

THE EFFECT OF EMOTIONAL INTELLIGENCE TOWARDS STUDENTS' MATHEMATICS PROBLEM SOLVING ABILITY: A META-ANALYSIS CORRELATIONAL STUDY

Noor Annisah Sholehah¹, Dadang Juandi², Surya Kurniawan³

^{1,2,3}Mathematics Education, FPMIPA, Universitas Pendidikan Indonesia, Bandung, Indonesia
E-mail: nisahsholehah45@gmail.com; dadang.juandi@upi.edu; surya.k@upi.edu

DOI: 10.20527/edumat.v10i2.14763

Abstract: *The literature has shown that emotional intelligence can control a person's rational decision-making and also contribute to mathematical problem-solving. There have been many correlational studies investigating the effect of emotional intelligence on the mathematical problem-solving abilities of students in Indonesia. This study aims to summarize the effect size values given by the primary study through meta-analysis techniques. Twenty-one primary studies that have been published by journal publishers, theses, and proceedings in the last ten years and meet the inclusion criteria will be analyzed. Data analysis using Jeffreys's Amazing Statistics Program (JASP) software with the stages of investigating publication bias, random or fixed effect models, and statistical hypothesis testing. Based on the random effects model, the results showed that there was a positive effect of emotional intelligence on students' mathematical problem-solving abilities in Indonesia with the category of medium positive effect ($r = 0.6$; $p < 0.01$). These results suggest for students and learners to give serious attention to students' emotional intelligence to improve their mathematical problem-solving abilities.*

Keywords: *Emotional Intelligence, Emotional Quotient, Mathematics Problem Solving, Meta-Analysis.*

INTRODUCTION

The objectives in learning mathematics proposed by NCTM (2000) include Problem Solving, Argumentation and Reasoning, Communication, Connection, and Representation. Moreover, NCTM not only makes problem-solving the goal of learning mathematics but also a major tool to perform or work mathematically. To equip students with these abilities, learning mathematics must train students to optimize their potential, including problem-solving abilities. Problem-solving is an important aspect as a basis for learning and teaching mathematics (Jiang et al., 2021; Liljedahl et al., 2016; Rodley &

Bailey, 2021). Polya defines problem-solving as an activity or reasoning carried out in answering a particular problem without a fixed procedure to achieve it, meaning that to achieve a goal the problem solvers must use different steps or methods depending on the existing problem. Polya (1945) argues that there are four recommended steps to try to solve a problem, that are (1) understanding the problem, (2) arranging a settlement plan, (3) executing the plan that has been made, then (4) re-examining the results obtained. This step proposed by Polya makes the problem-solving process more structured and systematic. Prior mathematical knowledge

has a great impact on good problem-solving abilities (Juandi, 2021) in line with Suarsana et al., (2019) that through systematic steps in applying existing knowledge to finding solutions, students will gain experience that can improve their thinking skills in logical, analytical, critical, and creative aspects in dealing with a problem

In recent years, problem-solving has had its place, especially in learning mathematics, students are taught problem-solving learning methods to become problem solver who thinks systematically. In solving mathematical problems several strategies can be used as recommended by Posamentier, A. S. & Krulik (1988) including trial and error, looking for patterns, investigating smaller cases, making visual representations, working backward, seeing symmetry, and so on. Mathematical problem-solving ability can be improved through learning with problem-solving-based models (Isam, 2020). Solving mathematical problems requires several things to achieve, such as a given optimistic attitude, patience, high concentration, and perseverance to create student enthusiasm for learning (Maryani et al., 2019). However, the mathematical problem solving ability of students in Indonesia is currently still not in the good category. It can be seen that students still experience difficulties in solving problems because they cannot translate the problem or understand it (Hendriana et al., 2018; Mailisman et al., 2020). To improve problem solving abilities and help cognitive intelligence, what is called emotional intelligence is needed (Sharei et al., 2012).

Emotional intelligence is one of the factors that influence one's problem solving abilities. Because emotions are able to color the way of thinking in dealing with situations, unknowingly emotions are often seen in them which causes a person to think ineffectively

(Wulansari, 2014). Each emotion motivates students in positive and negative ways, so that it can affect personality and ultimately affect learning abilities and problem solving abilities (Khoirunisa & Hartati, 2017).

Emotional intelligence refers to a person's ability to realize, understand, and control his emotions to recognize and understand the emotions of others and can be used to increase the success of himself and others (Behera, 2016). Emotional intelligence also allows a person to choose his way of thinking, recognize and feel, and take appropriate action, this intelligence contributes to at least 80% of the success of one's activities (Kanhai, 2014). Previous studies have also shown that emotional intelligence helps a person control his thoughts, make rational decisions, and become good problem solvers by collaborating with others (Behera, 2016). Reuven Bar-On describes at least five aspects that can measure a person's emotional intelligence which include: intrapersonal skills, interpersonal skills, stress control, the ability to adapt, and general mood (Singh, 2015). Whereas Higgs & Dulewicz (1999) states that there are seven aspects of emotional intelligence, namely: the preservation of emotion, self-awareness, motivation, persuasion, interpersonal sensitivity, firmness, and prudence with integrity. From this definition, an assumption can be made that emotional intelligence is needed for someone from various fields such as in the field of education so that learners can be successful in their studies.

