

Original Article

**A COMPARATIVE STUDY OF INTELLIGENT QUOTIENT SCORES BETWEEN LEFT HANDED AND RIGHT HANDED UNDERGRADUATES IN A TERTIARY INSTITUTE IN EASTERN NIGERIA**

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**ABSTRACT**

The objective of this study was to compare Intelligent Quotient Scores Between Left Handed And Right Handed Undergraduates in a Tertiary Institute in Eastern Nigeria. Four hundred (400) students were randomly selected and a structured questionnaire and IQ test from Raven's progressive matrices was used to collect their data, which were analysed using statistical package for social sciences (SPSS version 20). Descriptive and inferential statistics were deployed. Majority 262(65.5%) were in the age range 18-22 years, with mean age  $\pm$  SD ( $21.62 \pm 2.32$ ). Out of the 400 students, 371 (92.75%) were right handed, while 29 (7.25%) were left handed. The results showed there was no significant difference between handedness and intelligent quotients among the students. It is recommended, more studies with a larger sample size are needed to further explore this result.

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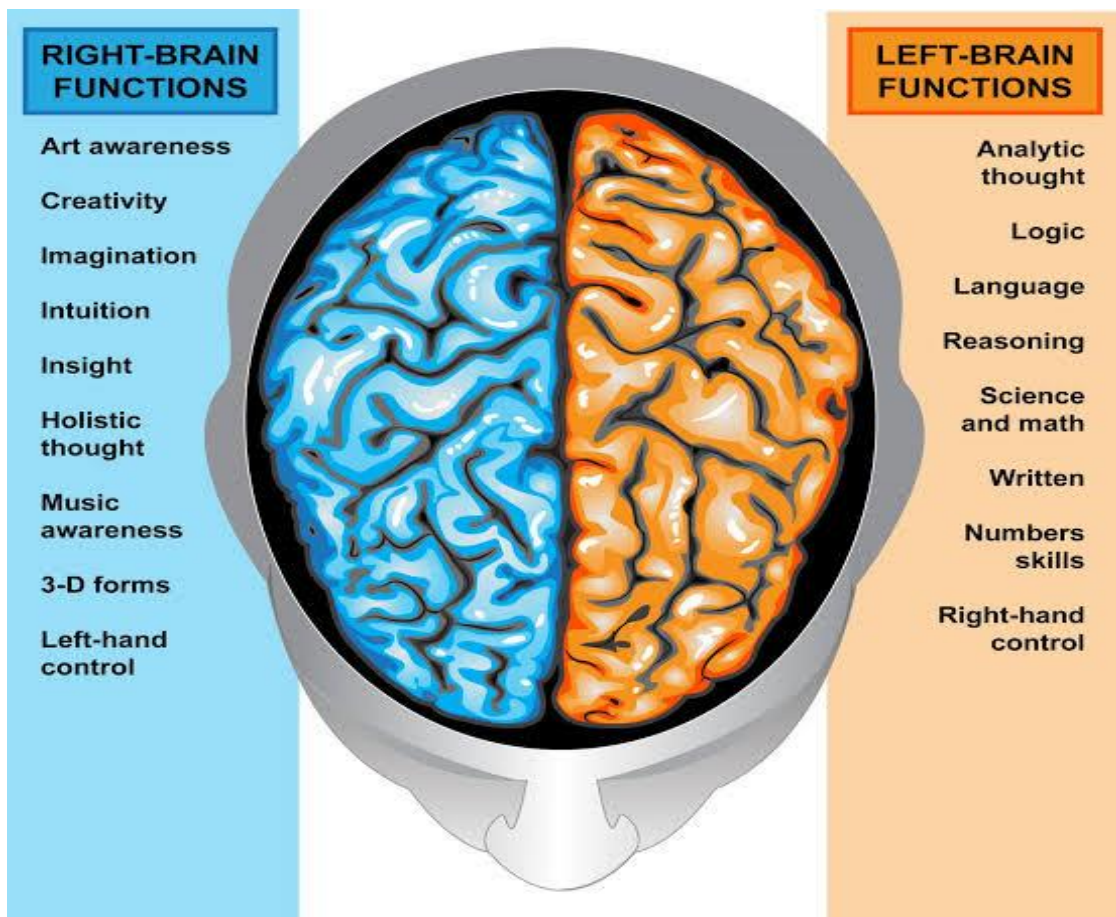
## **INTRODUCTION:**

