The Mediating Effect of Academic Resilience on the Relationship Between Psychological Resilience and Academic Achievement

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Abstract

It is necessary to examine the factors that affect the academic performance and achievement of the students at school, which is considered as an indicator of the quality of the education system and the goals of the students. Considering the important role of psychological resilience and academic resilience for student achievement, it is important to get an idea of the extent to which these factors affect student achievement. The aim of this study is to examine the mediating effect of academic resilience in mathematics on the relationship between the psychological resilience of secondary school students and the academic achievement of mathematics courses. In the study, the relational screening model was used from quantitative research models. The study group consists of a total of 140 students, 65 girls, and 75 boys, who are studying in the 6th and 7th grades of secondary schools in the İzmit district of Kocaeli province in the 2022-2023 academic year. The Brief Resilience Scale (BRS), Academic Resilience Scale in Mathematics and grade point averages of mathematics courses were used as data collection tools. The data were analyzed with SPSS 27 statistical analysis program and the added Process patch. As a result of the research, it was determined that there were positive significant relationships between psychological resilience and academic resilience, psychological resilience and academic achievement, and academic resilience and academic achievement variables. In addition, it was concluded that mathematics had a mediating effect on the relationship between psychological resilience and academic achievement. For a more detailed evaluation of the relations between variables in future research, qualitative studies or mixed design studies in which qualitative and quantitative methods are used together can be done.

Keywords: *Psychological resilience, Academic achievement, Academic resilience in mathematics, Mediator variable*

Suggested Citation

Demir, B. (2023). The mediating effect of academic resilience on the relationship between psychological resilience and academic achievement, *E-International Journal of Educational Research,* 14(3), 52-67. DOI: https://doi.org/10.19160/e-ijer.1253101

INTRODUCTION

Psychological strength factors are gaining more importance in academic research because they reveal the possibilities of coping with stress in individuals. An incompatible coping with stress occurs with a low level of psychological strength, which also causes dysfunctional work attitudes in individuals. Although the concept of endurance has been studied for a long time, there is a lack of consensus on the definition, conceptualization and measurement of endurance, which attracts attention in academia (Stainton, Chisholm, Kaiser, Rosen, Upthegrove &Ruhrmann, 2019). With a clear conceptualization, measurements, analyses and interventions that focus on resilience can be better targeted (Den Hartigh & Hill, 2022).

The term durability is obtained from the Latin verb "resilience", which means to recoil or "bounce back" (Pai & Vella, 2018; Zautra, Hall & Murray, 2008). Fletcher and Sarkar (2013) emphasize that most researchers agree that the definition of psychological resilience depends on these two elements. Therefore, in sequence for an individual to be said to be resilient, they must be resilient to some type of adversity or risk (Vella & Pai, 2019). Resilience is defined as having a successful adaptability despite challenging and threatening conditions, trying in this process and being successful in the end (Gürgan, 2006; Masten, Best & Garmezy, 1990). It is seen that the words strength and durability are also used in the literature instead of resilience (Gizir, 2004; Öz & Bahadır Yılmaz, 2009; Yıldırım, 2016; İşcan & Malkoç, 2017). In international studies, the way in which the concept of "resilience" is handled is differentiated by adding another determinant word in front of this word (e.g., psychological resilience, organizational resilience, career resilience), but it has been observed that different words are preferred in studies originating from Turkey (Yılmaz Börekçi & Gerçek, 2018).

Stewart, Reid and Mangham (1997) defined resilience as an individual's ability or capacity to cope effectively when faced with significant changes, negative or risky situations in his life. Masten (2001) defines the concept of resilience as seeing positive and positive results in the adaptation and development of the individual despite the serious negativity and great dangers that occur in his life. Rutter (2006), who defines resilience as having a relatively good psychological outcome despite risk experiences that are expected to bring serious dangers, evaluates this situation as a feature that develops throughout life and becomes more evident at different times of life rather than a feature that appears suddenly (Rutter,2007). From this point of view, on the one hand, there are negative and threatening events or situations (for example, losing a loved one, having an accident, failing an exam), on the other hand, protective factors (for example, the individual's religion and belief level, knowledge, family ties, financial opportunities) (Durak, 2021). Considering the definitions made, it can be said that psychological resilience cannot be explained in a single dimension. However, it is seen that there are some common points in all definitions. These common points are that psychological resilience is a dynamic process; contain developable features; it includes coping effectively with trauma and difficult life events and the processes of healthy adaptation or competence development; in order to develop psychological resilience, the individual is exposed to risk or difficulty and achieves success in different areas of life by adapting to the situation; it is also the fact that individuals have some personality traits that are described as protective factors for psychological resilience (Gizir,2007; Gürgan, 2006).

In psychology, resilience is conceptualized as a personality trait. This conceptualization assumes how individuals adapt to adverse events or stressors in different domains and times. For example, a person with high resilience may experience difficulties in business, private life, etc. It is said that it adapts well to the stress factors that occur (Block & Block, 1980). Individuals with psychological resilience have higher educational success and scientific ability scores, and better reading, communication, and reasoning skills (Mandleco, 2001; Padesky, 2009). Students are negatively affected physically, mentally and academically due to psychological problems. However, this situation can be combated by using effective coping strategies and adaptation skills. At this point, psychological resilience, which is the ability to cope with difficult situations and get rid of these difficulties, gains importance (Sağar,2022).

The concept of academic resilience has become one of the important dimensions of resilience that has been studied in recent years (Borman & Overman, 2004; Finn & Rock, 1997; Martin & Marsh, 2006). It can be said that the equivalent of resilience in academic life is the concept of academic resilience

(Yavuz & Kutlu, 2016). As in definitions of resilience, academic resilience has been defined as the individual's success in school despite environmental adversities and its support for other areas of life (Wang, Haertal, & Walberg, 1994). According to Martin (2002), the concept of academic resilience focused on why some students experience negative situations due to low performance, stress, work pressure, while others answer the question of how they can recover. Supporting academic resilience supports positive results both in school life and in other areas of life and supports healthy development of the individual (Martin, 2002).