Emotional intelligence provides many benefits to students and is an important quality for today's school students (AL-Qadri & Zhao, 2021). This is also evidenced by studies showing that emotional intelligence has a positive effect on a student's academic achievement (Meher et al., 2021; Moreno,

2018; Singh, 2015). Academic achievements in the field of mathematics education can also be seen in their problem-solving abilities, and this is also reinforced by the literature that emotional intelligence has a positive effect on students' problem-solving abilities (Bindu et al., 2021; Sharei et al., 2012; Maryani et al., 2019)

The literature on the influence of emotional intelligence on students' mathematical problem-solving abilities has been widely carried out to evaluate whether there is a positive influence of emotional intelligence on students' mathematical problem-solving abilities. The findings have agreed that emotional intelligence has a positive effect on the mathematical problem-solving ability of students in Indonesia (Cintami et al., 2022; Maryani et al., 2019; Merianah, 2019; Pasangka, 2020). However, these findings have very diverse correlation values with each other, therefore it will lead to inconsistencies in the findings. Meanwhile, students and students in schools feel the need to find out what the actual size of the effect is on the intended effect of emotional intelligence, which will be taken into consideration by students and teachers in learning mathematics. Therefore, we need a data analysis that can summarize the existing studies so that the actual effect of the combined existing literature is known as meta-analysis.

Meta-analysis uses statistical effect size calculations (Tamur et al., 2020) because it can minimize objective interpretation of studies with different results (Borenstein et al., 2009). Through meta-analysis techniques, this study will use data from primary sources that present the effect size of the results of the correlation study of emotional intelligence and mathematical problem-solving to determine the actual effect size based on studies that have been conducted in Indonesia. This study

aims to comprehensively analyze primary studies that present statistical data on the effect of emotional intelligence on mathematical problem-solving abilities of students including elementary, junior high, and high school students in Indonesia.

METHOD

To achieve the aim of study, the correlational meta-analysis method is an appropriate statistical method as a tool to analyze existing data. According to Cleophas & Zwinderman (2017), Meta-analysis is a quantitative method that follows several procedures to obtain the strength of the relationship between variables to be analyzed from existing studies. Meta-analysis is an appropriate and objective method for summarizing study results. Correlational meta-analysis is a type of systematic review research that has the aim of inclusively and comprehensively summarizing a collection of primary studies of previous research (Littell et al., 2008). The purpose of conducting a meta-analysis according to (Borenstein et al., 2009) is to understand the results of each study in the context of the whole study. Meta-analysis research uses statistical data obtained from primary data, therefore meta-analysis research is closer to quantitative research (Cooper, 2017). Meta-analysis can be used to summarize primary studies in the form of contrast groups, pre-post contrasts, and correlation studies by combining studies whose effect size can be measured (Retnawati et al., 2018).

Borenstein et al. (2009) also added that especially in correlational studies between two continuous variables, the value of the correlation coefficient stands as an effect size. Thus, each study can be analyzed simultaneously if it contains the value of the correlation coefficient. In line with this opinion (Retnawati et al., 2018) added that the

correlational studies that can be reviewed should at least contain the value of the correlation coefficient (r), the calculated t value, and or the calculated F value because these values can be converted to obtain the effect size value sought by the following formula:

$$F = t^2$$

$$r = \frac{t}{\sqrt{t^2 + N - 2}}$$

Where N is the sample size studied in a study. The distribution of the sample r around the population is skewed except in a large sample, while the distribution of the sample z is symmetrical, so the values of r must be converted to the Fisher value (z) first (Card, 2012). Convert the value of r to Fisher value can use the formula:

$$z = 0.5 \times \ln \frac{1+r}{1-r}$$

with standard error z (SE_z) equal to $\sqrt{\frac{1}{n-3}}$.

The conversion calculation can be done with the help of Microsoft Excel first and then the data is transferred to meta-analysis statistical data processing software, one of which is JASP.

The steps in conducting the recommended meta-analysis are: formulating the problem, searching for literature to be sampled, calculating the effect size of each study and as a whole, analyzing the impact of moderating variables, and interpreting and reporting the results (Decoster, 2009).

