CORRELATIONAL STUDY OF SELF-CONCEPT AND STUDY HABIT ON MATHEMATICS ANXIETY AMONG SECONDARY SCHOOL STUDENTS IN OYO NORTH SENATORIAL DISTRICT, NIGERIA

J. W. Owoyele
Department of Counselling Psychology,
Tai Solarinn University of Education,
Ijagun, Ijebu-Ode, Nigeria
Owotopbest@Yahoo.Com
Owoyelejw@Tasued.Edu.Ng
+2347056888645

K. O. Muraina
Department Of Guidance and Counselling,
University of Ibadan, Oyo State.
Tel: 08034592046.
E-Mail: Muraina_Kamilu@Yahoo.Com

Abstract
Mathematics is part of the basic requirements for entrance into the different stages of higher educational system. It is the bedrock of all science and technologically-based subjects. Yet, it remains a challenging subject to students at the secondary school level. Hence, the purpose of this study was to investigate the correlational study of self-concept and study habit on mathematics anxiety among secondary school students in Oyo North Senatorial District, Nigeria. Descriptive research design of ex-post-facto type was used in the study. 186 respondents were selected from four Local Government areas in Oyo North, Nigeria. The respondents were measured with relevant standardized scale (instruments) and the data obtained were analyzed using the Pearson Product Moment Correlation (PPMC) and Multiple regression statistical analysis. Three research Questions were raised and answered in the study. Findings revealed that Mathematics anxiety correlated with gender ($r = .137$; $p<.05$); self-concept ($r = .817$; $p<.05$) and study habit ($r = .901$; $p<.05$). Moreover, the independent variables when pulled together have significant contribution to students' Mathematics anxiety

(R (adjusted) =.938 & R^2 (adjusted) =.877) and each of the independent variables made a significant contribution to the prediction of students' Mathematics anxiety. In term of magnitude of contribution, study habit made the most significant contribution (Beta= .176; t= .963; P<0.05) to the prediction follow by self-concept (Beta= .115; t= 1.391; p<0.05). It was recommended that counselling interventions addressing mathematics anxiety should be provided for students regularly in order to reduce incidence of mathematics anxiety amongst them.

Key words: Self-Concept, Study Habit and Mathematics Anxiety

Background of the Study

Mathematics is a branch of knowledge dealing with measurements numbers and quantities. It's such an important subject that currently, it's been made compulsory for admitting candidates into all discipline in tertiary institutions in Nigeria. Therefore, for students to achieve success in their desired academic career, they are expected to pass the subject properly with at least a credit pass. According to Cohen, O'Donoghue & Fitzsimons (2000), Mathematics is the language of science, as a discipline. It is the pivot around which the whole essence of living revolves. Again, Mathematics is viewed as the basis for scientific and technological analysis. According to Gilling's (1982), for analysis of weather to be accurate, Mathematical calculations are necessary. Also, Mckee (2002) opined that, every new body of discovery is Mathematical in form. This is because, variables such as time and age, must be calculated Mathematically, since it is concerned with symbols and is necessary for any meaningful involvement in modern civilization.

From available statistics, the national average hovers around 32 per cent for Mathematics. Uwadie (2014) in support of the above assertion noted that it was only 48.88% of candidates who sat for November/December 2013 West African Senior School Certificate Examination (WASSCE) that has credit while the rest of 51.12% of the candidates failed in Mathematics. The 2014 May/June SSCE results also recorded mass failure by students across the country. In Mathematics, 242, 162 students sat for the examination with only 23,042 representing 9.52% obtaining distinction. 15, 752 representing 6.50% got credit while 101,321 representing 41.8% got pass. 94.162

representing 38.9% failed while 7,886 representing 3.26% were involved in malpractice (Adejumo, Oluwole, & Muraina, 2015). By implication, only 16.02% (distinction and credit percentage) is qualified for admission into universities and polytechnics.

