



Systematic Literature Review: Pengaruh Kecemasan Matematika Terhadap Kemampuan Pemecahan Masalah Matematis
Systematic Literature Review: The Effect of Math Anxiety On Mathematical Problem-Solving Ability

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ABSTRAK

Dipublikasi

Salah satu faktor yang mempengaruhi kemampuan pemecahan masalah matematis adalah siswa tidak menyukai pelajaran matematika dan kurangnya kemampuan pemahaman konsep yang baik. Tujuan dari penelitian ini adalah menganalisis pengaruh kecemasan matematika terhadap kemampuan pemecahan masalah matematis siswa. Penelitian ini menggunakan SLR (*Systematic Literature Review*). SLR adalah metodologi penelitian yang mengumpulkan dan menganalisis penelitian sebelumnya yang berfokus pada topik yang dipilih. Hasil dari penelitian ini adalah pengaruh dari kecemasan matematika terhadap kemampuan pemecahan masalah bersifat negatif. Berdasarkan penelitian-penelitian yang direview dapat disimpulkan bahwa tingkat kecemasan matematika siswa tinggi, maka kemampuan pemecahan masalah yang dihasilkan menjadi rendah, begitu juga sebaliknya. Kemampuan pemecahan masalah sangat dipengaruhi oleh kecemasan matematika siswa.

Kata kunci: Systematic Literature Review, Kecemasan Matematika, Kemampuan Pemecahan Masalah

ABSTRACT

One of the factors that influence the ability to solve mathematical problems is that students do not like mathematics and lack the ability to understand concepts. The purpose of this study was to analyze the effect of math anxiety on students' mathematical problem solving abilities. This research uses SLR (Systematic Literature Review). A systematic literature review is a research methodology that collects and analyzes previous studies focusing on the chosen topic. The result of this study is that the effect of math anxiety on problem solving abilities is negative. Based on the studies reviewed, it can be concluded that the level of students' math anxiety is high, so the resulting problem-solving ability is low, and vice versa. Problem solving abilities are strongly influenced by students' math anxiety.

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Keywords: Systematic Literature Review, Math Anxiety, Problem-Solving Ability

INTRODUCTION

Education is a process of change in one's attitude and behavior to achieve self-maturity (Ihsan, 2019). One of them is in the process of improving problem-solving abilities. Problem-solving ability is an indicator of success in learning mathematics (Septian et al., 2022). Problem-solving is a crucial cognitive ability and must be owned by every student (Fauziah et al., 2021). Problem-solving skills are essential because students can apply the knowledge and skills gained from the process of learning to apply to everyday life. Problem-solving abilities are attempts by students to use skills and knowledge to solve mathematical problems (Davita & Pujiastuti, 2020). So Problem-solving abilities are essential and must be trained by doing problem-solving activities.

The ability to solve problems that are considered necessary has not been able to be owned by most students in Indonesia. The survey *Program for International Student Assessment (PISA)* in 2018 assessed 600 000 students aged 15 years from 79 countries. Indonesia is ranked at seven from the bottom, 73 out of 79 countries, with an average score of 379 (PISA, 2018). It means that students' ability in Indonesia to solve problems is still deficient.

Some factors that influence students' problem-solving abilities are still low, one of which is that students do not like the subject of mathematics (Lestari et al., 2020). Students still feel the notion that math is a tough and scary lesson. Fear of math lessons will cause anxiety for the student. This anxiety is called mathematics anxiety (*Math Anxiety*). Anxiety is a situation that a person feels is unpleasant, accompanied by physical sensations that alert people to imminent danger (Lestari et al., 2020). Math anxiety is an adverse emotional reaction to mathematics that interferes with the ability to do mathematics (Carey et al., 2019). Anxiety-level mathematics has a negative impact on students' mathematical problem-solving abilities, meaning that the higher the level of math anxiety, the lower the problem-solving ability that students have, and it applies vice versa (Lestari et al., 2020). Anxiety with low intensity can provide positive value in the form of enthusiasm or encouragement to improve

