EFFECTS OF COGNITIVE ERGONOMICS ON THE PERFORMANCE OF ACADEMIC STAFF OF LAGOS STATE UNIVERSITY (LASU).

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Abstract— The study examined the effects of cognitive ergonomics on the performance of academic staff of Lagos State University (LASU). Researches especially in Nigeria have focused on how the physical environment and workplace design affect the musculoskeletal system of workers and invariably their long-time health crisis. However, little has been done on the possibilities of cognitive demands of work tasks causing cognitive load especially in academics institution whose employees engaged mostly in cognitive activities. The study aimed to examine how cognitive activities and mental stress of academic staff of LASU affect their performance and body mass index (BMI). The study adopted a descriptive survey research design. The population of the study comprised of academic staff of Lagos State University, Ojo campus, this result in a total population of four hundred and four (404). The study used Yamane (1977) formula to derive a sample size of two hundred and one (201) from the population. The study adopted a convenient, stratified and purposive sampling techniques in selecting the sample from the population. The reliability of the research instrument was assessed using the Cronbach's Alpha coefficient (with 0.899 reliability statistics) while the validity was assessed using content and face validities. The study found that, amongst others, there is a moderate positive relationship between cognitive ergonomics and performance of academic staff of LASU (R = 0.605); this implies that there is a relationship between cognitive ergonomics and performance of academic staff of LASU. The study concluded that the use of indicators such as mental stress and BMI to study the relationship, especially within knowledge-work office environments give a new insight to how these factors not only cause mental or musculoskeletal health risk but can directly impede on the performance of employee. The study, therefore, recommended that the management of knowledge-based system needs to create a work environment to reduce mental stress with special consideration to employee with high BMI to get optimum utilisation of their employees.

Index Terms— BMI, Cognitive ergonomics, Mental stress, Performance

1 INTRODUCTION

The academia as a micro system is major contributor to the growth and development of the macro system be it a District, State, Nation etc. This contribution from the academia is made possible mostly through the input of academicians in the environment. But with the work environments heavily relying on mental reasoning, cognitive functioning and information processing that involve one or a combination of administrative, working memory, decision-making, learning, lecturing and research there is possibility of mental stress and strain. Thus, to [1] interaction of humans with their workplace may consist of identifying the relationship between job physical risk factors and physiological responses. The physiological issue this study will focus on is the cognitive factors.

Cognitive ergonomics is a domain of specialisation within ergonomics that concerns 'mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system' [33]. [33] further stated that, when studying the factors that predict successful human interaction within a system, it is important to understand how the cognitive aspects of both the human and system parts of the interaction constrain relate to health condition and performance.

[20] in their research work observed that, cognitive function is noticeable in knowledge work jobs that require working with abstract knowledge and acquiring, creating and applying knowledge, as well as continuous on-the-job learning. [20] further revealed that cognitive demands of work tasks caused cognitive load, which easily exceed the natural limitations of human cognitive capacities, but strain may also be further increased by working conditions. The limitation to human cognitive capacities has become a major problem to most academicians as most fail to realise it when they are determined to meet up with their work expectation and work schedule. This limitations couple with some other working conditions – workplace design, long working hours, high quantitative demands, information and communication technology (ICT) demands, social support, good resources at work, underqualification overqualification etc. – impair cognitive performance, as identified in the research of [7], [8], [35].

A critical examination of an academic work place design shows that most academician are frequently exposed to long period in two posture/position. The standing position when performing cognitive related function such as lecturing, sometimes laboratory experiment etc. and the sitting position during research, administrative function, even some laboratory experiment etc. that are also cognitive function.

