



Statistics of Anxiety among Undergraduate Students in the Faculty of Education, University of Calabar, Nigeria

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Abstract

The purpose of the study was to determine the level of statistics anxiety among undergraduate students, and whether the level is influenced by factors such as gender and age. A sample of 100 third year students who enrolled for basic statistics in the University of Calabar was used for the study. A series of t-tests revealed that the sampled students displayed significantly high level of statistics anxiety; and no factor differences. Recommendations were made accordingly. Limitation included the non-generalizability of results.

Keywords: Statistics of Anxiety, Undergraduate and Education Students

Introduction and Review of Literature

Until recently all trainee- teachers were exposed only to two core quantitative faculty-wide courses during their programme. These courses are educational test and measurement and research and statistics in education. Being a stakeholder, these two courses are enough headaches for most trainee- teachers. However, living in an information age in which man is bombarded daily with quantitative information from various sources such as the media, corporation, and politics. It became germane that quantitative skills be taught to trainee- teachers to avoid deception, to grasp and understand social reality and to be more effective teachers of the 21st century.

Consequently, the curriculum witnessed the introduction of a stand-alone course titled Basic statistics which is offered at the 300 level.

The researcher's interaction with this level of students for the past five years indicated that students do not expect to meet any course like statistics and do not seem to see its relevance in their training. Remarks such as "what am I doing with Mathematics" I thought 'am through with mathematics "what nonsense is this" "my head is not good for calculation" are common among these student. According to Idaka (2015), the mention of the word statistics evokes so much trepidation in some trainee –teachers that one can literally see them shaking with goose pimples. Of course, it is also clear to the researcher that the anxiety experienced by students may not have arisen only from poor background or insufficient skills, but from warnings of their 'senior colleagues' or from apocryphal tales they have heard (Slootmaeckers, 2017).

Incidentally, Basic statistics it is a compulsory core course which must be offered by all trainee- teachers. Little wonder therefore, students regard statistics as the most anxiety- inducing course in their training. Statistics anxiety is the anxiety elicited whenever a student is confronted with statistical computation at any level. Onwuegbuzie and Wilson (2003) described statistics anxiety as the anxiety that occurs when a student encounters statistics in any form or at any level.

Similarly, Cruise, cash and Bolton (1985) see statistics anxiety as "the feeling of anxiety encountered when taking a statistics course or doing statistical analyses" (p.92). These researchers opined that statistics' anxiety is a multidimensional construct made up of six factors. These include are: Test and class anxiety, interpretation anxiety, fear of asking for help anxiety, worth of statistics, computation self-concept and fear of statistics lecturer. Test and class anxiety deals with the anxiety elicited when attending statistics lectures or when taking statistics test/examination. Fear of asking for help assesses the anxiety experienced when seeking help either from colleagues or teacher. Worth of statistics has to do with student's perception of the relevance of statistics to his/her course of study. On the other hand, computation self-concept relates to the student's self

perception of his/her ability to understand and do statistics; and finally, fear of statistics teacher refers to the student's perception of the statistics lecturer. However, the same statistics anxiety has been conceptualized as consisting of three factors: (i) Examination Anxiety (ii) Asking for Help Anxiety and (iii) Interpretation Anxiety (Vigil-Colet, Lorenzo-sera & Condon, 2008). In this research, the focus was on the conceptualization of Vigil-Colet, et al (2008).

Of course statistics anxiety is considered a debilitating phenomenon due to its effect on students' statistics achievement. Apart from affecting the overall purpose of statistics education, the class room effectiveness and efficiency of these teachers on graduation may be called to question. Generally, a consistent negative relationship has been found between statistics anxiety and statistics achievement in many studies (Hanna & Dempster, 2009). Similarly, it has been found that students who experience higher levels of statistics anxiety tend to have lower performance on statistics examination or have failed the course at least once (Keeley, Zayac & Correia, 2008; Galli, Ciancaleoni, Chiesi & Primi, 2008). Its existence in high doses has been well documented in the literature in some advanced countries e.g UK and USA (Cruise, et al, 1985; Hanna & Dempster, 2008).

