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EXAMINATION OF THE RELATIONSHIP BETWEEN ACADEMIC GRIT AND THEIR ACADEMIC SUCCESS FOURTH GRADE STUDENTS IN PRIMARY SCHOOL

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Abstract

This study aims to examine the relationship between the academic achievement of primary school students and their academic grit. It also tried to determine whether the academic grit of the students affected various variables. The research is a quantitative study based on the relational screening model. The study sample consists of 400 fourth-grade students in the center of Sivas, which was determined by the proportional stratified method. Personal information form and Academic Perseverance Scale were used as data collection tools. According to the study results, a significant relationship was found between academic achievement and academic grit. This relationship was found to be significant, moderate, and positive. In addition, the study determined that academic perseverance differed significantly according to gender, father's education status, socioeconomic status, and pre-school education status. However, it was observed that academic perseverance did not differ according to the number of siblings and the mother's educational status.

Keywords: Primary school, academic grit, academic success, fourth-grade student.

INTRODUCTION

Education helps individuals adapt to life in all stages of life. Individuals can keep up with the adaptation process to the extent that they can use their abilities. Education aims to create behavioral changes in individuals by supporting their cognitive, social, emotional, and moral development (Akyuz, 2012). The aspect of education related to cognitive development is associated with academic success. Therefore, it can be considered that the cognitive development of a student with high academic success is also developed at a desired level. Rivnik, Hanuskek, & Kain (2005) defined academic success as the attainment of targeted goals in terms of education and suggested that it covers behavioral changes that occur in individuals apart from psychomotor and emotional development.

Academic success, one of the most significant indicators of knowledge acquisition, is necessary for individuals to find jobs, advance their careers and attain the things they value. Therefore, the factors that affect academic achievement have been examined by many researchers (Reraki, Celik, & Saricam, 2015). Many factors affecting academic success, including education provided by the teacher, the student's efforts, school climate, the family's attitude towards education, participation of

the family in education at home or school, the environment where the school is located, the developmental period that the child is going through, the educational status of parents, socioeconomic level, character traits of the student and gender (Jeynes, 2011).

The reason why individuals with the same intelligence level have a different level of academic success (apart from these factors) has long been a topic of research for pedagogues and psychologists. It is seen in the studies that the determination of the individual is a strong factor in increasing academic success (Credé, Tynan, & Harms, 2017). Allen, Kannangara, and Carson (2021), Clarck and Malecki (2019), Jiang et al. (2019), and Lam and Zhou (2019) examined the connection between academic grit and success; Datu, Yuen, and Chen (2017) studied grit and self-sufficiency in academic, career and skill development. Meyer et al. (2020) searched the relationship between grit and endurance. Determination is another factor considered as important as intelligence for academic success. Grit is the effort exerted despite failures and problems and a variable that requires working keenly against challenges while maintaining interest in the subject. In sum, success is a product of talent and effort (Datu, Yuen, & Chen, 2017; Duckworth, Peterson, Matthews, & Kelly, 2007; Sturman & Zappala-Piemme, 2017).

Grit is an indispensable variable for success (Al-Mutawah & Fateel, 2018; Bozgun & Basgul, 2018). Academic determination represents the desired quality of academic behaviors required for both short- and long-term academic success and the acquisition of a degree (Arslan, Akin, & Citemel, 2013; Ozhan & Boyaci, 2018). Grit can be defined as self-commitment to achieve a certain goal in the long run (Mohan & Kaur, 2021). Grit involves two factors: degree of effort and consistency of interest. The first one refers to how persistently people facing difficulties make an effort. Consistency of interest reflects the tendency to support a similar line of interest for an extended period (Duckworth & Quinn, 2009). Apart from these two dimensions, it is thought that grit, representing one's ability to adapt to changing conditions in life in a practical way, is also associated with adapting to situations, expecting challenges, accepting changes, being flexible, and overcoming new challenges (Datu et al., 2017). More grit individuals are more persistent and hardworking, are more motivated to set long-term goals and projects, and can better focus (Bazelais, Lemay, & Doleck, 2016).

While grit emphasizes individual differences that lead to success, it is influenced by general achievement criteria. Being aware of these achievement criteria, it is substantial for educators to know the grit skills levels of their students (Mohan & Kaur, 2021). The issue of academic stability has been studied by researchers in recent years. These studies are included to determine academic success and performance (Lam & Zhau, 2019). As a notion that has recently emerged, academic grit is also regarded as a feature of motivation that partly determines the approaches and strategies related to academic tasks (Alhadabi et al., 2019).

Grounds and Significance of the Research

The literature review reveals that there are studies performed to analyze the association between academic grit and success (Christopoulou et al., 2018; Dixson, 2019; Duckworth & Quinn, 2009; Akos & Kretchmar, 2017; Clark & Malecki, 2019; Dixson et al., 2016; Duckworth et al., 2007; Hodge, Wright, & Bennett, 2017; Hwang, Lim, & Ha, 2017; Hinojosa, Lu, & Vela, 2019; Jiang et al., 2019; Kleiman, Adams, Kashdan, & Riskind, 2013; Perez, 2015; Reraki et al., 2015; Rimfeld et al., 2016; Rogers, Strayhorm, 2014; Townsend, & Lindner, 2004; Tucker-Drob et al., 2016; Weisskirtch, 2016; West et al., 2016; Wolters & Hussain, 2015). Looking at the literature, Dixson (2019), Gümüş (2021), Duckworth and Quinn (2009), and Serin (2021b) stated that high school students, secondary school students by Clark and Malecki (2019), Rojas and Usher (2012), Acar (2021), Ural and Çınar (2014), Borton and Grelle (2013); It was observed that the grits of undergraduate students were examined by Reraki, Çelik, and Sarıçam (2015), Wolter and Hussain (2015), Porter (2019). The difference between the study from these studies is that it examines the academic grit of primary school 4th-grade students. When the studies are examined, there are also studies examining the perseverance of primary school students (Eryiğit, 2022; Jiang et al., 2019). The difference between the study from these studies is that it examines the relationship of academic grit with success and its

effect on various variables. In addition, it was seen that most of the studies on academic grit in the literature were not conducted with primary school students.