The long period in these postures arise when academicians are determined to meet up with their work expectation and schedule as identified earlier. Such as having three consecutives two hour each lecture at a stretch or having two to three administrative meetings with each lasting more than two hours or a combination of long periods of lectures and meet-

ings. These are common routine activities among academicians especially as they move toward the professorial cadre. All these and other working condition some of which were identified earlier, have been identified as possible cause of health hazard due to the possibility of cognitively straining working conditions [20]. [20] further explained that:

"Not only do cognitively straining working conditions directly impair cognitive functioning and task performance; they can also lead to cognitive failures that affect overall performance"

Also, [38] identified from literature how health condition related to Body Mass Index (BMI) is another possible cause of long-term health condition. With the rise in employee long-term health conditions putting their participation in work at risk, it is important to develop a work environment where everyone has a chance to fulfil their potential. But, a preliminary survey of the working condition within Lagos State University environment-LASU (by the researcher) revealed that the Body Mass Index of some academics may require a slight change in work place design to support the standing posture especially during lecture periods. This is because, according to the few students interviewed, the way information a key component of academic lecture and cognitive function are passed during lecture reduces with increase in time spent especially with those the students' term as 'obsessed/fat lecturer'. This requires a critical examination to identified methods of improving cognitive functions in the working environment of academicians that can improve their performance.

Statement of the Problem

Most of the past studies on ergonomics among Nigerian researchers have focus on physical ergonomics – [26], [25] etc. and workplace ergonomic – [11], [19], [27] etc. but there is still dearth in knowledge in cognitive and organisational ergonomics. Researches especially in Nigeria have focused on how the physical environment and workplace design affect the musculoskeletal system of workers and invariably their long-time health crisis. However, little has been done on the possibilities of cognitive demands of work tasks causing cognitive load especially in academics institution whose employees engaged mostly in cognitive activities. In the quest of trying to optimise their lecture period, research time and time for administrative activities, in order to meet up with their work expectation and schedule as identified earlier, most academician easily exceed the natural limitations of human cognitive capacities, which could expose them to mental stress and strain that could lead to long time health risk. This study filled this gap in literature by examining how the cognitive function of academicians in Lagos State University could impede on their health risk and invariably their performance.

Also, as identified earlier, a preliminary survey of the working condition within Lagos State University environment (by the researcher) revealed that the lecturers are mostly in the standing posture throughout the duration of their lecturing activity. Though researchers like [38], identified that high BMI is another possible cause of long-term health condition. They did not examine if it affects cognitive functions as observed in the LASU students' preliminary survey. Hence this study examined the effects of cognitive ergonomics on the performance of academic staff of LASU.

Objectives of the Study

1. To examine the relationship between cognitive ergonomics and performance of LASU academic staff
2. To investigate if there is a significant relationship between cognitive ergonomics and body mass index of LASU academic staff.
3. To examine the relationship between mental stress and performance of LASU academic staff.

Research Questions

1. What is the relationship between cognitive ergonomics and performance of LASU academic staff?
2. How significant is the relationship between cognitive ergonomics and body mass index of LASU academic staff?
3. What relationship exist between mental stress and performance of LASU academic staff?

Research Hypotheses

1. There is no relationship between cognitive ergonomics and performance of LASU academic staff.
2. There is no significant relationship between cognitive ergonomics and body mass index of LASU academic staff.
3. There is no relationship between mental stress and performance of LASU academic staff.

Relevance of the study

The weight each variable indicator(s) has in policy formation differs among organisations. This study's assessment of the relationship between the study variables – cognitive ergonomics, performance, mental stress and body mass index– via specific indicators gives better insight to managements of organisations especially in academic environment. It will give these managers the opportunity to assess other indicators of interest in their policy formation to get a better quality of work output from their employees. It also serves as a bases for other researchers or stakeholders to studying how employees react to other identifiable indicators in further studies.

Scope and Limitation of the Study

This study examined the relationship between ergonomics on the performance in academic environment. But the scope of this study will be limited to exploring how cognitive ergonomics as a domain of ergonomics affect performance within an academic environment – lecturing and research output. This study is, for convenience, cost and time constraints, limited to an academic environment within Lagos State University– LASU.