Intensive programs, exams and abstract practices cause anxiety in students and mathematics fatigue is adversely affected. As anxiety increases, faith and fighting power decrease. When these are accompanied by the oppressive and emotional attitudes of teachers in the classrooms, the resistance of the students decreases (Johnston-Wilder & Lee, 2010). At the same time, students who are trying to cope with this situation may face stressful life events. Each student's reactions to these situations and coping strategies are different. Some students may experience various distress, such as anxiety and depression, and the negative mood can last a very long time. Some students, on the other hand, are better at dealing with such adversities and overcoming them easily. This power in individuals' ability to quickly recover and return to their daily lives is explained by the concept of psychological resilience.

Achievement refers to the level of attainment of a set goal, while academic achievement/performance refers to the degree to which a student, teacher or institution can reach the goals set in line with educational objectives (Toprakçı, 2017). At the same time, academic achievement can be expressed as a criterion for deciding the effectiveness of educational programs (Abolmaali, Rashedi & Ajilchi, 2014). Achievement in education usually refers to "academic achievement", which is the expression of the skills or knowledge gained by the exam result grades, test scores or both related to the courses taught in school. It is thought that the studies on academic success can be an important guide in the studies to be carried out in this regard as well as to create a body of knowledge about academic achievement.

Academic resilience in mathematics; to continue to learn mathematics even in difficult situations encountered while learning mathematics (Kooken, Welsh, Megan, Mccoach, Johnson-Wilder & Lee, 2013). It is of great importance to show continuity in the mathematics learning process, to be determined and persistent. Students who show resilience in the face of difficulties and adversities in mathematics and who have high power to continue working have high math resilience (Kooken et al., 2013). In this context, students' resilience toward mathematics courses has an important place in increasing their mathematics achievements. Because the fact that the mathematics course has an abstract structure and requires more effort makes the students' academic resilience more important. Especially at the primary school level, these situations constitute the basis for future mathematics education lives and adolescence makes the resilience of students more important.

Academic achievement is accepted as an important indicator of academic resilience (Allan, McKenna & Dominey, 2014; Alva, 1991; Esquivel, Doll & Oades-Sese, 2011; Gizir, 2004; Kapikiran & Acun-Kapikiran, 2016; Yavuz & Kutlu, 2016; Masten & Coatsworth, 1998). It is stated that individuals with high academic achievement have higher academic resilience (Alva, 1991). In this respect, the individual's achievement and progress in academic life despite adversities indicates academic resilience (Yavuz & Kutlu, 2016). The inability of students to cope with the stresses they encounter in academic life can cause many social, behavioral and emotional problems, as well as some educational consequences (Kaya, Peker & Gündüz, 2016). Therefore, it is expected that students with high academic resilience will be more successful academically and have positive educational outcomes.

Given the crucial role of psychological resilience and academic resilience for student success, it's important Özgüven (2002), success is an indicator of the degree to which students benefit from the course or academic program in the school. In this context, it is very important to examine the factors affecting the achievement and academic performance of students in school, which are considered as indicators of the goals of students and the quality of the education system (Alnabhan, Al-Zegoul & Harwell, 2001).

When the secondary education level is evaluated within the framework of developmental periods, it is characterized by rapid developments in the field of physical, emotional and interpersonal relations.

During these periods, there may be difficulties in academic performance and social relations. One of the reasons that enable the child to be successful both in the academic and social areas in the school environment is their psychological resilience and academic resilience. Due to their importance in determining mathematics achievement, the detection of students at risk of failure in the second level of primary education will contribute to teachers in terms of development and preventive studies. It is expected that the findings to be obtained from the research will shed light on the studies aimed at improving the academic success of students, especially in school environments.

The research aims to contribute to this debate by looking at the different variables in which academic resilience is measured. In the literature review on the subject of academic success, it was determined that there were research in which academic success was examined together with different groups and variables. However, it can be stated in the literature that the studies carried out on secondary school students for mathematics lessons are limited. However, there was no study in which the variables of academic achievement, psychological resilience, and academic resilience in mathematics of secondary school students were examined together. In this context, it is aimed to determine the mediating role of academic resilience in the relationship between psychological resilience and the academic achievement secondary school students. In addition, as a sub-objective, it is aimed to investigate the relationships of these variables with each other. The research model (Figure 1) and hypotheses created for this purpose are given below.
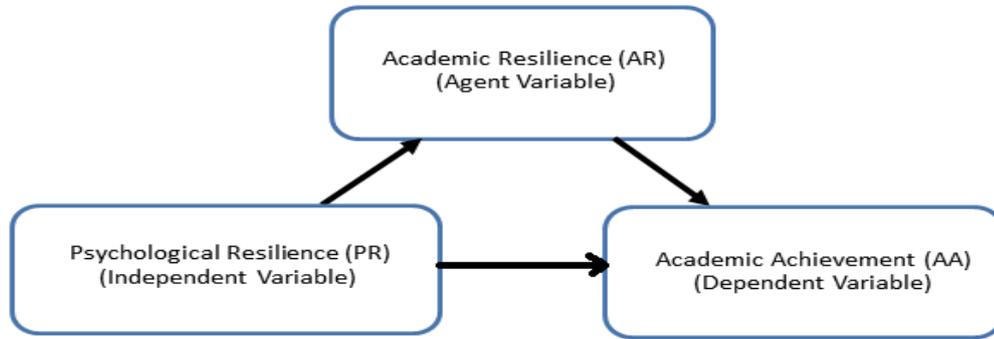
Figure 1. *Research Model*

H$_1$: There is a significant relationship between psychological resilience and the academic achievement of secondary school students.

H$_2$: There is a significant relationship between the psychological resilience of secondary school students and their academic resilience towards mathematics lessons.

H$_3$: There is a significant relationship between secondary school students' academic retirement toward mathematics and their academic achievement.

H$_4$: Academic resilience has a mediating role in the relationship between psychological resilience and academic achievement of secondary school students.

METHOD

Model of Research

In the study, the relational screening model was used from quantitative research models. The relational screening model is a research model that aims to determine the presence and/or level of change between two or more variables together (Karasar, 2013). The independent variable of the study was determined as psychological resilience, the dependent variable as academic achievement and the median variable as academic resilience.

Research Group

The research group is the 6th and 7th grades of secondary schools in İzmit district of Kocaeli province in the 2022-2023 academic year. It consists of a total of 140 students, 65(%46) girls and 75(%54) boys, who are studying in their classes and who voluntarily participated in the research.

