

MATHEMATICS ANXIETY: COMPARISON AMONG MALES AND FEMALES STUDENTS

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ABSTRACT

This research paper is the study of mathematics' anxiety comparatively among male and female students at the Elementary level. The population is all the elementary schools and mathematics students in the northern area of District Chitral, Khyber Pakhtunkhwa, Pakistan. Purposive sampling technique is employed, and twenty (20) schools, ten male and ten female are selected. The data is collected from 120 participants: 60 males and 60 females. To analyze the data Mathematics Anxiety Scale for children (MASC) and T-test are used to draw the conclusion. The findings indicate no significant differences in mathematics anxiety between male and female students. Moreover, mathematics learning anxiety was concerned, no statistically significant difference is found between male and female students. Besides, the anxiety created among students by teachers seems to be higher in female students than the male students.

KEYWORDS

Mathematics Anxiety, Comparison, Males & Females, Khyber Pakhtunkhwa

INTRODUCTION

Mathematics anxiety is a kind of fear or a detrimental emotional response to the design of solving math's problems (Ashcraft, 2002); (Dowker, Sarkar, & Looi, 2016), and it is linked to weak math performance (Cipora, Szezygiel, Willmes, & Nuerk, 2015) (Carry, Hill, Devine, & Szues, 2016); (Foley, Herts, & Borgonovi, 2017); (Hembree, 1990a) (Ho et al., 2000); Ma, 1999; (Maloney & Beilock, 2012), and very weak result in general (Tobias, 1991). Extensive study has observed math anxiety in children and teen-agers (e.g., Chinn, 2009; (Johnston-Wilder, Brindley, & Dent, 2014), including an international study of 65 countries, which found that approximately 32% of 15-year-old pupils described feeling deserted when solving math problems (Johnston-Wilder et al., 2014).

Everyone feel anxiety which is experienced by each person in various normal situations. When the feeling is not extreme then it does not become a serious issue. When the emotion is undue to a definite degree it turns into anxiety. Worry is a reaction of mind that has a instantaneous developmental and mental effect. Considerable literature related to math anxiety is focused on the relation among performance in mathematics problems and math anxiety. It has been thought to be akin to a specific phobia (Felson & Trudeau, 1991). In the present time of globalization and renovation, the quality of life is improve by means of education. In mathematics education almost every student experiences math-related anxiety in the modern era. The math worry may occur because of teachers' behavior, barriers in the learning processes and math testing. Hence, the anxiety may create feelings of tension and fear that disrupts the students' performance in mathematics.

Moreover, it is a type of anxious feeling and tense which manipulates the students in several situations to solve mathematical problems. Mathematics anxiety appears an emotive response in academic situation. So students feels worry from math anxiety while solving math problems. Those students who have highly anxiety cannot study mathematics. Most research study conducted at various stages have investigated math anxiety, ranging from university, colleges, secondary and elementary schools. In broad spectrum, the higher mathematics anxiety reflected a low math performance. It displays the relationships between the levels of mathematics anxiety and students' success.

While, the only variable related to mathematics anxiety may not be the students performances, but there are some other factors, which generate anxiety and decrease the confidence level of the students in solving mathematics problems,

i.e., lack of interest, rude behavior of teachers, lengthy course etc. (Macey & Miller, 1995). These may also be caused by students' math anxiety.

REVIEW LITERATURE

Indeed, research in the field of mathematics discovers that anxieties, which affect the mental health of the students, and thus they would not be able to enhance their capacity related to educational improvement. It is, therefore, necessary for every student at secondary level to have a strong background in mathematics. It is a very significant concern at the national level that brilliant students cease to learn mathematics, science and technology due to the anxiety.