deficiencies, but when the intensity is high and negative, anxiety can cause harm and interfere with a person's physical and psychological state (Ikhsan, 2019). Math anxiety makes students depressed during learning math. It makes students being unable to accept and understand the lesson well. The next thing that happened was that the students' solving abilities could not develop, and ultimately, learning outcomes were not good. From this statement, it can be surmised that math anxiety relates to problem-solving ability. Based on this background, this research aims to analyze how math anxiety influences students' problem-solving abilities (Awa Rosi & Gumiandari, 2021).

RESEARCH METHODS

This study uses the *Systematic Literature Review (SLR)* method. A *systematic Literature Review (SLR)* is a research methodology that collects and analyzes previous studies focusing on the chosen topic. The researcher examines, identifies, evaluates, analyzes, and performs several existing research. In this way, the researcher systematically reviews and identifies journals that follow the steps set in each process.

Next, the researcher looked for journal articles using the keyword the effect of math anxiety on students' problem-solving abilities. Document search implemented through the google scholar database assisted by the Publish or Perish application. The researcher's investigation turned up dozens of articles that generally came close to what had become research purposes. Restrictions on the search for journal articles are necessary due to the focus on research results so that the purpose of this study will be discussed in detail and entirely.

After the search is complete, the researcher evaluates the document search results. 20 journal articles fall into the researcher's classification. The researcher selected this article based on specific criteria. Some Literature criteria are (1) literature, especially aspects of anxiety and problem-solving, (2) journal article literature published from 2018 to 2022, and (3) journal article literature published indexed at least Sinta. Articles selected based on these criteria will help provide information and evidence about the

RESULT AND DISCUSSION

The research data included in this literature review summarizes literature articles related to math anxiety and problem-solving abilities. Twenty journal articles fall into the researcher's classification. The researcher divided twenty articles into two tables. In particular, the following table references sources of articles on the effects of anxiety mathematics on problem-solving and various other cognitive abilities.

Table I. Article Reference Sources

No	Focus	Source
1	Effects of Math Anxiety of Various Capabilities Cognitive	Mustamin Anggo (2019); Shinta Dwi Handayani (2019); Lutfia Fitriyani, Asih Miatun (2020); Annisa Juliyanti, Heni Pujiastuti (2020); Nur Hajarus Afiatman, Hafiludin S., Novita Ririk (2022); Sella Tanzila, Haryati Ahda Nasution (2022); Sandra Nindiani Suci dan Asih Miatun (2022); Marweli, Sowanto, B. Erdiansyah (2022); Cindy Maharani, Yuan Andiny, & Witri Indah Lestari (2022); Novila Muhsana, Hafsa Adha Diana (2022).
2	Effect of Math Anxiety on Problem-Solving Ability	Putri Tiya Fitri Agustin, dan Setyo Hartanto (2018); Fajar Riski, Indiana Marethi, dan Isna Rafianti (2019); Wahyu Hidayat dan Delifya B. Ayudia (2019); Lutfiyah, Ettie Rukmigarsari dan Abdul Halim Fathani (2019); Hesti Lestari, Rozi Fitriza, dan Halen A (2020); Ika Septiarini, Nila Kesumawati dan Jumroh (2020); Siti Nurul Afifah, Abdul Fatah dan Isna Rafianti (2020); Hanuri Sakarti (2018); Eka Ritma Ardani, Sujiran, dan Dian Ratna Puspananda (2021); Fauziah Apriyani dan Adi Ihsan Imami (2022).

Math anxiety

Math anxiety is an emotional symptom that causes discomfort, worry, fear, anxiety, and unpleasantness about something (Lestari et al., 2020). Anxiety refers to an individual's disposition to react with suspicion, disturbing thoughts, mental disorganization, tension, and physiological arousal when confronted with an evaluative context or situation (Saputra, 2020). Math anxiety is feelings of stress and even fear that can interfere with math performance.

