



## The Examination of Gender Differences in Affective Entry Characteristics towards Mathematics

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**To cite this article:** Caliskan, M. (2019). The Examination of Gender Differences in Affective Entry Characteristics towards Mathematics, *International Online Journal of Educational Sciences*, 11 (5), 200-211.

### ARTICLE INFO

#### Article History:

Received: 18.03.2019

Available online:  
11.11.2019

### ABSTRACT

In this study, the main and joint effects of grade level and gender on affective entry characteristics towards mathematics were tested. Six schools took part in the study. Students from grades 4 to 8 completed the scale, resulting in a total 638 responses. The data were analyzed by two-way ANOVA for independent samples. The results indicate that grade level affects students' affective entry characteristics towards mathematics. As grade level increases, scores of affective entry characteristics towards mathematics decrease. Students' affective entry characteristics towards mathematics do not differ according to gender. Grade level and gender do not have a joint effect on affective entry characteristics towards mathematics. The findings were interpreted according to the sources of gender differences in affective entry characteristics towards mathematics. It could be argued that grade level is an effective variable in affective entry characteristics, gender differences still remain controversial, and further research is needed to investigate the joint effect of grade level and gender.

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#### Keywords:

Affective entry characteristics towards mathematics, attitudes towards mathematics, grade, gender, gender differences

### Introduction

Affective entry characteristics towards mathematics can be defined as a combination of the student's interest in mathematics or attitude towards learning units of mathematics and his/her academic self-concept. As emotions play an important role in deciding how much mathematics students need in the future and how to approach the mathematical content they study (Reyes, 1984), there has recently been increased awareness of the importance of affective factors in mathematics learning. In the literature, the importance of affective factors, as well as cognitive factors, is emphasized in mathematics. Investigating students' affective responses to mathematics has become a major topic (Lebens, Graff, & Mayer, 2011). The importance of affective factors in mathematics learning has been stated periodically (Evans & Tsatsaroni, 1996). Affective entry characteristics towards mathematics can be an important variable affecting mathematics performance. The nature of the

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DOI: <https://doi.org/10.15345/iojes.2019.05.01414>

affective entry characteristics of students (positive or negative) may determine whether he/she will struggle when he/she faces a difficulty in learning mathematics.

There are many variables that determine the affective entry characteristics (interests, attitudes, and math self-concept) towards mathematics. These variables are gender, mathematics performance, mathematical understanding, previous mathematics achievement, report card grade, grade level, family income level, mother's education level, father's education level, mother's profession, father's profession, number of siblings, family support, taking extra support course, the person who encourage them to love mathematics, spatial skills, the perceived utility of mathematics, the school being coeducational or single-sex, gender stereotypes. Many studies (Abalı-Öztürk & Şahin, 2015; Cvencek, Kapur, & Meltzoff, 2015; Ganley & Lubienski, 2016; Ganley & Vasilyeva, 2011; Gunderson, Ramirez, Levine, & Beilock, 2012; Hyde, Fennema, Ryan, Frost, & Hopp, 1990; Kaba & Şengül, 2015; Kıbrıslıoğlu-Uysal & Haser, 2018; Kocakaya, Okuyucu, Öner, & Uzunyol, 2018; Lamb, 1997; Lee & Anderson, 2015; Ma & Xu, 2004; Recber, Isiksal, & Koç, 2018; Skaalvik & Skaalvik, 2004; Şimşek, Şahinkaya, & Aytekin, 2017; Taşdemir, 2009; Tocci & Engelhard, 1991; Tuncer & Yılmaz, 2016; Yücel & Koç, 2011) have examined the relationship between affective entry characteristics and these variables. In most of these studies, the relationship between affective entry characteristics and gender was investigated. According to Tocci and Engelhard (1991), gender differences have been the main subject of research investigating math attitude. Therefore, it can be argued that gender differences are an important variable in affective entry characteristics towards mathematics. Felson and Trudeau (1991) explain the gender differences with the standard socialization model. Cvencek, Kapur, and Meltzoff (2015) point to gender stereotypes as the source of gender differences. Parents' and teachers' expectations for children's mathematics competences are generally gender-based and may affect children's affective characteristics (Gunderson et al., 2012). As the grade level increases, gender roles and gender stereotypes are strengthened. Thus, it could be suggested that grade level, as well as gender, would be an important variable in terms of affective entry characteristics towards mathematics.

