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Research Article

The Relationship between the Secondary School Students' Mathematics Anxiety and Mathematical Literacy Self-Efficacy

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Abstract

The research aims to determine the difference between secondary school students' mathematics anxiety with mathematics literacy self-efficacy level and study these connections. The relational screening model in the research population comprises 32 secondary schools in the 2020-2021 academic years in Esenyurt province, Istanbul. Research samplings comprise 1682 students that are chosen with the stratified sampling method from nine different secondary schools in Esenyurt province. Data was gathered by the ''Secondary School Mathematics Literacy Self-Efficiency Scale'' and ''Mathematics Anxiety-Apprehension Survey''. For data analysis, descriptive statistics, Sperman Correlation Analysis and statistical techniques are used. As a result of the analysis, secondary school students' mathematics anxiety is higher than average, and their mathematics literacy self-efficacy is also significantly higher. After the examination of the relationship between the scales, it was determined that there is a positive relationship between mathematics anxiety and mathematics literacy self-efficacy.

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Introduction

The difficulties experienced in defining mathematics also apply to mathematic literacy (Yenilmez & Turğut, 2012). The most common encountered definition of mathematical literacy made by OECD; is a person who is an individual who thinks, produces and judges, deciding while the problem-solving process of the problems that may arise today or in the future tracking down using the mathematical thinking methods to make an understanding over the mathematics place in the world and learning adequacy (OECD, 2006). From this point of view, mathematic literacy is useful; as a person notices how much mathematics takes place in the world, in the use of daily life encounters, in the interpretation of the number-sign-table graphics, and in different problem-solving skills (Özgen & Bindak, 2008). Individuals who have mathematical literacy, to be a part of related mathematical

cases; it would be said that it helps actively benefits to use mathematics in daily life (Yıldırım, 2016).

Determining the level of mathematical literacy provides a link between mathematical literacy and daily life problems, providing awareness in mathematics teaching and making mathematics teaching effective (Gürbüz, 2014). In order to develop mathematical literacy, students should have the necessary mathematical knowledge and different problem-solving strategies, and they should know when and how to use these strategies (Kabael & Barak, 2016; Özgen & Kutluca, 2013). Güler (2013) revealed that students have difficulties in solving the questions such as lack of self-confidence, lack of knowledge, disability to reading the problem properly, not understanding, carelessness and accepting their own knowledge as the information given in the problem. It is important to understand the individual's perception of their own performance and weaknesses as well as knowing their mathematical performance (Goodwin, Ostrom & Scott, 2009).

Self-efficacy is one of the must-be setting stones that needs to actively benefit to increase (Zehir & Zehir, 2016). From the point of view of Bandura's Social Cognitive Learning Theory, the self-efficacy concept is defined as these three results which are, individuals' ability to express, reveal and believe their knowledge correctly (Bandura, 1997). Based on this definition, the student's belief that she/he will move towards correct results with numbers by relying on his/her calculus skills may lead to the judgment of self-efficacy in a good manner.

The knowledge and equipment may not be sufficient to qualify the person as successful in the field of numbers. As a matter of fact, İpek (2019) stated the fact that mathematics achievement is only related to field proficiency which is an indicator of the inability to look at the situation from a broad perspective. Konca (2008) on the other hand, stated that one of the main problems in this area is the feeling of anxiety. In parallel, Pajares (2003) and Usher (2009) stated that one of the starting point of self-efficacy is psychological states that develop as a result of stress and anxiety in the individual. In this direction of the idea, it is stated that the relationship between mathematics anxiety and mathematics self-efficacy is reversed (Marshall, 2000).