Data Collection Tools

In order to collect data in the study, the Brief Resilience Scale (BRS) and the Academic Resilience Scale in Mathematics (AMRS) were used. In the study, the Brief Psychological Resilience Scale (BRS), developed by Smith, Dalen, Wiggins, Tooley, Christopher and Jennifer Bernard (2008) and adapted by Doğan (2015), was used to measure the resilience levels of students. The scale consists of one dimension and 6 items. Items 2, 4, and 6 on the scale are coded in reverse. The internal consistency coefficient for BRS was reported as 0.83. The expressions in the scale were used as "1= Not appropriate at all" and "5= Completely appropriate" and a 5-point Likert type scale.

In order to measure the academic resilience levels of students in mathematics, the one-dimensional " Academic Resilience in Mathematics Scale (AMRS)" developed by Ricketts, Engelhard and Chang (2017) and adapted by Pekdemir, Yazıcı, Altun and Tosun (2019) was used. The Cronbach alpha internal consistency coefficient of the scale is 0.79. The expressions on the scale were "1= strongly disagree" and "6= strongly agree", and the 6-point Likert-type scale was used. In this study, the academic success of the students was determined based on the success of the mathematics course at the end of the semester.

Collection of data

The study was primarily conducted by Kocaeli University Social Sciences Scientific Research and Publication Ethics Committee (Decision Date: 14.02.2023; Meeting: 2023/01; Number of Documents: 42) ethics committee approval has been obtained. The participation of volunteer individuals was taken as the basis for the research and informed consent was obtained from the students before participating in the research. In addition, the principle of confidentiality was taken into consideration during the data collection process and the students were informed about it. After obtaining the necessary permission, the study data were collected by the teacher of the course and the researcher in the schools with the help of a face-to-face survey. The survey application took approximately 20 minutes. The data collection process took about 3 weeks. The questionnaires were examined, and 12 questionnaires were excluded from the study due to missing data.

Analysis of Data

Preliminary analyses were performed to examine the characteristics of the scale used, the assumption of normality and the correlation estimates between the study variables. Reliability analysis was performed to measure the reliability of the scales, taking into account the Cronbach Alpha coefficient. Pearson correlation analysis was performed to determine the relationships between the descriptive statistics of the factors resulting from the factor analyzes applied to the scales and the variables of the study. In order to test the mediating effect of academic resilience on the effect of resilience, which is the main purpose of the study, on academic achievement, analyzes were conducted to determine the relationships and mediation between the variables within the framework of the model created using the Process Macro tool for SPSS (Hayes, 2018).

FINDINGS

Descriptive Statistics for the Variables of the Research

In order to determine whether the variables have a normal distribution, skewness and kurtosis values, mean and standard deviation values were calculated.

Table 1. *Definitional statistics of scores from scales*

Variable	N	Min	Max	X	SS	Skewness Value	Std.	Kurtosis Value	Std.
Psychological Resilience	140	1,00	5,00	3,16	,715	,376	,205	-,365	,407
Academic Resilience	140	1,00	6,00	4,17	1,04	-,388	,205	-,460	,407
Success grade	140	11,00	100,0	48,94	22,3	,480	,227	-,445	,451

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Table1 when examined, it is seen that the skewness values of the variables are between -0.388 and 0.480, and the flatness values are between -0.460 and 0.451. For the variables to have a normal distribution, the skewness and flatness values must be between +2 and -2 (George and Mallery, 2010). It was observed that the calculated values were included in the specified range, the assumption of normal distribution was met.

Factors and Reliability Analysis Findings of Scales

In order to perform factor analysis, it is stated that the sample size is at least 10 times the number of questions used in the research will be sufficient to perform factor analysis (Akgül, 2005). The number of samples used in this study is 140, which is acceptable for factor analysis and other multivariate statistical analyses. Kaiser Mayer Olkin (KMO) values were calculated as 0.799 for the Brief Resilience Scale and 0.801 for the Academic Resilience Scale in Mathematics, and the Barlett Globality Test results were 652.463 and 674.071 (p:0.000 <0.01), respectively.

As a result of the factor analysis, the item loads of the Brief Resilience Scale (were collected under a single-factor structure as in the original and Turkish version, with the total variance described in the range of 0.609-0.812 and the total variance described was 59.26%. An analysis that explains 50-75% of the total variance described in social sciences is considered a valid analysis. In addition, the factor loads of the substances should be above 0.40 and should not be overlapped. As a result of the analyzes, no questions were removed from the scale. As a result of the factor analysis conducted for the Academic Resilience Scale in Mathematics, a single-factor structure was obtained as in the original and Turkish adaptation of the scale. Factor loads were in the range of 0.683-0.845 and the total variance explanation rate was calculated as 61.52%. It can be said that all these values are statistically acceptable in the literature.

The Cronbach alpha reliability values of the scales were calculated as 0.7 41 for the Brief Resilience Scale and 0.705 for the Academic Resilience Scale in Mathematics. If the coefficient is 0.60 and above, the scale is reliable. These results show us that the scales used in the research are reliable.

Findings of hypotheses

Two-variable Pearson correlation analysis was performed to reveal the general relationships of the variables in the study to make a preliminary examination and to reveal their general relationships with each other. To determine the mediating role of academic resilience in the relationship that makes up the model in Figure 1 and the relationship between psychological resilience and academic achievements, 5000 resample options and the Sobel method were analyzed with the bootstrap technique.

In line with the hypothesis of H_1, H_2 and H_3, the results of the analysis made to determine the relationship between psychological resilience and academic resilience, psychological resilience and academic success and academic success variables of the students at that school were given in Table 2.