There may be various reasons for the differentiation of affective entry characteristics towards mathematics according to gender. One of them is mathematics performance (Ganley & Lubienski, 2016). Math performance affects the development of affective characteristics. Ma and Xu (2004) argue that previous success (also called performance) predicts the future attitude significantly. According to Ganley and Lubienski (2016), mathematics performance is a consistent predictor of subsequent confidence and interest. It can be argued that high performers will develop positive affective characteristics. The widespread belief is that males outperform females in mathematics. Therefore, it is expected that affective characteristics of boys will be more positive than girls. Proximate mediators affect the performance in mathematics, distal mediators affect proximate mediators, and gender affects distal mediators. Effort, math anxiety, and course preparation are proximate mediators. A student's and others' attributions of mathematical ability, a student's attitudes and the attitude of others about the importance of mathematics, and the encouragement from others are distal mediators. Distal mediators are shaped by gender (Felson & Trudeau, 1991). For example, girls may be given the message that they have low abilities for mathematics, that when they become an adult, they do not need any further skills, and that mathematics is a male domain. They may receive less encouragement than boys. These messages can cause girls to lose interest in mathematics and to have less self-confidence. According to Felson and Trudeau (1991), gender differences in favour of males are attributed to gender socialization. Kimbal (1989) argues that males perform better as they have more autonomous learning styles. Boys have a more autonomous learning style than girls. This difference allows them to perform better in tasks that require knowledge to apply to new problems (as cited in Felson & Trudeau, 1991). Thus, the good performance can enable boys to develop positive affective characteristics. It could be said that it is the opposite for girls. Ganley and Vasilyeva (2011) state that gender differences can be explained by spatial skills. Male students have more spatial skills than female ones. This enables them to participate in mathematics lessons, solve problems and be less concerned about

mathematics which results in the fact that boys develop a more positive attitude than girls. According to Lamb (1997), the perceived utility of mathematics results in the difference between male and female students in terms of attitudes towards mathematics. According to Lee and Anderson (2015), the fact that the school is coeducational or just a single sex school for boys or girls can be a determinant in gender differences. Lee and Anderson (2015), in their study, has chosen three schools, a coeducational school, a single sex school for boys and a single sex school for girls. They compared the students' mean scores of attitude scale. The research findings revealed that the most positive group is female students in single sex school for girls. They are followed by the male students in single sex school for boys and the students in coeducational school, respectively. When the mean scores of the students' in the single sex schools were compared, there were no significant differences in items "I fell anxious while studying maths, studying maths is one of my favourite activities, maths is quite stressful for me". The mean scores of girls were significantly higher than the boys in items "I like mathematics, I often think that what we're dealing with in mathematics is exciting, maths is fun, I'm quite happy when I study maths". The mean scores of boys were significantly higher in items "I do not like maths". This result supports the idea that female students have the belief that "boys outperform girls in mathematics" because the attitudes of female students in single sex schools where there are no male students are more positive. Cvencek et al. (2015) argues that gender identity may be another reason for gender differences. Gender identity can be a factor for a student that helps identify strongly (for boys) or weakly (for girls) with maths. Cultural stereotypes can lead the girls stay away from mathematics.

