

Self-Efficacy, Social Support, Academic Flow, and Math Anxiety among Islamic Senior High School Students

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Abstract

Math anxiety is a crucial problem experienced by almost all students. Due to the math anxiety affects the decreasing of mathematics achievement, many educators and researchers focused to overcome the math anxiety. The purpose of this study is to empirically examine the effects of math self-efficacy, social support, and academic flow on math anxiety. This research used a quantitative approach, by using psychological scales survey as a data collection. The participants of this study were 167 students which were collected using quota sampling technique at two high schools. The results show that there was a simultaneous significant negative effect of math self-efficacy, social support, and academic flow toward math anxiety. In addition, the partial analysis shows that there is no significant effect between math self-efficacy and math anxiety. While social support and academic flow have a significant effect on math anxiety. Thus, social support and academic flow can be used as strong predictors of math anxiety.

Keywords: *math anxiety, self-efficacy, social support, academic flow*

Abstrak

Kecemasan matematika merupakan masalah krusial yang dialami hampir semua siswa. Para pendidik dan peneliti menaruh perhatian terhadap persoalan kecemasan matematika, karena dampak kecemasan matematika berpengaruh terhadap rendahnya prestasi matematika. Penelitian ini bertujuan menguji secara empiris pengaruh *math self-efficacy*, *social support*, dan *academic flow* terhadap kecemasan matematika. Penelitian menggunakan pendekatan kuantitatif yang dilakukan dengan metode survei menggunakan skala psikologi sebagai alat ukur. Subjek penelitian berjumlah 167 siswa yang diambil dengan teknik kuota sampling pada dua sekolah menengah atas. Hasil penelitian menunjukkan bahwa secara simultan terdapat pengaruh negatif signifikan dari *math self-efficacy*, *social support*, dan *academic flow* terhadap kecemasan matematika. Namun, secara parsial tidak terdapat pengaruh signifikan *math self-efficacy* terhadap kecemasan matematika. Sedangkan variabel *social support* dan *academic flow* memiliki pengaruh negatif signifikan terhadap kecemasan matematika. Variabel *social support* dan *academic flow* dapat dijadikan prediktor yang kuat bagi kecemasan matematika.

Kata Kunci: kecemasan matematika, efikasi diri, dukungan sosial, flow akademik

Introduction

Mathematics is a compulsory learning material at all education levels. According to the Minister of National Education Regulation 2006, one of the subjects which exist in the Indonesian curriculum at all education levels is math. Mathematics is perceived negatively by students. The students' perception about the difficulty of mathematics subjects makes students'

demotivated to learn this subject (Deringol, 2018). As a result, it affects students' anxiety when they have to learn math. From the students' perspective, the desire to gain achievements in mathematics subjects gives the anxiety since they feel pressured by the various exercises and assignments from the teacher (Gafoor & Kurukkan, 2015).

Math anxiety is a common problem experienced by almost all students around the world (Chang & Beilock, 2016). The Program for International Student Assessment (PISA) research results show that the majority of students around the world experience anxiety during mathematics classes and exams (Luttenberger et al., 2018). According to (Blazer, 2011), there are approximately 93% of students in the United States indicate that they have experienced math anxiety. Similarly, Ibrahim (2008) showed that generally, the ability to solve mathematical problems in secondary education in Indonesia has not been satisfactory yet. One of the factors of this problem is that the students are afraid and nervous to face a math test. As a result, math anxiety demotivates students and decreases mathematical performance (Ashcraft & Moore, 2009).

Stoehr (2017), stated that math anxiety is a feeling of nervousness and worry to deal with mathematics, both in class and exams. Solikah (2012) said that math anxiety is a mental condition characterized by worries and fear of counting numbers or solving mathematical problems. Math anxiety is a strong feeling and involves fear to face mathematical problems (Zakaria & Nordin, 2008). Whyte & Anthony (2012) assumed that math anxiety is fear that can produce negative responses toward activities related to mathematics. Consequently, this anxiety disrupts a person's performance. Also, it can trigger and interfere with the process of learning mathematics (Mathews, 2013). Furthermore, Kurniawati (2014) showed that math anxiety has an impact on the learning process, the higher the anxiety experienced by a student, the more likely students will experience math anxiety. Math anxiety that occurs in individuals for a long time causes cognitive impairment in the form of lacking concentration, affective in the form of fear, and behaviors in the form of avoiding learning. Previous studies

have shown that math anxiety greatly influences mathematics achievement (Al Mutawah, 2015; Henry, 2017; Ruff & Boes, 2014). Students who have high math anxiety tend to have low mathematic achievement. On the contrary, students who have low math anxiety tend to have high mathematical achievement.