2 LITERATURE REVIEW

This section will capture reviews of the conceptual and theoretical works that are relevant to this research. In order to aid proper research work, there will be an insight into particular concepts and literature that will provide a general understanding of the relationship between cognitive ergonomics,

performance, mental stress and body mass index in the academic's environment.

Concept of study Variables

Concept of Ergonomics

According to [32] ergonomics is derived from two Greek words: 'ergon' meaning work and 'nomoi' meaning natural laws, it literally means science of work. Thus, researchers and stakeholders in the field of ergonomics, examined this 'work' and how it should be done and how to optimise it, in an attempt to make employees reach their potentials at work or have better job satisfaction. With this, ergonomics has become useful tool, and making work flow more effective and efficient. [32] further emphasis that;

"ergonomics is to ensure the design, strength and ability of people and minimize the effects of their limitations, rather than forcing them to adapt".

In the research work published by Health and Safety Authority UK-HSA (2019), ergonomics is seen in practice to involve the study of work activities and the work environment in order to understand how people carry out the works. The UK-HSA (2019) further identified three types of ergonomics that affects human performance as: physical ergonomics – the physical requirements of an activity; cognitive ergonomics – the way information in relation to the task is presented to the person; organisational ergonomics – how work is organised.

[22] conceptualised ergonomics as the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theories, principles, data and methods to design in order to optimise human well-being and overall system performance. But unlike the UK-HSA (2019), [22] identified four domains of ergonomics. First, physical ergonomics – concerned with human anatomical, anthropometric, physiological and biomechanical characteristics as they relate to physical activity. Second, workplace ergonomic – the science of fitting workplace conditions and job demands to the capabilities of the working population. Thus, ergonomics is seen as an approach or solution to deal with a number of problems (among them are work-related musculoskeletal disorders). Third, cognitive ergonomics – concerned with mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system to get an optimum benefit from the system. And finally, organisational ergonomics-concerned with the optimisation of sociotechnical systems, including their organisational structures, policies, and processes. But this study is limited to cognitive ergonomics as identified in the scope of the study.

Concept of Cognitive

The word cognitive, comes from the Latin cognoscere "to get to know" and refers to the ability of the brain to think and reason as opposed to feel [36]. That is, employees' cognitive development is the growth in their capability to think and solve problems or their mental process of knowing, including aspects such as awareness, perception of processing information and using it.

However, most researchers like [4], [17] etc. accepted that the construct 'cognitive' does not have a single, stable, well-behaved definition, Bayne believed that, though some definitions of 'cognitive' may be better than others no single definition seems likely to cover all legitimate uses of the term. But, any definition of 'cognitive' must involve a certain amount of stipulation as the quest for a definition might still be illuminating. The key to Bayne's view is not an attempt to say what 'cognition' means, but as an attempt to isolate the central and theoretically interesting features that lie at the heart of cognitive phenomena. Hence, in Bayne's view, one of those features concerns the concepts.

[17] on the other hand identified how pivotal the concept "cognitive" is to modern day psychology and empirical clinical psychology. [17] discussed two views on the nature of cognitive. Firstly, within cognitive psychology, where it was explained in terms of information processing. Second, within functional psychology, where it was conceptualised in terms of behaviour. It must be noted that both perspectives are not mutually exclusive and they can be reconciled within a functional-cognitive framework for psychological research that recognises two interdependent levels of explanation in psychology; a functional level that aims to explain behavior in terms of elements in the environment and a cognitive level that is directed at understanding the mental mechanisms by which elements in the environment influence behavior.

Also, [29] defined cognition as the study of how human beings receive, process, integrate, and respond to information. While, [17] also identified the definition of Neisser as one of the most recent and influential description of the construct 'cognitive' as stated below:

> *……the term 'cognition' refers to all the processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used. It is concerned with these processes even when they operate in the absence of relevant stimulation, as in images and hallucinations ...*

Irrespective of the perception of researchers' or stakeholders, one thing that is common in all their conceptualisation of the construct 'cognitive' is information processing.

