





## Investigation of 8th Grade Students' Mathematics Anxiety<sup>2</sup>

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### Abstract

The aim of this research study is to determine how students define their anxiety about learning mathematics, to determine the symptoms of anxiety and to define how anxiety occurs. The phenomenology research design was used in the study. A semi-structured interview form was used as a data collection tool in the research. The data were analyzed through the content analysis. The study group of the research consists of four male and four female 8th graders in two public secondary schools in Uluborlu district of Isparta. According to the results, students predominantly defined mathematics anxiety as frightening/scary. Also, students identified the symptoms of mathematics anxiety mostly as the theme of physical/physical symptoms. Students stated that sociological, psychological and philosophical dimensions were effective in the emergence of mathematical anxiety. Some students expressed common views on the sociological dimension-psychological and psychological-philosophical dimension. The effects of mathematics anxiety have been examined under two titles as the effects related to the psychological and sociological dimensions. While the effects related to the psychological dimension are discussed in terms of course achievement and effects on themselves, the effects related to the sociological dimension are discussed in terms of their effects on their relationship with their family and friends.

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## Introduction

For many years, the concept of anxiety that has persisted since the existence of humanity has been considered. According to Cüceloğlu (2005), anxiety is defined as a concept that includes one or more of the emotions such as fear, grief, distress, feeling of failure, inability and judgment. Many definitions have been made in the literature about the concept of anxiety until today. According to Kierkegaard,

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who first stated that people have an anxious existence and researched this situation, anxiety is the mood that people create to get rid of the feeling of nothingness they are in (Manav, 2011). According to Heidegger, who is also one of the representatives of existentialist philosophy, anxiety is a long inner distress that will last until death. Baltaş (2004) defines the concept of anxiety as fear of uncertain source; Baymur (1989) expresses anxiety as the tense emotional state that occurs in individuals in the face of unmet need. As for Tekindal (2009), he stated that anxiety disrupts human behaviors, prevents effective learning from occurring, and this situation harms individuals. Anxiety, which is accepted as one of the basic emotions of human beings, emerges as a situation that negatively affects effective learning. Due to mathematics anxiety, it is thought that individuals stay away from mathematics lesson because they think that they do not like, hate and cannot do mathematics (Baloğlu, 2001). As a result, there is insecurity in individuals due to, their thoughts and abilities that they cannot do mathematics (Yenilmez & Özbey, 2006). It is inevitable that students who move away from the mathematics course do not succeed in this course. It is thought that investigating the underlying causes of anxiety causing failure is important in achieving the desired level of success in mathematics education both in terms of students and school education. Considering the related literature, the causes of mathematics anxiety can be examined under three groups. These are sociological, psychological and philosophical dimensions (Bayram, 2020).

### **The Sociological Dimension**

At the heart of the social dimension, which is defined as people being afraid of being criticized, humiliated by others in social settings and therefore avoiding these environments, is mostly the negative experiences that students have experienced with their environment (such as the teacher, family and friends) (Zorbaz, 2013). Teachers' attitudes and behaviors such as lecture methods, competence in the subject matter, and leaving the student in a passive state are seen as important factors in the formation of anxiety in students (Deniz & Üldaş, 2008). Another factor affecting the sociological dimension is the family dimension. Parents have high expectations of their children, and accordingly, their attitudes and behaviors such as pressure, benchmarking, and punishment cause anxiety in students (Alkan, 2011).

### **The Psychological Dimension**

The first person to look at anxiety from a psychological perspective was Sigmund Freud, the founder of psychoanalytic theory. According to Freud, anxiety is a psychological process and a reflection of the ego which performs tasks such as warning people against the stimuli coming from the social and physical environment, adapting to the situation, and continuing on with their lives (Geçtan, 1992). Yet, negative experiences are important factors that reveal anxiety in human beings (Arem, 2010).

Once again, the attitudes towards mathematics lesson, subject matter competency, and working methods are also shown to be among the reasons for the anxiety (Bekdemir, 2007). The inability of the students to ask their teachers what they do not understand during the lesson, their prejudice towards the lesson, their giving up immediately in the face of hard-to-solve problems, and as a result, low motivation are the dimensions of the psychological factors stemming from the individual.

### **The Philosophical Dimension**

According to Kierkegaard, who is considered among the founders of existentialism, anxiety is defined as a mood that a person creates to get rid of the feeling of nothingness, an inevitable part of life and a disease that can last until death (Manav, 2011). In this dimension, factors such as students' prejudices towards mathematics, lack of knowledge, beliefs that mathematics is unnecessary, low motivation, and giving up quickly are the philosophical dimensions that create anxiety. Again, the fact that the mathematics is abstract and logical in nature makes it difficult for students to understand this lesson. According to Eldemir (2006), the fact that Maths, which is already defined as difficult by the students, is not offered by the teachers with appropriate learning methods also causes further anxiety.

Therefore, teachers are expected to take individual differences of students into account in the instructional processes and to organize the educational environment in a way that they can better understand Maths.

### **The Research Context**

Most research studies in the literature on the level of mathematics anxiety, gender, grade level, parents' educational status, overall success of teachers, attitude, and socio-economic status have been examined with quantitative research methods (Adal & Yavuz, 2017; Akgül, 2008; Ateş & Güler, 2016; Baban, 2018; Borlat, 2018; Bozkurt, 2012; Dođru & Arslan, 2008; Eldemir, 2006; Kılıç, 2011; Şentürk, 2016; Taşdemir, 2013; Tuncer & Yılmaz, 2016; Yeniheyat, 2007). According to the findings of these studies, no significant differences were found in the attitudes and anxiety of the students towards the mathematics lesson based on gender. A negative moderate correlation was found between students' mathematics course grades and their mathematics anxiety. Examining the grade level variable, it was seen that as the grade level increased, the anxiety level of the students also increased. In their study titled "Content analysis of graduate theses conducted with mathematical concern in Turkey", Toptaş and Gözel (2018) concluded that only quantitative methods were used in all of the 43 graduate theses obtained from the National Thesis Center database. Again, Bayram (2020) in his master's thesis named "Evaluation of research on anxiety in mathematics education", he found that 84 studies on mathematical anxiety between 2005 and 2018 were conducted using six qualitative, two mixed, and 76 quantitative methods.

In the light of relevant literature review above, it can be said that the number of studies on mathematics anxiety is considerably high. However, it is seen that the studies are generally carried out using quantitative research methods, while qualitative research methods are less in number. Based solely on quantitative studies, it may not be sufficient on its own to explain what mathematics anxiety means for the student, what triggers and how it emerges, and what effects it has on students' friends, family, and course success. Therefore, qualitative research methods which focus on such questions and reveal in depth what mathematics anxiety means are of significance (Yıldırım & Şimşek, 2005). Thus, the aim of the present study is, by utilizing qualitative methods, to determine how students define their anxiety about learning mathematics, to determine which symptoms of anxiety, and how anxiety occurs.

The purpose of the study is to examine how the psychological, sociological, and philosophical dimensions together affect the formation of mathematics anxiety and to define the resulting effects which have not been quite emphasized until now. Again, it is aimed to reveal how mathematics anxiety affects students' relationship with themselves as well as with their environment. In this context, the problem to be addressed by the present study is "How do middle school eighth grade students define their Mathematics anxiety?" In accordance with this problem, answers were sought for the following research questions:

1. How do students describe the mathematics anxiety they experience?
2. What are the components of the resulting anxiety and how do they relate?
3. How do students describe the effects of their mathematics concerns on their course success, family and environment, and themselves?

### **Method**

In this study, it is aimed to recognize anxiety as a meaning structure and to define the formation and transformation processes of anxiety. In this respect, phenomenological research design as is one of the qualitative research methods was utilized in the study since it allows for identification based on the experiences, narratives, and opinions of students with mathematics anxiety problems. The phenomenon we work on in the research is the fear of Maths. We tried to define this phenomenon

within the context of learning mathematics and operationalized it as to be able to answer Mathematics questions in the lesson and in the exams. We also tried to define how the mathematics anxiety occurs, as well as its components and consequences.

### **Participants**

The data source to the study consisted of 8th grade students studying in two secondary schools affiliated to the Ministry of National Education in the Uluborlu district of Isparta. The data have been collected during the second semester of the 2019-2020 academic year. Four male and four female participants have been included in the study sample. Parents' permission has been sought.

