Journal of the Ghana Institution of Engineering (2024) 24:3
https//doi.org/10.56049/jghie.v24i3.186

CASE STUDY (Presented at 2023 GhIE Annual Conference & AGM)

The bearings of workspace design on employee health

Samuel N. Dorhetso[1,*], Emmanuel Gadze[1]

Received: 12th February, 2024 / **Accepted:** 22nd October, 2024
Published online: 5th December, 2024

Abstract

At present computer workstations have become crucially essential to most occupations, and employees spend ample time using them. Hence, health issues emerging from their design and use must be properly examined, and the gaps due to the dearth of sufficient knowledge on how they affect employee health through the incidence of musculoskeletal disorders (MSDs) must be filled. Hence, the purpose of the current study was to examine the effects of workspace design as well as the control effects of work posture on the health of employees, captured as the tendency of MSDs. A positivist research approach was adopted for this study, and data were collected from respondents in the finance, insurance and education industries within the Greater Accra Region using a 5-point Likert scale close-ended questionnaire. The data garnered were evaluated with bivariate correlation and regression analysis, facilitated by the statistical package for the social sciences software, and discussed. The study found that workstation layout (specifically leg comfort) and feet support or sitting posture statistically significantly ($p = 0.001$) predict employee health. The findings of the study would be used primarily within the context of the particular industries studied. However, the verdicts may be generalized to add on to literature, since theoretical and empirical findings are equally relevant universally. It is envisioned that the yields of this study would inform strategic decisions regarding workspace designs by firms to create and maintain remarkable levels of health amongst employees and help reduce the frequency of work-related MSDs.

Keywords: Workspace Design, Musculoskeletal Disorders, Workstation Layout, Work Posture, Employee Health

Introduction

The need to ensure that ergonomic standards are considered during the design of computer workstations cannot be ignored. The goal to prevent or reduce the effect of musculoskeletal disorders and other health challenges while maintaining a conducive work environment has become necessary in this modern era of high demand for productivity and competition within industries. The world has reached a modern era where the use of computer workstations has become very common and vital to achieving productivity. Even among children, the use of computers to retrieve information for their school assignments is no longer a luxury. The importance of computer workstations within the office environment and even for employees working from home with regards to productivity cannot be overemphasized (Kumar, 2016; Kumar and Raj Kumar, 2017). Kumar and Raj Kumar (2017) posited that ergonomics for computer workstations design help to improve productivity, save time, reduce stress and improve quality of work. The most important consideration in planning an office space could be the number and design of computer workstations required for employees to effectively perform their roles. Depending on the area available for employees' work activity, consideration is given to their comfort, ease of movement around these computer workstations and aesthetic condition of the whole work environment. Organizations therefore invest heavily into the acquisition of computer workstations. Most employees spend on average about eight hours working on their computers. Nowadays, most employers measure performance of their employees through software that records the volume of work activity carried out on their computers (Ikonne, 2014). Considering how essential computer workstations have become, and the time employees spend using them, health issues emerging from their design and use must be properly examined, and the gaps due to the dearth of sufficient knowledge on how they affect employee health through the incidence of musculoskeletal disorders must be filled. Musculoskeletal disorders, headaches and eyestrains are common health issues most employees battle with (OSHA, 2014).

To fill some of these gaps, this contemporary study focused on examining the effects of workspace design (independent variable) and work posture (control variable) on the health of employees (tendency of musculoskeletal disorders) within the finance, insurance and education industries in the Greater Accra Region. Workstation design was limited to the desk, chair, computer visual display unit and keyboard usage. Similarly, work posture looked mainly at sitting and standing postures within the office environment in lieu of pushing, pulling and lifting postures common among field or industrial workers. Musculoskeletal disorders were the main focus for health problems affecting employees studied in this treatise. This study used a quantitative exploratory descriptive design to recognise, examine, and define the effect of workspace design and work posture ergonomics on the health of employees in selected industries within the Greater Accra Region. The researcher gathered extensive data from employees within the selected industries. It is envisaged that the findings and recommendations of the study would guide employers towards an appreciation of the importance of providing comfortable working environments for their employees to curb the occurrence of work related musculoskeletal disorders, motivate them and improve health and productivity. The following subsections present succinct reviews of literature regarding workspace design, work posture ergonomics, and employee health. The conceptual framework and hypotheses of the study were subsequently evinced under this section.