The study of gender differences in the affective entry characteristics towards mathematics is a highly researched topic. When the literature is reviewed, it is seen that there are contradictory results. Skaalvik and Skaalvik (2004) concluded that male students' math self-concept and interest levels were significantly higher than girls. Abalı-Öztürk and Şahin (2015) reported that female students' mathematics self-efficacy levels differed significantly from male students. Kıbrıslıoğlu-Uysal and Haser (2018) concluded that the mathematical self-efficacy beliefs did not differ according to gender. Different results have been obtained in studies investigating gender differences in mathematics. There are studies reporting that the attitude towards mathematics differs according to gender (Ganley & Vasilyeva, 2011; Reber et al., 2018; Şimşek et al., 2017; Tocci & Engelhard, 1991), as well as studies reporting no difference in terms of attitude according to gender (Abalı-Öztürk & Şahin, 2015; Kaba & Şengül, 2015; Tuncer & Yılmaz, 2016; Yücel & Koç, 2011). Hyde, Fennema, Ryan, Frost, and Hopp (1990) stated that gender differences in attitude towards mathematics are small. The results of the studies, which examine the relationship between grade level and the attitude towards mathematics, one of the components of affective entry characteristics, are consistent. Researches (Kaba & Şengül, 2015; Kocakaya et al., 2018; Şimşek et al., 2017; Taşdemir, 2009; Tuncer & Yılmaz, 2016) concluded that students' attitudes towards mathematics varied according to grade level, and attitude scores decreased as the grade level increased.

It is observed that the results of the studies investigating gender differences in affective entry characteristics towards mathematics are not consistent. It is remarkable that gender difference is an important variable in previous studies but it has been reported that there are no differences according to gender in recent studies. The results which were obtained from the studies in recent years reporting that there is no difference according to gender suggest that there is a change in gender stereotypes. The results of the studies investigating affective entry characteristics towards mathematics according to grade level are consistent. As grade level increases, scores of affective entry characteristics decrease. Gender differences and gender stereotypes and social stereotypes are expected to be as low as the girls' affective entry characteristics as grade level increases. If gender differences are due to gender roles and gender stereotypes as claimed, girls' affective entry characteristics are expected to be low as grade level increases, because gender roles will be learned more and gender stereotypes will be strengthened when grade level increases. Thus, the aim of this study is to

investigate whether the main and joint effect of grade level and gender on affective entry characteristics towards mathematics are significant. For this purpose, the following questions were addressed:

1. Do students' affective entry characteristics towards mathematics differ significantly according to grade level?
2. Do students' affective entry characteristics towards mathematics differ significantly according to gender?
3. Do students' affective entry characteristics have a significant difference depending on the joint effect of grade level and gender?

### Method

Six schools in a large metropolitan area took part in the study. All students in grades 4 to 8 completed the scale, resulting in a total of 638 responses. The distribution of participants by grade and gender is shown in Table 1.

The data were collected with Affective Entry Characteristics Scale for Mathematics (AECSM) developed by Çalışkan and Serçe (2016). This single-factor scale included 20 items. The maximum possible score that can be obtained from the scale is "80", while the minimum possible score is "20". Cronbach's alpha coefficient of internal consistency was recalculated and found as .945 for this study. A two-way ANOVA for independent samples was used to test the joint effect of grade level and gender on affective entry characteristics towards mathematics. The purpose of this technique is to test the main and joint effect of two factors on the dependent variable simultaneously instead of testing the effects of two factors on a dependent variable separately (Büyüköztürk, 2011).

**Table 1.** Distribution of participants

Grade	Female	Male	Total
4	49	45	94
5	92	53	145
6	81	59	140
7	105	40	145
8	29	85	114
Total	356	282	638

Skewness and kurtosis values of affective entry characteristics towards mathematics scores in each grade level and gender are given in Table 2. When Table 2 is examined, it could be suggested that the scores do not deviate significantly from normal distribution (Büyüköztürk, 2011).

**Table 2.** Skewness and kurtosis values of scale scores

Grade	Gender	Skewness	Kurtosis
4	Female	-1.051	3.821
	Male	-.780	.372
5	Female	-1.093	2.543
	Male	-1.022	1.026
6	Female	-.368	-.221
	Male	-.066	-.006
7	Female	-.205	-.184
	Male	-.375	.032
8	Female	.146	.663
	Male	-.373	.176

## Findings

Two-way ANOVA for independent samples was used to test the main and joint effect of grade level and gender on affective entry characteristics towards mathematics. Descriptive statistics on the scores obtained from the AECSM scale are in Table 3, and ANOVA results are in Table 4.

