International Journal of Pure and Applied Mathematics
Volume 114 No. 12 2017, 11-20
ISSN: 1311-8080 (printed version); ISSN: 1314-3395 (on-line version)
url: http://www.ijpam.eu
Special Issue

Prevalence and Intensity of General Anxiety and Mathematics Anxiety in College Students

[1]Merlin Abraham, [2]R. Aishwarya and [3]Supriya Rajendran

[1]Department of Mathematics,

School of Arts and Sciences, Amrita University.

[2]Department of Mathematics,

School of Arts and Sciences, Amrita University.

[3]Department of Mathematics,

School of Arts and Sciences, Amrita University.

Abstract

The study investigated the prevalence and intensity of general anxiety and mathematics anxiety in college students. 603 undergraduate students from southern, central and northern parts of Kerala with mathematics as a subsidiary subject participated in this study. The association between both anxieties and academic performance was measured using Karl Pearson's coefficient of correlation and was analyzed using multiple regression analysis. The general anxiety level was measured using the Beck Anxiety Inventory Scale, the mathematics anxiety level was measured using Revised Mathematics Anxiety Rating Scale and academic performance was measured using the overall semester marks in percentage. The results indicated that the academic performances of a considerable amount of students were affected by these anxieties. Among college students, the prevalence and intensity of general anxiety was more evident than mathematics anxiety. The intensity of general anxiety were more in females while mathematics anxiety was more significant in males.

Key Words: Academic performance, general anxiety, intensity, mathematics anxiety, prevalence and undergraduates.

1. Introduction

Education opens the door for gaining of knowledge, values and skills. Ways of educational methods adopted are teaching, training and exploration. The four stages of education are preschool, primary school, secondary school and college or university. Academic performance is the outgrowth of education which is used to evaluate the student's performance following the examination. The factors affecting academic performances are attention, interpretation, concentration, memory, social interaction, hard work and anxiety. Recent psychological studies have proven that anxiety is a major forecaster of academic performance. Anxiety persists when there is a fear or worry about a particular incident or multiple areas of life. The fear or worries in some students are too immoderate compared to that of peers of their age. General symptoms of anxiety are dry mouth, numbness in the hands or feet, sweaty hands and shortness of breath. Anxiety isn't generated by a single factor but a multitude of reasons. Anxious individuals struggle hard to avoid distractions and consume more time to deviate their attention from one duty to the next than their less anxious peers. The four levels of anxiety are mild, moderate, severe and panic. This study concentrates on the two sources of anxiety namely General Anxiety and Mathematics Anxiety. General Anxiety otherwise known as anxiety here refers to the complexities of life like the stresses due to family issues, disputes between friends, the pressure from the institution, difficult life experiences, physical health, fear of the worst happening and various other factors. The tensions and emotions in life are experienced more from the stage of adolescence through adulthood and persist longer than in the stage of childhood. Many researchers have identified that mathematics anxiety plays a vital role in academic performance. Mathematics anxiety is described as an unpleasant feeling of tension or fear during the process of learning mathematics. In the 1950s, research about anxiety in mathematics began to accumulate attention from researchers. In 1954, Dutton devised to assess the emotion of an individual towards mathematics. Some researchers described mathematics anxiety as mathematics phobia and incurable disorder (Dodd, 1992). Viebranz considered it as American phobia and Lazarus (1974) differentiated mathematics phobia from dyscalculia. Mathematics anxiety is caused due to many factors. These include punishment for failing to solve problems by the teacher, having a bad remark on mathematics, and lack of motivation from teachers or parents.

A. Scope of the Study

Measuring anxiety can help in the growth of interventions, to control anxiety by taking precautions at the earliest. The study will help the researchers to adopt remedial measures to control general anxiety and mathematics anxiety both in academics and in life. It also helps the researchers to analyze the reasons for the differences in anxieties and effect of these among males and females.

