JURNAL EDUSCIENCE (JES)
p-ISSN : 2303 - 355X | e-ISSN : 2685 - 2217
PUBLISHED BY : LPPM of UNIVERSITAS LABUHANBATU

Break the Myth, Grow the Math Mindset: A Systematic Literature Review

Priarti Megawanti[1], Heri Retnawati[2], Ray Wagiu Basrowi[3], Putri Rahmadani[4]

[1]Department of Mathematics Education, Universitas Indraprasta PGRI, Indonesia
[2]Department of Educational Research and Evaluation, Universitas Negeri Yogyakarta, Indonesia
[3]Indonesia Health Development Center, Indonesia
[3]Department of Community Medicine, Universitas Indonesia, Indonesia
[4]Varians Statistik Kesehatan, Indonesia
*Email: priartimegawanti@gmail.com

ARTICLE INFO

Keywords:
Mathematical mindset
Fixed math mindset
Growth math mindset
Math myth

ABSTRACT

Purpose – This article aims to examine the factors that influence and inhibit a math mindset and how to develop it. Some people still believe in several myths that mathematical intelligence is innate and only suitable for men. This myth not only fosters math anxiety but also hinders the growth of students' mindsets and the achievement of students' academic goals.

Methodology – The method employed is a Systematic Literature Review (SLR) adhering to the PRISMA 2020 guidelines. After carrying out a search process using Publish or Perish for articles indexed by Scopus, 72 articles were obtained as the final result of several selection stages. These articles were reviewed one by one, allowing us to answer the Research Question (RQ) of this study.

Findings – The results indicate that two factors contribute to a math mindset, namely internal and external. Meanwhile, factors inhibiting a math mindset include math anxiety, family, and educators, as well as several other factors. Family and educators play important roles in debunking myths and fostering a growth mindset in math.

Contribution – The results of this study contribute to the efforts of the government, teachers, and parents in promoting the development of the mathematical mindset in children and students. By understanding that mathematical intelligence can be mastered by everyone without exception, the government, teachers, and parents can jointly implement a curriculum that emphasizes the importance of the learning process rather than the results.

Received 13 May 2025; Received in revised form 20 May 2025; Accepted 18 November 2025
Jurnal Eduscience (JES) Volume 12 No. 6 (2025)
Available online 30 December 2025

INTRODUCTION

Mathematics or math is important in everyday life (Boaler, 2016; Su et al., 2021). Humans need mathematics to solve problems in their daily lives. Mathematics is learned through play, starting in playgrounds and kindergarten, continuing through high school, and even university. Unfortunately, some students perceive mathematics as an abstract and complicated subject (Chestnut et al., 2018; Lucini & Boltz, 2023), and they believe it does not correlate with reality (Lucini & Boltz, 2023).

Although math can help solve problems, for some students, math is the problem itself. Students' lack of interest in mathematics at school is exacerbated by several myths about mathematics, one of which is the myth that mathematics is more identified as a masculine science; on the other hand, women and minority groups tend to be considered to lack brilliance in mathematics (Chestnut et al., 2018; Moore, 2018). This stereotype suggests that men tend to master mathematics more easily than women (Moore, 2018; Y. Song et al., 2022). This stereotype can reduce women's motivation to pursue careers in the fields of Science, Technology, Engineering, and Mathematics (STEM) (Degol et al., 2018). Some marginalized groups are also considered to have more difficulty understanding mathematics than white men. In this era of rapid technological advancement, everyone should have an equal right to education and mastery in any field. However, in mathematics, stereotypical distinctions based on gender and skin color still exist.

Besides gender stereotypes, mathematics is also believed to be a science that can be mastered by just "math person" (Anderson et al., 2018; Boaler, 2016; Chestnut et al., 2018; Moore, 2018; Petherbridge, 2020). There is a widespread idea that math intelligence is innate (Heyder et al., 2020). Some people believe that mathematical genius is something that is inherited, not the result of hard work. These things then become a justification: if students cannot do mathematics problems, then they are not talented (Dweck, 2022a). In fact, in the learning process, a person will certainly experience failure. However, some people understand that those with natural mathematical intelligence will never experience failure. It is what makes mathematics the discipline in which fixed mindset beliefs are most prevalent in the general public (Campbell et al., 2021). Nevertheless, mathematics is needed in everyday life, so every student is expected to be able to master it (Petherbridge, 2020).

Reflecting on the case of Indonesia, as one of the countries that has participated in PISA for several periods, Indonesian students' mathematical abilities still need to be improved. Moreover, when linked to mindset, the 2018 PISA results for Indonesia and several other countries, such as the Philippines, Panama, Thailand, the Dominican Republic, and Argentina, showed that students have a fixed mindset (Sugandi, 2023). This means that many Indonesian students still believe intelligence is something fixed, rather than the result of effort or hard work (Supartono, 2021). For example, the results of research by Saefudin et al. (2023) in Indonesia showed that students often assume their mathematical intelligence is challenging to change or doubt that active and diligent learning activities can improve it.

In studying mathematics, students need a mindset that fosters motivation and persistence in learning (Aditomo, 2015; Bui et al., 2023; Hoeve et al., 2019; Lovin et al., 2021). A mathematical mindset refers to the way people who study mathematics approach and understand it (Rahmah, 2018). The mathematical mindset can have a broad meaning, extending beyond mathematics lessons to encompass numbers, simple calculations, or events in the universe that involve mathematical logic (Boaler, 2016). It is an implicit explanation of the adaptability and stability of human qualities associated with mathematical skill, intellect, and talent (Saefudin, Wijaya, Dwiningrum, et al., 2023).

In daily life, some people often see hard work as clear evidence that someone is talentless (Dweck, 2022a). Some people believe that talented people do not need to work hard (Chestnut et al., 2018). Many people believe that geniuses and talented individuals are endowed with special abilities that not everyone possesses, particularly in mathematics. They view mathematical intelligence as a permanent and genetically inherited ability (Mills & Mills, 2018; Rammstedt et al., 2021; Saefudin, Wijaya, Dwiningrum, et al., 2023). They will tend to choose math problems that they can do and avoid challenges that can make them look stupid (Ayebo & Mrutu, 2019; Dweck, 2022b; Saefudin, Wijaya, Dwiningrum, et al., 2023). This kind of thinking has become

known as a fixed math mindset (Daly et al., 2019).

Someone with a fixed mindset is afraid of being seen as stupid when asking questions or failing an exam (Dweck, 2022a). Educators and parents with a fixed mindset will treat students who are math geniuses differently from those who are not (Heyder et al., 2020; Ramirez et al., 2018). They will judge by speed and results, not by the time it takes students to complete the process (Cutler, 2020). They often develop math anxiety, demotivation to learn, and unhealthy competition in class (Boaler, 2016; Dweck, 2022b). Students with a fixed math mindset tend to reject criticism from others and view failure as evidence that they are not talented (Mills & Mills, 2018; Saefudin, Wijaya, Dwiningrum, et al., 2023). They prefer praise for their abilities and consider math grades to be a representation of actual abilities.

Meanwhile, educators with a fixed mindset tend to take all criticism to heart, making it difficult for them to rise above their mistakes and learn from them (Meierdirk & Fleischer, 2022). What then becomes concerning is when some parents and educators believe that children who are weak in math from the start have no hope for the future. A child who is bad at math will always be considered stupid. Meanwhile, a child who excels in math will be considered a genius and infallible. However, failure and mistakes are an inseparable part of the learning process.