Factors causing mathematics anxiety in students were put forward by Trujillo & Hadfield as follows; personality factors include fear of one's abilities and lack of confidence. Social environmental factors include the coercion of parents on their children to be able to be good at math, teachers in the classroom that seems scary, and methods of teaching by unattractive teachers. Intellectual or psychological factors include the level of students' thinking skills and talents.

There are several indicators for measuring the level of math anxiety. Indicators of math anxiety in this study were formulated by Suharyadi (Satriyani, 2016) and will use as a reference for measuring instruments of mathematical anxiety, as follows:

Table II. Indicators of Mathematical Anxiety

Emergency Factor	Indicator
Cognitive (thinking)	Self-ability, self-confidence, difficulty concentrating, fear of failure
Affective (Attitude)	Nervous, displeased, restless
Physiological (Physical condition reaction)	Nausea, cold sweats, palpitations, headaches

Each student's math anxiety level is different. But math lessons become a frightening specter for students. Mathematics lessons are viewed as a complicated science to master. A *mindset* like that starts with negative thoughts that eventually become a reality in students.

Several things cause mathematics lessons to be feared by students, namely 1) Mathematics is a specific branch of science. 2) Many people consider mathematics a tough lesson. 3) Mathematics is a monotonous subject. Teacher lack innovation in learning models. With so, students' ability is less explored

because they tend to be afraid of math lessons and their teachers.

After knowing the level of students' math anxiety and the factors that make math lessons feared, teachers must provide solutions to problems that students experience. The solutions aim to reduce or even eliminate their anxiety while learning mathematics. The solution offered by Freedman in overcoming math anxiety are 1) eliminating negative (pessimistic) self-talk; 2) applying questions during the process of learning mathematics; 3) assuming that mathematics is a foreign language that must always be practiced; 4) do not rely on learning mathematics rote; 5) often read math books; 6) have their learning method; 7) if experiencing difficulties, then immediately ask for help from friends or teachers to explain; 8) during the process of learning mathematics try to stay relaxed and comfortable; 9) say that math "easy" and everyone can master it; 10) continuously develop responsibility if the result is still failing and even has succeeded (Septiarini et al., 2020).

Problem-solving skill

Mathematical problems are math problems given to students in the form of questions that are not routine and are also completed by students using non-routine algorithms. Mathematical problem-solving abilities aim to build knowledge of new mathematics, because it starts with a problem, students can think more deeply about it and solve it (Lestari et al., 2020). Problem-solving is the ability to apply knowledge already owned by someone into a state that is still new and unknown (Dewi et al., 2019). So, problem-solving ability is an important thing both in the school environment as well as in everyday life.

Polya identified four basic principles in problem-solving; understanding the problem, devising a plan, carrying out the plan, and looking back. The first phase is to understand the problem. Understanding the problem is very important because without understanding the problem, students may not be able to solve the problem properly. After students can understand the problem correctly, then they must be able to devise a problem-solving plan. The ability to design this plan depends heavily on their problem-

solving experience. The more experience they have in solving problems, the more creative they are expected to be in developing a plan to solve a problem. After drawing up a settlement plan problem, then problem-solving is done according to the plan that has been made. And the last step of the problem-solving process is to check what has been done. This way, errors can be minimized to the most appropriate answer (Son & Fatimah, 2020)

Obstacles for students in the aspect of problem-solving abilities are students often experience obstacles in understanding the problem so that it is less precise in choosing and using a settlement strategy. To be accurate and effective in problem-solving activities, develop an indicator or steps to solve the problem. According to Santrockstep, what must be done so that the problem-solving process is effective are: 1) students must compose first the problem found and disclose information from a given problem; 2) students develop strategies in solving problems; 3) students give an evaluation for the solutions given; 4) students always identify problems and solutions return.