Mathematics anxiety is defined as a phenomenon that occurs as a feeling of tension or a state of stress during an individual's learning life and daily life; when solving mathematical problems, or he/she has to perform operations in situations involving numbers (Tobias,

1978). Sheffield and Hunt (2006), on the other hand, defined mathematics anxiety as a state of hesitation and anxiety that occurs when a person encounters problems involving mathematics. If the anxiety exceeds the required level, it will cause fear of mathematics in the person and negatively affect his learning and further thinking processes (Wilson, 2012). When we look at the causes of mathematics anxiety, there are emotional reasons and resistance in learning mathematics (Wilson, 2012), negative thoughts towards mathematics (Uusimaki & Nason, 2004), environmental factors (Stuart, 2000), low academic achievement (Kramarski, Weisse & Kololshi-Minsker, 2010; Kutluca, Alpay & Kutluca, 2015) and lack of self-confidence (Brady & Bowd, 2005). Having a negative feeling towards the math lesson also causes math anxiety, low performance and making math an unpopular course (Keitel & Kilpatrick, 2005). In addition, math anxiety directly affects behavior towards math (Hembree, 1990). However, it can be clearly stated that mathematics anxiety is one of the negative emotions that hinders having knowledge about mathematics and developing mathematical abilities (Green, 1999). There are many studies investigating students' mathematics anxiety and self-efficacy. In studies that determine the level of mathematics self-efficacy, there are results in which self-efficacy beliefs are found to be high (Walsh, 2008) as well as moderate or low (Yaman & Dede, 2006). In some studies that aim to determine the anxiety level, it is seen that the participant's mathematics anxiety levels are low (Walsh, 2008), on the contrary in other studies it is found to be high (Uusimaki & Nason, 2004). Based on these studies, it can be said that there is no common opinion in the literature about mathematics anxiety and self-efficacy of secondary school students. In some studies, the bilateral relations between mathematics anxiety and self-efficacy are examined. In the majority of these studies, it was determined that there is a negative (Yaratan & Kasapoğlu, 2012) significant relationship between mathematics anxiety and self-efficacy (Nicolaidou & Philippou, 2003).

Tabur (2019) measured the level of math anxiety in a study by which students stated that after the math exam is over, they often bear a great burden and they are more nervous in math exams than other exams, they often feel more nervous than normal while waiting for the results of the exam, and they do not want math exams to be very important for their future. As can be seen, the use of time-limited mathematics exams by students is seen as the factor that causes the most anxiety (Hembree, 1990). It may be more beneficial to use alternative measurement and evaluation methods and tools such as projects, research, homework, group work, development file, self-assessment and observation instead of using

such exams frequently (Bozkurt, 2012). In addition, it can be said that students' anxiety decreases when they are supported by the teacher and they are successful (Erden & Akgün, 2010). For this, teachers need to be skilled in removing the factors that cause students' anxiety in the classroom environment and increasing their social support on the other hand (Bozkurt, 2012). For this reason, it is important to identify math anxiety or to be aware of it in order to offer and search for a unique solution.

According to the PISA 2012 results, it is determined that while the anxiety scores of the countries with low mathematical literacy are high, the anxiety scores are also higher in countries with high mathematical literacy (Tatlı, Ergin & Demir, 2016). This result contradicts the general literature findings and it is stated that it should be investigated. As can be seen, looking at the PISA results, it can be said that anxiety is one of the factors that prevent mathematics learning. On the other hand, it is stated that one of the variables affecting mathematics anxiety is mathematics self-efficacy (Haynes, Mullins & Stein, 2004). In this context, the fact that anxiety can be associated with many student characteristics makes it possible to determine the effect of this relationship on mathematics anxiety. In the literature review, it is seen that most of the studies in Turkey on mathematics anxiety are in the form of correlational research. Mathematics anxiety and motivational beliefs (Yurt & Şahin, 2015), test anxiety (Yılmaz, 2015), learning styles (Coşkun & Demirtaş, 2015), mathematics attitude (Tuncer & Yılmaz, 2016), sports success perception (Aydoğdu 2017), mathematical understanding (Kaba & Şengül, 2018), mathematical thinking (Köksal, 2019), learned helplessness (Tan, 2015) and metacognitive awareness (Mert & Baş, 2019). When the studies conducted in Turkey on mathematical literacy self-efficacy were examined that university students studying in the field of teaching were selected in the sample of most of them (Dinçer, Akarsu & Yılmaz, 2016) is determined. The topic studied, mostly visual mathematical literacy self-efficacy (İlhan & Aslaner, 2019) and PISA applications (Sezgin, 2017) is selected. As a result of the literature review, it can be said that there is not a study in Turkey that correlates mathematics literacy self-efficacy in the context of secondary school students, which is one of the affective characteristics of mathematics anxiety and one of the sub-branches of self-efficacy and mathematics anxiety.