Someone who enjoys challenges and views mistakes in learning mathematics as an opportunity to continue learning believes that intelligence can be developed (Cutler, 2020; Francome & Hewitt, 2020). They believe that mathematical intelligence can be mastered with hard work (Dweck, 2022b; Mills & Mills, 2018). When they get complex math problems, they do not give up easily and keep trying to find the answer (Shen et al., 2016). The nerves in the brain will increase as a person makes mistakes, thinks, and learns more often (Boaler, 2016).

The idea that math ability is malleable is also referred to as the growth mindset in math (Daly et al., 2019; Kim et al., 2021). Good mathematics educators tend to have a growth mindset (Meierdirk & Fleischer, 2022). They are open to accepting students' shortcomings and mistakes. They tend to have high standards for student achievement while also helping students achieve them (Dweck, 2022a). They want to listen to their students instead of immediately judging them as failures (Meierdirk & Fleischer, 2022). They teach that correcting mistakes is the best way to become an expert. These educators will encourage students to ask numerous questions and experience failure, which is not something to be ashamed of (Stohlmann, 2022).

Based on the explanation above, several research gaps remain unaddressed, including the factors that influence a person's mathematical mindset, the factors that hinder its growth, and the methods for developing a mathematical mindset. Therefore, this article aims to answer several Research Questions (RQs) systematically. There will be three RQs discussed, i.e., RQ1. What factors can influence a mathematical mindset? RQ2. What factors can hinder the growth of a mathematical mindset? and RQ3. How do people develop a mathematical mindset?

METHODOLOGY

Research Design

This research uses the SLR method. A literature review itself is an analysis and search of the published literature on a particular issue, presenting the state of the art based on prior research and providing an overview of the strengths and weaknesses of the area of interest (Marcos-Pablos & García-Peñalvo, 2018). Meanwhile, SLR aims to obtain information about a topic from published articles, where several selection procedures must have been carried out (Parums, 2021). SLR enables researchers to review accessible references, providing a broad overview while also offering specifics related to the research question. Broadly, this means that references reviewed can be from anywhere in the world, provided they are in English and are open-access. Specifically, this means that, based on the numerous references obtained, researchers can examine the research question they are interested in in detail.

Data Analysis

This literature review research refers to the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) 2020 guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), 2020). The stages carried out include determining search keywords, preparing research questions (RQ), searching for literature, selecting criteria, developing a data extraction strategy, quality assessment (QA), and data analysis (Suryanti & Megawanti, 2022; Wolor et al., 2021). Article QA in this study refers to the title, abstract, and content of the article that can answer the RQ. Therefore, all articles that pass QA can be used for data analysis.

Data Collection

There are no participants in the SLR method. The data used are secondary data derived from various articles. In SLR, it is crucial to determine the right keywords to find the right article (Marcos-Pablos & García-Peñalvo, 2018). Articles were collected with the help of Publish or Perish, based on Scopus and PubMed indexes, to identify articles with a good reputation and a Digital Object Identifier (DOI). It takes several searches to find articles that discuss the concept of the "mathematical mindset" (Table 1). The first search was conducted by entering the keywords "math" in the title words column and "mindset" in the keyword column. It is to retrieve articles that discuss the mindset, including those with "math" in the title. The first and the second were carried out by entering the math mindset in the title words section. However, the results are not all articles that discuss math and mindset. Some articles discuss math, and others discuss mindset. Therefore, a third search was carried out by adding double quotation marks and brackets to narrow the search focus (Ajie, 2015). In the fourth search, the title words column was entered ("math mindset") by adding double quotation marks and brackets to ensure that the articles found included the two words sequentially (Marcos-Pablos & García-Peñalvo, 2018). Search fifth by typing ("mathematical mindset") in the title words column, and in the sixth search, the words ("mathematical mindset") were typed in the keyword column. In the seventh and eighth searches, use the Boolean AND code on keywords, because it found zero articles on the title words.

Table 1. Search Process on the Scopus database

Search	Index	Employed String	Number of results*
1st	Scopus	Title words: math; keywords: mindset	77
2nd	Scopus	Title words: math mindset	37
3rd	Scopus	Title words: ("math mindset")	7
4th	Scopus	Keywords: ("math mindset")	12
5th	Scopus	Title words: ("mathematical mindset")	17
6th	Scopus	Keywords: ("mathematical mindset")	32
7th	Scopus	Keywords: math AND mindset	200
8th	PubMed	Keywords: math AND mindset	41
Total			423

* Publish or Perish result

After going through the search process several times, the article metadata was saved in an Excel file, and duplicates were eliminated. Articles that are deemed duplicates share the same title and author. There were 241 duplicate articles, so 182 articles were removed from the 423 total. Articles were selected based on the type of publication. Since several journals closely scrutinize references with a DOI, this research analyzed only journal articles, proceedings, and book chapters that had a DOI. There were 26 articles in the form of data and reviews, as well as articles that lacked a DOI, which had to be excluded. Following the article type selection process, a data extraction strategy is implemented (Suryanti & Megawanti, 2022). After that, the articles were eliminated based on whether they had titles and abstracts related to the math mindset. Articles that do not provide information regarding RQ will be eliminated. Eighty-four articles had to be eliminated because their

titles and abstracts did not match the topic being analyzed. The final stage of this research method involves data analysis based on article search results, as per RQ1, RQ2, and RQ3. Based on the results of the data extraction strategy, 72 articles were obtained. After carrying out the data extraction strategy, a quality assessment was carried out to determine whether the 72 articles could answer each RQ. The flow of the steps is illustrated in Fig. 1.

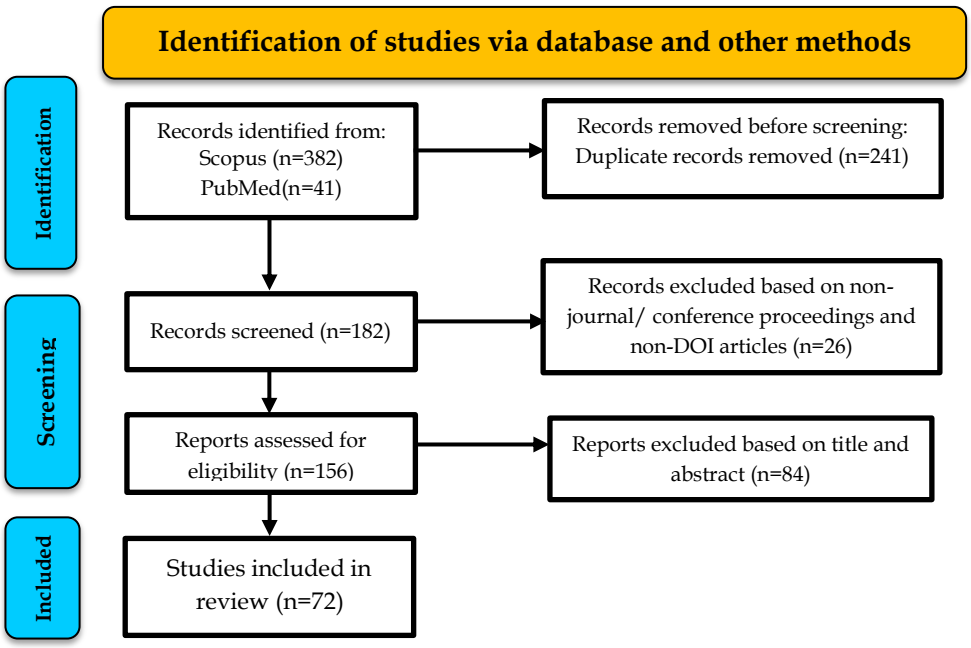

Figure 1. Step of the SLR Process based on PRISMA 2022 Flow Diagram

FINDINGS

In the search process, there is no limit to the search year. This is to determine from which year articles related to the mathematical mindset began to be published. The results obtained (Figure 2) show that the first published articles about the mathematical mindset were in 2016. Before 2016, no articles related to a mathematical mindset were found. No publications were found in 2017; however, publications about the mathematical mindset began to increase in 2021. As shown in Figure 2, recent publications on mathematical mindset have begun to increase. This means that not only are abilities to be pursued, but also the belief that everyone can master mathematics is an important concept that educators and students must hold.

