

## What's Wrong With Math Anxiety in Elementary School?

**Danuri<sup>1,a)</sup>, Kintoko<sup>2,b)</sup>, Kris Nita Sari<sup>1,c)</sup>**

<sup>1</sup>Department of Elementary Education, Universitas PGRI Yogyakarta, Jl PGRI 1 No 117 Bantul, Yogyakarta, Indonesia

<sup>2</sup>Department of Mathematics Education, Universitas PGRI Yogyakarta, Jl PGRI 1 No 117 Bantul, Yogyakarta, Indonesia

e-mail: <sup>a)</sup><mailto:Danuri@upy.ac.id>, <sup>b)</sup>[kintoko@upy.ac.id](mailto:kintoko@upy.ac.id)

### Abstract

The purpose of this study was to determine (1) the math anxiety; (2) the mathematics learning achievement, and (3) the effect of math anxiety on learning achievement; of fifth grade elementary school students in Yogyakarta City and Bantul Regency. This study uses a quantitative survey method. The data analysis of this research used a validity test (Product Moment Method), a reliability test, a normality test (Kolomogorov-Smirnov), a linearity test, and a hypothesis test using the simple linear regression test. The results showed that math anxiety in fifth grade elementary school students in Yogyakarta City and Bantul Regency was included in the high anxiety category, while learning achievement for fifth grade elementary school students in Yogyakarta City and Bantul Regency was included in the very high category, and there was an influence of math anxiety on the learning achievement of fifth grade elementary school students in Yogyakarta City and Bantul Regency. The results between math anxiety on learning achievement have significant results, with a percentage of 1.6%.

**Keywords:** learning achievement, math anxiety

### INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process. Learners can actively develop their potential through guidance, teaching, and/or educational training for their future roles, so that they have spiritual strength, self-control, intelligence, noble character, and skills. Therefore, education is an important part. Every individual has the right to education.

Based on PISA-2018 data, Indonesia is ranked 70<sup>th</sup> out of 77 world countries surveyed. With an average score of 379, below the world average of 489 (OECD, 2019). Only 28% of the 12,098 students can reach level 2 (with a world average of 76%) and only 1% can get 5 levels out of 6 levels in the PISA (OECD, 2019). Based on TIMSS-2015 data, Indonesia is ranked 44<sup>th</sup> out of 49 world countries

surveyed, with an average score of 397 out of an international average score of 500 (Mullis, Martin, Foy, & Hooper, 2016). TIMSS (Trends in International Mathematics and Science Studies) is the most up-to-date international evaluation institution held in 50 countries to measure progress in learning mathematics and natural sciences. Auliya (2016) states that there is math anxiety that has a significant effect on students' mathematical understanding abilities.

Student anxiety can be identified with three components, namely physiological, psychological, and social components. Physiological component can be in the form of cold sweat on the palms, palpitations, elevated blood pressure, and so on. Psychological components are anxiety, nervousness, tension, anxiety, insecurity, fear, and quick surprise. Social component can be in the form of behavior that will be shown by each individual in the environment such as sleep disorders

(Dacey in Ekawati, 2015). If anxiety in mathematics lessons has dominated the minds of every student, it can make students find it difficult to think and concentrate, so that students will no longer want to learn mathematics and tend to stay away from mathematics. This will result in low student achievement.

Learning achievement is the result of a measurement of students which includes cognitive, affective, and psychomotor factors after students take part in learning. This can be measured using relevant tests or instruments. Learning achievement is an educational assessment of student progress in everything that is learned or obtained at school concerning the knowledge and skills stated after learning (Rosyid, Mustajab, & Abdullah, 2019). Learning achievement is the result achieved by students during the teaching and learning process within a certain period of time. The results of the learning measurement can be manifested in the form of numbers, letters, symbols, or sentences that state the success of students during the learning process.

Based on the preliminary interviews, there are fifth grade students in one of the elementary schools in Yogyakarta City and Bantul Regency who feel worry and anxiety when facing math lessons, causing anxiety in math lessons. In addition, when the teacher gave a question suddenly that had to be done, students often felt uneasy until they sweated. When the teacher orders and appoints students to work on questions or answer questions in front of the class, students feel nervous and afraid if the answer is wrong. This results in the emergence of a fear of learning mathematics. Signs of anxiety that students may experience include feelings of displeasure, pessimism, self-doubt that they unable to do math problems, and tense.

