



Participatory Educational Research (PER)
Vol.10(5), pp. 184-199, September 2023
Available online at <http://www.perjournal.com>
ISSN: 2148-6123
<http://dx.doi.org/10.17275/per.23.81.10.5>

Id: 1303322

A Study on the Predictability of Students' Grit by their Growth Mindset

Süleyman Barbaros YALÇIN*

Necmettin Erbakan Üniv. Faculty of Education, Department of Psychological Counseling and Guidance, Konya, Türkiye, ORCID: 0000-0002-5660-5581

Ercan YILMAZ

Necmettin Erbakan Üniv. Faculty of Education, Department of Educational Science, Konya, Türkiye, ORCID: 0000-0003-4702-1688

Article history

Received:
02.05.2023

Received in revised form:
15.06.2023

Accepted:
02.08.2023

Key words:

Growth mindset, grit, growth mindset theories, high school students

The purpose of this study is to test the growth mindset theories of high school students' grits with explanatory models. The correlational design of the quantitative research approach was used in the current study. This study consists of 35000 students studying secondary education in the city center of Konya, Türkiye. The sample of this study consists of 783 students to whom the scales were applied in the selected schools. The study results highlighted a negative significant relationship between the fixed mindset dimension of Mindset Theories, belief in invariance and procrastination sub-dimension scores of high school students, and the perseverance of effort and consistency of interest scores of their grits. The fixed mindset dimension predicts 12.6% of students' grits' consistency of interest and perseverance of effort, 3.6% of the variability in belief in invariance sub-dimension, and 17.3% of the variability in the procrastination. While the consistency of interest dimension of the students' grits does not have a significant predictor of the growth mindset dimension of mindset theories, it has a significant predictor of the variability in the fixed mindset dimension. The study found that the consistency of interest fixed mindset predicted the variability in the procrastination dimension more. It can be suggested to organize training, activities, and projects for the development of students' grit, and to test grit and mindset theories across cultures by conducting similar studies in different countries.

Introduction

The mindset of individuals is the way of thinking that enables them to strive and struggle in the pursuit of success (Dweck, 1999). The mindset theory is based on the belief that people can improve their abilities and characteristics while realizing and dealing with certain situations. This belief consists of variables such as self-vision, self-evaluation, self-regulation, self-motivation, and success (Dweck, 2006; Haimovitz & Dweck, 2017, Yılmaz & Güven, 2022). These beliefs may suggest to the individual that 'you are good at these subjects; these subjects are not an area that you can achieve'. Such suggestions may prevent

* Correspondency: barbarosyl@gmail.com

individuals from revealing their true potential (Dweck, 2016a). Students' mindset theories can influence their learning and motivation to learn, and even every aspect of their lives (Bernecker & Job, 2019). Because students' mindset theories can control reactions such as giving up, experiencing stress, or panicking in the face of the problems and difficulties they experience. Therefore, these reactions can affect their success (Blackwell et al., 2007; Schmidt et al., 2017; Yeager & Dweck, 2012). The mindset theories of students may be related to their reactions such as giving up and not overcoming difficulties. Because mindset theories are related to coping with difficulties, resisting obstacles, striving, and always doing better (Dweck, 2017; Krakovsky, 2007). Many of these actions are associated with endurance, that is, grit. Grit and endurance are important personality traits of individuals (Calo et al., 2019). Grit is not giving up, struggling, and showing fortitude to achieve and realize a job (Yılmaz and Çapuk, 2022). Grit is the ability of individuals to consistently and voluntarily perform goal-directed behaviors despite difficulties or obstacles in the process of reaching their goal (İşgör et al., 2023). Grit refers to the individual's attitude and personality traits against obstacles. When they encounter obstacles, ambitious students understand their obstacles correctly through introspection, perceive their obstacles as changeable or controllable situations, and believe that they will success, and face obstacles without having bad feelings (Bai et al., 2020).

One of the obstacles in the process of reaching the goals of the students may be the mindset theories they have. In other words, students may perceive their talents and intelligence competencies as obstacles to reaching their goals. Ambitious students may be aware that their talents can be improved, and they may strive to develop these talents. According to studies, the effort required in the process of managing long term goals is related to the growth mindset (Cavanagh et al., 2018; Puente Díaz & Cavazos-Arroyo, 2017; Toney, 2019; Yılmaz, 2022 & Wang et al., 2018). Studies show that whether someone has a fixed or growth mindset contributes to effort, grit, and reaching the goal. Hence, there is a relationship between mindset structures and how an individual can predict goal setting, goal operation, and goal tracking (Zeng et al., 2019). Furthermore, in the experimental study of Mrazek et al. (2018), students' growth mindset theory is related to their grit in school activities.

Based on these, it is aimed to reveal the relations between them by testing the mindset theories of the determination of high school students with models. Within the scope of this main purpose, answers to the following questions will be sought:

- (1) Is there a relationship between high school students' grit and mindset theories?
- (2) Do high school students' consistency of interest and perseverance of effort sub-dimensions predict mindset theories, growth mindset dimension of mindset theories, the belief in invariance, and effort sub-dimensions?
- (3) Do high school students' grit's consistency of interest and perseverance of effort sub-dimensions predict fixed mindset dimension and procrastination and belief in invariance sub-dimensions of mindset theories?

Theoretical Framework

In the theoretical structure dimension of the study, institutional explanations were made regarding the mindset theory and grit variables of the study.

