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Confidence vs. Anxiety: Unveiling the Link Between Self-Efficacy and Math Anxiety

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Original Article

Confidence vs. Anxiety: Unveiling the Link Between Self-Efficacy and Math Anxiety

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Abstract. Background of the study: the aim of this research is to find out whether there is a relationship between self efficacy and mathematics anxiety and aims to see a picture of students' self efficacy and mathematics anxiety. The method used in this research uses a quantitative approach. The population and sample in this research were 189 Bina Dharma Jakarta Middle School students. Data were analyzed using SPSS version 27 software with correlational techniques. The findings in this research are that there is a significant relationship between self efficacy (X) and mathematics anxiety (Y), seen from the contribution made by self efficacy of 17.6% to mathematics anxiety. The relationship between levels of self efficacy and mathematics anxiety is in the moderate relationship category with a significance value of -0.419 (negative), so it can be stated that an increase in students' self efficacy causes a decrease in mathematics anxiety.

Keywords: Self-Efficacy, Math Anxiety, Confidence

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Introduction

The millennial generation now tends to depend on their smartphones to carry out activities, especially in searching for answers, because of technological developments, they no longer memorize multiplication, but use calculators to do calculations (Disai et al., 2017). Moreover, the millennial generation now has many demands from family or those closest to them to get the best grades. However, each individual feels unable to face the demands of the people around him (Nursilawati, 2013). This makes them worry, anxious and afraid of getting grades in their mathematics subjects. The definition of mathematics anxiety is a feeling of fear when faced with the possibility of solving a mathematical problem (Mutawah, 2015). According to most people, feelings of anxiety, stress and fear are normal things when studying, because everyone feels these things when studying (Riski & Rafianti, 2019). However, according to experts, it turns out that this can psychologically affect a person's academic achievement (Priyanto, 2017). According to Atkinson (1999), usually mathematics anxiety refers to an unhealthy mood response that occurs when facing mathematical problems, which is manifested in emotions such as panic, loss of reason, depression, resignation, restlessness, fear, and symptoms such as facial sweating and clenching (Auliya & Munasiah, 2016). Mathematics anxiety is when their heart beats faster, they feel stronger, and they believe that they will not be able to solve math problems (Disai et al., 2017).

The importance of learning mathematics cannot be separated from the role of mathematics in various aspects of life (Auliya & Munasiah, 2016). Mathematics is a subject that must be implemented at every level of education starting from elementary school to college

(Nursilawati, 2013). Studying mathematics can help students manage personal finances and encourage problem-solving abilities. Mathematics also helps in forming thought patterns and makes students think systematically, scientifically, logically and critically (Milatina, 2017). Apart from that, mathematics subjects are also the basis for other sciences such as medicine, physics, biology, economics, accounting, management, technology and information (Biantari, 2022). There appears to be a mismatch between students' efforts to learn mathematics and their attitudes towards mathematics learning. It turns out that mathematics is still considered a scary, difficult and unpleasant subject, so it is avoided, because mathematics is full of formulas and requires concentration when studying it (Biantari, 2022). Therefore, anxiety that occurs in individuals, especially students, can occur through a process that begins with external or internal stimulation until it becomes a situation that is considered a threat or something dangerous (Yakub, 2022).

The symptoms experienced by students during mathematics lessons are supported by research results from (Satriyani, 2016) that aspects of anxiety are divided into 3 types, namely: (a) psychological aspects. Symptoms of physiological anxiety include cardiovascular (heart palpitations and feeling like fainting), respiratory such as shortness of breath, blood pressure in the chest and a feeling of suffocation, neuromuscular (insomnia, pacing and stress), gastrointestinal (loss of appetite, nausea and diarrhea).), urinary tract with inability to hold urine, and sweaty skin with redness and hot and cold sensations on the skin; (b) cognitive aspect. Cognitive behavior includes distracted attention, poor concentration, forgetfulness, poor judgment, impaired thinking, loss of objectivity, confusion, fear, and nightmares; (c) affective aspect. Affective behaviors include irritability, impatience, restlessness, tension, nervousness, worry, guilt and shame.