However, most of these studies were not carried out with primary school students, and it can be suggested that research is limited since academic grit is a new field (Cohen, 2015). Literature review shows that analysis of academic grit in terms of various variables is also limited. Studies carried out with lower age groups (Postigo, Cuesta, Fernández-Alonso, García-Cueto, & Mu˜niz, 2021) suggest that failure in school, especially as age increases increases as a result of a decrease in academic grit. Therefore, it is necessary to take the necessary steps to encourage and reinforce academic grit in these groups. Because it is thought that academic grit should be examined by researchers (Costa & Faria, 2018; Lou & Noels, 2019). In addition, researchers suggest that academic perseverance may mediate perceptions and beliefs about school work and success (Kaya & Karakoc, 2022). In this regard, the research is significant in terms of analyzing the relationship between academic grit and the success of 4th-grade students and analyzing academic grit in relation to various variables.

Grit is influential in determining which individuals are persistent enough to stay on track in the education process. Therefore, it seems increasingly important to investigate the trends that affect students' grit and achievement results (Bazelais, Lemay, & Doleck, 2016). Being determined significantly affects academic learning. That's why many researchers and educators try to encourage courage to increase students' academic success. However, the studies do not provide complete information on the extent to which academic grit can explain success (Lam & Zhou, 2019). In addition, considering that academic success is vital in education, it is crucial to analyze academic grit, which is thought to affect academic success.

The Aim of the Research

This research aims to determine the relationship between academic grit and the academic success of fourth-grade students. Answers have been sought for the following questions in line with this aim:

Sub-Problems

1. What are the academic grit and success levels of fourth-grade students?

2. Is there a significant relationship between academic grit and the academic success of fourth-grade students?

3. Does the academic grit of fourth-grade students differ significantly based on the;

- ✓ gender,
- ✓ mother’s educational status,
- ✓ father’s educational status,
- ✓ socioeconomic level of the area where the school is located,
- ✓ number of siblings,
- ✓ status of pre-school education.

METHOD

This part includes the research model, universe and sample, data collection tools, implementation process, and data analysis.

Research Model

This research uses a survey model, a quantitative study based on the relational screening model. In the correlational survey model, information is collected from a group of people to identify some features of the universe that the relevant group is a part of. The primary way of collecting information is to ask questions; the answers given to these questions by group members constitute the study’s data. A cross-sectional study aims to collect information from a sample from a pre-determined universe

(Fraenkel, Wallen, & Hyun, 2012, p. 393). In a cross-sectional survey design, the researcher collects data simultaneously. In cross-sectional studies, choosing a sample as large as possible is essential to display the characteristics that resemble the target universe (Creswell, 2012).

Population and Sample

The research population consists of 5062 fourth-grade students who study in state primary schools in the city center of Sivas in the academic year 2020-2021. Four hundred (400) primary school students were selected using the proportional stratified sampling technique study in different socioeconomic regions of Sivas province. In determining the sample group, information was requested from the Turkish Statistical Institute (TSI) regarding the socioeconomic level of the neighborhoods in the city center of Sivas. As a result, TSI grouped the neighborhoods in the city center of Sivas based on their socioeconomic status as lower, middle, and upper. Proportionate stratified is a sampling method that aims to determine the population's lower groups and ensure that they are represented in the sample in line with their proportion in the universe (Buyukozturk et al., 2014, p. 86). In the population consisting of 5062 people, it was observed that 1200 people were at the upper socioeconomic level, 2854 were at the middle socioeconomic level, and 1008 were at the lower socioeconomic level, according to the region where the school is located. According to this, 96 people were chosen randomly, with a rate of 24% for the upper socioeconomic level, 224 people with a rate of 56% for the middle socioeconomic level, and a rate of 20% for the lower socioeconomic level, and 80 people were randomly selected.

Table 1 indicates the sample's data distribution based on their various demographic information.

Table 1. Demographic information of the students

Features		f	%
Socioeconomic Level	Upper	96	24
	Middle	224	56
	Lower	80	20
Gender	Male	184	46
	Female	216	54
Mother's Educational Status (MES)	Primary	99	24.8
	Secondary school	112	28
	High school	100	25
	Undergraduate and above	89	22.2
Father's Educational Status (FES)	Primary school	54	13.5
	Secondary school	78	19.5
	High school	143	35.8
	Undergraduate and above	125	31.2
Number of Siblings	1	137	34.3
	2	106	26.4
	3 and above	157	39.3
Status of Pre-School Education	Yes	275	68.7
	No	125	31.3

Table 1 shows that the socioeconomic level of the regions where the school is related is upper for 24% of the students (n=96), middle for 56% of the students (n=224), lower for 20% of the students (n=80); 46% of the students are male (n=184), and 54% are female (n=2016); the educational status of the mother is the primary school for 24,8% of the students (n=99), secondary school for 28% (n=112), high school for 25% (n=100), and undergraduate or above for 22.2% (n=89); the educational status of the father is the primary school for 13,5% of the students (n=54), secondary school for 19,5% (n=78), high school for 35,8% (n=143), undergraduate and above for 31.2% (n=125); 34,4% of the students (n:137) have 1 sibling, 26,4% (n:106) has 2 siblings, and 39,3% (n=157) 3 and more siblings; 68.7% of the students (n=275) received pre-school education, and 31.3% (n=125) did not receive pre-school education.