The Effect of Mathematical Anxiety on Mathematical Problem-Solving Ability

Math anxiety is an emotional symptom that causes discomfort, worry, fear, anxiety, and unpleasantness about something (Lestari et al., 2020). Problem-solving abilities in students are affected by math anxiety. In solving problems or questions, students are anxious, nervous, and in a hurry, so the score results are ultimately unsatisfactory. Another opinion is that math anxiety is not only influential when students work on questions but also, at the beginning of learning, students already feel anxious, nervous, and afraid of math lessons.

Math anxiety has a negative effect on students' mathematical problem-solving ability. One of the causes of the negative influence is assumed that students with math anxiety tend to be afraid to solve problems outside of procedure in general. In addition, students who have math anxiety tend to be difficult to find ideas to solve problems. Thus, students who have high anxiety will tend to solve the problem in accordance with the procedure or not will finish it at all, so the student becomes weak in retrieval decisions during the process of solving the problems they experience. A negative

relationship between math anxiety and mathematical problem-solving ability means that with a high level of anxiety, the level of problem-solving ability is low, and vice versa. If the level of anxiety is low, then the problem-solving ability is getting higher, based on (Aunurrofiq & Junaedi, 2017). From the description above, it can be concluded that anxiety negatively influences the ability to solve math problems.

In the research article above, information was obtained that math anxiety affects several cognitive abilities. Math anxiety affects the students' critical thinking skills, conceptual understanding, reasoning, and learning outcomes. From the research data obtained, math anxiety negatively affects critical thinking skills, conceptual understanding, reasoning, and student learning outcomes. If the student is at the highest level of math anxiety, then the student has low cognitive abilities. Previous researchers have extensively researched the effect of math anxiety on results learning. The result, among other things, is math anxiety's effect on learning outcomes of 26.90%, 61%, up to 79.4%. So students must be able to control their math anxiety because it has a terrible impact on learning outcomes. Students with high anxiety levels show that the learning outcomes obtained are low and vice versa. Students with low anxiety levels will get higher learning outcomes than those with high anxiety.

According to research data, math anxiety has effects starting from 13 %, 21%; 24.56%; 31.9%; 42.9%; 57.1% to 86.3% towards problem-solving ability. It shows that math anxiety significantly influences students' problem-solving abilities. Then the influence produced by anxiety mathematics is negative. It means if the students' math anxiety increases, the student's problem-solving ability becomes low. So is conversely, out of 10 journal articles relating to the effect of math anxiety on problem-solving abilities, all of which result in the conclusion that if the level of anxiety high in mathematics, then the ability to solve the problem will be low. So the relationship between the two is a value-reversal relationship. Therefore it is necessary to control math anxiety. Students must learn to face problems and feel calmer and focused so that the resulting concentration will be maximum.

The level of anxiety and stages of problem-solving ability, in general, can be described as follows. Students with high anxiety level categories cannot fulfill problem-solving indicators. At the stage of understanding the problem, students with high anxiety only know at a glance without trying to read or understand the problem again. Hence, it tends to be imperfect when interpreting the questions. Next is devising a plan. Students only describe as much as possible and are still ambiguous in compiling settlement plans. The plans made tend not to lead to problem-solving. At the stage of carrying out the plans, students with this category cannot solve problems because indeed at the previous stage they were not able to plan a settlement with good. The last is the stage of looking back, students with the high anxiety category did not carry out the checking stage again because, in the previous stage, it was already difficult to work on and get the answers to the questions.

Next are students with moderate anxiety level category. In understanding the problem, students with moderate anxiety levels can already interpret the questions, thought's not perfect. Then at the stage of devising a plan, students with moderate levels can describe better than students with the high anxiety category and write more clear step details. Students with moderate levels of math anxiety tend to be able to plan a solution well. The next stage is carrying out the plans. Students with moderate anxiety tend to experience difficulties, although they can finally work on the question. The last stage is looking back, students tend to be inconsistent in re-checking their answers. They are not thorough in double-checking or even not double-checking answers to what they got.