B. Literature Review

EMAN DAWOOD, HIND AL GHADEER, RUFA MITSU, NADIAH ALMUTARY and BROUJ ALENEZI (2016)[1] investigated the relation between achievement in academics and test anxiety among nursing students who are undergraduates. A two – part questionnaire survey was given to them. From the data analyzes it was evident that there exists a negative relationship between test anxiety scores and academic level and the test reveal that there is a significance negative relationship between test anxiety score and Grade Point Average. ROSELIE B. ALDAY, ALONA B. PANALIGAN (2013)[2] conducted a study to reduce the fear in mathematics with the use of e – learning among Filipino undergraduate students. To measure the level of anxiety and the mind-set of students towards mathematics a non – standardized instrument was devised through the study of Sillorequez. As a result, there showed a positive outcome on the utilization of e – learning. SUSAN F CHIPMAN, DAVID H KRANTZ, RAE SILVER (1992)[3] – Scholastic Aptitude Test (SAT) scores was obtained from 1366 students from Barnard college and investigated their feelings about learning mathematics and their career interests. It was evident from the results that mathematics anxiety showed a negative correlation with the interest in science careers but SAT score was related to career interest. ANTHONY GBENRO BALOGUN, SHYNGLE KOLAWOLE BALOGUN and CHIDI VICTOR ONYENCHO (2017)[4] – a total number of 393 participants chosen from a public university in Nigeria. Moderated hierarchical multiple regression was used to analyze the hypotheses. From the results, it was clear that test anxiety correlated negatively with academic performance and achievement motivation had a positive correlation on academic performance. SUNITHA.T.P; DR.MUHAMMEDUNNI ALIAS MUSTHAFA.M.N; (2013)[5] – the study was conducted in Kerala for a sample of 352 secondary school students. It also investigated the gender differences in the relationship. Result revealed a significant relation between academic procrastination and mathematics anxiety for total sample and subsample based on gender. KAREN NEWSTEAD (1998)[6] compares mathematics anxiety in 9 – 11 year old children taught in a traditional manner with that of children whose teachers selected an alternative teaching strategy highlighting discussion of children's own informal strategy and problem solving. Results revealed that children showed more math anxiety in a traditional approach than in an alternative approach. BETZ, NANCY E. (1978)[7] – 652 students were tested on Mathematics Anxiety Scale, Spielberger's Test Anxiety Inventory and A – Trait scale of the State – Trait Anxiety Inventory. It was found that math anxiety occurred less in men than women and also students with lack of high school math backgrounds. The result indicated a significant negative correlation between mathematics achievement test scores and mathematics anxiety. Higher levels of mathematics anxiety showed an elevation in the levels of test anxiety and levels of trait anxiety. EFFANDI ZAKARIA, NORMALIZAM MOHD, ZAIN, NUR AMALINA AHMAD and AYU ERLINA (2012)[8] – the need of the study was to identify anxiety in mathematics and scores in mathematics for students in Malaysia. The

variations in mathematics anxiety related to gender and variations in mathematics achievement were examined on the basis of anxiety in mathematics. Fennema – Sherman Mathematics Attitudes Scale was applied on 195 secondary students. The data collected was analyzed using SPSS to find the mean, one way ANOVA, frequency and t-test. The result indicated that secondary students showed anxiety in mathematics. The t-test revealed that the differences in mean are not significant between gender and mathematics anxiety. According to ANOVA test there showed a high variation in achievement on the basis of anxiety levels in mathematics. YINGHUI LAI, XIAOSHUANG ZHU, YINGHE CHEN, YANJUN LI (2015)[9] investigated the impact of math anxiety and mathematical metacognition on statement problem solving for 224 students using WPS tasks, Mathematics Anxiety Scale for Children and Chinese Revised-edition Questionnaire of Pupil's Metacognitive Ability in Mathematics. The results showed that after controlling for IQ mathematical metacognition intervened the consequence of MA on WPS. Secondly, the students were divided into four groups including high achieving (HA), typical achieving (TA), low achieving (LA), and mathematical learning difficulty (MLD) to compare group variations in MA and metacognition with IQ partialled out. From the results, students with MLD obtained low scores in self-image and comparatively high scores in learning mathematics anxiety than the HA and TA students, but not in math assessment anxiety.

C. Purpose of the Study

Individuals with high level of mathematics anxiety avoid important career parts that require mathematical thinking. In many colleges, a strong gender difference is seen in opting the main subjects. The study outlines the prevalence and intensity of the two sources of anxiety in academic performance. The overall semester marks in percentage represented the dependent variables and general anxiety and mathematics anxiety represented the independent variables.

D. Research Questions

1. Whether student's anxiety, mathematics anxiety affect their academic performance?
2. Does there exist a significant correlation between anxiety and academic performance of students in various courses with mathematics as subsidiary subject?
3. Does there exist a significant correlation between mathematics anxiety and academic performance of students in various courses with mathematics as subsidiary subject?