Tobias (1993) defines anxiety in Mathematics as feelings of tension and anxiety that interferes with the manipulation of numbers and the solving of Mathematical problems in a wide variety of ordinary life and academic situation. According to him, anxiety in Mathematics can cause one to forget and lose one's self confidence. It is very real and it occurs among many students. The question that readily comes to mind then is why students should experience anxiety in Mathematics since Mathematics as opined by Akinsola and Tella (2003) is an important school subject which is associated with more academic and/or career opportunities. Similarly, Burton cited in Agwah and Usman (2003) relate the importance of Mathematics to the scientific, industrial, technological and social progress of a society. That Mathematics is an important subject is undetestable. But it is very sad to note that many students' performance in the subject in recent time is not encouraging (Adesemowo, 2005; Adejumo, Oluwole, & Muraina, 2015). This however, can be attributed to the fact that majority of students have phobia for Mathematics.

Self-concept refers to relatively set of attitudes and feelings reflecting self-perception, self-evaluation and attitudes of students towards learning of Mathematics in the school. Mathematics self-concept is said to be the most important part of an individual's personality that influence the student learning in Mathematics. It is an affective construct that has been reviewed in many ways by psychologists, philosophers and educationists. Mathematics self-concept is an important construct in education because of its linkage to anxiety in Mathematics (Byrne, 2004; Valentine, Dubois & Cooper, 2004). Denga (2007) viewed Mathematics self-concept as an organized configuration of perceptions of self which are admissible to Mathematical awareness. Wang (2007) stated that there are recent researches that show a causal relationship between Mathematics self-concept and subsequent anxiety and that this relationship is reciprocal in nature. Thus a while better student anxiety leads to improvement of self-concept, positive Mathematics self-concept can help increase student anxiety concurrently. Vispoel (2005) opined that a positive

Mathematics self-concept is a potential facilitator of Mathematics anxiety and performance whereas Brookover, Erikson and Journer cited in Child (2003) viewed Mathematics self-concept of students to have positive relationship overtime with anxiety.

Another variable in this study is study habit. This is premised on the fact that evidences suggest that victims of anxiety in Mathematics suffer from lack of preparation for a test (as indicated by cramming the night before the examination, poor time management, failure to organize text information, poor study habit and worry about past performance in examinations emanated from how friends and other students are doing and the negative consequences of failure (Penberthy 2007). According to him, test anxiety can affect the student by causing nervousness in terms of having difficulty in reading and understanding the questions on the examination paper. It also involves having difficulty retrieving key words and concepts when answering essay questions and doing poorly in the examination even though the student knows the material. However, a research conducted by Bakare (1977) shows a negative correlation between test anxiety and study habit of -0.52. Study habit might be defined by the amount of studying that actually occurs as measured by time.

In a study conducted by Jiao and Onwuegbuzie (2000) to examine empirically the relationship between specific study habits and anxiety, findings reveal that study habit weaknesses are identified in the areas of note-taking and reading skills. An all possible subsets multiple regression analysis led to the identification of eight specific study behaviours that predict levels of library anxiety. Also, the study of Musch and Broder (1999) which investigate the relative contribution of test anxiety, study habits, and Mathematics skill to performance in a statistics examination discover that both Mathematics skill and test anxiety add unique variance in explaining performance, whereas study habits did not. The researcher's choice of study habit as a second moderator variable is premised on the fact that there have been differences in research findings on anxiety and study habit over the years. However, the needs of the society today require greater need for Mathematics and this explains why a credit in Mathematics is one of the qualifications for admission into tertiary institutions of learning.

Moreover, the key to success in any examination or test is knowing how to manage or treat anxiety problems. Therefore, since it

is very dangerous to neglect the adverse effects of anxiety in Mathematics which increased academic failure in Mathematics (Adesemowo, 2005; Oyedeji, 2004), various attempts have been made by several researchers (Adejumo, Oluwole, & Muraina, 2015; Aremu & Sokan, 2003; Hassan, 1983; Sofesan, 1981; Wiseman, 1973 to mention a few) to examine the causes of Mathematics anxiety and performance. They discovered causes like intellectual ability, poor study habit, achievement motivation, lack of vocational goals, socio economic status and anxiety; few of them have actually dwelt on anxiety as a major cause of poor academic performance and its reduction among students. In view of this, the present study focuses on correlational study of self-concept and study habit on mathematics anxiety among secondary school students in Oyo North Senatorial District, Nigeria.