Data Collection Tools

1. Personal Information Form

The researchers created this form to determine the gender, school, mother's and father's educational status, number of siblings, the status of pre-school education, and overall school report grades (success average) for the first semester of the academic year 2020-2021 for the students who participated in the research. The student's academic achievement scores represent the average grade point average at the end of the first semester of the fourth year. These grades consist of the student's average scores in the exam for all courses during a semester and their performance. The data obtained using the form can be determined in light of the literature review and can affect academic grit.

2. Academic Grit Scale

The scale developed by Rojas, Reser, Usher, and Toland (2012) to determine the academic grit level of fourth-grade and secondary school students was adapted to Turkish by Bozgun and Basgul (2018). The scale consists of 10 items and a single dimension. The first and ninth items of the scale are negative. If the first and eighth items have the same reply, it can be deduced that the scale has not been read; thus, the relevant data can be removed from the dataset (Rojas et al., 2012). It is a Likert-type scale consisting of the following replies: "I strongly disagree," "I disagree," I am neutral," I agree," and "I strongly agree." The lowest score that can be obtained from the scale is 10, and the highest is 50. Lower scores indicate that the student has low academic grit, and higher scores indicate that the student has high academic grit. Cronbach internal consistency coefficient is .85 in the original form of the scale and .84 in the Turkish form. Within the scope of the validity study of the scale, it was determined that the fit index values of the Confirmatory Factor Analysis had acceptable and perfectly varying values (Bozgun & Basgul, 2018). This study calculated Cronbach's alpha internal consistency coefficient as .89.

Implementation Process

First of all, administrators in randomly selected schools were interviewed. Institutional and scale usage permissions were obtained, and the necessary information was given to the people to whom the application would be made. In addition, the fourth-grade teachers in the schools where the data will be collected were also interviewed. Their contributions were requested to fill out the forms carefully to collect the data reliably. In the implementation period, data were collected remotely as the academic year 2020-2021 was generally carried out online due to the pandemic. The academic grit scale was transferred to Google Forms, and relevant links were sent to fourth-grade teachers working in state primary schools in Sivas. The teachers were asked to share the links in parent WhatsApp groups. The parents were informed that the forms also needed to be filled out by the students. The data collection process was completed in April-May of the academic year 2020-2021.

Analysis of Data

The research data were analyzed using a statistical package program in the computer environment. In the data analysis, it was initially determined whether the grades obtained by the students in the measurement tool exhibited normal distribution. To check whether the data exhibited normal distribution, Kolmogorov-Smirnov (K-S) test and Shapiro-Wilk (S-W) test were carried out, and skewness and kurtosis values, Z scores and histogram graphics were examined. Examination results showed that the data did not exhibit a normal distribution.

In the data analysis, the Mann Whitney U test was used to compare the student's academic grit scores based on gender and status of pre-school education. Kruskal Wallis H test and Jonckheere-Terpstra test, which are non-parametric tests, were used to compare the student's academic grit scores based on the educational status of the mother and father, the socioeconomic level of the region where the school is located and the number of siblings. Mann Whitney U test was used to determine between which groups there was a significant difference. The relationship between the student's academic grit and academic success was determined by calculating the Spearman Rank Difference Correlation Coefficient. P values lower than .05 were regarded as statistically significant in the research.

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FINDINGS

This part includes statistical analyses performed to test the sub-problems of the research and the findings obtained in these analyses.

Table 2 shows the findings demonstrating the academic grit and success level for primary school fourth-grade students.

Table 2. Results on the descriptive statistics of the students' academic grit and academic success

Variables	n	Lowest	Highest	Mean	Std.Dev.	K-S/S-W
Academic Grit	400	13.0	50.0	40.18	8.78	.00/.00
Academic Success	400	60.0	100	92.36	8.93	.00/.00

Table 2 shows that the average score for the student's academic grit is 40.18. Based on this result, the academic grit is high. However, it can also be stated that the student's academic grit scores were not distributed normally (p>.05). It was spied on that the average score for the student's academic success was 92.36. Based on this result, the student's academic success is high. In addition, it was observed that the student's academic success scores were not distributed normally (p<.05).

The changes that occurred in the student's academic grit and academic success scores were examined. For this purpose, the arithmetic average, standard deviation, and normality values of the students' academic grit skill scores and academic success scores (Kolmogorov-Smirnov/Shapiro-Wilk) were evaluated. Table 3 shows the descriptive statistics regarding the students' academic grit skill scores and academic success scores.

Table 3. Descriptive statistics regarding the students' academic grit scores and academic success scores

Score	n	Mean	Std.Dev.	K-S/S-W
Academic Grit Score	400	40.18	8.77	.00/.00
Academic Success Score	400	92.36	8.93	.00/.00

Table 3 shows the average ($\overline{X}$ =40.18) and standard deviation (S=8.77) of the student's academic grit scores and the average ($\overline{X}$ =92.36) and standard deviation (S=8.93) of their academic success scores. It can also be seen that the student's academic grit and success scores (K-S= 0.00, S-W= 0.00, p<.05) do not exhibit a normal distribution.