When students experience worries, they will automatically become confused and unable to think and understand the material in that day's learning. Most female students experience math anxiety more because they are worried that they can't do or learn math. In

contrast, the male students are prefer mathematics. Learning anxiety is experienced by most students in mathematics learning. The studies showed that learning involvement affects learning anxiety (Li *et al.*, 2021). It is very different from male students who take mathematics lessons casually and prefer mathematics. So that male students can more easily understand the material presented by the teacher. Math anxiety in female students is higher than that of male students.

When learning mathematics, the teacher is still monotonous and there is no interesting medium or learning model, so that it makes students feel uneasy when learning mathematics. The material delivered by the teacher is not understood by the students, so it adds to the students' dislike of mathematics. The teacher only explains the formula when there are students who do not understand. The student is directed to ask friends who already understand or can ask the teacher directly. Learning mathematics has a lot of material that must be studied in elementary school, especially in class fifth. Students who experience anxiety when they attend math lessons can be affected when they work on problems given by the teacher. Students get good learning achievements by getting good results when the material being taught is easy and students getting poor results when the material being taught is difficult.

So that when students experience fear, even excessive worry and anxiety will result in the results obtained. Fear of even worrying about math can be interpreted as math anxiety. It can be seen that when students work on math problems given by the teacher, they get bad grades because they feel fear and worry first. According to Susilowati (2017), maths anxiety has a negative influence on mathematics achievement because it leads to avoiding mathematics. This anxiety about mathematics will interfere with students' working memory, which is used to solve mathematical problems (Passolunghi, Živković, & Pellizzoni, 2019). Based on the explanation above, it can be concluded that there is an effect of student

anxiety when studying mathematics on student achievement.

Mathematical ability can be achieved if in mathematics learning does not encounter several problems. But in fact, there are several factors that can affect mathematical ability that significantly affect student achievement. The purpose of this study was to determine (1) the math anxiety; (2) the mathematics learning achievement; and (3) the effect of math anxiety on learning achievement; of fifth grade elementary school students in Yogyakarta City and Bantul Regency.

## METHOD

This study uses a quantitative survey method. This study was carried out in accordance with field conditions. This study aims to determine the effect of math anxiety on the learning achievement of fifth grade elementary school students. The study was conducted in May-June 2021. The study was conducted in elementary school in Yogyakarta City and Bantul Regency. The research site consisted of 27 elementary schools, namely 16 elementary schools in Yogyakarta City and 11 elementary schools in Bantul Regency. The population in this study was fifth grade elementary school students in Yogyakarta City and Bantul Regency.

Based on online data from the Ministry of Education, a number of fifth grade elementary school students in Yogyakarta City is 40,567, while in Bantul Regency is 73,549. The determination of the sample in this study was made using a random sampling technique. The sample was determined using the Slovin formula, that was 396 fifth grade elementary school students in Yogyakarta City and 397 fifth grade elementary school students in Bantul Regency, so that the number of samples was 793. The data collection technique in this study used a questionnaire consisting of 16 statements related to math anxiety and a multiple-choice test using Google Form. In determining the score on each statement of the questionnaire, using the Likert scale

guidelines, with a score of 1-5. Data analysis techniques in this study were using descriptive analysis, prerequisite tests (normality and linearity), and hypothesis testing using simple linear regression tests.

## RESULT AND DISCUSSION

### Math Anxiety for fifth grade students in Yogyakarta City and Bantul Regency

Math Anxiety data from fifth grade elementary school students in Yogyakarta City and Bantul Regency was obtained from a questionnaire consisting of 16 questions distributed to respondents, with a total of 793 respondents. The data was processed using the IBM SPSS Statistics 24 program. The results about math anxiety were obtained: mean= 53.61; median= 54.00; mode= 48; std. deviation = 9,669; variance= 93,486; minimum score= 21; and maximum score= 78. Then the results of student statements regarding math anxiety in fifth grade elementary schools in Yogyakarta City and Bantul Regency are presented using a frequency distribution table (see Table 1).