From the symptoms that have been mentioned, there are factors that influence students' fear of mathematics subjects (Dastirah, 2014) which are as follows: (1) low self-esteem; (2) negative perception of mathematics subjects; (3) low student extrinsic motivation; (4) the teacher's unfriendly attitude when teaching; (5) decline in effective study habits; (6) students' low self-confidence increases anxiety in facing mathematics exams. Looking at the current reality, data in the field shows that the quality of students' mathematical abilities in Indonesia is still low (Nurmila, 2016). As a reference, the author cites the results of previous research to see the gap in research results, which was researched by (Rawa & Yasa, 2018) with the title mathematics anxiety in elementary school teacher education students, where the result was that there were 12 students (37%) experiencing severe anxiety. , 9 students (28.12%) experienced moderate anxiety, and 8 students (25%) experienced mild anxiety, while there were only 3 students (9.38%) who were not indicated to experience mathematics anxiety. Based on the results of research researched by (Julia, 2022) with the title students' anxiety levels in solving Class VII mathematics questions at SMP Negeri 1 Watang Pulu, the results of which were that 59% of students experienced severe levels of anxiety, 32% of students experienced high levels of anxiety. moderate, 5% of students experience panic level anxiety, and 5% of students experience low level anxiety.

Based on the results of a preliminary study conducted by researchers on Monday 23 October 2023, it shows that at Bina Dharma Jakarta Middle School, no research has been carried out on mathematics anxiety, so it is necessary to research mathematics anxiety. This statement shows that while learning is in progress, students still rely on Google to find answers, often even copying their friends' assignments. There are still many students who like to procrastinate in completing the assignments given, this is because apart from being lazy, they also don't understand and feel unable to do it. There are still students who are worried about getting bad grades and are afraid if their parents find out about these grades. So if this is not addressed, it will cause anxiety in students in mathematics which can result in them getting low grades.

Students who suffer from anxiety usually feel forced to study mathematics. This can be seen in the answer to the question of whether students are able to answer and carry out appropriate learning steps when studying numbers or solving mathematical problems (Nurmila, 2016).

Dengan kata lain, siswa yang merasa mampu dan percaya diri dengan matematika tidak perlu terlalu khawatir. In other words, students who feel capable and confident with mathematics don't need to worry too much. Therefore, self efficacy will have an influence in facing mathematics subjects, where if students' self efficacy is low, it will cause anxiety in facing mathematics learning (Dastirah, 2014).

It is important to instill self efficacy in each individual so that it does not cause excessive fear or anxiety so that they can overcome the problems they are experiencing. According to Alwisol (2012), the definition of self efficacy is a feeling of confidence and trust in one's potential, effort and seriousness in solving the problems faced (Auliya & Munasiah, 2016). Self efficacy is also defined as an assessment of oneself, whether an individual has the ability to achieve success according to his or her desires (Yakub, 2022). According to Bandura (1997), self efficacy is an individual's perception regarding confidence in his ability to carry out the expected actions (Sifah, 2016). Self efficacy generally describes an individual's evaluation of himself or his level of confidence in his ability to complete certain tasks to achieve certain results (Disai dkk., 2017). So the existence of self efficacy can help individuals gain confidence in their abilities so that they can better carry out their duties as students (Sunawan et al., 2017).

Aspects of self efficacy are divided into 3 dimensions, namely level dimensions, strength dimensions, generalization dimensions (Sifah, 2016). his level dimension is related to a person's confidence in completing tasks ranging from easy to difficult, so it shows that the individual has a high level of confidence in his ability to complete the tasks he faces (Yakub, 2022). The strength dimension (strength) is related to the level of strength and individual beliefs and expectations regarding their abilities (Nursilawati, 2013). The generalization dimension (generality) is related not only to a person's confidence in their abilities in a specific task but also having high confidence in their abilities in dealing with varied tasks (Ghufron & Suminta, 2013).