Workspace Design

The use of computer workstations has become very common as most companies on daily basis rely on it. The design of workstations could have an impact on employee health and job satisfaction. Good workstation design requires that consideration is given to the number of employees who would use the space, their physical characteristics, their sitting and standing postures and nature of task to be performed (Minshew and Hobson, 2008). Following Minshew and Hobson (2008), workstation design as currently researched, encapsulates the layout of desk, set up of visual display units, keyboard, mouse, and chair in an office environment. There are ergonomic principles that facilitate the determination of suitability of any workstation design. The focus of these principles are to ensure that the user interacts comfortably with the workspace and

*Corresponding author: samueldorhetso@gmail.com

[1]Accra Institute of Technology, P. O. Box SA 92, Somanya, Ghana

ISSN: 0855-0743/

become productive at work.

Ikonne (2014) posited that health problems leading to reduction in performance and production are adverse effects of ignoring ergonomic principles in workspace design. De Croon *et al*. (2005) noted in a study that depending on how a workspace is designed, it could lead either directly or indirectly to physiological and psychological reactions. According to the study, for instance, ergonomically incorrect and poor computer workstation set-ups could produce a variety of problems in the form of crowding stress (the feeling of inadequacy of space), breathing difficulties, occupationally induced fatigue, and probable increase in the levels of blood pressure.

Work Posture Ergonomics

According to Minshew and Hobson (2008), posture is the way the body is carried whether in sitting or standing position. Working in an office environment restricts the employee basically to sitting and standing postures. Holding a good posture for long can cause some discomfort and fatigue. According to a study by Rezaei et al, (2021), personnel are exposed to ergonomic hazards, musculoskeletal disorders, and other work-related injuries, and low back pain is the most common musculoskeletal disorder. According to the study, the prevalence of low back pain in personnel is high, and body position at work, stress and lack of physical activity were the strongest risk factors. The practice of having short breaks have been recommended by most ergonomic experts. Employees are likely to adjust their body posture according to the design of the workspace. The chair plays a vital role in maintaining good posture.

The provision of a lumbar support to give the back the required shape and the design of seat pans to prevent sliding of the pelvis are key design considerations for ergonomic chairs. Jellema *et al*. (2001) asserted that there was insufficient evidence that lumber supports as a treatment method is effective. Employees are often carried away by their passion to get task completed. However, long hours of continuous sitting behind their computer workstations can be detrimental to their health. Adeyemi (2010) recommended that caution should be taken to avoid sitting all day as it can be dangerous to the back and that employees must have flexible working positions.

Employee Health

Most people consider the office environment safer than other environments such as mining, construction, and field engineering. However, many health problems have emerged from poor office ergonomics. Poor workstation design could result in poor work posture which evolves into many health problems for employees. The main health problems associated with the use of workstations within the office environment are musculoskeletal disorders (MSDs). MSDs are injuries and disorders that affect the human body movement or musculoskeletal system (muscles, tendons, nerves, ligaments, discs etc.). Some common MDSs include carpal tunnel syndrome, tendonitis, tendon strain, ligament strain, thoracic outlet compression, epicondylitis, radial tunnel syndrome, mechanical back syndrome, and degenerative disc disease (De Croon *et al*., 2005; OSHA, 2014; WHO, 2022).

According to the World Health Organization (WHO, 2022), lower back pain contributes as much as 570 million out of the 1.7 billion MSD cases worldwide. It has been observed that, aside performing strenuous task involving bending motions and standing for long hours, poorly designed chairs also cause lower back pain. The design of visual display terminals could also contribute to MDSs mainly around the upper body areas such as the neck, shoulders elbows and wrists. The lack of frequent medical screening in some organizations could result in some health challenges such as musculoskeletal sicknesses becoming worse. The Occupational Safety and Health Administration (OSHA, 2014). encourages and provides guidance on how and what employers should do with regards to medical screening and surveillance

Conceptual Framework and Hypotheses of the Study

The influence of workspace design and the control effects of work posture on the health of employees (propensity of musculoskeletal disorders) are highlighted in the conceptual framework of the study as evinced in Figure 1. In accord with the study's purpose and research questions, as well the theories and empirical keystones, the following hypotheses were proposed for testing:

Hypothesis 1: There is a positive and significant statistical relation between workspace design and employee health.

Hypothesis 2: Work posture has a positive and statistically significantly impact on the health of employees.

