

# The Effects of Sex, Education and Handedness on Rosenberg

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## ABSTRACT

**Background:** Self-esteem is defined as feelings of one's personal self-worth. The objective of the present study was to investigate the relationships among gender, education level, handedness and self-esteem score in African university students.

**Methods:** A total of 345 Nigerian university students were involved in the study. Participants were 177 men and 168 women who were 17-28 years of age. Rosenberg Self-esteem Scale was used to get their individual self-esteem points. Data were analyzed by applying student's t-test (independent sample test) and one way ANOVA tests in SPSS for Windows (version 18) statistical program.

**Results:** Self-esteem score was higher in left-handed students than in right-handed students ( $t=3.58, p<0.001$ ). There are no statistical differences in self-esteem score by sex, age, and weight and education level. Their departments in university had no significant effect on self-esteem scores.

**Conclusion:** These results showed that the higher self-esteem scores in left-handed university students in the present study may be associated with higher sports performance in the left-handed persons.

**Key words:** Self-esteem, Handedness, Sex Education

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## INTRODUCTION

Self-esteem is described as feelings of one's personal self-worth [1]. It gives us person's evaluation about his or her own worth. Self-esteem means one's overall subjective emotional evaluation of his or her own worth. It is the decision made by an individual as an attitude towards the self. Also, self-esteem was defined as our thoughts about ourselves, including our positive or negative evaluations [2]. Self-esteem is an important indicator of some characteristics, such as school success [3,4], happiness [5], achievement in marriage and other relationships [6], and criminal behavior [6]. There are many synonyms of self-esteem such as self-worth, self-regard, self-respect and self-integrity.

Testosterone is an important hormone for modulating aggression and self-regulation. It has been reported that acute testosterone changes in men are positively associated with aggressive behavior for those with more independent self-construals, whereas basal testosterone is negatively associated with aggression when individuals have more interdependent self-construals [7]. They

suggested that self-construal moderates the association between testosterone and aggression.

Geschwind and Galaburda asserted a claim that elevated levels of fetal testosterone are associated with left-handedness [8]. In addition to, it has been suggested that adult levels of circulating testosterone might be related to fetal testosterone levels [9], and that anomalous dominance (left-handers, mixed-handers, and right-handers with familial sinistrality) [10] and handedness [11] may be related to levels of circulating testosterone in adult men and women.

A lot of studies on the relationships between cerebral lateralization and neurological and mental health problems have been reported. These are some examples. Patients with schizophrenia has an increased left ear (right temporal hemisphere) advantage and left temporal hemispheric dysfunction [12]. In above mentioned study, they reported increased frequency of mixed-handedness and decreased frequencies of both right- and left-handedness in comparison with controls in patients with schizophrenia. Also, there was a sex related differences in which the male patients had significantly increased incidences of left eye dominance, crossed hand-eye dominance, and non-congruent hand-eye dominance, but not the female patients [13]. In another study, the higher frequencies of left-handedness, left-eyedness and left

nasal dominance were reported in children with autism compared to normal children [14]. In men, the incidence of left-handedness and left-eyedness were higher in patients with migraine than in controls. The presence of aura in patients with migraine was associated with the incidence of left-eyedness and crossed hand-eye dominance for the total sample and women [15]. It has been reported that the heroin and hashish addictions were related with the left-handedness and cigarette, alcohol, heroin and hashish addictions were with the left-eyedness and the crossed hand-eye dominance [16].

However the relationships amongst sex, education level, and some behavioral tests such as alexithymia [17], depression [18] are well known in African university students, there is no study amongst sex, education level, handedness and self-esteem. The behavioral studies need the robust replications with the larger sample size. The present study was planned to investigate the effects of sex, education level, and handedness on self-esteem in Nigerian university students.

## MATERIALS AND METHODS

### Subjects

A survey was carried out to assess self-esteem scores. This was to ensure the results obtained from the probing were valid and reliable. In the survey, the questionnaire was posted online for volunteers to fill out. A total of 345 volunteers participated in this survey (168 women, mean age=20.74, SD=0.92; 177 men, mean age=21.12, SD=1.12). They were students of the different faculties in Nile University of Nigeria. Hand preference was assessed on the Edinburgh Handedness Inventory [19]. All subjects completed the study voluntarily.

