# Ergonomic Design of Workstations: Investigating The Impact of Ergonomic Design on Employee Comfort, Productivity and Health

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**ABSTRACT**

This study examines the impact of ergonomic workstation design on employee comfort, productivity, and health outcomes within office environments in Ghana. A cross-sectional survey was conducted among 250 office workers across various industries to assess the relationship between ergonomic workstation features and self-reported physical comfort, work efficiency, and health indicators. Using regression analysis, the study found that ergonomic improvements—such as adjustable chairs, proper monitor height, and keyboard placement—significantly enhanced employee comfort ($\beta = 0.85$, *p* < 0.001) and reduced musculoskeletal discomfort. However, the effect on productivity was less pronounced, suggesting that ergonomic interventions should be integrated with broader workplace wellness strategies. The study also identified moderating factors, including pre-existing health conditions and prolonged work hours, which influenced outcomes. These findings highlight the importance of tailored ergonomic solutions in Ghanaian workplaces, where resource constraints and cultural attitudes toward discomfort may affect implementation. The results provide evidence-based insights for employers and policymakers to improve occupational health standards while addressing contextual challenges.

**Keywords**: Ergonomics, Workplace Design, Employee Health, Productivity, Ghana

## 1. Introduction

The modern workplace is increasingly recognized as a critical determinant of employee well-being, efficiency, and long-term health outcomes. With the shift towards knowledge-based and screen-intensive jobs, especially in office settings, the design of workstations has become central to discussions surrounding occupational health and safety. Ergonomics, defined as the scientific discipline concerned with understanding interactions among humans and other elements of a system, aims to optimize human well-being and overall system performance (International Ergonomics Association, 2021). In this context, ergonomic workstation design refers to the tailoring of workplace environments to meet the physical and cognitive needs of employees.

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As organizations strive to improve both employee satisfaction and productivity, understanding how ergonomic design influences comfort, efficiency, and health is not only timely but essential.

Recent workplace trends underscore the growing importance of ergonomic considerations. The proliferation of remote work arrangements and sedentary office roles has intensified concerns about musculoskeletal disorders (MSDs), eye strain, and chronic fatigue—all of which have been associated with poorly designed workstations (Shariat et al., 2018). According to a study by Robertson, Ciriello, and Garabet (2021), employees using ergonomically designed furniture reported fewer instances of back and neck pain, and showed improved postural alignment and work efficiency. This reinforces the argument that ergonomic interventions are not a luxury but a necessary investment for sustainable human resource management. In a similar vein, Hedge and Ray (2020) observed that incorporating ergonomic training and workstation redesign led to measurable reductions in work-related discomfort and absenteeism, particularly in technology-driven and administrative sectors.

In Ghana and many other developing economies, ergonomic awareness and implementation remain underdeveloped despite increasing reliance on office-based work. A study by Akuffo and Boateng (2022) revealed that many Ghanaian companies lack formal ergonomic policies and that employees frequently report discomfort due to unsuitable furniture, poor screen placement, and inadequate lighting. These findings highlight a disconnect between international best practices and local implementation, emphasizing the need for empirical investigations into ergonomic design's role in health and productivity within Ghanaian contexts. This gap is significant given that persistent discomfort and fatigue can directly impact employee morale, cognitive functioning, and ultimately, job performance.

Moreover, productivity has been strongly linked to the quality of ergonomic design. A randomized control study by Vink et al. (2021) indicated that simple interventions such as adjustable chairs, standing desks, and monitor elevation significantly increased work output and reduced the need for rest breaks among employees in clerical positions. Ergonomically optimized workspaces foster seamless interaction between employees and their tools, reducing physical strain and cognitive overload. In addition, better ergonomics often contribute to higher satisfaction and retention rates, with employees feeling valued and cared for, as suggested by O'Neill and Sharples (2020). The economic rationale behind investing in ergonomics is also compelling—organizations can recoup investments through improved efficiency and reduced healthcare costs related to occupational injuries and illnesses.

The relationship between ergonomics and employee health is also supported by growing epidemiological evidence. For instance, Mahmud et al. (2019) found that poor workstation design was a leading contributor to repetitive strain injuries and stress-related disorders in Southeast Asia's growing tech industry. In contrast, firms that implemented ergonomic redesigns saw not only a decrease in health-related complaints but also improvements in psychological well-being. Psychological ergonomics, involving factors such as visual comfort, noise control, and spatial layout, are now being integrated into comprehensive workplace design strategies. In this way, ergonomics serves both preventive and promotive functions by minimizing risks and enhancing user experience.

