Resource Management: A Very Short Introduction*. OUP Oxford.
- Wright, P. M. and Nishii, L. H., 2013. Strategic HRM and organizational behaviour: Integrating multiple levels of analysis. In J. Paauwe, D. Guest, & P. Wright (Eds.), *HRM & performance: Achievements & challenges* (pp. 97-110). Chichester: Wiley.
- Wilton, N., 2022. *An introduction to human resource management*. London: SAGE.