Handedness, the preference for using one hand over the other for most daily tasks, has been a subject of scientific interest for many years<sup>1</sup> Left handedness, also known as lefties or southpaws are referred to as people who work perfectly and comfortably with their left hand while right handedness is the ability to work with the right hand perfectly and comfortably<sup>2</sup> Ambidexterity is the ability to use both the right and left hand equally<sup>3</sup>In the field of psychology and neuroscience, researchers have explored various aspects of handedness, including its prevalence underlying mechanisms and potential associations with cognitive abilities<sup>4</sup> Over time left-handed people have been viewed and treated as outcasts, some even considered them cursed<sup>5</sup>. The prevalence of handedness in the general population is largely right handed with approximately 85-90% of individual favoring their right hand while the remaining 15-10% exhibits left-handed or ambidextrous<sup>6</sup>. The study of handedness dates back to the late 19th century when researchers first recognized the prevalence of left handed individuals in the society<sup>2,7</sup>Early observation suggested that left handedness might be associated with various physical and psychological differences<sup>8</sup>. However, it was not until the mid-20th century that systematic investigations into the link between left handedness and cognitive abilities began

Several theories have been proposed to explain the potential relationship between handedness and intelligent quotient (IQ)<sup>9</sup> One prominent potential hypothesis suggests that left handed individuals may possess a more evenly distributed brain lateralization, allowing for enhanced cognitive flexibility and creativity<sup>10</sup>While on the other hand, right handed individuals are thought to exhibit stronger left hemisphere dominance, which might contribute to better language and analytical skills<sup>11</sup>Some studies have explored the possibility of shared genetic factors influencing both handedness and cognitive abilities, although the specific genes involved remain elusive. Research seems to support both sides of the argument<sup>12</sup>.A 2010 study in the journal of the international neuropsychological society revealed that strong right handed seemed to perform slightly better on cognitive tests when compared to left handed individuals.

A 2007 study in the journal of the Indian academy of applied psychology found that out of the 150 subjects, left handed participants were significantly more likely to perform better on an intelligence test than right handed people<sup>13,16</sup>Another study in the journal in 2019 revealed that there are genetic differences between individuals with left handedness and right handedness<sup>17-20</sup>

## Brain Dominance Theory



**Fig. 1. An image showing brain dominance theory<sup>21</sup>**

Much of the theories of left-right specialization has been developed through examining patients who have physical defect in one part of the brain<sup>21</sup>One of the earliest of these investigations was Paul Broca's work in 1861 which he nicknamed Tan who had a large cyst in the left hand side of the

brain<sup>22</sup>.Tan could only say one word: "tan", hence the nickname. This indicated that some language function were concentrated in the left side of the brain. Further study of eight patients who all had language problem revealed they also had left hemisphere lesion and the study of the left-right specialization was born<sup>23</sup>.

## RESULTS

**Table 1:** showing some of the socio-demographic information of the students of Nnamdi Azikiwe University College of health sciences, Okofia (N=400) involved in the study.

| Variable                             | Frequency | Percentage |
|--------------------------------------|-----------|------------|
| <b>Age (years)</b>                   |           |            |
| 18 – 22                              | 262       | 65.50      |
| 23 – 27                              | 138       | 34.50      |
| <b>Mean Age (<math>\pm</math>SD)</b> |           |            |
| 21.62 ( $\pm$ 2.35)                  |           |            |
| <b>Median Age (IQR)</b>              |           |            |
| 22 (22 – 23)                         |           |            |
| <b>Gender</b>                        |           |            |
| Female                               | 246       | 61.50      |
| Male                                 | 154       | 38.50      |
| <b>IQ level</b>                      |           |            |
| Low                                  | 133       | 33.25      |
| Average                              | 162       | 40.50      |
| High                                 | 105       | 26.25      |
| <b>Handedness</b>                    |           |            |
| Left                                 | 29        | 7.25       |
| Right                                | 371       | 92.75      |

*SD=standard deviation, IQR=interquartile range*

From the table above, Majority of the subjects were between ages 22 – 23. The females constituted 246 (61.50%), while the males made up 154 (38.50%). 133 (33.25%) had low Intelligence quotient (IQ) levels; 162

(40.50%), average level IQ; and 105 (26.25%), high Intelligence quotient levels. As speculated; most of the subjects (92.75%) were right handed, while 29 (7.25%) of the 400 involved in the study, were left handed.