Participants were selected using convenient sampling where the researcher identifies cases that are close to him and are easy to reach (Yıldırım & Şimşek, 2005). The researcher normally attends the classes of 40 students at the school, but since eight of the students stated that they had mathematics anxiety and that they could participate in the study voluntarily, these students constituted the cases in the study. Since these students were going to sit in the national High School Entrance Exam, they were readily available as anxious about learning mathematics. Due to research ethics, students' real names were not included, instead, code names have been assigned to each case.

### **Data Collection Instrument**

In this study, we collected data from middle school 8th grade students on the phenomenon of "mathematics anxiety" by using a semi-structured interview form. Before the interview form was prepared, pilot interviews were conducted with 3 students in order to check the suitability, clarity, and understandability of the questions. After the pilot interviews, the interview form was finalized in line with the student views and the recommendations of an expert on qualitative research. The form consisted of 3 questions that guided the interviews:

1. What does mathematics anxiety look like?
2. How does mathematics anxiety occur (influencing factors and who triggers it)?
3. How does mathematics anxiety affect your Mathematics success, your relationships with friends and family?

No information about mathematics anxiety has been shared with the students before the interviews. Only questions about whether they experienced mathematics anxiety or not have been posed to determine their anxiety level. The interviews were recorded with permission and transcribed for the main analysis. The transcribed interviews were then asked to be confirmed by the participants in order not to leave any room for any kind of misunderstanding.

### **Data Analysis**

Each participant's perspective was examined separately according to the case study method, and then the relationships between events were analyzed to establish semantic connections between them. To this end, data were analyzed through content analysis. The basic process in content analysis is to gather similar data around specific themes and codes and transfer them in a way that the reader can understand. This thematizing and coding process was carried out according to Colaizzi's (1978) phenomenological data analysis approach which consists of seven stages. Audio recordings and notes taken during the interview were transcribed by the researcher. As a result of individual interviews, meaningful data that can be an answer to the research questions were determined by the researcher, and then codes and themes were created in the content analysis process. In order to find the common themes, the codes have been put together and studied first. Themes were created by finding similar aspects among the codes. The themes have been categorized under main headings. We then summarized and interpreted the generated codes, themes, and categories through graphs and tables.

## Results

The results of the study are presented in line with the research questions.

### Results of the First Research Question

The first research question of the study was “How do students describe the mathematics anxiety they experience and what are the components of the resulting anxiety and how do they relate?” and has been examined in four sub-headings. In the first part, we included student views on how mathematics anxiety is defined and what its symptoms are. The other part covers what are the components of the resulting anxiety and the relationships between them.

#### Defining mathematics anxiety.

Students' views on the definition of mathematics anxiety have been grouped under three themes: Difficult, scary/creepy, and emotional/mental state. The data obtained can be seen in Table 1.

Table 1. *Analysis of the Answers Given by the Students for the Definition of Mathematics Anxiety*

Themes	Codes	Participants
1. Grisly/Scary (n = 5)	Dog	Hilmi
	Insect	Eda
	Vortex	Mustafa
	Thinner and fire	Mustafa
	Drowning	Berna
	Horror	Nalan
2. Difficult (n = 3)	Fishing	Nalan
	Labyrinth	Veli
	Mountain	Furkan
3. Emotional/Mental State (n = 3)	Stress	Nalan
	Bias	Havva
	Aggressive, depressed	Mustafa

When Table 1 is examined, five of the students have been observed to tend towards the grisly /scary theme, three to the difficult theme, and three to the emotional/mental state theme. It was seen that the students predominantly expressed their views on the frightening/scary theme. In addition, students expressed their mathematics anxiety as a difficult and emotional/mental state.

Some quotes from the students who define their mathematics anxiety as scary/frightening and the assigned codes are as follows:

*Hilmi: “Mathematics anxiety is the fear of being ruined if I can't do it in our future exams. I can compare mathematics anxiety to a dog. Just like a dog, mathematics anxiety can bite us and get rabies.” [code: dog]*

*Mustafa: “Mathematics anxiety is like a whirlpool for me. The more you try to do it, the more you get into it; the more you get into it, the more your hope and determination run out and the vortex swallows it. As a result of this vortex, I am afraid of mathematics.” [code: swirl]*

*Eda: “Mathematics anxiety is being afraid that I will not be able to solve mathematics and that I will not be able to do it in the future. The insect looks a lot like anxiety in my opinion. Being afraid of*

*the insect as if the insect will bite you is just like what I have experienced in mathematics." [code: insect]*

Quotes and codes from students who define mathematics as difficult are as follows:

*Veli: "I think Mathematics anxiety is like an unknown labyrinth. I am having a hard time reaching the result in mathematics." [code: labyrinth]*

*Furkan: "I compare the anxiety of mathematics to a mountain because it is easy to climb the mountain first, that is, the subjects are few and easy, but the mountain gets steeper and more difficult. It becomes unattainable." [code: mountain]*

Quotations and codes from students who define mathematics as emotional/mental states are as follows:

*Nalan: "As the fear of not being able to complete the mathematics questions continues over time, it creates stress for me and when I see the mathematics questions, I get around my feet." [code: stress]*

*Havva: "For me, mathematics anxiety is a prejudice originating from thinking that I cannot do it. So my situation is a bit psychological." [code: bias]*

### **Symptoms of mathematics anxiety.**

Based on data from student interviews, the symptoms of mathematics anxiety were collected under three themes. These are physical/physical symptoms, cognitive symptoms, and affective symptoms. The data obtained are presented in Table 2.

Table 2. *Analysis of the Answers Given by Students for the Symptoms of Mathematics Anxiety*

<i>Themes</i>	<i>Codes</i>	<i>Participants</i>
1. Physical/Physical symptoms ( <i>n</i> = 6)	Headache and dizziness	Mustafa
	Nausea	Hilmi
	Sweating, abdominal pain	Veli
	Cold sweating	Havva
	Freezing of hands and feet due to cold sweating, abdominal pain	Berna
2. Cognitive symptoms ( <i>n</i> = 1)	Being unable to breathe due to depression	Eda
	Low motivation	Furkan
3. Affective symptoms ( <i>n</i> = 1)	Feeling of failure	Nalan

When Table 2 is checked, 6 of the students chose the Bodily/Physical Symptoms theme, one of the students the Cognitive Symptoms theme, and one of the students the Affective Symptoms theme. The majority of the students stated that the symptoms of mathematics anxiety were mainly the physical/physical symptoms.

Some of the quotations and codes from students who physically/physically expressed the symptoms of mathematics anxiety are as follows:

*Mustafa: "My head hurts a lot and my head starts spinning, especially when I can't do Mathematics questions." [code: headache and dizziness]*

*Hilmi: "The anxiety that arises when I am not sure, it is as if you eat pastry and sit on your stomach and then you get sick." [code: nausea]*

*Berna: "When I see Mathematics questions, and especially when I'm between two choices, I get cold sweat, my hands and feet are freezing, my stomach hurts." [code: cold hands and feet due to cold sweat, abdominal pain]*

Quotations and codes from students who cognitively expressed the symptoms of mathematics anxiety are as follows:

*Furkan: "Mathematics, which is the lesson I have difficulty with, seems to me like climbing a mountain. This leads to a low motivation for my lessons." [code: low motivation]*

Quotations and codes from students who affectively expressed the symptoms of mathematics anxiety are as follows:

*Nalan: "Hurrying through an exam I want to train can cause anxiety. This creates the idea that I cannot do the questions and I cannot get rid of this thought. This creates a feeling of failure in me." [code: feeling of failure]*

### **Dimensions of mathematics anxiety.**

Students' views on the emergence of mathematics anxiety were grouped under three themes: sociological dimension, psychological dimension, and philosophical dimension. The data obtained are presented in Table 3.