As the students' academic grit scores and academic success scores do not exhibit normal distribution, the Spearman Rank Difference Correlation analysis was performed to examine the relationship. Analysis results are shown in Table 4.

Table 4. Correlation between the academic grit score and academic success score

Variables		Academic Grit Skill Score	Academic Success Score
Academic Grit Score	r_s	1.00	.294
	p	-	00*
Academic Success Score	r_s	.294	1.00
	p	.00*	-

*p<.01

Table 4 shows that, based on the Spearman Rank Difference Correlation analysis, there is a positive and med-level relationship between the students' academic grit scores and academic success scores (r_s=.294, p<.05). It was identified that the determination coefficient is $Rs^2=(.294)^2=.09$. Accordingly, 9% of the total variability in students' academic grit originates from their academic success. The remaining variance of 91% originates from other variables.

The changes in the student's academic grit scores concerning gender were examined. For this purpose, the arithmetic average, standard deviation, and normality values of the students' academic

grit skill scores based on gender (Kolmogorov-Smirnov/Shapiro-Wilk) were evaluated. Table 5 shows the descriptive statistics regarding the students' academic grit skill scores based on gender.

Table 5. Distribution of students' academic grit scores by gender

Score	Gender	n	Mean	Std.Dev.	K-S/S-W
Academic Grit	Male	184	39.28	8.92	.00/.00
	Female	216	40.94	8.59	.00/.00

Table 5 shows the average ($\overline{X}$ = 40.94) and standard deviation (S= 8.59) of the academic grit scores of female students and the average ($\overline{X}$ =39.28) and standard deviation (S=8.92) of the academic grit scores of male students. It can also be seen that the academic grit scores of female students (K-S=.00, S-W=.00, p<.05) and male students (K-S=.00, S-W=.00, p<.05) do not exhibit a normal distribution. Based on these results, whether the students' academic grit scores vary based on gender was analyzed using the Mann-Whitney U test, and the results were evaluated. Analysis results are shown in Table 6.

Table 6. Results of Mann Whitney U test for the students' academic grit based on gender

Test	Gender	n	Rank Average	Rank Sum	U	p	r
Academic Grit	Male	184	186.96	34400.50	17380.50	.03*	.10
	Female	216	212.03	45799.50			

*p<.05

Tablo 6 shows that the student's academic grit scores vary significantly based on gender (U=17380.50, Z=-2.165, p<.05, r=.10). The academic grit scores of female students (median=43, n=216) are higher than male students (median=41, n=184). The effect size calculated for this data is low.

The changes in the student's academic grit scores based on the mother's educational status were analyzed. For this purpose, the arithmetic average, standard deviation, and normality values (Kolmogorov-Smirnov/Shapiro-Wilk) of the student's academic grit scores based on the Mother's Educational Status (MES) were evaluated. Table 7 shows the descriptive statistics of the academic grit scores based on the MES.

Table 7. Descriptive statistics of the academic grit scores based on the MES

Score	MES	n	Mean	Std.Dev.	K-S/S-W
Academic Grit	Primary school	99	39.62	8.37	.00/.00
	Secondary school	112	39.37	9.05	.00/.00
	High school	100	40.16	9.06	.00/.00
	Undergraduate and above	89	41.83	8.45	.00/.00

Table 7 shows the average ($\overline{X}$ = 39.62) and standard deviation (S= 8.37) of the academic grit scores for the students whose MES is primary school; the average ($\overline{X}$ =39.37) and standard deviation (S=9.05) of the academic grit scores for the students whose MES is secondary school; the average ($\overline{X}$ = 40.16) and standard deviation (S=9.06) of the academic grit scores for the students whose MES is high school; and the average ($\overline{X}$ =41.83) and standard deviation (S=8.45) of the academic grit scores for the students whose MES is undergraduate and above. In addition, as the academic grit scores (K-S= .00, S-W=.00, p <.05) do not exhibit normal distribution for the students whose MES is a primary school, secondary school, high school, and undergraduate and above, Kruskal Wallis H Test was performed for analysis. Table 8 shows the analysis results.

Table 8. Kruskal Wallis H test results for the students' academic grit scores based on the MES

Test	MES	n	Rank Average	Df	H	p
Academic Grit	Primary S.	99	186.86	3	7.24	.06
	Secondary S.	112	190.32			
	High S.	100	201.10			
	Undergraduate and above	89	227.81			

Table 8 shows that the student's academic grit scores do not exhibit a significant difference based on the educational status of the mother ($H_{(3)}$=7.24, p>.05).

The changes in the student's academic grit scores based on the Father's Educational Status (FES) were examined. For this purpose, the arithmetic average, standard deviation, and normality values (Kolmogorov-Smirnov/Shapiro-Wilk) of the student's academic grit scores based on the FES were evaluated. Table 9 shows the descriptive statistics regarding the students' academic grit scores based on the FES.