Next are students with low anxiety level category. Students by category with low levels of anxiety can implement problem-solving based on Polya. Students can interpret the problem correctly and perfectly at the understanding stage. Then at the stage of devising a plan, students can develop a settlement plan that is right well. At the problem-solving stage, students with low anxiety can carry out plans prepared in the previous stage with the correct procedural steps. Finally, students re-check their answers to avoid oversight mistakes in answering questions. Students with low levels of math anxiety can carry out the level of re-checking activities carefully and well.

The results showed differences in problem-solving abilities between students with low, medium, and high mathematics anxiety, where the math problem-solving ability of students with low anxiety is higher than the problem-solving ability of students with moderate anxiety. Solving ability the math problems of students with low anxiety are higher than students with high anxiety. The problem-solving abilities of students with moderate anxiety were also higher than the problem-solving ability of high-anxiety students.

Students with high math anxiety levels tend to be afraid of facing math problems, avoid when asked to solve problems, and are not passionate about learning. In the class, students with high anxiety are usually restless and afraid. Students feel unable or do not understand the material presented by the teacher. Students with high anxiety feel anxious when appointed to come forward to solve the questions on the blackboard. When faced with a mathematics problem, students with high anxiety tend to comment that the test questions are difficult, even though they haven't seen the overall test. While working on the questions, many students with high anxiety take deep breaths, massage their foreheads, give stare tired, moan, frown, pace to the toilet, and scribble on paper, but no is the solution to the given test.

Students with moderate math anxiety sometimes feel anxious and restless but also feel calm and enjoy the learning atmosphere. This is influenced by the ability of students in over matter. If the material is easy and students are able to master it, students will tend to relax during the learning process. But if the material gets too difficult, students tend to get anxious and restless.

Students with low anxiety levels tend to be able to understand the material teacher conveys. Students with low anxiety levels are calmer and enjoy the atmosphere study in class. They can enjoy learning because they are able to understand the material teacher conveyed. Students with low anxiety levels tend to have abilities good conceptual understanding of the material taught by the teacher. By understanding the material first, things like anxiety can be avoided, so the ability to solve problems can be developed. Things to note in order to have the ability to understand the material is that students first study the material to be taught.

From the description above, it can be seen that the ability to solve problems is greatly influenced by math anxiety. Some of the causes of math anxiety are because students do not like math lessons and are less able to understand the concept of the material to be delivered. So the teacher must create the best possible learning atmosphere for students to feel relaxed and not tense to reduce anxiety when learning mathematics. Teachers must also build students' ability to understand the material. Teachers are expected to bring lessons as attractive as possible and easy to understand to reduce student difficulties in their studies. Likewise, students should be able to control the anxiety that is in them so that they can improve their problem-solving abilities. Students also need to be more prepared to receive the material the teacher will teach.

CONCLUSION

Math anxiety has a negative effect on students' mathematical problem-solving ability. Even math anxiety also has a negative effect on critical thinking skills, conceptual understanding, reasoning, and student learning outcomes themselves. Mathematical anxiety and mathematical problem-solving ability have a negative relationship which means if the level of anxiety is high, then the level of problem-solving ability is low, and conversely, if the level of anxiety is low, then the level of problem-solving ability is increasing tall. Some of the causes of math anxiety are because students don't like mathematics lessons and they are less able to understand the concept of the presented material. So the teacher must create the best possible learning atmosphere so that students feel relaxed and not tense. The teacher must also be able to build students' ability to understand the material. Likewise, students should be able to control their anxiety to improve their problem-solving ability. Students also need to be more prepared to receive the material the teacher will teach.