Table 3. *Analysis of the Answers Given by Students for the Emergence of Mathematics Anxiety*

<i>Themes</i>	<i>Codes</i>	<i>Participants</i>
1. Sociological dimension ( $n = 5$ )	Circle of friends	Furkan
	Class climate	Havva
	Social media news	Berna
	The family's commitment to the idea that the child cannot meet the expectations of the child by comparing it with others	Berna
	Teacher's attitude towards doing wrong	Nalan
2. Psychological dimension ( $n = 4$ )	Boredom of teachers' teaching style - students' disaffection from lessons	Mustafa
	Hard or even impossible barrier	Furkan
	Lack of acceptance/self-esteem	Hilmi
	Failing	Eda
3. Philosophical dimension ( $n = 2$ )	Prejudiced attitude of students towards mathematics lesson	Veli
	Feeling worthless and losing the meaning of his existence	Hilmi, Eda

When Table 3 is examined, it can be seen that five of the students highlighted the sociological dimension theme, four of them highlighted the psychological dimension theme, and two of them highlighted the philosophical dimension theme. According to the opinions of the students, it is observed that the sociological dimension and the psychological dimension themes are predominant in the emergence of mathematics anxiety.

Some of the quotations and codes from the students who expressed the emergence of mathematics anxiety as a sociological dimension are as follows;

*Havva: "The biggest reason for my mathematics anxiety to arise is to talking to each other in the classroom environment about the difficulty of mathematics lessons. Also, in the 6th grade, our teacher wrote a problem on the blackboard. Those who knew the question would go to the*

*recess, and those who did not would sit in the classroom. I did not know the question and my friends were making fun of me from the classroom door." [code: classroom climate-social dimension, humiliation through teasing-psychological effect]*

Berna: *"I am always reminded by my family of successful children on TV news or people who are successful in their lessons in our immediate environment (e.g. our neighbor's son). Seeing what my family has done in their time of lack of resources and saying that everything is complete but you are not working increases my anxiety." [code: The family's processing of the idea that the child cannot meet the expectations from the child by comparing it with others-social dimension-crush-psychological effect]*

Mustafa: *"when I said that the subjects were going well, all of a sudden there were things like equations, numbers, coordinate systems, and all the desire for the lesson went away. The teacher talks all the time, and you listen all the time. After a certain period of time, you already ignore what the teacher says. I think the reason for the anxiety is the teachers, because they do very boring lessons." [code: the boredom of teachers' way of processing lessons-the cooling off of students from lessons - the social dimension]*

Quotes and codes of students expressing the emergence of mathematics anxiety as a psychological dimension are as follows;

Eda: *"It comes up in situations where we want to do but can't. When fear and anxiety are combined together, I can't stop thinking that I'll never succeed in mathematics, which makes me move away from mathematics. Again, when I try to solve a question, the number of questions I solve daily also decreases. It can also be called anxiety about not being able to raise it in trials. Rushing a test I want to train can cause anxiety. That's the idea that I can't do the questions, and I can't get rid of that thought. " [code: Fail/Fail-psychological dimension]*

Veli: *"I think the main reason for mathematics anxiety is our prejudices in our minds. It's impossible to solve mathematics questions when we can't get rid of these prejudices." [code: students' biased approaches to mathematics course-psychological dimension]*

Speech quotations and codes of students who express the emergence of mathematics anxiety as a philosophical dimension are as follows;

Hilmi: *"Unless a person can do mathematics, his work does not come, and when he does, I cannot do it anyway. This situation affects me psychologically and I do not even come to mathematics class, it is heartbreaking. I feel worthless about mathematics. It so happens that I am left alone in the world, as if there is no purpose for me to be in the world. These situations also make me feel bad." [code: failure/failure - psychological effect, feeling worthless and losing the meaning of his existence - philosophical dimension]*

Eda: *"Mathematics is a difficult course or it is difficult for me, I don't know. But I am sure that mathematics is a lesson that I failed. The mathematics class I failed makes me feel worthless. Because as I see people who are successful in mathematics class, the thought of being the only one that comes to mind. So, the thought arises that I have one short-coming from the people who are successful in this course. This makes me feel worthless and aimless." [code: acceptance/lack of self-confidence-psychological effect, feeling worthless and losing the meaning of his existence- philosophical dimension].*

## **Results of the Second Research Question**

### **Components of emerging anxiety and the relationship between these components.**

The second research question of the study is "What are the components in the formation of mathematics anxiety?" Regarding this problem, the findings were examined under three themes,



namely the psychological dimension, the philosophical dimension and the sociological dimension, and which or which of these dimensions were effective together was evaluated within the framework of the opinions of the students to the first question. The distribution of the common components of the anxiety is presented in Figure 1.

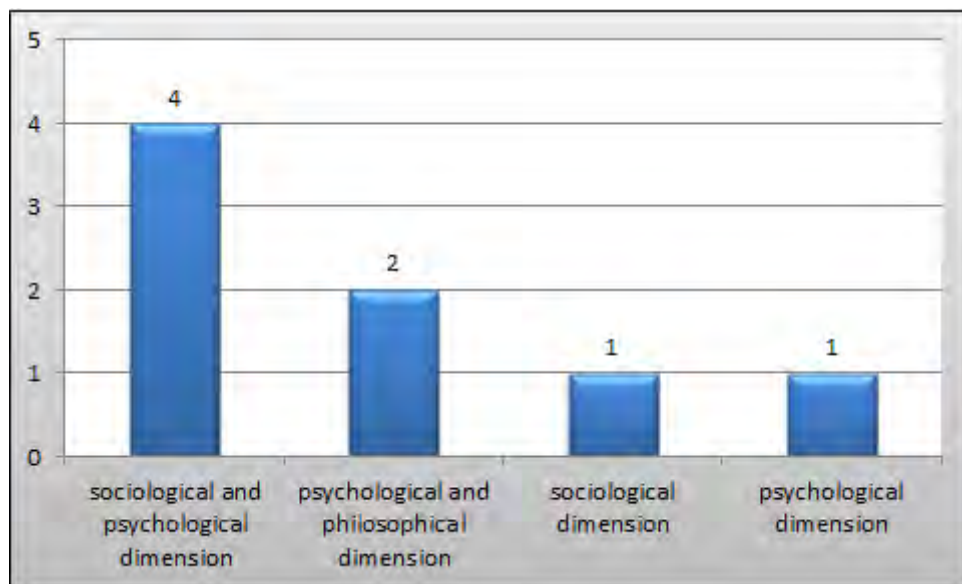


Figure 1. *Distribution of Common Components of Emerging Anxiety*

When Figure 1 is analyzed, it is understood that the students Furkan, Havva, Berna, and Nalan stated that the formation of mathematics anxiety is both sociologically and psychologically two-dimensional. For example, the student named Eve points out that the social dimension that emerges as mocking him within the framework of the classroom climate created by his classmates triggers the effects of the psychological dimension in the form of embarrassment, boredom and humiliation. Berna, on the other hand, stated that she had low self-esteem within the framework of the social dimension formed by her family and social media news and emphasized the relationship between the social dimension and the psychological dimension.

It is understood from the students that Hilmi and Eda stated that mathematics anxiety is two-dimensional both philosophically and psychologically. These students stated that the reason for mathematics anxiety is the psychological effect of not being able to do it in the social environment and the feeling of being worthless and losing the meaning of their existence by going beyond. In these students, it is observed that the psychological effect caused by failure to do the mathematics lesson and the psychological effect triggering the philosophical dimension, losing the meaning of their existence.

Mustafa, one of the students, stated the reason for the occurrence of mathematics anxiety only as a sociological dimension. Also, one of the students, Veli, expressed the reason for mathematics anxiety as the psychological dimension.

### **Results of the Third Research Question**

The third research question of the study was "How do students define the effects of their mathematics anxiety on their academic achievement, family environment and themselves?". The second sub-problem has been examined under two subtitles. The first part examines the effects of anxiety in relation to the psychological dimension while the other covers the effects of anxiety related to the sociological dimension.

### Effects of mathematics anxiety related to psychological dimension.

The effects of anxiety related to the psychological dimension are examined under two sub-headings. These are in terms of course success and in terms of self/personal effects.

#### Perceptions of the effects in terms of course success.

Students' perceptions of the effects of mathematics anxiety on academic achievement were found to emerge under two themes, positive and negative. Three codes were determined for the theme determined as negative. These are poor performance, not attending the lesson, and the effect on other lessons. The data obtained are presented in Table 4.

