

Math Phobia among School Students: A Comparative Design

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ABSTRACT:

Background: A Comparative study was conducted to assess the level of Math Phobia (Mathematical Anxiety) among high School students in selected Government and Private Schools, Kollam, Kerala. A total sample of 60, High school students were selected using convenience sampling technique. The objectives of the study were to assess the level of Math Phobia/Mathematical Anxiety among Government and Private High School students and to compare the level of Math Phobia/Mathematical Anxiety among Government and Private High School students. The final objective was to find out the association between level of Math Phobia/Mathematical Anxiety and selected Socio-demographic variables.

Materials and Methods: A Descriptive Comparative design was used to conduct the study. A sample comprising of 60 High School students (30 Government and 30 Private) from 10th Standard were enrolled using non-probability convenience sampling technique. The conceptual framework of the study was based on Modified Health Belief Model by Becker and Rosenstock (1974). Tools used for data collection were Demographic Performa and Modified Abbreviated Mathematics Anxiety Rating Scale.

Results: Data analysis was done using Descriptive and Inferential statistics. Findings of the study revealed that the mean Mathematical anxiety among Government High School students was 33.83 ± 9.80 and the mean Mathematical anxiety among Private High School students were 45.87 ± 17 . The comparisons of the mean Mathematical Anxiety scores among the Government and Private High School students were done using the 'Student t test'. The computed 't value' at 3.27^{**} (df=58) was statistically significant at $p < 0.01$. No significant association was observed between the level of Math Phobia and selected Socio-demographic variables among both Government and Private School students ($P > 0.05$).

Conclusion: The findings of the study confirmed that the level of Math Phobia/Mathematical Anxiety among the Private High School students were significantly higher than the Government High school students.

Keywords: Comparative study, Level of Math Phobia/Mathematical Anxiety, Government, Private, High school, Students.

INTRODUCTION

It is told that, "Science/Research without Statistics/Mathematics bears no fruits and Mathematics without research has no roots". Mathematics is an area of knowledge that includes the topics of numbers, formulas and related structures, shapes and the spaces in which they are contained, and quantities and their changes. These topics are represented in modern mathematics with the major subdisciplines of number theory, algebra, geometry, and analysis, respectively. Mathematics is essential in the natural sciences, engineering, medicine, finance, computer science and the social sciences. ^[1]

Mathematics is a fundamental part of human thought and logic, and integral to attempts at understanding the world and ourselves. Mathematics provides an effective way of building mental discipline and encourages logical reasoning and mental rigor. In addition, mathematical knowledge plays a crucial role in understanding the contents of other school subjects such as science, social studies, and even music and art.^[2] Mathematical anxiety, also known as math phobia, is anxiety about one's ability to do mathematics. Mark H. Ashcraft defines math anxiety as "a feeling of tension, apprehension, or fear that interferes with math performance"^{[3], [4]}. According to the American Psychological Association, mathematical anxiety is often linked to testing anxiety. This anxiety can cause distress and likely causes a dislike and avoidance of all math-related tasks^[3].

According to the research found at the University of Chicago by Sian Beilock and her group, math anxiety is not simply about being bad at math. After using brain scans, scholars confirmed that the anticipation or the thought of solving math actually causes math anxiety. The brain scans showed that the area of the brain that is triggered when someone has math anxiety overlaps the same area of the brain where bodily harm is registered^[5]. Many learners experienced Mathematical Anxiety in their school days and reported consequences like being anxious towards mathematics including the avoidance of mathematics and the decline in mathematics in achievement^[6]. The mathematics anxiety is resulting from post mathematical experience such as learning style, past experience, teacher's personality, poor books, class room environment, the time limitations and student anxiety in mathematics learning^[7]. A study recently reported that prevalence rate of mathematical anxiety among children and adolescents range from 1% -5% with mean rate of 15% for adolescents in USA and Australia one in five children are suffering from mathematical anxiety^[6]. The programme for international students' assessment (PISA), conducted a study on 74 countries. The study results reveal poor performance of Indian students in mathematics. Based on the report Indian states bagged 72nd and 73rd position out of 74th, thus poor performance in mathematics. Also, the Indian students were not yet well prepared for such a test^[8].

The Investigator(s) through this study aims to assess the level of Math phobia and to compare the level among Government and Private High School students.

OBJECTIVES OF THE STUDY

To assess the level of Math Phobia/Mathematical Anxiety among Government High School students.

To assess the level of Math Phobia/Mathematical Anxiety among Private High School students.

To Compare the level of Math Phobia/Mathematical Anxiety between Government and Private High School students

To find out the association between the level of Math Phobia/Mathematical Anxiety and selected Socio-demographic variables among Government and Private High School students.

HYPOTHESES

H₁-There is significant difference in the Mean Mathematical Anxiety scores among the Government and Private High School students.