The Mindset Theory

The mindset is the cognitive activities related to the work we perform in the life process and the cognitive frameworks we have when trying to understand an event (French, 2016; Mather et al., 2013). The mindset theory highlights that the mindset is the beliefs individuals have about the simple qualities like intelligence, abilities, and characteristics (Dweck, 2016b, Dweck & Leggett, 1988). According to Dweck and Leggett (1988), two different belief systems create different perceptions of success, motivational orientation, and learning paths for students. These belief systems are the fixed mindset theory and the growth mindset theory.

The growth mindset theory is the belief that individuals develop their intelligence as a feature that can develop (Dweck, 2012; Keenan, 2018; Orosz et al., 2017). The growth mindset theory is a belief that a trait such as intelligence or talent can be grown or developed over time (Yeager & Dweck, 2012). The growth mindset theory is also related with individuals improve intellectual skills (Claro et al., 2016). Intellectual abilities can be verbal or nonverbal mental skills, problem-solving, mental speed, abstract reasoning, or memory (Pfeiffer & Jarosewich, 2003). Students with a growth mindset theory are aware of their learning paths and learn in that way, try to overcome difficulties, and strive to learn (O'Rourke et al., 2014). These students tend to be lifelong learners and are motivated by their personal development. They also believe that their intelligence or personality can change, they do not see failure as a threat, and they continue to learn to succeed (Ng, 2018).

The fixed mindset is the other dimension of mindset theory. The fixed mindset is the belief that qualities such as intelligence or talent are unchangeable (Yeager & Dweck, 2012). People with a fixed mindset deem that the intelligence is an innate trait, and the people have a certain amount. On the contrary, people with a growth mindset believe they can improve their intelligence (Dweck, 2012). Individuals with the fixed mindset theory believe that mental skills, properties, and creativity skills are unchangeable features. These people, who avoid entering new environments that require struggle because they are afraid of mistakes, do something below the capacity (Güven & Yılmaz, 2017). Chiu et al. (1997) concluded that when those with a fixed mindset are asked to identify future behaviors based on certain situations, they perceive subsequent behaviors based on past experiences and cannot see change. In contrast to the growth mindset dimension of mindset theory, individuals with a fixed mindset theory dimension are likelier to escape from a challenging duty and feel desperate in such situations (Burnette et al., 2013).

Grit

Grit is the motivation to use the individual's potential at the highest level for long term goals (Duckworth et al., 2007). Grit is the individual's behavioral, cognitive, and emotional resilience in coping with the difficulties that arise in the work that the individual tries to perform (Sarıçam et al., 2016). Grit is only being resistant to failure and sticking to individual goals with high motivation (Perkins-Gough, 2013). Determined individuals do not give up on their long-term goals, they use various strategies to reach the goal over a long period (Jin & Kim, 2017), and they approach the process of achieving success like a marathoner, and they persistently try to achieve success with effort (Duckworth et al., 2007). The basis of grit is the individual's effort and perseverance.

Determined individuals have intrinsic motivation without losing their interest and desire while trying to accomplish a task. Grit is one of the important determinants of motivation and



academic success in research (Lee & Rhee, 2021; O'Neal et al., 2019). Determined individuals try to do their jobs passionately (Ericcson et al., 1993). Determined individuals know how and how much their potential should be used (Duckworth et al., 2007). Individuals' grit can positively affect their social-emotional development, well-being, self-efficacy, self-regulation, hopefulness, and self-esteem (Belfield et al., 2015; Harms vo., 2018; Kleiman et al., 2013; Rojas et al., 2012; Vela et al., 2015; Wolters & Hussain, 2015).

Grit is a personality trait with a hierarchical structure. These are the perseverance of effort and consistency of interest. Perseverance in striving involves overcoming adversity and obstacles in the process of achieving challenging goals. Perseverance of effort is the individual's constant effort until he completes the work he is trying to accomplish. Consistency of interest is the passionate focus and commitment to this goal in the process of achieving its goals. Consistency of interest consistency is the ability of the individual to maintain his interest until he completes the job he is trying to perform without being affected by external stimuli (Duckworth et al., 2007; Duckworth & Gross, 2014; Duckworth & Quinn, 2009).

Grit is a non-cognitive skill and is important for individuals' educational and professional success (Crede et al., 2017). At the same time, grit is one of the important determinants of students' success (Shechtman et al., 2013). Grit can be understood in five different dimensions for students. These are academic, social relations, health, extracurricular and emotional dimensions. Academic grit helps students meet their academic responsibilities. Grit in social relations is the ability of students to communicate and interact with others to achieve their goals in social relations. Health ambition is having health strength, sticking to an exercise routine, and sleep schedule, or maintaining healthy eating habits. Extracurricular grit is the ability to cope with and continue these actions when faced with obstacles or setbacks in extracurricular activities such as sports, art, or volunteering. Emotional grit is the ability to manage your feelings of fortitude, face your fears, deal with anger, and cope with emotional difficulties (Baruch-Feldman, 2017).

Method

The current study aims to explore the growth mindset predictor of students' grit. The research was carried out with the correlational design of the quantitative research methods. The correlational design is a research design that determines the relationship between variables (Creswell, 2013). While the independent variables of the research are students' grit, the dependent variable is the students' mindset theories.