Table 4. Analysis of the answers given by students to the effects of mathematics anxiety on academic achievement

Themes	Codes	Participants
1. Negative effects ( $n = 7$ )	Low performance	Hilmi, Veli, Nalan, Furkan, Havva, Berna, Eda
	Reluctance to attend class	Hilmi, Veli, Nalan, Havva, Berna
	Effects on other lessons	Hilmi, Furkan, Eda
2. Positive effects ( $n = 1$ )	A motivating power	Mustafa
	Increasing willingness to study	Mustafa

When Table 4 is examined, all of the students except Mustafa stated that mathematics anxiety has a negative effect on academic success. Again, all of the students in the negative effects theme stated that mathematics anxiety caused them to decrease performance. 5 students stated the reluctance to participate in the course code under the negative effective theme, and 3 students stated the code for the effect on other courses.

Some quotes and codes for the negative effects theme are presented below.

Hilmi: *"Thinking about mathematics at any time due to anxiety about mathematics or taking only mathematics as a lesson can cause my performance in other courses to decrease. Because of this over thought, your brain is very full and can cause frequent headaches. The headache dulls my desire to study mathematics. As a result, I am not studying this course and I am failing."* [code: low performance, reluctance to participate in classes, effects on other lessons]

Nalan: *"Mathematics anxiety has a negative effect on my academic performance, of course. Actually, I can solve the questions with our teacher in the classroom, but I cannot do the questions, especially in the trials for LGS. Because these questions are very difficult for me and I do not want to do the questions. At that moment, my anxiety is so high that I don't even go to mathematics class later. In the end, this anxiety causes me to fail because it slows down my willingness to work."* [code: low performance, unwillingness to attend class]

Eda: *"Mathematics anxiety starts the moment I attend the class at school. In the lesson, thoughts such as if I cannot understand the subject or if I cannot do it begin and this prevents me from listening and understanding the lesson. As a matter of fact, this emotional state affects my lesson performance in mathematics negatively and decreases my course performance. This situation in mathematics can be generalized to all lessons later. Especially when I see something about numbers in science class, I leave that subject and I fail."* [code: low performance, reluctance to participate in classes, effects on other lessons]

The theme of positive effects was determined only by Mustafa from the participants. The speech excerpt and codes of this student are presented below.

Mustafa: *"Mathematics anxiety has many aspects in terms of academic success, both good and bad. It affects me in a good way. Because the good thing is, the constant thinking of mathematics in*

*my mind and inside me prompts me to study. This situation is a force that constantly pushes me."*  
[code: a motivating force, increased willingness to study]

### Perceptions in terms of self/personal effects.

Students' perceptions of the personal effects of mathematics anxiety were grouped under four themes: comparing themselves with others, fear of making mistakes, negative experiences, and inability to meet expectations. The data obtained are showed in Table 5.

Table 5. *Analysis of the Answers Given by Students for the Personal Effects of Mathematics Anxiety*

Themes	Codes	Participants
1. Fear of doing wrong (n = 4)	Avoiding mathematics	Furkan, Mustafa, Havva, Berna
	Being in continuous moral-mood disorder due to failure	Furkan, Mustafa, Havva, Berna
	Lack of self confidence	Furkan, Mustafa, Havva, Berna
2. Failure to meet expectations (n = 2)	Failure to meet family expectations	Eda, Hilmi
	Failing to meet individual expectations	Eda, Hilmi
3. Comparing themselves with others and negative experiences (n = 2)	Comparing themselves to others	Nalan
	Negative experiences	Veli

When Table 5 was examined, four of the students stated the theme of fear of doing wrong, two of failure to meet expectations, two of comparing themselves to others and negative experiences. According to the opinions of students, their perception of the personal effects of mathematics anxiety is mainly dominated by the fear of making mistakes.

Here are some quotes and codes from students who express their perception of the personal effects of mathematics anxiety as a fear of making mistakes;

Mustafa: *"It leads to a lack of self-confidence. It scares me to be treated like an idiot by those around me, especially if my name is in the last place on the lists that hang as a result of the exams. So, I think it really affected us as a personality. We can also be in an introverted mood, or we can also be in an aggressive state. This, in turn, significantly reduces my course success, and I don't even want to go to mathematics class. Even if I go to class, I often worry that I will make mistakes."*  
[code: lack of self-confidence, abstinence from mathematics, constant morale-mood disorder based on failure]

Berna: *"I am happy when I do the mathematics questions, and when I cannot, I become unhappy, depressed, and anxious. This causes a loss of self-esteem. After all, it makes me an unhappy person and I don't want to solve mathematics questions anymore. I've become afraid of mathematics."* [code: being in constant morale-mood due to failure, lack of self-confidence, avoiding mathematics]

Some of the quotations and codes of students who express their perceptions of the personal effects of mathematics anxiety as not meeting the expectations are as follows;

Hilmi: *"The people around me and myself have a lot of expectations from me, so I work hard in order not to upset them. But when I can't pay for my work, I go crazy and go crazy."* [code: family and individual Failure to meet expectations]

Eda: *"Of course, mathematics anxiety has a lot of effects on myself. Especially when I cannot do the questions, I get nervous, sad and my self-confidence decreases. As these feelings grow over time, of course I cannot do the mathematics. When I fail, I regret that the efforts of my teachers*

*and my family will be wasted. I don't want to be embarrassed about them." [code: family and individual Failure to meet expectations]*

Quotations and codes of students who express their perceptions of the personal effects of mathematics anxiety as comparing themselves with others and negative experiences are as follows;

Nalan: *"I put a lot of effort into mathematics lessons. However, when those who do not make as much effort get higher marks than me, I get very angry and anxious. I feel depressed when I see students who get better grades than me. Thoughts like "He's doing it, why can't I do it?" eat off my brain. Since I constantly compare myself with others, I avoid solving questions in mathematics." [code: do not compare themselves with others]*

Veli: *"I do not like and do not understand mathematics lesson. The reason for this lies in the fact that I have bad experiences with mathematics lessons in the past, and this affects today. My teachers have a great influence on these events I have experienced. I do not understand what he is telling me and when he asks me a question and cannot answer, they get very angry with me. I am sad when I fail, and if this does not improve as time passes, there is silence in the lessons." [code: negative experiences]*

### **Effects of mathematics anxiety related to the sociological dimension.**

The effects of anxiety related to the sociological dimension are examined under two subtitles. These are the perception of its effects in terms of relations with family and relationships with friends.

#### **Perceptions of its effects in terms of relations with the family.**

Students' views on the effects of mathematics anxiety on family relationships were grouped under three themes: criticism, high expectation, and comparison with others. The data obtained are presented in Table 6.

Table 6. *Analysis of Students' Answers Regarding the Effects of Mathematics Anxiety in Terms of Relations with Family*

<i>Themes</i>	<i>Codes</i>	<i>Participants</i>
1. High expectation ( $n = 4$ )	High expectation	Nalan, Havva, Berna, Eda, Hilmi
	Getting angry, no willing to study	Furkan
2. Comparison with others ( $n = 2$ )	Comparison with siblings, lack of self-confidence, thinking not being hardworking, getting angry, no willing to study, worry about what if I don't read/not like them	Mustafa
3. The theme of criticism ( $n = 2$ )	Warning, fear, inability to say something, inner stress	Berna
	Pressure, punishment, breaking ties with family	Veli

When Table 6 is studied, five of the students stated the theme of high expectation, two of them to compare with others, and two of them to be criticized. Accordingly, the participants mostly commented on the high expectation theme.