H₂- There is significant association between level of Mathematics Anxiety with selected Socio-demographic variables.

METHODOLOGY

Research Approach: Quantitative research approach.

Research Design: Descriptive, Comparative research design.

Population: High School students from Government and Private Schools, Kollam.

Settings: Selected Government and Private High Schools of Kollam district, Kerala.

Sampling Technique: Non –probability, Convenience sampling technique.

Sample size: 60 High School students (30 Government & 30 Private) of selected High Schools, Kollam, Kerala.

TOOLS AND TECHNIQUE

Tool-A: Demographic Performa was used to assess the Socio-demographic characteristics such as Age, Gender, Religion, Education of Parents, Socio-economic status, Area of residence, Medium of previous education, Academic performance in previous year and Hobbies.

Tool-B: Modified Abbreviated Mathematics Anxiety Scale (A-MARS) was used to assess the level of Math Phobia/Mathematical Anxiety among both Government and Private High School students.

Method of Data collection: This data was collected from Siddhartha senior school, Kollam and a Government high school in Kollam from 7/12/2015 to 19/12/2015. After explaining the purpose and obtaining an informed consent from the samples, the investigators used Socio-demographic Performa and Modified Abbreviated Mathematics Anxiety Rating Scale (A-MARS) to assess level of Mathematical Anxiety among both Government and Private High School students.

Inclusion criteria: High School students who were willing to participate in the study

High School students who were available at the time of data collection

Exclusion criteria: High School students who were not willing to participate in the study

High School students who were not available during the period of data collection

Statistical analysis: Both Descriptive and Inferential statistics were used to analyse the data [using SPSS version 20 (SPSS Inc., Chicago, IL)]. Descriptive statistics such as Frequency distribution and percentage were used to describe the Socio demographic data and Inferential statistics such as ‘Student t test’ was used to compare the mean Mathematical Anxiety scores among the Government and Private High School students. Chi Square was performed to find out the association between level of Math Phobia/Mathematical Anxiety and selected Socio-demographic variables. The level $P < 0.05$ was ascertained as the minimum accepted level of significance.