Universe-Sample

35000 students studying secondary education in Konya constitute the universe of the study. While trying to determine the sample from this universe, the gradual sampling method process was followed. In the first step, the person who should be in the sample was determined. The person to be sampled was determined by the minimum number of people formula (Özdamar, 2003). $n = \frac{N \cdot \sigma^2 \cdot Z\alpha}{(N-1) \cdot d^2}$ while making calculations based on the sampling formula, the number of people in the population (N)= 70975, the standard deviation of the population (σ)=7.35; For $Z\alpha=0.05$, a value of 1.96 was accepted as an acceptable error level (d)=0.5. As a result of the operations carried out with these values, the minimum number of people that should be in the sample was calculated as 423. In the gradual sampling process, the students were divided into 3 strata according to the central district where they studied. The number of schools in which the students are educated according to the strata and the number

of students in the strata are given in Table 1. The ratios of the number of students in the strata within the universe were determined. To ensure the quantitative representation of the students in the strata, the number of students that should be in the sample for each stratum was determined based on the ratio of the number of students in the strata within the universe.

Table 1. Statistical data on the incremental sampling method

City	Number of schools	Number of students in layers	The ratio in the universe (%)	Number of students to be in the minimum sample	Number of students in the sample	Ration in the sample
Karatay	32	14647	22,04	93	175	22,3
Meram	41	16747	25,20	107	203	26
Selçuklu	88	35063	52,76	223	405	51,7
Total	161	66457	100	423	783	100

In the last stage of the sampling process, the schools in each stratum in the universe were assumed to be a cluster. The application in the schools is determined by the random method. The sample of the study consisted of 783 students to whom the scales were applied in the selected schools.

Table 2. Statistical data about the sample group

Gender	Frequency (f)	Percentage (%)
Female	443	56,6
Male	340	43,4
Grade		
9	185	23,63
10	192	24,52
11	202	25,80
12	204	26,05
Total	783	1000

According to Table 2, 56.6% (n=443) of high school students in the research sample are girls and 43.4% (n=340) are boys. When the students in the sample are examined according to their grades, 23.63% (n=185) of them are in the 9th grade, 24.52% (n=192) are in the 10th grade, 25.80% (n=202) of them in the 11th grade and 26.05% (n=204) are in the 12th grade.

Materials

Data Collection Tools

Three data collection tools were used within the scope of the research. These are the “Short Grit Scale”, “Growth Mindset Scale” and “Personal Information Form”.

Short Grit Scale

The Short Grit Scale was developed by Duckworth and Quinn (2009), and Saricam et al. (2016) adapted it into Turkish. The Short Grit Scale consists of two sub-dimensions and eight items. The reliability coefficients of the Short Grit Scale are .83 for the whole scale, .80 for the consistency of interest, and .71 for the perseverance of effort sub-dimension of the scale. In the research sample, the internal consistency coefficients of the scale were examined.



As a result of these examinations, the scale is .85 for the whole, .82 for the consistency of interest, and .73 for the perseverance of effort.

The Growth Mindset Scale

The Growth Mindset Scale developed by Yılmaz (2022) consists of 13 items. The four-factor structure of the scale, which emerged with exploratory factor analysis, was confirmed by confirmatory factor analysis. The reliability coefficients of the Growth Mindset Scale were .72 for procrastination, .80 for the belief in invariance, .70 for effort, .77 for the belief in improvement, .72 for the fixed mindset, and .71 for the growth mindset. The reliability coefficient of the whole scale is .80. (Yılmaz, 2022). As a result of the internal consistency calculations of the scale in the research sample, the internal consistency coefficients were .73 for the procrastination, .81 for the belief in invariance, .72 for the effort, .79 for the belief in improvement, .73 for the fixed mindset, and .72 for the growth mindset. The reliability coefficient of the whole scale was calculated as .81.

Procedure

Data Collection

It was applied face-to-face to the students who wanted to voluntarily answer the questions in the data collection tool. In cases where the students did not understand, had difficulties, or wanted an explanation, explanations were made.

Data Analysis

While the collected data were being prepared for analysis, the extreme values were first examined. According to Tabachnick and Fidell (2007), one-way extreme values of the data can be determined by converting the scores to z scores (2007). For this reason, the Z values of the values in the data set were examined and 11 data whose Z values were outside the range of +3 and -3 were removed from the data set. Normality distribution assumptions of the data set were tested with skewness and kurtosis coefficient.

Table 3. Normality Values of Study Data

Scale	Scale and Sub-Dimensions	Skewness Coefficient	Kurtosis Coefficient
Short Grit Scale and sub-dimensions	Grit	-.047	-.501
	Consistency of interest	-.062	-.286
	Perseverance of effort	-.274	-.615
	Mindset theory	-.233	-.609
Growth Mindset Scale and sub-dimensions	Growth mindset	-.291	-.464
	Fixed mindset	.344	-.360
	Belief in improvement	-.555	-.367
	Effort	-.452	-.148
	Belief in invariance	.339	-.412
	Procrastination	.317	-.234

Normality assumptions, skewness, and kurtosis coefficients of the data set collected in the study were examined (Table 3). The student’s growth mindset, dimensions, and sub-dimensions of this theory, skewness, and kurtosis coefficients of grit and sub-dimensions ranged from -.609 to .344. The data set meets the normal distribution conditions. According to George and Mallery (2016), if the skewness and kurtosis values take values between -2 and +2, the distribution can be accepted as a normal distribution. Since the skewness and kurtosis coefficients of the research data set are between -2 and +2, it is assumed that they meet the



normality conditions. Since the data set collected in the research provided the assumptions of normal distribution, the analyzes were carried out with parametric tests. In the study, the relationship between the independent variable and the dependent variable was tested with the Pearson Product Moment Correlation Coefficient. In the study, the predictor of the dependent variable of the independent variables was tested with multiple regression. Before the regression analyses, the absence of multicollinearity problems among the independent variables was accepted, with the variance inflation factors (VIF) being less than 10 and the tolerance value greater than 0.1, and the Durbin-Watson value between 1.5 and 2.5, indicating autocorrelation, where there was no relationship between error terms. (Kalaycı, 2010). The predictor of the dependent variable of the independent variables was tested with multiple regression. The level of significance in the analysis of data most of the time in educational research is accepted as .05 (Balçı, 2004). For this reason, the level of significance accepted in the study is .05.