Table 9. Descriptive statistics of the students' academic grit scores based on the FES

Score	FES	n	Mean	Std.Dev.	K-S/S-W
Academic Grit	Primary S.	54	39.43	8.93	.57/.00
	Secondary S.	78	38.83	9.13	.00/.00
	High S.	143	39.84	8.86	.00/.00
	Undergraduate and above	125	41.72	8.25	.00/.00

Table 9 shows the average ($\overline{X}$ =39.43), and standard deviation (S=8.93) of the academic grit scores for the students whose FES is a primary school; the average ($\overline{X}$ =38.83) and standard deviation (S=9.13) of the academic grit scores for the students whose FES is a secondary school; the average ($\overline{X}$ =39.84) and standard deviation (S=8.86) of the academic grit scores for the students whose FES is high school; the average ($\overline{X}$ =41.72) and standard deviation (S=8.25) of the academic grit scores for the students whose FES is undergraduate and above. It can also be seen that the academic grit scores of the students whose FES is a primary school (K-S= .57, S-W=.00, p<.05) and the academic grit scores of the students whose FES is a secondary school, high school, and undergraduate and above (K-S=.00, S-W=.00, p<.05) do not exhibit a normal distribution. Therefore, whether the academic grit scores of the students varied based on the FES was analyzed using the Kruskal Wallis H Test. Table 10 shows the analysis results.

Tablo 10. Kruskal Wallis H test results for the students' academic grit scores based on the FES

Test	FES	n	Rank Average	Df	H	p	r
Academic Grit	Primary S.	54	186.60	3	7.96	.04*	.13
	Secondary S.	78	183.06				
	High S.	143	194.95				
	Undergraduate and above	125	223.74				

*p<.05

Table 10 shows that the student's academic grit scores vary significantly based on the educational status of the father ($H_{(3)}$=7.96, p<.05). Std. J-T Statistics value was found to be 2.66 according to the Jonckheere-Terpstra Test. Therefore, the academic grit scores increase as the father's educational status increases, and the students' academic grit scores decrease as the father's educational status decreases. The difference is significant at .05 (J=32127.00, Z=2.66, p<.05, r=.13). Therefore, the effect of the FES on the students' academic grit is low.

As there are significant differences between the groups, the Mann-Whitney U test was used to analyze which groups these differences stem from. Table 11 shows the analysis results.

Table 11. Comparison of the students' academic grit based on the FES

Test	FES	n	Rank Average	Rank Sum	U	p	r
Academic Grit	Primary	54	67.15	3626.00	2071.00	.87	-
	Secondary	78	66.05	5152.00			
	Primary	54	95.23	5142.50	3657.50	.57	-
	High School	143	100.42	14360.50			
	Primary	54	79.22	4278.00	2793.00	.06	-
	Undergraduate and above	125	94.66	11832.00			
	Secondary	78	106.87	8335.50	5254.50	.47	-
	High School	143	113.26	16195.50			
	Secondary	78	89.15	6953.50	3872.50	.01*	.17
	Undergraduate and above	125	110.02	13752.50			
	High School	143	125.27	17913.50	7617.50	.03*	.13
	Undergraduate and above	125	145.06	18132.50			

*p<.05

Table 11 shows that there is not a significant difference between the academic grit of the students whose FES is a primary school and the academic grit of those whose FES is a secondary school (U=2071.00 p>.05); the academic grit scores of the students whose FES is a primary school and those whose FES is high school (U=3657.50, p>.05), the academic grit scores of the students whose FES is a primary school and those whose FES is undergraduate and above (U=2793.00, p>.05), the academic grit scores of the students whose FES is a secondary school and those whose FES is high school (U=5257.50, p>.05).

It was found that there is a significant difference between the academic grit scores of the students whose FES is a secondary school and those whose FES is undergraduate and above (U=3872.50, p<.05, r=0.17). In addition, the academic grit scores of the students whose FES is undergraduate and above (median=44.00) are higher than those whose FES is a secondary school (median=41.00). However, the effect size of this difference is small.

It was found that there is a significant difference between the academic grit scores of the students whose FES is high school and those whose FES is undergraduate and above (U=7617.50, p<.05, r=0.13). In addition, the academic grit scores of the students whose FES is undergraduate and above (median=44.00) are higher than those whose FES is high school (median=42.00). However, the effect size of this difference is small.

The changes in the academic grit scores based on the socioeconomic level of the region where the school is located were examined. For this purpose, the arithmetic average, standard deviation, and normality values (Kolmogorov-Smirnov/Shapiro-Wilk) of the student's academic grit scores based on their socioeconomic level were examined. Table 12 shows the descriptive statistics of the student's academic grit scores based on their socioeconomic levels.

Table 12. Descriptive statistics of the students' academic grit scores based on their socioeconomic levels

Score	Socioeconomic Level	n	Mean	Std.Dev.	K-S/S-W
Academic Grit	Upper	96	42.38	6.49	.00/.00
	Middle	224	39.82	9.24	.00/.00
	Lower	80	38.53	9.39	.00/.00

Table 12 shows the average ($\overline{X}$ = 42.38) and standard deviation (S=6.49) of the academic grit scores for the students whose socioeconomic level is upper; the average ($\overline{X}$ =39.82) and standard deviation (S=9.24) of the academic grit scores for the students whose socioeconomic level is middle; and the average ($\overline{X}$ = 38.53) and standard deviation (S=9.39) of the academic grit scores for the students whose socioeconomic level is lower. It can also be seen that the academic grit scores of the students with upper (K-S=.00, S-W=.00, p<.05), middle (K-S=.00, S-W=.00, p<.05), and lower (K-S=.00, S-W=.00, p<.05) socioeconomic levels do not exhibit a normal distribution. Therefore, Kruskal Wallis H Test was used to analyze whether the students' academic grit scores varied based on their socioeconomic levels. Table 13 shows the analysis results.