Thus, for this study, cognition or the adjective cognitive is conceptualised simply as a term for the processing of information and the use of the processed information. This conceptual identity is peculiar to this study because of two reasons. One, it identified with just an aspect of the meaning of cognitive as shown from the different concepts stated earlier from the work of some few researchers. Two, this study is limited according to the scope to how academics process information – acquisition of knowledge and make use of the knowledge – for lecturing or research purpose. Hence, this study limits the cognitive skill accessed to five. These are; sustained attention, which is the basic ability to look at, listen to and think about students respond over a period of time; response inhibition, which is the ability to restrain one's own response to distractions; speed of information processing, which refers to how quickly a learner can process incoming information; cognitive flexibility, which is the ability to change what you are thinking about, how you are thinking about it and even what you think about it – in other words, the ability to change your mind;

working memory, which refers to the ability to remember instructions or keep information in the mind long enough to perform tasks. While other skill like multiple simultaneous attention, category formation and pattern recognition and inductive thinking as identified by [29] are not considered.

Concept of Cognitive Ergonomics

[24] in their work first identified with the definition of cognitive ergonomics by the Ergonomics and Human Factors Society (2019), which see the construct as an intercession that centres on human factors and practices that aim to ensure 'suitable relationship' between work, product and environment, and human needs, capabilities and limitations within workplace. The focus is on human cognitive functioning and the conditions affecting this, and on making human-system interaction at work compatible with human cognitive abilities and limitations. But because the work of [34] is focused on knowledge-work office environments, they see cognitive ergonomics as a study of the factors that reduces the cognitive strain associated to working conditions. To [21], the importance of cognitive ergonomics includes mental workload, decision-making, skilled performance, human-computer interaction, human reliability, work stress, and training as these may relate to human-system design. [21] believes cognitive ergonomics mainly studies cognition in work and operational settings in order to optimise human well-being and system performance. Thus, [21], like others, is of the opinion that cognitive ergonomics in the human-system interaction utilise the developing knowledge from cognitive sciences on mental and information processes such as perception, attention, memory, decision-making, and learning and how to understand the factors that affect cognitive function. [21] further explained that cognitive ergonomics is to elucidate the nature of human abilities and limitations in information processing. This means that the aim is to improve the working conditions with specific emphasis on health and safety and performance of the human factor such that human errors due to unnecessary loading that can cause cognitive stress and strain is reduce or avoid.

Based on the differing conceptualisation of the constructs 'Ergonomics, Cognition and Cognitive Ergonomics' by the researchers identified earlier, this study defines cognitive ergonomics as the study of how the human brain processes information and the use of the processed information within knowledge-work office environments and operational settings in order to optimise human well-being and system performance. The use of this conceptual view is to deviate slightly from the Psychologist view from which most researches tend to study cognitive ergonomics and reflect more on how the mental capabilities within the Working/Industrial Relations and Condition of the Human Resource can be better managed specifically in an academic environment.

This is why the study identified one of the possible factors – BMI – noticed by students of the research environment that could possibly affect the cognitive function of the lecturers.

Concept of Body Mass Index

Most researchers like [18] and [3] expressed BMI in term of the mathematical expression of the ratio of the body mass/weight to the square meter in meters (kg/m2). But this study adopted the definition of [24] that state BMI as the metric currently in use for defining anthropometric height/weight characteristics in adults and for classifying (categorising) them into groups. The common interpretation to this concept according to Nuttall concept is that, it represents an index of an individual's fatness – as identified by students in the preliminary observation. This concept is also widely used as a risk factor for the development of or the prevalence of several health issues.

Concept of Mental Stress

Researchers from differs discipline has differs meaning for the concept of stress [13]. To [37]., stress which can be internal or external is a physical, mental, or emotional factor that causes bodily or mental tension to initiate the "fight or flight" response. As defined by the [9] stress is an individual's response to change in circumstance or to a threatening situation. Homewood, (n.d.) see it as a psychological and physiological response to events that upset our personal balance in some way.

