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Comparative Study Between Anthropometry of Head andAcademic Performance of Primary School Pupils in Nassarawa Local Government, Kano State

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Abstract

This study investigated the potential association between head circumference and academic performance in school pupils (ages 6-12) from both public and private schools within the Nasarawa Local Government Area of Kano State, Nigeria. The aim was to determine relationship between head circumference and academic performance, and sexual dimorphism in relation to head circumference and academic performance. Headcircumference was repeatedly measured by both the researcher and his assistant to ensure reliability and minimize measurement error. Academic performance was assessed using pupils' previous results from standardized tests school records, allowing for an analysis independent of current testing conditions. Data was analyzed using "SPSS statistics version20." The variable measurements were presented as mean ± SD. Differences between males and females were compared using an independent-sample t-test. Pearson correlation analyses were used to assess the relationships between variables. Values of $p < 0.05$ were considered statistically significant. The present study found negative or no significant relationships between head circumference and academic performance, supporting the null hypothesis. The study acknowledges the potential influence of factors such as nutrition, health conditions, and environmental influences, warranting further investigation in future research. The findings could inform educational interventions relevant to both public and private schools within the Nasarawa LGA, considering the diverse educational opportunities and resources available.

Keywords: *head circumference, academic performance, relation, pupils, Nassarawa local government, Kano state, sexual dimorphism, data, significant.*

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Introduction

Scholars agree that students 'academic achievement is a net result 'of their cognitive and non-cognitive attributes[1-2] as well as the sociocultural context in which the learning process takes place. In view of its documents benefits for academic outcomes, mindfulness practice has now gained growing attention in educational settings.

The study found that head circumference was greater by 2.5 to 5 percent in those who obtained top degrees, taken as a measure of higher intelligence, than in those who obtained fewer good degrees. This positive association has been confirmed in numerous subsequent studies showing that among both children and adults head circumference is positively correlated with intelligence measured by intelligence tests, summarized by Lynn[3] and by Rushton[4] who reported results from 32 studies with an average correlation of .23. In these studies, head circumference was adopted as a proxy for brain size and it was argued that theexplanation for the positive association is that larger brains confer greater cognitive ability. In more recent studies brain size has been measured directly by magnetic resonance imaging rather than being inferred from head circumference, and was shown to be positively associated with intelligence. The correlation was reported as .40 in the meta-analysis by Vernon *et al.*[5], and as .24 in an updated meta-analysis of associations between human brain volume and intelligence differences.
The aim of the study is to determine the relationship between head circumference and academic performance of primary school pupils at Nassarawa local government, Kano state.

Materials And Methods

Study Location

The study was conducted in randomly selected primary schools at Nassarawa local government, Kano State, Nigeria.

Research Participants

The subject participated in this research were primary school pupils from Nassarawa local government area, Kano state, Nigeria within the range of 6-12 years.

Inclusion Criteria

1) Children whose parents or guardians consented

2) Primary school children whose aged between 6-12 years

3) Children without disabilities

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Exclusion Criteria

1) Those whose care givers refused to consent

2) Children less than 6 years or greater than 12 years

3) Children with disabilities

Ethical Approval

Introductory letters were presented to the primary schools that were selected for the study, and ethical clearances were obtained from the management of the school.

Research Design

A cross-sectional descriptive study of 200 pupils attending primary school in Nassarawa local government, Kano state, was carried out to examine the association of head circumference with academic performance.

Sample Size Determination

Simple random sampling technique was adopted to select samples. G-Power computer software was used in determining sample size, using an effect size of 0.5, α level of significance of 0.05, and statistical power of 0.85 were used which gave minimum sample size of 200 participants. Therefore, a total of 200 samples were recruited for the purpose ofthis study.

Method

The required anthropometric parameter was obtained according to national health andnutritional examination survey protocol, while academic performance was recorded from their previous examination. Anthropometric measurement on participants was carried out by the research and research assistant. In order to reduce errors, anthropometric measurement was read twice independently and the mean of the measurements was taken as actual value. In each school visited, the terminal results of the pupils were collected from their teachers. The head circumference and academic performance were recorded in data collection sheet.

Measurement of Head Circumference

Head circumference was measured using an inelastic tape scale nearest to 0.1cm. The tape was placed across the frontal bones just above the eyebrows, around the head above the ears on each side, and over the occipital prominence at the back of the head. Hair ornament,braids, and cap

were removed, the tape was moved up and down over the back of the head to locate the maximal circumference of the head. The tape is put perpendicular to the long axis of the face it then firmly pulls to compress hair and underlying soft tissue. Data and Statistical Analysis Data was collected and sorted out in Microsoft Excel before analysis. IBM Statistical Package (SPSS 20.0) was used to analyze the data. Results were presented as mean ± standard deviation (SD). The sexual dimorphism in head circumference and academicperformance was compared using independent sample t-test. The correlation analysis between the quantitative variables was determined using Pearson correlation. Value of $p<0.05$ was considered significant.

Results

The demographic characteristics of the participants as revealed from Table 1 below indicated that there were equal participants in the study with 100 males (50%) as there are females (50%). Participants of age range 10-12 years (64.5%) were more compared to younger age of 5-9 years (35.5%).