In this context determining the mathematics anxiety and mathematics literacy self-efficacy of secondary school students and being able to reveal the relationship between them constitute the problem situation of the study. The data obtained in studies examining

mathematics anxiety and affective characteristics show that it is necessary to determine the predictors of anxiety. It is thought that this study will contribute to the related literature, which constitutes a source for the measures that can be taken in learning environments and education policies that can be developed in the long term, by revealing the relationship between mathematics anxiety and mathematical literacy self-efficacy.

The aim of the study is to examine the mathematics anxiety and mathematics literacy self-efficacy of secondary school students and to reveal the relationship between mathematics anxiety and mathematics literacy self-efficacy.

In line with the purpose and problem situation of the research, secondary school students;

- What are mathematics anxiety levels?
- What is mathematical literacy self-efficacy?
- What is the relationship between mathematics anxiety and mathematical literacy self-efficacy?

answers to sub-problems are sought.

Method

Research Model

This research determines mathematics anxiety with mathematical literacy self-efficacy level and will show the relationship between them. So, in terms of the relation scanning model, this is a descriptive quantitative study. Correlational research is a non-experimental study, in terms of using data derived from two pre-existing variables. There is typically no cause-effect relationship in the correlational survey model. The advantage of this method is that it gives information about the strength of the relationship between the variables (Ary, Jacobs, Irvine & Walker, 2018).

Sample of the Research

The sample of the research; in order to increase the representativeness of the population of the sample, random sampling is chosen, and the sample unit is determined as stratified sampling; since subgroups in the population are determined and represented by their ratios in the population size (Büyüköztürk et al., 2011). Stratified sampling, the target participants' factors are the categorization of factors within each stratum into different groups or strata that are similar in terms of the attributes selected as important for the scale.

The stratification process is also used to reduce the cost of testing a sample model and increase the efficiency of the estimator in terms of precision (Parsons, 2014).

Schools are selected by considering the problem situation of this research, and secondary school students are divided into subgroups according to the socio-economic level and type of school variables, which are thought to influence the mathematics anxiety level and literacy self-efficacy perception. A list is arranged for each layer. As a universe, 32 secondary schools in the Esenyurt province of Istanbul in Turkey are listed according to their socio-economic level, as low-middle-upper, and according to school types, in the form of secondary schools-İmam Hatip secondary schools. After that, simple random sampling was done for each layer. In the last stage, 9 secondary schools were selected, with 3 levels from each socio-economic level. When these 9 secondary schools are proportioned according to the school type, they take their final form in the sample as 6 secondary schools and 3 İmam-Hatip secondary schools.

The sample of the research consists of 1686 secondary school students studying in public secondary schools in Istanbul Esenyurt in the 2020-2021 academic year. Demographic characteristics of the sampling are given in Table 1 and Table 2.

Table 1. Sampling group gender distribution

Gender	Frequency	Percentage (%)
Female	984	58.4
Male	702	41.6
Total	1686	100.0

When the participants of the study are examined in terms of gender variables, as seen in Table 1, there are a total of 1686 students, 984 (58.4%) of the students are girls, and 702 (41.6%) are boys.

Table 2. Sampling group grade distribution

Grade	Frequency	Percentage (%)
5th Grade	249	14.8
6th Grade	405	24
7th Grade	472	28
8th Grade	560	33.2
Total	1686	100.0

On the other hand, 249 students (14.8%) are in the 5th grade, 405 (24%) are in the 6th grade, 472 (28%) are in the 7th grade, and 560 (33.2%) are in the 8th grade.

Data Collection Tools

As a data collection tool in the research, "Mathematics Anxiety-Apprehension Survey" (MASS) is developed by Ikegulu in 1998 and adapted into Turkish by Özdemir and Gür (2011) to determine the levels of mathematical literacy self-efficacy "Secondary School Mathematics Literacy Self-Efficacy Scale" Baypınar and Tarım (2019) are used.