Table 1. Frequency Distribution of Math Anxiety Category for Grade V Elementary School in Yogyakarta City and Bantul Regency

Category	Description	Percentage
$X > 64$	Very high	15%
$63 < X \leq 54$	High	35%
$53 < X \leq 45$	Currently	34%
$44 < X \leq 35$	Low	13%
$X < 34$	Very low	3%
Total		100%

Based on the results in the Table 1, it shows that math anxiety for fifth grade elementary school students in Yogyakarta City and Bantul Regency is in the very high category of 15%, high 35%, moderate 34%, low 13%, and very low 3%. So it can be concluded that the math anxiety of fifth grade elementary school students in Yogyakarta City and Bantul Regency is included in the high

category, which is 35%. Meanwhile, in a previous study with a similar theme conducted by Talitha (2018), the results showed that the determination of the category in her research was included in the category of moderate anxiety with a percentage of 76.2% (16 students). So, from the two results, the results are the same in terms of the level of student anxiety.

In this case, it shows that each student feels different levels of anxiety. These different levels of anxiety, according to the theory of Trujillo and Hadfield (Qausarina, 2016) state that the causes of math anxiety can be classified into three factors, namely: environmental factors, psychological factors, and intellectual factors. These three factors have an effect on different children's anxiety levels. Environmental factors are very influential on the level of anxiety, because in this environment, for example, conditions during the teaching and learning process of mathematics in the classroom feel tense due to teachers who do not use models and methods that attract students. For psychological factors, children have a fear of their abilities. As well as intellectual factors, every child has a different intellectual. This intellectual factor is cognitive, which is more directed at the talent and level of intelligence possessed by each student. Therefore, these three factors are very influential in the level of anxiety experienced by students. Because every student has a different level of anxiety depending on the cause of the anxiety.

#### **Mathematics Learning Achievement in Fifth Grade Elementary School Students in Yogyakarta City and Bantul Regency.**

Data on the learning achievement of fifth grade elementary school students in Yogyakarta City and Bantul Regency was obtained from a test consisting of 29 multiple-choice questions, with a total of 793 respondents. The data can be processed using the IBM SPSS Statistics 24 program, and it is known that the mean, median, mode, standard deviation, variance, minimum, maximum, and

sum values of the learning achievements of fifth grade elementary school students in Yogyakarta City and Bantul Regency.

From the data analysed, the mean is 18.85; median= 21.00; mode= 28; std. deviation= 7,772; variance= 60,400; minimum score= 2; and maximum score= 29. Then the results of student statements regarding math anxiety in fifth grade elementary schools in Yogyakarta City and Bantul Regency are presented using a frequency distribution table (see Table 2).

Table 2. Frequency Distribution of Learning Achievement Category for Fifth Grade Elementary School Students in Yogyakarta City and Bantul Regency

Category	Description	Percentage
$X > 22$	Very high	48%
$21 < X \leq 18$	High	14%
$17 < X \leq 13$	Currently	12%
$12 < X \leq 9$	Low	10%
$X < 8$	Very low	16%
Total		100%

Based on the results in the Table 2, it shows that the learning achievement of fifth grade elementary school students in Yogyakarta City and Bantul Regency is: in the very high category 48%, high 14%, moderate 12%, low 10%, and very low 16%. So it can be concluded that the learning achievement of fifth grade elementary school students in Yogyakarta City and Bantul Regency is included in the very high category, which is 48%. In a previous study with a similar theme, Talitha (2018) suggested that the determination of the category in her research was included in the high category with a percentage of 43%. Therefore, the two studies show the same results in the level of achievement obtained by students.

The level of achievement in learning mathematics in this study shows different results for each student because each student has different abilities and understandings. According to Syah's theory in (Syafi'i, et al.

2018), measuring student achievement in the cognitive field can be done in various ways, either by means of a written test or an oral test. In this study, a written test was used in the form of multiple choice. There are several levels in measuring this cognitive aspect, namely: level of knowledge, level of understanding, level of application, level of analysis, level of synthesis, and level of evaluation. The six levels of cognitive aspects are very influential on children's learning achievement. Like the level of understanding, every child has a different level of understanding, especially in mathematics. This level of understanding is the ability of a child to use and apply the information that has been learned in new situations and can solve problems that arise in everyday life.

#### **Normality test**

The normality test was conducted using the Kolmogorov-Smirnov test with the help of IBM SPSS Statistic 24. The significance value of Kolmogorov Smirnov is the significance of the math anxiety variable using exact sig (2-tailed), which is 0.172, and from the learning achievement variable using exact sig (2-tailed) that is equal to 0.695. The significance value of the variable is greater than the significance level of  $0.05 = 5\%$ . It can be concluded that the data from the math anxiety variable and learning achievement are normally distributed.