Materials and Methods

A positivist quantitative exploratory descriptive design was used for this study to examine the effects of workspace design and work posture ergonomics on the health of employees in three selected industries. Due to cost and time constraints, primary data collection was limited to the Greater Accra Region. The researchers gathered extensive data from employees within the finance, insurance and education industries within the Greater Accra Region. The five-point Likert-scale questionnaire covering the questions of the research was prepared with google forms and used to collect primary data from staff for analysis by: confining workstation design to the desk, chair, computer visual display unit and keyboard usage; defining work posture as sitting and standing postures within the office environment in lieu of pushing, pulling and lifting postures common among field or industrial workers; and classifying MSDs as the main instigator of employee health problems studied in this treatise. From the design of the study, through the gathering of the field data, ethical standards were diligently observed as recommended by Creswell (2014).

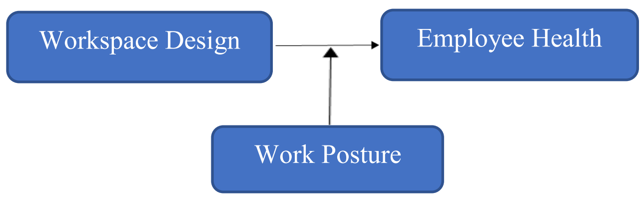

Figure 1 Conceptual framework of the study

Consequently, the questionnaire included information on the protection of respondents' privacy and the confidentiality of the data provided. Respondents were assured that their data would only be used for the study and were informed of their freedom to choose whether or not to participate in the research. The researcher ensured that no institution, office, or respondent was coerced into participating in the study. Anonymity was preserved by concealing the personal identities of respondents in the analysis, and all secondary sources of information were properly cited to avoid plagiarism.

Sampling for the study

The target population of the study included employees from the finance, insurance and education industry within the Greater Accra Region. Cluster sampling, a probability sampling method, was used to collect data for this study. Cluster sampling is characterised by the division of the whole population into clusters or groups. Consequently, a random sample is taken from these clusters, all of which are included in the final sample (Wilson, 2010). Cluster sampling is beneficial to researchers whose subjects are split over large geographical areas as it saves time and money (Evans and Davis, 2005).

The steps for cluster sampling can be summarized as follows: choosing cluster grouping for sampling frame, such as type of company or geographical region; numbering each of the clusters; and selecting sample using random sampling. For this study, organisations operating in Accra were divided into three clusters based on their nature and functions; hence firms in the suburbs of Accra were sub-grouped as finance, insurance and education firms. The cluster sampling method gives each element in the population an equal probability of getting into the sample, and all the choices are independent of one another. The sampling frame of the study is presented in Table 1.

Table 1 Sampling frame of the study

Industry Category	Number of Cases
Finance	150
Insurance	150
Education	150
Total Sample size	**450**

Determination of sample size

The size of a sample that would be suitable for a reliable and valid study is quite complex to determine. Decisions on an appropriate sample size to use for at study depends on factors such as statistical methods, boundaries of error, and levels of certainty (Creswell, 2014). Corbetta (2003) posited that the size of a survey's sample is directly proportional to the anticipated level of confidence of the estimates as well the differences in cases examined, and inversely proportional to the error that researchers would tolerate. The magnitude of a sample is computed for the constructive circumstance of the probability of positive response (0.5) being equal to the probability of negative response (0.5), when the scope of the population is outsized and preceding works cannot be found to facilitate an assessment of the differences of an approximation from all conceivable samples. The size of the sample for this study was computed in accordance with Corbetta's (2003) suggestions, using the Topman formula (Dillon, 1993) as follows:

$$n = \frac{z^2 pq}{e^2}$$

Where n = required sample size, z = degree of confidence (1.96), p = probability of positive response (0.5), q = probability of negative response (0.5), and e = tolerable error (0.05). Therefore, .

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2} = 384$$

However, the actual size of sample used for this current study was inflated to 450 respondents based on the sampling frame of the study (150 respondents for each of the three industrial sectors studied) to enhance the consistency and validity of results.

Model specifications for effects of workspace design on employee health

To examine the effects of workspace design on employee health, the following equation, where employee health is depicted as a function of workspace design was used:

$$EH = f\,(WD) \quad (1)$$

$$EH = f\,(WL, CD, VDU, MP) \quad (2)$$

Where EH = Employee Health, WD = Workspace Design, WL = Workstation Layout (Leg Comfort), CD = Chair Design (Lumbar Support), VDU = Distance Between Eyes and The Visual Display Unit, and MP = Monitor Placement with Eye Level.