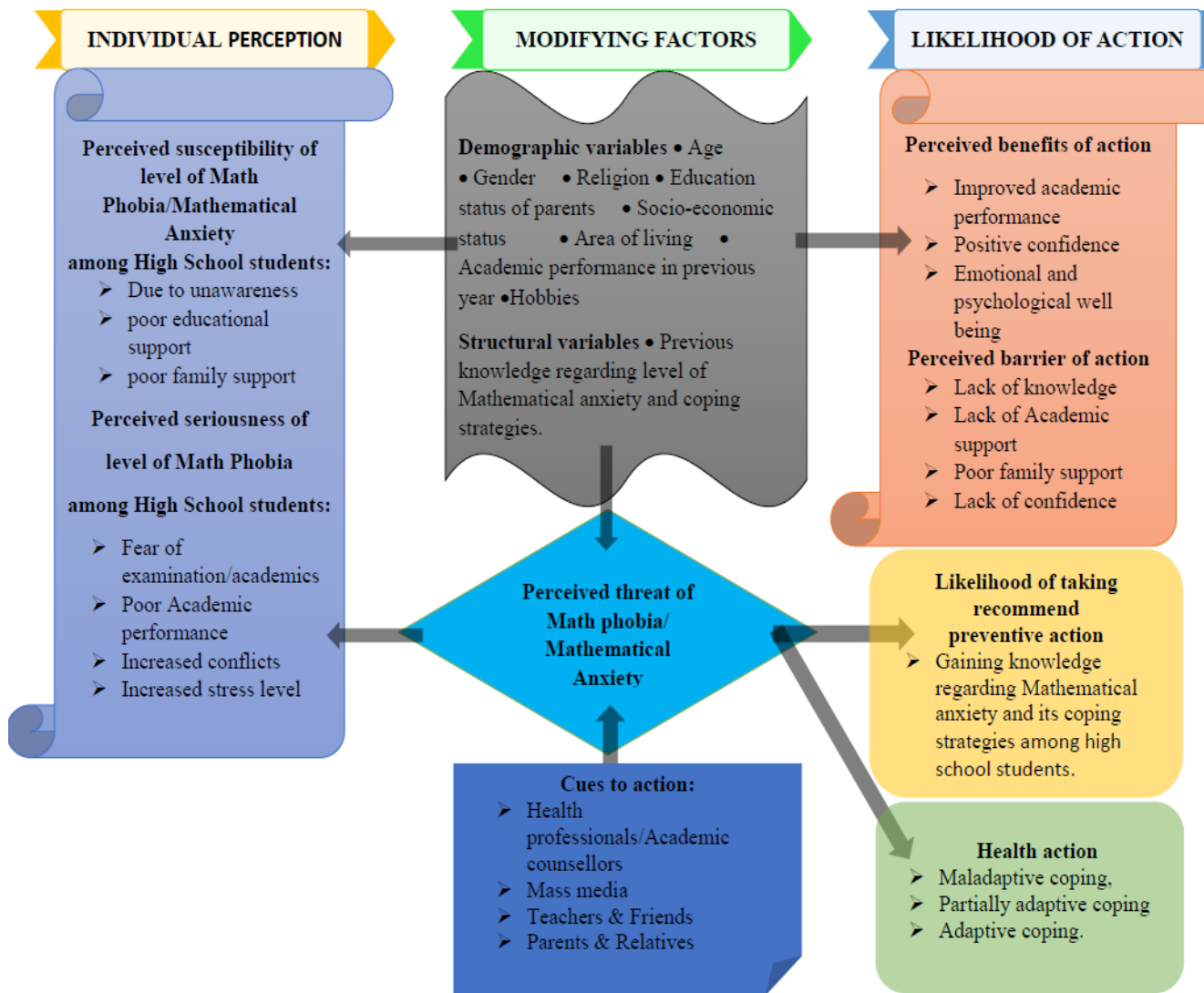


Figure 01: Conceptual framework based on Modified Health Belief Model of Becker and Rosenstock (1974) for assessing the level of Math Phobia and its coping strategies among High School students.

*Coping strategies are not a part of the study

RESULTS

Section-I: Frequency distribution and Percentage of Sample characteristics

Table 01: Frequency distribution and Percentage of High School students. (N=30)

SL NO	Demographic variables	Government Students		Private Students	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
01	Age in years				
	15- 16 yrs.	24	80.00%	25	83.40%
	Above 16 yrs.	06	20.00%	05	16.60%
02	Gender				
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
	Male	15	50%	12	40%

	Female	15	50%	18	60%
03	Religion	Frequency	Percentage	Frequency	Percentage
		(f)	(%)	(f)	(%)
	Hindu	15	50%	18	60%
	Muslim	09	30%	07	23.33%
	Christian	06	20%	05	16.67%
04	Education of Parents	Frequency	Percentage	Frequency	Percentage
		(f)	(%)	(f)	(%)
	Primary	06	20%	02	6.67%
	High School	14	46.67%	06	20%
	Higher Secondary	06	20%	10	33.33%
	Graduates and above	04	13.33%	12	40%
05	Socio-economic Status	Frequency	Percentage	Frequency	Percentage
		(f)	(%)	(f)	(%)
	Lower	08	26.67%	06	20%
	Middle	20	66.67%	20	66.67%
	Upper	02	6.66%	04	13.33%
06	Area of Residence	Frequency	Percentage	Frequency	Percentage
		(f)	(%)	(f)	(%)
	Rural	20	66.67%	12	40%
	Urban	10	33.33	18	60%
07	Medium of Previous Education	Frequency	Percentage	Frequency	Percentage
		(f)	(%)	(f)	(%)
	English	04	13.33%	30	100%
	Malayalam	26	86.67%	00	0%
08	Academic performance in previous year	Frequency	Percentage	Frequency	Percentage
		(f)	(%)	(f)	(%)
	≥75%	22	73.33%	07	23.33%
	60-74%	06	20%	09	30%
	≤60%	02	6.66%	14	46.67%
09	Hobbies	Frequency	Percentage	Frequency	Percentage
		(f)	(%)	(f)	(%)
	Books, Magazines	08	26.67%	06	20%
	Music, TV, Internet	09	30%	12	40%
	Indoor Games	07	23.33%	06	20%
	Outdoor Games	06	20%	06	20%