Findins

In this section, the findings and discussion of the analyzes carried out within the scope of the aims of the study are given. The relationship between high school students' grits, grit dimensions, and mindset theories and dimensions was tested with the Pearson Product Moment Correlation Coefficient. Findings related to this test are given in Table 4.

Table 4. The relationship between a growth mindset and grit

			Grit	Consistency of interest	Perseverance of effort
			Grit		
Mindset Theories	Mindset theory	r	.449**	.300**	.447**
	Growth mindset	r	.435**	.191**	.535**
	Fixed mindset		-.357**	-.313**	-.278**
	Belief in improvement	r	.337**	.133**	.430**
	Effort	r	.397**	.191**	.472**
	Belief in invariance	r	-.197**	-.157**	-.169**
	Procrastination	r	-.415**	-.378**	-.307**

*p < .05 **p < .01

There is a positive and significant relationship between high school students' mindset theories, growth mindset dimension of mindset theories, belief in improvement and effort sub-dimension scores, and grit scores (p<.05). There is a negative significant relationship between students' fixed mindset dimension, belief in invariance and procrastination sub-dimension scores of mindset theories and their grit scores (p>.05).

High school students' grit and its sub-dimensions (consistency of interest and perseverance of effort) predicted variability in mindset theory dimensions (growth and fixed mindset) and sub-dimensions (belief in improvement, effort, belief in invariance and procrastination) were tested with multiple regression analyzes. In the regression analysis, whether there is a relationship between the independent variables or not, the relationship between the multicollinearity and the error terms was checked by autocorrelation, and there was no multicollinearity and as a result, there was no correlation between the error terms of the independent variables.

Table 5. Regression analysis results in the prediction of the growth mindset dimension of mindset theories of grit’s sub-dimensions

Dependant variable	Independent variable	β	t	F	R ²	VIF	Durbin-Watson
Growth mindset dimension	Fixed	15.082	26.468**	156.766**	.285	1.160	1.662
	Consistency of interest	-.011	-.302				
	Perseverance of effort	.606	16.548**				

*p < .05; **p < .01

The regression model, which was created to determine the predictors of the consistency of interest and perseverance of effort sub-dimensions of the students’ grits in the growth mindset dimension of mindset theories, was found to be statistically significant as a result of the analysis (F=156.766; P<.01). Consistency of interest and perseverance of effort sub-dimensions of high school students’ grits predict 28.5% of the variability of mindset theories in growth mindset dimension. While the perseverance of effort sub-dimension of high school students’ grits was a significant predictor of the growth mindset dimension of mindset theories (p<.01), other sub-dimensions did not have a significant predictor (p>.05).

Table 6. The results of the regression analysis of the sub-dimensions of grit on the prediction of mindset theories’ growth mindset dimension belief in improvement sub-dimension

Dependant variable	Independent variable	β	t	F	R ²	VIF	Durbin-Watson
Growth mindset dimension belief in improvement sub-dimension	Fixed	7.656	19.794**	89.056**	.184	1.160	1.700
	Consistency of interest	-.021	-.893				
	Perseverance of effort	.315	12.694**				

*p < .05; **p < .01

When Table 6 is reviewed, the consistency of interest and perseverance of effort, sub-dimensions of high school students’ grits explain 18.4% of the variability in the belief in improvement sub-dimension of the growth mindset dimension of mindset theories (F=89.056; P<.01). While perseverance of effort sub-dimension of students’ grits explains the variability in belief in improvement sub-dimension of mindset theories’ growth mindset dimension (p<.05), consistency of interest dimension does not have a significant predictor (p>.05).

Table 7. The results of the regression analysis regarding the prediction of the growth mindset dimension and the effort sub-dimension of mindset theories of the sub-dimensions of grit

Dependant variable	Independent variable	β	t	F	R ²	VIF	Durbin-Watson
Effort	Fixed	7.426	22.467**	111.737**	.221	1.160	1.847
	Consistency of interest	.011	.525				
	Perseverance of effort	.290	13.674**				

*p < .05; **p < .01

The multiple regression model was conducted to determine the predictability of the consistency of interest and perseverance of effort sub-dimensions of high school students’



grits in the effort sub-dimension of mindset theories, and it was found to be statistically significant ($F=111.737$; $P<.01$). Consistency of interest and perseverance of effort sub-dimensions of high school students' grits explain 22.1% of the variability in the effort sub-dimension of the growth mindset. When examined in terms of the sub-dimension of the Short Grit scale, the perseverance of effort sub-dimension significantly explains the variability in the growth mindset ($p<.05$). Consistency of interest sub-dimension was not found to be a significant predictor ($p>.05$).