#### **Linearity test**

Linearity tests were performed using the help of IBM SPSS Statistics 24. Based on the output results of IBM SPSS Statistics 24, the results of linearity tests with the help of SPSS that the Score of significant Deviation from Linearity or sig. of 0.727. So the research data is linear or normally distributed because the Sig Deviation score of linearity  $> 0.05$ . So it can be interpreted that there is a linear relationship between anxiety and learning achievement.

#### **Hypothesis Test**

Simple linear regression test used the help of IBM SPSS Statistic 24. The results of the  $F$  value is 12.926 with a sig value. of  $0.000 < 0.05$ , it can be said that there is an influence of math anxiety on mathematics learning achievement. The coefficient of determination ( $R$  Square) is 0.016, which means the effect of math anxiety on learning achievement is 1.6%. With the regression equation  $Y = 46.190 + 0.352X$ , it means that if the value of  $X$  (anxiety) = 0, then  $Y$  (learning achievement) is equal to 0.352. The value of  $X$  in the result is positive, so it has a positive effect between variable  $X$  and variable  $Y$ . This means that when  $X$  increases by 1,  $Y$  will increase by 0.352. The sig value from the results above is 0.000, meaning that there is an influence between anxiety and learning achievement. The  $t$ -value in the table shows the results of 8.659 and 3.596, which means that it is significant, because the results of  $t$  arithmetic  $> T$  table, with  $t$  table of 1.960 and a significance level of 5%, so there is a significant effect.

The results in this study have a positive effect, meaning that the higher the anxiety, the higher the learning achievement. There are research results from the University of Chicago (Qausarina, 2016) which state that there is a strong relationship between success in doing math problems and activities in the brain network involved in controlling attention and regulating children's emotions. In this case, for each student with a high level of anxiety in mathematics who can do math problems well, their brain activity worked during the anticipation phase through brain activity when completing a math task. This brain activity does not involve areas normally in numerical calculations. Instead, this activity is more related to motivation. So it can be interpreted when students experience math anxiety and get high achievement too, because students have motivation to learn mathematics in order to get good achievements. The motivation can be in the form of learning harder.

The results of using a simple linear regression test obtained a significance value of  $0.000 < 0.05$ , so it can be said that there is an influence of math anxiety on mathematics learning achievement with a percentage of 1.6%, which can be seen from the coefficient of determination (*R Square*) of 0.016. With a percentage of 1.6%, it shows that the influence of anxiety on student achievement is low. This is due to several factors that influence it. According to Rosyid, *et al.* (2019), there are two factors that influence, namely external factors and internal factors. External factors come from outside students who are influenced by the environment (family, school, community, and nature). So that when children experience anxiety about mathematics and are in an environment where their friends do not experience anxiety. The child is immediately carried away to not be anxious about dealing with mathematics. Meanwhile, internal factors come from within students in the form of physiological and psychological factors. These psychological factors are talents, ways of learning, and interests. Every child has different talents, interests, and ways of learning. So these factors that affect the low influence of anxiety on learning achievement are low because children can experience anxiety from other things. The higher the grade level, the greater the math anxiety experienced by students. For this fifth grade student, there are still many students who like mathematics, so that math anxiety does not affect their learning achievement too much. So, based on the results in this study, the influence of mathematics anxiety on student achievement is low. There is a relationship or influence between mathematics anxiety and student achievement. The results of this study are the same as those conducted by Dewi (2017).

The results of the correlation test show that aspects of attitudes towards mathematics have a positive and significant relationship with the mathematics achievement. Cognitive aspects and mathematical achievement have a correlation coefficient of 0.346 with  $p= 0.001$  ( $p < 0.01$ ). The coefficient value is 0.1197

(11.97%). The affective aspect and mathematics learning achievement have a correlation coefficient of 0.378 with  $p= 0.001$  ( $p < 0.01$ ). The coefficient value is 0.1428 (14.28%). The cognitive aspect and mathematical achievement have a correlation coefficient of 0.430 with  $p= 0.001$  ( $p < 0.01$ ), so the coefficient value is 0.1849 (18.49%). So the results of the study show that there is a relationship between attitudes towards mathematics and mathematics achievement in fifth grade. So the results of the study show that there is a relationship between attitudes towards mathematics and mathematics achievement in fifth grade. The results of this study and the results of Dewi's research (2017) are the same, namely having positive results, meaning that the higher the anxiety, the higher the learning achievement results. This is because there is a strong relationship between success in doing math problems and activity in brain networks involved in controlling attention and regulating children's emotions. In this case, for each student with a high level of anxiety in mathematics who can do math problems well, their brain activity worked during the anticipation phase through brain activity when completing a math task. This brain activity does not involve areas normally involved in numerical calculations. Instead, this activity is more related to motivation. So it can be interpreted when students experience math anxiety and get high achievement too, because students have motivation in learning mathematics in order to get good achievements. The motivation can be in the form of or like students taking lessons.