Table 2. *Correlation results of middle school students between psychological resilience, academic resilience in mathematics and academic achievement*

		Psychological Resilience	Mathematics Academic Resilience	Academic Achievement
Psychological Resilience	**r**	1	0,355**	0,301**
	p	-	0,000	0,002
Mathematics Academic Resilience	**r**	0,355**	1	0,392**
	p	0,000	-	0,000
Academic Achievement	**r**	0,301**	0,392**	1
	p	0,002	0,000	-

**$p < 0,001$

Table 2 when examined, it is seen that there is a positive moderate relationship between the psychological resilience levels of secondary school students and the academic resilience levels in mathematics at the importance level of 0.01 (r = 0.355**). A statistically significant relationship was seen between students' psychological resilience and academic achievement at a positive moderate level (*r* = 0.301**). There is a positive relationship between academic resilience and academic achievement in a similar way to other variables, and it can be said that this relationship is a statistically significant

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relationship at the intermediate level (r = 0.392**). For effect size measures of the analyses, r ≥ .10 is small, r ≥ is medium if .30, and r ≥ .50 is a large level of relationship (Cohen, 1988). According to these results; "H_1: There is a significant relationship between the resilience of secondary school students and their academic achievement.", "H_2: There is a significant relationship between the psychological resilience of secondary school students and their academic resilience towards the mathematics course." and "H_3: There is a significant relationship between middle school students' academic resilience towards mathematics and their academic achievement." hypotheses were accepted.

Unstandardized regression coefficients of the mediation analysis obtained with Process Makro to determine the mediating role of academic resilience in the relationship between psychological resilience and academic achievements of secondary school students, which is the main purpose of our research, Table 3 is detailed in. The results of the analysis made by the method of Bootstrap and Sobel Table 4 and Table 5 is given.

The brokerage analysis was obtained using Process Macro developed by Hayes (2018). To evaluate the research hypothesis in the mediation effect analyzes performed by the Bootstrap method, the 95% confidence interval (CI) values obtained because of the analysis should not contain the value (0) (MacKinnon, Lockwood & Williams, 2004). There are some rules that must be followed in intermediary impact analysis. The first rule is that there must be a relationship between the argument and the mediator variable. The second rule is that there must be a relationship between the independent variable and the dependent variable. When the third rule is put into the regression model together with the independent variable and the mediating variable, the relationship in the second rule must weaken or disappear.

Table 3. *Standardized regressive effects of psychological resilience on academic achievement through academic resilience.*

Stages	Variables	Coefficient	Significance	Model Values
1	PR→AR	0,488	0,001	R^2= 0,172 F= 19,636 P= 0,001
2	PR→AA	7,893	0,015	R^2= 0,079 F= 6,222 P= 0,015
3	PR→AA	2,879	0,001	R^2= 0,231 F= 10,598 P= 0,001
	AR→AA	10,268	0,339	

*PR: *Psychological Resilience* AR: Academic *Resilience* AA: *Academic Achievement*

Table 3 the results show that psychological soundness is a positive and good predictor of academic resilience and academic achievement. In addition, psychological resilience explains 17% of the variance in academic resilience, while psychological resilience and academic resilience explain 2to 3 % of the variance in academic achievement.

In the light of the explanations made before the table, it is seen that the first, second and third conditions have become stronger. However, the realization of the desired conditions is not enough to speak of the existence of intermediary effect. Whether the intermediary effect revealed here is significant should be determined either by Sobel Test or by Bootstrap analysis. The Bootstrap method has been tested for its mediating effect in many studies by stating that it gives more reliable results than the traditional method of Baron and Kenny (1986) and the Sobel test (Preacher, Rucker & Hayes, 2007; Zhao, Lynch& Chen, 2010; Hayes, 2018; Gürbüz, 2019). The Sobel Test performs the same function as bootstrap. However, Andrew Hayes, who introduced the Process in the Sobel test, saw it as weak, so he developed the bootstrap analysis. However, Process also includes Sobel Test results in its analysis. The results of these two analyses are presented below.

Tablo 4. *Bootstrap (Indirect Effect)*

Agent Variable	Effect	Bootstrap Std. Even	Lower Value	Upper Value
AR	5,041	1,537	2,539	8,816

Whether psychological resilience has an indirect effect on academic achievement was determined according to the confidence intervals obtained by the Bootstrap method. According to Table 4 it is seen that the effect value (5,041) is between the lower value (2,539) and the upper value (8,816). This result shows that the mediation effect analysis is significant. Thus, it was concluded that the indirect effect of resilience on academics was significant, and therefore, academic resilience mediated the relationship between resilience and academic achievement.

Table 5. *Sobel Test*

Effect	Std Hata	Z Score	P
5,041	1,734	2,891	0,003*

*p < 0,05

According to these results, the main hypothesis of the research is that academic resilience mediates the relationship between psychological resilience and academic achievement.

CONCLUSION, DISCUSSION AND SUGGESTIONS

In this research, the mediating effect of their academic resilience in mathematics on the relationship between psychological resilience and academic achievement of secondary school students was investigated. The relationship between psychological resilience and academic success, psychological resilience and academic resilience, and academic resilience and academic success were also examined. In this context, firstly, the first hypothesis of the research, "There is a significant relationship between students' psychological resilience and academic achievements" was tested. According to the results of the research, it was determined that the psychological resilience of secondary school students positively and moderately affected their academic success of the students. In other words, it can be said that as students' psychological resilience level increases, their volume of academic achievement also increases. This result was found in various research conducted in the literature (Allan et al., 2014; Borman and Overman, 2004; Novotny and Kremenkova, 2016; Sakız and Aftab, 2019; Fire and Milk, 2022). In the research carried out, it was determined that there was a significant positive relationship between academic achievement and psychological resilience.

The second hypothesis of the study is that "there is a significant relationship between the psychological resilience of secondary school students and their academic resilience towards mathematics lessons". As stated by the results of the research, it was determined that the psychological resilience of secondary school students positively and significantly affected their academic resilience of the students. A limited number of studies on psychological resilience and academic resilience indicate a positive relationship between these two variables.

Another hypothesis, "There is a significant relationship between students' academic resilience towards mathematics courses and their academic achievements" was supported as a result of the analysis. Accordingly, it can be said that academic resilience has a positive effect on the academic success of the students, and therefore reflects positively on the academic success of the students. The academic achievement shows the individual's academic resilience. The stated that the academic resilience of individuals with high levels of academic achievement, which is an important indicator of academic resilience, is also high (Alva, 1991). Our findings extend the findings in existing reviews by focusing on how academic resilience is functionalized as a particular structure. Analyses show a clear effect on the relationship between academic resilience and academic achievement. According to Gürgan (2006), factors such as academic achievement, participation in social welfare work, happiness, obeying the rules, self-acceptance and adaptation, life satisfaction and being psychologically healthy are among the positive results of indomitable individuals. Students with endurance status show significantly more positive results.   The results obtained from the research are in line with previous research findings and theoretical expectations (Allan et al. 2014; Esquivel et al. 2011; Hartley, 2011; Bitmann, 2021; Arastaman and Balcı, 2013; Jowkar, Kojuri, Kohoulat and Hayat, 2014; Cutter, 2016; Mwangi, Okatcha, Kinai and Ireri, 2015; Tezel, 2021). As mentioned in the literature, individuals with academic resilience consistently have

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more positive academic trajectories, and the results of this have positive effects on other variables such as intentions to leave school, better grades, and being more satisfied with their lives (Bitmann, 2021). In light of these evaluations, it can be said that the students who are successful in mathematics lessons have the feature of mathematics resilience.

