Mathematics Performance and Academic Hardiness, Mathematics Anxiety in Adolescence

Armin Mahmoudi

Assistant Professor, Department of Studies in Education, Yasouj branch, Islamic Azad University, Yasouj, Iran
dehlidena@yahoo.com   phone: 00989177430926

ABSTRACT: This paper examined the relationship between Mathematics performance and Academic Hardiness, Mathematics anxiety in Adolescence. The sample contained of 284 (144males and 140 females) 10 grade of Adolescence from Karnataka state. Pearson correlation analysis and two independent samples T test were used to analyze the data. The results revealed that Mathematics anxiety significantly has negative correlation with Mathematics performance but it was not significantly correlate with Academic Hardiness. It was also found that there are significant gender differences in Mathematics anxiety, whereas there are no significant differences between boys and girls in Mathematics performance and Academic Hardiness. The implications for practice and research are discussed.

Introduction

However, the topic of general psychological factors and its effects on academic situations is of growing concern to educational researchers and practitioners, there remains a notable lack of rigorous scientific inquiry in some important factors in this area. A review of the literature reveals numerous studies addressing the psychological factors topics in general; while few studies were found to target the special psychological factors in educational situations. 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. It has defined also 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 (Suinn 1988). 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; Hembree 1990) noted that math's anxiety seriously constrains Performance in mathematical tasks and reduction in anxiety is consistently associated with improvement in achievement. Academic Hardiness is also very important not only to students and their parents, but also to institutions of learning, educationists and any progressive. The quality of students' Academic Hardiness is influenced by wide range of

environmental factors.

Despite the many reports on the relationships between test anxiety and Academic Hardiness, there is scarce if any documentation of the influence of Mathematics anxiety on Mathematics performance and Academic Hardiness or the relationship between these two variables. Secondly, there is need for studies which will address gender differences in the levels of Mathematics anxiety in relation to Mathematics performance and Academic Hardiness. This presents study therefore focuses on these issues.

Objectives

The objectives of the study have divided in two areas:

- To examine the relationship between levels of Mathematics anxiety, Mathematics performance and Academic Hardiness among Adolescence in Karnataka.

- To examine the effects of gender on students' levels of Mathematics anxiety, Mathematics performance and Academic Hardiness.

Methodology

Sample

The participants of this study consisted of 284 students of 8 grade (144 males and 140 females), whom selected randomly from 9 different high school in Mysore and Bangalore.

Tools and Materials

Mathematics Anxiety Rating Scale-India (MARS-I): This questionnaire was developed by Venkatesan and Karimi (2008) and contains 31 items of situations that arouse Mathematics anxiety. It has two subscales – Math test Anxiety with 15 items and Numerical tasks with 16 items .Each item of this scale was rated on a five – point scale rating , from very much anxious – 5 to not at all anxious-1) . Psychometric properties of this scale have computed by researchers. The correlation between scores on MARS-I and MARS (Richardson and Suinn 1972) was 0.87. Two weeks test-retest reliability of the scale was 0.85 and internal consistency alpha coefficient was computed 0.88.

Academic Hardiness Scale (AHS): This Scale created by Benishek and Lopez (2001) with 18-item self-report instrument in a four-response Likert format. This instrument was designed to gather information about student attitudes regarding academic success. The four response options range from 1 = completely false to 4 = completely true. The psychometric properties of this scale has shown that internal consistency alpha coefficient was computed 0.86 (Benishek and Lopez 2001).

Mathematics performance: Marks obtained by students in the last class examination in the school in mathematics were collected.

Results

According to the hypothesis of the current investigation, the analysis of data divided in two parts:

At first part we have evaluated the relationship between three variables and in the second part we analyzed the gender differences in three variables.

Relationship between Mathematics anxiety, Mathematics performance and Academic Hardiness

The correlations between levels of Mathematics anxiety, Mathematics performance, and Academic Hardiness are presented in the correlation matrix Table 1.

Table 1: Means, standard deviations and correlation matrix of MA, MP, and AH

Variables	Two subscales of Mathematics anxiety		Total scores of Mathematics anxiety M=66.14 SD=7.01	Mathematic performance. M=73.47 SD= 10.69	academic Hardiness M=52.70 SD=6.05
	Math test M=33.01 SD=3.54	Numerical task M=33.89 SD=3.49			
Math test	−				
Numerical task	.35 (**)	−			
Total MA scores	.71(**)	.51 (**)	−		
Mathematics performance	-.21(**)	-.16(*)	-.15 (*)	−	
Academic Hardiness	.09	.08	. 09	.14 (*)	−

N: 284.   ** Correlation is significant at the 0.01 level, p <.01 (2-tailed).
          * Correlation is significant at the 0.05 level, p <.05 (2-tailed).

It was hypothesized that there are significant relationships between Mathematics Anxiety, Mathematics performance and Academic Hardiness. Contrary to the hypothesis, negative significant correlations were found between Mathematics Anxiety with Mathematics performance [r= -.-.15, p <.05] but there was no significant correlation between Mathematics Anxiety with Academic Hardiness [r = .09, P >.05].