Previous researchers paid a great deal of attention to the problem of math anxiety. According to Abbasi et al. (2013) that mathematics anxiety is strongly influenced by factors that come from student personalities such as student self-esteem and also factors from the teacher, and how the teacher's personality and the methods used in teaching mathematics. Meanwhile, according to Miller et al. (2017) mathematics anxiety is largely influenced by students' perceptions of teacher competence in teaching mathematics, student respect, and effort to excel in mathematics. Meanwhile, Radisi et al. (2015) stated that mathematics anxiety is strongly influenced by students' interests and attitudes towards mathematics, mathematics self-concept, and the atmosphere of learning mathematics in the classroom. Garcia-Santillan (2016) found that 5 factors influence mathematical anxiety in students, namely: anxiety toward evaluation, anxiety toward temporality, anxiety toward an understanding of mathematical problems, anxiety toward numbers and operations, and anxiety toward mathematical situations in real life.

Whyte & Anthony (2012) assumed that the factors of math anxiety come from personality factors, intellectual factors, and environmental factors. Similarly, Wicaksono & Saufi (2013) explained that the feeling of pessimism is one of the causes of math anxiety in individuals. The belief of being able or not in carrying out certain tasks are also called self-efficacy. In the same way, Bandura (2001) stated that self-efficacy is an individual's assessment of the ability or competence to perform a task, achieve a goal, and produce a product.

Besides, Olango (2016) said that self-efficacy is a predictor of math anxiety. Nizham & Suhendra (2017) stated that self-efficacy can reduce math anxiety. In the same way, Disai et al. (2018) said that self-efficacy enables an individual to manage anxiety which results in the reduction of math anxiety.

Besides personality factors, math anxiety is also influenced by environmental factors. Adicondro & Purnamasari (2011) explained that environmental factors and social support are the factors that influence students' math anxiety. Sarafino & Smith, (2014) said that social support refers to the help or appreciation from others, as well as the attention received from other people or groups. Students who get strong social support from the environment tend to have low math anxiety. Erden & Akgül (2010), found that social support reduced math anxiety. The role of social support is very important to decrease math anxiety (Im, 2012).

Slameto (1988), stated that the success of mathematics subjects is influenced by interests, abilities, psychological conditions, and academic flow. According to Joo & Kim (2015), academic flow is a personality factor that influences student anxiety and achievement, in addition to motivational factors and self-efficacy. Meanwhile, according to Golnabi (2017), academic flow and mathematics self-efficacy, which are aspects of student personality, also affect the development of mathematical abilities. Similarly, Csikszentmihalyi & Csikszentmihalyi (1992) explained that the academic flow is a behavior in which a person concentrates, interests, and being passionate to do an activity. Individuals who experience flow are usually actively involved in activities, so they tend to be unaware of the time or place. Students who experience academic flow tend to avoid lazy behavior, such as cyberloafing (Yuwanto, 2018). Besides, Ljubin-Golub et al. (2018) stated that students who experience flow tend to do

work as perfectly as possible (perfectionist) and have a high level of engagement at work. Elias et al. (2010), assumed that students who experience flow tend to have high motivation in learning. Also, Hong et al. (2012) found that someone who has self-efficacy and a high flow tends to be less anxious. Thus, academic flow can be used as a predictor of math anxiety.

Previous studies that simultaneously linked the variables of math self-efficacy, social support, and academic flow with math anxiety areas researched by Suminta, (2014) which shows that simultaneously variables such as parental academic support, peer academic support, classroom climate, mathematics self-efficacy, and academic flow affect mathematics anxiety. Meanwhile, Golnabi (2017) in his research, found that simultaneously mathematics self-efficacy and academic flow affect students' mathematics anxiety. Meanwhile, according to Akin & Kurbanoglu (2011), there is a relationship between math attitudes and math self-efficacy with math anxiety. Thus this research on math self-efficacy, social support, and academic flow on math anxiety is different from previous studies.

