
Comparison of Mathematics Anxiety between Male and Female Students at Secondary Level

*Muhammad Ameen¹, Dr. Iftikhar Ahmad Baig² & Abdul Khaliq¹

1. PhD Scholar, The University of Lahore, Lahore.

2. Professor, The University of Lahore, Lahore.

*Corresponding Author: khaliquol@gmail.com

Abstract

The present study aimed to determine significant difference between male and female students regarding mathematics anxiety (MA). Descriptive survey type approach was applied to conduct the present study. Target population of this study was all students at the secondary level in public schools in Punjab. A sample of 300 male and female students was drawn through simple random sampling technique from the accessible population. Mean, Standard Deviation and Independent Samples t-test were used as statistical techniques for analyzing the collected data. Highly significant differences were found regarding MA between male and female students, and with respect to students of rural and urban areas. Therefore, it was concluded that female students have more anxiety towards mathematics than male students; also the students of rural areas showed more anxiety about mathematics than urban areas.

Keywords: Mathematics anxiety, female students, male students, secondary level, public schools.

1. Introduction

Mathematics anxiety (MA) among students is a burning issue for many teachers in the present age; and it inversely correlates with students' learning and their academic achievement. Mathematics anxiety mean, a state of uneasiness, nervousness or fear created when students perform mathematical tasks (Cemen, 1987). The major attributes of this distress condition consist of dislike, fear and worry with particular behavioral manifestations such as dissatisfaction, tension, helplessness, distress, and mental disorganization when students performs mathematical operations (Richardson and Suinn, 1972). Furthermore, a sense of anxiety among students can lead them towards fear, strain, helplessness, distress, embarrassment, incapability to cope particular tasks, perspiring palms, panicky stomach, face difficulty in breathing, and failure in the ability to focus on mathematical problems (Posamentier and Stepelman, 1990).

According to Freedman (2003), MA is "an emotional reaction to mathematics based on a past unpleasant experience which harms future learning". Similarly Spicer (2004) elucidated that MA is "an emotion that blocks a person's reasoning ability when confronted with a mathematical situation". This phenomenon happens when learners try to memorize mathematics concepts without understanding and they are likely to fall into this "anxiety gorge" (Reys et al., 2007)

MA directly or indirectly influences students in learning mathematical problem. MA develops due to the outcome of students' previous negative experiences in learning mathematical problems at the school or in home (Rossnan, 2006). Consequently, educators should perform significant roles in mitigating the intensity of MA among learners in the classroom through creating the environment conducive. Both educators and parents may be proved a foundation for lessening the MA among students. By providing positive support and appropriate mathematics learning settings for students, educators may reduce MA among students (Shields, 2006).

According to Arem (2003), MA is a psychological and physical action associated with the mathematical thinking and problem-solving process that triggers from painful prior experiences concerned with mathematical operations. MA is slackly considered as a state of dread, nervousness and panic when students cope with situations concerning with the mathematics major. Osborne (2001) found that learners having low levels of MA perceived more enthusiasm, excitement, confident and highly motivated in learning mathematics than those students who have higher levels of anxiety. According to Hembree (1990), MA begins from the junior grades, reaches at the apex in ninth and tenth grades, and its intensity off through senior high grades and college.

The indicators of MA include: i) feelings of tension, threat, apprehension and fear, ii) negative mind-set regarding mathematical learning, iii) failing to achieve potential, iv) temporary loss in working memory, v) teachers' behavior, vi) parents' attitude, vii) difficulty in learning material, viii) low level of achievement in the required mathematics courses (Hembree, 1990).

Female students have higher level of MA than male students (Frost et al., 1994; Hembree, 1990; Ashcraft, 2002) and Osborne (2001) explored in a meta-analysis study that that gender disparity in MA; and concluded that male students had lower levels of MA and higher grades in mathematics than female students.

Several studies reveal that MA is multifaceted construct and it occurs due to the result of rational, personality, and environmental factors. The rational attribute that is strongly contributing to MA is the lack of ability to comprehend mathematical problems and concepts. Personality traits include having a lower degree of self-esteem, incapability to handle disappointment, fear, and shyness. Environmental aspects contain negative classroom experiences and highly aspirations of parents such as incomprehensible textbooks, giving stress on practice without comprehension, and poor subject knowledge of mathematics' instructor. Mathematics teachers who are incapable to effectively elucidate mathematics concepts, behave impatiently with pupils, make daunting comments, and have little motivation regarding the subject matter often create mathematics anxious learners (Woodard, 2004; Furner & Berman, 2004; Scarpello, 2007; Plaisance, 2009).