**Table 3.** Descriptive statistics

Grade	Gender	n	Means	Std. Deviation
4	Female	49	65.91	8.79
	Male	45	64.20	10.50
	Total	94	65.09	9.63
5	Female	92	64.36	10.21
	Male	53	63.69	11.33
	Total	145	64.12	10.60
6	Female	81	61.35	10.15
	Male	59	59.83	10.71
	Total	140	60.71	10.38
7	Female	105	55.42	10.80
	Male	40	58.47	12.34
	Total	145	56.26	11.28
8	Female	29	50.37	8.71
	Male	85	51.77	10.50
	Total	114	51.42	10.05
Total	Female	356	60.12	11.16
	Male	282	58.63	11.96
	Total	638	59.46	11.53

As shown in Table 3, the mean scores of grade 4 ( $M=65,09$ ) were the highest. The mean scores of grade 8 ( $M=51,42$ ) were the lowest. When the mean scores of girls and boys in all grade levels were compared, girls' mean scores ( $M=60,12$ ) were higher than boys' mean scores ( $M=58,63$ ). Regarding grade level and gender, the mean scores of girls' in grade 4, 5 and 6 and the mean scores of boys' in grade 7 and 8 are high.

**Table 4.** ANOVA results of affective entry characteristics towards mathematics scores according to grade level and gender

Source of variation	Sum of squares	Degrees of freedom	Mean square	F	p-value
Grade	14856.493	4	3714.123	33.747	.000
Gender	0.083	1	0.083	0.001	.978
GradeXGender	475.022	4	118.756	1.079	.366
Error	69115.670	628	110.057		
Total	84794.671	637			

Grade levels affect students' affective entry characteristics towards mathematics [ $F_{(4, 628)}=33,747$ ,  $p=0,000$ ,  $SME=110,057$ ,  $\eta^2=,177$ ]. This finding shows that students' affective entry characteristics towards mathematics differ according to grade level. The results of the Scheffe test conducted to find out the differences between the grades are as follows: there was a significant difference in favour of grade 4 among grades 4, 6, 7 and 8; there was a significant difference in favour of grade 5 among grades 5, 7 and 8; there was a significant difference in favour of grade 6 between grades 6 and 8; there was a significant difference in favour of grade 7 between grades 7 and 8. Accordingly, it could be argued that as the grade level increases, scores of affective entry characteristics towards mathematics decrease. It could also be said that students in lower grades have

more positive affective entry characteristics towards mathematics than students in higher grades. Gender does not affect affective entry characteristics towards mathematics [ $F_{(1, 628)}=0,001$ ,  $p=0,978$ ,  $SME=110,057$ ,  $\eta^2=,000$ ]. Students' affective entry characteristics towards mathematics do not differ according to gender. It can be argued that grade level and gender do not have a mutual effect on students' affective entry characteristics towards mathematics, that is, they do not have joint effect on affective entry characteristics [ $F_{(4, 628)}=1,079$ ,  $p=0,366$ ,  $SME=110,057$ ,  $\eta^2=,007$ ]. Therefore, girls' and boys' affective entry characteristics towards mathematics do not differ according to grade levels. In other words, affective entry characteristics towards mathematics of the students studying in various grade levels do not differ according to gender.

### Discussion and Conclusion

Gender differences are emphasized as an important factor affecting affective entry characteristics towards mathematics (interest-attitude-math self-concept). Although there are many sources of gender differences, the standard socialization model (Felson & Trudeau, 1991), parents' expectations and beliefs (Gunderson et al., 2012), gender roles and gender stereotypes (Cvencek et al., 2015) are among the most remarkable. Thus, it is expected that girls' affective entry characteristics are lower than that of boys as the grade level increases. In other words girls' affective entry characteristics are expected to be negative because as the grade level increase (age will increase), gender roles and gender stereotypes will be strengthened. Therefore, in this study, it was investigated whether students' affective entry characteristics towards mathematics differed according to grade level, gender and the joint effect of the two. It was found that students' affective entry characteristics towards mathematics differed according to grade level but they did not differ according to gender. Affective entry characteristics towards mathematics did not differ according to the joint effect of grade level and gender. In other words, grade level affects affective entry characteristics but gender does not affect. Grade level and gender do not have a joint effect on affective entry characteristics towards mathematics.