Statement of the Problem

There is a negative perception among the students that Mathematics is a very difficult subject. As much as possible students tend to avoid taking Mathematics courses which make them to develop Mathematics anxiety toward Mathematics. However, it is disheartening that research and data from National Examination Bodies like West African Examinations Council (WAEC), National Examination Council (NECO) among others have shown a consistent poor performance in this subject (Adejumo, Oluwole, & Muraina, 2015). Majority of school going adolescents often dread and show negative attitude towards Mathematics and the trends of their achievement in the Senior Secondary School (SSS) certificate examination is also a source of worry to the stakeholders.

Mathematics anxiety and achievement in Mathematics in Nigerian secondary schools has assumed alarming proportions and caused a lot of concern for many years. This is because Mathematics is today part of the basic requirements for entrance into the different stages of higher Educational system since it is the bedrock of all science and technologically-based subjects. It affects all aspects of human life at different degrees. This consistent poor performance by students in Mathematics calls for serious national action to remedy situation. In view of this, the present study focuses on correlational study of self-concept and study habit on mathematics anxiety among secondary school students in Oyo North Senatorial District, Nigeria.

Purpose of the Study

The main purpose of this study is to investigate into the effects of self-concept and study habit on mathematics anxiety among secondary school students in Oyo North Senatorial District, Nigeria. Specifically other purposes include to;

i. Find the relationship among the independent variables (self-concept and study habit) and Mathematics anxiety among secondary schools students
ii. Investigate the joint effect of independent variables (self-concept and study habit) on Mathematics anxiety among secondary schools students
iii. Examine the relative effects of independent variables (self-concept and study habit) on Mathematics anxiety among secondary schools students

Research Questions

1. What is the relationship among the independent variables (self-concept and study habit) and Mathematics anxiety among secondary schools students
2. What is the joint effect of independent variables (self-concept and study habit) on Mathematics anxiety among secondary schools students
3. What is the relative effects of independent variables (self-concept and study habit) on Mathematics anxiety among secondary schools students

Methodology

Research Design

The study adopted descriptive *ex-post- facto* research approach. Such an approach does not involve the manipulation of variables in the study. It is therefore, after the fact study. It's neither adds to nor subtracts from the existing fact. However, it is carefully observe and record information as it naturally occurred at the time the study was conducted.

Population

The participants for the study were all secondary school students in Oyo North Senatorial District, Oyo State, Nigeria.

Sample and Sampling Technique

Four (4) Local Governments were selected out of thirteen (13) Local Governments in Oyo North through random sampling technique. In each randomly selected Local Governments, five (5) secondary schools were selected from each local Government for the study. In each of randomly selected schools, ten (10) participants were selected through simple random techniques balloting. On the whole, two hundred (200) students were selected for the study. However, the students were secondary school students and these consist of male and female.

Instrumentations

Mathematics Anxiety Scale

This scale consists of fourteen (14) item instrument rated on four points type scale ranging from strongly agreed (SA) to strongly disagreed (SD). The instrument was adopted from Mathematics anxiety scale developed by Mahmood & Khatoon (2011). Example of the items in the scale was: 1. Mathematics makes me feel comfortable and easy; 2. I feel worried before entering the Mathematics class; 3. Solving Mathematics problems is always pleasant for me. The instrument has reliability coefficient of .89 with Cronbach's Alpha of .87.

Self-concept Scale

This scale consists of fifteen (15) item instrument rated on four points type scale ranging from strongly agreed (SA) to strongly disagreed (SD). The instrument was adapted from Mathematics self-concept scale developed by Liu & Wang (2005). Example of the items in the scale was: 1. I day dream a lot in the Mathematics class; 2. I often do my Mathematics homework without thinking; 3. if I work hard I can go to university to study Mathematics. The instrument has reliability coefficient of .76. The instrument was however re-validated and Cronbach alpha value of .81 was obtained after administering the instruments in a pilot study to a selected sample of thirty (30) JSS 2 students in Ibadan, Oyo State, Nigeria.

Study Habit Scale

The study habit scales constructed by Animasaun (2007) was adopted to be used as a measure of study habit of respondents. It is a fifteen (15) items scale with responses anchored base on the four likert points. Some of the items of the scale read as follow: 1 I attend my classes regularly. 2. I am restless and I cannot pay much attention in the class.3. I copy class notes from my friends. 4. I hate some of my teachers and cannot discuss anything with them. As indicated by Animasaun the instrument has a Cronbach's Alpha of .90 and .83 internal consistency was obtained.