1.1 Objectives of the Study

To conduct this study, following objectives were made, after intensive study of the pertinent literature:

1. To compare the level of mathematics anxiety between male and female students at the secondary level.
2. To compare the level of mathematics anxiety between students of urban and rural schools.

1.2 Research Questions

For the attainment of the above developed objectives, following research questions were made:

1. Is there any mean difference between level of mathematics anxiety between male and female students at the secondary level?
2. Is there any mean difference between level of mathematics anxiety between students of urban and rural schools?

2. Procedure of the Study

The present study was descriptive survey type and a quantitative approach was applied in this study to investigate the attitude and perception of students regarding the mathematics anxiety between male and female students in public secondary schools in the province of Punjab. The target population was comprised of all students of both genders in public schools at secondary level in Punjab. The accessible population of the study was all male and female scholars of public secondary schools (PSSs) in Faisalabad district. A sample of 300 male and female students was drawn through simple random sampling technique from the scholars of public secondary schools of Faisalabad district.

To appraise the level of MA between male and female scholars, Mathematics Self-Efficacy and Anxiety Questionnaire by Diana K. May was used as a research tool. Mathematics Anxiety (MA) and Self-Efficacy (SE) Questionnaire has two subscales Self-efficacy and Mathematics Anxiety, so its subscale Mathematics Anxiety was applied to determine level of MA between male and female scholars. Sixteen items about Mathematics Anxiety was taken in the structured questionnaire from the MSEAQ. A five point Likert scale was applied to know the perceptions and attitudes of the research participants. Through the pilot testing of the tool, reliability index of the research tool was calculated. So, the value of Cronbach Alpha was 0.84. Mean (*M*), Standard Deviation (*SD*), and Independent Samples t-test were used as statistical techniques for the analysis of the data.

3. Results

Research Question 1: Is there any mean difference between level of mathematics anxiety between male and female students at the secondary level?

An Independent samples t-test was run to explore the mean difference between the level of mathematics anxiety between male and female students at the secondary level.

Table 1

Descriptive Statistics

Respondents	N	M	SD	SE_M
Male Students	150	2.66	.3598	.0294
Female Students	150	2.85	.3562	.0291

Above table portrays the results of descriptive statistics about the male and female students' MA. It is indicated from the above table that the mean score of female students $M=2.85(SD=.3562)$ is greater than male students $M=2.66(SD=.3598)$ regarding mathematics anxiety. So, it is concluded that female students are more fearful than male students about mathematics at secondary level in public schools.

Table 2

Comparison of Mathematics Anxiety between male and female students

Respondents	N	Mean Difference	SD Difference	t	p
Male Students	150				
		-.1925	.04134	-4.656	.000
Female Students	150				

*** $p < .001$

The above table expresses a highly significant mean difference between male and female students regarding their anxiety in mathematics; $t(298) = 3.673, p < .001$. Therefore, it is inferred from the above information that both groups were significantly different regarding mathematics anxiety in public secondary schools.

Research Question 2: Is there any mean difference between level of mathematics anxiety between students of urban and rural schools?

An Independent samples t-test was conducted to explore the mean difference regarding the level of mathematics anxiety between students of urban and rural schools at the secondary level.

Table 3

Descriptive Statistics

Respondents	N	M	SD	SE_M
Students of Urban Schools	150	2.68	.3589	.0293
Students of Rural Schools	150	2.85	.3684	.0301

Above table indicates the results of descriptive statistics regarding the anxiety in mathematics of the students of urban and rural schools at the secondary level in public sector. It is portrayed

from the table 3 that the mean score of rural schools' students $M=2.85(SD = .3684)$ is more than urban school male students $M=2.68(SD=.3589)$ regarding anxiety in mathematics. Consequently, it is concluded that rural schools' students are more nervous than urban schools' students about mathematics at secondary level in public schools.

Table 4

Comparison of Mathematics Anxiety between Urban and Rural students

Respondents	N	Mean Difference	SD Difference	t	p
Students of Urban Schools	150				
		-.1679	.0420	-3.999	.000
Students of Rural Schools	150				

 $p < .001$

The above table's information reveals a highly significant mean difference between students of urban and rural schools regarding their anxiety in mathematics; $t(298) = -3.999$, $p < .001$. Hence, it is interpreted from the above information that both groups were significantly differ regarding mathematics anxiety in public secondary schools.

4. Findings and Discussion

The present study investigated that there was a significant mean difference regarding students' mathematics anxiety with respect to their gender. This finding is in line with the findings of Hembree (1990); Frost et al. (1994); Osborne (2001); Ashcraft (2002); Bidin et al. (2003); Woodard (2004); Yuksel-Şahin (2008); and Karimi & Venkatesan (2009), all of them investigated significant differences regarding MA with respect to gender, with male students exhibiting lower level of MA than female students. But this finding negate the findings of Zettle & Raines (2000) and Rahim (2002), who investigated that there is no significant association between gender and MA. Through this study, the researcher also identified significant differences between students of urban and rural schools in public sector at secondary level.