Table 13. Kruskal Wallis H test results for the students' academic grit scores based on their socioeconomic levels

Test	Socioeconomic Level	n	Rank Average	Df	H	p	r
Academic Grit	Upper	96	223.01	2	6.48	.04*	.13
	Middle	224	198.51				
	Lower	80	179.06				

*p<.05

Table 13 shows that the student's academic grit scores vary significantly based on their socioeconomic levels ($H_{(2)}$=6.48, p<.05). Std J-T Statistic value was found to be 2.52 according to the Jonckheere-Terpstra test. Therefore, the student's academic grit scores increase as the socioeconomic level increases, and the student's academic grit scores decrease as the socioeconomic level decreases. This difference is significant at .05 (J=20539.50, Z=2.52, p<.05, r=.13). The students' socioeconomic levels have a low effect on their academic grit.

As there is a significant difference between the groups, the Mann-Whitney U test was used to analyze which groups this difference stemmed from. Table 14 shows the analysis results.

Table 14. Mann Whitney U test results for the paired comparisons of the students' academic grit scores based on their socioeconomic levels

Test	Socioeconomic Level	n	Rank Average	Rank Sum	U	p	r
Academic Grit	Upper	96	174.01	16705.00	9455.00	.09	-
	Middle	224	154.71	34655.00			
	Upper	96	97.49	9359.50	2976.50	.01*	.19
	Lower	80	77.71	6216.50			
	Middle	224	156.30	35012.00	8108.00	.21	-
	Lower	80	141.85	11348.00			

*p<.05

According to Table 14, there is no significant relationship between the academic grit scores of the students from upper and middle socioeconomic levels (U=61.00, p>.05) and the academic grit scores of the students from middle and lower socioeconomic levels (U=8108.00, p>.05).

It was found that there is a significant difference between the academic grit scores of the students from upper and lowered socioeconomic levels (U=2976.50, p<.05, r=.19). The academic grit scores of the students from upper socioeconomic levels (median=43.50) are higher than those of students from lower socioeconomic levels (median=41.00). The effect size of this difference is small.

The changes in the student's academic grit scores based on the number of siblings were analyzed. For this purpose, the arithmetic average, standard deviation, and normality values of the students' academic grit skill scores based on the number of siblings (Kolmogorov-Smirnov/Shapiro-Wilk) were evaluated. Table 15 shows the descriptive statistics regarding the students' academic grit skill scores based on the number of siblings.

Table 15. Descriptive statistics of the students' academic grit based on the number of the siblings

Score	Number of Siblings	n	Mean	Std.Dev.	K-S/S-W
Academic Grit	1	137	40.46	8.77	.00/.00
	2	106	39.77	9.69	.00/.00
	3 and above	157	40.20	8.15	.00/.00

Table 15 shows the average ($\overline{X}$ =40.46) and standard deviation (S=8.77) of the academic grit scores of the students with 1 sibling; and the average ($\overline{X}$ =39.77) and standard deviation (S=9.69) of the academic grit scores of the students with 2 siblings, and the average ($\overline{X}$ =40.20) and standard deviation (S=8.15) of the academic grit scores of the students with 3 and more siblings. It can also be seen that the academic grit scores of the students with 1 sibling, 2 siblings, and 3 and more siblings do not exhibit normal distribution (K-S=.00, S-W=.00, p<.05). Therefore, whether the students' academic grit scores vary based on the number of siblings was analyzed using the Kruskal Wallis H test. Analysis results are shown in Table 16.

Table 16. Kruskal Wallis H test results for the students' academic grit scores based on the number of siblings

Test	Number of Siblings	n	Rank Average	Df	H	p
Academic Grit	1	137	205.57	2	.52	.77
	2	106	200.82			
	3 and above	157	195.86			

Table 16 shows that there is no significant difference in the student's academic grit scores based on the number of siblings ($H_{(2)}$=.52, p>.05).

The changes in the student's academic grit scores based on the status of pre-school education were analyzed. For this purpose, the arithmetic average, standard deviation, and normality values (Kolmogorov-Smirnov/Shapiro-Wilk) of the student's academic grit scores based on the status of pre-school education were evaluated. Table 17 shows the descriptive statistics of the academic grit scores based on the status of pre-school education.

Table 17. Descriptive Statistics of the Students' Academic Grit Scores Based on the Status of Pre-School Education

Score	Status of Pre-School Education	n	Mean	Std.Dev.	K-S/S-W
Academic Grit	Yes	275	40.84	8.69	.00/.00
	No	125	38.72	8.82	.00/.00

Table 17 shows the average ($\overline{X}$ =40.84) and standard deviation (S=8.69) of the academic grit scores for the students who received pre-school education; and the average ($\overline{X}$ =38.72) and standard deviation (S=8.82) of the academic grit scores for the students who did not receive pre-school education. In addition, it can be seen that the academic grit scores of the students who received pre-school education and those who did not receive pre-school education (K-S=.00, S-W=.00, p<.05) do not exhibit a normal distribution. Based on these results, whether the students' academic grit scores vary based on the status of pre-school education was analyzed using the Mann-Whitney U test, and the results were evaluated. Analysis results are shown in Table 18.