The characteristics of individuals who have high self efficacy are when the individual: (1) feels confident that he or she is able to effectively handle the events and situations they face (Auliya & Munasiah, 2016); (2) diligent in completing tasks (Hartati et al., 2021); (3) believe in your own abilities (Husna, 2023). So, when individuals have low self efficacy and are experiencing obstacles, they will quickly give up. So therefore, someone who has low self efficacy will not make any effort to overcome existing obstacles, because they believe that their actions will not have any influence (Yakub, 2022). The existence of self efficacy makes each individual believe in their own abilities and allows them to perform their duties as a student better (Dastirah, 2014). With self efficacy students can predict future performance, because self efficacy is related to student decision making and effort (Hartati et al., 2021). This effort is one of the individual motivations to carry out certain learning activities.

The factors causing low self efficacy are based on four sources of information (Milatina, 2017), namely as follows: (a) performance attainment, namely where individuals consistently succeed in completing existing tasks, then feelings of self-confidence in their abilities will increase. However, if failure occurs it will lower self efficacy (Sifah, 2016); (b) other people's experience (vicarious experience), namely if someone sees someone else succeed in a task, he concludes that he is also capable of doing it. Moreover, if the individual believes that other people are equally capable of having equal abilities (Ghufron & Suminta, 2013); (c) verbal persuasion, namely if other people convince the individual that the individual can do a task, the individual can often do the task better (Nursilawati, 2013); (d) physiological states and reactions, namely anxiety and stress that arise in a person when carrying out a task is often interpreted as failure (Sunawan et al., 2017).

Having high self efficacy will be able to motivate students cognitively to act more purposefully and be able to control the surrounding environment so that they can display certain behavior as expected, namely being able to adapt well in the school environment (Sunawan et al., 2017). Individuals who have low self efficacy will avoid all tasks and give up easily when problems arise. They consider failure as a lack of existing abilities (Yakub, 2022). Students who

have the will to fulfill their academic demands will of course always try as optimally as possible and must have confidence in their abilities to achieve their goals successfully (Pramesta & Dewi, 2021).

As a reference, the author cites the results of previous research to see the gap in research results, which was researched by Warsito with the title the relationship between self efficacy and academic adjustment and academic achievement, the result of which was that there were 19 students (31.67%) who did not try to complete their assignments properly. time for various reasons, and 11 students (18.33%) easily give up in situations such as facing many difficult tasks, feeling less confident about being able to complete something and 30 students (50%) not feeling confident in their ability to fulfill academic requirements (Nursilawati, 2013). Based on the results of research conducted by Anitasari, Olivia Pandansari, Rika Susanti, Kurniawati and Abdul Aziz with the title the influence of self efficacy on elementary school students' cheating behavior during online learning, the results of which were that there were 15.5% or 7 students classified as low self efficacy. , 69% or 31 students were classified as having moderate self efficacy while 15.5% or 7 students had high self efficacy (Anitasari et al., 2021).

From the results of previous research, the relationship between self efficacy and mathematics anxiety has a very big influence. This shows that individuals who have mathematics anxiety will unconsciously experience negative things about their excessively anxious attitude. Therefore, mathematics anxiety is the biggest factor in students' self efficacy. Based on the description above, it can be seen that it is very important to research because, the anxiety experienced by students when facing mathematics lessons can arise not only because of the burden which is felt to be threatening, but also because of how students perceive their ability to complete the assignment or mathematics problem which is self efficacy (Sifah, 2016). Therefore, researchers are interested in looking more deeply at whether there is a relationship between self efficacy and mathematics anxiety. Therefore, the focus of this research is to find the relationship between self efficacy and mathematics anxiety in students at Bina Dharma Middle School, Jakarta. So it will reveal the relationship between children's self efficacy and their mathematics anxiety. So this research can be used as a reference to see, prove and help students by providing guidance and counseling services at school so they can handle teenagers who still have math anxiety due to teenagers' low self efficacy.

Method

This research is quantitative descriptive research on Bina Dharma Middle School students in Jakarta. The sample in this study amounted to 189 students (male = 57.1%; female = 42.9%), students in the research sample aged 12-15 years with married parent status = 78.6%; divorced 11.9%; parents die = 9.5%. Sampling used purposive sampling technique (non-probability sampling).