Inclusion Criteria

Inclusion-exclusion criteria are required to filter publications/literature in the Google Scholar database. The publication criteria that will be included are: (1) a publication from a journal, proceeding, undergraduate or postgraduate thesis, and doctoral dissertation, (2) the research location is in the

territory of Indonesia, (3) a publication that examines the influence of emotional intelligence on mathematical problem-solving abilities, (4) published in the 2012-2022 range, (5) is a correlational study that contains at least one of the correlation values of r , calculated t values, and or calculated F values. These criteria were set by the researcher to ensure the answers to the research questions posed and to ensure the objectivity of the meta-analysis research. The publications that do not meet these five criteria will be excluded as samples.

Data Collection

Literature search using the Google search engine on the Google Scholar database. In filtering the literature that meets the inclusion criteria that have been described, the researcher uses various keywords in Indonesian and English which are a combination of the phrases "emotional intelligence", "mathematical problem-solving ability", "mathematics problem solving", "emotional intelligence", "EQ", "problem-solving", for the range of years there is an article filtering facility on the Google Scholar database website and adjust it to 2012-2022. Based on the existing inclusion criteria, 21 literatures were obtained that fulfilled the sample in this study.

Data Analysis

After getting publications that meet predetermined criteria, researchers take the required data from each publication such as the year of research, sample size (N), correlation value (r) or t -count value and or calculated F value, and Grade research sample. These activities are carried out with the help of Microsoft Excel. After getting these data, the researcher converts the correlation value r into Fisher value (z) and also standard error z (SE_z), these values will be analyzed

using Jeffrey's Amazing Statistics Program (JASP) software. The stages in analyzing meta-analysis data follow the steps: (a) describe the characteristics of the sample; (b) check for publication bias; (c) heterogeneity test; (d) calculate the effect size summary; (e) make forest plots; last (f) calculate p-values for hypothesis testing.

RESULT AND DISCUSSION

Searching the literature through the database with the keywords and inclusion and exclusion criteria described above resulted in the sample in this study achieving the research objectives. The following in table 1 is the literature that has been screened and became the sample in this study.

Table 1 The Distributions of Sample

No	Year	Author(s)	Publication	<i>n</i>	<i>r_{xy}</i>	<i>t</i>	Grade
1	2016	Asinda, Salajang, & Monoarfa	Journal	146	0.551		SMK
2	2017	Ariati & Hartati	Journal	58	0.409		SMA
3	2017	Septiawan & Wahidah	Proceeding	89	0.246		SMA
4	2018	Naswi	Undergraduate Thesis	59	0.370	3.00	SMA
5	2019	Hapsyah, Permana, & Zanthi	Journal	30	0.522		SMP
6	2019	Inda, Ahmad, & Yannika	Journal	39	0.792		SD
7	2019	Merianah	Journal	63	0.374	3.15	SD
8	2019	Innasyithoh	Undergraduate Thesis	78	0.915		MIN
9	2019	Elvira	Undergraduate Thesis	22	0.655		SMP
10	2019	Maryani, Pramudya, & Slamet	Journal	20	0.965	15.76	SMP
11	2019	Brahmansyah	Journal	84	0.24		SMP
12	2020	Hidayat & Basuki	Proceeding	38	0.187	1.14	SMA
13	2020	Pasangka	Journal	89	0.260	2.51	SMP
14	2020	Yuliati, Sujiran, & Puspnanda	Journal	25	0.717		MTs
15	2020	Halim	Undergraduate Thesis	50	0.378	2.83	SMP
16	2020	Khoiri	Undergraduate Thesis	30	0.597		MTs
17	2021	Dini, Karimah, & Najibufahmi	Proceeding	31	0.877		SMP
18	2021	Ningsih, Rifat, & Hartoyo	Journal	21	0.45		MTs
19	2021	Rofiqoh	Undergraduate Thesis	332	0.363		SD
20	2022	Cintami, Cahyadi, & Budiman	Journal	30	0.784	6.69	SD
21	2022	Utami, Lestari, & Napis	Proceeding	35	0.73		SMA

Information: SD = Elementary School, SMP = Junior High School, SMA = Senior High School, MIN = Islamic Elementary School, MTs = Islamic Junior High School, and SMK = Vocational Senior High School. Bold numbers represent transform results from t-value to r.

Based on table 1 above, 21 studies investigate the effect of emotional intelligence on mathematical problem-solving

abilities and meet the inclusion-exclusion criteria described in the previous section. Of the 21 studies, 14 studies calculate and

report the correlation value (r) while the rest include the calculated t-value. Studies that do not include correlation values but include t values can be found for the r-value with the formula:

$$r = \frac{t}{\sqrt{t^2 + N - 2}}$$

After calculating the conversion of the t value to the correlation value, it is obtained that the range of correlation values varies from 0.18 to 0.96. The r-value of all studies also has a

positive sign, so emotional intelligence has a positive influence on mathematical problem-solving abilities. Diversity also occurs in the number of samples between studies with a range of 20 to 332. Thus, the total sample size is 1369 students consisting of SD/MIN, SMP/MTs, and SMA/SMK students. The distribution of the sample by year, publication, and grade can be seen in table 2 below.