Some of the speech quotations and codes of the students who express their perceptions about the effects of mathematics anxiety on family relations as high expectations are as follows;

Berna: *"My family has expectations from me in mathematics class. I believe there is verbal intelligence too, but they expect me to enroll in science high school in numerical field. However, I cannot do the mathematics. The more I succeed in mathematics, the higher my value in their eyes; the more the failure the less my value. Since my father is a construction worker, he works*

*day and night without complaining about if it's winter and there's snow and he always tells me you study and don't experience financial difficulties like me. I do not want to frustrate my father's efforts. That's why I'm very worried if I can't do it either."* [code: high expectation]

Eda: *"Mathematics class is the biggest problem affecting my family relationships. Because when you do mathematics, you don't have any problems in other classes. My parents are very upset that I failed. I can't stand seeing them sad, and I'm very sad. My parents really want me to read, especially my mom. My mother never went to school, and my daughter tells me that I couldn't read, you read. So I especially want to fulfill my mother's expectations of me."* [code: high expectation]

Hilmi: *"Because my mother and father are teachers, especially because my father is a mathematics teacher, I constantly get warnings from my parents that I should study, and they do not tolerate even 1 mistake. My father keeps saying that I'm the son of a mathematician, and that's why I have to do mathematics. It makes me worry so much, I'm so worried about what I'll say to my father if I do it wrong on exams. Because of the way I think about it, I can't concentrate too much on other questions. I wish my parents weren't teachers..."* [code: high expectation]

Some of the quotations and codes of the students who express their perceptions about the effects of mathematics anxiety on family relations as a comparison with others are as follows;

Furkan: *"Mathematics negatively affects my family relationships. When I get a low score in mathematics experiments, he immediately starts to compare with our neighbor's son Hasan. Here is Hasan, good and good words like this annoys me. This situation makes me very uncomfortable and causes both my anxiety to increase and not to study."* [code: getting angry, not wanting to study]

Mustafa: *"I am the youngest child of my family. My brother is studying medicine and my sister is studying law. This is why my family is always comparing me to them. You don't work like your brother or sister; I hear words like they work hard. This situation really lowers me. Okay, I am not hardworking like them, but it annoys me that they always compare me with them and I do not study because of this situation. I am constantly thinking about myself; if I cannot study like my older sister, I am worried..."* [code: comparison with siblings, lack of self-confidence, thinking that they are not hardworking, getting angry, not wanting to study, or worrying if I do not read like them]

Speech quotations and codes of students who express their perception of the effects of mathematics anxiety on family relations as being criticized are as follows;

Berna: *"When I score low on mathematics exams and tests, I am subject to harsh verbal warnings by my family. I can not say anything about these conversations, but it is eating up my heart. I am very scared and intense. This generally affects my relationships with my family (in terms of communication) negatively."* [code: warning, fear, inability to say anything, constriction]

Parent: *"Academic failure, especially in the mathematics lesson, causes pressure from my family. They constantly warn me why you are not working, why you are not successful, you will not be successful. Later, it causes some prohibitions against me. There are penalties such as taking the phone and computer away from me and not allowing me to go outside with my friends. This causes the bond between me and my family to break, and tension builds up between us."* [code: repression, punishment, break with family]

### **Perceptions about the effects in terms of relationships with friends.**

Students' views on the effects of mathematics anxiety in terms of their relationships with friends were grouped under two themes: having an effect (mocking and being excluded from the group) and no effect. The data obtained are presented in Table 7.

Table 7. Analysis of the Effects of Students' Mathematics Anxiety in Terms of Their Relationship with Friends

Themes	Codes	Participants
1. Has an effect (n = 6)	Being ridiculed (n = 3)	Nalan, Havva, Eda
	Exclusion from the group (n = 3)	Furkan, Mustafa, Hilmi
2. No effect (n = 2)	Does not affect	Berna, Veli

When Table 7 is analyzed, three of the students stated the theme of being ridiculed and three of them were excluded from the group. Two of the students stated that mathematics anxiety did not have any effect on relationships with friends.

Quotations and codes of students who express their perceptions of the effects of mathematics anxiety in terms of their relationships with friends as mocking are as follows;

Havva: *"The biggest reason my mathematics anxiety arises is the classroom environment. Our class is very crowded. Although there are many people in our class, the number of students participating in the class is very small. I do not want to throw myself in the middle of the class because few people participate. If I jump and do it wrong, I don't want to be the subject of fun of my friends. That's why I do not participate in the lesson very much."* [code: mocked]

Eda: *"Of course, it affects my friendships. As people with mathematics anxiety, we tend to be aggressive, angry, and violent towards all people around us. We treat all our friends badly; I mean bad behavior. I use strong language even if I do not speak to them. Because failing something pisses me off. I also do not get a voice in the classroom. Especially, I am afraid that my friend next to me will make fun of me."* [code: mocked]

The quotations and codes of the students who express their perceptions of the effects of mathematics anxiety in terms of their relationships with friends as exclusion from the group are as follows;

Furkan: *"Mathematics anxiety affects the circle of friends. Since I can do mathematics, I have a better quality and orderly circle of friends around me. This will positively affect my career in all aspects and I want to be a leader in the group. The way to do this is that I am very good at mathematics. However, I also know that when I cannot do mathematics, I will be ignored by my circle of friends."* [code: exclusion from the group]

Mustafa: *"I am unsuccessful in mathematics class, but I am a leader person who is listened to in a friendly environment. In my circle of friends, I do not open much of the conversations about mathematics, I change the subject if there is any. Because I know this lack will hurt me. I don't want my place in the group to change. In the eyes of my friends, I am a person who knows and does everything and I do not want this to change. That's why I took mathematics out of my life."* [code: exclusion from the group]

Speech quotes and codes of students who express their perception of the effects of mathematics anxiety in terms of their relationship with a friend as having no effect are as follows;

Berna: *"Friends don't affect my relationships because all my friends usually fail Mathematics."* [code: does not affect]

Veli: *"It has no effect on my friend relationships. Because we don't talk about lessons in a friendly environment, and even if we do, it doesn't affect our relationship."* [code: does not affect]

## Discussion, Conclusion and Implications

Students compared mathematics anxiety to scary/frightening situations. In addition, students express their mathematics anxiety as a difficult and emotional/mental state. Considering the codes created based on the opinions of the students; it is seen that students are afraid of mathematics lesson; they have difficulty and this affects their emotional state. In parallel with our study, there are studies in the literature that show that mathematics lesson is difficult (Başar, Ünal, & Yalçın, 2002; Baykul, 2004). Again, in the study conducted by Işık, Çiltaş and Bekdemir (2008), students in our country and around the world stated that they were afraid of, disliked, and anxious about mathematics. Studies that found mathematics anxiety as scary and frightening by students (Lewis & Aiken, 1970; Baloğlu, 2001; Bourne, 1995; Chipman, Krantz, & Silver, 1992; Gierl & Bisanz, 1995; Izard, 1972; Skiba, 1990; Şahin, 2004; Tobias, 1978; Zettle & Houghton, 1998) support the results of the current study. Again, some of the students who participated in the study described mathematics anxiety as difficult. McLeod and Adams (1989) and Yetkin (2003) stated in their study that students had difficulties in understanding and learning the mathematics lesson.

It has been determined that the emergence of anxiety has physical/physical, cognitive and affective symptoms. In the relevant literature, parallel to the study, it is stated that anxiety has physical/physical, cognitive and affective symptoms (Cüceloğlu, 2005; Deniz & Üldaş, 2008; Köknel, 1989; Köroğlu, 2006; Semerci, 2007; Tolan, 2002; Yeşilyurt, 2006). As a result of the interviews with the students, the symptoms of mathematics anxiety were stated as physical/physical symptoms. Students who describe the symptoms of the emergence of anxiety as physical/physical; They reported sweating, dizziness, abdominal pain, ice cold hands and feet, inability to breathe, and nausea. In the study of Cüceloğlu (2005), there are physical symptoms of anxiety and these are; sweating, headaches, dizziness, dry mouth, chest tightness, shortness of breath, heart palpitations. Again, Deniz and Üldaş (2008) stated that anxiety causes the emergence of some physiological symptoms such as anxiety, panic, fear, stress, stomach problems, difficulty in breathing, sweating of the palms, and shame. These negative situations that arise due to anxiety cause the academic success of students to be limited.