Based on these explanations, it shows that variables such as self-efficacy, social support, and academic flow are predictors that affect math anxiety. Therefore, it is necessary to conduct empirical research on how these three variables influence math anxiety. This study examines whether there is an effect of math self-efficacy, social support, and academic flow toward math anxiety.

Method

This study uses a quantitative approach particularly, a type of predictive correlational research that focuses on one or more variables as predictor variables to predict their effects on the criterion variable (Gall et al., 2006). The survey is used to collect data from the research instrument distribution to participants.

Participant

This research was conducted in two schools, state Islamic senior high school (MAN) 1 Mojokerto and state Islamic senior high school (MAN) 1 Jombang. The two schools were purposefully used as research objects because the preliminary research studies in these schools showed a high tendency of students who experienced math anxiety = 69.84 > 45 (theoretical average) (Herawati, 2020). To select the participants, the quota sampling technique was used which results in 167 students as a research sample. Table 1 shows the distribution of participants.

Instrument

Four psychological measurements were used as the instrument in this study: 1) Math Anxiety Scale (S-MA), this scale measured three aspects of math anxiety: cognitive, affective, and behavioral. This instrument was arranged based on Wyhte and Anthony's (2012). This scale consists of 18 high-reliability items ($\alpha = .898$). Examples of S-MA items include the following: "I feel tense while working on math problems" ($r = .748$). 2) Math Self-Efficacy Scale (S-MSE), this scale measured three aspects of self-efficacy: magnitude, strength, and generality (Bandura, 2001). This scale was arranged to measure math self-efficacy consisting of 18 very high-reliability items ($\alpha = .904$). Examples of S-MSE items include the following: "I believe I can solve math problems correctly" ($r = .848$). 3) Social Support Scale (S-SS), this scale measures four aspects of social support; emotional support, appreciation support, instrumental support, and information support (Sarafino & Smith, 2014). This scale was arranged to measure social support that consisted of 16 high-reliability items ($\alpha = .866$). Examples of S-SS items include the following: "My parents often help solve math problems if I'm having trouble" ($r = .762$). 4) Academic Flow Scale (S-AF), this scale measured three aspects of academic flow: absorption,

enjoyment, and intrinsic motivation (Csikszentmihalyi & Csikszentmihalyi, 1992). This scale was arranged to measure academic flow that consisted of 18 high-reliability items ($\alpha = .888$). Examples of S-AF items include the following: "Studying mathematics for a long time gives me a pleasant feeling" ($r = .802$).

All of the instruments in this study were arranged through the following stages: (1) defining the concept; (2) making operational definitions of behavior; (3) arranging behavioral aspects; (4) compiling indicators; (5) preparing a blueprint; (6) testing the draft items by two experts; (7) presenting to 20 students and 5 teachers as readers; (8) revising the draft from the experts, readers and teachers suggestion; (9) retesting the items to 60 students; (10) selecting the items; (11) preparing the items for research instruments (Beaton et al., 2000; Borsa et al., 2012; Hambleton & Zenisky, 2011).

Data Analysis

Multiple regression analysis was used to analyze the data. Also, stepwise techniques were used to analyze the effect of each predictor variable on the math anxiety variable. All data analyses used SPSS Program for Windows Version 20.

Table 1
Respondents Distribution

Demography	Total	Percentage
Sex		
Male	64	38.3%
Female	103	61.7%
Age		
14 Year Old	4	2.4%
15 Year Old	72	43.1%
16 Year Old	91	54.5%
School		
MAN 1 Mojokerto	82	49.1%
MAN 1 Jombang	85	50.9%