Similar to this there are significant relationships (negatively) between two subscales of Mathematics Anxiety with Mathematics performance (Math test with MP [r= -.-0.21, p <.01] and

Numerical task with MP [r= -.-.16, p <.05]) and there was no significant correlation between two subscales of Mathematics Anxiety (Math test and Numerical task) with Academic Hardiness. These corroborate previous students which reported significant correlations between Mathematics Anxiety and Mathematics performance (Clute 1984; Hembree 1990 and Lee 1996).

Furthermore There was a significant correlation between MP, and AH[r= .14 (*), p <.05].

The influence of gender on Mathematics anxiety, Mathematics performance and Academic Hardiness

Table 2 presents the scores of boys and girls in three variables. The results of two independent t-test are described below.

Table 2: Means, standard deviations and estimated two independent samples T test of boys and girls in three variables

Dependent Variable	Sex	Mean	SD	T
Mathematics anxiety	male	63.81	3.13	4.24**
	female	69.41	9.37	
Mathematics performance	male	73.62	11.05	.27
	female	73.40	9.31	
Academic performance	male	51.32	7.17	1.46
	female	54.20	8.22	

N: 424.   ** Difference is significant at the 0.01 level (2-tailed).

An inspection of the mean scores of males and females indicates that:
1. Females scored slightly higher on the MA scale (m = 69.41, SD = 9.370) than males (m = 63.81, SD=3.13).
2. 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.
3. In Academic Hardiness also there is not significantly differences between two gender groups,

(m = 51.32, SD =7.17) for male and (m = 54.20, SD = 8.22) 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 Academic Hardiness.

Discussion & conclusion

The first hypothesis of the current investigation suggested that there is significant relationship between Mathematics anxiety, Mathematics performance and Academic Hardiness. The results of the study revealed significant relationship between Mathematics anxiety and Mathematics performance. This means that students who have high Mathematics anxiety tended to perform fewer score in Mathematics. However, those who have low Mathematics anxiety tended to perform high score in Mathematics. These findings corroborate pervious findings which report significant relationships between Mathematics anxiety and Mathematics performance (Clute 1984; Hembree 1990 and Lee 1996). But opposite to the second part of this hypothesis there was no significant relationship between Mathematics anxieties and academic Hardiness.

The second hypothesis suggested that there is significant difference between boys and girls in MA, MP and AH. The results revealed that there is significant gender difference only on the scores of Mathematics anxiety whereas there is not significant gender difference on the scores of Mathematics performance and Academic Hardiness. These findings are agreed with Lee (1996) and Orenstein (1994) about the role of gender in Mathematics anxiety and Mathematics 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 slightly good predictor of Mathematics performance. It also shows that gender hasn't a moderate's role in the effects of Mathematics anxiety on Mathematics performance and Academic Hardiness. 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.

Author:
Armin Mahmoudi Assistant Professor, Department of Studies in Education, Yasouj branch, Islamic Azad University, Yasouj, Iran.

Email: dehlidena@yahoo.com
phone: 00989177430926

Refrencess

1. American Association of University Women 1992. Report of how schools shortchange girls. American Association of University Women Educational Foundation. Washington, DC.
2. Benishek L A Lopez F G 2001. Development and Initial Validation of a Measure of Academic Hardiness. *J Career Assessment. 9* (4): 333-352.
3. Betz NE 1978. Prevalence, Distribution and Correlates of Math Anxiety in College Students. *J Counseling Psychology, 25*: 441-448.
4. Clute P 1984. Mathematics Anxiety, Instructional Method and Achievement in a Survey Course in College Mathematics. *J Research in Mathematics Education, 5*: 50-58.
5. Daane CJ, Judy G and Tina S 1986. "Mathematics Anxiety And Learning Styles: What Is The Relationship In The Elementary Pre Service Teachers?" . *J School Science and Mathematics*: 84-88.
6. Dreger R M and Aiken L R 1957. The Identification of Number Anxiety in a College Population. J *Educational Psychology, 47*: 344-351.
7. Frankensteini M 1984. Overcoming Math Anxiety by Learning about Learning. Mathematics and Computer Education, 18 (3):169-180.
8. Garry V S 2005. The Effect of Mathematics Anxiety the Course and Career Choice of High School Cational- Technical Education Students.
9. Hembree R 1990. The Nature, Effects, and Relief of Mathematics Anxiety. *J Research in Mathematics Education*, *21*(1):33–46.
10. Lee V E 1996. Report of the Influence of School Climate on Gender Differences in the Achievement and Engagement of Young Adolescents. *Report No. PS 025 154)*: *Washington, DC.*
11. Orenstein P 1994. School Girls: Young Women, Self-Esteem, and the Confidence Gap. New York, Doubleday.
12. Rabalise A 1988. Identification of Math Anxiety Subtypes. Thesis Submitted for Degree Master of Clinical Psychology (Unpublished), West Virginia University.
13. Richardson FC and Suinn RM 1972. "The Mathematics Anxiety Rating Scale: Psychometric Data". *J Counseling Psychology, 19:39*-47.
14. Shemp RR 1986. "*The Psychology of Learning" Mathematics.* Penguin: Harmondsworth. 95-112.
15. Venkatesan S and Karimi BA 2008. Development of Mathematics Anxiety Scales in Adolescence of India and Iran. Ph.D Thesis (Unpublished) University of Mysore: INDIA.

6/28/2011