Table 2 Sample Characteristics

	Frequency (F)
Year of Publication	2016
	2017
	2018
	2019
	2020
	2021
	2022
Form of Publication	Undergraduate Thesis
	Proceedings
	Journal
Grade	SD/MIN
	SMP/MTs
	SMA/SMK

Information: SD = Elementary School, SMP = Junior High School, SMA = Senior High School, MIN = Islamic Elementary School, MTs = Islamic Junior High School, and SMK = Vocational Senior High School.

Based on table 2, the year of publication is in the 2016-2022 range, around the last six years. Publications fluctuated in terms of number and the most were in 2019 with a total of seven articles or about 33% of the total studies. The most popular grade in the research sample is the SMP/MTs level which takes up 47.6% of the total study. As for the type of publication, journal articles account for more than half of

the total studies, around 55%. The first step is to determine whether the studies reviewed in this article are susceptible to publication bias or not. To investigate, it can be seen from the Funnel-Plot diagram (see. Fig. 1), Funnel-Plot with trim-fill analysis (see. Fig. 2), and rank correlation and regression (egger's) test for funnel plot asymmetry (see. table 3) as follows.

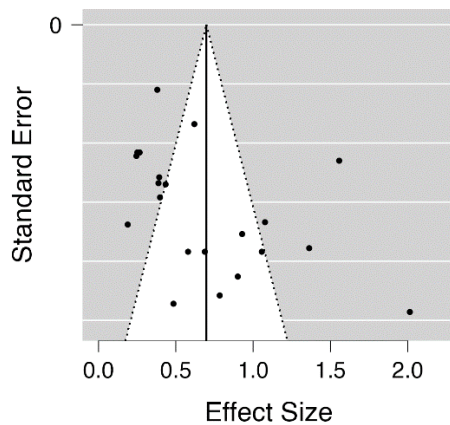


Figure 1. Initial Funnel Plot

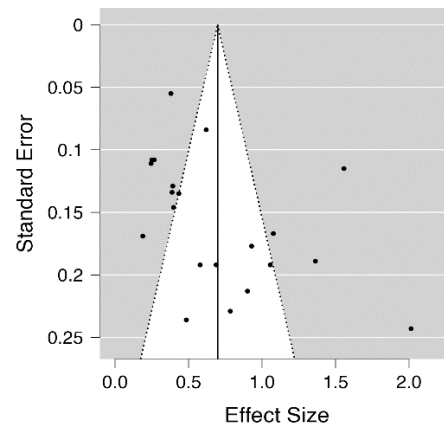


Figure 2. Trim-Fill Analysis

Table 3. Rank Correlation and Regression (Egger's) Test for Funnel Plot Asymmetry

	Kendall's τ	<i>p</i> -value
Rank tes	0.423	0.008
	Z	<i>p</i> -value
Sei	2.309	0.021

Figure 1 shows the distribution of effect size (r) around the funnel plot and it can be seen that the distribution of the correlation values is symmetrically distributed from the center line of the triangle, which means that the observed publications are not prone to publication bias. This is also confirmed by the trim-fill analysis in Figure 2 which does not show a significant difference with the initial funnel plot. Simultaneously, figure 1 and figure 2 have full black dots and

no colorless circles. This means that no publication bias was found, this is also reinforced by the *p*-value of rank and regression test for funnel plot asymmetry, both of which are less than $\alpha = 0.05$. Thus, it is not necessary to reduce or add samples in the publications that are observed. Next, we will see what effect model is fit for testing publication bias, weight effect size, summary effect size, and *p*-value using the *Q*-value represented in table 4 below.

Table 4 Fixed and Random Effect

	Q	df	<i>p</i> -value
Omnibus test of Model Coefficients	46.512	1	<.001
Test of Residual Heterogeneity	198.788	20	<.001

Table 5 Residual Heterogeneity Estimates

		95% Confidence Interval	
	Estimate	Lower	Upper
I^2 (%)	91.894	85.854	96.347

Table 4 summarizes the results of the heterogeneity test based on the distribution of the existing effect size (r) values. The table presents the Q-value for the heterogeneity test. The table is also used as a basis for using the right model to estimate further analysis. The Q value in the table above is 198.788 with a p-value less than 0.001 concluding that all distributions of correlation values are not the same, or the correlation value of each study is statistically

significant. This is also reinforced by the value of I^2 which is 91.8% very close to 100% based on table 5. Thus, the appropriate estimation model for data analysis including publication bias, aggregate effect size, and hypothetical testing is the random effect model. After obtaining that the effect used is a random effect model and is not susceptible to publication bias, the next step is to test the main hypothesis, that is:

- H_0 : There is no significant correlation between emotional intelligence and students' mathematical problem-solving abilities
 H_1 : There is a significant correlation between emotional intelligence and students' mathematical problem-solving abilities

The criteria used to make a decision is to reject H_0 if the p-value is less than $\alpha = 0.05$.