Grade level is an important variable on students' affective entry characteristics towards mathematics. As grade level increases, scores of the students' affective entry characteristics towards mathematics decrease. Similar results were obtained in many studies (Kaba & Şengül, 2015; Kocakaya et al., 2018; Şimşek et al., 2017; Taşdemir, 2009; Tuncer & Yılmaz, 2016). It is due to the difficulty of the subjects of mathematics as grade level increases. In addition, as grade level increases, students are faced to cope with more difficult math questions in preparation for the upcoming central national exams. It can be interpreted as follows. When the subjects are difficult and the student fails, academic self-concept decreases. A low academic self-concept affects interest in and attitude towards mathematics negatively. Although the interpretations given to the results of this study seem appropriate, researching what really changes as the grade level increases may reveal some things we do not know at the moment. Deficiencies in pre-learning may increase as the grade level increases. This makes learning math difficult because mathematics is a school subject that demonstrates a strict progressive relationship with the topics of the previous year.

Gender is not an important variable on students' affective entry characteristics towards mathematics. Similar results were obtained in many studies (Abalı-Öztürk & Şahin, 2015; Hyde et al., 1990; Kaba & Şengül, 2015; Kıbrıslıoğlu-Uysal & Haser, 2018; Şimşek et al., 2017; Tuncer & Yılmaz, 2016; Yücel & Koç, 2011). However, there are also studies that revealed different results (Ganley & Vasilyeva, 2011; Lamb, 1997; Recber et al., 2018; Skaalvik & Skaalvik, 2004; Tocci & Engelhard, 1991). The difference in these studies is generally in favour of men. These different results indicate that gender differences in affective entry characteristics towards mathematics are still controversial. In this study, why affective entry characteristics towards mathematics did not differ according to gender could be explained through change in three facts. The first is the perception. According to Lamb (1997), the perceived utility of mathematics causes the affective characteristics of male and female students to differ. The perception that mathematics is for men, and it doesn't serve for women is one

of the reasons for gender differences. However, today, this perception has changed. The second is the parents' expectations and beliefs. According to Gunderson, Ramirez, Levine, and Beilock (2012), parents' and teachers' expectations for children's mathematical competences are often gender-based and may affect children's math attitudes. Parents and teachers expect and encourage boys more. Girls are not encouraged. However, this has also changed, the expectations from girls have increased and they are being encouraged. The third is gender stereotypes. Cvencek et al. (2015), suggest gender stereotypes may distract girls from mathematics by changing interest, motivation and so on. Math-gender stereotypes are significantly correlated with a stronger math self-concept for boys and a weaker math self-concept for girls. Today, we could argue that these gender stereotypes have also changed. In short, there are changes in these three facts and this change reduces the gender differences. Mathematics is an important subject all over the world. It is a basic course for achieving goals. For this reason, today we could say that beliefs suggesting that "mathematics is for men, engineering is a male domain, girls don't need maths" have changed. The findings obtained in this study (the absence of gender differences in affective characteristics) were interpreted with a belief of change in three facts. Whether this change is real or not deserves further research.

Grade level and gender do not have a joint effect on affective entry characteristics towards mathematics. The effect of grade level is not gender dependent. In other words, there is a difference according to grade level, but gender is not the reason for this difference. Whatever the source of its difference according to grade level, this affects both girls and boys similarly. In this study, it was expected that as grade level increased, girls' affective entry characteristics would be lower than boys. The result obtained from the study indicated that affective entry characteristics towards mathematics did not differ according to the joint effect of grade level and gender and this could be explained by the three facts mentioned above.