But this study observed one similarity in these differs definitions with the use of two phrases in the first and most generic definition of stress as identified by Hans Selye [13]: "Response of a Body" and "To any Demand." To an engineer, it means response of an observed machine, bridge or any other object to the possible load it would be subjected. To a psychologist that specialise in wok study, it has to do with response of an employee or group of employees to work demands and the environment. Other definitions from other researchers either from the same or different fields have evolved to cater for different situations [13].

Hence, this study adapted the concept of mental stress from [12] it states as follows:

> *"Mental stress is the pressure brought to bear on the existing mental balance or emotional equilibrium of any person with symptoms that will most commonly be exhibited when the demands of a situation are seen as exceeding the personal resources that the individual can bring to bear on them at that moment."*

Concept of performance

According to [10], when an individual or a group of people engaging in a collaborative effort or take a complex series of actions that integrate skills and knowledge, the valued results produced is their performance. [2] views the concept of performance as the process of performing; of accomplishing a task; usage of knowledge instead of just acquiring it, and any perceived exploit. This mean performance may be considered as the 'ends'-results- or the 'means' -actions- that produced the ends. The ends are usually in the form of results performance (dependent variable) and are thus historical in nature, as data from such events are collated after it has occurred as observed in this study. But could also be the 'means' performance (independent variables) are recent activities at the period of data collation which is not considered in this study. This is because the study is investigation how the management can improve performance through cognitive ergonomics and not how the

performance of management can improve cognitive function

Theoretical Framework

[28] observed that there are many theories involved in cognitive development. But the three main cognitive theories are Piaget's cognitive developmental theory, Vygotsky's sociocultural theory, and information-processing theory.

Here Piaget's theory states that children construct their understanding of the world and go through four stages of cognitive development. These four stages are: sensorimotor, preoperational, concrete operational, and formal operational. Each stage serves a different purpose in cognitive development.

Vygotsky's theory is a sociocultural cognitive theory that emphasises how culture and social interaction guide cognitive development. Sauce identified from the work of [28] that, although Piaget believed that children learn alone, Vygotsky proposed that, 'development is an apprenticeship in which children advance when they collaborate with others who are more skilled.

The information processing theory emphasises that individuals manipulate information, monitor it, and strategise about it. This is slightly different from the views of most researchers like [23] who believed the basic idea of information processing theory is equating the human mind/brain to a computer/information processor. That is, the mind/brain receives input, processes, and delivers output. Information gathered from the senses (input) is processed and stored by the brain, and finally brings about a behavioral response(output). Since the focus of this study is on the information processing, this theory is further examined.

To [6], Information Processing Theory was developed by George Miller and some other American psychologists around 1950s. Caroline sees it as a cognitive theory that focuses on how information is encoded into the memory. The theory describes how the brains filter information, from what human are paying attention to at present moment, to what gets stored in the short-term or working memory and ultimately into the long-term memory. This means, in information processing theory, creating a long-term memory is something that happens in stages; first human perceives something through the sensory memory, which is the sensed to see, hear, feel or taste in a given moment; the short-term memory to remember things for very short periods; and long-term memory is stored permanently in the brains.

Based on the slight examination of the Information Processing Theory above, it will be observed that, it focused more on human psychological development contrary to studies that focus on how to optimise human well-being and system performance as ergonomic factors affect human process of information and use processed information. The focus of the latter is on Human Resource Management with the emphasis on practical utilisation of the most important component of a working environment- Human- for optimal benefit. Thus, this study considered both Information Processing Theory and Theory of Accountability also known as Theory A for Optimising Human Productivity as more relevant for the study.

[30] believed that theory A explored the possibilities of managers having to transform an average employee to real performers by strategical planning for the system under consideration. But to plan for the system/organisations, the first step is to identify the problem/factors that could impede the optimisation of the employees, and aid joint policy formulation. [30] further state the functional elements of Accountability Theory (Theory A) as follows;

(1) Planning – Institutional assessment, problem identification, and joint policy formulation.