Table 6 Hypothesis Testing

					95% Confidence Interval	
	Estimate	Standard Error	z	p	Lower	Upper
intercept	0.698	0.102	6.820	<.001	0.497	0.899

Based on table 6, obtained the value of $z = 6.820$ with p-value less than $\alpha = 0.05$. That is, there is not enough data to accept the null hypothesis. Thus, it can be concluded that there is a significant correlation between emotional intelligence and students' mathematical problem-solving

abilities. To see how much correlation is given, it can be seen in the following analysis. The next step is to calculate the aggregate effect size value or in this case the summary correlation value which will be described in Figure 3.

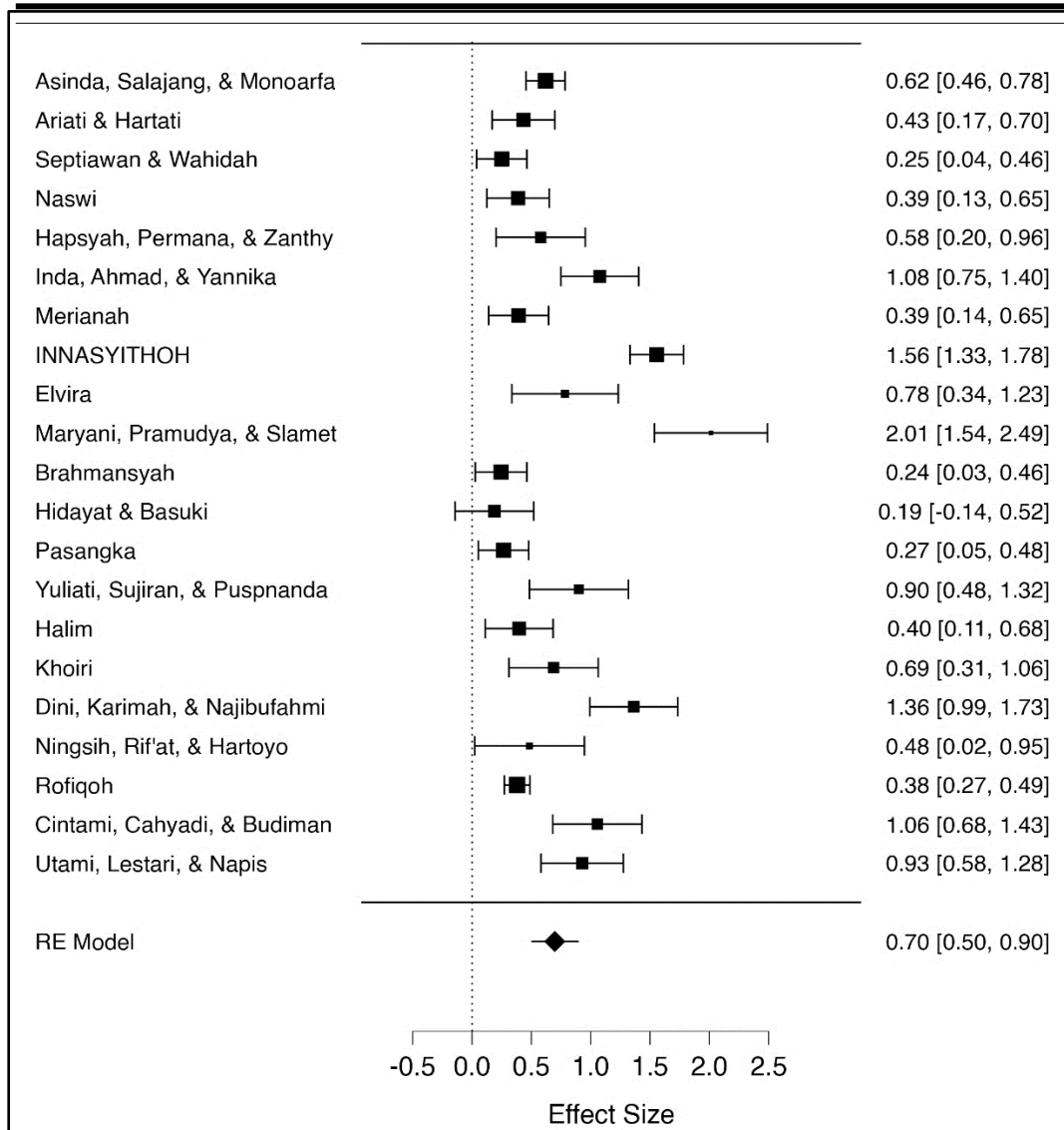


Figure 3 Forest Plot Based on Random Effect Model

Figure 3 shows the summary effect of all the studies analyzed in this study in their respective ranges. The summary effect value in the random effect model produces a number $M = 0.70$ in the range of 0.50 – 0.90, this value still has to be converted again to the correlation value (r) because the correlational meta-analysis calculation uses the z-fisher value. To change the value to the correlation value can use the following formula:

$$r = \frac{\exp(2M - 1)}{\exp(2M + 1)}$$

With a little manual calculation, we get the actual value of r is $r = 0.600$ which is the summary effect of all reviewed studies. The correlation value is classified as moderate strength (Thalheimer & Cook, 2002). The range value is also converted using the same formula so that the range correlation value obtained is in the range of 0.46 to 0.71.

Research on mathematical problem solving has been done a lot, many factors affect the ability to solve mathematical problems, one of which is emotional intelligence. Emotional intelligence also has an impact on open-mindedness, flexibility, motivation, conflict resolution, interpersonal and intrapersonal relations, team building, productivity, and empathy (Sherry, 2016). Mathematical problem-solving ability can be seen in emotional intelligence which contributes to the attachment to the medium category. This is reinforced by research showing that the higher a person's emotional intelligence, the stronger the potential they have to solve mathematical problems (Mulyaningsih et al., 2021; Oeleu et al., 2019).

This research has reviewed the study of the correlation of emotional intelligence on mathematical problem-solving ability, 21 studies have summarized the value of r presented, and the various correlation values create an inconsistency that must be addressed immediately. With meta-analysis, the overall score is 0.6 which is included in the medium category. Also, there is a positive influence between emotional intelligence and students' mathematical problem-solving abilities ($z=6820$ with a p -value less than $=0.05$). Problem solvers who are self-aware and can accurately and honestly assess their strengths in comparison to others in the organization have the advantage of leveraging the attributes of others in the problem-solving process (Baltazar, 2022; Hess & Bacigalupo, 2014).

These results provide input to teachers that in addition to preparing media, tools, models, and others in learning, students' emotional intelligence must also be involved (Antonella D' Amico, 2018) so that mathematics learning becomes more

effective and improves students' mathematical problem-solving abilities in Indonesia (Herdianto et al., 2020).

Emotional intelligence has a very large influence on learning mathematics, this can be seen from research (Maryani et al., 2020) that students who have high emotional intelligence have better mathematical problem solving abilities compared to students who have a moderate level of emotional intelligence, from this it can be seen that this emotional intelligence can support intellectual or cognitive intelligence to achieve learning success. In addition, emotional intelligence also influences other mathematical abilities which support each other to improve mathematical problem solving abilities, for example, reasoning abilities and mathematical understanding are also influenced by emotional intelligence (Hidayanto & Agustin, 2021). The research also revealed that high emotional intelligence allows students to make assumptions, to check the validity of a solution that is in accordance with the polya problem solving steps.

CONCLUSIONS

The results of the correlation meta-analysis that has been carried out show that there is a significant positive correlation between emotional intelligence and the mathematical problem-solving ability of students in Indonesia. The effect size values in each study differed significantly so that the heterogeneity assumption was met. As a result, the random effects model was used for further analysis. The studies analyzed were not prone to publication bias, so the publications analyzed were representative of the population. The summary effect value through the random effects model obtained is 0.6, which is in the range of 0.46 to 0.71. The value of $r=0.6$ is in the medium

category. Then the value of $R^2 = 0.36$ which means emotional intelligence contributes 36% in influencing problem solving abilities. The implications of these results are very useful for educators, students, and researchers in the field of mathematics education and teaching to always pay attention to the emotional intelligence possessed by students so that students' mathematical problem-solving abilities become better.