As a result, it is possible to argue that grade level is an effective variable in affective entry characteristics, gender differences are still controversial, and further research is needed to investigate the joint effect of grade level and gender.

## GENİŞLETİLMİŞ ÖZET

### Matematiğe Yönelik Duyuşsal Giriş Özelliklerinde Cinsiyet Farklılıklarının İncelenmesi

#### Giriş

Matematiğe yönelik duyuşsal giriş özelliklerinde cinsiyet farklılıklarını inceleyen araştırma sonuçlarının tutarlı olmadığı görülmektedir. Daha önceki yıllarda yapılan çalışmalarda cinsiyet farklılıklarının önemli bir değişken olduğu buna rağmen son yıllardaki çalışmalarda cinsiyete göre farklılık olmadığı rapor edilmesi dikkat çekmektedir. Son yıllardaki çalışmalarda ulaşılan cinsiyete göre farklılık olmadığı sonucu toplumsal kalıp yargılarda değişme olduğunu düşündürmektedir. Sınıf düzeyine göre matematikte duyuşsal giriş özelliklerini inceleyen çalışma sonuçları ise tutarlıdır. Sınıf düzeyi arttıkça duyuşsal giriş özellikleri puanları düşmektedir. İddia edildiği gibi cinsiyet farklılıklarının nedeni cinsiyet rolleri ve toplumsal kalıp yargıları ise sınıf düzeyi ilerledikçe kızların duyuşsal giriş özelliklerinin düşük olması beklenir. Çünkü sınıf düzeyi ilerledikçe cinsiyet rolleri daha çok öğrenilecektir ve toplumsal kalıp yargılar güçlenecektir. Bu bağlamda, bu çalışmanın amacı, sınıf düzeyinin ve cinsiyetin matematiğe yönelik duyuşsal giriş özellikleri üzerindeki etkilerinin ve ortak etkilerinin anlamlı olup olmadığını araştırmaktır. Bu amaçla aşağıdaki sorulara cevap aranmıştır:

1. Öğrencilerin matematiğe yönelik duyuşsal giriş özellikleri, sınıf düzeyine göre anlamlı bir farklılık göstermekte midir?
2. Öğrencilerin matematiğe yönelik duyuşsal giriş özellikleri, cinsiyete göre anlamlı bir farklılık göstermekte midir?
3. Öğrencilerin matematiğe yönelik duyuşsal giriş özellikleri, sınıf düzeyinin ve cinsiyetin ortak etkisine bağlı olarak anlamlı bir farklılık göstermekte midir?

#### Yöntem

Çalışma dördüncü, beşinci, altıncı, yedinci ve sekizinci sınıflara devam eden 638 öğrenci ile gerçekleştirildi. Veriler Çalışkan ve Serçe (2016) tarafından geliştirilen Matematiğe Yönelik Duyuşsal Giriş Özellikleri Ölçeği ile toplandı. Sınıf düzeyinin ve cinsiyetin matematiğe yönelik duyuşsal giriş özellikleri üzerindeki ortak etkisini eş zamanlı test etmek amacıyla ilişkisiz örneklemeler için iki faktörlü ANOVA kullanıldı. Bu tekniğin amacı, gruplararası iki faktörün bir bağımlı değişken üzerindeki etkisini ayrı ayrı test etmek yerine, faktörlerin temel etkilerini ve iki faktörün bağımlı değişken üzerindeki ortak etkisini eş zamanlı olarak test etmektir (Büyüköztürk, 2011).