REFERENCES

- Aunurrofiq, M., & Junaedi, I. (2017). Kecemasan Matematik Siswa dalam Menyelesaikan Soal-Soal Pemecahan Masalah. *UJMER: Unnes Journal of Mathematics Education Research*, 6(2), 157–166.
- Awa Rosi, Q., & Gumiandari, S. (2021). Penerapan

- Model Pembelajaran Tutor Sebaya Pada Mata Pelajaran Bahasa Inggris Melalui Pendekatan Andragogi Di Lingkungan SMAN 1 Jatiwangi. *Pedagogik: Jurnal Pendidikan*, 16(1), 45–54. <https://doi.org/10.33084/pedagogik.v16i1.1865>
- Carey, E., Devine, A., Hill, F., Dowker, A., Mclellan, R., & Szucs, D. (2019). Understanding Mathematics Anxiety; Investigating the experiences of UK primary and secondary school students. *Understanding Mathematics Anxiety; Investigating the Experiences of UK Primary and Secondary School Students*, 1(March), 63.
- Davita, P. W. C., & Pujiastuti, H. (2020). Analisis Kemampuan Pemecahan Masalah Matematika Ditinjau Dari Gender. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 11(1), 110–117. <https://doi.org/10.15294/kreano.v11i1.23601>
- Dewi, N. P. R., Ardana, I. M., & Sariyasa, S. (2019). Efektivitas Model ICARE Berbantuan Geogebra Untuk Meningkatkan Kemampuan Pemecahan Masalah Matematis Siswa. *JNPM (Jurnal Nasional Pendidikan Matematika)*, 3(1), 109. <https://doi.org/10.33603/jnpm.v3i1.1762>
- Fauziah, S., Mulyana, E. H., & Mulyadi, S. (2021). Permainan Sains Problem-Solving Cardboard Box Lego dan Kreativitas Anak Usia Dini. *Edusia: Jurnal Ilmiah Pendidikan Asia*, 1(1), 86–92. <https://doi.org/10.53754/edusia.v1i1.48>
- Ihsan, N. (2019). *TUNAS Efforts To Improve Ipa Learning Outcomes Using Collaboration Problem Solving Method With Experimental Methods In Grade III Students In Islamic*. 1–6.
- Ikhsan, M. (2019). Pengaruh Kecemasan Matematis Terhadap Hasil Belajar Matematika. *De Fermat: Jurnal Pendidikan Matematika*, 2(1), 1–6. <https://doi.org/10.36277/deferemat.v2i1.28>
- Lestari, H., Fitriza, R., & A, H. (2020). PENGARUH KECEMASAN MATEMATIKA (MATHEMATICS ANXIETY) TERHADAP KEMAMPUAN PEMECAHAN MASALAH PESERTA DIDIK KELAS VII MTs. *Math Educa Journal*, 4(1), 103–113. <https://doi.org/10.15548/mej.v4i1.1325>
- Saputra, T. A. (2020). *Jurnal Bimbingan dan Konseling. Bentuk Kecemasan Dan Resiliensi Mahasiswa Pascasarjana Aceh-Yogyakarta Dalam Menghadapi Pandemi Covid-19*, 6(1), 55–61.
- Satriyani. (2016). Pengaruh Kecemasan Matematika (Mathematics Anxiety) Dan Gender Terhadap Kemampuan Pemecahan Permasalahan Matematika. (*Universitas Islam Negeri Syarif Hidayatullah Jakarta*), 156.
- Septian, A., Widodo, S. A., Afifah, I. N., Nisa, D. Z., Putri, N. P. K., Tyas, M. D., Nisa, R. H., & Andriani, A. (2022). Mathematical Problem Solving Ability in Indonesia. *Journal of Instructional Mathematics*, 3(1), 16–25. <https://doi.org/10.37640/jim.v3i1.1223>
- Septiarini, I., Kesumawati, N., & Jumroh, J. (2020). Pengaruh Kecemasan Matematika Terhadap Kemampuan Pemecahan Masalah Matematis Siswa Smp Negeri Se-Kecamatan Banyuasin. *Journal of Mathematics Science and Education*, 3(1), 8–16. <https://doi.org/10.31540/jmse.v3i1.951>
- Son, A. L., & Fatimah, S. (2020). *Students ' Mathematical Problem -Solving Ability Based*. 11(2), 209–222.