

Comparing the Math Anxiety of secondary school female students in groups (Science and Mathematical Physics) Public Schools

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ABSTRACT

The aim of this study is comparing math anxiety of secondary school female students in groups (Science and Mathematical Physics) Public Schools, district 2, city of Sari. The purpose of the research is applied research, it is a development branch, and in terms of the nature and method, it is a causal-comparative research. The statistical population in this study consisted of all secondary school female students in groups (Science and Mathematical Physics) Public Schools, district 2, city of Sari that is the equivalent of 1,900 people according to the latest figures cast of Education in Sari city. According to the population size and referring to the Morgan's sample size table, the sample size was considered 320 people. Simple random sampling method was used to select research samples. Data collection methods included library and observation. Data collection tool in the survey is questionnaire. Pelick and Parker (1982) math anxiety questionnaire that their reliability was calculated 0.98 by using Cronbach's alpha. Research Hypothesis test and data derived from questionnaires were analyzed by using spss software and descriptive and inferential statistics. The tests used in the research included Kolmogorov-Smirnov test and Pearson correlation and T of two independent groups. The results show a difference between math anxiety among students of mathematics and science. According to the average score of students' math anxiety, we find out students' math anxiety in science is more than math. There is an inverse relationship between math anxiety and students' academic achievement. Students, who have high math anxiety, have lower academic achievement.

KEYWORDS

anxiety, math anxiety, academic achievement

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Introduction

Education has played a key role in the sustainability of human society from long ago and in the education system, academic achievement is an issue that, every

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year, devotes a huge amount of research to itself and the factors affecting it have attracted the attention of education psychologists, and other education professionals, for years. Math anxiety is one of the factors that, causes avoiding the math or students' poor math performance in teaching and learning. One of the factors that can create problems in the process of learning math is math anxiety. More than four decades have been passed since the math anxiety word entered into the glossary of psychology for the first time (Noori et al., 2013). On this time, although the clearer view has been obtained, but still, there is a long way ahead to fully understand the structure and its dynamics. Among all the negative effects of anxiety in mathematics, what is more discussed than others is the negative relationship between mathematics anxiety and achievement in mathematics. This negative relationship describes research findings that students with high level of math anxiety, gain low level of success (Putwain & Daniels, 2010).

However, in the context of the factors that cause math anxiety, there is no perfect theory presented so far. However, according to studies, we can divide the causes of math anxiety into three factors related to the individual, environmental factors and the education position and math abstract concepts. Mathematical thinking is one of the main tools of thinking. All students should trust their capabilities to do arithmetic for achieving the level of readiness in the arrival of the information age and they should gain the problem solving capability and reasoning (Yarmohammadi, 2012). Many researchers note the importance of basic math education in schools as the main basis for specialized training. The importance arises from the fact that, right instructions can create right insights and perspectives of mathematics in children, so that they understand their living environment scientifically and use a scientific approach in the scientific activities and problem solving. This foundational math education will be the origin of specialized and higher training (Jain & Dowson, 2009). Usually, the most important question that arises for those involved in mathematics education and the teachers of this course is the factors that hinder academic achievement of students in mathematics. It could be noted to factors such as the complexity of the act of thinking and learning in humans, students' anxiety and most important of all, the lack of teachers' readiness for teaching with new methods (Nikmanesh & Yari, 2014).

Efficacy refers to the vigor of personality, in dealing with the issues for reaching goals and success, and it is more influenced by personality traits, including self-confidence, activist and give up (Animate their), explore the reasons of failure (self-evaluation), new arrangements and social methods to achieve the goal (self-regulation) and controlling impulses (leadership). These factors, in some students, even more than the ability to learn, cause progress and academic success (PourJafar Doust, 2010). On the other hand, it is believed that self-efficacy beliefs play an important role in the growth of their intrinsic motivation (Pourjafar Doust, 2010). This inner strength grows when the desire to achieve these criteria will be created in person and as a result, the individual achieves positive self-evaluation. The internal interest causes the individual efforts in long-term and without environmental rewards. In the field of education, self-efficacy leads to the student's belief about his ability to understand or do

homework. The quality nature of teaching materials deals with anxiety. If they ask a student to memorize a list of words, high levels of anxiety may lead to improved performance. However, if the anxiety will be more than his power, he may not prove his geometry problems in a measured way.