#### Bulgular

Sınıf düzeyi öğrencilerin matematiğe yönelik duyuşsal giriş özelliklerini etkilemektedir [ $F_{(4, 628)}=33,747$ ,  $p=0,000$ ,  $SME=110,057$ ,  $\eta^2=,177$ ]. Bu bulgu öğrencilerin matematiğe yönelik duyuşsal giriş özelliklerinin sınıf düzeyine göre farklılaştığını gösterir. Sınıf düzeyleri arasındaki farkların hangi sınıflar arasında olduğunu incelemek amacıyla yapılan Scheffe testi sonuçlarına göre dördüncü sınıflar ile altıncı, yedinci, sekizinci sınıflar arasında dördüncü sınıfların; beşinci sınıflarla yedinci ve sekizinci sınıflar arasında beşinci sınıfların; altıncı sınıflar ile sekizinci sınıflar arasında altıncı sınıfların; yedinci sınıflar ile sekizinci sınıflar arasında yedinci sınıfların lehine anlamlı bir fark vardır. Buna göre sınıf düzeyi arttıkça matematiğe yönelik duyuşsal giriş özellikleri puanlarının düştüğü söylenebilir. Alt sınıflardaki öğrencilerin üst sınıflardaki öğrencilere göre matematiğe yönelik daha olumlu duyuşsal giriş özelliklerine sahip oldukları söylenebilir. Cinsiyet matematiğe yönelik duyuşsal giriş özelliklerini etkilememektedir [ $F_{(1, 628)}=0,001$ ,  $p=0,978$ ,  $SME=110,057$ ,  $\eta^2=,000$ ]. Öğrencilerin matematiğe yönelik duyuşsal giriş özellikleri cinsiyete göre farklılaşmamaktadır. Sınıf düzeyi ve cinsiyet faktörlerinin öğrencilerin matematiğe yönelik duyuşsal giriş özelliklerini birlikte karşılıklı olarak



etkilemediklerini yani duyuşsal giriş özellikleri üzerinde ortak bir etkiye sahip olmadıkları anlaşılmaktadır [ $F_{(4, 628)}=1,079$ ,  $p=0,366$ ,  $SME=110,057$ ,  $\eta^2=.007$ ]. Bu bulguya göre, kızların ve erkeklerin matematiğe yönelik duyuşsal giriş özelliklerinin farklı sınıf düzeylerinde farklı bir deęişkenliğe sahip olmadığı söylenebilir. Bir başka ifade ile farklı sınıf düzeylerinde öğrenim gören öğrencilerin matematiğe yönelik duyuşsal giriş özellikleri cinsiyete göre farklılaşmamaktadır.

### **Tartışma ve Sonuç**

Bu çalışmada, öğrencilerin matematiğe yönelik duyuşsal giriş özelliklerinin sınıf düzeyine göre farklılaştığı, cinsiyete göre farklılaşmadığı sonucuna ulaşılmıştır. Matematiğe yönelik duyuşsal giriş özellikleri sınıf düzeyi ve cinsiyetin ortak etkisine baęlı olarak farklılaşmamaktadır.

Sınıf düzeyi öğrencilerin matematiğe yönelik duyuşsal giriş özellikleri üzerinde önemli bir deęişkendir. Sınıf düzeyi ilerledikçe öğrencilerin matematiğe yönelik duyuşsal giriş özellikleri puanları düşmektedir. Birçok çalışmada (Kaba & Şengül, 2015; Kocakaya vd., 2018; Şimşek vd., 2017; Taşdemir, 2009; Tuncer & Yılmaz, 2016) benzer sonuca ulaşılmıştır. Bu sonuç sınıf düzeyi ilerledikçe matematik konularının zorlaşmasına baęlanmaktadır. Ayrıca sınıf düzeyi ilerledikçe yaklaşan merkezi sınavlara hazırlık sürecinde öğrenciler daha zor matematik sorularıyla baş etmek zorunda kalmaktadırlar.