E. Research hypothesis

The following null hypotheses were tested:

H01: there is no significant correlation between anxiety and academic

.performance.

H02: there is no significant correlation between mathematics anxiety and academic performance.

H03: there is no significant relationship between anxieties and their academic performance.

2. Methodology

A. The Participants

The study was done in southern, central and northern parts of Kerala on a sample of 603 Undergraduate students with mathematics as a subsidiary subject. The quantitative data collected was primary. Of the participants, 211 were males and 392 were females with a mean age of 18. Participation agreements and confidentiality of the data collected were secured.

B. The Instruments

The variables selected for this research (mathematics anxiety, anxiety and academic performance) were measured using the following instruments.

Beck Anxiety Inventory (BAI)

The Beck Anxiety Inventory was created by Beck, Aaron T., M.D., and Steer, R.A. The BAI distinguishes between anxious and non – anxious groups. It is a well – accepted self – report measure of anxiety in adolescents and adults. It contains 21 items rated from 0 – 3 and with the total score of 63 points. It is mainly used to analyze the anxiety such as "Fear of worst happenings". Internal consistency for the BAI equals (Cronbach's $\alpha = 0.92$). Test – retest reliability is 0.75 (one week).BAI was fairly correlated with revised Hamilton Anxiety Rating Scale (0.51). Mildly correlated with Hamilton Depression Rating Scale (0.25).

Revised Mathematics Anxiety Rating Scale (RMARS)

In the year 1972, Richardson and Suinn developed a 98 – item Mathematics Anxiety Rating Scale to analyze anxiety in mathematics. Later in 1982, Plake and Parker framed a revised version of MARS (RMARS). The RMARS 1 is very much associated to MARS with the estimated correlation at 0.97 and produces a coefficient α reliability estimated at 0.98. This subscale consists of 16 – items using 5 – point Likert scale.

Overall Semester Marks in Percentage

Data regarding academic scores was collected from each student. We used the overall semester marks (percentage) to indicate their academic performance. The data regarding sex was also taken into consideration for analyzing possible

variations in the levels of anxiety over academic performance and mathematics anxiety levels over academic performance in males and females.

C. Research Design

Correlational design was used to signify the association between variables and multiple regression analysis to determine the extent to which there is a relationship between a dependent variable and one or more independent variables.

D. Procedure

Firstly, we informed the Principal of the college and the students about the purpose of the study and about the instruments involved in data collection. After the approval of the Principal a short briefing about the self – report questionnaire was given to all the students. Each questionnaire was completed in 5 – 10 minutes and the students were asked to fill their personal details along with overall semester marks in percentage. BAI and RMARS were administered to the subjects in a classroom situation during second semester.

E. Data Analysis

Statistical measures like Karl Pearson's coefficient of correlation and multiple regression analysis were adopted for data analysis. In order to perform data analysis a window based program, SPSS was used. It is capable of handling magnitudes of data.

3. Tables

Table 3.1: Relationship between students' achievement scores and anxiety

		ANXIETY	OVERALL SEMESTER MARKS IN PERCENTAGE
ANXIETY	Pearson Correlation	1	-.336**
	Sig. (2-tailed)		.000
	N	603	603
OVERALL SEMESTER MARKS IN PERCENTAGE	Pearson Correlation	-.336**	1
	Sig. (2-tailed)	.000	
	N	603	603

**. Correlation is significant at the 0.01 level (2-tailed).

From the result we can make sure that a student having anxiety has a significant correlation with his/her academic performance. The result shows a negative correlation between anxiety and overall academic performance.

Table 3.2: Relationship between students' achievement scores and mathematics anxiety

		OVERALL SEMESTER MARKS IN PERCENTAGE	MATHS ANXIETY
OVERALL SEMESTER MARKS IN PERCENTAGE	Pearson Correlation	1	-.298**
	Sig. (2-tailed)		.000
	N	603	603
MATHS ANXIETY	Pearson Correlation	-.298**	1
	Sig. (2-tailed)	.000	
	N	603	603

**. Correlation is significant at the 0.01 level (2-tailed).

The above result shows that a student having anxiety in mathematics have a significant correlation with his /her academic performance. Mathematics anxiety and overall academic performance are negatively correlated.

Table 3.3: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.388[a]	.150	.148	10.249

a. Predictors: (Constant), MATHS ANXIETY, ANXIETY.