(2) Target setting – Communication, shared understanding, and action planning.

(3) Motivation – Adoption of the idea and increased performance.

(4) Work Strategies – Empowerment, support and teamwork.

(5) Responsibility – Commitment, consistency, and target fulfillment.

(6) Role model – Following example and willingness to improve.

(7) Monitoring & Guiding – Joint review, self-appraisal, and confirmation of accomplishment.

(8) Accountability – Contribution through commitment and creativity.

Though, the performance of human resources in organisations also depends on the technology and external environment, among others, the way of processing information by individuals, teams, and humanistic orientation, are also important to the organisation. To Sreeramana and Suresh (2016), many researchers have tried to optimise productivity using different strategies, including motivation of employees, privatisation of organisations, optimising risks and optimising rewards. This study, examined how cognitive functions in the working environment of academicians to improve their well-being and invariably help optimise their performance.

3 RESEARCH METHODS.

This section highlights the process and procedure (which includes: research design, study population, the study sample and sampling techniques, sources of data and method of analysis) used in this study, and also presents important information (data) on specific fields where the survey was carried out.

The research design adopted for this study is the descriptive survey. The population of the study comprises of 404 Academic staff of Lagos State University in Ojo campus only. The academics staff in the library department were not considered because they were not assessible during the Covid-19 lockdown when data was collected. A sample of 201 was drawn from the population using Yamane (1969). The convenience sampling technique was used based on institutions' proximity and accessibility for the researcher and the field officers. Also, stratified and purposive sampling techniques were used in selecting the sample (see Table 1). The sample was stratified to ensure that all the faculties on Ojo campus were adequately represented, purposive sampling techniques was used to elicit information from those who are willing, relevant to the objectives of the study, and return it within an acceptable time.

Data was collected through questionnaires and observation. A six-point Likert-typed scale questionnaire was designed to elicit information on how the performance of academic staff of LASU' is affected by cognitive ergonomics in academic environment. Copies of questionnaire were taken to the offices and distributed to the staff with minimal persuasion within two weeks. The observation involved the measurement of the height and weight of the respondents to get their BMI.

To establish the validity of the research instrument, the study sought opinions of experts in the field of study (content validity). Also, to establish the reliability of the research instrument, the study used Cronbach's Alpha, which was based on internal consistency with an initial sample collected. The collected data will be analysed using descriptive statistics (frequency table) and inferential statistics (correlation, regression, and multiple regression analyses) with the aid of a statistical software called IBM SPSS (Statistical Product and Service Solution).

Yamane Formula

n= N/(1+N(e)2)

Where

n is the sample size,

N is the population size which is 404, and

e is the level of precision. Taken to be 5% in this study

Applying this formula, we get n= 404 / (1+404(.05)2)

n= 200.99 = 201

Table 3.1: Distribution of Samples in Strata

S/N	Faculty/School	Population	Sample for each stratum
		N_1	n_1
1	Art	79	39
2	Management Sciences	67	33
3	Social Sciences	54	27
4	School of Communication	21	11
5	School of Transport	07	05
6	Law	22	11
7	Education	53	26
8	Sciences	101	49
	TOTAL	N= 404	n= 201

Source: Audit Unit LASU (2020)

To determine the size of each strata n1 the study used the formula: (N1/N) *n. That is the proportion of each faculty to the study population is their proportional contribution to the sample size.

4 DATA ANALYSIS

Test of Reliability

Before further analysis, the reliability of the instrument was tested to ensure consistent measurement across various items in the questionnaire. Cronbach's alpha was used to test the reliability of the scale. The reliability statistics table (see Table 2) shows the overall Cronbach alpha of 0.899 which indicates that the research instrument is highly reliable because the value is higher than the recommended threshold of 0.70 (Nunally & Bernstein, as cited in Leong, Hew, Lee, & Ooi, 2015).