Exclusion criteria were health problems such as psychiatric, respiratory, metabolic, cardiac, or autonomic nervous system diseases that might change the self-esteem scores. The present study was conducted and its data was collected between October 2018 to February 2019. This study was performed in accordance with the Declaration of Helsinki. All subjects were voluntaries to

attend the study. All participants signed informed consents after the aims and objectives of the study have been clearly explained.

### Self-esteem

Rosenberg Self-esteem Scale [20] was used to assess the points associated with self-esteem. The reliability and validity of Rosenberg Self-esteem Scale have been well-demonstrated [21,22]. The participants were asked to rate the degree to which they agree with each of the statements using a five-point Likert rating scale that ranges from "strongly agree" to "strongly disagree." The questionnaire was posted on the following platforms: The school faculty website. Google classroom for students to fill out and social media, every student can fill the questionnaires only once while login into the online survey students ID is required in order to protect duplication.

### Statistical analyses

Measured values are given as a mean  $\pm$  standard deviation. Statistical analysis was performed by using SPSS for Windows (version 18) statistical program. Student's t-test (independent sample test) and one way ANOVA tests were used to compare the alexithymia scores in university students. p-value less than 0.05 were considered significant.

## RESULTS

Of 177 male participants, 156 (88.1%) were right-handed and 21 (11.9%) left-handed; of 168 female participants, 152 (90.5%) were right-handed and 16 (9.5%) left-handed. The gender frequency difference for handedness was not significant. There are no statistical differences in self-esteem score by sex, age, and weight and education level and department.

Left-handed university students had statistically significant higher self-esteem scores compared to right-handed students ( $t=3.58$ ,  $p<0.001$ ) (Table 1).

**Table 1: The mean ( $\pm$  SD) self-esteem scores by handedness.**

Right Handed (N=308)	Left Handed (N=37)	t	p
26.64 $\pm$ 3.73	28.89 $\pm$ 2.59	3.58	p<0.001

## DISCUSSION

It is well known that self-esteem (self-worth or self-respect) can be an important part of success. Decreased self-esteem in especially young people can cause people to feel defeated or depressed themselves. Also, decreased self-esteem can result in people to reach bad decisions and to catch destructive relationships, or to fail to live up to their full potential. Conversely, increased self-esteem can certainly be off-putting to others and can even damage personal relationships. It has been suggested that testosterone is an important hormone for modulating aggression and self-regulation and self-

construal moderates the association between testosterone and aggression [7].

Geschwind and Behan [23] and Geschwind and Galaburda [24] proposed that anomalous dominance (left-handedness and both handedness) may be related with the effects of testosterone on the fetal brain; for this reason the left-handed persons have better developed motor, attentional, and spatial functions. It has been well known that the relationships between left-handedness and higher athletic performances and sportive achievements were reported in athletes of both team [25,26] and individual [25,27-31] sports. This relation

would be consistent with their proposal. Also, it has been reported that the destructive aggressiveness was higher for the left- than the right-handed athletes and the tolerance and insistence scores were higher for the right- than the left handed athletes and suggested that higher aggressiveness and less tolerance and insistence in the left-handers may be associated with their higher sports performance [32]. In the present study, the left-handed university students had the higher self-esteem scores than the right handed participants. It can be suggested that these results supports the relationships amongst left-handedness, self-esteem (self-regulation and self-construal), the higher sport performance and testosterone.

It has been suggested the ratio of second to fourth digit lengths (2D:4D) as markers for fetal androgens [33]. In men, the fourth digit is longer than the second digit, vice versa in women [34]. It has been reported that lower 2D:4D among men is associated with higher athletic performance [35], and among women [36]. A recent study reported that the frequency of left handedness was higher in males, but there was no gender difference in eyedness, footedness and digit ratio. Also the digit ratio for the right hand was higher in subjects with crossed hand-eye dominance, while the left hand digit ratio was higher in subjects with crossed hand-foot dominance [37]. Also, in another recent study, it has been reported that athletes had no significantly lower digit ratio than sedentary subjects and there was no significant correlation between digit ratios [38]. They concluded that sexual dimorphism and handedness related differences in digit ratio like previous studies claimed [33-36] are not universal in humans.

### CONCLUSION

The higher self-esteem scores in left-handed university students in the present study and the higher destructive aggressiveness and the less tolerance and insistence in the left-handers, may be associated with higher sports performance in the left-handed persons. In universities, because balanced self-esteem not too little and not too much self-esteem is important for success, the emotional training programs can be useful to decrease many possible psychological problems and to increase academic achievement. Results of the current study should be replicated and reconfirmed by further robust replication studies.

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