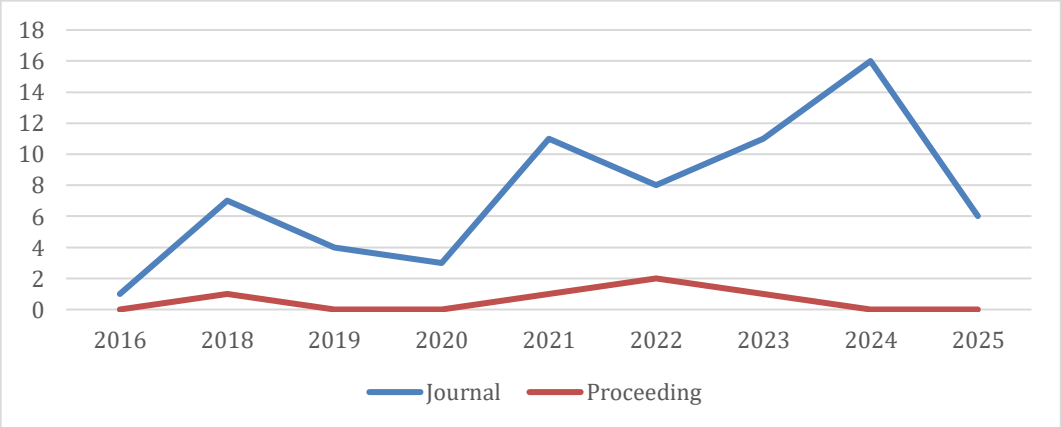

Figure 2. Search Results and Data Classification

Next, we will discuss the findings from the included articles that successfully advanced to the final stage of several selection processes. As previously explained, there are three RQs in this study.

RQ1: Factors that Influence Mathematical Mindset

RQ1 focuses on what factors influence a person's mathematical mindset. Based on a literature review of 72 articles, factors influencing the development of a mathematical mindset in individuals can be identified. In general, the factors that influence a person's mathematical mindset are categorized into two main groups: internal and external (Table 3). Internal factors include beliefs about mathematical intelligence, metacognitive ability, resilience, attitude toward responding to mistakes and criticism, and persistence. Meanwhile, external factors include support from family, educators, supervisors of preservice math teachers, and friends.

Beliefs are implicit thoughts that result in a person's behavior (Schwitzgebel, 2023). Dweck (Dweck, 2022b) explained that there are two theories regarding belief: the incremental theory and the entity theory. Incremental beliefs refer to the idea that mindsets are malleable, while entity theories believe that intelligence is innate. For someone with entity beliefs, it will be challenging to understand that anyone can become a mathematician through hard work (Park et al., 2023). Not many people are willing to accept feedback and try different strategies after experiencing failure (Stohlmann, 2022). Just as a growth mindset does not develop on its own, the willingness to view criticism as constructive input is something that needs to be cultivated (Meierdirk & Fleischer, 2022).

Table 3. Factors that Influence Mathematical Mindset

Factors	Description	Articles	Total
Internal	The more they believe that mathematical ability is fixed, the more anxious students will be about mathematics.	(Eckerskorn et al., 2023; Saefudin, Wijaya, Dwiningrum, et al., 2023)	2
	Metacognitive abilities may be required for pupils to recognize their development mindset.	(Wang et al., 2021)	1
	The formation of a mathematical mindset is built on an abstraction process that is dependent on one's capacity to apply conceptual information and methods.	(Hakim & Nurlaelah, 2018)	1
	A person's willingness to persevere in the face of challenges and difficulties.	(Campbell et al., 2021; Cutler, 2020; Mielicki et al., 2022; Saefudin, Wijaya, Dwiningrum, et al., 2023)	4
	How a person responds to mistakes, criticism, and others' success.	(Francome & Hewitt, 2020; Lutovac et al., 2023; Mills & Mills, 2018; Saefudin, Wijaya, & Dwiningrum, 2023; Saefudin, Wijaya, Dwiningrum, et al., 2023)	4
	How persistent a person is in carrying out continuous exercises or trying to solve math problems.	(Im & Park, 2023; Mrutu et al., 2022; Saefudin, Wijaya, Dwiningrum, et al., 2023; Shen et al., 2016)	4
External	Family engagement in math learning	(Im & Park, 2023; Lin & Muenks, 2023; Mayer et al., 2023; Park et al., 2023; Su et al., 2021)	5
	Mathematics teachers	(Anderson et al., 2018; Eckerskorn et al., 2023; Heyder et al., 2020; Kismiantini et al., 2021; Saefudin, Wijaya, Dwiningrum, et al., 2023)	5
	Supervisor of preservice math teachers	(Lutovac et al., 2023)	1
	Interaction with friends	(Galanti & Miller, 2021)	1

External influences are also important in addition to the internal factors discussed previously. Family support is the most crucial external factor in developing a growth-oriented math mindset (Mayer et al., 2023). When parents believe that math intelligence is malleable, children are more likely to be motivated to achieve

better math scores. Family factors can also destroy misconceptions about gender and math (J. Lee et al., 2022). However, the family is also the beginning of the belief that mathematical intelligence is innate, where families tend to underestimate the mathematical abilities of girls compared to boys (Xie et al., 2022). Children who do not inherit mathematical talent are often considered to have a limited future. In this way, indirectly, families can eliminate math anxiety, but it can also be the cause of growing math anxiety in children, especially in girls.

Educators are also an important factor in developing (Chestnut et al., 2018; Meierdirk & Fleischer, 2022; Stohlmann, 2022) or inhibiting students' growth mindset in schools (Lutovac et al., 2023; Ramirez et al., 2018). When teachers believe that intelligence is genetically inherited, it becomes more challenging for students to achieve learning outcomes (Heyder et al., 2020). Pre-math teacher supervisors are also an important part of establishing policies that can help prospective mathematics teachers have a growth mindset (Lutovac et al., 2023). Because teaching is a job that requires both the heart and the brain, teachers need to foster positive interactions with students. In this way, it will be easier for teachers to convince students that mathematical abilities can be developed (Boaler, 2016).

The other external factor is interaction with friends. Friends can support the improvement of mathematical mindsets (Galanti & Miller, 2021). Cooperative friends can build positive relationships and help each other learn (Harvey, 2020). Students with a growth mindset will consider their friends as a valuable resource for asking questions and sharing knowledge. They feel inspired by the success of others (Dweck, 2022a). Meanwhile, students with a fixed mindset will feel threatened if they perceive someone as being smarter than they are (Saefudin, Wijaya, Dwiningrum, et al., 2023). However, the presence of friends is still very much needed in the learning process and in cultivating students' mathematical mindsets in class.