Another result of the study is "What are the dimensions in the formation of mathematics anxiety?" Concerning this problem, the findings were examined under three themes: psychological dimension, philosophical dimension, and sociological dimension. In this sub-problem, which was created based on the answers given by the students to the first question, it is seen that the students mostly expressed their opinions on the sociological dimension and psychological dimension themes. In the subthemes of the sociological dimension; friend circle and classroom climate, family and teacher, in the subthemes of the psychological dimension; A flat wall that is difficult or even impossible to overcome, lack of acceptance/self-confidence, Failure/Failure, Prejudiced attitudes of students towards mathematics lesson. In the research studies, it is expected that there will be an increase in their academic success with the increase in social support perceived by students (Erden & Akgül, 2010; Yıldırım, 2006). Social support perception is a powerful factor in solving, preventing, and treating individuals' sociological and psychological problems (Yıldırım, 2006). Therefore, the social support system is a situation that can decrease or increase the mathematics anxiety levels of individuals. Alkan (2011) stated in his study that students who do not receive support from their families have mathematics anxiety. Again, Uzman (2004) stated that families' supportive role is an important factor in students' overcoming anxiety. Social support offered to students not only improves psychologically and physiologically but also has positive contributions to academic success (Erden & Akgül, 2010; Ergene & Yıldırım, 2003; Yıldırım, 2006). When students' perception of social support increases, students' motivation levels also increase (Şentürk, 2016). It is thought that students who are supported by their friends, families, and especially teachers will be well motivated in the education process.

Considering the results regarding the relations between the dimensions of the emerging anxiety; the sociological-psychological dimension and the psychological-philosophical dimension themes occur

together or trigger each other. This shows the complexity of the concept of anxiety. In the studies conducted so far, the concept of anxiety has been examined through scales prepared in the form of dimensions-factors. However, life itself is not a rather simplified form of anxiety, but rather a state of complexity, seen as, for example, lowering the dignity and status of the family; The family, which is called the immediate social environment, does not trust the child or accept him as it is, and this situation leads to the child's self-confidence-psychological deficiency and this situation also causes them to feel himself as a threat to their existence, which is a worthless-philosophical dimension.

One of the findings of the interviews with the students is that they negatively expressed the effect of mathematics anxiety on academic achievement. Students who stated that it had a negative effect on course achievement stated that mathematics anxiety caused situations such as low performance, not attending the class, and its effect on other lessons. All of the students who stated that mathematics anxiety affected negatively stated that mathematics anxiety caused poor performance. In the relevant literature, there are studies explaining that there is a negative and significant relationship between academic achievement and mathematics anxiety (Arıkam, 2004; Bekdemir, 2007; Erden & Akgül, 2010; Erkin, Dönmez, & Özel, 2006; Erol, 1989; Oksal, Durmaz, & Akın, 2013; Peker & Şentürk, 2012; Richardson & Suinn, 1972; Sapma, 2013; Şahin, 2004; Şentürk, 2010; Tan & Solak, 2015; Yenilmez & Özbey, 2003). Studies and this research show us that students with high levels of anxiety fail in mathematics lessons. As a matter of fact, when students are anxious, they fail in mathematics lesson, when they fail, they are afraid of mathematics and this failure situation becomes permanent. Yüksel and Şahin (2004) concluded in their study that as the level of success of students increases, their anxiety levels decrease. Therefore, it is seen that the mathematics performance of students with mathematics anxiety decreases and there is a negative relationship between anxiety and achievement.

The students stated that the reason for their mathematics anxiety might be their own. The students especially stated that they had a fear of making mistakes and they attributed this to their lack of self-confidence. It can be seen in this finding that students have a self-efficacy problem against mathematics lesson. Due to this self-efficacy problem, students do not solve mathematics problems and do not even want to attend classes. It is an expected but psychologically unwanted result that students do not want to solve mathematics problems and avoid class, and therefore worry. The students stated that they had a lot of difficulty especially in the questions that require logic and reasoning, which were asked under the name of new generation questions, and their anxiety levels increased more when these questions were asked in the mathematics and mock exams. They stated that as a result of the bad results, they were mentally and physically worn out, and this caused communication disorders with their environment. As a matter of fact, the anxiety levels of the students towards the mathematics lesson increase due to the decrease in the self-confidence of the students. The category of perceiving oneself as worthless as a result of the study also shows us that anxiety is an ontological concept. According to Kierkegaard, ontology is defined as a threat to its existence (hurt, feeling bad, insecure person, hence perceiving as worthless) (Flow, 2014). What is meant by the threat here is that the family, which we will call the close social environment, does not trust the child or accept him as it is, and the feeling of self-worth due to the lack of self-confidence in the child. Işık, Çiltaş and Bekdemir (2008) stated in their study that because of the fear of mathematics, students cannot learn mathematics knowledge in lessons and instead memorize the information. In the findings obtained from the study, the students stated that their anxiety would decrease when they have a good command of the field knowledge and they have confidence in themselves. Doruk, Öztürk and Kaplan (2016), on the other hand, found in their research that as students' self-confidence increased, their anxiety would decrease. Aschraft and Krause (2007) stated that the reason why students with high anxiety level fail in mathematics lesson is not only anxiety, but also insufficient mathematics knowledge will increase anxiety. Again, low self-esteem and memory deterioration in people are also a factor that increases anxiety. Koca (2011) stated in his study that students who consider themselves competent have lower mathematics anxiety. As a result, the reason behind the students' fear of doing



wrong is the lack of self-confidence. The anxiety levels of the students decrease with the increase of their self-confidence, and their anxiety levels increase with the decrease of their self-confidence.

When the effects of mathematics anxiety in terms of family relations are examined, it is seen that the mathematics lesson is effective in the deterioration of students' family relationships. The students stated that their relations with their families had deteriorated due to the mathematics lesson. Students stated that their anxiety increased especially because their families had high expectations from them. According to Bayer (2005), Money and reputation are among the reasons for families to have high expectations from their children. People who have fame, reputation and money in the society are regarded as "a man", while those who are the opposite are regarded as "nothing". Alain de Botton (2003) stated that not having high status does not only mean financially limited, individuals' self-esteem decreases. Material gains come at the top of the status understanding in modern societies. Changing this dominant thought in societies is as difficult as changing the direction of rotation around the sun. Therefore, it is inevitable that people who do not have high status will receive limited respect from others in the society. Indeed, according to Alain de Botton (2003), high status is like a key that opens the door to many wealth. Families today also support the statements of Alain de Botton and expect their children to be individuals of high status. Therefore, families put pressure on their children. Again, the students stated that their anxiety increased due to the situation of being compared with others and being criticized by their families. According to the information received from the students, families put pressure on students, whether they want to or not. It is observed that there are oppressive demands by their families that students should always get the highest score. For this reason, parents want students to spend more time in mathematics lesson and to be successful. However, families do not realize that these behaviors will further increase the level of anxiety in their students. As a matter of fact, one of the results of our study revealed that the students were more anxious due to these oppressive attitudes of the families and they also moved away from the mathematics course. Children of families with oppressive attitudes have a lack of self-confidence (Sertelin Mercan & Yavuzer, 2007). An individual with low self-esteem is more likely to experience anxiety than a person with high self-esteem (McKay & Fanning, 2008). Therefore, when parents take an active role in their children's education, the sense of trust in their children will develop.

As a result of interviews with students, it is seen that mathematics anxiety has negative effects on friendship relations. The students who stated that it had negative effects on their friendships defined this situation as being mocked and excluded from the group. Students are not able to actively participate in the lesson, not even wanting to speak in the classroom environment, especially because they fear being ridiculed. Again, because students match their place in the peer groups with being good or bad in mathematics lesson, they think that being successful in mathematics lesson is very important for them and if they fail in mathematics lesson, they will be excluded from peer groups. Therefore, students stated that people who are successful in mathematics lessons are respected in their peer groups, their words are listened to and they are seen as leaders. In addition, the students stated that they were angry, quarrelsome, and contemplative due to their math anxiety and that this situation negatively affected their friendship relations. In these times we live in the communication age, everyone or everything has positive or negative effects on our lives. Students' thoughts of getting reactions from their friends in the classroom and feeling themselves under pressure can lead to mathematics anxiety. In the studies conducted in the literature, it has been determined that the mathematics anxiety levels of the students who are not seen as hardworking by their friends and who think that they will be mocked by them will increase (Alkan, 2011; Bekdemir, 2007; Cantimer, 2016). As a result of this study, it was found that the students had mathematics anxiety because they feared being mocked and excluded by their friends, and this is similar to the results of the studies in the literature.

