

## Mathematics Anxiety, Mathematics Performance and Overall Academic Performance in High School Students

Venkatesh Kumar, G., and Karimi, A.  
University of Mysore, Mysore

This paper examined the relationship between Mathematics anxiety, Mathematics performances and overall academic performance of high school students. 424 (111 males and 113 females) of high school students from Karnataka, Tamil Nadu and Kerala responded to a Mathematics anxiety and socio demographic questionnaire. The effects of gender on Mathematics anxiety, Mathematics performances and overall academic performance were also examined and Pearson correlation analysis and one way ANOVA were used to analyze the data. The results reveal that Mathematics anxiety significantly has negative correlation with Mathematics performances and overall academic performance. Moreover it was found that there is significant gender difference in Mathematics anxiety, whereas there is no significant difference between boys and girls in Mathematics performances and academic performance.

**Keywords:** Mathematics anxiety, Mathematics performances, overall academic performance, High school students

**G**ood academic performance is very important not only to students and their parents, but also to institutions of learning, educationists and any progressive. The quality of students' academic performance is influenced by wide range of environmental factors rather simply teacher factors and psychological factors within the learners such as motivation and the self, rather than simply by ability. The test anxiety and Mathematics anxiety are increasingly being seen as factors underpinning levels of motivation for academic performance. Suinn, Taylor, and Edwards (1988), suggested that it affects many people and threatens both performance of participation.

Many learners experience Mathematics anxiety in our schools today. Reported consequences of being anxious toward Mathematics include the avoidance of Mathematics and the decline in Mathematics achievement. This kind of 'anxiety' was first detected in the late 1950s. Dreger and Aiken

(1957) noticed undergraduate college students reacting emotionally to arithmetic and Mathematics. Although this reaction appeared to be similar to test anxiety in general; they found that Mathematics anxiety has an existence of its own. They labeled it 'number anxiety'. It is often assumed that high level of anxiety impairs performance. A moderate amount of anxiety may actually facilitate performance. Beyond a certain degree, however, anxiety hinders performance particularly in the case of higher mental activities and conceptual process (Shemp, 1986).

Psychological literature provides a number of conceptualizations of Mathematics anxiety (Rabalise, 1988). Richardson and Suinn (1972) defined Mathematics anxiety in terms of its (debilitating) effect on mathematical performance. They observed that the feeling of tension and anxiety interfere with manipulation and solving of mathematical problems in a wide variety of ordinary life and

academic situations. Many students who suffer from Mathematics anxiety have little confidence in their ability to do Mathematics and tend to take the minimum numbers of required Mathematics courses, greatly limiting their career choice options (Garry, 2005).

Mathematics anxiety is an outcome of low self-esteem and fear of failure. It causes problems for processing the next oncoming information as well as in using previously learned information for problem solving. Such students tend to avoid Mathematics whenever or wherever possible (Daane and Tina, 1986). It may be a critical factor in the educational and vocational choices students make and may influence whether or not they achieve their educational or career goals (Betz, 1978). Clute, (1984) found that Students who have a high level of Mathematics anxiety have lower levels of Mathematics achievement (Clute, 1984) and Hembree (1990) noted that math's anxiety seriously constrains Performance in mathematical tasks and reduction in anxiety is consistently associated with improvement in achievement.

Despite the many reports on the relationships between test anxiety and academic performance, there is scarce if any documentation of the influence of Mathematics anxiety on academic performance. Secondly, there is need for studies which will address gender differences in the levels of Mathematics anxiety in relation to their overall academic performance. This presents study therefore focuses on these issues. The study has two objectives:

- i. To examine the relationship between levels of Mathematics anxiety and Mathematics performances and overall academic performance among high school students in Karnataka
- ii. To examine the effects of gender on students' levels of Mathematics anxiety and Mathematics performances and academic performance.

### **Clarification of concepts**

Mathematics anxiety: Mathematics anxiety is defined as involving feelings of tension and anxiety that interfere with the manipulating of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations (Richardson & Suinn, 1972). In this research, the Mathematics anxiety refers to the scores of Mathematics Anxiety Rating Scale (MARS) by Venkatesan and Karimi (2008).

### **Hypotheses**

- i. There are negative significant relationships between Mathematics anxiety, Mathematics performances and overall academic performance in high school students.
- ii. There are significant differences between boys and girls in Mathematics anxiety, Mathematics performances and overall academic performance in high school students.

### **Method**

#### **Sample:**

424 students (211 males and 213 females) were selected via random sampling of 12 high School from three state in south India (Karnataka, Tamilnadu & Kerala).

#### **Tools:**

**Mathematics Anxiety Rating Scale-India (MARS-I):** It was developed by Karimi (2008) and contains the situations that arouse Mathematics anxiety. The correlation between scores on the 31 item MARS-I and 98 items MARS Richardson and Suinn (1972), was 0.87. Two week test-retest reliability of the abbreviated (31-item) scale was 0.85 and internal consistency alpha coefficient for the 31 -item MARS –I was computed 0.88. For each item is 5 options ( 1- not at all anxious , 2- not anxious , 3- slightly anxious , 4-anxious , 5-very much anxious ) and the ranges of scores is between 25 to 125.

**Results and Discussion**

It was hypothesized that there are negative significant relationships between Mathematics Anxiety, MP and AP. Contrary to the hypothesis, negative significant correlations were found between MA with MP [r= -.55, p =.000] and with OAP [r = -.49, p = .000. ]. Moreover there are negative significant relationships between two subscales of Mathematics Anxiety (Math test and

Numerical task) with MP and OAP. These corroborate previous students which reported significant correlations between Mathematics Anxiety and overall academic performance (Clute, 1984; Hembree ,1990 & Lee,1996). Furthermore There was a high correlations between MP, and AP[r= .90, p = .000]. Table 1 presents the scores of boys and girls in three dependent variables. The results of two independent samples t test are described below.