Participants

Population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by the researcher to be studied and then conclusions drawn (Nursilawati, 2013). Students of SMP Bina Dharma Jakarta were chosen by the researcher as the population in this study. The population referred to by the researcher is all students in Grades 7, 8, and 9 of SMP Bina Dharma Jakarta in the 2023/2024 academic year totaling 189 students.

Sampling Procedures

In selecting participants, then by taking samples from the population. A sample is a representative of the object to be studied which is part of the number and characteristics of the

object (Sugiyono, 2016). If the population is large, and researchers cannot study everything in the population, for example due to limited funds, manpower and time, then researchers can use samples taken from that population (Nurmi, 2016). The calculated results show that the sample in this study amounted to 189 students.

Materials and Apparatus

Data was collected through two questionnaires, including a self efficacy instrument that I adopted from (Nuhaliza, 2021) using theory (Bandura, 1997) with 14 items and a mathematics anxiety instrument developed from theory (Whyte et al., 2012) with 29 items. The questionnaire uses 4 points with a Likert scale model including answer choices: strongly agree, agree, disagree and strongly disagree. The instrument has been tested for validity with SPSS version 27 software. The results of SPSS analysis on the self efficacy instrument show that item reliability is 0.795 from 18 items to 14 valid items, so the items on the instrument that have been tested are declared reliable because they meet the prerequisite criteria for the reliability test, namely > 0.60 with the level of relationship being in the strong category, meaning that the instrument has good quality for measuring mathematics anxiety. The results of the SPSS analysis on the mathematics anxiety instrument showed that item reliability was 0.928 from 32 items to 29 valid items, so the items on the instrument that had been tested were declared reliable because they met the prerequisite criteria for the reliability test, namely > 0.60 with the level of relationship being in the very category. strong, meaning the instrument has good quality for measuring self efficacy.

Procedures

The materials and equipment used by researchers in conducting the research were using a mobile phone, then distributing questionnaires via Google Form. The independent variables were self-efficacy and the dependent variable was math anxiety. This study aims to see how the level of self-efficacy affects the level of math anxiety. The role of researchers during the research was to provide instructions on how to fill out the Google Form regarding attitude statements with the choices very appropriate, appropriate, inappropriate, and very inappropriate. Then what students did while filling out the Google Form was about themselves in behaving.

Design or Data Analysis

The method used in this study uses a quantitative approach with a correlational research type, so it uses the Pearson correlation statistical method to see the relationship between the level of self-efficacy and the level of mathematics anxiety.

Results and Discussions

Based on the distribution of a self efficacy questionnaire to 189 students at Bina Dharma Jakarta Middle School with 14 statement items, the lowest score was 22 and the highest score was 50 with an average of 38.13. This score is then used as a basis for determining the categorization of data on self efficacy which is presented in table 1.

Table 1. Description of Self Efficacy.

Interval Score	Category	Frequency	%
14 – 22	Very Low	1	0,8
23 – 30	Low	7	5,6
31 – 38	Currently	60	47,6
39 – 46	Tall	53	42,1
≥ 47	Very High	5	4,0

Based on the table above, it was found that 5 students (4%) were in the very high category, 53 students (42.1%) were in the high category, 60 students (47.6%) were in the medium category, 7 students (5.6%) is in the medium category, and 1 student (0.8%) is in the very low category. This means that the average student's self efficacy is in the medium category. This score is then used as the basis for determining the categorization of mathematics anxiety data which is presented in table 2.

Table 2. Description of Mathematics Anxiety.

Interval Score	Category	Frequency	%
32 – 51	Very Low	0	0
52 – 70	Low	35	27,8
71 – 89	Currently	67	53,2
90 – 108	Tall	23	18,3
≥ 109	Very High	1	0,8

Based on the table above, it was found that 1 student (0.8%) was in the very high category, 23 students (18.3%) in the high category, 67 students (53.2%) in the medium category, 35 students (27.8%) in the low category, and 0 students (0%) in the very low category. This means that the average student's mathematics anxiety is in the medium category. Using a valid instrument, a Pearson correlation analysis was carried out which aimed to determine the relationship between self efficacy and mathematics anxiety in students at Bina Dharma Middle School, Jakarta. Based on Pearson correlation analysis using SPSS 27 software, the following results were obtained:

Table 3. Pearson Correlation Results.