RQ2: Factors Inhibiting the Growth of a Mathematical Mindset

RQ2 refers to factors that hinder the growth of a person's math mindset. Several articles clearly explain the obstacles faced in efforts to develop a mathematical mindset, one of which is math anxiety. Xie et al. (Xie et al., 2022) call math anxiety the major obstacle for students to succeed in mathematics. It appears that this problem cannot be avoided by students, regardless of their views on mathematics. Mathematics anxiety is a problem experienced not only by elementary school children but also by college students (Gonzalez-DeHass et al., 2023; Samuel & Warner, 2021). Mathematics can be learned and understood by anyone (Boaler, 2016), but it is this anxiety that hinders students' actual abilities (Samuel & Warner, 2021). Students who initially believe they can solve math problems and earn good grades often feel anxious when they receive low math scores (Apiola & Sutinen, 2020). Along with poor grades, students with a fixed mindset may think they lack natural mathematical abilities. The more fixed the student's mindset, the greater the math anxiety they will feel (Eckerskorn et al., 2023; Gonzalez-DeHass et al., 2023).

In addition to anxiety about mathematics, parental beliefs, income, and lack of knowledge hinder children's mathematical thinking patterns (Xie et al., 2022). As the people closest to and most frequently encountered by children, parents play a crucial role in instilling life values in them. When parents believe that intelligence is fixed, it becomes difficult for children to develop the motivation to learn mathematics (Park et al., 2023). Although they may be reluctant to admit it, parents indirectly instill a fixed mindset in their children. Socioeconomic background strengthens parents' concerns about their children's future. Economic limitations can influence a person's mindset (Xie et al., 2022). Everyone, regardless of their background, has the same opportunities to experience education. However, for some parties and in certain situations, the cost of education is also an obstacle that cannot be underestimated. Parents who overhelp their children with school matters may also lead them to believe they are less intelligent, as their parents often provide assistance even when the children do not ask for it (Park et al., 2023). Parents must always ensure that their children possess the necessary mathematical skills and can complete their assignments effectively.

Another factor that is no less disturbing is a teacher who has math anxiety. As long as the teacher does not try to overcome his anxiety, they will pass on his math anxiety to the students (Saragih, 2019). Understandably, everyone has a different development process, but that does not mean someone who lacks

knowledge cannot improve their skills. Educators also play a crucial role in reducing learning motivation and fostering math anxiety in students by perpetuating the misconception that mathematics can only be mastered by those who are innately talented (Meierdirk & Fleischer, 2022). Lastly, there is the issue of gender and racial stereotypes, where women and minority groups occupy lower positions than men, especially whites (Moore, 2018). This reinforces the myth that women are less intelligent than men in STEM fields, particularly in mathematics (Xie et al., 2022). As a result, women are considered unfit to have a career in STEM, so they generally have a negative self-concept and anxiety about mathematics lessons (Seo et al., 2019).

Table 4. Factors Inhibiting the Growth of a Mathematical Mindset

Factors	Description	Articles	Total
Math anxiety	Mathematics anxiety makes students believe that they are not talented in mathematics.	(Gonzalez-DeHass et al., 2023)	1
	Math anxiety is more common in women than in men and has an impact on their career interests.	(Huang et al., 2019; Orbach, 2022; Samuel et al., 2022)	3
	Math anxiety hinders students' growth in their math mindset.	(Samuel et al., 2022; Samuel & Warner, 2021)	2
Parents' belief	Parents' beliefs about their children have a significant impact on the motivation and academic performance of elementary school students in mathematics.	(Kim et al., 2021; S. H. Lee et al., 2021)	2
Belief about innate talent	The belief that mathematical abilities are innate and hard to change.	(Chestnut et al., 2018; Heyder et al., 2020, 2021; Latterell, 2022; J. Lee et al., 2022; Mills & Mills, 2018; S. Song, 2022)	7
Intrusive parent support	Parents who intrusively assist their children may also be implying to their kids that they lack competence, particularly if they think intellect is innate.	(H. J. Lee et al., 2022; Park et al., 2023)	2
Parents' income	Students whose parents have low incomes tend to have a fixed mindset.	(Xie et al., 2022)	1
Sosioeconomic	Math achievement is favorably correlated with a growth mindset, but this relationship is merely up for pupils from upper socioeconomic backgrounds.	(Carroll et al., 2023; Kaya et al., 2023; Kismiantini et al., 2021; Wang et al., 2021; Xie et al., 2022)	5
Intrusive homework	The harmful consequences of unwanted support on academic work may be worsened by a belief that intellectual aptitude cannot be altered.	(Park et al., 2023)	1
Teacher	Teachers with insufficient knowledge sometimes experience math anxiety and lack confidence in teaching mathematics.	(Massey & Muhammad, 2023; Ramirez et al., 2018)	2
Gender and Stereotype	Women tend to be considered less good at mathematics than men.	(Carroll et al., 2023; Chestnut et al., 2018; Heyder et al., 2021; H. J. Lee et al., 2022; J.	7

		Lee et al., 2022; Levine & Pantoja, 2021; Xie et al., 2022)	
	There is gender inequality that limits women's participation, performance, and behavior.	(J. Lee et al., 2021; Seo et al., 2019; York et al., 2021)	3
	Women tend to have lower expectations and report lower self-proficiency than men.	(Ershova et al., 2021)	1
	Children from ethnic minorities are viewed as weak in intelligence.	(Chestnut et al., 2018)	1
	Female adolescents had a more negative math self-concept than male adolescents among Whites and Latinxs, but not among Blacks and Asians. High school math proficiency has little bearing on the STEM job prospects of Latina and Black youth.	(Seo et al., 2019)	1
	Gender variations in math proficiency and STEM job ambitions exist; lower levels of STEM motivation among women compared to men may impede such accomplishments.	(Degol et al., 2018)	1

RQ3: How to Develop a Mathematical Mindset

RQ3 discusses what can be done to overcome the obstacles. The most important factor in efforts to foster a growth mindset in math is the family, which can consist of parents and siblings (Lin & Muenks, 2023; Mayer et al., 2023). Parents can help change stereotypes that commonly apply in society by instilling the belief that every child can develop any level of intelligence.

Apart from families, several articles also emphasize the importance of government policies in encouraging education stakeholders to foster a growth mindset culture (Kismiantini et al., 2021). Universities with researchers and lecturers also have a role in introducing the benefits of a growth mindset among students (Kismiantini et al., 2021; O'Keefe et al., 2023). As part of society, students are agents of change who can convince parents that their children's future can still be fought for.

Supervisors of preservice teachers also play an important role in fostering teachers' self-confidence and reducing math anxiety before they begin teaching. The majority of student teachers find teacher training to be challenging; therefore, teachers need to adopt a growth mindset (Meierdirk & Fleischer, 2022). As shown in Table 5, many articles outline strategies that teachers can employ to promote students' growth in a math mindset. Shen et al. (2016) emphasized the importance of educators understanding their students' difficulties. It is not a matter of genius or not, but how parents and educators understand students' difficulties, so that solutions can be found to handle them.