## CONCLUSION

Based on the results of research conducted in May-June 2021 with a total sample of 793 students on the effect of math anxiety on student achievement in fifth grade elementary school students in Yogyakarta City and Bantul Regency. It is possible to conclude: 1) Math anxiety in fifth grade elementary school students in Yogyakarta City and Bantul Regency is included in the category of high

anxiety with a percentage of 35%. 2) The learning achievement of fifth grade elementary school students in Yogyakarta City and Bantul Regency is included in the very high category with a percentage of 48%. 3) There is an influence of math anxiety on the learning achievement of fifth grade elementary school students in Yogyakarta City and Bantul Regency. It is proven by a simple linear regression test which shows a significance result of 0.00 with a significance value of less than 0.05. This shows that there is an influence between math anxiety on learning achievement with a percentage of 1.6% and is significant.

## REFERENCE

- Auliya, R. N. (2016). Kecemasan Matematika dan pemahaman matematis. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 6(20), 12–22. <http://dx.doi.org/10.30998/formatif.v6i1.748>
- Dewi, N. C. (2017). Hubungan antara sikap terhadap Matematika dan prestasi matematika pada siswa SD kelas V (Skripsi). Yogyakarta: Universitas Sanata Dharma.
- Ekawati, A. (2015). Pengaruh kecemasan terhadap hasil belajar Matematika siswa kelas VII SMPN 13 Banjarmasin. *Math Didactic: Jurnal Pendidikan Matematika*, 1(3), 164–169. <https://doi.org/10.33654/math.v1i3.16>
- Li, H., Zhang, A., Zhang, M., Huang, B., Zhao, X., Gao, J., & Si, J. (2021). Concurrent and longitudinal associations between parental educational involvement, teacher support, and math anxiety: The role of math learning involvement in elementary school children'. *Contemporary Educational Psychology*, 66, 101984. <https://doi.org/10.1016/j.cedpsych.2021.101984>
- Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). *TIMSS 2015 International Results in Mathematics*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center.
- OECD. (2019). *PISA 2018 Results: Combined executive summaries Volume I, II & III*. OECD.
- Passolunghi, M. C., Živković, M., & Pellizzoni, S. (2019). Mathematics Anxiety and Working Memory: What is the Relationship? In Irene C. Mammarella, S. Caviola, & A. Dowker (Eds.), *Mathematics Anxiety What is Known and What is Still to be Understood* (pp. 103–125). Routledge.
- Qausarina, H. (2016). *Pengaruh Kecemasan matematika (math anxiety) terhadap hasil belajar matematika siswa kelas X SMA Negeri 11 Banda Aceh*. Skripsi, Universitas Islam Negeri Ar-Raniry Darussalam- Banda Aceh. <https://repository.ar-raniry.ac.id/id/eprint/2275/>
- Rosyid, Z., Mustajab, M., & Abdullah, A. R. (2019). *Prestasi belajar*. Malang, Indonesia: CV Literasi Nusantara Abadi.
- Susilowati, R. (2017). *Hubungan antara kecemasan terhadap Matematika dan prestasi Matematika pada siswa kelas V sekolah dasar*. Skripsi, Universitas Sanata Dharma. [https://repository.usd.ac.id/8332/1/121414071\\_full.pdf](https://repository.usd.ac.id/8332/1/121414071_full.pdf)
- Syafi'i, A., Marfiyanto, T., & Rodiyah, S. K. (2018). Studi tentang prestasi belajar siswa dalam berbagai aspek dan faktor yang mempengaruhi. *Jurnal Komunikasi Pendidikan*, 2(2), 115–123. <https://doi.org/10.32585/jkp.v2i2.114>
- Talitha, V. (2018). *Hubungan antara kecemasan dengan prestasi belajar Matematika materi volume kubus dan balok pada siswa kelas V SDN Caturtunggal 1*. Skripsi, Universitas Sanata Dharma. <http://repository.usd.ac.id/id/eprint/31650>