The above equation (2) can be rewritten as the following econometric model with its functional form:

$$EH = \beta_0 + \beta_1 WLt + \beta_2 CDt + \beta_3 VDUt + \beta_4 MPt + C \quad (3)$$

Where β_0 is the intercept, β_1 to β_4 represent the coefficients for the components of the independent variables, measured by WL, CD, VDU and MP, and C is the constant of the regression. The data garnered were evaluated and discussed by the use of statistical tools, such as correlation and regression analysis. The data were analysed by using the statistical package for the social sciences (SPSS) software, version 20.

Model specifications for estimation of effects of work posture on employee health

To examine the effects of work posture on employee health, the following equation where employee safety is depicted as a function of work posture was used:

$$EH = f\,(WP) \quad (4)$$

$$EH = f\,(AL, FS, FM, FH, CA, RE) \quad (5)$$

Where WP = Work Posture, Al= Armrest On the Same Level as Desk, FS = Feet Support, Sitting Posture, FM =5 Minutes Rest After Every One Hour, FH = Work On Average for More Than Four Hours a Day at Computer, CA = Computer Accessories and Other Devices Easily Reachable On Desk, and RE = Maintaining Relaxed Elbows at 90 Degrees Besides the Upper Body

The equation (5) can be rewritten as the following econometric model with its functional form:

$$EH = \beta_0 + \beta_1 ALt + \beta_2 FSt + \beta_3 FMt + \beta_4 FHt + \beta_5 CAt + \beta_6 REt + C \quad (6)$$

Where β_0 is the intercept, β_1 to β_6 represent the coefficients for the components of the independent variables, measured by AL, FS, FM, FH, CA and RE, and C is the constant of the regression.

Results and Discussion

A probability sampling method, cluster sampling, was used to collect data for this study. The questionnaire was designed and copies were distributed to the respondents. Although the required sample size of the study was pegged at 384 participants, 450 copies of questionnaire were distributed (See Table 1). This was done in anticipation of the possibility of failure of some respondents to complete the questionnaire appropriately.

Subsequently, 403 copies of questionnaire were retrieved from the participants. However, 16 copies were not properly filled and were thus excluded from the study. Eventually, 387 completed copies of questionnaire were retained and used for the study. The variables were represented by proxy questions, and the collected data were analysed by using SPSS 20.

Demographic features of the sample

From Table 2, it is apparent that a majority of the respondents in the study belong to the 36-46 age group (203, 52.5%). The age group with the least number of respondents had individuals above 47 years of age (27, 7%). The distribution shows that most of the respondents were either young or middle-aged. This could be an indication of a very active workforce in the country. The results as shown in the table also indicate that majority of the respondents in the study were males (200, 51.7%) while (187, 48.3%) represented females. The outcome could be a reflection of the fact that males are mostly bread winners of their families hence the need to work to provide for the family. Additionally, it is apparent from the table that majority of the respondents in the study held a first degree from a university (211, 54.5%). There were only three (0.8%) respondents with a PhD degree, whiles 109 (28.2%) respondents had a master's degree. Furthermore, respondents in the study were almost evenly distributed amongst the three industries. However, the insurance industry had the highest number of respondents (144, 37.2%).

Econometric analysis of effects of workspace design on employee health

Correlation analysis was initially carried out with SPSS 20 to measure the strength and direction of association that exists between workspace design and employee health (MSD). The results exuded a weak, positive correlation between EH and WL which was statistically significant (r = .162*, n = 387, p = .000), but the correlations between MSD and the other three variables were statistically insignificant (P > 0.05). Subsequently, multiple regressions were run to predict EH from WD. The results indicated that only WL statistically significantly predict EH, F (4, 381) = 4.171, $p < .005$, R^2 = .042. From the results, CD, VDU and MP did not statistically significantly predict employee health (see Table 3). Hence hypothesis 1 is supported by the study's finding, thus there is a positive and significant statistical relation between WD and EH, and addressing workstation design issues would help to reduce the occurrence of work-related musculoskeletal disorders among employees.