In addition to the dimensional nature of statistics anxiety, research has also documented some antecedent conditions of statistics anxiety. According to Onwuegbuzie and Wilson (2003), these can be classified into three:- Situational, dispositional and environmental. Situational antecedents refer to factors that surround the stimulus object or event and may include variables such as mathematics anxiety (Baloglu, 2004) and characteristics of statistics courses (Bell, 2005; DeVaney, 2010). Dispositional antecedents refer to the personality characteristics of the student such as procrastination (Onwuegbuzie, 2004) and reading ability (Collins & Onwuegbuzie, 2007). On the other hand, environmental antecedents refer to events which occurred in the past and include variables such as age, gender and prior mathematics or computation experience (Chew & Dillon, 2013).

Commenting on the influence of age on statistics anxiety, Baloglu (2003) and Bell (2003) reported that older students had higher statistics anxiety than their younger counterparts. However recent studies found no age differences or relationship (Bui & Alfaro, 2011; Chew & Dillon, 2014). On the factor of gender differences, some studies e.g., Baloglu (2003), Bui and Alfaro (2011) and Chew and Dillon (2014) found no differences between male and female students. Conversely, others reported gender differential for statistics anxiety (Baloglu, Deniz & Kesici, 2011; Rodarte-Luna & Sherry, 2008). Besides age and gender, prior mathematics experience has been widely investigated as statistics is often regarded as a cousin of mathematics. Generally, prior mathematics experience has been found to be negatively related to statistics anxiety (Chiesi & Primi, 2010; Lalonde & Gardner, 1993).

Unfortunately it is not to the knowledge of the researcher if a similar study has been conducted in the University of Calabar in particular and Cross River State in general. Moreso, the conflicting results regarding the influence of age and gender differentials have further suggested a gap in literature which this present study is poised to fill. It is therefore germane to conduct this present study in the University of Calabar, Nigeria as the findings may provide clearer direction and insights. The purpose of this study was therefore to determine the level of statistics anxiety among undergraduate students in the Faculty of Education; and to determine if the level was influenced by factors such as gender and age. Three hypotheses were formulated to guide the study:-

- (i) Statistics anxiety level is not significantly high
- (ii) Male students are not significantly different from their female counterparts in their level of statistics anxiety.
- (iii) Age has no significant influence on the level of statistics anxiety.

Methodology

The study employed a descriptive survey of the statistics anxiety of Education students in the University of Calabar. Survey research

allows one to simultaneously measure attitudes or opinions, determined the status quo of some primary phenomenon and assesses relationship among variables. All 300 level education students (1, 850) of the 2017/2018 session offering Basic statistics made up the population of the study. A total of 150 students from Department of Library and information service, and Educational Administration and Planning who were taught by the researcher were randomly selected through the use of simple balloting technique (90 females and 60 males).

The instrument was an adaptation of Statistics Anxiety Scale (SAP) by Vigil-Colet, et al (2008). It was made up of two sections:- A and B. Section A asked for basic demographic questions e.g. age, gender and whether one is good in calculation, section B was a 24 items SAS designed to assess three factors of statistics anxiety:

- (i) Examination Anxiety (e.g going to a statistics test without enough revision;
- (ii) Asking for Help Anxiety (e.g. going to my teacher for help in solving some problems, and
- (iii) Interpretation Anxiety (e.g., interpreting the meaning of a table or graph in the statistics text) (Vigil-Colet et al., 2008).

Respondents were asked to rate each of the items on a 5-point modified Likert Scale that ranges from 1 = No anxiety to 5 = considerable anxiety.

Appropriate items scores were summed up for each factor, with higher scores, indicating higher levels of statistics anxiety. The instrument was validated by the researcher, an expert in Educational test and measurement. A trial testing of the instrument yielded Cronbach Alpha reliability estimates ranging from 0.85 to 0.93. The questionnaires were administered to the students during a fixed class on Saturday. Respondents were advised to be as truthful as possible as the findings was going to help the researcher teach them better.

Data analysis

All hypotheses was analyzed using SPSS (version 16) at .05 level of significance.