		Self Efficacy	Mathematics Anxiety
Self Efficacy	Pearson Correlation	1	-0,419**
	Sig. (2-tailed)		0,000
Mathematics Anxiety	Pearson Correlation	-0,419**	1
	Sig. (2-tailed)	0,000	

Based on the research correlation test, a correlation value of -0.419 was obtained with a significance of $0.000 < 0.05$, so it is known that there is a significant relationship between self efficacy and mathematics anxiety. According to the Guildfold scale found in (Sugiyono, 2016), the value -0.419 is between 0.40 - 0.599, this shows that the level of relationship between self efficacy and mathematics anxiety is moderate. The correlation value is negative, indicating that the higher the student's self efficacy (X), the lower the anxiety in the mathematics subject (Y) and vice versa, the lower the student's self efficacy (X), the higher the anxiety in the mathematics subject. (Y).

Based on the results of research at SMP Bina Dharma Jakarta obtained from the two variables which have been processed using the SPSS version 27 application for 189 respondents, the significance results obtained were $0.000 < 0.05$, which means that the two variables are

correlated or there is a relationship between self efficacy and mathematics anxiety. , which means H1 is accepted and H0 is rejected. The results of hypothesis testing using the Pearson correlation technique show a Sig. (2-tailed) value -0.419 for both variables. This implies that the hypothesis in this study has significance and shows a relationship between self efficacy and mathematics anxiety. When examining the dynamics of self efficacy and math anxiety, real differences between students' ages become apparent. The data revealed interesting changes that highlight the complex relationship between age, self efficacy, and math anxiety among students.

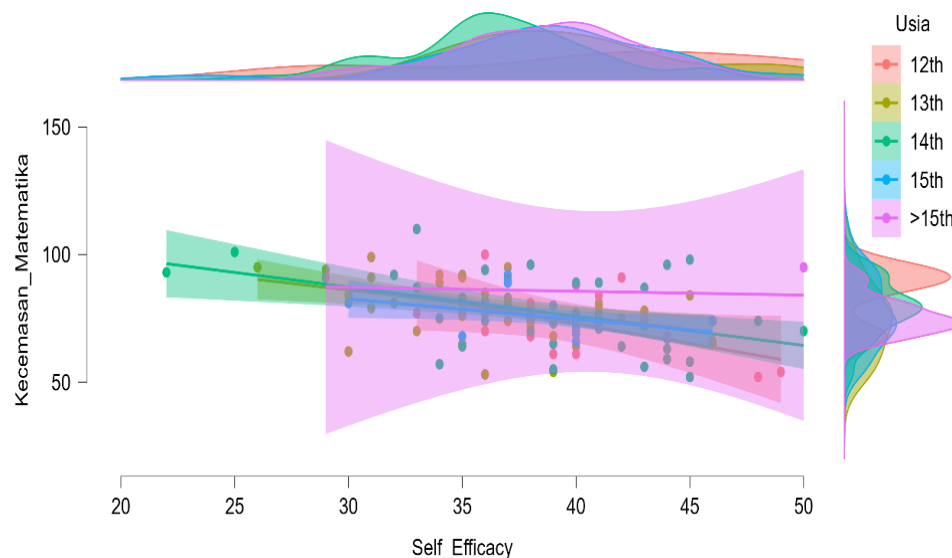


Figure 1. Self Efficacy – Math Anxiety Based on Age

This explanation emphasizes research findings that show a lack of differences in self efficacy and math anxiety scores among students. These findings indicate that, overall, students demonstrated similar and consistent levels of self efficacy and math anxiety within groups. The results of this research are supported by previous research journal research conducted by (Dastirah, 2014) namely "The Relationship between Self efficacy and Test Anxiety in Mathematics Subjects at SMKN 8 Jakarta". Based on the research results described in the journal, it can be concluded that there is a negative relationship between self efficacy and test anxiety in mathematics subjects. This means that the higher the self efficacy score, the lower the anxiety, and the lower the self efficacy score, the higher the anxiety.