**Table 2:** showing the mean comparison between the IQ scores of the left and right handed respondents.

|          |                             | Levene's Test<br>for Equality of<br>Variances |      | t-test for Equality of Means |        |                     |                    |                          |                                                 |       |
|----------|-----------------------------|-----------------------------------------------|------|------------------------------|--------|---------------------|--------------------|--------------------------|-------------------------------------------------|-------|
|          |                             | F                                             | Sig. | T                            | df     | Sig. (2-<br>tailed) | Mean<br>Difference | Std. Error<br>Difference | 95% Confidence<br>Interval of the<br>Difference |       |
|          |                             |                                               |      |                              |        |                     |                    |                          | Lower                                           | Upper |
| IQ level | Equal variances assumed     | .037                                          | .847 | .995                         | 398    | .320                | .148               | .148                     | -.144                                           | .439  |
|          | Equal variances not assumed |                                               |      | 1.049                        | 33.153 | .302                | .148               | .141                     | -.139                                           | .434  |

From the table above, an independents sample t-test was conducted; comparing between the IQ scores of the right handed and the left handed subjects of the sample population involved in this study and there was found to

be no statistically significant difference in their IQ scores therefore showing that neither right handedness nor left handedness had any significant effect on the IQ score of the students of College of Health sciences.

## DISCUSSION

From the table 1, the age distribution of the subjects involved in the study ranged from 18 to 27 years with their mean age being 21.62 ( $\pm 2.35$ ) years. Majority of the subjects were between ages 22 – 23. Out of 400 students enrolled, 371 (92.75%) were right-handed and 29 (7.25%) were left-handed. There were 154 (38.50%) male and 246 (61.50%) female students. The females constituted 246 (61.50%), while the males made up 154 (38.50%). 133 (33.25%) had low Intelligence quotient (IQ) levels; 162 (40.50%), average level IQ; and 105 (26.25%), high Intelligence quotient levels. As speculated; most of the subjects (92.75%) were right handed, while 29 (7.25%) of the 400 involved in the study were left handed.

The results of the Chi square analysis in Table 2.0 shows there was no significant difference between handedness and intelligence quotients among the students, however Sala, *et al.*, (2017) reported that, hand preference does affect a person's overall cognitive ability. He described the Annett's right-shift theory according to which the right-handed are at a cognitive advantage. He then described another research by Benbow according to which left-handed are at an advantage when it comes to mathematics and those too are mostly males. This probably is due to link of math with spatial ability, which is better in left-handed.

On the basis of intelligence quotient, some studies say that left-handed are better than the right-handed individuals. This attribute to the more creative and artistic abilities of left-handed<sup>24-28</sup>

The Creative Industries Policy and Evidence Centre (PEC), at Nesta funded by the UK's Arts and Humanities Research Council, reported that creativity and inquisitiveness are the top traits that will be required for excelling in the future job market.<sup>29-31</sup> suggested that at present however, both left and right brainers are at an equal advantage.

The results of this study show that about 7.25% of the students were left handed. This percentage is less than that seen worldwide but close to the left-handed prevalence seen in India, which is about 5.4%<sup>32</sup>. A study carried out by<sup>33</sup>, revealed that the average marks of left handed students were higher than the right-handed ones but this difference was not significant statistically. They concluded that although the left-handed did well but it could have been due to chance or the fact that their ratio is not comparable to the right-handed students. This means whether a student is right- or left handed, he has equal chances of getting good grades and excelling academically.

A study by<sup>34-36</sup> showed that brain dominance has no role in academic performance of students. Another study by<sup>37</sup>, conducted on primary school children showed that hardly any difference exists between academic performance and handedness. A systematic review of 36 studies performed by<sup>38</sup> on 66,108 individuals showed that overall no significant difference exists between right and left-handed individuals IQ wise. This is in agreement to this present study.

A study <sup>3, 39</sup>conducted on handedness in Nigeria had gender and handedness as parameters of interest and revealed that both had no influence on success in exams.

Another study conducted by <sup>39</sup> showed that gender has no influence whatsoever, on academic success however, what mattered was the learning style preferences of the students. <sup>1,39</sup> showed no gender-based differences in IQ level.

### **CONCLUSION**

It can be concluded that handedness has no influence on intelligence quotients. Hence, whether left or right-handed both can show comparable excellence in academics and intelligence quotients. It is recommended more studies with a bigger sample size are needed to further explore this finding.

### **RECOMMENDATION**

More in-depth and larger studies are needed to explore the phenomenon of gender-based differences in marks achieved by medical students.

**Conflict of interest** none declared by authors

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