Mathematics Anxiety-Apprehension Survey (MASS)

Mathematics Anxiety-Apprehension Survey consists of 20 items, 13 of these items are positive and 7 of them are negative and has a 5-point Likert structure. Negative items were scored inversely. The scale has a two-factor structure in the form of positive and negative attitudes. A score between 20 and 100 can be obtained from the scale. A higher score indicates that the student's anxiety-apprehension level is also higher. According to the results of the validity and reliability test of the scale adapted by Özdemir and Gür (2011), The Cronbach alpha internal consistency coefficient of the whole scale determined .91, The Cronbach alpha internal consistency coefficient of the positive attitude sub-dimension determined .85, and The Cronbach's alpha internal consistency coefficient of the negative attitude sub-dimension determined .91. In this study, The Cronbach alpha internal consistency coefficient of the positive attitude towards mathematics dimension determined as .84 and the coefficient of the negative attitude dimension determined as .89, and this coefficient found to be .61 for the whole scale. According to the data obtained, it can be said that the scale is valid and reliable for this research.

Mathematical Literacy Self-Efficacy Scale for Secondary School

Secondary School Mathematical Literacy Self-Efficacy Scale contains 30 items, 24 of which are positive and 6 of them are negative items and it has 4 sub-dimensions. These sub-dimensions are; mathematical skill, personal experience, scientific modeling, and social context. The scale was arranged in a 5-point Likert format. Negative items were scored inversely. The lowest score that can be obtained from the scale is 30, and the highest score is 150. A high score indicates high mathematical literacy self-efficacy. Baypınar and Tarım (2019) found the Cronbach's alpha internal consistency coefficient for the whole scale they developed .92, .90 for the first sub-dimension, .75 for the second sub-dimension, .81 for the third sub-dimension, and 0.78 for the fourth sub-dimension. In the data collected within the scope of this research, The Cronbach's alpha internal consistency reliability coefficients of the secondary school mathematical literacy self-efficacy scale determined .89 for the whole scale,

.93 determined for the first sub-dimension, .93 determined for the first sub-dimension, .81 determined for the second sub-dimension, personal experience, and .83 determined for the third sub-dimension, the fourth sub-dimension .82 determined for social context. According to the data obtained, it can be said that the scale is valid and reliable for this research.

Analysis of Data

The analysis of the answers from the scales used in the research were carried out with the SPSS 20.0 package program. In order to decide on the appropriate test in the analysis of the data, the normality of the distribution of the scores obtained from the whole scale and its sub-dimensions are examined. It is decided that the distribution is not normal because the arithmetic mean-peak value-mean values of the scores obtained are not close, and because normality tests (Kolmogrov-Smirnov and Shipiro Wilk) significance values are not $p<0.05$. While descriptive statistics methods are used to determine the current status of the sample measured by scales (1st and 2nd sub-problem), the Spearman rank difference correlation coefficient is calculated for the relationship between the scores obtained from the scales.

Finding

Findings Regarding the Level of Mathematics Anxiety

The descriptive statistics of the scores obtained from the Mathematics Anxiety Scale are given in Table 3.

Table 3. Secondary school students' mathematics anxiety-apprehension level

Mathematics Anxiety-Apprehension Rating Scale	n	Min.	Max.	$\bar{x}$	Ss
Positive Attitude	1686	13	65	45.46	11.70
Negative Attitude	1686	7	35	18.24	7.00
Mathematics Anxiety (Total)	1686	20	100	63.70	9.43

Since the lowest score that can be obtained from the scale is 20, the highest score is 100, and 60 points are considered a medium level. In Table 3, it is determined that the total score average of the data obtained from 1686 students is 63.70. According to the aforementioned average, it can be said that the mathematics anxiety levels of the secondary school students participating in the study are above the medium level. When the two sub-dimensions of the scale are examined; the highest score that can be obtained from the items of the positive attitude dimension towards mathematics is 65, the lowest score is 52 points, and the lowest score that can be obtained from the items of the negative attitude dimension

is 7, the highest score is 35, and 28 points are interpreted as medium level. It is seen that the participants have a positive attitude mean score ($\overline{X}$=45.46) and a negative attitude mean score ($\overline{X}$=18.24). Accordingly, it is understood that the attitude scores of the students in both sub-dimensions of the scale are lower than the average value.