Based on the results related to the first problem, the social help the students get from their friends, families and teachers increases their academic successes. Therefore, the people in the social help

extent should make the students feel that they help her. One of the reasons of mathematics fear seen on the students is that the mathematics is seen frightening and difficult. There is a common belief that Mathematics lesson is difficult in Turkey. This shows that there is a prejudgement against the Mathematics lesson among the students. So exercises related to get rid of this prejudgement can be done. One of the reasons of the fear the students feel is to have mistakes and be laughed at. It's mostly the teacher's duty to get rid of this fear. The teachers should prepare democratic and supportive classroom environment to reduce the fear of making mistakes and make the students reply with courage. The current study is limited with the eighth grade students and phenomenology research design. Different class levels with other qualitative designs may be studied in the future.

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## Sekizinci Sınıf Öğrencilerinin Matematik Kaygılarının İncelenmesi

### Giriş

İnsanlığın var oluşundan itibaren süregelen kaygı kavramı üzerinde uzun yıllar düşünülmüştür. Cüceloğlu'na (2005) göre kaygı; korku, tasa, sıkıntı, başarısızlık hissi, acizlik, yargılanma gibi duygulardan birini veya birçoğunu içeren kavram olarak tanımlanmıştır. İnsanların temel duygularından biri olarak kabul edilen kaygı, etkili öğrenmeyi olumsuz biçimde etkileyen bir durum olarak karşımıza çıkmaktadır. Matematik kaygısı nedeniyle bireylerin matematik dersini sevmedikleri, nefret ettikleri ve bu dersi yapamayacaklarını düşünmeleri sebebi ile matematik dersinden uzaklaştıkları düşünülmektedir (Baloğlu, 2001). Bu durumların sonucu olarak da bireylerde güvensizlik, matematiği yapamayacağına dair düşünce ve yeteneklerinin farkına varamama durumları oluşmaktadır (Yenilmez & Özbey, 2006). Matematik dersinden uzaklaşan öğrencilerin bu dersten başarılı olmamaları da kaçınılmaz bir durumdur. Başarısızlığa yol açan kaygının altında yatan nedenlerin araştırılmasının, matematik eğitiminde gerek öğrenciler gerekse okul eğitimi bakımından istenen başarı düzeyine erişebilmek için önemli olduğu düşünülmektedir. Literatürdeki çoğu araştırmada öğrencilerin matematik kaygı düzeylerinin cinsiyet, sınıf düzeyi, anne baba eğitim durumu, genel başarı durumu, öğretmenlerin tutumu ve sosyo ekonomik düzeyleri arasında değişiminin nicel araştırma yöntemleriyle incelendiği görülmektedir (Adal & Yavuz, 2017; Akgül, 2008; Ateş & Güler, 2016; Baban, 2018; Borlat, 2018; Bozkurt, 2012; Doğru & Arslan, 2008; Eldemir, 2006; Kılıç, 2011; Şentürk, 2016; Taşdemir, 2013; Tuncer & Yılmaz, 2016; Yenihayat, 2007). Matematik kaygısıyla ilgili yapılan çalışmaların sayı bakımından azımsanmayacak kadar çok olduğu söylenebilir. Ancak yapılan çalışmaların genellikle nicel araştırma yöntemlerinin kullanılarak yapıldığı, nitel araştırma yöntemlerinin ise göz ardı edildiği görülmektedir. Yapılan bu nicel araştırmalar; matematik kaygısının öğrenci için ne anlama geldiğini, matematik kaygısını nelerin tetiklediğini ve nasıl ortaya çıktığını ve öğrencilerin arkadaş, aile, ders başarılarında nasıl bir etkiye sahip olduğunu açıklamada tek başına yeterli olmayabilir. Bu yüzden nitel araştırma yöntemleri bu tür sorulara odaklanarak matematik kaygısının ne anlama geldiğini derinlemesine ortaya çıkarmaktadır (Yıldırım & Şimşek, 2005). Nitekim nitel yöntemler kullanılarak yaptığımız bu çalışmanın amacı, öğrencilerin matematik öğrenmeye yönelik kaygılarını nasıl tanımladıklarını saptamak, kaygının hangi belirtilerinin olduğunu belirlemek ve kaygının nasıl ortaya çıktığını tanımlamaktır. Araştırmada matematik kaygısının oluşmasında psikolojik, sosyolojik ve felsefik boyutların birlikte nasıl etkili olduğu incelenerek şimdiye değin üzerinde durulmayan bileşke etkilerin tanımlanması amaçlanmaktadır. Bu kapsamda çalışmanın problem cümlesi "Ortaokul sekizinci sınıf öğrencileri matematik kaygılarını nasıl tanımlamaktadır?" olarak ifade edilmektedir. Bu araştırmaya uygun olarak aşağıdaki alt problemlere yanıtlar aranmıştır:

1. Öğrencilerin yaşadıkları matematik kaygısı nasıl tanımlanmaktadır?
2. Matematik kaygısının bileşenleri nedir ve aralarında nasıl bir ilişki bulunmaktadır.
3. Öğrenciler yaşadıkları matematik kaygılarının ders başarılarına, aile ile çevresine ve kendisine yönelik etkilerini nasıl tanımlamaktadır?

## Yöntem

Çalışmamızda nitel araştırma yöntemlerinden fenomenoloji araştırma deseni kullanılmıştır. Katılımcılar, amaçlı ve kolay ulaşılabilir durum örnekleme tekniğiyle belirlenmiştir. Her bir katılımcı, örnek olay yöntemine göre ayrı ayrı incelenmiş, sonrasında aralarında anlamsal bağlar kurmak için olaylar arası ilişkiler saptanmaya çalışılmıştır. Araştırmada veri toplama aracı olarak yarı yapılandırılmış görüşme formu kullanılarak ortaokul sekizinci sınıf öğrencilerinin “matematik kaygısı” olgusu hakkında veri toplanması amaçlanmıştır. Görüşme formu hazırlanmadan önce soruların amaca uygunluğu, açıklığı ve anlaşılabilirliğini kontrol etmek amacıyla 3 öğrenci ile pilot görüşme gerçekleştirilmiştir. Veriler, içerik analizi tekniği yoluyla çözümlenmeye çalışılmıştır. Tema ve kodlama süreci Colaizzi'nin (1978) yedi aşamadan oluşan fenomenolojik veri analizi yaklaşımına göre yürütülmüştür.

## Bulgular

Araştırmada elde edilen bazı önemli bulgular aşağıda sunulmaktadır:

- Öğrencilerin matematik kaygısını ağırlıklı olarak ürkütücü/korkutucu durumlara yönelik tanımladıkları görülmektedir.
- Öğrenciler matematik kaygısının belirtilerini bedensel/fiziksel belirtiler olarak belirtmişlerdir.
- Matematik kaygısının ortaya çıkmasında sosyolojik ve psikolojik boyutun baskın olduğu gözlenmektedir.
- Ortaya çıkan kaygının boyutları arasındaki ilişkilere bakıldığında; sosyolojik- psikolojik boyut ve psikolojik-felsefik boyut temalarının birlikte ortaya çıktığı veya birbirini tetiklediği görülmektedir.
- Öğrenciler matematik kaygısının ders başarısı açısından olumsuz bir etkiye sahip olduğunu belirtmişlerdir.
- Öğrenciler yaşadıkları matematik kaygısının nedenini kendilerinden kaynaklı olabileceğini belirtmişlerdir. Öğrenciler özellikle yanlış yapma korkusu yaşadıklarını söylemişlerdir ve bunun gerekçesini de kendilerindeki özgüven eksikliğine bağlamışlardır.
- Öğrenciler matematik dersinden dolayı aileleriyle ilişkilerinin bozulduğunu ifade etmişlerdir. Öğrenciler özellikle ailelerinin kendilerinden yüksek beklenti içerisinde olmalarından dolayı kaygılarının çok arttığını ifade etmişlerdir.
- Öğrencilerle yapılan görüşmeler neticesinde matematik kaygısının arkadaşlık ilişkilerine olumsuz etkileri olduğu görülmektedir. Arkadaş ilişkilerine olumsuz etkilerde bulunduğunu belirten öğrenciler bu durumu alay edilme ve gruptan dışlanma olarak tanımlamaktadırlar.