The basic hypothesis of the research, "Academic resilience has a mediating role in the relationship between students' psychological resilience and academic achievements" was accepted as a result of the analysis. According to the results obtained in this study, it was determined that academic resilience played a mediating role in the relationship between psychological resilience and academic success. This result shows that students' academic resilience is an important variable for the relationship between psychological resilience and academic achievement supported by the literature and this study. Therefore, it can be said that psychological resilience and academic resilience, which are among the factors that will increase the academic success of students, should be taken into consideration together and steps should be taken to increase these levels. The results obtained by individuals within the framework of the meaning they attribute to academic success can affect themselves positively or negatively.In the study conducted by Açıkgöz (2016), it was determined that the psychological resilience scores of students with high academic achievement were significantly higher than those with low academic achievement.In the light of these explanations, it is thought that academic resilience may have a mediating effect on individuals' perceptions of their academic success in overcoming challenging situations (Camadan & Kıraç, 2020).

Research has several important contributions. The current study sought to determine the relationship between academic resilience and psychological resilience of the content in mathematics and the academic success of the mathematics course. The study found that the relationship between psychological resilience and academic achievement changed with academic resilience as an intermediary function. Studies of endurance scales' mediating or regulatory effects on academic achievement are lacking. This study tried to fill this gap by investigating the subject comprehensively. In the study, the sample was relatively large, statistical analyses were reliable, and valid and reliable tools were used.

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It can be said that one way to increase the academic achievement of students in mathematics courses is to increase their psychological resilience and mathematics academic resilience levels. In this context, studies to increase students' psychological resilience and academic resilience levels can be included in increasing their academic achievement levels. Research exploring the complexity of resilience may be underway to inform multi-level prevention and intervention strategies to improve resilience in different research groups or individuals experiencing different adversities. In addition, by examining how other variable bases of resilience interact with other areas, a broader analysis of the issue can be provided. In addition, research can be done on whether there are various demographic characteristics that can affect the relationship between these variables. The limitations of this research are that this research is quantitative in size, with a limited number of participants, and is limited to the qualities measured by the measurement tools used in this research. For a more detailed evaluation of the relations between variables in future research, qualitative studies or mixed design studies in which qualitative and quantitative methods are used together can be done.

Psikolojik Sağlamlık ile Akademik Başarı Arasındaki İlişkide Akademik Yılmazlığın Aracı Etkisi

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Özet

Eğitim sisteminin kalitesinin ve öğrencilerin hedeflerinin bir göstergesi olarak kabul edilen okuldaki akademik performanslarını ve başarılarını etkileyen faktörlerin incelenmesi gerekmektedir. Psikolojik sağlamlık ve akademik yılmazlığın öğrenci başarısı üzerindeki önemli rolü göz önüne alındığında, bu faktörlerin öğrenci başarısını ne ölçüde etkilediğine dair bir fikir edinmek önemlidir. Bu çalışmanın amacı, ortaokul öğrencilerinin psikolojik sağlamlıkları ile matematik dersi akademik başarıları arasındaki ilişkide matematik akademik yılmazlığının aracılık etkisini incelemektir. Araştırmada nicel araştırma modellerinden ilişkisel tarama modeli kullanılmıştır. Çalışma grubunu 2022-2023 eğitim-öğretim yılında Kocaeli ili İzmit ilçesindeki ortaokulların 6. ve 7. sınıflarında öğrenim gören 65 kız, 75 erkek olmak üzere toplam 140 öğrenci oluşturmaktadır. Veri toplama aracı olarak Kısa Psikolojik Sağlamlık Ölçeği, Matematikte Akademik Yılmazlık Ölçeği ve akademik başarı için matematik dersi not ortalamaları kullanılmıştır. Verilerin analizi SPSS 27 istatistiksel analiz programı ve eklenen Process yaması ile yapılmıştır. Araştırma sonucunda psikolojik sağlamlık ile akademik yılmazlık, psikolojik sağlamlık ile akademik başarı ve akademik yılmazlık ile akademik başarı değişkenleri arasında pozitif yönde anlamlı ilişkilerin olduğu tespit edilmiştir. Ayrıca psikolojik sağlamlık ile akademik başarı arasındaki ilişkide matematik akademik yılmazlığın aracı etkisinin olduğu sonucuna ulaşılmıştır. Gelecekteki araştırmalarda değişkenler arasındaki ilişkilerin daha detaylı değerlendirilmesi için nitel araştırmalar veya nitel ve nicel yöntemlerin birlikte kullanıldığı karma desenli araştırmalar yapılabilir.

Keywords: *Psikolojik sağlamlık, Akademik başarı, Matematikte akademik yılmazlık, Aracı değişken*

Genişletilmiş Özet

Problem: Psikolojik güç faktörleri, bireylerde stresle başa çıkma olanaklarını ortaya koyduğu için akademik araştırmalarda daha fazla önem kazanmaktadır. Stresle uyumsuz bir başa çıkma, düşük düzeyde psikolojik güçle ortaya çıkmakta, bu da bireylerde işlevsel olmayan iş tutumlarına neden olmaktadır. Sağlamlık kavramı uzun süredir çalışılmasına rağmen akademide dikkat çeken sağlamlığın tanımı, kavramsallaştırılması ve ölçülmesi konusunda fikir birliği bulunmamaktadır (Stainton, Chisholm, Kaiser, Rosen, Upthegrove ve Ruhrmann, 2019).