In this regard, the research results of Aqajani et al. (2015), entitled study the relationship between self-confidence and self-efficacy with mathematics anxiety among primary school students in Kazeroon city, have shown that components of self-confidence and self-efficacy have significant correlation with math anxiety. Multivariate regression analysis showed that the variables of self-confidence, learning self-efficacy and emotional self-efficacy are respectively the strongest predictor of mathematics anxiety in students. The results showed that mathematics anxiety of female students is significantly more than mathematics anxiety in male students. The results showed a significant difference in math anxiety between mathematics and science fields in the humanities. Nikmanesh & Yari (2014) has done a research entitled the relationship between self-efficacy and self-perception with test anxiety, in male and female high school students in Sabzevar. The results showed a significant correlation between self-efficacy and test anxiety. In addition, there is a significant positive correlation between the three components of self-perception, including the passive perception, acting perception and aggressive perception, and test anxiety. Stepwise regression analysis also showed that, among the variables, passive component alone predicts 0.25 and in combination with acting component, it predicts 0.29 variance of test anxiety. In addition, results showed that self-efficacy of male students was more than female students and test anxiety in female students is higher than male students. Parviz (2014) has done a research entitled the relationship between cognitive and metacognitive strategies and mathematics anxiety, in the Bokan PNU students. The results of this study indicate a relationship between metacognitive strategies and self-efficacy. When the metacognitive strategies move up, self-efficacy beliefs also go up. There is no relationship between gender and metacognitive strategies, which means, there is no difference between men and women in the metacognitive strategies. There is a relationship between gender and mathematics anxiety, which means women have higher mathematics anxiety than men. in a research has studied forecasting mathematics anxiety in math, humanities and science high school students in the city of Bandar Abbas, based on self-efficacy variables and goal orientation. The findings showed that the rate of mathematics anxiety of students in the theoretical fields (math, science and humanities), in the second grade of high school has significant difference. In addition, all aspects of self-efficacy show a negative relationship with mastery goal orientation (avoidance and trends) and show a significant positive relationship with Performance-oriented goal orientation (avoidance and trends). Self-efficacy and goal orientation correlated with mathematics anxiety, and based on the type of goal orientation and self-efficacy of students, we can predict about 45 percent of math anxiety in them. has done a research entitled the predictors of math anxiety and its relationship with math academic failure in elementary school students in Semirom City. The findings revealed that math self-concept, teacher's behavior, mathematical motivation, family behavior, self-confidence, social assistance and



purposefulness are along with mathematics anxiety and affect mathematics performance. (Putwain & Daniels, 2013) showed in a research that students with avoidance goals show more math anxiety and in contrast, the students with no mastery goals, reveal low level of math anxiety. It seems that, first category seeks a good score and parental consent and they do not afraid of failure. (Tobias, 2009), in a study to investigate the nature of the students' perception by using qualitative and quantitative, examined the perceived resources of students from test anxiety. In addition, many studies have been done about the consequences of test anxiety, but there are few studies available about the implicit antecedents. Jain and Dawson (2009) showed in a research, students, who suffer from the math anxiety, have known motivational and emotional factors that can be used as predictors of math anxiety. Miller and Bichsel (2009), showed in a research that the absence of sufficient background in mathematics to do math activities and a lack of self-confidence in math, will reinforce math anxiety. According to the current state of mathematics and mathematics education in the country, in order to meet the challenges of mathematics education in the present era, a comprehensive plan to correct the problems and limitations of mathematics education seems necessary. Boosting academic failure, especially in mathematics, in high school, dropout students in recent years have concerned authorities and experts in education, and no efforts have been made in order to discover the causes of this problem so far (Bonaccio et al., 2008).

In this regard, it is important to consider that, despite the inherent capabilities of the individual that are hereditary and non-modifiable, cognitive functions are acquired and changeable. Therefore, the smart practice can be taught and learnt and with identifying the causative factors in academic performance, we can take steps in directing, improving and solving learning problems. In general, the poor performance of students in mathematics is the result of various factors that their identification can help to improve student achievement in the areas of curriculum. From these variables, we can refer to self-efficacy and self-perception. Therefore, the researcher intends to compare the math anxiety of secondary school female students in groups (Science and Mathematical Physics) Public Schools, District 2, and City of Sari.

Methodology

This research is applied research in terms of purpose, and a branch of development and in terms of the nature and method, it is a causal-comparative research. The statistical population in this study includes all high school female students in groups (Science and Mathematical Physics) Public Schools, District 2, city of Sari, which, according to the latest figures cast of Education in Sari city; it is equal to 1,900 people. According to population size and refer to Morgan sample size Table, the sample size was considered 320 people. To select samples, simple random sampling was used. Method of data collection includes the library and field. Data collection tool in this study is questionnaire. standard questionnaire of math anxiety, which the reliability was, calculated 0.98 by using Cronbach's alpha. Research hypotheses test and data obtained from questionnaires were analyzed by using spss software and descriptive and

inferential statistics. The tests used in this study include Kolmogorov-Smirnov test and the Pearson correlation and t-test.