Technological advancements are further shaping how ergonomic interventions are developed and evaluated. The use of motion-capture systems, wearable sensors, and AI-based posture tracking has allowed for more personalized and responsive ergonomic solutions (Lee & Lee, 2022). These technologies enable real-time monitoring of worker behavior, providing insights into posture, movement patterns, and fatigue levels that can inform workstation adjustments. When integrated with user feedback, these data-driven approaches result in highly adaptive work environments. However,

while promising, such innovations are still largely inaccessible in resource-constrained settings, raising concerns about equity and inclusiveness in occupational health management.

Despite these advancements, ergonomic solutions are often overlooked in policy formulation and workplace regulation. In many developing countries, including Ghana, labor laws and occupational safety standards have yet to catch up with the ergonomic demands of modern work environments. This regulatory gap allows for inconsistent practices, which exposes employees to avoidable health risks and limits organizational performance. According to a World Health Organization (2022) report, musculoskeletal conditions are now among the leading causes of disability worldwide, with work-related factors accounting for a significant proportion of cases. The incorporation of ergonomic standards into national occupational health frameworks is therefore not just a workplace issue but a public health priority.

Cultural perceptions and organizational culture also influence how ergonomics is valued and implemented. Some employers view ergonomic investments as non-essential or believe that health issues related to workstation design are minimal. This underestimation persists despite evidence that ergonomic discomfort can lead to long-term absenteeism, high turnover, and low workplace engagement (Dul et al., 2019). Employee awareness and empowerment are equally crucial—when workers are educated about proper posture, screen height, and keyboard placement, they are better able to advocate for their well-being and adopt healthier work habits. This underscores the importance of not only providing ergonomic tools but also ensuring adequate training and organizational support.

**Statement of the Problem**

Despite increasing awareness of occupational health and safety, many organizations continue to underestimate the significant role that ergonomic workstation design plays in employee well-being, productivity, and long-term health. In various corporate and institutional settings, employees spend extended hours seated in poorly designed workspaces that do not align with ergonomic standards, leading to musculoskeletal discomfort, reduced concentration, fatigue, and in some cases, long-term disability. According to the World Health Organization (2022), work-related musculoskeletal disorders are among the top contributors to occupational illnesses globally, and a significant proportion of these cases are attributed to non-ergonomic work environments. The persistence of such conditions not only endangers the health of workers but also impairs their output, leading to lower organizational efficiency and increased costs associated with sick leave, turnover, and medical compensation.

In Ghana and similar developing economies, the implementation of ergonomic principles in workstation design is often overlooked or deprioritized. Most offices and administrative institutions continue to use conventional, one-size-fits-all furniture without considering the diverse anthropometric and functional needs of users. A study by Akuffo and Boateng (2022) revealed that over 60% of surveyed workers in Accra reported regular neck, shoulder, or back pain associated with their workstation setup. Despite these reports, very few organizations have initiated workplace assessments or introduced ergonomic redesign policies. This inertia is often driven by the misconception that ergonomics is a luxury rather than a necessity, especially in cost-conscious environments. Consequently, the lack of proactive measures exacerbates the incidence of work-related discomfort and undermines efforts to improve occupational health outcomes.

While several international studies have established the link between ergonomic interventions and improved employee comfort and productivity (Robertson et al., 2021; Vink et al., 2021), there is a paucity of context-specific research examining how ergonomic workstation design affects employees in Ghanaian office environments. Most existing literature either generalizes findings from developed

countries or focuses on industrial ergonomics, leaving a significant gap in empirical evidence on administrative or knowledge-based work environments in sub-Saharan Africa. This research gap is problematic because ergonomic needs and challenges can vary greatly across socio-economic and infrastructural contexts. For instance, access to adjustable furniture, lighting control, or climate-regulated environments, which are common in developed nations, may be scarce or unevenly distributed in Ghana, thus affecting how ergonomic designs are perceived and utilized.

Moreover, there is limited data on how ergonomic workstation design influences not only physical health outcomes but also psychological factors such as job satisfaction, motivation, and perceived productivity. Studies by Hedge and Ray (2020) and Mahmud et al. (2019) suggest that well-designed work environments significantly reduce stress and mental fatigue, yet few Ghanaian studies have quantitatively explored these outcomes. The integration of ergonomic principles has also been shown to enhance employee retention, reduce absenteeism, and support inclusive employment for individuals with physical challenges. These broader organizational benefits further justify the need for in-depth, localized research that assesses the multi-dimensional impact of workstation design on employees.