Validity of the Instrument

For content and face validity of the instruments designed for the study, the researcher gave the instruments to experts in the field of Guidance and Counselling and experts in the area of Research and Statistics. After all these people had given their suggestions and made necessary correction on the instrument, the researcher then submitted them to the supervisor who made the final corrections.

Reliability of the Instrument

After content and face validity of the instruments, thirty (30) copies of the instruments were administered in order to re-establish the psychometric properties of the instrument. The test retest analysis of reliability was then used to test their reliability to ensure that they are consistent in measuring what they were designed to measure. The results from the analysis carried out yielded the following on each variable: Self-Concept: 0.82; Study Habit: 0.73; Motivation: 0.87 and Mathematics Anxiety: 0.79.

Procedures for Data Collection

The instruments were administered to the respondents on the day approved by the school authorities for the exercise. The researcher was assisted by research assistance in administration and collection of the instruments. In each of selected school, the administration and collection of instruments were done on the same day of administration. On the whole data collection lasted for two weeks. Out of two hundred (200) questionnaires distributed only one hundred and seventy six (186) were retrieved and were used for data analysis.

Method of Data Analysis

The Pearson Moment Correlation Coefficient (PPMC) and Multiple Regression statistical methods were used to analyse the data collected in this study.

Results and Discussions

Research Question One: What is the relationship among the independent variables (gender, self-concept, study habit, motivation) and Mathematics anxiety among secondary schools students?

Table 1: Descriptive Statistics and Inter-Correlations among the Variables

Variables	N	Mean	SD	1	3	4
Mathematics Anxiety	186	34.20	16.96	1.00		
Self-Concept	186	26.30	9.94	.817**	1.00	
Study Habit	186	28.44	11.90	.901**	.936	1.00

Correlation is significant at the 0.05 level (2-tailed)

Table 1 contains descriptive statistics and inter-correlations among the study variables. As shown in the table 1, Mathematics anxiety among secondary schools students is correlated with gender ($r = .137$; $p<.05$); self-concept ($r = .817$; $p<.05$); study habit ($r = .901$; $p<.05$) and motivation ($r = .936$; $p<.05$). There were also significant correlations among the independent variables. In line with this finding, Denga (2007) who viewed Mathematics self-concept as an organized configuration of perceptions of self which are admissible to Mathematical awareness. Mathematics self-concept is an important construct in education because of its linkage to anxiety in Mathematics (Byrne, 2004; Valentine, Dubois & Cooper, 2004). Evidences also suggest that victims of anxiety in Mathematics suffer from lack of preparation for a test (as indicated by cramming the night before the examination, poor time management, failure to organize text information, poor study habit and worry about past performance in examinations emanated from how friends and other students are doing and the negative consequences of failure (Penberthy 2007). According to him, test anxiety can affect the student by causing nervousness in

terms of having difficulty in reading and understanding the questions on the examination paper.

Research Question Two: What is the joint effect of independent variables (gender, self-concept, study habit, motivation) on Mathematics anxiety among secondary schools students?

Table 2: Multiple Regression Analysis on Mathematics Anxiety Data

Multiple R (adjusted) = .938 Multiple R^2 (adjusted) = .877 Standard error of estimate = 5.95				
Analysis of variance				
	Sum of square (SS)	**DF**	**Mean square**	**F**
Regression	44268.86	2	22134.43	670.13
Residual	6043.78	183	33.03	
Total	50312.64	185		

The table 2 shows that the independent variables when pulled together have significant contribution to students' Mathematics anxiety. The value of R (adjusted) =.938 and R^2 (adjusted) =.877. The analysis of variance performed on the multiple regressions yielded an F- ratio value of 670.13 and was found to be significant at 0.05 level. This finding is in agreement with the study of Wang (2007) who stated that there are recent researches that show a causal relationship between Mathematics self-concept and subsequent anxiety and that this relationship is reciprocal in nature. Thus a while better student anxiety leads to improvement of self-concept, positive Mathematics self-concept can help increase student anxiety concurrently. Also, the study of Musch and Broder (1999) which investigate the relative contribution of test anxiety, study habits, and Mathematics skill to performance in a statistics examination discover that both Mathematics skill and test anxiety add unique variance in explaining performance, whereas study habits did not. The researcher's choice of study habit as a second moderator variable is premised on the fact that there have been differences in research findings on anxiety and study habit over the years.