Masten (2001) psikolojik sağlamlık kavramını, yaşamında meydana gelen ciddi olumsuzluklara ve büyük tehlikelere rağmen bireyin uyum sağlama ve gelişmesinde olumlu ve olumlu sonuçlar görmesi olarak tanımlamaktadır. Psikolojik sağlamlığı, ciddi tehlikeler getirmesi beklenen risk yaşantılarına karşın görece iyi bir psikolojik sonuca sahip olmak olarak tanımlayan Rutter (2006) bu durumu, kişinin sahip olduğu bir özellikten çok, yaşam boyunca gelişen, aniden ortaya çıkan ve yaşamın farklı dönemlerinde daha belirgin hale gelen bir özellik olarak değerlendirmektedir. Bu açıdan bakıldığında bir yanda olumsuz ve tehdit edici olay ya da durumlar (sevilen birini kaybetmek, kaza geçirmek, sınavda başarısız olmak gibi), diğer yanda koruyucu faktörler (örneğin bireyin din ve inanç düzeyi, bilgi, aile bağları, maddi imkanlar) (Durak, 2021). Yapılan tanımlara bakıldığında psikolojik sağlamlığın tek bir boyutta açıklanamayacağı söylenebilir. Ancak tüm tanımlarda bazı ortak noktaların olduğu görülmektedir. Bu ortak noktalar, psikolojik sağlamlığın dinamik bir süreç olduğu; geliştirilebilir özellikler içerir; travma ve zor yaşam olayları ile etkili bir şekilde baş etmeyi ve sağlıklı uyum veya yeterlilik geliştirme süreçlerini içerir; psikolojik sağlamlığı geliştirmek için bireyin riske veya zorluğa maruz kalması ve duruma uyum sağlayarak hayatın farklı alanlarında başarıya ulaşması; bireylerin psikolojik sağlamlık için koruyucu unsurlar olarak tanımlanan bazı kişilik özelliklerine sahip oldukları da bir gerçektir (Gizir,2007; Gürgan, 2006). Psikolojik sağlamlığa sahip bireyler daha yüksek eğitim başarısına ve bilimsel yetenek puanlarına, daha iyi okuma, iletişim ve muhakeme becerilerine sahiptir (Mandleco, 2001; Padesky, 2009). Psikolojik sorunlar nedeniyle öğrenciler fiziksel, zihinsel ve akademik olarak olumsuz etkilenmektedir. Ancak etkili başa çıkma stratejileri ve uyum becerileri kullanılarak bu durumla mücadele edilebilir. Bu noktada zor durumlarla baş edebilme ve bu zorluklardan kurtulabilme yeteneği olan psikolojik sağlamlık önem kazanmaktadır (Sağar,2022).

Matematikte akademik yılmazlık; matematik öğrenirken karşılaşılan zor durumlarda bile matematiği öğrenmeye devam etmektir (Kooken, Welsh, Megan, Mccoach, Johnson-Wilder ve Lee, 2013). Matematik öğrenme sürecinde süreklilik göstermek, azimli ve ısrarcı olmak büyük önem taşımaktadır. Matematikteki zorluklar ve olumsuzluklar karşısında dayanıklılık gösteren ve çalışmaya devam etme gücü yüksek olan öğrencilerin matematik dayanıklılığı da yüksektir (Kooken vd., 2013). Bu bağlamda öğrencilerin matematik derslerine karşı dirençli olmaları matematik başarılarının artmasında önemli bir yere sahiptir. Çünkü matematik dersinin soyut bir yapıya sahip olması ve daha fazla çaba gerektirmesi öğrencilerin akademik yılmazlığını daha önemli hale getirmektedir. Özellikle ilkokul düzeyinde bu durumlar gelecekteki matematik eğitimi yaşantılarının temelini oluşturmakta ve ergenlik dönemi öğrencilerin yılmazlığını daha da önemli hale getirmektedir. Akademik başarı, akademik yılmazlığın önemli bir göstergesi olarak kabul edilmektedir (Allan, McKenna ve Dominey, 2014; Alva, 1991; Esquivel, Doll ve Oades-Sese, 2011; Gizir, 2004; Kapıkıran ve Acun-Kapıkıran 2016; Yavuz ve Kutlu, 2016; Masten ve Coatsworth,1998). Akademik başarısı yüksek olan bireylerin akademik yılmazlıklarının da daha yüksek olduğu belirtilmektedir (Alva, 1991). Bu açıdan bireyin akademik hayatta olumsuzluklara rağmen başarılı olması ve ilerlemesi akademik yılmazlığın göstergesidir (Yavuz ve Kutlu, 2016). Öğrencilerin akademik yaşamda karşılaştıkları streslerle baş edememeleri birçok sosyal, davranışsal ve duygusal sorunun yanı sıra bazı eğitimsel sonuçlara da neden olabilmektedir (Kaya, Peker ve Gündüz, 2016). Bu nedenle akademik yılmazlığı yüksek olan öğrencilerin akademik olarak daha başarılı olmaları ve olumlu eğitim çıktılarına sahip olmaları beklenmektedir.

Psikolojik sağlamlık ve akademik yılmazlığın öğrenci başarısındaki kritik rolü göz önüne alındığında oldukça önemlidir. Özgüven (2002), başarı öğrencilerin okuldaki dersten veya akademik programdan ne derece yararlandığının bir göstergesidir. Bu bağlamda öğrencilerin amaçları ve eğitim sisteminin kalitesinin göstergesi olarak kabul edilen okuldaki öğrencilerin başarı ve akademik

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performanslarını etkileyen faktörlerin incelenmesi oldukça önemlidir (Alnabhan, Al-Zegoul ve Harwell, 2001).

Ortaöğretim dönemi, bireyin/çocuğun gelişim evreleri çerçevesinde değerlendirildiğinde fiziksel, duygusal, sosyal, cinsel, ahlaki alanlarda hızlı değişmelerin yaşandığı bir zaman kesitidir. Bu değişmeler bireyin kendisi, sosyal ilişkileri ve akademik performansını etkileyerek bir takım güçlüklerle karşılaşmasına sebep olabilmektedir (Toprakçı, 2017). Çocuğun okul ortamında hem akademik hem de sosyal alanda başarılı olmasını sağlayan sebeplerden biri psikolojik sağlamlığı ve akademik yılmazlığıdır. Matematik başarısını belirlemedeki önemi nedeniyle ilköğretim ikinci kademede başarısızlık riski taşıyan öğrencilerin tespiti, öğretmenlere geliştirici ve önleyici çalışmalar açısından katkı sağlayacaktır. Araştırmadan elde edilecek bulguların özellikle okul ortamlarında öğrencilerin akademik başarılarını artırmaya yönelik çalışmalara ışık tutması beklenmektedir.