Table 8. The results of regression analysis of the sub-dimensions of grit predicting the fixed mindset dimension

Dependant variable	Independent variable	β	t	F	R^2	VIF	Durbin-Watson
Fixed mindset	Fixed	25.310	29.825**	57.400**	.126	1.160	1.581
	Consistency of interest	-.356	-6.754**				
	Perseverance of effort	-.284	-				
			5.211**				

* $p < .05$; ** $p < .01$

When Table 8 is examined, the consistency of interest and perseverance of effort sub-dimensions of high school students' grits predict 12.6% of the variability in the fixed mindset dimension of mindset theories ($F=57.400$; $p<.01$). The two sub-dimensions of the students' grits significantly explain the fixed mindset dimension ($p<.01$).

Table 9. Regression analysis results regarding the prediction of the fixed mindset dimension of the mindset theories of grit's sub-dimensions and the belief in invariance sub-dimension

Dependant variable	Independent variable	β	t	F	R^2	VIF	Durbin-Watson
Belief in invariance sub-dimension	Fixed	9.792	19.245**	15.807**	.036	1.160	1.622
	Consistency of interest	-.091	-2.885*				
	Perseverance of effort	-	-				
		.111	3.407**				

* $p < .05$; ** $p < .01$

The fixed mindset of the consistency of interest and perseverance of effort sub-dimensions of high school students' grits explains 3.6% of the variability in the belief invariance sub-dimension ($F=15.807$; $p<.01$). Perseverance of effort sub-dimension ($p<.01$) and consistency of interest ($p<.05$) of their grits significantly explain the belief in invariance sub-dimension of mindset theories of the students, respectively.

Table 10. Regression analysis results regarding the prediction of the fixed mindset dimension of the mindset theories of grit's sub-dimensions and the procrastination sub-dimension

Dependent variable	Independent variable	β	t	F	R^2	VIF	Durbin-Watson
Fixed mindset dimension's procrastination sub-dimension	Fixed	15.519	31.845**	82.891**	.173	1.160	1.622
	Consistency of interest	-.265	-8.749**				
	Perseverance of effort	-.173	-				
			5.517**				

* $p < .05$; ** $p < .01$

Consistency of interest and perseverance of effort sub-dimensions of grits explain 17.3% of the variability in the procrastination of mindset theories of high school students ($F=82.891$;



p<.01). The variance in the procrastination of the students’ mindset theories significantly explains the consistency of interest (p<.01) and perseverance of effort (p<.01) sub-dimensions of their grits, respectively.

Table 11. Regression analysis results regarding the prediction of mindset theories of grit’s sub-dimensions

Dependant variable	Independent variable	β	t	F	R ²	VIF	Durbin-Watson
Mindset theories	Fixed		31.772	26.169**	110.218**	.218	1.471
	Consistency of interest	of .345		4.579**		1.160	
	Perseverance of effort	of .890		11.409**		1.160	

*p < .05; **p < .01

The regression model created to determine the predictors of mindset theories of the consistency of interest and perseverance of effort sub-dimensions of the students’ grits was found to be statistically significant as a result of the analysis (F=110.218; P<.01). Consistency of interest and perseverance of effort sub-dimensions of high school students’ grits predict 21.8% of the variance of mindset theories. Perseverance of effort and consistency of interest sub-dimensions of high school students’ grits significantly predict mindset theories (p<.01).

Discussion

The results of the study show that there is a positive and significant relationship between high school students’ mindset theories growth mindset dimension belief in improvement, effort sub-dimension scores, and consistency of interest and perseverance of effort scores of their grits. The consistency of interest and perseverance of effort sub-dimensions of students’ grits predicted 28.5% of the variability in the growth mindset dimension of mindset theories, 18.4% of the variability in the belief in improvement sub-dimension, and 22.1% of the variability in the effort.

When the sub-dimensions of the students’ grits are examined, the perseverance of effort sub-dimension of the grits has a significant predictor, while the consistency of interest dimension does not have a significant explanatory value. The perseverance of effort feature of students is that they strive continuously until they complete the work they are trying to perform (Duckworth & Gross, 2014). The fact that students have grit means they show emotional resilience (Sarçam et al., 2016). Students reaching their goals with a sense of resilience and creating change in some situations in this process may contribute to their development of positive beliefs about development. This belief can positively affect his belief that he can improve his abilities and even his intelligence. The growth mindset can also have need for effort in the change and development procedure. According to Yılmaz (2022), diligent individuals may be willing to do any job, they are not intimidated. They can work to manage something, and they believe that they can be able to change it. The individual’s zeal can overwhelm growth mindset theories. Cavanagh et al. (2018) found a relationship between students’ growth mindset theories and grit. According to Zeng et al. (2019), there is a relationship between the growth mindset theories of individuals and perseverance of effort, contributing to goal achievement, goal setting, goal operation, and goal tracking. Setting goals and persistently trying to achieve them are related to grit, and these results support the study results.