Research Question Three: What is the relative effect of independent variables (gender, self-concept, study habit, motivation) on Mathematics anxiety among secondary schools students?

Table 3: Relative Contribution of Independent Variables

	Unstandardized coefficients	Standardized coefficients		T	P
Model	B	Standard error	Beta		
Constant	5.949	2.819		2.110	P<0.05
Self-Concept	.197	.142	.115	1.391	P<0.05
Study Habit	.251	.260	.176	.963	P<0.05

The table 3 shows that each of the independent variables made a significant contribution to the prediction of students' Mathematics anxiety. In term of magnitude of contribution, study habit made the most significant contribution (Beta= .176; t= .963;P<0.05) to the prediction follow by self-concept (Beta= .115; t= 1.391;p<0.05). In consistent with this finding, Jiao and Onwuegbuzie (2000) examined the empirically the relationship between specific study habits and anxiety, findings reveal that study habit weaknesses are identified in the areas of note-taking and reading skills. An all possible subsets multiple regression analysis led to the identification of eight specific study behaviours that predict levels of library anxiety. Vispoel (2005) opined that a positive Mathematics self-concept is a potential facilitator of Mathematics anxiety and performance whereas Brookover, Erikson and Journer cited in Child (2003) viewed Mathematics self-concept of students to have positive relationship overtime with anxiety.

Recommendations

Based on the findings in this study, the following recommendations were made;

1. The public and private schools should endeavour to provide enabling environment for the staff and students of the schools. This will help in enhancing the achievement motivation of the students and invariably improve students' Mathematics anxiety and achievement in the school.

2. Counseling/Educational psychologists should intensify their effort to organize seminars/conferences on the implications of these variables (that is self-concept, and study habit among others) as they influence negatively students' Mathematics anxiety and achievement in the school.
3. The researchers and stakeholders in education should not only focus on the students' Mathematics achievement alone but also their Mathematics anxiety. This is because the affective aspect (readiness) of the students has a lot of implications and influence on the learning processes.
4. The parents/guardians should be enlightened on the significance of their involvement in the students learning processes most especially in the area of improving students' Mathematics self-concept and reducing Mathematics anxiety. This will go a long way in enhancing their Mathematics anxiety and achievement in the school.
5. Teachers and other stakeholders in the school system are to be trained on how to inculcate effective training skills toward reducing students' Mathematics anxiety. This will serve as collaborative efforts to assist the students in overcoming the challenges of high Mathematics anxiety/phobia which will in turn enhance the students' Mathematics anxiety and achievement in the school.
6. The home (parents/guardians) and school (school management) should work as a team towards improving students' Mathematics self-concept which invariably contributes to enhanced Mathematics anxiety and achievement among students in the school.

Conclusion

Base on the findings of this study, persistent Mathematics anxiety of Nigerian secondary school students need not to continue indefinitely. There is hope that with the improvement of self-concept and study habit, the situation can be changed for the better. The study discovered that self-concept and study habit influence the Mathematics anxiety among secondary school students in the school. By and large, self-concept and study habit has a great influence on the Mathematics anxiety among students. By and large, it was also concluded from this

study that Mathematics self-concept and study habit have a great impact on the students' Mathematics anxiety in the school. This means that low Mathematics self-concept and ineffective study habit definitely have a negative effect on students' Mathematics anxiety. By implication, students' Mathematics anxiety can be reduced drastically through an improved Mathematics self-concept and effective study habit in the school system. Therefore, these factors are to be managed and controlled in our schools for us to have reduced students' Mathematics anxiety not only in Oyo State but also in other States of Nigeria and other Country at large.

Reference

Adejumo, A, Oluwole, D. A & Muraina, K. O. 2015. The influence of some psychological factors on the learning gains of University undergraduates in Mathematics in Ibadan, Nigeria. Proceedings of *International Conference for* pedagogical and educational sciences, excellence in research & innovations for humanity, January, 15-18. Switzerland.

Adesemowo, P. O. 2005. *Premium on affective education: panacea for scholastic malfunctioning and aberration*. 34th Inaugural Lecture, Olabisi Onabanjo University. Ago-Iwoye: Olabisi Onabanjo University Press.