The urgency of addressing ergonomic deficiencies is further amplified by shifts in work patterns such as remote work, flexible office hours, and digitization, which require adaptable and user-friendly workspaces. Without data-driven insights, organizations risk continuing to design or maintain workspaces that compromise both employee well-being and organizational productivity. Therefore, this study is warranted as it seeks to investigate the impact of ergonomic workstation design on employee comfort, productivity, and health within the Ghanaian context. By filling the existing research gap, the study aims to provide evidence-based recommendations that will support the development of ergonomic policies and promote healthier, more efficient work environments.

**Purpose of the Study**

The purpose of this study is to examine how ergonomic workstation design influences employee comfort, productivity, and health in office environments, particularly within the Ghanaian context. The study seeks to provide evidence-based insights that can inform workplace design improvements and occupational health policies.

**Specific Objectives**

1. To assess the effect of ergonomic workstation design on employee physical comfort.
2. To examine the relationship between ergonomic workstation features and employee productivity.
3. To determine the impact of ergonomic workstation design on employee health outcomes.

## 2. Literature Review

**Theoretical Framework**

A suitable theoretical foundation for this study is the Person-Environment Fit Theory (P-E Fit Theory), which posits that the degree of compatibility between individuals and their work environments significantly influences their psychological and physical well-being, as well as their performance outcomes. Developed from the field of environmental psychology and widely adopted in organizational behavior and occupational health literature, the theory offers a valuable lens through which to examine how ergonomic workstation design aligns with the needs of employees and the resulting effects on their comfort, health, and productivity.

The core tenet of Person-Environment Fit Theory is that employees thrive when there is congruence between their personal attributes (such as physical characteristics, abilities, and preferences) and the attributes of their work environment, including physical workspace, organizational culture, and job

demands (Edwards, Caplan, & Van Harrison, 1998). When such alignment exists, employees experience reduced stress, enhanced satisfaction, and improved performance. Conversely, a misfit between the individual and their environment can lead to discomfort, fatigue, injury, and dissatisfaction. In the context of workstation ergonomics, this theory suggests that the design of chairs, desks, monitors, and other physical components of the workstation should correspond to the physical dimensions, posture needs, and task requirements of each employee to ensure optimal well-being and output.

This concept of fit is particularly important in evaluating ergonomic interventions. For instance, ergonomic design principles advocate for adjustable furniture and equipment that accommodate users of different heights, limb lengths, visual needs, and mobility levels (Robertson et al., 2021). A desk that is too high or a chair that lacks lumbar support may seem like minor inconveniences, but over time, such mismatches can result in chronic musculoskeletal conditions such as lower back pain, carpal tunnel syndrome, or neck strain. In Ghanaian workplaces, where standard workstation furniture is often mass-produced and not tailored to individual users, the potential for person-environment misfit is high. This makes the P-E Fit Theory especially relevant as it underscores the importance of individualized ergonomic solutions rather than generic office layouts.

Studies have consistently shown that enhancing person-environment fit through ergonomic design leads to measurable improvements in health outcomes and job performance. A study by Vink et al. (2021) demonstrated that employees who received ergonomically customized workstations reported a 30% decrease in work-related discomfort and a 20% increase in self-reported productivity within three months. Similarly, Hedge and Ray (2020) found that ergonomic workstations reduced absenteeism rates due to physical strain by nearly 15% in large corporate offices. These findings align with the P-E Fit Theory's assertion that when the work environment accommodates individual needs, positive outcomes follow not just in health, but also in efficiency and engagement.

Moreover, the P-E Fit Theory extends beyond physical compatibility to encompass psychological and perceptual aspects of the workplace. For instance, the theory explains why employees who perceive their work environment as supportive and comfortable are more likely to remain motivated and satisfied. In the case of ergonomic design, even the perception that one's organization has invested in employee comfort can foster a stronger psychological attachment to the workplace. Employees may feel more valued, which enhances job satisfaction and organizational commitment (Kristof-Brown, Zimmerman, & Johnson, 2005). This perspective is vital in the Ghanaian context, where limited organizational resources may sometimes prevent comprehensive ergonomic overhauls. Even incremental adjustments—such as allowing employees to reposition monitors or adjust chair height—can send important signals that management cares about their well-being.

The P-E Fit Theory also helps to explain individual variability in how employees respond to the same work environment. What is comfortable for one person may be stressful for another, depending on their body dimensions, health status, and work style. This variability highlights the need for flexibility and user-centered design in workstations, which is a core principle in ergonomics. Rather than seeking a one-size-fits-all solution, employers should consider modular and adjustable components that can be customized. In this regard, the theory supports the implementation of inclusive ergonomic design that accounts for diversity in gender, age, ability, and job function—factors that are often overlooked in standardized office settings in Ghana and other developing economies (Akuffo & Boateng, 2022).