R gives the correlation between the observed and predicted values of dependent variable that is the overall academic performance. R square value shows that 15% of the variance in academic performance is explained by anxiety and mathematics anxiety.

Table 3.4: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11162.019	2	5581.010	53.129	.000[b]
	Residual	63028.399	600	105.047		
	Total	74190.418	602			

a. Dependent Variable: OVERALL SEMESTER MARKS (percentage).
b. Predictors: (Constant), MATHEMATICS ANXIETY, ANXIETY.

The *P*-value for the *F* test statistic is less than 0.05, providing strong evidence against the null hypothesis. There is a significant relationship between students' anxiety and mathematics anxiety over academic performance.

4. Conclusion

The result indicated that both general anxiety and mathematics anxiety were negatively correlated with academic performance. On comparing the effect of these anxieties with academic performance it was found that the intensity of general anxiety was more than mathematics anxiety. From the results obtained,

general anxiety level was seen dominant in females while mathematics anxiety level was dominant in males. The regression analysis found both anxieties to be significant contributors to academic performance. In both males and females we observed a negative correlation between both anxieties and academic performance. The correlation coefficient between mathematics anxiety and academic performance was seen high in males when compared to females while the correlation coefficient between general anxiety and academic performance was seen high in females when compared to males.

Suggestions

It is essential to aid undergraduate students to cope with the stress and reduce these anxieties in academic performance through group work via students, parents and teachers. In addition, introducing yoga and meditation as a part of curriculum, teachers taking a friendly approach towards students, finding out ways to evaluate students without inducing high levels of anxiety are some ways to reduce general anxiety. High levels of anxiety like constant panic can only be controlled using medication. A positive attitude, clarifying the doubts in the subject, practicing regularly, being persistent and learning from mistakes helps in overcoming mathematics anxiety.

Acknowledgement

Foremost, we are grateful to Dr. U Krishnakumar, Director, School of Arts and Sciences, Amrita University, Kochi, for his constant encouragement to do this research work. We would like to express our sincere gratitude to Ms. Supriya Rajendran, Asst. Professor who guided us throughout our project and for her continuous support and motivation. Besides them, we would like to thank all the heads of the institution for giving consent to collect data from their students. Our sincere thanks to the faculty and fellow mates of our department who contributed help during the study. Last but not the least, we would like to thank our family for supporting us spiritually throughout our life

References

[1] Eman Dawood, Hind AL Ghadeer, Rufa Mitsu, Nadiah Almutary, Brouj Alenezi, Relationship between Test Anxiety and Academic Achievement among undergraduate nursing students, Journal of Education and Practice 7(2) (2016), 68-73.

[2] Roselie B. Alday, Alona B. Panaligan, Reducing math anxiety of CCS students through e-learning in analytic geometry, Educational Research International 2(1) (2013), 76-90.

[3] Susan F. Chipman, David H. Krantz, Rae Silver, Mathematics Anxiety and Science Careers among Able College Women, Association for Psychological Science 3(5) (1992), 292-295.

[4] Anthony Gbenro Balogun, Shyngle Kolawole Balogun, Chidi Victor Onyencho, Test Anxiety and Academic Performance among Undergraduates:The Moderating Role of Achievement Motivation, The Spanish Journal of Psychology 20 (2017).

[5] Sunith T.P., Musthafa M.A., Relationship between Academic Procrastination and Mathematics Anxiety among Secondary School Students, International Journal of Education and Psychological Research 2(2) (2013), 101-105.

[6] Karen Newstead, Aspects of Children's Mathematics Anxiety, Educational Studies In Mathematics 36(1) (1998), 53-71.

[7] Betz, E.Nancy, Prevalence, Distribution, and Correlates of Math Anxiety in College Students, Journal of Counseling Psychology, 25(5) (1978), 441-448.

[8] Effandi Zakaria, Normalizam Mohd, Zain, Nur Amalina Ahmad and Ayu Erlina, Mathematics Anxiety And Achievement Among Secondary School Students, American Journal of Applied Sciences 9(11) (2012), 1828-1832.

[9] Yinghui Lai, Xiaoshuang Zhu, Yinghe Chen, Yanjun Li, Effects of Mathematics Anxiety and Mathematical Metacognition on Word Problem Solving in Children with and without Mathematical Learning Difficulties, A Peer–Reviewed, Open Access Journal, 10(6) (2015).