Results and Discussion

The results of the statistical analysis in table 2 show that there is a simultaneous significant negative effect on the three predictor variables: math self-efficacy, social support, and academic flow towards math anxiety ($F = 122.754$; $P = .000$). The third effect of predictor variables is 69.3% on math anxiety. Although the three predictor variables have different effects on math anxiety. Table 3 shows the results of partial tests, where there is no significant effect between math self-efficacy on mathematics anxiety ($\beta = -.431$; $t = -.949$; $p = .344$). While social support variables have a significant negative effect on mathematics anxiety ($\beta = -1.021$; $t = -4.076$; $p = .000$). That is, the higher the social support of a student the lower mathematical anxiety, conversely the lower the social support of a student the higher mathematical anxiety. The academic flow variable has a significant negative effect on students' mathematical anxiety ($\beta = -.154$; $t = -5.081$; $p = .000$). In short, the higher the academic flow of a student the lower the mathematics anxiety. On the contrary, the lower the academic flow of a student the higher the mathematics anxiety. Thus, social support and academic flow variables can be used as predictors of mathematics anxiety. Besides, the math self-efficacy variable cannot be used as a predictor variable to mathematics anxiety.

Table 2
Multiple Regression Analysis of Predictors Variables on Math Anxiety

Statistic	Value
<i>F</i>	122.754
<i>P</i>	.000
<i>R</i>	-.833
<i>R Square</i>	.693

Table 3
Effect of Predictors Variables on Math Anxiety

Predictors Variables	<i>B</i>	<i>T</i>	<i>P</i>
Math Self-Efficacy	-.431	-.949	.344
Social Support	-1.021	-4,076	.000
Academic Flow	-.154	-5.081	.000

Table 4
Effective Contribution (EC) of Variable Predictors on Math Anxiety

Variable Predictors	EC of Variable Predictors on Math Anxiety
Math Self-Efficacy	2.5%
Social Support	11.15%
Academic Flow	55.65%
Total	69.3%

Table 4 show the results of the effective contribution (EC) of each predictor variable on the criterion variable indicate that the EC variable math self-efficacy on mathematics anxiety = 2.5%; EC for the social support variable on mathematics anxiety = 11.15%; and EC for the variable of academic flow against mathematics anxiety = 55.65%. Based on this, it can be understood that the academic flow variable gives EC that has the highest effect on reducing mathematics anxiety, while the math self-efficacy variable provides the lowest EC on reducing mathematics anxiety.

The results of this study indicate that the variables such as math self-efficacy, social support, and academic flow are simultaneous strong predictors of math anxiety. In accordance, Chang & Beilock (2016), revealed that math anxiety is influenced by individual factors (cognitive, affective, motivational) and environmental (social, contextual). Though in partial, those variables have different effects on math anxiety. However, this study does not clarify that math self-efficacy influences students' math anxiety. On the contrary Akin & Kurbanoglu (2011); Ardi et al. (2019); Azar & Mahmoudi (2014); Ganesan & Singh (2016); Jameson & Fusco (2014); Peker (2016); Siswanti & Djalal (2018) stated that math self-efficacy affects math anxiety.

In other words, tough the students have high math self-efficacy, especially a student with a semester credit system, their math anxiety is still high. Justicia et al. (2017), stated that math anxiety is strongly influenced by mathematical self-concept

and working memory. Similarly, math anxiety is strongly influenced by the role of learning situations in the classroom and students' self-regulation (Lavasani et al., 2011). Also, math anxiety is caused by the low ability to problem-solve (Das & Das, 2013). Similarly, Ahmed et al. (2012), stated that math anxiety is influenced more by students' self-concepts about mathematics.

In addition to this, the insignificance of the math self-efficacy variable on mathematics anxiety is due to the researcher using direct multiple regression analysis, either simultaneously or partially, so that it is not known which predictor variable influenced the mathematics anxiety variable first. When compared with the findings of Gurefe & Bakalim (2018), it shows that mathematics anxiety (both negative and positive anxiety) as an independent variable affects math self-efficacy. If analyzed using One-way ANOVA and Structural Equation Modeling (SEM), it is possible to know the relationship model of each variable.