**Table 1: Mean, SD and correlation matrix of MA, MP, and OAP (N=424)**

Variables	Math test M=32.17 SD=3.56	Numerical task M=33.99 SD=3.54	Total MA scores M=66.17 SD=7.05	Mathematic performance M=73.51SD=10.75	Academic performance M=73.01SD=10.31
Math test	-				
Numerical task	.94 **	-			
Total MA scores	.97**	.96**	-		
Mathematic performance.	-.55**		-.49**	-.55**	-
overall academic performance			-.51**	-.46**	-.49** .90** -

\*\* p<0.01

**Table 4: Means, SD and estimated two independent samples T test of boys and girls in three variables**

Variable	Gender	Mean	SD	t-value
Maths anxiety	Male	63.81	3.139	-4.240**
	Female	69.85	9.370	
Maths performance	Male	73.62	11.05	.270
	Female	73.40	9.310	
Academic performance	Male	72.85	11.131	-.32
	Female	73.18	10.345	

\*\* p<0.01

An inspection of the mean scores of males and females on table 4 below indicates that: Females scored slightly higher on the MA scale (m=69.85, SD=9.37) than males (m=63.81, SD=3.13). There are not significantly differences between males and females on Mathematics performance. (m=73.62, SD =11.05) for male and (m=73.40, SD=9.31) for female. In overall academic performance also there is not significantly differences between two gender groups, (m=72.85, SD=11.13) for male and (m=73.18, SD=10.34) for female .

On the whole, it is interpreted that even though the Mathematics anxiety of females is higher than mails, but it hasn't negative effects on their Mathematics performance or overall academic performance.

**Conclusion**

It is hypothesized that there is significant relationship between Mathematics anxiety, Mathematics performances and overall academic performance in high school students. The results of the study reveal significant relationship between Mathematics anxiety, Mathematics performances and overall academic performance in high school students. This means that students who have high Mathematics anxiety tended to perform fewer score in Mathematics and their overall academic performances. However, those who have low Mathematics anxiety tended to perform high score in Mathematics and their overall academic performances. These findings corroborate pervious findings which report significant relationships between Mathematics anxiety, MP and OAP (Clute, 1984; Hembree, 1990; and Lee, 1996).

The results reveal that there is significant gender difference on the scores of Mathematics anxiety . females scored significantly higher than males whereas there is not significant gender difference on the scores of Mathematics and academic performance. These findings are agree with; Lee (1996) and Orenstein (1994), about the role of gender in Mathematics anxiety and performance. In most of these studies the researchers has showed that Mathematics anxiety in females is higher than males (AAUW, 1992).

In support of previous studies this study has established the fact that Mathematics anxiety is a good predictor of Mathematics performances and overall academic performance. It also shows that gender hasn't a moderate's role in the effects of Mathematics anxiety on Mathematics performances and overall academic performance. There is a need for further research with Mathematics anxiety with different stages of academic levels, difference kinds of anxiety and across the other states to further information in this area good.

### References

- American Association of University Women. (1992). *How schools shortchange girls*. Washington, DC: American Association of University Women Educational Foundation.
- Betz, N.E. (1978). Prevalence, distribution and correlates of math anxiety in college students. *Journal of Counseling Psychology*, 25, 441-448.
- Clute, P. (1984). Mathematics anxiety, instructional method, and achievement in a survey course in college Mathematics. *Journal for Research in Mathematics Education*, 5, 50-58.
- Daane, C.J., Judy, G., & Tina, S. (1986). "Mathematics Anxiety and learning styles: What is the Relationship in the Elementary pre service Teachers?" *School Science & Mathematics*: 84-88.
- Dreger, R. M., & Aiken, L. R. (1957). The identification of number anxiety in a college population. *Journal of Educational Psychology*, 47, 344-351.
- Garry, V.S. (2005 ). The effect of Mathematics anxiety the course and career choice of high school vocational-technical education students.
- Hembree, R. (1990). The nature, effects, and relief of Mathematics anxiety. *Journal for Research in Mathematics Education*, 21, 33-46.
- Karimi, A. (2008). Development of Mathematics anxiety scales in high school students of India and Iran. Unpublished PhD thesis, Mysore University.
- Lee, V. E. (1996). The influence of school climate on gender differences in the achievement and engagement of young adolescents (Report No. PS 025 154). Washington, DC.
- Orenstein, P. (1994). *School girls: Young women, self-esteem, and the confidence gap*. New York: Doubleday.
- Rabalise, alien. (1988). Identification of math anxiety subtypes. Unpublished MA thesis, West Virginia University.
- Richardson, F.C., & Suinn, R.M. (1972). The Mathematics Anxiety Rating Scale: Psychometric Data. *Journal of Counseling Psychology*, 19, 39-47.
- Shemp. R.R (1986). The psychology of learning Mathematics. *Penguin: Harmondsworth*. 95-112.
- Suinn, Taylor & Edwards (1988). The measurement of Mathematics anxiety: The Mathematics anxiety rating scale for adolescents - MARS-A. *Journal of Clinical Psychology*, 38, 576-580.

Received: September 17, 2009

Revision received: October 26, 2009

Accepted: November 16, 2009

**Venkaatesh Kumar, G.** PhD, Department of Studies in Psychology, University of Mysore, Mysore - 570 006.

**Ayatollah Karimi .** Research Scholar Department of Studies in Psychology, University of Mysore - 570 006.