This is considered as a dangerous omen for the reduction of human skills (T. Campbell, Dollaghan, Needleman, & Janosky, 1997). Similarly, studies related to anxiety of mathematics in children e.g., (Chinn, 2009); (Johnston-Wilder et al., 2014), have been conducted internationally in 67 countries. The major findings of the studies reveal that 30% of 16-year-old students report feeling helpless in solving math problems (Lee, 2009), whereas the adult students remain in stress situation due to the math anxiety (Amanda M. Ferguson, Erin A. Maloney, Jonathan Fugelsang, & Evan F. Risko, 2015); (Khine, Al-Mutawah, & Afari, 2015). On the other hand, Hill et al., 2016): (Amanda M Ferguson, Erin A Maloney, Jonathan Fugelsang, & Evan F Risko, 2015) (Engelhard, 1990) state that mathematics anxiety has four components, i.e., "Evaluation anxiety of mathematics, learning mathematics anxiety, Problem solving mathematics anxiety and math teacher anxiety".

This paper is based on the above discussed components for mathematics anxiety by applying Mathematics Anxiety Rating Scale (SMARS) (Kazelskis et al., 2000). Moreover, to derive these dimensions the study analyzed 400 respondents: 210 males and 190 females, studying in different secondary schools. The test is conducted with the help of "Mathematics Anxiety scale for Children" (MASC), on the basis of (S-MARS). A sketch of the four components of this study as under.

Mathematics evaluation anxiety

This mathematics anxiety deals with learning of mathematics, like preparation for mathematics test and thinking about the test. Mathematics anxiety and examination anxiety both are the separate phenomena (Holtzworth-Munroe, Meehan, Herron, Rehman, & Stuart, 2000).

Learning anxiety of Mathematics

In this dimension, the learning activities and processes are discussed, like participation in class, new math curriculum preparation, or starting with math new chapter. In this regard, some research studies have been conducted, and the findings reveal that different students face difficulties in learning and thus they perform poorly in mathematics (Halat, 2006).

These hindrances may be based on mathematics anxiety variables (Baloglu, 1919), styles of learning (Peker, 2009a) (Peker, 2009a), instruction (Vinson, 2001); (Iossi, 2013), shortage of self-confidence: (Peker, 2009b), (Uusimaki & Nason, 2004); (Brady & Bowd, 2005), teachers' beliefs, environment (Uusimaki & Nason, 2004), lack of parental support (Engelhard Jr, Hansche, & Rutledge, 1990);(Peker, 2009b):(Uusimaki & Nason, 2004), and gender (Altermatt & Kim, 2004). The above mentioned factors affect the learning abilities of the students in mathematics (Hadfield & Maddux, 1988).

Problem solving anxiety of Mathematics

It deals with the solution of problems in different situations related to mathematics test, i.e., interpretation of tables and charts or solving math problems by the students. The previous research on the subject of that area reveals that the impact of mathematics anxiety on problem solving performances concerned to mathematics (Beilok, Wherenge, & H.Carr, 2005);(Beilock & DeCaro, 2007).

Mathematics teacher anxiety

Lastly, mathematics anxiety found in the previous studies reveal that it occurs due to the behavior of the mathematics teachers Those teachers, who would not be able convey the lesson to the students. It is because of the advocate talent of the teachers in the mathematics classes to convey the lesson in the easy manners (Betz.1978: & Ma, 1919). Campbell and Stuart (2000) conducted a research on mathematic anxiety, the number of their respondents was 49 students, among them 24 males and 25 females, belonging to the age group of 8 to 13 years. Students were asked to evaluate themselves in mathematics.

The result indicated that half of the male respondents confirmed that they perform satisfactorily and love mathematics. Moreover, the same observation was made as regards the female respondents. Hembree (1990) states that 165 researchers have found that mathematics anxiety is more common in female than in male students. The majority of the research conducted on gender differences shows a significant difference between male and female students' "progress of mathematics and

mathematics anxiety among the Japanese primary level students. Stake (1995) studied 80 students at grade 4 (45 males, 35 females) and 88 students (49 boys, 39 girls).

On the basis of “ Mathematics Anxiety Rating Scale” the results showed that the female students get average marks (87.6), which was significantly higher as compared to the marks of the male students that was (66.21). Besides, a study was conducted in 2012, on the population of 433 secondary schools’ students in the UK. The study found that the students experienced math anxiety.