Table 5. Things that Can Be Done to Develop a Mathematical Mindset

Aspects	Description	Articles	Total
Parent/ family	Parents can increase children's self-confidence and growth in a math mindset, and can reduce gender and racial stereotypes through their language and behavior.	(Chestnut et al., 2018; Kim et al., 2021; H. J. Lee et al., 2022; J. Lee et al., 2021, 2022; Levine & Pantoja, 2021)	6

	Parents and teachers can guide students in developing the proper perspective regarding mistakes and failure.	(Su et al., 2021)	1
Government policy	The government should adopt two policies: offering a large-scale intervention to increase and sustain a growth mentality among students, and designing a curriculum that incorporates a growth mindset as part of teaching mathematics.	(Kismiantini et al., 2021)	1
College	The campus can design and implement curricula, policies, and activities that help students develop their mindset and skills.	(Kismiantini et al., 2021; O'Keefe et al., 2023)	2
Supervisory instructors	Supervisors can provide feedback and direction that can develop the preservice teacher mindset.	(Lutovac et al., 2023)	1
Training	Growth mindset training helps female students overcome gender stereotypes and shift their mindset from a fixed to a growth-oriented one. When they have a growth mindset, their math skills improve rapidly.	(S. Song, 2022)	1
Teachers' strategies	Teachers can approach students in a way that motivates them to learn, fosters a growth mindset, and promotes academic grit, which can enhance their academic achievement.	(Kaya & Karakoc, 2022; J. Lee et al., 2022; Shoshani, 2021; Yu et al., 2022)	4
	Teachers can provide mathematics learning experiences with a mindfulness and growth-oriented mathematical mindset intervention for each racial and gender group to foster mindsets and beliefs in students' abilities.	(Boaler et al., 2021; Chestnut et al., 2018; Samuel & Warner, 2021; Seo et al., 2019)	4
	The school or campus can administer diagnostic tests to students, providing early information about their abilities. In this way, students can be handled and approached regarding their academic achievements.	(Orbach, 2022)	1
	The need for early involvement, as well as overcoming children's attitudes and gender stereotypes regarding mathematical thinking patterns, is an effort to increase children's motivation and mathematics achievement.	(J. Lee et al., 2021)	1
	Teachers purposefully prepare for faults to occur so that they can be discussed and worked on.	(Francome & Hewitt, 2020; Galanti & Miller, 2021)	2
	To reduce gender stereotypes in mathematics, teachers should show an illustrated slide show of the lives and accomplishments of successful women from various walks of life and races.	(Rule et al., 2019)	1
	Educators can design learning experiences that open up the broadest possible opportunities for students to actively build engagement and performance, and develop their math mindset.	(Bettinger et al., 2018; Boaler et al., 2018; Chang & Wu, 2022; Choi & Walters, 2018)	4
	Effective teaching strategies in the classroom can help students develop a love for mathematics.	(Boaler et al., 2022; Im & Park, 2023;	4

	Mrutu et al., 2022; Ramirez et al., 2018)	
It is feasible to enhance the motivation of mathematical learners by making minor adjustments to the presentation of mathematical problems.	(Daly et al., 2019)	1
Formative feedback provided through e-learning platforms can be used to enhance students' growth mindset, particularly among female students.	(Ershova et al., 2021)	1

DISCUSSION

Although this article provides an overview of various internal and external factors influencing the development of a growth mindset in mathematics learning, several limitations need to be acknowledged. First, most of the references cited are based on studies conducted in Western countries, particularly the United States. Therefore, generalizing these findings to other cultural and educational contexts, such as those in Indonesia, should be done with caution.

Second, the literature reviewed in this discussion tends to be descriptive and does not fully explore the complex interactions between multiple factors, such as the simultaneous influence of gender, socioeconomic status, and longitudinal learning experiences in mathematics (Safitri et al., 2025; Safitri, Lestarani, et al., 2024; Safitri, Rosnawati, et al., 2024). While the role of families, teachers, and peers is emphasized, the text lacks an in-depth discussion of systemic or collaborative interventions among these stakeholders. Moreover, contextual factors such as national curricula, standardized testing pressures, and local education policies are not extensively addressed, even though they may significantly impact the effectiveness of growth mindset development in schools(Safitri, 2024a, 2024b).

Ultimately, this discussion primarily relies on theoretical perspectives and secondary sources, without incorporating primary empirical data to substantiate the arguments presented. Therefore, further research using both qualitative and quantitative approaches in local contexts is necessary to gain a deeper understanding of the dynamics of mathematical mindset among students and educators across different educational levels.

CONCLUSION

Based on the results of the literature analysis related to the mathematical mindset, myths such as the notion that mathematics is a male-dominated subject perpetuate stereotypes that discriminate against several races and genders. Apart from that, based on research into several references, it is known that mathematical genius is not inherited but rather the result of continuous study and practice. Internal and external factors influence the mathematical mindset. Internal factors that influence a person's mathematical mindset include beliefs, metacognitive abilities, willingness, resilience in the face of problems, and how mistakes and criticism are responded to. Meanwhile, external factors consist of parents, math teachers, supervisors of preservice math teachers, and friends.

Meanwhile, several things hinder the development of a person's mathematical mindset, including math anxiety, parents' beliefs in myths, economic status, teacher abilities, and stereotypes related to gender and race. Ultimately, developing a mathematical mindset can be facilitated through parental involvement, government policies, and effective teaching strategies. Parents and family are the most important factors that can eliminate and break the myth stereotypes about gender and race related to mathematics and academic achievement. Parents need to instill optimism in every child, regardless of their gender, racial background, or socioeconomic status. When parents succeed in instilling the mindset that anyone can have a promising future, children will have the motivation and self-confidence to face wrong judgments about them. Parents can help children reduce math anxiety and low self-concept.

Finally, math teachers also need to understand that every student has the potential to master mathematics. Therefore, teachers need to think creatively in solving the problems they and their students face. Many activities in class can foster the development of a growth mindset in math among students, such as learning through play, project-based math learning, and discussing math problems with peers. Teachers also gradually introduce the importance of the learning process, rather than just focusing on achieving good grades. Teachers can also learn together with students how to praise and provide feedback effectively. Therefore, further research is necessary to investigate the impact of a mathematical mindset on academic achievement. Longitudinal research on mathematical mindset and the factors that influence it can provide valuable knowledge and insight for parents, teachers, and policymakers.

ACKNOWLEDGMENT

We gratefully acknowledge the Varians Statistik Kesehatan and Kaukus Masyarakat Peduli Kesehatan Jiwa for providing the boot camp and mentoring to improve the manuscript writing.

REFERENCES

Aditomo, A. (2015). Students' Response to Academic Setback: "Growth Mindset" as a Buffer Against Demotivation. *International Journal of Educational Psychology*, *4*(2), 198. https://doi.org/10.17583/ijep.2015.1482

Ajie, M. D. (2015). Teknik Temu Balik Informasi (Information Retrieval) dan Analisa Kapabilitas Pencarian Search Engine Google (www.google.com). In *UPI.edu*.