Table 18. Results of the Mann Whitney U test for the students' academic grit based on the status of pre-school education

Test	Status of Pre-School Education	n	Rank Average	Rank Sum	U	p	r
Academic Grit	Yes	184	211.21	58082.00	14243.00	.01*	.14
	No	216	176.94	22118.00			

*p<.05

Table 18 shows that the student's academic grit scores vary significantly based on the status of pre-school education (U=14243.00, Z=-2.751, p<.05, r=0.14). The academic grit scores of the students who received pre-school education (median=43.00, n=184) are higher than those of students who did not (median=41, n=216). The effect size calculated for this data is low.

DISCUSSION, CONCLUSION, and SUGGESTIONS

Findings demonstrate that the academic grit skills and the academic success of the fourth-grade students involved in the study are high. Literature (Postigo et al., 2021; Cosgrove, Chen, & Castelli, 2018; Tucker-Drob et al., 2016; Dixson et al., 2016; Guerrero et al., 2016; West et al., 2016; Ivcevic & Brackett, 2014; Duckworth & Quinn, 2009) shows that the academic grit level is higher in lower age groups. Studies carried out with samples that include the age groups between 10 and 18 show that grit can be an important factor in anticipating adolescents' academic success. There is a positive, mid-level relationship between the academic grit skill scores and academic success scores of fourth-grade students. It was presented that 9% of the total variance of students' academic grit skills stems from their academic success. The remaining variance of 91% stems from other variables. A review of the studies on grit and academic success shows that there is a positive relationship between academic grit and academic success for primary school students (Jiang et al., 2019), secondary school students (Clark & Malecki, 2019; Dumfart & Neubauer, 2016; Guerrero et al., 2016; Dudovitz, Chung, Dosanjh, & Wong, 2016), high school students (Credé et al., 2017; Dixson, 2019) and undergraduate students (Reraki, Celik, & Sariçam, 2015; Wolter & Hussain, 2015; Kelly, Matthews, & Bartone, 2014; Robertson-Kraft & Duckworth, 2014). Xu e al. (2021) determined that there is a positive relationship between grit and academic success for East Asian and British students. In their study on agriculture trainers, Rogers, Townsend, and Lindner (2004) presented that there is a significant relationship between academic grit and the academic success of agriculture trainers. Rojas and Usher (2012) determined a significant relationship between grit and success in mathematics lessons in their studies on primary and secondary school students.

Lam and Zhou (2019) analyzed the studies that examined the relationship between grit and academic success. They found a positive and significant relationship between grit and academic success in most of the studies. Serin (2021b) also found that students with higher report card grades have higher academic grit than others. It may demonstrate that students who display academic achievement are more determined than others. The literature stated that other factorsmight be instrumental in explaining the relationship between academic grit and educational outcomes (Flanagan & Einarson, 2017; Lee & Sohn, 2017; Tucker-Drob et al., 2016).

It was determined that the academic grit of primary school students varies significantly based on gender. Female students' academic grit levels are higher than male students. It may stem from the fact that the tendency for success is higher for female students. Literature includes studies that obtain similar and different findings. Therefore, it can be stated that gender affects academic grit skills. Studies conducted on the subject show that the academic grit levels of female students are significantly higher than that of male students (Sagkal et al., 2020; Clark & Malecki, 2019; Oriol, Miranda, Oyanedel, & Torres, 2017; Christensen & Knezek, 2014; Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). Similar to the findings obtained from the literature, Rojas and Usher (2012) found in their study on fourth-grade and eighth-grade students that grit is affected by gender in favor of female students.

Similarly, Soysal Işıkçı (2022) found in his study that the academic perseverance of female students is higher than that of males. In studies carried out on postgraduate students by Suhruth and Deb (2017), on Ph.D. students by Cross (2014), and undergraduate students by (Kannangara et al. (2018), it was concluded that female students have higher grit. While Serin (2021b) found in the study of 10-11-12th-grade students and Eryiğit (2022) in her study with third-grade students, and Whipple and Dimitrove-Grajzl (2020) found in their studies that gender has a predicting role in concerning grit, it was determined that this effect was in favor of male students unlike in other studies. Unlike these

findings, in their study on agriculture trainers, Eryiğit (2022), in her study with fourth-grade students, and Rogers, Townsend, and Lindner (2004) determined that the academic grit skills of the agriculture trainers were high and that academic grit did not significantly vary based on gender. Similarly, in studies by Duckworth and Quinn (2009) on students between the ages of 11 and 17, in the study by Gumus (2021) and Gorman (2015) on high school students, in the studies by Rusadi et al. (2021) and Porter (2019) on undergraduate students and in the study by Serin (2021a) on fourth-grade students, it was determined that gender does not affect grit.

It was also seen that the student's academic grit skill scores did not significantly vary based on the mother's educational status. Therefore, it was determined that the mother's educational status did not affectacademic grit skills. As literature is limited in research on academic grit, some examples were given about studies carried out on the variable of academic success concerning academic grit. In studies carried out by Acar (2021) on secondary school students and by Gumus (2021) on high school students, it was seen that academic grit did not vary based on the mother's educational status. Ates (2008) determined that the mother's educational status did not affect the academic success of secondary school students.

Although academic grit scores do not significantly vary based on the mother's educational status according to the results, it can also be stated that as the mother's educational status increases, average academic grit scores also increase. Establishing that the educational status of the mother affects academic success, Guven (2019) found a significant difference between the rate of mothers with lower educational levels who have children with high academic success and mothers with higher educational levels who have children with high academic success. Kotaman (2008) also found a positive, significant relationship between academic success and the mother's educational status. Raty (2006) stated that the mother's educational level differences influence the children's participation in education and academic success. These findings suggest that mothers with a high level of education are more aware in terms of education, and due to this awareness, they guide their children in a way that improves their academic success.