Table 1: Demographic Characteristics of the Participants

Characteristics	Frequency	Percentage (%)
GENDER		
Male	100	50
Female	100	50
Total	200	100
AGE		
5-9	71	35.5
10-12	129	64.5
Total	100	100

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Table 2 shows the mean value age for both subject sex (male and female) with a minimum of 6 and maximum of 12 years in males and a minimum of 6 and maximum of 12years in females also. The head circumference of the subjects was 51.74 ± 1.65 and 51.94 ± 1.71 in males and females respectively, while the average academic performance expressed in percentage were 51.82 ± 16.46 in males and 51.45 ± 17.07 in females.

Table 2: Descriptive Statistics of age, head circumference and academic performance

Sex		Minimum	Maximum	Mean	SD
Male	AGE	6	12	9.94	1.45
	HC`	47	57	51.74	1.65
	AP	14	78.5	51.82	16.46
Female	AGE	6	12	9.99	1.39
	HC	47	56.5	51.94	1.71
	AP	14	81	51.45	17.07

HC= Head Circumference AP= Academic Performance SD= Standard Deviation

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Table 3 revealed the results of independent sample t-test for sexual dimorphism amongthe variables. There was no statistically significant difference in neither the head circumference nor the academic performance of the mean groups in both males and femalessubject (P=0.40). Also, there was no significant statistical difference (P=0.87) in the academic performance of males and females subject.

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Table 3: Sexual dimorphism in head circumference and academic performance

Variables	Sex	Mean	SD	*t*-value	*p*-value
HC	Male	51.74	1.66	0.84	0.40
	Female	51.94	1.72		
AP	Male	51.82	16.46	-0.15	0.87
	Female	51.45	17.07		

HC= Head Circumference AP= Academic Performance SD= Standard Deviation

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Table 4.4 revealed the results of Pearson‘s correlation of the study variables. The result of the correlation analysis between head circumference and academic performance revealed a very weak negative correlation between head circumference and academic performance.

Table 4: Pearson's correlation of the study variables

Variable	*N*	R	*P*-value
Head Circumference (cm) — AP	**200**	**-0.014**	**0.842**

AP= Academic Performance *N*= Number of participants

Discussion

The negative sexual dimorphisms observed can be due to equal and non-observable changes in the levels of testosterone in males and females as testosterone level is known to directly increase the size and mass of muscles and bones, and thus changes in the shape of the face.[6] Thus, this probably brought about the non-observable changes in children males because there is no increase in testosterone level in males than in females at pre-pubertal stage. Study in Hawaii by Nakashima[7] suggested that environmental and variant ecological conditions could cause changes in head dimensions such as cranial capacity and head shape. The noticeable differences in the cranial size and capacity among people caused by environmental pressure could be important factors that enable human beings to adapt life in various environment conditions.[8]

The study revealed that head circumference has negative and non-significant relationship with academic performance ($p>0.05$). The Pearson correlation analysis of this study from table4.4 shows there is weak negative correlation ($r= -0.014$, $P =0.842$) between head circumference and the mean academic performance. These showed no correlation between brain (head size) and test of intelligence, which might be as a result of differences in cultural background and socioeconomic status. This suggests that population difference in cranial capacity and cranial dimension are attributed to race, age and geographical factors.[9] Also, according to Eysenk[10] individual brain size is affected by nutrition and early experience, this can be due to the reason that males are more subjected to physical activities. The differences between individuals and groups in general intelligence may be largely due to genetics and environment.[11]

Conclusion

There was no statistically significant relationship between head circumference and academic performance. Sexual dimorphism was absent in the study population.

References

1. Lee BD, Shute CK. Cognitive abilities and Psychosocial development. *Journal of Psychotherapy*, 2010; 8(2), 121-124
2. Lee BD, Stankov YC. Students performance is influenced by Juvenile cognition. *International Journal of Psychosocial and Cognitive Studies*, 2016; 2 (1),53-57
3. Lynn CA. Head circumference Relationship to Cognitive ability. *Neuroscience*, 1994; 18(4): 12-16
4. Rushton JP, Skuy M. Performance on Raven_s Matrices by African and White university students in South Africa. *Intelligence,* 2000*;* 28:251–265
5. Vernon PA, Wickett JC, Bazana PG, Stelmack RM. The neuropsychology and psychophysiology of human intelligence. In R. J. Sternberg (Ed.), Handbook of intelligence (pp. 245–264). Cambridge: Cambridge University Press. 2000.

6. Osunwoke EA, Amah-Tariah FS, Obia O, Ekere IM, Ede O. Sexual Dimorphism in Facial Dimensions of the Bini. *Asian Journal of Medical Sciences*, 2011; *3*(2), 71-73
7. Nakashima T. Bradycephalization in the head form of school girls in North Kyushu. *Journal of University of Occupational and Environmental Health*, 1986; 8:4 11-414
8. Irmak MK, Korkmaza A, Erogul O. selective brain cooling seems to be a mechanism leading to human craniofacial diversity observed in different geographical regions. *Medical hypothesis*, 2004; 63:974-9.
9. Golalipour MJ, Haisarik JM, Farahani RM. The shapes of head and face in normal male newborns in South-East of Caspian Sea (Iran-Gorgan). *Journal of Anatomical Society of India*, 2003*;* 52:28-31
10. Eysenck HJ. The Future of Psychology. *Mind and Brain Sciences in the 21st Century*, 1999; 271.b.
11. Bouchard TJ. Genetic influence on human psychological traits: A survey. *Current Directions in Psychological Science, 2004;* 13:148-151.