Findings on Mathematical Literacy Self-Efficacy

The descriptive statistical results of the scores obtained from the Mathematical Literacy Self-Efficacy Scale are presented in Table 4.

Table 4. Secondary school student's mathematics literacy self-efficacy

Mathematics Literacy Self-Efficacy Scale	N	Min.	Max.	$\bar{x}$	Ss
Mathematical Skill	1686	15	75	49	13.62
Personal Experience	1686	6	30	17.61	6.08
Scientific Modeling	1686	4	16	14.94	4.04
Social Context	1686	5	25	17.40	4.51
Mathematics Literacy Self-Efficacy (Total)	1686	30	150	98.95	18.15

According to Table 4, the average value for the total scale is 98.95. Considering the average value taken from the sub-dimensions of the scale, it is found that the average value of the first sub-dimension is 49, the average value of the second sub-dimension is 17.61, the average value of the third sub-dimension is 14.94, and the average value of the fourth sub-dimension is 17.40. In line with the aforementioned arithmetic score averages, it is understood that the students are moderate in mathematical skills, moderate in personal experience, very good in scientific modeling, good in a social context, and moderate on the whole scale.

Findings on the Relationships between Mathematics Anxiety-Apprehension Levels and Mathematical Literacy Self-Efficacy

The Spearman Rank Differences Correlation Coefficient Test is used to determine the relationship between the variables, one of the questions that the study sought answers, and the correlation expressing the relationship is given in Table 5.

Table 5. Sperman correlation analysis showing the relationship between mathematics anxiety-apprehension level and mathematics literacy self-efficacy

		Mathematics Anxiety-Apprehension (Total)	Mathematical Literacy Self-Efficacy (Total)
Mathematics Anxiety-Apprehension	r	1	0.47
	P		0.00

(Total)			
Mathematical Literacy Self-Efficacy (Total)	r	0.47	1
	p	0.00	

p<0.05

When the significant value in Table 5 is examined, it is mentioned that there is a significant relationship between the two scales (p<0.05). Considering the relationship between the scales and their sub-dimensions according to the data, it was determined that there was a moderate positive relationship between total mathematical anxiety and total mathematics literacy self-efficacy (r=0.47, p<0.05).

Table 6. Sperman correlation analysis showing the relationship between mathematics anxiety-apprehension level and sub-dimensions of the secondary school students' mathematics literacy self-efficacy scale

		Mathematical Skill	Personal Experience	Scientific Modeling	Social Context
Positive Attitude	r	0.71	-0.50	0.48	0.52
	p	0.00	0.00	0.00	0.00
Negative Attitude	r	-0.54	0.67	-0.39	-0.40
	p	0.00	0.00	0.00	0.00

p<0.05

As can be seen in Table 6, a correlation coefficient of .71 is calculated between mathematical skill, one of the sub-dimensions of mathematical literacy self-efficacy, and positive attitude, which is one of the sub-dimensions of mathematics anxiety, and -.54 between the negative attitude dimensions. In this case, it can be said that there is a high level of positive correlation between mathematical skills and positive attitude, on the other hand, there is a weak negative relationship between mathematical skills and negative attitude. The correlation coefficient between personal experience, which is one of the mathematical literacy self-efficacy sub-dimensions, and positive attitude, which is one of the anxiety sub-dimensions is -.50, and between the negative attitude sub-dimension .67. In line with these results, it can be said that there is a moderately negative relationship between the personal experience sub-dimension and positive attitude and a high-level positive relationship between the negative attitude sub-dimension. A correlation coefficient of .48 calculated between scientific modeling another mathematical literacy self-efficacy sub-dimension and positive attitude, which is one of the anxiety sub-dimensions, and -.39 correlation coefficients between negative attitudes. In line with these results, it can be said that there is a moderately

positive relationship between scientific modeling and positive attitude and a slightly negative relationship between positive attitude dimensions. A correlation coefficient of .52 between the social context which is the last sub-dimension of the mathematical literacy self-efficacy scale and positive attitude which is one of the anxiety sub-dimensions and -.40 between the negative attitude dimension is calculated. It can be said that there is a moderately positive relationship between social context and positive attitude and a small negative relationship between negative attitudes.