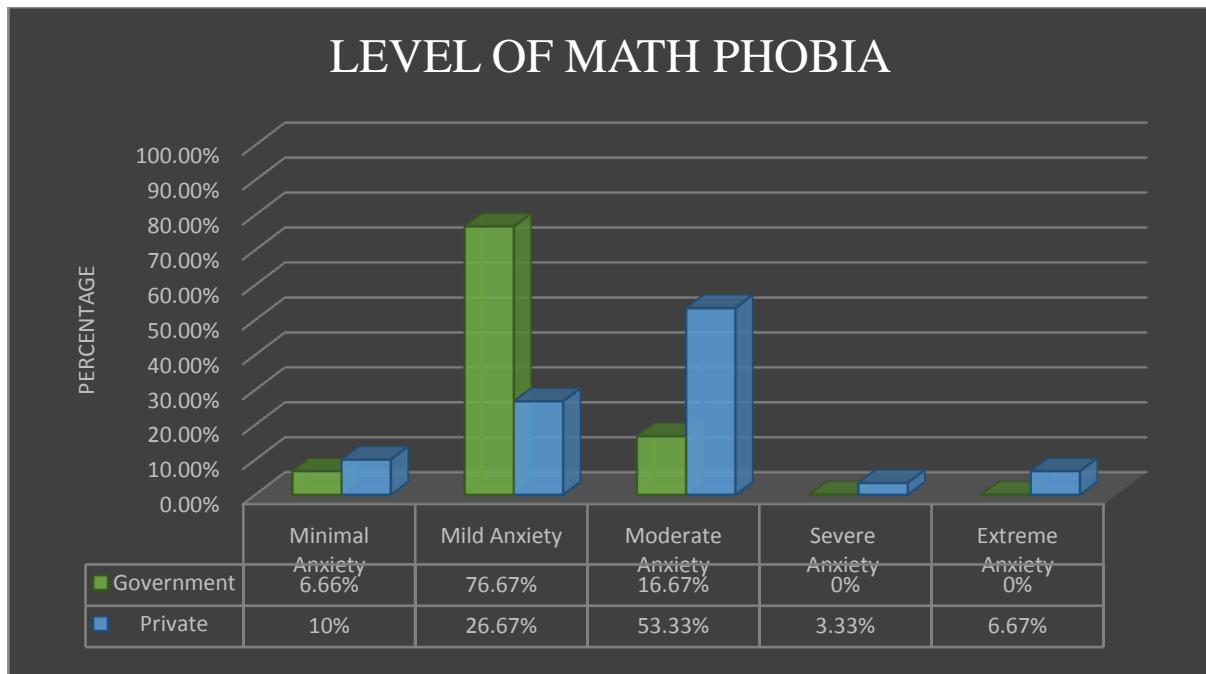
Section-II: Level of Math Phobia/Mathematical Anxiety among Government and Private HighSchool students

Table-02: Frequency distribution and Percentage of level of Math Phobia/Mathematical Anxiety (N=30)

SL. No	Level of Math Phobia/ Mathematical Anxiety	Government f	Government %	Private f	Private %
01.	Minimal Anxiety	02	06.66%	03	10.00%

02.	Mild Anxiety	23	76.67%	08	26.67%
03.	Moderate Anxiety	05	16.67%	16	53.33%
04.	Severe Anxiety	00	0%	01	03.33%
05.	Extreme Anxiety	00	0%	02	06.67%

Figure-08: Bar Diagram showing the percentage distribution of both Government and Private High school students according to their level of Math Phobia/Mathematical Anxiety.



Section-III: Comparison of Level of Math Phobia/Mathematical Anxiety among Government and Private High School students.

Table 03: Mean, Standard deviation and t value of level of Mathematical Anxiety (N=60)

Stage	Mean ±SD	Mean Difference	df	t value	P value
Government	33.83 ± 9.80	12.04	58	3.27**	P<0.01
Private	45.87 ± 17.61				

****Significant at 0.01 level.**

Table 03 shows that the mean Mathematical Anxiety among Government High School students was 33.83±9.80 and among the Private high school students was 45.87±17.61. The ‘student t test’ value (3.27**

at df 58) computed to compare the anxiety scores was significant at $p < 0.01$ level. Hence the research hypothesis (H_1) was accepted.

Section-IV: Association between the Level of Math Phobia/Mathematical Anxiety and selected demographic variables among Government and Private High School Students.

The association computed using chi square test statistics revealed that there was no significant association observed between level of Math Phobia and Socio-demographic variables among both Government and Private High school students. ($p > 0.05$). So, the research hypothesis H_2 was rejected and the null hypothesis was accepted.

DISCUSSION

The findings in the present study revealed that the mean Mathematical Anxiety score among Government High School students was 33.83 ± 9.80 and the mean Mathematical anxiety among Private High School students was 45.87 ± 17 . The t value [3.27^{**} , $df=58$] computed by comparison of the mean Mathematical Anxiety scores among the Government and Private high School students was statistically significant at $P < 0.01$ level. Therefore, it is interpreted that the level of Math Phobia among Private School students is significantly higher than the Government School students.

CONCLUSION

The study was conducted to compare the level of Mathematical Anxiety between Government and Private High School students. The results of the study confirm that the mean Mathematical Anxiety score among Private High School students is significantly higher than the mean Mathematical Anxiety score among Government students at $p < 0.01$ level. Therefore, it is concluded that the level of Math Phobia among Private School students is significantly higher than the Government School students.

LIMITATIONS

The study used a non-probability, convenience sampling technique.

The study was limited to a small sample (30 samples).

RECOMMENDATIONS

A similar study can be replicated among College students.

The study can be conducted on a large sample with random sampling to generalize the findings.

An Interventional study can be conducted to assess the effect of Progressive Muscle relaxation on level of Mathematical Anxiety among School students.

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