Araştırma, akademik yılmazlığın ölçüldüğü farklı değişkenlere bakarak bu tartışmaya katkıda bulunmayı amaçlamaktadır. Akademik başarı konusunda yapılan literatür taramasında akademik başarının farklı grup ve değişkenlerle birlikte incelendiği araştırmaların olduğu belirlenmiştir. Ancak literatürde ortaokul öğrencileri üzerinde matematik dersi için yapılan çalışmaların sınırlı olduğu ifade edilebilir. Ancak ortaokul öğrencilerinin matematik dersinde akademik başarı, psikolojik sağlamlık ve akademik yılmazlık değişkenlerinin birlikte incelendiği bir araştırmaya rastlanmamıştır. Bu bağlamda, ortaokul öğrencilerinin psikolojik dayanıklılık ile akademik başarıları arasındaki ilişkide akademik yılmazlığın aracılık rolünün belirlenmesi amaçlanmaktadır. Ayrıca alt amaç olarak bu değişkenlerin birbirleri ile ilişkilerinin araştırılması amaçlanmaktadır. Bu amaçla oluşturulan araştırma modeli (Şekil 1) ve hipotezler aşağıda verilmiştir.

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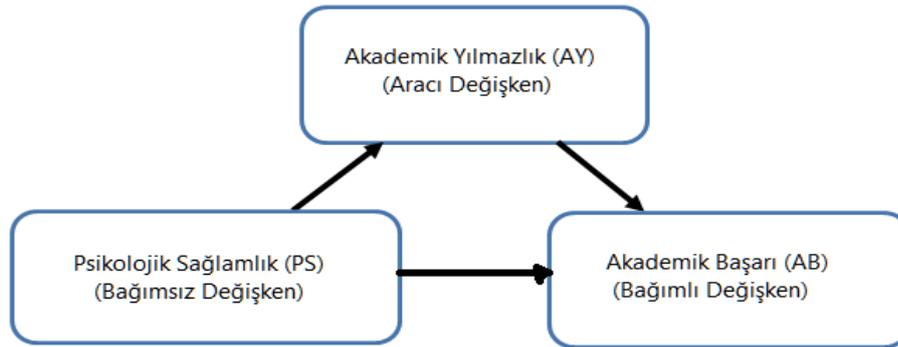
Şekil 1. *Araştırma Modeli*

H$_1$: Ortaokul öğrencilerinin psikolojik sağlamlık ile akademik başarıları arasında anlamlı bir ilişki bulunmaktadır.

H$_2$: Ortaokul öğrencilerinin psikolojik sağlamlık ile matematik dersine yönelik akademik yılmazlıkları arasında anlamlı bir ilişki bulunmaktadır.

H$_3$: Ortaokul öğrencilerinin matematik dersine yönelik akademik yılmazları ile akademik başarıları arasında anlamlı bir ilişki bulunmaktadır.

H$_4$: Ortaokul öğrencilerinin psikolojik sağlamlık ile akademik başarıları arasındaki ilişkide akademik yılmazlığın aracılık rolü bulunmaktadır.

Yöntem: Araştırmada nicel araştırma modellerinden ilişkisel tarama modeli kullanılmıştır. ˙Araştırmanın bağımsız değişkeni psikolojik sağlamlık, bağımlı değişkeni akademik başarı ve aracı değişkeni akademik yılmazlık olarak belirlenmiştir. Araştırma grubunu 2022-2023 eğitim öğretim yılında Kocaeli ili İzmit ilçesindeki ortaokulların 6. ve 7. sınıflarında öğrenim gören ve araştırmaya gönüllü olarak katılan 65(%46) kız ve 75(%54) erkek olmak üzere toplam 140 öğrenciden oluşmaktadır. Araştırmada veri toplamak amacıyla Smith ve arkadaşları tarafından geliştirilen ve Doğan (2015) tarafından uyarlanan Kısa Psikolojik Sağlamlık Ölçeği ve matematik alanındaki akademik yılmazlık düzeylerini ölçmek amacıyla Ricketts ve arkadaşları (2017) tarafından geliştirilen Pekdemir ve diğerleri (2019) tarafından uyarlanan tek boyutlu "Matematikte Akademik Yılmazlık Ölçeği" kullanılmıştır. Bu çalışmada öğrencilerin akademik başarıları dönem sonunda matematik dersindeki başarılarına göre belirlenmiştir. Araştırma için gönüllü bireylerin

katılımı esas alınmış ve katılmadan önce öğrencilerden bilgilendirilmiş onam alınmıştır. Kullanılan ölçeklerin özellikleri, normallik varsayımı ve çalışma değişkenleri arasındaki korelasyon tahminlerini incelemek için ön analizler yapılmıştır. Ölçeklerin güvenirliğini ölçmek için Cronbach Alpha katsayısı dikkate alınarak güvenirlik analizi yapılmıştır. Ölçeklere uygulanan faktör analizleri sonucunda elde edilen faktörlerin betimsel istatistikleri ile araştırmanın değişkenleri arasındaki ilişkileri belirlemek için Pearson korelasyon analizi yapılmıştır. Çalışmanın temel amacı olan psikolojik sağlamlığın akademik başarıya olan etkisinde akademik yılmazlığın aracı etkisini test etmek amacıyla SPSS için Process Makro aracı (Hayes, 2018) kullanılarak oluşturulan model çerçevesinde değişkenler arasındaki ilişkileri ve aracılığı belirleyen analizler yapılmıştır.