Furthermore, the theory is particularly useful in exploring the consequences of poor ergonomic fit on employee health and organizational outcomes. When the work environment imposes physical demands that exceed an employee's capability—such as excessive reaching, bending, or screen glare—it creates what Edwards (1996) describes as a "strain-producing misfit." Over time, this misfit can lead to

psychological stress, job dissatisfaction, and burnout, thereby reducing organizational productivity and increasing turnover. In contrast, by proactively applying the principles of person-environment fit, organizations can mitigate these risks and foster a culture of preventive health.

**Empirical Review**

A number of empirical studies have examined the impact of ergonomic workstation design on employee comfort, health, and productivity, contributing significantly to the understanding of how physical work environments influence occupational outcomes. These studies span different geographical locations, sectors, and methodological approaches, yet converge on the critical role that ergonomics plays in workplace efficiency and employee well-being.

Robertson, Ciriello, and Garabet (2021) conducted a quasi-experimental study in the United States to assess the effectiveness of ergonomics training and workstation redesign in a corporate setting. Their research involved employees from three large firms, divided into control and intervention groups. The intervention group received personalized workstation adjustments and ergonomic training, while the control group did not. The findings revealed a significant reduction in reported musculoskeletal discomfort and a noticeable increase in productivity among the intervention group. This study demonstrated the value of coupling ergonomic design with user education to achieve optimal results.

In a study by Hedge and Ray (2020), the researchers focused on the correlation between ergonomic office furniture and absenteeism due to work-related injuries. Their longitudinal research involved data from over 200 office employees over a 12-month period. The study measured variables such as number of sick days, reports of physical discomfort, and work performance ratings. Results showed that organizations that invested in ergonomic interventions—particularly adjustable chairs and work surfaces—experienced a 17% reduction in absenteeism and a 22% increase in task accuracy. The authors argued that ergonomic design not only improves physical comfort but also boosts cognitive focus by minimizing distractions caused by pain or discomfort.

Mahmud et al. (2019) examined the prevalence of musculoskeletal disorders among IT workers in Southeast Asia and the extent to which poor ergonomic practices contributed to these issues. Using a cross-sectional survey approach involving 400 respondents across Malaysia, Indonesia, and Singapore, the study found that over 60% of respondents experienced neck and back pain directly linked to prolonged sitting and improper monitor height. The authors noted that most respondents worked in companies with no formal ergonomic policies or workstation assessments. The findings emphasized the urgent need for ergonomic guidelines, especially in tech-driven environments where employees are often sedentary for long periods.

Vink et al. (2021) conducted a field study in the Netherlands to explore the relationship between ergonomic workstation adjustments and employee productivity. Using direct observational methods and self-reported data, the study evaluated the effects of sit-stand desks, monitor arms, and ergonomic keyboards over a four-month period. Results indicated that employees using height-adjustable workstations demonstrated improved energy levels and concentration, leading to a 25% increase in task completion rates. Additionally, reports of lower back pain decreased significantly. The study concluded that even modest ergonomic improvements could yield substantial performance gains when properly implemented and monitored.

In the African context, Akuffo and Boateng (2022) explored the state of ergonomic practices in corporate Ghana through a survey of employees in five large firms in Accra. The study assessed the availability of ergonomic furniture, employee satisfaction with workstation design, and the incidence of occupational injuries. Findings revealed that only 28% of respondents had access to adjustable furniture, and 64% reported regular discomfort while at work. The study also linked poor ergonomic conditions with lower

job satisfaction and higher turnover intentions. The authors recommended that organizations incorporate ergonomic assessments into their human resource and occupational health strategies.

Another relevant study by O'Neill and Sharples (2020) evaluated the psychological effects of ergonomic workstation design in a large-scale call center in the United Kingdom. The research combined physical ergonomic assessments with surveys on employee stress, motivation, and job satisfaction. It found that employees who rated their workstations as comfortable also reported lower levels of stress and higher levels of engagement. The study highlighted the role of psychological ergonomics, suggesting that comfort is not only physical but also perceptual—employees who perceive their environment as supportive are more likely to remain engaged and productive.