Table 2: Cronbach's Alpha Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.899	18

Source: Researcher's Computation (2020)

Test of Hypotheses

Analysis of Hypothesis one

H0: There is no relationship between cognitive ergonomics and performance of LASU academic staff.

To test the hypothesis, linear regression analysis was used as specified in the regression model. cognitive ergonomics (CE) formed the independent variable while performance of academic staff of LASU (P) formed the dependent variable. The regression test results are presented in Table 3.

Table 3: Model Summary of cognitive ergonomics and performance of LASU academic staff

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.605[a]	.366	.360	.54165

a. Predictors: (Constant), COGNITIVE ERGONOMICS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.226	.325		6.853	.000
	COGNITIVE ERGONOMICS	.500	.065	.605	7.713	.000

a. Dependent Variable: PERFORMANCE

Source: Researcher's Computation (2020)

The model summary table above shows that there is a moderate positive relationship between cognitive ergonomics and performance of academic staff in LASU (R = 0.605). The model further indicates the extent to which the cognitive ergonomics explains the changes in performance of academic staff in LASU. The coefficient of determination (Adj R2 = 0.360) suggests that cognitive ergonomics explains 36.0% of the changes in performance of academic staff in LASU. This result is statistically significant because the p-value of the result (0.000) is less than 0.01 level of significance used for the study. Therefore, the research hypothesis one was rejected. This implies that there is a relationship between cognitive ergonomics and performance of academic staff in LASU.

It was also observed from the table above that an evaluation of the unstandardised coefficient of cognitive ergonomics in the coefficient table, and its associated p-value shows that cognitive ergonomics ($\beta CE = 0.500$, $p < 0.01$) is statistically significant and can be used in predicting the performance of academic staff in LASU. This, therefore, further strengthens the rejection of the research hypothesis one, which implies that there is a relationship between cognitive ergonomics and performance of academic staff in LASU

P = 2.226 + 0.466CE

Analysis of Hypothesis two

H0: There is no significant relationship between cognitive ergonomics and BMI of LASU academic staff.

To test the hypothesis, linear regression analysis was used as specified in the regression model. cognitive ergonomics (CE) formed the independent variable while performance of academic staff of LASU (P) formed the dependent variable. The regression test results are presented in Table 4.

Table 4: Model Summary of cognitive ergonomics and BMI of LASU academic staff

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.274[a]	.075	.066	4.84298

a. Predictors: (Constant), COGNITIVE ERGONOMICS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.139	2.905		6.934	.000
	COGNITIVE ERGONOMICS	0.077	.580	.274	2.894	.005

a. Dependent Variable: BMI

Source: Researcher's Computation (2020)

The model summary table above shows that there is a weak positive relationship between cognitive ergonomics and BMI of academic staff in LASU (R = 0.274). The model further indicates the extent to which the cognitive ergonomics accounts for the changes in performance of academic staff in LASU. The coefficient of determination (Adj R2 = 0.066) suggests that cognitive ergonomics accounts for 6.6% of the changes in performance of academic staff in LASU. The adjusted R2 is relatively small when compared with the 25.0% recommended by Krause, Boyle and Base (2005). This result is statistically significant because the p-value of the result (0.005) is less than 0.01 level of significance used for the study. Therefore, the research hypothesis two is rejected. This implies that there is a significant relationship between cognitive ergonomics and BMI of LASU academic staff, however the relationship is considered to be weak.

It is also observed from the table above that an evaluation of the unstandardised coefficient of cognitive ergonomics in the coefficient table, and its associated p-value shows that cognitive ergonomics ($\beta CE = 0.077$, $p < 0.01$) is statistically significant but weak in predicting the BMI of academic staff in LASU. This, therefore, further strengthens the rejection of the research hypothesis two, which implies that there is a significant relationship between cognitive ergonomics and BMI of LASU academic staff, however, the relationship is considered to be weak.

BMI = 2.139 + 0.077CE

Analysis of Hypothesis three

H0: There is no relationship between mental stress and performance of LASU academic staff.