All above identified significant differences may be due to the disparity in male and female students' educational backgrounds, parents' educational level, individual differences between genders, socioeconomic status, home and schools environment, availability of facilities in public school, their attitude and basic knowledge regarding mathematics, and gender of the educators, etc.

5. Recommendations

It is proposed that Punjab Education Department (PED) should conduct refresher courses with the collaboration of Directorate of Staff Development (DSD) for the professional development of

secondary school teachers particularly the female mathematics teachers' for the reduction of MA of female students.

It is also suggested that pedagogues should employ the following potential techniques for the alleviation of students' Mathematics Anxiety: i) Develop strong teaching and learning skills and a positive attitude regarding mathematics; ii) Relate mathematics to the practical life settings of the learners; iii) Support learners towards reflective thinking; iv) Promote active learning in the classroom; v) Involve learners into cooperative learning activities; vi) Provide support and encouragement; and vii) Use information and communication technology (ICT) in the instructional activities.

It is also proposed that students themselves can use the following potential techniques for the alleviation of their anxiety regarding mathematics: i) Practice mathematics on a daily basis; ii) Adopt appropriate learning techniques; iii) study, according to the their own learning style and abilities; iv) don't depend only on the memory; v) concentrate on the prior achievements; and vi) request for immediate assistance.

6. References

- Arem, C. A. (2003). *Conquering Math Anxiety* (2nd ed.), Brooks/Cole-Thomson Learning, Pacific Grove, ISBN-10: 0534386342, pp: 193.
- Cemen, P. B. (1987). *The Nature of Mathematics Anxiety* (Report No. SE 048689). Stillwater, OK: Oklahoma State University (ERIC Document Reproduction Service No. ED287729.).
- Freedman, E. (2003). *Professo Freedman's Math Help Website*. Retrieved on 3-2-2016 from <http://www.mathpower.com>.
- Furner, J. M., & Berman, B. T. (2004). Confidence in Their Ability to Do Mathematics: The Need to Eradicate Math Anxiety so our Future Students Can Successfully Compete in a High-Tech Globally Competitive World. *Philosophy of Mathematics Education Journal*, 18(1), 1-33.
- Hembree, R. (1990.) The Nature, Effects, and Relief of Mathematics Anxiety. *Journal for Research in Mathematics Education*. 21(1): 33–46.
- Osborne, J.W. (2001). Testing stereotype threat: Does anxiety explain race and sex differences in achievement? *Contemporary Educational Psychology*, 26(1), 291-310.
- Plaisance, D. V. (2009). A Teacher's Quick Guide to Understanding Mathematics Anxiety. *Louisiana Association of Teachers of Mathematics Journal*, 6(1). Retrieved from http://www.lamath.org/journal/vol6no1/anxiety_guide.pdf.
- Posamentier, A.S. & Stepelman, J. S. (1990). *Teaching Secondary School Mathematics* (3rd ed.). New York: Merrill.

- Reys, R. E., Lindquist, M.N., Lambdin, D.V., & Smith, N. L. (2007). Helping children learn mathematics. Hoboken, NJ: John Wiley & Sons, Inc.
- Richardson, F.C. & Suinn, R.M. (1972). The mathematics anxiety rating scale: Psychometric data. *Journal of Counseling Psychology*, 19(6), 551-554.
- Rossnan, S. (2006). Overcoming Mathematics Anxiety. *Mathitudes*. 1(1), 1-4. Retrieved on January 17, 2016, from <http://www.coe.fau.edu/mathitudes/Maths%20Anxiety%20Research%20Paper%202.pdf>.
- Scarpello, G. (2007). Helping Students Get Past Math Anxiety. *Connecting Education and Careers*, 82(6), 34-35.
- Shields, D. J.(2006). *Causes of Mathematics Anxiety. The Student Perspective*. Unpublished doctoral dissertation, Indiana University of Pennsylvania, Indiana.
- Spicer, J. (2004). *Resources to combat math anxiety*. Eisenhower National Clearinghouse Focus12 (12). Retrieved on January 12, 2016: [http://www.enc.org/features/focus/archive/Math Anxiety/document.shtm?input=FOC-003455-index](http://www.enc.org/features/focus/archive/Math%20Anxiety/document.shtm?input=FOC-003455-index)
- Woodard, T.(2004). *The Effects of Math Anxiety on Post-Secondary Development Students as Related to Achievement, Gender, and Age*. *Inquiry*, 9(1). ERIC Document Reproduction Service No. EJ876845.