Anderson, R. K., Boaler, J., & Dieckmann, J. A. (2018). Achieving elusive teacher change through challenging myths about learning: A blended approach. *Education Sciences*, *8*(3). https://doi.org/10.3390/educsci8030098

Apiola, M., & Sutinen, E. (2020). Mindset and Study Performance: New Scales and Research Directions. *ACM International Conference Proceeding Series*. https://doi.org/10.1145/3428029.3428042

Ayebo, A., & Mrutu, A. (2019). An Exploration of Calculus Students' Beliefs about Mathematics. *International Electronic Journal of Mathematics Education*, *14*(2), 385–392. https://doi.org/10.29333/iejme/5728

Bettinger, E., Ludvigsen, S., Rege, M., Solli, I. F., & Yeager, D. (2018). Increasing perseverance in math: Evidence from a field experiment in Norway. *Journal of Economic Behavior and Organization*, *146*, 1–15. https://doi.org/10.1016/j.jebo.2017.11.032

Boaler, J. (2016). *A Mathematical Mindset*. Jossey-Bass. https://doi.org/10.1088/2058-7058/32/12/32

Boaler, J., Brown, K., LaMar, T., Leshin, M., & Selbach-Allen, M. (2022). Infusing Mindset through Mathematical Problem Solving and Collaboration: Studying the Impact of a Short College Intervention. *Education Sciences*, *12*(10). https://doi.org/10.3390/educsci12100694

Boaler, J., Dieckmann, J. A., LaMar, T., Leshin, M., Selbach-Allen, M., & Pérez-Núñez, G. (2021). The Transformative Impact of a Mathematical Mindset Experience Taught at Scale. *Frontiers in Education*, *6*(December), 1–13. https://doi.org/10.3389/feduc.2021.784393

Boaler, J., Dieckmann, J. A., Pérez-Núñez, G., Sun, K. L., & Williams, C. (2018). Changing Students Minds and Achievement in Mathematics: The Impact of a Free Online Student Course. *Frontiers in Education*, *3*(April), 1–7. https://doi.org/10.3389/feduc.2018.00026

Bui, P., Pongsakdi, N., McMullen, J., Lehtinen, E., & Hannula-Sormunen, M. M. (2023). A systematic review of mindset interventions in mathematics classrooms: What works and what does not? *Educational Research Review*, *40*(August), 100554. https://doi.org/10.1016/j.edurev.2023.100554

Campbell, A. L., Mokhithi, M., & Shock, J. P. (2021). Exploring mathematical mindset in question design: Boaler's taxonomy applied to university mathematics. *9th Research in Engineering Education Symposium and 32nd Australasian Association for Engineering Education Conference, REES AAEE 2021: Engineering Education Research Capability Development*, *2*, 960–968. https://doi.org/10.52202/066488-0105

Carroll, J. M., Yeager, D. S., Buontempo, J., Hecht, C., Cimpian, A., Mhatre, P., Muller, C., & Crosnoe, R. (2023). Mindset × Context: Schools, Classrooms, and the Unequal Translation of Expectations into Math

Achievement. *Monographs of the Society for Research in Child Development*, *88*(2), 7–109. https://doi.org/10.1111/mono.12471

Chang, Y. L., & Wu, S. C. (2022). Designing Mindset Mathematics Teaching Materials in An Elementary Teacher Professional Development Supporting System. *Proceedings of the International Multi-Conference on Society, Cybernetics and Informatics, IMSCI*, *2022-July*(Imsci), 76–77. https://doi.org/10.54808/IMSCI2022.01.76

Chestnut, E. K., Lei, R. F., Leslie, S. J., & Cimpian, A. (2018). The myth that only brilliant people are good at math and its implications for diversity. *Education Sciences*, *8*(2). https://doi.org/10.3390/educsci8020065

Choi, J., & Walters, A. (2018). Exploring the impact of small-group synchronous discourse sessions in online math learning. *Online Learning Journal*, *22*(4), 47–64. https://doi.org/10.24059/olj.v22i4.1511

Cutler, C. S. (2020). Preservice Teachers' Mathematical Mindsets During Pandemic-Induced Pivot to Online Learning. *Frontiers in Education*, *5*(November), 1–6. https://doi.org/10.3389/feduc.2020.595264

Daly, I., Bourgaize, J., & Vernitski, A. (2019). Mathematical Mindsets Increase Student Motivation: Evidence from the EEG. *Trends in Neuroscience and Education*, *15*, 18–28. https://doi.org/10.1016/j.tine.2019.02.005

Degol, J. L., Wang, M. Te, Zhang, Y., & Allerton, J. (2018). Do Growth Mindsets in Math Benefit Females? Identifying Pathways between Gender, Mindset, and Motivation. *Journal of Youth and Adolescence*, *47*(5), 976–990. https://doi.org/10.1007/s10964-017-0739-8

Dweck, C. S. (2022a). *Mindset* (Updated). Ballantine Books.

Dweck, C. S. (2022b). *Self-theories: Their role in motivation, personality, and development*. Routledge -Taylor & Francis Group, LLC.

Eckerskorn, F., Schwab, C., & Frenzel, A. C. (2023). The (Joint) Effects of Self-Concept, Mindset, and Gender on Math Anxiety. *AERA Online Paper Repository*. https://doi.org/https://doi.org/10.3102/2012173

Ershova, V. S., Gerasimova, I. O., & Kapuza, A. V. (2021). Math Is Not for Girl? Investigating the Impact of e-Learning Platforms on the Development of Growth Mindsets in Elementary Classrooms. *Voprosy Obrazovaniya / Educational Studies Moscow*, *2021*(3), 91–113. https://doi.org/10.17323/1814-9545-2021-3-91-113

Francome, T., & Hewitt, D. (2020). "My math lessons are all about learning from your mistakes": how mixed-attainment mathematics grouping affects the way students experience mathematics. *Educational Review*, *72*(4), 475–494. https://doi.org/10.1080/00131911.2018.1513908

Galanti, T. M., & Miller, A. D. (2021). From High School to College Calculus: Beliefs about Sense-Making and Mistakes. *Journal for STEM Education Research*, *4*(1), 73–94. https://doi.org/10.1007/s41979-020-00039-7

Gonzalez-DeHass, A. R., Furner, J. M., Vasquez-Colina, M. D., & Morris, J. D. (2023). Undergraduate Students' Math Anxiety: the Role of Mindset, Achievement Goals, and Parents. *International Journal of Science and Mathematics Education*, 4–11. https://doi.org/https://doi.org/10.1007/s10763-023-10416-4

Hakim, L. L., & Nurlaelah, E. (2018). Mathematical mindsets: The abstraction in mathematical problem solving. *Journal of Physics: Conference Series*, *1132*(1). https://doi.org/10.1088/1742-6596/1132/1/012048

Harvey, C. (2020). *Mindset Matters: Using Research-Based Strategies to Enhance Middle-School Math Instruction*. Assupmtion College.

Heyder, A., Weidinger, A. F., Cimpian, A., & Steinmayr, R. (2020). Teachers' Belief that Math Requires Innate Ability Predicts Lower Intrinsic Motivation Among Low-Achieving Students. *Learning and Instruction*. https://doi.org/10.1016/j.learninstruc.2019.101220

Heyder, A., Weidinger, A. F., & Steinmayr, R. (2021). Only a Burden for Females in Math? Gender and Domain Differences in the Relation Between Adolescents' Fixed Mindsets and Motivation. *Journal of Youth and Adolescence*, *50*(1), 177–188. https://doi.org/10.1007/s10964-020-01345-4

Hoeve, M. Van, Doorman, M., & Veldhuis, M. (2019). How can teachers influence their students' (mathematical) mindset ? *Eleventh Congress of the European Society for Research in Mathematics Education*.