Hypothesis 1:

Statistics anxiety level is not significantly high among undergraduate students. For the level of anxiety to be considered significantly high, the researcher reasoned that the score representing such high level of statistics anxiety should be greater than 84.0 (which is more than the midpoint, 3.5 multiplied by the number of items, 24 measuring statistics anxiety). To analyze this hypothesis therefore, the one-sample mean t-test was employed and the result is as shown in Table 1.

TABLE 1:

A one- sample mean t-test analysis of the level of statistics anxiety is not significantly high

Variable	\bar{X}	SD	t	sig
Statistics anxiety	87.02	2.50	14.738*	.004
Reference mean	84.00			

**Significant $p < .05$*

The result of the analysis indicated a sample mean of 87.02 and SD=2.50, whereas the reference mean was 84.00. It further gave a significant t-value of 14.739 which indicated that undergraduate students sampled for the study displayed a significantly high level of statistics anxiety.

Hypothesis 2

Male students are not significantly different from their female counterparts in their statistics anxiety. This hypothesis was analyzed

using independent t-test, and the result is as shown in Table 2.

TABLE 2:
Independent t-test analysis of the influence of gender on students' statistics anxiety.

Variable	Group	N	Mean	<i>SD</i>	t	sig
Gender	Male	60	72.03	2.03	-1.034	0.61
	Female	90	72.33	1.24		

Not Significant P < .05

Table 2 shows the mean and standard deviation of males as 72.03 and 2.03 respectively. For females, the mean and standard deviation was 72.33 and 1.24 respectively. Furthermore, the table indicated that the calculated absolute t-value of 1.034 is not significant at .05 level of probability. In other words, there is no significant difference in the level of statistics anxiety among male and female students sampled in this study.

Hypothesis 3:

Age has no significant influence on the level of statistics anxiety. The independent variable age was categorized as: below 20 years and above 20 years; and the two groups compared on their statistics anxiety, dependent variable. The independent t-test was therefore employed for the analysis, and the result is as shown in Table 3.

TABLE 3.
Independent t-test analysis of the influence of age on students' statistics of anxiety.

Variable	Group	N	\bar{X}	SD	T	Sig.
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Age	20 and above	65	69.01	1.23		
					1.918	0.152
	Below 20 years	85	68.07	1.05		

**Not Significant at $P < .05$*

Table 3 shows the means and standard deviations of the two groups; and the calculated t-value of 1.918 which is not significant at .05 level of probability. In other words, the null hypothesis of no significant influence of age on students' statistics anxiety was accepted.

Discussion

The first purpose of the present study was to determine the level of statistics anxiety among students in the University of Calabar. The results suggest that education students sampled for this study displayed a high statistics anxiety. The result represents the norms for undergraduate students in some advanced countries e.g. USA and UK (Cruise et al., 1985; Hanna & Dempster, 2008). This could be explained by the misconception of students in these departments (Library and Information science and Education administration and planning) that their programmes is non-quantitative and as such does not require a statistics course.

The second purpose of the study was to determine the influence of gender a statistics anxiety. It was hypothesized that gender will have on influence on students' statistics anxiety (Hypothesis 2). The results indicated no gender influence on the sampled students' statistics anxiety. The findings was in agreement with those of Chew and Dillon (2014), Bui and Alfaro (2011) and Baloglu (2003). It was however, at variance with the findings of Baloglu, Deniz & Kesici (2011) and Rodarte-Luna & Sherry (2008) who reported gender differences. The finding of the present study could be explained by taking into account that the issue of stereotyping threat is gradually giving way. In other words, Sciences where mathematics is required is no longer the preserve of male students; and sometimes , females even perform better than males.

The third purpose was to determine the influence of age on statistics anxiety. It was hypothesized that age will have no influence on statistics anxiety (hypothesis 3). The findings indicated no age influence of the sampled students' statistics anxiety. This finding was in consonance with those of Bui and Alfaro (2011) and Chew and Dillon (2014). But differs from the findings of Baloglu (2003) and Bell (2003) who reported that older students have higher statistics anxiety than their younger counterparts. The finding of this factor in the present study could be explained taking cognizance of the fact that the age difference among undergraduates is slim these days.