Agwah, K. & Usman, N. 2003. Training of undergraduate teachers in Nigeria universities: Focus on problems of effective integration and attitude of students to computers in Mathematics instruction. Retrieved from http.//www.math.uocgr/jetm 2/proceeding/gap w9.pdf. on 18th Oct. 2007

Akinsola, M. K., Tella, A. 2003. Effectiveness of individualistic and cooperative teaching strategies in learning geometry and problem solving in Mathematics among junior secondary schools. *Nigeria Personality Study and Behaviour.* 23, 95-105.

Animashaun, R. A. 2007. Academic Success Barrier Battery (ASB^2). University press. Ibadan

Aremu, A. O., & Sokan, B. O. 2003. A Multi-causal evaluation of academic performance of Nigerian Learner, Issues and implications for National development. In Ayodele Bamisaiye, O., I. A, Nwazuoke, & A. Oladiran (Eds.), *Education in this millennium* (pp. 365-375). Ibadan: Macmillan Nig. Ltd.

Bakare, A. 1977. Study Habits Inventory. (SHI) Manual Psycho-educational research production. Ibadan: University Press.

Byrne, S. 2004. *Cognitive therapy and the emotional disorders*. New York: International Universities Press.

Child, G. U. 2003. A comparison of behaviour therapy and cognitive behaviour therapy in the treatment of generalized anxiety disorder. *Journal of Consulting and Clinical Psychology,* 59: 167-175.

Cohen, D., O'Donoghue, M & Fitzsimons, K. 2000. *Essentials of psychology: exploration and application*. New York: Wadsworth/Thompson Learning.

Denga, G. 2007. Designing teaching materials for learning problem solving in technology education. Research in Science and Technological Education, 19(1), 25-38.

Gillings, K. D. 1982. The relationship between Mathematics attitudes and performance. *Nigeria Journal of Basic and Applied Psychology* 1 (1), 96-112.

Hassan, T. 1983. Psychosocial predictors of academic achievement. Psychology for everyday living, 2(2) 155-169.

Jiao, H. B & Onwuegbuzie, K. R. 2000. Test-taking strategies of high and low Mathematics achievers. *Journal of Mathematics* 99, 31.

Liu, G &Wang, B.2005. Developed and Validated Mathematics Self-concept Scale. Doctoral Thesis. Riverside, CA: University of California.

Mahmood, A. Y & Khatoon, H. C. 2011. Development and Validation of the Mathematics Anxiety Scale for Secondary and Senior Secondary School (SSS) Students *British Journal of Arts and Social Sciences. http://www.bjournal.co.uk/BJASS.*

Mckee, H. S. 2002. Mathematics anxiety. The study skills workshop (pp. 117).

Musch, H & Broder, J. 1999. How to manage anxiety. *Psychology for everyday Living.* 1, 45-54.

Oyedeji, R. H. 2004. *Construction and validation of science oriented attitudinal scale for Nigerian schools*. (Doctoral dissertation). University of Ado-Ekiti.

Penberthy, J. T. 2007. *Psychology: The science of mind and behaviour.* New York: McGraw Hill.

Sofesan, F. C. 1981. Cognitive Behavioural Therapy. Encyclopedia of Psychotherapy Elsener Science (USA).

Tapia, M. & Marsh G. E. 2004. The relationship of Mathematics anxiety and gender. *Academic Exchange Quarterly,* 8(2).

Tobias, S. 1993. *Overcoming math anxiety.* New York: W. W. Norton & Company.2, 102 109.

Uwadie, H. J. 2014. Relationship between boys and girls' nonverbal ability and mathematical achievement. School Psychology International, vol. 17, pp. 71-80.

Valentine, R., Dubois, T & Cooper, M. 2004. Can emotional intelligence be schooled? A critical review. *Educational Psychologist* 37, 4, 215-231

Vispoel, F. R. 2005. *Fear of math, how to get over it and get on with your life*. New Brunswick, New Jersey: Rutgers University Press.

Wang, H. R. 2007. Students' anxiety and attitudes in business statistics. *Journal of Education for Business,* 73, 10-16.

Wiseman, S. 1973. The educational obstacle race: Factors that hinder pupil's progress. *Educational Research,* 15(2), 87-93.