Lee and Lee (2022) introduced a technological dimension to ergonomic evaluation by employing wearable sensors and AI-based posture tracking to assess the posture of workers in real-time. Conducted in a manufacturing facility in South Korea, the study sought to examine how real-time feedback on posture could influence employee behavior and reduce ergonomic risks. The intervention group received alerts to correct poor posture throughout the day, while the control group did not. After six weeks, the intervention group showed significantly improved posture and reduced complaints of shoulder and back pain. The study concluded that technology-assisted ergonomic interventions could be a valuable addition to traditional ergonomic redesign.

Taken together, these studies provide compelling empirical evidence on the multifaceted benefits of ergonomic workstation design. From improved physical health outcomes to enhanced psychological well-being and productivity, ergonomics emerges as a critical aspect of modern workplace management. They also highlight a consistent gap in the implementation of ergonomic principles, particularly in developing regions where resources and awareness may be limited. Furthermore, the studies underscore the need for holistic interventions that combine physical modifications with training, monitoring, and employee engagement to ensure lasting impact. As the modern workplace evolves—with trends like hybrid work, increased screen time, and flexible workspaces—future ergonomic interventions will need to be adaptive, personalized, and technology-driven. The current research builds on these insights by focusing specifically on Ghanaian office environments, aiming to contextualize these global findings within a local framework and contribute to more ergonomic and inclusive workspaces across the country.

## 3. METHODOLOGY

### Research Design and Approach

This study employed a quantitative research design to investigate the relationship between ergonomic workstation design and its impact on employee comfort, health, and productivity within selected corporate offices in Ghana. The quantitative approach was chosen to allow for measurable analysis of key variables and to identify statistical relationships between ergonomic conditions and work outcomes. By relying on structured survey instruments, the study sought to obtain empirical data that could be generalized to similar workplace environments. The design enabled the researcher to assess patterns in discomfort levels, physical symptoms, and self-reported productivity based on respondents' experiences with various ergonomic workstation elements such as chair adjustability, monitor height, keyboard position, and lighting.

### Population of the Study

The target population for this study comprised employees working in office-based roles across selected public and private sector organizations in Accra, Ghana. These included administrative staff, IT professionals, and other corporate employees who spend the majority of their workday seated at a

workstation. The study focused on individuals who use computers and desk-based tools regularly, as they are more likely to experience the physical and cognitive impacts of workstation design. Organizational health and safety officers were also engaged to validate institutional policies on ergonomics. This population was selected to capture diverse workplace practices and to evaluate the consistency of ergonomic interventions across different organizational settings.

**Sample Size and Technique**

A stratified random sampling technique was used to ensure representativeness across various sectors and job roles. Employees were stratified based on their departments and job functions to account for different exposure levels to sedentary tasks and workstation use. From the broader population, a total of 250 respondents were selected, including 200 general office employees and 50 health and safety or HR officers. This sample size was determined based on statistical adequacy for inferential analysis, while also ensuring variation in organizational structure and job characteristics. The technique facilitated comparative analysis across departments and allowed the researcher to explore sector-based variations in ergonomic implementation and its effects.

**Data Collection Instrument**

The primary data collection tool was a structured, closed-ended questionnaire designed to capture quantitative responses on key variables. The instrument gathered information on demographic characteristics (e.g., age, gender, job role), workstation features (e.g., chair and desk adjustability, screen positioning), health symptoms (e.g., back pain, neck strain, eye discomfort), and self-rated productivity levels. Likert-scale items were used to measure perceptions of comfort, satisfaction with workstation design, and frequency of ergonomic-related issues. The questionnaire was reviewed by experts in occupational health and pre-tested with a small group of employees to ensure clarity, reliability, and relevance. Necessary adjustments were made before full administration. The instrument was distributed in both paper and electronic formats to accommodate the preferences of respondents across different organizations.

**Data Analysis**

Data collected from the questionnaires were analyzed using descriptive and inferential statistical techniques with the aid of SPSS software. Descriptive statistics—including frequencies, means, standard deviations, and percentages—were used to summarize demographic characteristics, prevalence of health symptoms, and employee perceptions of ergonomic adequacy. Inferential statistics such as t-tests and ANOVA were employed to determine whether statistically significant differences existed in comfort or productivity based on workstation design features or job roles. Furthermore, multiple regression analysis was conducted to identify which ergonomic variables most significantly predicted employee health outcomes and performance levels. These analyses provided evidence to support or challenge assumptions about the link between ergonomic design and workplace well-being.

The quantitative analysis enabled the researcher to uncover trends in employee discomfort and to examine how ergonomic conditions influence individual and organizational outcomes. The use of validated instruments and statistical techniques ensured that the findings were both credible and applicable to real-world workplace design. By focusing on a sample drawn from diverse work settings in Ghana, the study contributes localized evidence to global literature on ergonomics and occupational health, offering practical implications for organizational policy and workspace planning.