Several practical implications for statistics lecturers in the faculty of education can be derived from this study. Firstly, lecturers should not assume that students in education do not experience statistics anxiety. Instead, lecturers should as a matter of necessity assess students' statistics anxiety prior to the first class using standard scales, and adjust their teaching accordingly. For instance, lecturers could take it slowly with such students and allocate more time for questioning.

The findings of this study however, should be taken with caution as the sample was not representative of education students and the result might not generalize to all undergraduate students in the Faculty of Education.

References

- Baloglu, M. (2003). Individual difference in statistics anxiety among college students. *Personality and Individual Differences*, 34(5), 855-865.
- Baloglu, M. (2004). Statistics and mathematics anxiety: Some interesting differences. *Educational Research Quarterly*, 27(3), 38-48.

- Bell, J.A. (2003). Statistics anxiety: The non-traditional student. *Education, 124* (1), 157-162
- Bell J.A. (2005). Length of term and level of statistics anxiety: A comparison of types of offerings. *Academy of Information and Management Sciences Journal, 8* (1), 103-109.
- Bui, N. H., & Alfaro, M.A. (2011). Statistics anxiety and science attitude: age gender and ethnicity factors. *College Student Journal, 45*(3), 573-585.
- Chiesi, F., Primi, C. (2010). Cognitive and non-cognitive factors related to students statistics achievement. *Statistics Education Research Journal, 9* (1), 6-26.
- Chew, P. K. H., & Dillon, D. B. (2016). Incidental differences in statistics anxiety among students in Singapore. In P. Mandal (Ed.), *Proceeding of the International Conference on Managing the Asian Century* (pp. 293-502). Singapore, Singapore: Springer Publishing Company.
- Collins, K.M. T., P Onwuegbuzie, A.J. (2007). I cannot read my statistics test book: The relationship between reading ability and statistics anxiety. *The Journal of Negro Education, 96* (2), 118-129.
- DeVaney, T.A. (2010). Anxiety and attitude of graduate students in on-campus vs. online statistics courses. *Journal of Statistics Education, 18* (1), Online: <http://www.amstat.org/publications/joe/v.18nl/devaney.pdf>.
- Cruise, R. J., Cash, R.W., & Bolton, D. J. (1985 August). *Development and validation of an instrument to measure statistical anxiety*. A paper presented at tel annual meeting of the Statistical Education Section, Chicago, IL.

- Baloglu, M., Deniz, M.E., & Kesici, S.(2011). A descriptive study of individual and cross-cultural differences in statistics anxiety. *Learning and Individual Difference, 21* (41), 308-391.
- Idaka, I.E. (2015). *Simplified statistics in education*. Calabar: Baye communications
- Keeley, J., Zayac, R., & Correia, C. (2008) Curvilinear relationship between statistics anxiety and performance among undergraduate students: Evidence for optimal anxiety. *Statistics Education Research Journal, 7*, 4- 15.
- Hanna D., & Dempster, M. (2009).The effect of statics anxiety on students' predicted and actual test scores. *The Irish Journal of Psychology, 30* (3-4), 201-209.
- Lalonde, R. N., & Gardner, R.C. (1993). Statistics as a second language ? A model for predicting performance in psychology students. *Canadian Journal of Behavioural Sciences, 25* (1), 108-125
- Onwuegbuzie, A. J., & Wilson, V. A. (2013). Statistics anxiety: Nature, etiology, antecedents, effects and treatments --A comprehensive review of the literature. *Teaching in Higher Education, 8* (2), 195-209.
- Onwuegbuzie A. J. (2014). Academic procrastination and statistics anxiety. *Assessment and Evaluation in Higher Education 79* (1), 1-19.
- Rodarte–Luna, B., Sherry, A. (2008). Sex difference in relation between statistics anxiety and cognitive/learning strategies. *Contemporary Education Psychology, 33* (2), 327-347.
- Slootmaekers, K. (2012). Too afraid to learn? Attitudes towards statistics as a barrier to learning statistics and to achieving

quantitative skills. *A paper presented at the 4th International Conference on Education and New Learning Techniques (EDU LEARNING), Barcelona (Spain).*

Vigil-Colet, A., Lorenzo-sera, U., & Condon, L. (2008). Development and validation of the statistical anxiety scale. *Psicothema*, 20 (1), 174-180.