Discussion and Conclusion

As a result of the analysis of the data of the research, it is understood that the mathematics anxiety of the secondary school students is below the medium level in both sub-dimensions but when the scores obtained from the whole scale examined the anxiety level was above the medium level. Mathematics anxiety reaction occurs by cognitively following the steps of re-evaluation, coping, defense, and avoidance with a stimulus that is included in mathematics, a perception that poses a threat to the self (Cemen 1987 cited in Yalçın 1997). Irrational thoughts are effective in mathematical anxiety. Unrealistic ideas about mathematics cause the person to feel anxiety about mathematics. "What is the reason for mathematical anxiety?". Although a definite and clear answer to the question has not been given yet, many understandings have been put forward about what could be at the source of mathematical anxiety (Reynolds, 2003). Bekdemir (2007) stated that cognitive and affective factors play a role in the development of mathematics anxiety. The teacher's incomplete knowledge, undemocratic teaching approach, rote habit, students' lack of knowledge from the past, the spread of problems and applications unrelated to real life, periodic exams, inability to embody abstract subjects, prescriptive publications, and the difficulty of mathematics are discussed in the category of cognitive factors. Personality structure, disinterest in mathematics, negative attitudes towards mathematics, insufficient self-confidence, level of mathematics achievement, negative classroom experience, gender bias, and family and teacher attitudes may be affective factors that cause mathematics anxiety. In this context, it is thought that mathematics anxiety can be dealt with by identifying these irrational ideas that affect the person or the factors around them and working to get rid of these ideas with a scientific approach (Anton & Klisch, 1995).

Erktin (1994) states that mathematical anxiety can be managed. At this point, the student's learning situation is only under his control, it is explained that mathematics anxiety

is not innate but learned later in the first stage, the person should review his own life and remember from whom he learned the fear of mathematics, provide the person with different mathematical experiences that he can achieve and make correct solutions from some simple problems to complex problems in the past. It can improve the feeling of continuous failure experienced (Erktin, 1994). After this point, it is important to develop mathematical knowledge and skills in a way that will sustain the feeling of success. What is meant by gaining the ability to work in mathematics; is to have knowledge of the students, to support them by preparing suitable learning environments, and to enable them to use the skills of following active learning paths. In this way, the situation of constant failure that increases anxiety can be eliminated. Relaxation exercises can be done to minimize the reactions of anxiety.

One of the parameters focused on in this research is the mathematical literacy self-efficacy levels of secondary school students. In the study, the mathematical literacy self-efficacy scale of secondary school students is determined moderate, the scientific modeling sub-dimension determined at a moderate level, the scientific modeling sub-dimension determined at a good level, and finally, the whole mathematical literacy self-efficacy scale determined at a moderate level. Believing in one's personal abilities is a prerequisite for fulfilling difficult obligations (Bandura, 1997). People with a high level of self-efficacy display a determined attitude in their difficult and need-to-finish responsibilities, show a high level of effort, act persistently to bring about the end, and reduce negative feelings to the lowest level (Zimmerman, 2000). On the other hand, if the self-efficacy level is low, the tasks given are not done or it may end with the inability to adequately regulate the cognitive-behavioral, emotional, and social skills necessary for the successful completion of the task. Schmader, Johns and Forbes (2008) stated that the lack of working memory for the individual to construct the task in the desired way affects the ability to complete it since the negative feelings about the responsibility undertaken by the low self-efficacy cause the working memory to not be used efficiently. Individuals with high self-efficacy set insurmountable goals in mathematical destinations put effort into mathematical activities, and show more patience in solving complex problems (Wolters & Rosenthal, 2000). In this study, the mathematical literacy self-efficacy of secondary school students is determined moderate. This situation, as pointed out by (Wolters & Rosenthal, 2000), is due to the lack of self-efficacy at the required level and the middle school students' sense of efficacy in setting

mathematical goals, making efforts in activities involving mathematics and cognitive, social, emotional It can be interpreted that partial problems may arise while revealing their behavioral and behavioral learning.