In the same way, the two other predictor variables, social support and academic flow negatively affect math anxiety. In other words, this study proves that the higher the social support and students' academic flow, the lower the math anxiety. On the contrary, the lower the social support and students' academic flow, the higher the math anxiety. This research agrees that the role of social support from the surrounding environment is very vital in reducing math anxiety. Similarly, the flow condition experienced by students helped to reduce math anxiety. Besides, students with high academic flow tend to have low math anxiety, whereas students with low academic flow tend to have high math anxiety

This study confirms the findings of Baltaci & Hamarta (2013), who stated that there was a negative relationship between social support and anxiety. However, Dzulkifli & Yasin (2009) revealed that

social support can reduce psychological problems such as anxiety. Similarly, Engerman et al. (2012), revealed that students who have academic support from their peers tend to be able to overcome various problems and improve their problem-solving abilities. Furthermore, Shishigu (2018) suggested that as an effort to support and to strengthen mathematics learning, it is necessary to have a preventive strategy to minimize math anxiety. Because students with low math anxiety tend to have a high mathematical achievement, intervention is needed to reduce math anxiety. In short, one of the most influential factors in reducing math anxiety is social support from teachers, peers, and parents (Maloney et al., 2015). Similarly, Wilcox et al. (2018), stated that the role of academic support from teachers, parents, and peers can reduce math anxiety in students.

Furthermore, Casad et al. (2015); Maloney et al. (2015); Soni & Kumari (2017), assumed that students' math anxiety is also influenced by parental anxiety which affects the decreasing of student mathematics achievement. In other words, parents' attitudes and anxiety play an important role in increasing students' math anxiety as well as students' mathematical achievements. Macmull and Ashkenazi (2019) stated that parenting pattern also influences math anxiety. Authoritative parenting tends to negatively affect math anxiety, while permissive parenting tends to positively influence math anxiety. Also, Griggs et al. (2013), argued that classroom learning with responsive approach models tends to be able to minimize students' math anxiety.

Additionally, the finding also shows that the students' academic flow condition has a significant negative effect on math anxiety. In other words, the more students experience the academic flow, the lower their math anxiety. On the contrary, the fewer students experience the academic flow, the higher the math anxiety. Thus,

students who experience academic flow tend to avoid lazy behavior, such as cyberloafing (Yuwanto, 2018). Similarly, Ljubin-Golub et al. (2018) stated that students who experience flow tend to do work as perfectly as possible (perfectionism) and have a high level of engagement at work. Elias et al. (2010), argued that students who experience flow tend to have high motivation in learning. Similarly, Hong et al. (2012), believed that someone who has self-efficacy and high flow tends to be less anxious.

Therefore, the findings of this study reveal that the role of variables such as social support and academic flow can be used as predictors to reduce the tendency of math anxiety. The intervention is needed to overcome math anxiety because this problem is a very important issue as consideration for the researchers (Ramirez et al., 2018). Furthermore, the finding of this study can be used as a reference policy and intervention in increasing mathematical performance. Therefore, if students experience anxiety, it has an impact on the decreasing of mathematical achievement (Foley et al., 2017). In short, the higher the math anxiety of students, the lower the mathematics achievement. On the contrary, the lower the math anxiety, the higher the mathematics achievement (Wu et al., 2012). To conclude, from this finding it is recommended for researchers to pay high attention to how psychological interventions such as academic support can reduce math anxiety.

However, this study contains limitations such as the sample used in only two schools and the sample size is still a little less representative of the actual population so that for further research it is necessary to use a larger sample with more complex demographic data variations. Besides, this study only tested the effect of all predictor variables directly on mathematics anxiety by using multiple regression analysis. The hope is that the next researcher can test with Structural

Equation Modeling (SEM) analysis to obtain more detailed results, the relationship between the variables studied.

Conclusion

Based on these explanations, it can be concluded that there is a simultaneous significant negative effect of math self-efficacy, social support, and academic flow toward math anxiety. In other words, math self-efficacy, social support, and academic flow can be used as strong predictors of math anxiety. In partial, the results of this study indicate that there is no significant effect between math self-efficacy toward math anxiety. While social support has a significant negative effect on math anxiety. Also, social support can be used as a strong predictor of math anxiety. Besides, the academic flow has a significant negative effect on math anxiety and academic flow can be used as strong predictors of math anxiety. This study shows that the role of students' internal factors such as academic flow and external factors such as social support is very influential in low math anxiety. Therefore, the findings of this study can be used as a reference for educators, parents, students, and stakeholders to pay attention to personality and social environment factors related to dealing with math anxiety problems.

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