Huang, X., Zhang, J., & Hudson, L. (2019). Impact of math self-efficacy, math anxiety, and growth mindset on math and science career interest for middle school students: the gender moderating effect. *European Journal of Psychology of Education*, *34*(3), 621–640. https://doi.org/10.1007/s10212-018-0403-z

Im, S., & Park, H. J. (2023). A Mathematical Mindset Scale using the positive norms. *Psychology in the Schools*,

60(8), 2901–2918. https://doi.org/10.1002/pits.22904

Kaya, S., & Karakoc, D. (2022). Math Mindsets and Academic Grit: How Are They Related to Primary Math Achievement ? *European Journal of Science and Mathematics Education*, *10*(3), 298–309. https://doi.org/10.30935/scimath/11881

Kaya, S., Yuksel, D., & Curle, S. (2023). The effects of language learning and math mindsets on academic success in an engineering program. *Journal of Engineering Education*, *112*(1), 90–107. https://doi.org/10.1002/jee.20499

Kim, H., Kim, Y., & Park, D. (2021). The Relation between mother's mindset and mother-child interaction in math: The mediating role of math anxiety. *The Korean Journal of Developmental Psychology*, *34*(3), 1–20. https://doi.org/pISSN: 1229-0718

Kismiantini, Setiawan, E. P., Pierewan, A. C., & Montesinos-López, O. A. (2021). Growth mindset, school context, and mathematics achievement in Indonesia: A multilevel model. *Journal on Mathematics Education*, *12*(2), 279–294. https://doi.org/10.22342/jme.12.2.13690.279-294

Latterell, C. M. (2022). Mathematics, mindsets, and what it means to be do-ers of math. *Irish Educational Studies*. https://doi.org/10.1080/03323315.2022.2093253

Lee, H. J., Lee, J., Song, J., Kim, S., & Bong, M. (2022). Promoting Children's Math Motivation by Changing Parents' Gender Stereotypes and Expectations for Math. *Journal of Educational Psychology*, *114*(7), 1567–1588. https://doi.org/10.1037/edu0000743

Lee, J., Lee, H. J., & Bong, M. (2022). Boosting Children's Math Self-efficacy by Enriching Their Growth Mindsets and Gender-fair Beliefs. *Theory into Practice*, *61*(1), 35–48. https://doi.org/10.1080/00405841.2021.1932156

Lee, J., Lee, H. J., Song, J., & Bong, M. (2021). Enhancing children's math motivation with a joint intervention on mindset and gender stereotypes. *Learning and Instruction*, *73*, 101416. https://doi.org/10.1016/j.learninstruc.2020.101416

Lee, S. H., Lee, H. J., & Bong, M. (2021). Predicting Elementary School Children's Math Motivation and Achievement with Parents' Math Gender Stereotypes, Fixed Mindset, and Expectations. *The Korean Educational Review*, *27*(4), 159–180. https://doi.org/http://dx.doi.org/10.29318/ker.27.4.6

Levine, S. C., & Pantoja, N. (2021). Development of children's math attitudes: Gender differences, key socializers, and intervention approaches. *Developmental Review*, *62*(October). https://doi.org/10.1016/j.dr.2021.100997

Lin, S., & Muenks, K. (2023). Family context of mindset matters: Students' perceptions of parent and sibling math mindsets predict their math motivation, behavior, and affect. *Applied Developmental Science*, *2015*, 1–5. https://doi.org/10.1080/10888691.2023.2177163

Lovin, L., Busi, R., & Lovin, N. (2021). PreK-8 prospective teachers' mindsets and depth of learning in mathe.pdf. *School Science and Mathematics*, *121*(7), 434–447. https://doi.org/10.1111/ssm.12496

Lucini, M., & Boltz, S. (2023). *Breaking Math Myths*. Benjamin Franklin International School.

Lutovac, S., Hasari, M., & Kaasila, R. (2023). Fixed mindset as a challenge in teaching practice: A pre-service teacher's experiences of received feedback. *European Journal of Science and Mathematics Education*, *11*(1), 167–181. https://doi.org/10.30935/scimath/12563

Marcos-Pablos, S., & García-Peñalvo, F. J. (2018). Decision support tools for SLR search string construction. *ACM International Conference Proceeding Series*, 660–667. https://doi.org/10.1145/3284179.3284292

Massey, C. C., & Muhammad, E. A. (2023). Preservice Special Education Teachers' Experience of a Math Methods Course: Examining the Development of Personal and Pedagogical Efficacy. *Teacher Educator*, 9–11. https://doi.org/10.1080/08878730.2023.2218860

Mayer, S. E., Kalil, A., Delgado, W., Liu, H., Rury, D., & Shah, R. (2023). Boosting Parent-Child Math Engagement and Preschool Children's Math Skills: Evidence from an RCT with Low-Income Families. *Economics of Education Review*, *95*. https://doi.org/10.1016/j.econedurev.2023.102436

Meierdirk, C., & Fleischer, S. (2022). Exploring the mindset and resilience of student teachers. *Teacher Development*, *26*(2), 263–278. https://doi.org/10.1080/13664530.2022.2048687

Mielicki, M. K., Schiller, L. K., Fitzsimmons, C. J., Scheibe, D., & Thompson, C. A. (2022). Perceptions of ease

and difficulty, but not growth mindset, relate to spesific math attitudes. *British Journal of Educational Psychology*, *92*(2), 707–729. https://doi.org/10.1111/bjep.12472

Mills, I. M., & Mills, B. S. (2018). Insufficient evidence: mindset intervention in developmental college math. *Social Psychology of Education*, *21*(5), 1045–1059. https://doi.org/10.1007/s11218-018-9453-y

Moore, M. (2018). Mindset and Mathematics in an All-Girls Secondary School A thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy by. *A Thesis Submitted in Fulfillment of the Requirements for the Degree of Doctor of Philosophy at Charles Sturt University by Maureen Moore BA Dip Ed MA MEd Charles*, *August*, 1–306.

Mrutu, A., Boekel, M. van, & Abulela, M. A. A. (2022). Path Analysis Between Growth Mindset and Math Achievement: A Systematic Review. *AERA Online Paper Repository*. https://doi.org/https://doi.org/10.3102/1883641

O'Keefe, P. A., Horberg, E. J., Dweck, C. S., & Walton, G. M. (2023). A Growth-Theory-of-Interest Intervention Increases Interest in Math and Science Coursework Among Liberal Arts Undergraduates. *Journal of Educational Psychology*. https://doi.org/10.1037/edu0000798

Orbach, L. (2022). A latent profile analysis of math anxiety and core beliefs toward mathematics among children. *Annals of the New York Academy of Sciences*, *1509*(1), 130–144. https://doi.org/10.1111/nyas.14720

Park, D., Gunderson, E. A., Maloney, E. A., Tsukayama, E., Beilock, S. L., Duckworth, A. L., & Levine, S. C. (2023). Parental intrusive homework support and math achievement: Does the child's mindset matter? *Developmental Psychology*, *59*(7), 1249–1267. https://doi.org/https://psycnet.apa.org/doi/10.1037/dev0001522

Parums, D. V. (2021). Editorial: Review articles, systematic reviews, meta-analysis, and the updated preferred reporting items for systematic reviews and meta-analyses (PRISMA) 2020 Guidelines. *Medical Science Monitor*, *27*, 1–3. https://doi.org/10.12659/MSM.934475

Petherbridge, A. N. (2020). *Everyone can be "a math person": The Role of the Growth Mindset in Mathematics Education*. Colby College.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). (2020).