In this study, there are findings regarding the existence of the relationship between these variables besides determining the mathematics anxiety and literacy self-efficacy of secondary school students. As a result of the data analysis using the correlation technique, a positive and significant relationship is found between mathematical anxiety and mathematics literacy self-efficacy. It is found that the common point of people with sufficient mathematics literacy self-efficacy is that they feel moderate mathematical anxiety. Tabur (2019), in his study examining mathematics anxiety and fractional number literacy, which is one of the sub-branches of mathematical literacy, determined that students' anxiety levels are high and fractional number literacy levels are low. In other words, there is a weak negative relationship between these two variables. Most results in the literature contrast with the results of this study. Since there are no studies examining the relationship between math anxiety and literacy self-efficacy in the national and international literature, the result of this study is compared with the studies examining the relationship between math anxiety and math self-efficacy. Geist (2010), Huang, Zhang and Hudson (2019), McMullan, Jones and Lea (2012) and Spaniol (2017) dissimilarity in the results of the studies. The studies have noted that students with low math anxiety have high math self-efficacy and the relationship between them is inverse. It can be said that the studies conducted contradict the results of this study. The reason for this may be that students have an anxiety that is not felt in other lessons in mathematics due to the meaning that both society and the individual ascribe to the mathematics lesson (Tabur, 2019). In a study, it was concluded that students did not experience such anxiety for other courses (Richardson & Suinn, 1972). On the other hand, in most of the central exams held in Turkey, a person must do a certain part of the math questions in order to achieve the desired success. Similarly, although a verbal education is received in the university entrance exams in Turkey, it will be an advantage for the person to be able to solve mathematics questions so that he or she can turn to the profession he/she aims at. When all these factors come together, the fear of not being able to succeed in mathematics may arise in the student. In the same way, parents' giving too much meaning to mathematics (Barnes, 2006), insufficient support given by families to their children (Sloan, 2010) or parents' transferring their own math anxiety to their children (Soni & Kumari, 2017)

may increase the student's anxiety level. For this reason, individuals with high mathematical literacy self-efficacy are likely to experience mathematics anxiety, as in this study. The mathematical notion of self is a perception or belief in the ability to do the mathematics; for this reason, self-efficacy is highly related to mathematics anxiety with its negative aspects (Stankov et al., 2012). Mathematics anxiety consists of multiple psychological formations that include complex structures such as feelings of difficulty, inability to perform adequately, and problem-solving that can occur at different times in daily life or academic subjects by preventing the manipulation of numbers (Kazelskis, 1998). According to Lyons and Beilock (2012), experiences during the lesson or due to the lesson teacher, low-level self-efficacy perception, or negative experiences related to mathematics in the past education life are various elements that cause mathematics anxiety. In addition, it is revealed that individuals who experience mathematics anxiety more than necessary are less efficient in completing tasks involving mathematics and in recognizing their abilities in this area (Lyons & Beilock, 2012). According to Phan (2012), when compared with their peers, people with high self-efficacy can also easily control negative emotions such as stress, fear, and anxiety while demonstrating high mathematics performance. This situation helps the individual to exhibit positive attitudes toward mathematics and to develop a stable mathematics perception (İpek, 2019).

Guiding students to minimize and control students' anxiety and raise their mathematical literacy self-efficacy to the highest level, providing seminars and training to mathematics teachers in order to apply the necessary methods, and cooperation with school guidance services so that individuals can reduce their mathematics anxiety and strengthen their self-efficacy perception. It is suggested that the activities should be included in the guidance programs. The study can create awareness among students, teachers, experts in mathematics education, and families for the future. In order to increase the performance in mathematics teaching, mathematics anxiety can be reduced, and mathematical literacy self-efficacy belief can be increased by acting as a team of school, parents and students. It can be said that there is a well-established idea that mathematics course is difficult in our country. It should not be forgotten by parents that future anxiety also reinforces mathematical anxiety. It is recommended that parents be informed in order to minimize inaccurate attitudes that occur unconsciously.

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Author Contribution Statement

Merve DAĞDELEN: Conceptualization, methodology, implementation, data analysis, review-writing and editing.

Avni YILDIZ: Conceptualization, methodology, consultancy and control preliminary draft writing and editing

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