The model equation of the study is given as:

EH = β0 + β1WLt + β2CDt + β3VDUt + β4MPt + C (7)

EH =1.803 +. 169WL +.105 CD +.093VDU -.092MP (8)

The coefficient of the independent variable depicts that a unit increase in poor workstation layout causes musculoskeletal disorders to increase by 0.169 units and is statically significant (p=0.001) at a 5% significance level. This implies that when the prevailing workstation layout, which includes leg comfort is improved, employees would experience better health and vice versa. The current findings corroborate with the positions of both Ionone (2014) and Minshew and Hobson (2008) positions regarding how ergonomic considerations in workspace design reduce health risks of employees. The findings also validate the WHO (2022) finding that lower back pain due to poor workspace layout contributes largely to MSD cases.

Table 2 Demographic characteristics of the sample

Age Group	**Frequency**	**Percentage**
25-35	157	40.6
36-46	203	52.5
47+	27	7.0
Total	387	100.0
Gender		
Male	200	51.7
Female	187	48.3
Total	387	100.0
Highest Level of Education		
Diploma	24	6.2
HND	40	10.3
First Degree	211	54.5
Masters	109	28.2
PhD	3	0.8
Total	387	100.0
Industry		
Finance	120	31.0
Insurance	144	37.2
Education	123	31.8
Total	387	100.0

Econometric analysis of effects of work posture on musculoskeletal disorders

The initial correlation analysis run with SPSS 20 to measure the strength and direction of association that exists between WP and EH unveiled a weak, positive path between EH and FM which was statistically significant (r = .122*, n = 387, p = .017), a weak, positive correlation between EH and RE which

Table 3 Summary of regression analysis results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.205[a]	.042	.032	.882	1.989
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
1 Regression	12.484	4	3.246	4.171	.003[b]
Residual	296.512	381		.778	
Total	309.495	385			

	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1 (Constant)	1.803	.325		5.539	.000
WL	.169	.052	.168	3.246	.001
CD	.105	.097	.055	1.075	.283
VDU	.093	.084	.056	1.104	.270
MP	-.092	.070	-.070	-1.322	.187

a. Dependent Variable: EH

b. Predictors: (Constant), MP, VDU, CD, WL was statistically significant ($r = .108^*$, $n = 387$, $p = .033$), a weak, negative correlation between EH and FS which was statistically significant ($r = -.194^*$, $n = 386$, $p = .000$), a weak, negative correlation between EH and CA which was statistically significant ($r = -.126^*$, $n = 387$, $p = .013$), and the correlations between EH and the two other variables were statistically insignificant.

Hence, multiple regressions were run to predict the effects of WP on EH. The results indicated that only FS statistically significantly predict EH, F (6, 379) = 3.656, $p < .005$, $R^2 = .055$. However, RE, CA, AL, FH, and FM were statistically insignificant prediction factors of employee health (see Table 4). Hence hypothesis 2 is supported by the study's finding; thus, prolonged exposure to suboptimal work postures is positively related to the development of specific work-related MSDs among employees, and implementing interventions aimed at improving employee work posture will lead to a decrease in the prevalence of work-related MSDs in the workplace.

The model equation of the study is given as:

$$EH = \beta 0 + \beta 1ALt + \beta 2FSt + \beta 3FMt + \beta 4FHt + \beta 5CAt + \beta 6REt + C \quad (9)$$

$$EH= 2.804 -.043AL.-.264FS +.074FM -.148FH -.042CA +.094RE \quad (10)$$

The coefficient of the independent variable depicts that a unit increase in the impropriety in FS causes EH to decrease by 0.264 units, respectively. and is statically significant at a 5% significance level. This finding implies that when the prevailing work posture, which was captured in the study by FS is kept the same and not improved, MSDs of employees will rise and vice versa. The findings of this study prove the assertions of Rezaei *et al*. (2021), Adeyemi (2010), and Jellema *et al*. (2001) regarding how incorrect posture can be dangerous to the back, suggesting that employees must have flexible working postures.

Conclusion

The current treatise assessed the effects of workspace design as well as the control effects of work posture on employee health using data that were collected from respondents in the finance, insurance and education industry within the Greater Accra Region of Ghana. The study found that there was a significant association between poor workstation design and the incidence of work-related MSDs among employees, and addressing workspace design issues could result in a reduction in the occurrence of work-related health issues among employees. The study also found that prolonged exposure to suboptimal work postures is positively related to the development of specific work-related MSDs amid employees, and implementing interventions aimed at improving employee work posture would decrease the prevalence of work-related MSDs in the workplace.