In the results of the research, there is a negative significant relationship between the fixed



mindset dimension of mindset theories, belief in invariance and procrastination sub-dimension scores of high school students, and the consistency of interest and perseverance of effort scores of their grits. The consistency of interest and perseverance of effort sub-dimensions of students' grits predicts 12.6% of the variability in the fixed mindset dimension of mindset theories, 3.6% in the belief in invariance, and 17.3% of the variability in the procrastination. While the consistency of interest dimension of the student grits does not have a significant predictor of the growth mindset dimension, this result of the research is remarkable because it has a significant predictor of the variability in the fixed mindset dimension. The consistency of interest in the grits is the passionate focus and commitment of students to their goals until they complete their work without being affected by external stimuli (Duckworth & Quinn, 2009). In the research, consistency of interest predicts the variability in the procrastination dimension of the fixed mindset more. Procrastination is not acting or acting late (Sekman, 2009). Procrastination arises from the fact that individuals do not want to leave their habits, truths, and value judgments in their lives easily (Schein, 1990). The inability of students to focus on their goals and stay connected may lead them to be in procrastinate. Because procrastination is related to individuals not giving up their old habits and thoughts easily and not accepting that innovations can support them (Çankaya & Demirtaş, 2010: 2). Procrastination with such a structure will be more predictive of students' grits of interest. Procrastination is also the continuous postponement or abandonment of actions, goals, and plans of individuals (Sekman, 2009). Grit's perseverance of effort dimension is associated with continuous effort (Duckworth & Gross, 2014). Students' inability to cope with obstacles in the process of reaching their goals may cause them to lose their motivation, reduce their desire for effort, and delay their goals over time. This may increase the feelings of procrastination.

Negative reactions to change can create resistance (Zaltman & Duncan, 1977). Resistance to change is the behavior towards the continuation of the same situation in case the current situation changes (Timurturkan, 2010). Individuals try to be protected from the effects of change efforts with these behaviors (Smollan, 2011). The change process first starts in the mind and is managed with emotions (Bulut, 2010). Belief in change with such a structure can be influenced by students' grit-related skills such as moving, persisting, and overcoming obstacles. Because the belief in developing students' abilities and intelligence may require action. Student action requires will, perseverance, and perseverance. Features like these are associated with grit. For these reasons, it can be expected that students' grit skills can predict their mindset theories. Koestner et al. (1995) attribute success to a lack of effort rather than a lack of ability. Studies have revealed that students with fixed mindsets often give up easily when faced with difficulties, and therefore their grit is low (Smith & Johnson, 2018). Students with grit work patiently and determinedly to achieve their goals (Duckworth et al., 2007). However, students with fixed mindsets may make less effort to reach their goals and may not learn from their failures and give up (Dweck, 2006). Based on these explanations, an inverse relationship between students' grits and fixed mindsets can be expected. Grit is the urge to achieve goals or solve difficult problems in the face of difficulties and setbacks (Duckworth, 2016). According to Yeager and Dweck (2012), the growth mindset indicates that students can increase their ability to remove obstacles instead of giving up when they encounter an obstacle, and these explanations may support the findings of the study.

There is a positive and significant relationship between the mindset theory scores of high school students and the consistency of interest and perseverance of effort of their grits. Consistency of interest and perseverance of effort sub-dimensions of high school students' grits predict 21,8% of the variance in mindset theories. Grit is the ability to work patiently and



decisively, not to give up, and to resist achieving their goals (Duckworth & Gross, 2019). Grit allows people to improve by learning from their failures when faced with difficulties. In this way, people discover their potential more and feel more successful (Johnson et al., 2018). While developing the Mindset Theory Scale, Yılmaz (2022) used the Short Grit Scale (Sarıçam et al., 2016) for criterion validity. There is a positive relationship between the Mindset Theory Scale scores of the students and their grit scores. Moreover, in some studies, a positive relationship was found between the students' grit scores and their growth mindset scores (Jankay, 2020; Hochanadel & Finamore, 2015; Tang et al., 2019; Tucker-Drob et al., 2016; West et al., 2016), and these results support the study results.

According to the results of the study, the following suggestions for further studies emerged. Since student grits positively predict the growth mindset and the assumption that students' grits can be improved through education (Gamel, 2014; Perez, 2015; Steinbeck, 2018), training, activities and projects can be organized for the development of students' grits.

This study is valid for high school students in Türkiye. A similar study can be conducted on students from different countries and regions, contributing to the generalization of the results.

References

- Bernecker, K., & Job, V. (2019). Mindset Theory. In *Social Psychology in Action* (pp. 179-191). Springer, Cham.
- Baruch-Feldman, C. (2017). *The grit guide for teens: A workbook to help you build perseverance, self-control, and a growth mindset*. New Harbinger Publications.
- Bai, X., Du, X., Niu, H., & Hao, J. (2020). The exploration of the structure of perseverance: Based on the measurement of undergraduates. *Stud. Psychol. Behav.* 18, 638–644. doi: 10.3969/j.issn.1672-0628.2020.05.010
- Belfield, C., Bowden, A. B., Klapp, A., Levin, H., Shand, R. & Zander, S. (2015). The economic value of social and emotional learning. *Journal of Benefit-Cost Analysis*, 6(3), 508-544.
- Blackwell, L., K. Trzesniewski & C. Dweck (2007), "Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention", *Child Development*, 78 (1), 246-263.
- Calo, M., Peiris, C., Chipchase, L., Blackstock, F. & Judd, B. (2019). Grit, resilience and mindset in health students. *The Clinical Teacher*, 16, 317–322.
- Cavanagh, A. J., Chen, X., Bathgate, M., Frederick, J., Hanauer, D. I., & Graham, M. J. (2018). Trust, growth mindset, and student commitment to active learning in a college science course. *CBE—Life Sciences Education*, 17(1), 1–8.
- Crede, M., Tynan, M. C., & Harms, P. D. (2017). Much ado about grit: A meta-analytic synthesis of the grit literature. *Journal of Personality and Social Psychology*, 113(3), 492.
- Çankaya, İ.H., & Demirtaş, Z. (2010). The Relationship Between University Climate and Inertia According To Preservice Teachers' View. *Pamukkale University Journal of Education Faculty*, 28(28), 1-9.
- Duckworth, A. (2016). *Grit: The power of passion and perseverance* (Vol. 234). New York, NY: Scribner.
- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92, 1087–1101. <https://doi.org/10.1037/0022-3514.92.6.1087>