The Findings

Demographic Findings showed that 62% of the subjects are studying in the second grade of high school (most frequency) and 38% are in the third grade of high school (lowest frequency). In addition, 68% of subjects are studying in the science fields (most frequency) and 32% are in mathematics (lowest frequency). Given that in Table 1, the p-value (significance level) is less than $\alpha=0.05$, the research hypothesis is confirmed with 95% confidence, and the result is that there is a difference between math anxiety about science and math students. Due to the average score of students' math anxiety, we find that science students' math anxiety is more than mathematics field.

Table 1: The T test of the first hypothesis

field	Number of subjects	Average answers	Standard deviation	The amount of t	Degrees of freedom	α	p-value
Math	103	2.43	0.76	-3.28	318	0.05	1.00
Science	217	2.68	0.40				

Given that in Table 2, Sig (significance level) is significant at 0.05 error level ($\text{sig}=0.008 < \alpha=0.05$), so with 95 percent certainty, the result was an inverse relationship between the two variables and in fact, there is an inverse relationship between math anxiety and academic achievement of students. Students, who have high math anxiety, have low academic achievement.

Table 2: The Pearson correlation coefficient

Variables	Pearson coefficient	(α)	Sig) The significance level(
Math Anxiety And Academic Achievement	-0.154	0.05	0.008

Discussion and commentary

Math anxiety is one of the most important, effective and common anxiety of students in the course of study. According to the researchers, the prevalence of mathematics anxiety among American students and its negative effect on math achievement has been confirmed. In addition, every year, many students, despite the ability and talent to continue their education in math, forced to choose non-math majors because of math anxiety, and avoid the math. If we do not confront with math anxiety, it becomes a permanent obstacle. The individual's attitude toward mathematics effects on the duration of his use of mathematics, his willingness to pursue advanced mathematics and even



choosing his career path. The findings of various surveys have shown that academic achievement in mathematics, not only affects the structures of knowledge and information processing, but also it relates to motivational factors such as beliefs, attitudes, values, and anxiety. Math anxiety causes the weakness of mental processes to perform mathematical operations, negativity and confusion in students. The group avoids math class, and shows an inability in math tests and anxiety and a lot of tension and elusive learning this lesson. The notion that math talent is innate, boys perform better in math than girls, or math is a logic course, not creativity course, create retreating and confronting of some students in learning math. The first hypothesis results showed a difference between the math anxiety of math and science students. Due to the average score of students' math anxiety, we find that science students' math anxiety is more than mathematics field. Students in the science field, in situations such as exams (quizzes) in math class, preparing to study for a math test, exam in math class without prior notice, and the final exam (final) of math will have more anxiety than mathematical physics field. In addition, the second hypothesis results showed an inverse relationship between math anxiety and academic achievement of students. Students, who have high math anxiety, have low academic achievement. When students find a sense of belonging to the mathematical and enjoy involvement in an activity that requires the use of mathematics, and consider this course useful, interesting and valuable, they will have less anxious lessons in math exam and experience less feelings of restlessness and confusion. In this regard, in order to reduce math anxiety in students, suggestions are proposed as below: short and varied tests can reduce students' mathematical anxiety. Simple tests of math, simple math problems solving, successive achievement in math tests and stepwise progress math strengthen confidence in students in learning mathematics. Simple questions that teachers know students can answer weekly tests that are chosen from the lesson of the week and repeated practices that are merely for a reminder of the previous lesson, also resulted in the minds of students in the class. Teach optimism to students. At the end of each school year, students bring a series of pleasant and unpleasant experiences and memories with them to their new school year. Math teacher should try to eliminate negative and unpleasant experiences that a group of students has about math in their minds and give a positive background to them. Reducing math anxiety through solving problems and returning to the basic concepts, applying new methods of teaching, creating a cheerful and energetic atmosphere, accepting mistakes of students, encouraging, asking questions in class and understanding the problems of students are including points that teachers can use to reduce math anxiety among students. Start teaching math happily and with the spirit of cordiality. Teachers, who are angry, tired and aggressive and teach students with bad temper, create a negative and unpleasant atmosphere in the class that causes fear and apprehension in students.

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