Rahmah, N. (2018). The Nature of Mathematics Education. *Al-Khwarizmi*, *1*(2), 1–10. https://doi.org/10.24256/jpmipa.v1i2.88

Ramirez, G., Hooper, S. Y., Kersting, N. B., Ferguson, R., & Yeager, D. (2018). Teacher Math Anxiety Relates to Adolescent Students' Math Achievement. *AERA Open*, *4*(1), 1–13. https://doi.org/10.1177/2332858418756052

Rammstedt, B., Grüning, D. J., & Lechner, C. M. (2021). *Measuring Growth Mindset: A Validation of a Three-item Scale and a Single-item Scale in Youth and Adults*. Center for Open Science. https://doi.org/10.31234/osf.io/rs43g

Rule, A. C., Blaine, D. A., Edwards, C. M., & Gordon, M. (2019). Girls explore math careers by making 3D-constructions of diverse Women Mathematicians' lives. *Mathematics Enthusiast*, *16*(1–3), 541–578. https://doi.org/10.54870/1551-3440.1472

Saefudin, A. A., Wijaya, A., & Dwiningrum, S. I. A. (2023). Growth Mindset in Mathematics in Junior High School: A Reflection on Students ' Mathematics Learning Activities in a Science Specialization Class. *Proceedings of the 2nd UPY International Conference on Education and Social Science*, 164–168. https://doi.org/10.2991/978-2-38476-176-0

Saefudin, A. A., Wijaya, A., Dwiningrum, S. I. A., & Yoga, D. (2023). The characteristics of the mathematical mindset of junior high school students. *Eurasia Journal of Mathematics, Science and Technology Education*, *19*(1). https://doi.org/10.29333/ejmste/12770

Safitri, I. (2024a). Should likert data be transformed using summated rating scale? A confirmatory factor analysis study on the continuous learning. *Jurnal Eduscience (JES)*, *11*(3), 790–801. https://doi.org/10.36987/jes.v11i3.6412

Safitri, I. (2024b). Transformation of Student Science Achievement Through Project-Based Learning (PjBL): A Meta Analysis Study. *Scientiae Educatia: Jurnal Pendidikan Sains*, *13*(2). https://doi.org/DOI: 10.24235/sc.educatia.v13i2.18694

Safitri, I., Andriyanti, E., Ansyari, R., Harahap, R. D., Harahap, R. H., & Istiqlal, M. (2025). Character Education in Indonesia: Do Integrated Islamic Schools Outperform Public Schools? *Journal of Education Culture and Society*, *16*(1), 251–270.

Safitri, I., Lestarani, D., Imtikhanah, R. D. N. W., Akbarini, N. R., Sari, M. W., Fitrah, M., & Hapsan, A. (2024). *TEORI PENGUKURAN DAN EVALUASI*. CV. Ruang Tentor.

Safitri, I., Rosnawati, R., & Ansyari, R. (2024). Estimasi Kesalahan Pengukuran dalam Penilaian Sidang Skripsi: Generalizability Theory Analysis. *Afeksi: Jurnal Penelitian Dan Evaluasi Pendidikan*, *5*(1), 162–168. https://doi.org/https://doi.org/10.35672/afeksi.v5i1.220

Samuel, T. S., Buttet, S., & Warner, J. (2022). "I Can Math, Too!": Reducing Math Anxiety in STEM-Related Courses Using a Combined Mindfulness and Growth Mindset Approach (MAGMA) in the Classroom. *Community College Journal of Research and Practice*, *August*. https://doi.org/10.1080/10668926.2022.2050843

Samuel, T. S., & Warner, J. (2021). "I Can Math!": Reducing Math Anxiety and Increasing Math Self-Efficacy Using a Mindfulness and Growth Mindset-Based Intervention in First-Year Students. *Community College Journal of Research and Practice*, *45*(3), 205–222. https://doi.org/10.1080/10668926.2019.1666063

Saragih, M. J. (2019). Perlunya Belajar Mata Kuliah Aljabar Abstrak Bagi Mahasiswa Calon Guru Matematika. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *3*(2), 249–265. https://doi.org/10.31004/cendekia.v3i2.104

Schwitzgebel, E. (2023). Belief. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy* (Winter edi). https://doi.org/10.5860/choice.187763

Seo, E., Shen, Y., & Alfaro, E. C. (2019). Adolescents' Beliefs about Math Ability and Their Relations to STEM Career Attainment: Joint Consideration of Race/ethnicity and Gender. *Journal of Youth and Adolescence*, *48*(2), 306–325. https://doi.org/10.1007/s10964-018-0911-9

Shen, C., Miele, D. B., & Vasilyeva, M. (2016). The Relation between College Students' Academic Mindsets and Their Persistence during Math Problem Solving. *Psychology in Russia: State of the Art*, *9*(3), 38–56. https://doi.org/10.11621/pir.2016.0303

Shoshani, A. (2021). Growth mindset in the maths classroom: a key to teachers' well-being and effectiveness. *Teachers and Teaching: Theory and Practice*, *27*(8), 730–752. https://doi.org/10.1080/13540602.2021.2007370

Song, S. (2022). Growth Mindset Training and the Effect of Math-Gender Stereotype Threat on Girl Students. *Best Evidence in Chinese Education*, *12*(2), 1629–1634. https://doi.org/10.15354/bece.22.ab012

Song, Y., Barger, M. M., & Bub, K. L. (2022). The Association Between Parents' Growth Mindset and Children's Persistence and Academic Skills. In *Frontiers in Education* (Vol. 6). Frontiers Media SA. https://doi.org/10.3389/feduc.2021.791652

Stohlmann, M. (2022). Growth mindset in K-8 STEM education: A review of the literature since 2007. In *Journal of Pedagogical Research* (Vol. 6, Issue 2, pp. 149–163). https://doi.org/10.33902/JPR.202213029

Su, A., Wan, S., He, W., & Dong, L. (2021). Effect of Intelligence Mindsets on Math Achievement for Chinese Primary School Students: Math Self-Efficacy and Failure Beliefs as Mediators. *Frontiers in Psychology*, *12*(March), 1–10. https://doi.org/10.3389/fpsyg.2021.640349

Sugandi, B. (2023). *PISA, UN, dan Indonesia*. Media Indonesia.

Supartono, J. W. (2021). *66 Persen Murid Indonesia Fixed Mindset, Apa Sudah Ada Penanganan?* Indonesiana.

Suryanti, R., & Megawanti, P. (2022). Systematic Literature Review terhadap Rendahnya Minat Baca di Indonesia. *Jurnal Inovatif Ilmu Pendidikan*, *4*(1), 33–51.

Wang, M. Te, Zepeda, C. D., Qin, X., Del Toro, J., & Binning, K. R. (2021). More Than Growth Mindset: Individual and Interactive Links Among Socioeconomically Disadvantaged Adolescents' Ability Mindsets, Metacognitive Skills, and Math Engagement. *Child Development*, *92*(5), e957–e976. https://doi.org/10.1111/cdev.13560

Wolor, C. W., Nurkhin, A., & Citriadin, Y. (2021). Leadership style for millennial generation, five leadership theories, systematic literature review. *Quality - Access to Success*, *22*(184), 105–110. https://doi.org/10.47750/QAS/22.184.13

Xie, F., Duan, X., Ni, X., Li, L., & Zhang, L. (2022). The Impact of Parents' Intelligence Mindset on Math Anxiety of Boys and Girls and the Role of Parents' Failure Beliefs and Evaluation of Child's Math Performance as

Mediators. *Frontiers in Psychology*, *13*(June), 1–9. https://doi.org/10.3389/fpsyg.2022.687136

York, A. M., Fink, A., Stoen, S. M., Walck-Shannon, E. M., Wally, C. M., Luo, J., Young, J. D., & Frey, R. F. (2021). Gender inequity in individual participation within physics and science, technology, engineering, and math courses. *Physical Review Physics Education Research*, *17*(2), 20140. https://doi.org/10.1103/PhysRevPhysEducRes.17.020140

Yu, Z., Zheng, Z., Yang, Y., & Li, Q. (2022). Research of the Influencing Factors and Mechanisms of Math Learning Motivation on Online Learning Engagement. *Blended Learning: Engaging Students in the New Normal Era: 15th International Conference (ICBL)*, 194–205. https://doi.org/10.1007/978-3-031-08939-8_17