For students, self-efficacy is very much needed in studying mathematics subjects, if you have self-efficacy you are able to achieve your goals and have confidence in yourself. Students who have self-efficacy in studying academic fields will gain knowledge and be able to improve their cognitive skills in completing their academic tasks. In accordance with Bandura (1997) opinion, good self-efficacy is characterized by high ability to complete tasks. The results of this research are also supported by research conducted by (Nursilawati, 2013) which explains that when a person's self efficacy is controlled, the influence of anxiety is reduced, so that individuals who have high self efficacy experience low anxiety. Individuals who have low self efficacy perceptions in overcoming threats result in high levels of anxiety in individuals. These results are in line with research conducted by (Auliya & Munasiah, 2016) entitled "The Relationship between Self efficacy, Mathematics Anxiety and Mathematical Understanding" which states that there is a positive relationship between self efficacy and mathematical understanding

abilities, then a negative relationship between mathematics anxiety and mathematical understanding abilities. and the negative relationship between self efficacy and mathematics anxiety. Research results from (Maryam, 2013) with the title "The Relationship between Self-efficacy and Anxiety Facing Mathematics Subjects in Bratan III State Elementary School Students, Surakarta" which explains that the correlation coefficient value obtained was -0.382 ; $p = 0.000$ ($p < 0.01$) meaning that there is a very significant negative relationship between self-efficacy and anxiety in facing mathematics subjects. In line with research from (Disai et al., 2017) entitled "The Influence of Mathematics Anxiety on Self-efficacy in Mathematics Lessons Viewed from Gender Differences in High School Students in Makassar City" states that the results of the research show that there is a negative influence of mathematics anxiety on students' self-efficacy with contribution of 5.0%, so it can be concluded that the higher the mathematics anxiety, the lower the self-efficacy and the results are that there is no difference in mathematics anxiety between male and female students. It can be concluded that during the school years students will face various kinds of difficulties that will be experienced in the learning process. Therefore, so that learning can run with good results, students must be able to face and overcome difficulties in the form of anxiety. This shows that for students self efficacy is very much needed in the learning process, if they have self efficacy they will be able to achieve their goals and have confidence in themselves. Students who have high self efficacy will not have feelings of anxiety and fear when the mathematics learning process takes place.

Conclusions

The existence of a significant and meaningful relationship between self efficacy and mathematics anxiety among Bina Dharma Middle School students in Jakarta has big implications. This is seen from the complex interaction between two important aspects, namely self efficacy and mathematics anxiety. Understanding the underlying mechanisms and causes of how self efficacy can contribute to math anxiety is critical. Future research could dig deeper into specific self efficacy attitudes that may exacerbate math anxiety, allowing for a deeper understanding of this relationship. Bina Dharma Jakarta Middle School can consider more effective treatment in order to overcome self efficacy attitudes towards anxiety in mathematics subjects. Based on the results of research and data analysis in this study, namely the relationship between self efficacy and mathematics anxiety in students at Bina Dharma Middle School, Jakarta, it was concluded that the results of the description of self efficacy data obtained that 5 students (4%) were in the very high category, 53 students (42.1 %) is in the high category, 60 students (47.6%) are in the medium category, 7 students (5.6%) are in the medium category, and 1 student (0.8%) is in the very low category. This means that the average student's self efficacy is in the medium category. Meanwhile, the results of the description of students' mathematics anxiety data obtained 1 student (0.8%) in the very high category, 23 students (18.3%) in the high category, 67 students (53.2%) in the medium category, 35 students (27, 8%) in the low category, and 0 students (0%) in the very low category. This means that the average student's mathematics anxiety is in the medium category.

The results of research data analysis and hypothesis testing described previously can be concluded that there is a significant relationship between self efficacy and mathematics anxiety. The r value obtained in this study shows that the significance of the correlation between self efficacy and mathematics anxiety is in the medium category. The effective contribution of self efficacy to mathematics anxiety is known to be 17.6% of mathematics anxiety. The results of the Pearson correlation are negative so it can be stated that an increase in students' self efficacy causes a decrease in mathematics anxiety.

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