Sonuçlar: Bu araştırmada ilk olarak "Öğrencilerin psikolojik dayanıklılıkları ile akademik başarıları arasında anlamlı bir ilişki vardır" hipotezi test edilmiştir. Araştırma sonuçlarına göre ortaokul öğrencilerinin psikolojik sağlamlıklarının öğrencilerin akademik başarılarını olumlu yönde ve orta düzeyde etkilediği belirlenmiştir. Diğer bir ifadeyle öğrencilerin psikolojik sağlamlık düzeyleri arttıkça akademik başarı hacimlerinin de arttığı söylenebilir. Bu sonuca literatürde yapılan çeşitli araştırmalarda rastlanmıştır (Allan vd., 2014; Borman ve Overman, 2004; Novotny ve Kremenkova, 2016; Sakız ve Aftab, 2019; Fire ve Milk, 2022). Yapılan araştırmalarda akademik başarı ile psikolojik sağlamlık arasında pozitif yönde anlamlı bir ilişki olduğu tespit edilmiştir. Araştırmanın ikinci hipotezi olan "Ortaokul öğrencilerinin psikolojik sağlamlıkları ile matematik derslerine yönelik akademik dayanıklılıkları arasında anlamlı bir ilişki vardır" hipotezinin yapılan analiz sonucu ortaokul öğrencilerinin psikolojik sağlamlıklarının öğrencilerin akademik yılmazlıklarını olumlu yönde ve anlamlı bir şekilde etkilediği belirlenmiştir. Psikolojik sağlamlık ve akademik yılmazlık üzerine yapılan sınırlı sayıda araştırma, bu iki değişken arasında pozitif bir ilişki olduğunu göstermektedir. Diğer bir hipotez olan "Öğrencilerin matematik derslerine yönelik akademik dayanıklılıkları ile akademik başarıları arasında anlamlı bir ilişki vardır" analizi sonucunda desteklenmiştir. Buna göre akademik yılmazlığın öğrencilerin akademik başarısı üzerinde olumlu bir etkiye sahip olduğu ve dolayısıyla öğrencilerin akademik başarısına olumlu yansıdığı söylenebilir. Analizler, akademik yılmazlık ve akademik başarı arasındaki ilişki üzerinde net bir etki göstermektedir. Araştırmadan elde edilen sonuçlar önceki araştırma bulguları ve teorik beklentilerle uyumludur (Allan vd., 2014; Esquivel vd., 2011; Hartley, 2011; Bitmann, 2021; Arastaman ve Balcı, 2013; Jowkar, Kojuri, Kohoulat ve Hayat, 2014; Cutter, 2016; Mwangi, Okatcha, Kinai ve Ireri, 2015; Tezel, 2021). Literatürde bahsedildiği gibi, akademik yılmazlığa sahip bireylerin sürekli olarak daha olumlu akademik yörüngeleri vardır ve bunun sonuçlarının okuldan ayrılma niyeti, daha iyi notlar ve yaşamlarından daha memnun olma gibi diğer değişkenler üzerinde olumlu etkileri vardır (Bitmann, 2021). Bu değerlendirmeler ışığında matematik derslerinde başarılı olan öğrencilerin matematik yılmazlık özelliğine sahip oldukları söylenebilir.

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Araştırmanın temel hipotezi olan "Öğrencilerin psikolojik sağlamlıkları ile akademik başarıları arasındaki ilişkide akademik yılmazlık aracı bir role sahiptir" analizi sonucunda kabul edilmiştir. Bu çalışmada elde edilen sonuçlara göre psikolojik sağlamlık ile akademik başarı arasındaki ilişkide akademik yılmazlığın aracı rol oynadığı belirlenmiştir. Bu sonuç, öğrencilerin akademik yılmazlıklarının psikolojik sağlamlık ile akademik başarı arasındaki ilişki için literatür ve bu araştırma tarafından desteklenen önemli bir değişken olduğunu göstermektedir. Bu nedenle öğrencilerin akademik başarılarını artıracak faktörler arasında yer alan psikolojik sağlamlık ve akademik yılmazlığın birlikte ele alınması ve bu düzeylerin yükseltilmesi için adımlar atılması gerektiği söylenebilir. Bireylerin akademik başarıya yükledikleri anlam çerçevesinde elde ettikleri sonuçlar kendilerini olumlu ya da olumsuz etkileyebilmektedir. Açıkgöz (2016) tarafından yapılan çalışmada akademik başarısı yüksek olan öğrencilerin psikolojik sağlamlık puanlarının anlamlı düzeyde daha yüksek olduğu belirlenmiştir. Bu açıklamalar ışığında akademik yılmazlığın, bireylerin zorlu durumların üstesinden gelmede akademik başarılarına ilişkin algılarında aracı bir etkiye sahip olabileceği düşünülmektedir (Camadan ve Kıraç, 2020). Bu çalışma, akademik yılmazlık ve matematik içeriğinin psikolojik sağlamlığı ile matematik dersinin akademik başarısı arasındaki ilişkiyi belirlemeye çalışmıştır. Çalışma, psikolojik sağlamlık ile akademik başarı arasındaki ilişkinin, akademik yılmazlığın aracı bir işlev olarak kullanılmasıyla değiştiğini bulmuştur. Dayanıklılık ölçeklerinin akademik başarı üzerindeki aracı veya düzenleyici etkilerine ilişkin çalışmalar eksiktir. Bu çalışma konuyu kapsamlı bir şekilde inceleyerek bu boşluğu doldurmaya çalışmıştır.

Çalışmada örneklem görece geniş, istatistiksel analizler güvenilir, geçerli ve güvenilir araçlar kullanılmıştır.

Öneriler: Öğrencilerin matematik derslerindeki akademik başarılarını artırmanın bir yolunun da psikolojik sağlamlık ve matematik akademik yılmazlık düzeylerini artırmak olduğu söylenebilir. Bu bağlamda öğrencilerin akademik başarı düzeylerinin artırılmasında psikolojik sağlamlık ve akademik yılmazlık düzeylerini artırmaya yönelik çalışmalara yer verilebilir. Ayrıca psikolojik sağlamlık değişkeninin diğer alanlarla nasıl etkileşime girdiği incelenerek, konunun daha geniş bir analiz yapılarak bu değişkenler arasındaki ilişkiyi etkileyebilecek çeşitli demografik özelliklerin olup olmadığı konusunda araştırmalar yapılabilir. Bu araştırmanın sınırlılıkları, araştırmanın nicel boyutta, sınırlı sayıda katılımcıyla ve bu araştırmada kullanılan ölçme araçlarıyla ölçülen niteliklerle sınırlı olmasıdır. Gelecekteki araştırmalarda değişkenler arasındaki ilişkilerin daha ayrıntılı değerlendirilmesi için nitel araştırmalar veya nitel ve nicel yöntemlerin birlikte kullanıldığı karma desenli araştırmalar yapılabilir.

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