Akkas's (2011) study on eighth-grade students and Yilmaz's (2017) on secondary school students, which differ from the research results, determined that students' academic success varies based on the mother's educational status. Moreover, Ural and Cinar (2014) determined in their studies on seventh-grade students that their academic success significantly varied based on the MES. Finally, Porter (2019) found that the academic grit of undergraduate students significantly varies based on the MES and that academic grit increases in parallel with the MES.

It was determined that the academic grit of primary school students significantly varies based on the FES. The academic grit level of students whose fathers received education at the undergraduate level and above is higher than that of students whose fathers received education at other levels. It may stem from the fact that the father's support for autonomy increases in parallel with the level of educational status. Students who are supported better adapt to school, and accordingly, their level of success increases. Some studies in the literature display similarities with the findings of this study. By determining that the educational status of the father affects academic success, Guven (2019) found a significant difference between the likelihood of a father with a lower education level having a child with higher academic success and the likelihood of a father with a higher education level having a child with higher academic success. Kotaman (2008) also found a positive, significant relationship between the father's educational status and academic success. Raty (2006) determined that father's education level differences affect their children's participation in education and academic success. These findings suggest that fathers with a higher level of education are more aware in terms of education. Due to this awareness, they guide their children in a way that improves their academic success. Porter (2019) also found in a study on undergraduate students that academic grit significantly varied based on the father's educational status and that as the father's level of education increased, so did the child's academic grit. In studies by Akkas (2011) and Karaca (2020) on eighth-grade students and in studies by Karadayi Atalar (2019) on sixth-grade students, it was determined that academic

success significantly varied based on the educational status of the father. On the contrary, in studies by Gumus (2021) on high school students and by Acar (2021) on secondary school students, found that the FES did not affect academic grit.

The academic grit level of students included in the study increases in parallel with their socioeconomic level. It may stem from parents providing more reinforcement or offering a more prosperous learning environment when students' academic grit leads to success or when they come up with more straightforward and quicker solutions for problems. Other studies display similarities with these findings. It was determined that academic success increases in parallel with the family's socioeconomic level, level of income, and social capital for secondary school students (Saglik, 2012), primary and secondary school students (Guven, 2019), all students (Sirin, 2005), primary school students (Symeou, 2008) and fifth-grade students (Aktan, 2012). Contrary to these studies, it was determined by Borton and Grelle (2012) for secondary school students and Porter (2019) for undergraduate students that those with a lower socioeconomic level had higher academic grit. In addition, it was seen in a study carried out with eighth-grade students that there is a relationship between average grades and grit for students with a lower level of income (Guerrero et al., 2016).

Academic grit levels did not vary based on the number of siblings for the students included in the research. Albeit insignificant, the fact that academic grit scores increase as the number of siblings decreases may suggest that they become more involved in decision-making processes within the family. Academic grit level is also expected to increase since they would try to act more individually in the process of coping with their problems. Serin's (2021b) findings suggest a decrease in academic grit level as the number of siblings increases, which shows similarities to the study's findings. Unlike these findings, Gumus (2021) determined in research carried out on high school students that academic success increases as the number of siblings increases. Ekmekyermezoglu (2010) found that academic success significantly varies based on the number of siblings in favor of two siblings.

It was observed that the academic perseverance levels of the students in the study changed in favor of pre-school areas according to their pre-school education status. Pre-school education also increases internal motivation. Moreover, considering that out-of-school activities are implemented more at play age, it can be stated that children who grow up in this environment would improve themselves more and quicker in terms of the scope of grit. There are studies in the literature that show similarities with these findings. Aktan (2012) found that receiving pre-school education affects academic success for fifth-grade students. It was also found by Ergun (2003) for primary school students and by Turkkas, Anasiz, Ekinci, and Anasiz (2018) for eighth-grade students that those who received pre-school education have higher academic success. Hazarika and Viren (2013) stated that pre-school education improves academic performance according to their study on students between the ages of 7 and 18.

Suggestions

In line with the results, primary school teachers can be advised to implement activities (aiming to create environments suitable for improving academic grit) to help students gain academic grit to improve their academic success. Researchers may examine the relationship between primary school students' academic grit levels with various variables (psychological well-being, belief in self-sufficiency, motivation, psychological endurance, and competency in career development). Regression models may be created where variables associated with academic level grit level (predictiveness, intermediacy) can be examined together. In addition, it may be considered to carry out experimental studies that aim to increase the academic grit level in younger ages and design projects that would set an example for teachers or teacher candidates.

Ethics and Conflict of Interest

Before the applications were carried out, the participants were informed about the research's purpose and scope, and it was declared that there was no ethical violation. Therefore, the ethical committee approval was obtained for this research from On Dokuz Mayıs University Scientific Research Ethics Committee with the decision numbered 2020/372 dated June 23, 2020. The authors declared no

potential conflicts of interest with respect to the research, authorship, and/or publication of this article. This study is the extended version of the paper that was orally presented in the 19th International Primary Teacher Education Symposium 12-14 November 2021 (IPTES 2021).

Limitations

The study sample was limited to fourth-grade primary school students studying in Sivas and a sample of 400 people.

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