The researcher suggested that further study was required to examine the progress of mathematics anxiety and its effects on math students’ performance in Pakistan. Keeping in view of the aforementioned suggestions, this study is conducted on the basis of the previous research on the proposed topic.

RESEARCH OBJECTIVE

1. To compare mathematics anxiety level among male and female students at elementary level.

RESEARCH QUESTIONS

1. Is there any significant difference between male and female students regarding math anxiety?
2. Is there any significant differences between male and female mathematics anxiety in the four areas?

RESEARCH METHODOLOGY

The population includes all the mathematics students, both males and females, at the elementary level in the northern area of Pakistan, Khyber Pakhtunkhwa district Chitral. For this purpose, 20 schools: 10 males and 10 females have been randomly selected. Total 120 participants have been selected: 60 males and 60 females. The research questionnaires were distributed among them.

The number of distributed questioners was 80, but 70 of filled questionnaires were taken back from the respondents. 45 questionnaires were taken from the female respondents while 25 were taken from the males’ participants. Chiu & Henry (1990) the data was further processed on the basis of “MASC” to diagnose the mathematics anxiety.

In the test scale of validity and reliability has been calculated. In the present study,

according to the method of “Define Groups” the basis was performed and the validity of the scale has been calculated. In the initial stage, a class containing about 30 students belong to the level 5, of 12 age and among them 12 students were successful in obtaining the highest marks (19.5) in the subject of mathematics and 12 students obtained the very lowest marks (10.8). The former defined the very high performance group while the latter defined the low performance group. Finally Chiu & Henrys “MASC” scale was applied, whereas the T-test was used to calculate the results between the two sets.

Table-1: *Validity of masc: t-test results*

	Groups	Mean	SD	Df	T-Value	P
Marks in Scale	Low performance	56.4	7.3	19	4.2	0.0
Mathematics Anxiety	Higher performance	56.3	7.4			

Table 1 depicts that mathematics anxiety is the significant different among the highest and lowest results in mathematics students and another with lower results.

The pupils whose performance were better in mathematics (Higher performance group) presented little anxiety as related to those who did not participate well (Low performance group). Variance was statistically significant, 0.05 level (P less than 0.05). The scale of reliability was found at 0.65 by means of Cronbach alpha “ α ” procedure.

Table-2: *Comparison of mathematics anxiety among boys and girls*

Gender	Mean	Standard Deviation	T-test	P-vale
Boys	49.4	12.5	7.3	19
Girls	49.7	12.9	0.21	0.70

The above table 2 shows no significant difference between male and female students about mathematics anxiety.

Table-3: *Male and female students comparison regarding mathematics anxiety in four aspect.*

		Aspects of math anxiety			Significant
	Gender	Mean	S. Deviation	T-Value	
Anxiety of	Males	1.6	.63		

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learning	Females	1.7	.59	0.46	0.47
Problem Solving anxiety	Males	1.7	.51	2.07	0.02
	Females	2.4	.61		
Anxiety of Teachers	Males	1.43	0.73	3.01	0.04
	Females	1.54	0.66		
Examination Anxiety	Males	2.44	0.67	.156	0.007
	Females	2.23	1.57		

Table 3 shows that the males' students have greater means with admiration to learning and the teacher's anxiety, the significant difference is checked in teachers' anxiety. Besides, the females' students have higher means to solve the problems, and the differences are the same in both areas.

RESULTS AND DISCUSSION

The first question was asked of the respondents i.e., Is there any difference between male and female students regarding math anxiety? Result obtained from table 1 indicates significant difference between males and female students. Thus, the result correlates to other researchers in the field of mathematics education. Research study showed that there are a little differences between boys and girls students regarding mathematics anxiety.