Cinsiyet öğrencilerin matematiğe yönelik duyuşsal giriş özellikleri üzerinde önemli bir deęişken değildir. Birçok çalışmada (Abalı-Öztürk & Şahin, 2015; Hyde vd., 1990; Kaba & Şengül, 2015; Kıbrıslıoęlu-Uysal & Haser, 2018; Şimşek vd., 2017; Tuncer & Yılmaz, 2016; Yücel & Koç, 2011) benzer sonuca ulaşılmıştır. Farklı sonuca ulaşan çalışmalar da (Ganley & Vasilyeva, 2011; Lamb, 1997; Recber vd., 2018; Skaalvik & Skaalvik, 2004; Tocci & Engelhard, 1991) vardır. Bu çalışmalarda fark genellikle erkeklerin lehinedir. Bu farklı sonuçlar matematiğe yönelik duyuşsal giriş özelliklerinde cinsiyet farklılıklarının hala tartışmalı bir konu olduğunu göstermektedir. Bu çalışmada ulaşılan matematiğe yönelik duyuşsal giriş özelliklerinin cinsiyete göre farklılaşmadığı sonucu şöyle açıklanabilir. Üç olguda deęişim olduğu söylenebilir. Birincisi algıdır. Lamb'e (1997) göre, matematiğin faydalı olacağı algısı kız ve erkek öğrencilerin duyuşsal özelliklerinin farklılaşmasına neden olur. Matematik erkek işidir ve kızların işine yaramaz algısı cinsiyet farklılıklarının nedenlerinden biridir. Ama artık günümüzde bu algının deęiştığı söylenebilir. İkincisi ebeveynlerin beklentileri ve düşünceleridir. Gunderson, Ramirez, Levine, ve Beilock'a (2012) göre, ebeveynlerin ve öğretmenlerin çocukların matematik yeterlikleri konusundaki beklentileri genellikle cinsiyete dayalıdır ve çocukların matematik tutumlarını etkileyebilir. Bu durumun da deęiştığı yani artık kızlardan da beklentilerin arttığı ve onların da teşvik edildiği söylenebilir. Üçüncüsü toplumsal cinsiyet kalıp yargıdır. Cvencek vd., (2015) göre, toplumsal cinsiyet kalıp yargılar ilgiyi, motivasyonu vb. deęiştirerek kızları matematikten uzaklaştırabilir. Matematik toplumsal cinsiyet kalıp yargıları erkekler için daha güçlü matematik özkavramı ve kızlar için daha zayıf matematik özkavramı ile anlamlı bir şekilde ilişkilidir. Günümüzde bu matematik toplumsal cinsiyet kalıp yargılarının da deęiştğini söyleyebiliriz. Kısacası bu üç olguda deęişim meydana geldiğini ve bu deęişimin cinsiyet farklılıklarını azalttığını söyleyebiliriz. Matematik tüm dünyada önemli bir derstir. Amaçlara ulaşmak için temel bir ders niteliğindedir. Burada elde edilen bulgu (duyuşsal özelliklerde cinsiyet farklılığının olmadığı) üç olguda deęişim olabileceği düşüncesi ile yorumlanmıştır. Bu deęişimin gerçekten olup olmadığı yapılacak araştırmalarla incelenebilir.

Sınıf düzeyi ve cinsiyet matematiğe yönelik duyuşsal giriş özellikleri üzerinde ortak bir etkiye sahip değildir. Sınıf düzeyinin etkisi cinsiyete baęlı değildir. Yani sınıf düzeyine göre bir farklılaşma olmaktadır ama bu farklılaşmanın nedeni cinsiyet değildir. Sınıf düzeyine göre farklılaşmasının kaynağı her ne ise bu kızları ve erkekleri aynı derecede etkilemektedir. Bu araştırmada ulaşılan matematiğe yönelik duyuşsal giriş özelliklerinin sınıf düzeyi ve cinsiyetin ortak etkisine baęlı olarak farklılaşmaması sonucu yine yukarıda ifade edilen üç olgudaki deęişim ile açıklanabilir.

Sonu olarak; matematięe ynelik duyuřsal giriř zelliklerinde sınıf dzeyinin etkili bir deęiřken olduęu, cinsiyet farklılıklarının hala tartiřmalı bir konu olduęu, sınıf dzeyi ve cinsiyetin ortak etkisinin incelenmesinde yeni arařtırmalara ihtiya duyulduęu sylenebilir.

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