**Analysis and Discussion of Results**

**To Assess the Effect of Ergonomic Workstation Design on Employee Physical Comfort**

To determine the effect of ergonomic workstation components on employee physical comfort, a multiple linear regression analysis was conducted using comfort score as the dependent variable. Independent variables included adjustable chair, monitor height, keyboard position, and lighting quality. The purpose of this analysis was to evaluate how different ergonomic features predict levels of physical comfort among employees in a corporate office setting. The regression model was tested using data collected from 250 respondents and analyzed using the Ordinary Least Squares (OLS) method.

The regression summary is presented below:

**Table 1: Regression Coefficients for Ergonomic Features and Physical Comfort**

| Variable | Coefficient (B) | Std. Error | t-value | p-value | 95% Confidence Interval |
|---|---|---|---|---|---|
| Constant | -0.227 | 0.271 | -0.839 | 0.402 | [-0.762, 0.307] |
| Adjustable Chair | 0.459 | 0.045 | 10.257 | <0.001 | [0.371, 0.547] |
| Monitor Height | 0.413 | 0.043 | 9.675 | <0.001 | [0.329, 0.498] |
| Keyboard Position | 0.390 | 0.043 | 9.155 | <0.001 | [0.306, 0.474] |
| Lighting Quality | 0.617 | 0.044 | 13.993 | <0.001 | [0.530, 0.704] |

**Table 2: Model Summary**

| Metric | Value |
|---|---|
| R-squared | 0.658 |
| Adjusted R-squared | 0.653 |
| F-statistic | 117.9 |
| Prob (F-statistic) | < 0.001 |
| AIC | 705.09 |
| BIC | 722.70 |
| No. of Observations | 250 |

The regression model demonstrates a strong overall fit, with an R-squared value of 0.658, indicating that approximately 65.8% of the variance in employee physical comfort can be explained by the ergonomic features assessed—namely adjustable chairs, monitor height, keyboard position, and lighting quality. The model is statistically significant ($F = 117.9$, $p < 0.001$), meaning the set of predictors reliably forecasts physical comfort.

Among the predictors, lighting quality emerged as the strongest determinant of comfort ($\beta = 0.617$, $p < 0.001$), suggesting that adequate and adjustable lighting plays a critical role in reducing eye strain

and enhancing physical ease at workstations. This was followed by the adjustable chair (β = 0.459), which highlights the importance of proper seating in supporting posture and alleviating back pain. Monitor height and keyboard positioning also showed strong positive relationships with comfort, with coefficients of 0.413 and 0.390 respectively, reinforcing the need for screen and input device alignment to prevent neck, shoulder, and wrist strain. All four predictors were statistically significant at the 0.001 level, and their coefficients indicate that improvements in these workstation elements are associated with increased levels of physical comfort. The model's low standard errors and narrow confidence intervals further validate the precision of the estimates.

In summary, the regression analysis confirms that ergonomic workstation design significantly influences employee physical comfort. These findings support the recommendation that organizations prioritize investment in adjustable chairs, proper monitor alignment, ergonomic keyboard positioning, and quality lighting systems to promote well-being and reduce discomfort among office-based employees.

**To Examine the Relationship Between Ergonomic Workstation Features and Employee Productivity**

To explore the relationship between ergonomic workstation features and employee productivity, a multiple linear regression analysis was conducted using productivity score as the dependent variable. The independent variables included adjustable chair, monitor height, keyboard position, and lighting quality. The aim was to determine whether these ergonomic design elements significantly predict variations in employee-reported productivity levels within office environments. The model was estimated using Ordinary Least Squares (OLS) with data from 250 office employees.

The regression results are presented in the following tables:

**Table 1: Regression Coefficients for Ergonomic Features and Productivity**

| Variable | Coefficient (B) | Std. Error | t-value | p-value | 95% Confidence Interval |
|---|---|---|---|---|---|
| Constant | -0.126 | 0.270 | -0.466 | 0.642 | [-0.656, 0.405] |
| Adjustable Chair | 0.531 | 0.044 | 11.945 | <0.001 | [0.444, 0.619] |
| Monitor Height | 0.374 | 0.042 | 8.797 | <0.001 | [0.290, 0.457] |
| Keyboard Position | 0.401 | 0.042 | 9.489 | <0.001 | [0.318, 0.485] |
| Lighting Quality | 0.537 | 0.044 | 12.262 | <0.001 | [0.451, 0.623] |

**Table 2: Model Summary**

| Metric | Value |
|---|---|
| R-squared | 0.649 |
| Adjusted R-squared | 0.643 |
| F-statistic | 113.3 |
| Prob (F-statistic) | < 0.001 |
| AIC | 702.02 |
| BIC | 719.63 |
| No. of Observations | 250 |

**Interpretation of Results**

The regression model reveals that 64.9% of the variance in employee productivity can be explained by the four ergonomic workstation features included in the analysis. This high R-squared value indicates a strong model fit, and the F-statistic of 113.3 ($p < 0.001$) confirms that the overall regression model is statistically significant.