- Duckworth, A. L., & Gross, J. J. (2014). Self-control and grit: Related but separable determinants of success. *Current Directions in Psychological Science*, 23, 319–325. <https://doi.org/10.1177/0963721414541462>
- Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the Short Grit Scale (GRIT-S). *Journal of Personality Assessment*, 91, 166–174.
- Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development*. Philadelphia: Psychology Press.
- Dweck, C. S. (2006). *Aklımı en doğru şekilde kullan*, (Çev.: U. Kaya). Yakamoz Yayıncılık.
- Dweck, C. S. (2012). Mindsets and malleable minds: Implications for giftedness and talent. *Malleable minds: Translating insights from psychology and neuroscience to gifted education*, 7-18.
- Dweck, C. (2016a). What having a “growth mindset” actually means. *Harvard Business Review*, 13, 213-226.
- Dweck, C. S. (2016b). *Mindset: the new psychology of success*. Ballantine Books.
- Dweck, C. (2017). *Mindset-updated edition: Changing the way you think to fulfil your potential*. Hachette UK.
- French, R. P. (2016). The fuzziness of mindsets. *International Journal of Organizational Analysis*, 24(4), 673-691.
- Gamel, M. (2014). *Impact of character development and empowerment program on grit and resilience growth in early and middle adolescents*. Unpublished doctoral dissertation. Kennesaw State University, Georgia.
- George, D., & Mallery, P. (2016). Frequencies. In *IBM SPSS statistics 23 step by step* (pp. 115-125). Routledge.
- Haimovitz, K., & Dweck, C. S. (2017). The origins of children's growth and fixed mindsets: New research and a new proposal. *Child development*, 88(6), 1849-1859.
- Harms, P. D., Brady, L., Wood, D. & Silard, A. (2018). Resilience and well-being. In E. Diener, S. Oishi and L. Tay (Eds.), *Handbook of well-being*. Salt Lake City, UT: DEF Publishers.
- Hochanadel, A., & Finamore, D. (2015). Fixed and growth mindset in education and how grit helps students persist in the face of adversity. *Journal of International Education Research*, 11(1), 47–50
- Jankay, A. (2020). The impact of growth mindset on perseverance in writing. *J. Teach. Action Res*, 7, 60-79.
- Jin, B., Kim, J., (2017). Grit, basic needs satisfaction, and subjective well-being. *J. Individ. Differ*. 38, 29–35.
- Johnson, A., Smith, J., & Brown, K. (2018). The impact of growth mindset on academic achievement. *Educational Psychology Review*, 30(2), 245-257. doi:10.1007/s10648-017-9419-9
- İşgör, İ. Y., Demir, S. ve Gürtepe, A. (2023). The Predictive Effect of Hope and Personality Features on Perseverance in University Students. *International Journal of Turkish Literature Culture Education*, 12(1), 346-361.
- Keenan, M. (2018). *The impact of growth mindset on student self-efficacy*. Master's thesis, Goucher College.
- Kleiman, E. M., Adams, L. M., Kashdan, T. B. and Riskind, J. H. (2013). Gratitude and grit indirectly reduce risk of suicidal ideations by enhancing meaning in life: Evidence for a mediated moderation model. *Journal of Research in Personality*, 47(5), 539-546.
- Krakovsky, M. (2007). The effort effect. *Stanford Magazine*, 36(2), 46-52.
- Koestner, R., Aube, J., Ruttner, J., & Breed, S. (1995). Theories of ability and the pursuit of challenge among adolescents with mild mental retardation. *Journal of Intellectual Disability Research*, 39, 57–65. <https://doi.org/10.1111/j.1365-2788.1995.tb00914.x>.