The results of the study could be used primarily within the context of the finance, insurance and education industries, but may also be generalized to add on to literature, since theoretical and empirical findings are equally relevant universally. The nature of this work sets it as an instigator that would initiate

Table 4 Summary of regression analysis results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	..234[a]	.055	.040	.877	1.950
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	16.853	6	2.809	3.656	.002[b]
Residual	291.171	379		.768	
Total	308.023	385			

	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	2.804	.386		7.270	.000
AL	-.043	.104	-.021	-.414	.679
FS	-.264	.099	-.154	-2.663	.008
FM	.074	.059	.067	1.252	.211
FH	-.148	.130	-.059	-1.142	.254
CA	-.042	.105	-.023	-.402	.688
RE	.094	.072	.069	1.300	.194

a. Dependent Variable: EH

b. Predictors: (Constant), RE, CA, AL, FH, FM, FS future research on the subject of interest. In future, researchers on the subject should dig deeper to investigate either the mediating or moderating effects of MSDs on productivity and job performance of employees, and overall performance of companies in terms of revenue accrued or budget savings and usefulness of productive time. Similarly, future studies may also consider investigating the moderating and/or mediating effects of other variables related to workstation design and work posture on job performance or productivity of firms. It is envisioned that the yields of this research would inform considered decisions regarding workspace designs by firms to craft and maintain remarkable levels of comfort for the proliferation of employee health.

Conflict of Interest Declarations

The author declares that no conflict of interest influenced the research conducted in this report

References

Adeyemi, A. O. (2010). ICT facilities: ergonomic effects on academic library staff. Library Philosophy and Practice (ejournal of University of Nebraska - Lincoln), 343.

Corbetta, P. (2003). The qualitative interview. In Social Research: Theory. Methods and Techniques. London: SAGE Publications, Ltd., pp. 264–86.

Creswell, J.W. (2014). Research design, qualitative, quantitative, and mixed methods approaches, (4th ed.). Thousand Oaks, CA: Sage.

De Croon, E., Sluiter, J., Kuijer, P.P. and Frings-Dresen, M. (2005). The effect of office concepts on worker health and performance: a systematic review of the literature. Ergonomics, 48(2), pp. 119-134

Dillon, J, (1993). Alcinous: The handbook of platonism. Oxford: Oxford University Press

Evans, W.R. and Davis, W.D. (2005) High-performance work systems and organizational performance: the mediating role of internal social structure. Journal of Management, 31, pp.758-775. http://dx.doi.org/10.1177/0149206305279370

Ikonne C.N. (2014). Influence of workstation and work posture ergonomics on job satisfaction of librarians in the Federal State University of Southern Nigeria. IOSR Journal of Humanities and Social Science (IOSR-JHS),19(9), pp. 78-84

Jellema P., Tudler M., Poppel M., Nachemson L., and Bouter L. (2001). Lumbar support for prevention and treatment of low back pain- a systematic review within the framework of the Cochrane Back Review Group. Spine, 26, pp 177-386

Kumar, S.S. (2016). Job satisfaction-an overview. International Journal of Research in Economics and Social Sciences, 6, pp. 200–206.

Kumar N. and Raj Kumar S. (2017). Design of workstation for computer users; a review. RE Journals, 1(4), pp.24

Minshew, N. J., and Hobson, J. A. (2008). Sensory sensitivities and performance on sensory perceptual tasks in high-functioning individuals with autism. Journal Autism Developmental Disorders, 38, pp.1485-1498. https://doi.org/10.1007/s10803-007-0528-4.

Occupational Health and Safety Administration (OSHA). (2014). Annual report 2014: Improving working conditions across Europe. https://osha.europa.eu/sites/default/files/annual-report-2014-en.pdf.

Rezaei B., Mousavi E., Heshmati B., and Asadi S. (2021). Low back pain and its related risk factors in health care providers at hospitals: A systematic review. Annals of Medicine and Surgery (London). 70, 102903. https://doi.org/10.1016/j.amsu.2021.102903.

Wilson, J. (2010). Essentials of business research: a guide to doing your research project. New Delhi: SAGE Publications India Pvt Ltd, 2010, 316 pp. Rs 495 (ISBN: 978-81-321-0567-1[Pb])

World Health Organisation (WHO). (2022). World health statistics 2022: monitoring health for the sustainable development goals. ISBN 978-92-4-005114-0 (electronic version) https://cdn.who.int/media/docs/default-source/gho-documents/world-health-statistic-reports/worldhealthstatistics_2022.pdf