REFERENCES

- AL-Qadri, A. H., & Zhao, W. (2021). Emotional Intelligence and Students' Academic Achievement. *Problems of Education in the 21st Century*, 79(3), 360–380. <https://doi.org/10.33225/pec/21.79.360>
- Antonella D' Amico. (2018). The Use of Technology in the promotion of Children's Emotional Intelligence: The Multimedia Program "Developing Emotional Intelligence". *International Journal of Emotional Education*, 10(1), 47–67. www.um.edu.mt/ijee
- Baltazar, L. P. T. (2022). Emotional Intelligence and Analytical Problem Solving Skills of Students in General Mathematics. *International Journal of Innovative Science and Research Technology*, 7(4), 981–996.
- Behera, A. K. (2016). Understanding Emotional Intelligence in Educational Context. *International Journal of Humanities and Social Science Invention*, 5(2), 17–28. www.ijhssi.org
- Bindu, S. N. H., Nadu, T., & Vema, G. (2021). Narayana Reddy. 2277, 72–74.
- Borenstein, M., Hedges, L. V, Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to Meta-Analysis*. United Kingdom: John Wiley & Sons, Ltd.
- Card, N. A. (2012). *Applied meta-analysis for social science research*. New York: The Guilford Press.
- Cintami, F. A., Cahyadi, F., & Budiman, M. A. (2022). *DIKDAS MATAPPA : Jurnal Ilmu Pendidikan Dasar Pengaruh Tingkat Kecerdasan Emosional Terhadap Kemampuan*. 1(20), 70–78.
- Cleophas, T. J., & Zwinderman, A. H. (2017). *Modern Meta-Analysis*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-55895-0>
- Cooper, H. (2017). *Research Synthesis and Meta-Analysis: A Step-by-Step Approach*. SAGE Publications, Inc. <https://doi.org/10.4135/9781071878644>
- Decoster, J. (2009). Meta-Analysis Notes. In *Narrative*. Tuscaloosa: Institute for Social Science Research, University of Alabama. <http://www.stat-help.com/notes.html>
- Hendriana, H., Purwasih, R., Triawan, E., Prasetyo, Y., & Satria, T. (2018). Analysis of Student Problem Solving Skill and Activity Concentration on a Senior High School. *Al-Jabar : Jurnal Pendidikan Matematika*, 9(1), 1–8. <https://doi.org/10.24042/ajpm.v9i1.2068>
- Herdianto, E. N., Mardiyana, & Indriati, D. (2020). ICT-Based Learning Media to Enhance Students' Problem Solving Ability in Efforts to Face the Industrial Revolution 4.0. *Journal of Physics: Conference Series*, 1511(1), 012097. <https://doi.org/10.1088/1742-6596/1511/1/012097>
- Hess, J. D., & Bacigalupo, A. C. (2014). Enhancing Management Problem-Solving Processes through the Application of Emotional Intelligence Skills. *Journal of Management Policies and Practices*, 2(3). <https://doi.org/10.15640/jmpp.v2n3a1>
- Hidayanto, E., & Agustin, N. M. (2021). *The mathematical reasoning in terms of emotional intelligence*. 040028. <https://doi.org/10.1063/5.0043375>
- Higgs Victor, M. D. (2001). *Making Sense of Emotional Intelligence*. Berkshire: NFER-Nelson Publishing Company.
- Isam, A. (2020). Investigating the

- Development of Pre-Service Teachers' Problem-Solving Strategies via Problem-Solving Mathematics Classes. *European Journal of Educational Research*, 9(1), 129–141. <https://doi.org/10.12973/eu-jer.9.1.129>
- Jiang, R., Liu, R., Star, J., Zhen, R., Wang, J., Hong, W., Jiang, S., Sun, Y., & Fu, X. (2021). How mathematics anxiety affects students' inflexible perseverance in mathematics problem-solving: Examining the mediating role of cognitive reflection. *British Journal of Educational Psychology*, 91(1), 237–260. <https://doi.org/10.1111/bjep.12364>
- Juandi, D. (2021). Heterogeneity of problem-based learning outcomes for improving mathematical competence: A systematic literature review. *Journal of Physics: Conference Series*, 1722(1), 012108. <https://doi.org/10.1088/1742-6596/1722/1/012108>
- Kanhai, A. (2014). Emotional Intelligence : A Review of Researches. *European Academic Research*, 11(1), 797–834. www.euacademic.org
- Khoirunisa, L., & Hartati, L. (2017). Kemampuan Pemecahan Masalah Matematika Ditinjau dari Kreativitas dan Kecerdasan Emosional. *Jurnal Analisa*, 3(2), 106–114. <https://doi.org/10.15575/ja.v3i2.2011>
- Liljedahl, P., Santos-Trigo, M., Malaspina, U., & Bruder, R. (2016). *Problem Solving in Mathematics Education*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-40730-2>
- Littell, J. H., Corcoran, J., & Pilai, V. (2008). *Systematic Reviews and Meta-Analysis*. United State of America: Oxford University Press.
- Mailisman, N., Ikhsan, M., & Hajidin. (2020). Mathematics problem-solving skills of vocational high school students related to the 21 st -century education. *Journal of Physics: Conference Series*, 1460(1), 012014. <https://doi.org/10.1088/1742-6596/1460/1/012014>
- Maryani, S., Pramudya, I., & Slamet, I. (2019). The Effects of Emotional Intelligence on Students' Mathematical Problem Solving Ability. *International Journal of Multicultural and Multireligious Understanding*, 6(5), 912. <https://doi.org/10.18415/ijmmu.v6i5.1164>
- Maryani, S., Pramudya, I., & Slamet, I. (2020). Students' Mathematical Problem-Solving Abilities in Terms of Emotional Intelligence with TGT and TAI Models. *Proceedings of the 3rd International Conference on Learning Innovation and Quality Education (ICLIQE 2019)*. <https://doi.org/10.2991/assehr.k.200129.130>
- Meher, V., Baral, R., & Bankira, S. (2021). An Analysis of Emotional Intelligence and Academic Performance of Four- Year Integrated B.Ed. Trainees. *Shanlax International Journal of Education*, 9(2), 108–116. <https://doi.org/10.34293/education.v9i2.3555>
- Merianah, M. (2019). Pengaruh Kecerdasan Emosional dan Adversity Quotient terhadap Kemampuan Pemecahan Masalah Matematika Siswa SDIT IQRA'1 Kota Bengkulu. *Jurnal Pendidikan Matematika Raflesia*, 4(1), 29–35. <https://doi.org/10.33449/jpmr.v4i1.7526>
- Moreno, L. A. S. R. (2018). Emotional Intelligence And Academic Achievement. *Liceo Journal of Higher Education Research*, 13(2). <https://doi.org/10.7828/ljher.v13i2.1056>
- Mulyaningsih, D., Utami, R. E., & Muhtarom, M. (2021). Profil Kemampuan Pemecahan Masalah Matematika Ditinjau Dari Kecerdasan Emosional. *Imajiner: Jurnal Matematika Dan Pendidikan Matematika*, 3(6), 457–464. <https://doi.org/10.26877/imajiner.v3i6.8104>
- National Council of Teachers of Mathematics (NCTM). (2000). *Principles and standards for school mathematics*. Reston: NCTM.