- Mather, M., Cacioppo, J. T. & Kanwisher, N. (2013). How fMRI can inform cognitive theories. *Perspectives on Psychological Science*, 8(1), 108-113. <https://doi.org/10.1177%2F174569161246903>
- Mrazek, A. J., Ihm, E. D., Molden, D. C., Mrazek, M. D., Zedelius, C. M., & Schooler, J. W. (2018). Expanding minds: Growth mindsets of self-regulation and the influences on effort and perseverance. *Journal of Experimental Social Psychology*, 79, 164–180
- Ng, B. (2018). The neuroscience of growth mindset and intrinsic motivation. *Brain sciences*, 8(2), 20.
- O'Rourke, E., Haimovitz, K., Ballweber, C., Dweck, C., & Popović, Z. (2014). Brain points: A growth mindset incentive structure boosts persistence in an educational game. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 3339-3348).
- Orosz, G., Péter-Szarka, S., Bóthe, B., Tóth-Király, I., & Berger, R. (2017). How not to do a mindset intervention: Learning from a mindset intervention among students with good grades. *Frontiers in Psychology*, 8, 311-322.
- Perez, M. (2015). Obtaining academic success: Nurturing grit in students. *Journal of Interpersonal Relations Intergroup Relations and Identity*, 8(Hiver/Winter), 56-63.
- Perkins-Gough, D. (2013). The significance of grit: A conversation with Angela Lee Duckworth. *Educational Leadership*, 71, 14–20.
- Puente-Díaz, R., & Cavazos-Arroyo, J. (2017). The influence of creative mindsets on achievement goals, enjoyment, creative self-efficacy and performance among business students. *Thinking Skills and Creativity*, 24, 1–11.
- Rojas, J. P., Reser, J. A., Usher, E. L. & Toland, M. D. (2012). Psychometric properties of the Academic Grit Scale. Lexington: University of Kentucky. Retrieved February 05, 2019, from <http://sites.education.uky.edu/motivation/files/2013/08/RojasUsher.pdf>.
- Sarıçam, H., Çelik, İ. ve Oğuz, A. (2016). Turkish Adaptation of the Short Grit Scale (Grit-S): Validity and Reliability Study. *International Journal of Turkish Literature Culture Education*, 5(2), 927-935
- Schein, E. H. (1990). Organizational Culture. *American Psychologist*, 45, 109-119.
- Schmidt, J.A., Shumow, L., Kackar-Cam, H.Z. (2017). Does mindset intervention predict students' daily experience in classrooms: A comparison of seventh and ninth graders trajectories. *Journal of Youth Adolescence*, 46: 582-602. DOI: <https://doi.org/10.1007/s10964-016-0489-z>
- Sekman, M. (2009). Overcoming Personal Inertia, İstanbul, Alfa Basım Yayım.
- Shechtman, N., DeBarger, A.H., Dornisfe, C., Rosier, S., & Yarnall, L. (2013). Promoting grit, tenacity, and perseverance: Critical factors for success in the 21st century. Washington, DC: US Department of Education, Office of Education Technology. Available at: <http://pgbovine.net/OET-Draft-Grit-Report-2-17-13.pdf> (accessed April 2020).
- Smith, J. K., & Johnson, M. J. (2018). Fixed mindset versus growth mindset: Which one do you have? *Journal of Education and Practice*, 9(30), 45-51.
- Smollan, R. K. (2011). The multi-dimensional nature of resistance to change. *Journal of Management & Organization*, 17(6), 828-849.
- Steinbeck, K. M. (2018). The impact of grit and non-cognitive skills on high school special education student success (Order No. 13423045). Available from ProQuest Dissertations & Theses Global. (2158870695). Retrieved from <https://search.proquest.com/docview/2158870695?accountid=25089>.
- Tang, X., Wang, M. T., Guo, J., & Salmela-Aro, K. (2019). Building grit: The longitudinal pathways between mindset, commitment, grit, and academic outcomes. *Journal of Youth and Adolescence*, 48, 850-863.

- Timurturkan, K. (2010). Impact of Organizational Structure on Resistance to Organizational Change: An Application at the Izmir Regional Land Registry and Cadastre. Doktora Thesis. Dokuz Eylül University: İzmir.
- Toney, R. P. (2019). The effect of growth mindset strategies on perseverance and engagement in middle school math classrooms. Unpublished doctoral thesis. Trevecca Nazarene University.
- Tucker-Drob, E. M., Briley, D. A., Engelhardt, L. E., Mann, F. D., & Harden, K. P. (2016). Genetically-mediated associations between measures of childhood character and academic achievement. *Journal of Personality and Social Psychology*, *111*, 790–815.
- Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist*, *47*(4): 302-314. doi: 10.1080/00461520.2012.722805
- Vela, J. C., Lu, M. T. P., Lenz, A. S. and Hinojosa, K. (2015). Positive psychology and familial factors as predictors of Latina/o students' psychological grit. *Hispanic Journal of Behavioral Sciences*, *37*(3), 287-303.
- Yılmaz, E. (2022). Development Of Mindset Theory Scale (Growth And Fixed Mindset): A Validity And Reliability Study (Turkish Version) . *Research on Education and Psychology, Scale Development and Adaptation Studies*, 1-26. DOI: 10.54535/rep.1054235
- Yılmaz E., & Güven, Z.Z. (2022). Investigating Mindsets of University Student Candidates in terms of Some Variables, *Journal of Ahmet Keleşoğlu Education Faculty* *4*(1), 75-94
- Yılmaz, E., & Çapuk, S. (2022). Prediction of the Grit of Vocational High School Students by Their Humanitarian Values, *Kahramanmaraş Sütçü İmam University Journal of Social Science*, *19*(3), 1110-1123. Doi: 10.33437/ksusbd.1035174
- Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist*, *47*(4), 302–314. <https://doi.org/10.1080/00461520.2012.722805>
- Zaltman, G., & Duncan, R. (1977). Strategies for planned change. Wiley.
- Zeng, G., Chen, X., Cheung, H. Y., & Peng, K. (2019). Teachers' growth mindset and work engagement in the Chinese educational context: Well-being and perseverance of effort as mediators. *Frontiers in Psychology*, *10*, 839.
- Wang, S., Dai, J., Li, J., Wang, X., Chen, T., Yang, X., ..., & Gong, Q. (2018). Neuroanatomical correlates of grit: Growth mindset mediates the association between gray matter structure and trait grit in late adolescence. *Human Brain Mapping*, *39*(4), 1688–1699. Doi:10.1002/hbm.23944
- West, M. R., Kraft, M. A., Finn, A. S., Martin, R. E., Duckworth, A. L., Gabrieli, C. F., & Gabrieli, J. D. (2016). Promise and paradox: Measuring students' non-cognitive skills and the impact of schooling. *Educational Evaluation and Policy Analysis*, *38*, 148–170.
- Wolters, C. A., & Hussain, M. (2015). Investigating grit and its relations with college students' self-regulated learning and academic achievement. *Metacognition and Learning*, *10*(3), 293-311.