Ma (1999) mentions 27 studies in which there is no important modification between the genders in this area. Related conclusions have been perceived by other researcher like (Zettle & Houghton, 1998), (Gierl & Bisanz, 1995), (Chiu & Henry, 1990), (Keshavarzi & Ahmadi, 2013). Similarly, some other researchers have observed the gender differences with respect to mathematics anxiety is conducted on Japanese primary schools and concluded the differences in males students and findings supported the study of (McCarthy & Betz, 1978; Tocci & Engelhard Jr, 1991) and (Pajares & Urdan, 1996) had similar results.

The very true gender changes regarding anxiety of mathematics and other dimensions related to educational areas should not be the same as natural differences between boys and girls. The effect of other variables, such as feeble education in mathematics, family support, and the important one is the teacher support. The other area that is the individual self-belief regarding mathematics,

parents' beliefs concerning gender must be considerable (Higgins et al., 1990). Thus, it is concluded a poor self-perception of mathematics exists more in females as related to males (K. T. Campbell & Evans, 1997). In conformity by the results of this study, it can be defended, that in general all the people and in specific senses our people should take steps to control gender differences from mathematics.

The study second question is, whether there are any significant differences between males and females mathematics anxiety in the four areas.

Table 2 results, reveal that there are no significant differences between males and females regarding mathematics knowledge; besides, in the other three areas like examination, problem solving and anxiety of teacher's significant differences are there. Related to anxiety of teachers, male students had more anxiety and the level of significance is 0.005. On the other hand, female students had a higher anxiety relating examination, and solution of mathematical problems at the level of significant 0.007 and 0.04 respectively.

There is lack of significant differences found between male and female students concerning mathematics learning. It is because the female students do not take interest in mathematics as well as in engineering, whereas, the male students seemed to be more inclined towards mathematics. The different branches of Engineering were once specifically for male students, but now there are equal opportunities for both males and females.

Moreover, as the culture related to girls' achievement in the field of mathematics has changed, extra self-confidence has produced in female students, the anxiety in learning math has remained less obvious. Being a teacher of mathematics, I have my personal experiences, i.e., male mathematics' teachers are strict, and disciplined as compared to the female teacher of mathematics. It is due to the strictness of male teachers that the anxiety level of male students would be more than the female students. Moreover, male students have the opportunity to be comfortable in various environments and thus their anxiety level would be minimized in problem solving as compared to female students.

Hence, the male students would be skilled in problem solving, whereas the female students would be better at understanding mathematical formulas. Female students' are less able than the males in transferring their knowledge to the real world. Besides this, it is obvious that the girls' students give maximum time to secure

good position in the examination and there are professional competitions between them. This competition is less in male students. At the end, it is evident that female students showed more anxiety as compared to boys with respect to examination.

Mathematics examination is related to its learning process. When a subject of mathematics is taught in a traditional way: like only practices and rote memorization. In this way of teaching a stable and permanent knowledge based on understanding is not expected.

As a result, in view of Blooms taxonomy of educational objectives, the conclusion of this type of learning is insufficient and is closely related to anxiety at the time of the solution of the problems: a process of instruction not based on critical thinking, then education becomes ineffective and stressful. Ineffective way teachers, transfer tense concept and information to the students can be the cause of hard in learning.

The findings prove that the anxiety level among boys and girls in mathematics teachers revealed that lack of Sympathy among teachers towards male students especially girls showed higher anxiety as compared to male students. Moreover, calculated significant differences between males and females related to examination be judged, female students are more sympathetic than males and very much concerned, when the stressful situation occur.

RECOMMENDATIONS

Potential techniques is required to reduce mathematics anxiety. Develop strong teaching and learning skills like: positive attitude among mathematics teachers and students, Encourage students in mathematics class Promote active and cooperative learning activity in mathematics class, use information communication technology.

Besides, these it is suggested that mathematics students can use different techniques to minimize mathematics anxiety: avoid rote memorization, Practices mathematics on daily basis.

Last but not least, more and more research is required to check the male and female differences in mathematics anxiety and its effect on the academic performance of students at elementary in Pakistan.

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