Among the predictors, adjustable chairs had the strongest positive influence on productivity ($\beta = 0.531$, $p < 0.001$), suggesting that customizable seating supports employees in maintaining energy and focus during work tasks. Lighting quality followed closely ($\beta = 0.537$, $p < 0.001$), reinforcing the role of visual comfort and illumination in enhancing concentration and task efficiency. Both monitor height ($\beta = 0.374$) and keyboard positioning ($\beta = 0.401$) also showed strong and significant positive associations with productivity, indicating that proper screen and input device alignment help reduce fatigue and promote smoother workflow execution.

All predictors in the model were statistically significant at the 0.001 level, with relatively low standard errors and narrow confidence intervals, confirming the robustness of the estimates. The model's constant term was not significant, which suggests that in the absence of ergonomic features, baseline productivity is statistically indeterminate—a result that aligns logically with the expectation that productivity is largely influenced by environmental support factors.

In conclusion, the regression analysis confirms that ergonomic workstation features have a meaningful and statistically significant effect on employee productivity. These findings emphasize the importance for organizations to invest in ergonomic improvements such as adjustable chairs, properly aligned monitors, supportive keyboard placements, and adequate lighting systems as key strategies for enhancing performance and work output. These insights support evidence-based recommendations for workplace design reforms aimed at optimizing employee performance through ergonomic integration.,

**The Impact of Ergonomic Workstation Design on Employee Health Outcomes**

Ergonomic workstation design has gained attention as organizations seek to mitigate work-related health issues such as musculoskeletal disorders (MSDs), eye strain, and chronic fatigue. This analysis examines the relationship between ergonomic interventions (e.g., adjustable chairs, monitor height, keyboard placement) and employee health outcomes. Using regression analysis, we quantify the strength and significance of this relationship while controlling for confounding variables such as work hours, pre-existing conditions, and job role.

**Regression Results**

**Table 1: Descriptive Statistics**

**Table 2: Regression Coefficients (OLS Model)**

| Variable | Coefficient | Std. Error | t-stat | p-value | 95% CI |
|---|---|---|---|---|---|
| Intercept | 3.21 | 0.76 | 4.22 | <0.001 | [1.72, 4.70] |
| **Ergonomic Score** | **0.85** | **0.18** | **4.72** | **<0.001** | **[0.50, 1.20]** |
| Work Hours | -0.04 | 0.02 | -2.00 | 0.046 | [-0.08, -0.001] |
| Age | -0.02 | 0.01 | -2.00 | 0.047 | [-0.04, -0.001] |

| Variable | Coefficient | Std. Error | t-stat | p-value | 95% CI |
|---|---|---|---|---|---|
| Pre-existing Condition | -1.10 | 0.32 | -3.44 | 0.001 | [-1.73, -0.47] |

**Model Fit:**

- **R-squared** = 0.42
- **Adjusted R-squared** = 0.39
- **F-statistic** = 12.6 ($p < 0.001$)

**Interpretation of Results**

The regression analysis reveals a statistically significant positive relationship between ergonomic workstation design and employee health outcomes. A one-unit increase in the **Ergonomic Score** (e.g., from 3 to 4 on a 5-point scale) is associated with a **0.85-point improvement in health outcomes** ($p < 0.001$), holding other factors constant. This suggests that ergonomic interventions have a meaningful impact on reducing discomfort and fatigue.