## Tartışma, Sonuç ve Öneriler

Öğrenciler matematik kaygısını korkutucu/ürkütücü olan durumlara benzetmişlerdir. Ayrıca öğrenciler matematik kaygısını zor ve duygusal/ruhsal durum olarak da ifade etmektedirler. Öğrencilerin görüşlerinden hareketle oluşturulan kodlara bakıldığında; öğrencilerin matematik dersinden korktukları, zorlandıkları ve bunun duygusal durumlarına etkilerde bulunduğu görülmektedir. Çalışmamızla paralel olarak alan yazında da matematik dersinin zor olduğuna yönelik bulgulara sahip araştırmalar bulunmaktadır (Başar, Ünal, & Yalçın, 2002; Baykul, 2004).

Kaygının ortaya çıkmasının fiziksel/bedensel, bilişsel, duyuşsal belirtileri olduğu saptanmıştır. İlgili literatürde de çalışmamıza paralel olarak kaygının fiziksel/bedensel, bilişsel, duyuşsal belirtilerinin olduğu ifade edilmektedir (Cüceloğlu, 2005; Deniz & Üdaş, 2008; Köknel, 1989; Köroğlu, 2006; Semerci, 2007; Tolan, 2002; Yeşilyurt, 2006). Kaygının ortaya çıkmasının belirtilerini fiziksel/bedensel olarak tanımlayan öğrenciler bu belirtilerin; terlemek, baş dönmesi, karın ağrısı, el ve ayağın buz gibi olması, nefes alamamak, mide bulantısı olarak belirtmişlerdir.

Öğrenciler matematik kaygısının ortaya çıkmasında sosyolojik ve psikolojik faktörlerin etkili olduğunu belirtmişlerdir. Sosyal destek algısı bireylerin sosyolojik ve psikolojik sorunlarının çözülmesinde, önlenmesinde ve tedavi edilmesinde güçlü bir etkidir (Yıldırım, 2006). Uzman (2004), ailelerin destekleyici rolünde olmasının öğrencilerin kaygının üstesinden gelmesinde önemli bir faktör olduğunu belirtmiştir. Öğrencilere sunulan sosyal desteğin psikolojik ve fizyolojik olarak iyi gelmesinin yanında akademik olarak da başarısına olumlu katkıları bulunmaktadır (Erden & Akgül, 2010; Ergene & Yıldırım, 2003; Yıldırım, 2006). Öğrencilerdeki sosyal destek algısı arttığı zaman öğrencilerin güdülenme düzeyleri de artmaktadır (Şentürk, 2016). Arkadaşları, aileleri özellikle de öğretmenleri tarafından desteklenen öğrencilerin eğitim sürecinde iyi motive olacakları düşünülmektedir.

Ortaya çıkan kaygının boyutları arasındaki ilişkilere ilişkin sonuçlara bakıldığında; sosyolojik-psikolojik boyut ve psikolojik-felsefik boyut temalarının birlikte ortaya çıktığı veya birbirini tetiklediği görülmektedir. Bu da kaygı kavramının karmaşıklığını göstermektedir. Zaten şimdiye değin yapılan araştırmalardaki incelemelerde kaygı kavramına boyutlar-faktörler şeklinde hazırlanmış ölçekler aracılığıyla bakılmıştır. Oysa hayatın kendisi kaygının oldukça basite indirgenmiş haliyle değil, tersine örneğin ailenin itibarını-statüsünü düşürme şeklinde görülen kaygı tam bir karmaşıklık halidir; yakın sosyal çevre olarak adlandırılan ailenin çocuk üzerindeki güvenmeme veya onu olduğu gibi kabul etmeme ile bu durumun çocukta özgüven - psikolojik eksikliğine ve bu durum aynı zamanda kendini değersiz - felsefi bir boyut olan ontolojik başka bir ifadeyle varlığına tehdit olarak hissetmesine yol açmaktadır.

Öğrencilerle yapılan görüşmelerin bulgularından biri de matematik kaygısının ders başarıları üzerindeki etkisini olumsuz olarak ifade etmeleridir. Ders başarılarına olumsuz etkileri olduğunu belirten öğrenciler matematik kaygısının performans düşüklüğüne, derse katılmama durumuna, diğer derslere etkisi gibi durumlara yol açtığını belirtmişlerdir. Öğrencilerden matematik kaygısını olumsuz etkiler şeklinde belirtenlerin tamamı matematik kaygısının performans düşüklüğüne yol açtığını belirtmişlerdir.

Öğrenciler yaşadıkları matematik kaygısının nedenini kendilerinden kaynaklı olabileceğini belirtmişlerdir. Öğrenciler özellikle yanlış yapma korkusu yaşadıklarını söylemişlerdir ve bunun gerekçesini de kendilerindeki özgüven eksikliğine bağlamışlardır. Çalışmamızın sonucunda oluşan kendini değersiz olarak algılama kategorisi de bize gösteriyor ki kaygı ontolojik bir kavramdır. Kierkegaard'a göre ontoloji, varlığına yönelik (incinme, kötü hissetme, güven vermeyen kişi, dolayısıyla değersiz olarak algılama) tehdit olarak tanımlanmaktadır (Akış, 2014). Buradaki tehditten kasıt, yakın sosyal çevre olarak adlandıracağımız ailenin çocuğuna güvenmemesi veya onu olduğu gibi kabul etmemesi ile bu durumun çocukta oluşturduğu özgüven eksikliğine bağlı olarak ortaya çıkan kendini değersiz hissetme durumudur.

Matematik kaygısının aile ile ilişkiler açısından etkileri incelendiğinde, öğrencilerin aile ile ilişkilerinin bozulmasında matematik dersinin etkili olduğu görülmektedir. Öğrenciler özellikle ailelerinin kendilerinden yüksek beklenti içerisinde olmalarından dolayı kaygılarının çok arttığını ifade etmişlerdir. Alain de Botton'a (2003) göre ailelerin çocuklarından yüksek beklenti içerisinde olma nedenleri arasında para, ün ve itibar gelmektedir. Alain de Botton'a (2003) göre yüksek statü birçok zenginliğin kapısını açan bir anahtar gibidir. Günümüzdeki aileler de Alain de Botton'un anlattığı ifadeleri destekler nitelikte hareket etmekte ve çocuklarının yüksek statülü bireyler olmalarını beklemektedirler. Bu yüzden de aileler çocukları üzerinde baskı kurmaktadırlar.

Öğrencilerle yapılan görüşmeler neticesinde matematik kaygısının arkadaşlık ilişkilerine alay edilme ve gruptan dışlanma olarak olumsuz etkileri olduğu görülmektedir. Öğrenciler özellikle alay edilme korkusu yaşadıkları için sınıf ortamında söz hakkı dahi istemeyerek derse aktif katılım gösterememektedirler. Yine öğrenciler arkadaş gruplarındaki yerlerini matematik dersinde iyi ya da

kötü olmakla eşleştirdikleri için matematik dersinde başarılı olmanın onlar için çok önemli olduğunu ve eğer matematik dersinde başarısız olurlarsa arkadaş gruplarından dışlanacaklarını düşünmektedirler.

Çalışmanın birinci alt problemine yönelik elde edilen sonuca göre öğrencilerin arkadaş çevresi, aile, öğretmenler tarafından algıladıkları sosyal destek akademik başarılarını arttırmaktadır. Bu yüzden sosyal destek kapsamı içerisindeki kişiler, öğrencilere destek olduklarını hissettirmelilerdir. Öğrencilerde oluşan matematik kaygısının sebeplerinden birisi matematik dersinin korkutucu ve zor olarak görülmesidir. Zaten Türkiye’de matematik dersinin zor olduğuna dair yaygın bir inanış vardır. Bu da öğrencilerde matematik dersine karşı bir önyargı olduğunu göstermektedir. Bu yüzden öğrencilerde bulunan bu ön yargılarını ortadan kaldırmaya yönelik etkinlikler yapılabilir. Öğrencilerde oluşan kaygının sebeplerinden birisi de ders esnasında yanlış yapma ve alay edilme korkusudur. Burada oluşan kaygının ortadan kaldırılması için en büyük görev öğretmenlere düşmektedir. Öğretmenlerin demokratik ve destekleyici sınıf ortamı oluşturmaları öğrencilerin yanlış yapma korkularını giderecektir ve cesaretle cevap vermelerini sağlayacaktır. Çalışma sekizinci sınıf öğrencilerle ve fenomenoloji deseniyle sınırlandırılmıştır. Farklı sınıf düzeyleri ve diğer nitel araştırma desenleri kullanılarak da çalışılabilir.