To test the hypothesis, linear regression analysis was used as specified in the regression model. Mental stress (MS) formed the independent variable while performance of academic staff of LASU (P) formed the dependent variable. The regression test results are presented in Table 5.

Table 5: Model Summary of mental stress and performance of LASU academic staff

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.652[a]	.425	.419	.51598

a. Predictors: (Constant), MENTAL STRESS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.365	.272		8.688	.000
	MENTAL STRESS	.527	.060	.652	8.722	.000

a. Dependent Variable: PERFORMANCE

Source: Researcher's Computation (2020)

The model summary table above shows that there is a moderate positive relationship between mental stress and performance of academic staff in LASU (R = 0.652). The model further indicates the extent to which the mental stress explains the changes in performance of academic staff in LASU. The coefficient of determination (Adj R2 = 0.419) suggests that mental stress explains 41.9% of the changes in performance of academic staff in LASU. This result is statistically significant because the p-value of the result (0.000) is less than 0.01 level of significance used for the study. Therefore, the research hypothesis three was rejected. This implies that there is a relationship between mental and performance of academic staff in LASU.

It is also observed from the table above that an evaluation of the unstandardised coefficient of mental stress in the coefficient table, and its associated p-value shows that mental stress ($\beta MS = 0.077$, $p < 0.01$) is statistically significant and can be used in predicting the performance of academic staff in LASU. This, therefore, further strengthens the rejection of the research hypothesis three, which implies that there is a relationship between mental stress and performance of academic staff in LASU.

P = 2.365 + 0.527CE

5 DISCUSSION ON FINDINGS

Past researches show evidence of a relationship between cognitive ergonomics and performance (e.g. [21], [33]), the use of such indicators mental stress and BMI to study the relationship especially within knowledge-work office environments like citadels of learning remained completely unexplored until now. Also while few of the past researches explored how this two indicators- mental stress and BMI affect the mental health or musculoskeletal health ([18], [38]), this present study deviate slightly by showing their direct impact on performance of academicians within knowledge-work office environments.

Results of the analyses were significant for hypotheses one and three. Hypotheses one shows that there is a relationship between cognitive ergonomics and performance of academic staff in LASU while hypotheses three showed a similar trend which implies that there is a relationship between mental stress and performance of academic staff in LASU. However, hypotheses two that examined the relationship between cognitive ergonomics and BMI of LASU academic staff shows a weak relationship. This may be as a result the timing of data gathering. Data was gathered during the Covid-19 lockdown period which prohibit some categories of staff from being assessed. But it should be noted that, though, it may be weak it does not reflect a contrary opinion to hypothesis one and three. Thus, the three hypothesis tested shows that there is a

correlation between cognitive ergonomics and performance of LASU academic staff. And designing knowledge-work office environments for cognitive factors will have a positive contribution to improve an employee performance among academics' staff of LASU as stated in the theory of Accountability from the work of Sreeramana and Suresh (2016)

Though, the Information Processing Theory as identified Caroline (2019) sees cognitive theory as focusing on how information is encoded into the memory, this study compliment the theory by identifying two factors - mental stress and BMI - that affect the effective utilisation of the information stored. Thus, as identified earlier from the theory of Accountability as observed by Sreeramana and Suresh (2016) management of knowledge-based system would need to create a working environment to reduced mental stress with special consideration to employee with high BMI to get optimum utilisation of the most important factor of their operations and production

6 CONCLUSION AND RECOMMENDATION

This study has assessed the effect of cognitive ergonomics on performance among Lagos State University staff. The results from the study shows a correlation between cognitive ergonomics and performance of LASU academic staff. It also shows that the use of such indicators as mental stress and BMI to study the relationship especially within knowledge-work office environments give a new insight to how these factors not only cause mental health or musculoskeletal health risk but could directly impede on the performance of employee. Thus, management of knowledge-based system would need to create a work environment to reduce mental stress with special consideration to employee with high BMI to get optimum utilisation of their employee.

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