- Oeleu, F. M., Leton, S. I., & Fernandez, A. J. (2019). Kemampuan Pemecahan Masalah Matematis Ditinjau Berdasarkan Kecerdasan Emosional Siswa Kelas VII SMP. *Asimtot : Jurnal Kependidikan Matematika*, 1(1), 51–59. <https://doi.org/10.30822/asimtot.v1i1.98>
- Pasangka, R. (2020). Pengaruh Kecerdasan Intelektual dan Emosional terhadap Kemampuan Pemecahan Masalah Matematika (Survei pada Siswa SMP Negeri di Bandar Lampung). 3(2), 114–119.
- POLYA, G. (1945). *How to Solve It: A New Aspect of Mathematical Method*. United States of America: Princeton University Press. <https://doi.org/10.2307/j.ctvc773pk>
- Posamentier, A. S., & Krulik, S. (1988). *Problem solving strategies for efficient and elegant solutions: A resource for the mathematics teachers*. Thousand Oaks, CA: Corwin Press Inc.
- Retnawati, H., Apino, E., Kartianom, Djidu, H., & Anazifa, R. D. (2018). *Pengantar Analisis Meta* (1st ed., Issue July). Yogyakarta: Parama Publishing.
- Rodley, H., & Bailey, J. (2021). The challenge of teaching children mathematics through meaningful problem-solving. *Set: Research Information for Teachers*, 1, 43–51. <https://doi.org/10.18296/set.0195>
- Sharei, M., Kazemi, F., & Jafari, M. (2012). Investigation the effect of emotional intelligence skills and metacognitive capabilities on student's mathematical problem solving. *Educational Research* (2141-5161), 3(11), 844–850. <http://search.ebscohost.com/login.aspx?direct=true&db=eft&AN=84432230&site=ehost-live>
- Sherry, M. (2016). EQ is More Important than IQ. *International Journal of Engineering, Management, Humanities and Social Sciences Paradigms (IJEMHS)*, 24(01).
- Singh, S. (2015). The Impact of Emotional Intelligence on Academic Achievement of U.G. Students. *Educational Quest- An International Journal of Education and Applied Social Sciences*, 6(3), 169. <https://doi.org/10.5958/2230-7311.2016.00003.9>
- Suarsana, I. M., Lestari, I. A. P. D., & Mertasari, N. M. S. (2019). The Effect of Online Problem Posing on Students' Problem-Solving Ability in Mathematics. *International Journal of Instruction*, 12(1), 809–820. <https://doi.org/10.29333/iji.2019.12152a>
- Tamur, M., Juandi, D., & Kusumah, Y. S. (2020). The Effectiveness of the Application of Mathematical Software in Indonesia; A Meta-Analysis Study. *International Journal of Instruction*, 13(4), 867–884. <https://doi.org/10.29333/iji.2020.13453a>
- Thalheimer, W., & Cook, S. R. (2002). *How to calculate effect sizes from published research: A simplified methodology*.
- Wulansari, K. R. (2014). *Hubungan Antara Kecerdasan Emosi Dengan Kemampuan Pemecahan Masalah Pada Remaja*. Universitas Muhammadiyah Surakarta.