## 4. Discussion of Results

The findings of this study demonstrate a significant positive relationship between ergonomic workstation design and employee physical comfort, aligning with prior research in occupational health. The regression analysis revealed that a one-unit improvement in ergonomic score corresponded to a 0.85-point increase in self-reported comfort levels, reinforcing the conclusions of Hedge (2004), who found that adjustable chairs and monitor positioning reduced musculoskeletal discomfort by 40% in office workers. Similarly, a study by Robertson et al. (2009) in South African offices reported comparable improvements, suggesting that ergonomic interventions have consistent benefits across different workplace settings. However, some scholars argue that individual adaptability may moderate these effects. For instance, Janwantanakul et al. (2012) observed that employees with pre-existing conditions or poor posture habits derived fewer benefits from ergonomic adjustments, which parallels our finding that pre-existing conditions significantly worsened comfort scores (-1.10 points). This implies that while ergonomic design is generally effective, personalized assessments may be necessary for optimal results. The study also identified a measurable link between ergonomic features and productivity, though the effect was less pronounced than for comfort. This aligns with research by Thorp et al. (2012), who noted that ergonomic improvements led to a 5-8% increase in task efficiency, primarily by reducing discomfort-related distractions. Conversely, some studies, such as that by Davis et al. (2014), found no direct productivity gains from ergonomic adjustments alone, arguing that factors like job autonomy and workload play a more dominant role. Our results partially reconcile these conflicting views by showing that while ergonomics contribute to productivity, their impact is secondary to work environment factors such as hours worked (-0.04 per additional hour). This suggests that ergonomic interventions should be integrated into broader workplace wellness strategies rather than treated as standalone solutions, a perspective supported by the International Labour Organization's (ILO, 2016) guidelines on holistic occupational health.

Regarding health outcomes, the study's findings corroborate existing evidence that ergonomic workstations reduce musculoskeletal strain and fatigue, consistent with research by Punnett & Wegman (2004) in developing economies. However, counterarguments exist, particularly from studies in low-resource settings. For example, Mbonile & Kayombo (2015) found that in Tanzanian offices, budget

constraints limited the effectiveness of ergonomic interventions, as employees often reverted to poor postures due to inadequate training or maintenance. This contextual challenge may also apply to Ghana, where resource limitations could hinder sustained ergonomic benefits. Additionally, while our model explained 42% of variance in health outcomes, the remaining 58% underscores the influence of unmeasured variables, such as stress and physical activity—factors emphasized by Sauter et al. (2013) as critical moderators of ergonomic success.

The Ghanaian context introduces unique considerations. Unlike Western studies where ergonomic policies are well-established, Ghana's formal sector is still adapting to ergonomic standards, as noted by Adzimah & Seckl (2018). Our results suggest that even basic ergonomic interventions can yield significant improvements, supporting calls by local occupational health advocates for policy reforms. Yet, skeptics argue that cultural attitudes toward workplace discomfort may underreport ergonomic needs, a phenomenon observed in similar economies by Ojo et al. (2019). This potential bias implies that our findings, while statistically significant, may underestimate the true prevalence of ergonomic-related issues.

## 5. Conclusion and Recommendation

**Conclusion**

This study demonstrates that ergonomic workstation design plays a crucial role in enhancing employee comfort, productivity, and health within Ghanaian office environments. The findings reveal a strong positive relationship between ergonomic interventions and reduced physical discomfort, supporting existing global research on workplace ergonomics. However, the study also highlights that ergonomic improvements alone may not dramatically boost productivity unless combined with broader organizational support systems. The influence of individual factors—such as pre-existing health conditions, work duration, and age—further underscores the need for tailored ergonomic solutions rather than standardized approaches.

The Ghanaian context introduces unique considerations, including resource limitations and cultural perceptions of workplace comfort, which may affect the long-term success of ergonomic interventions. While the study confirms the benefits of ergonomic design, it also emphasizes that sustainable improvements require more than just physical adjustments to workstations. A holistic approach, integrating ergonomic principles with health education and supportive workplace policies, is essential for maximizing employee well-being.

**Recommendations**

Employers should prioritize ergonomic workstation assessments and invest in adjustable furniture, proper lighting, and equipment that supports neutral postures. Given the financial constraints some organizations face, phased implementation of ergonomic upgrades could make improvements more feasible. Workplace training programs should educate employees on proper ergonomic practices and the importance of posture, movement, and workstation customization to individual needs. Policymakers in Ghana should develop and enforce ergonomic standards for office environments, ensuring that occupational health guidelines reflect the realities of local workplaces. Collaboration between government agencies, occupational health experts, and private sector employers could help establish realistic and enforceable ergonomic regulations.

Future research should explore the long-term effects of ergonomic interventions in Ghana and similar contexts, particularly how cultural attitudes and economic constraints influence adoption and outcomes. Comparative studies across different industries could also provide deeper insights into which ergonomic strategies are most effective for varying work environments. By combining ergonomic design with

supportive policies and education, organizations can foster healthier, more productive workplaces while addressing the unique challenges of the Ghanaian setting.

## 6. References


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