

Grit as a mediator of the relationship between motivation and academic achievement

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To produce things and to rear them,
To produce, but not to take possession of them,
To act, but not to rely on one's own ability,
To lead them, but not to master them -
This is called profound and secret virtue.

LAO-TZU

Abstract

The main purpose of this study was to examine the relationship between grit, academic motivation, and academic achievement. The second aim of the research is to investigate the mediator role of grit on the relationship between academic motivation and academic achievement. Participants were 334 university students who completed the The Short Grit Scale, the Academic Motivation Scale and the Personal Information Form. The obtained data were analyzed with Pearson Moments Correlation Analysis and Hierarchical Regression Analysis (HRA). In correlation analysis, there are positive relationships between grit, academic motivation, and academic achievement. According to Hierarchical Regression Analysis results, academic achievement was predicted positively by grit and academic motivation; grit is partially mediated the relationship between academic motivation, and academic achievement.

Key words: Grit, motivation, academic achievement

Introduction

The question why people with the same intelligence levels differ in terms of success is a subject which has been researched by educators and psychologists for many years (Duckworth, Peterson, Matthews, & Kelly, 2007). This question has been answered differently by numerous researchers. They have argued that socio-demographic factors such as intelligence (Laidra, Pullmann, & Allik, 2007), emotional intelligence (Parker, Summerfeldt, Hogan, & Majeski, 2004), creativity (Wilson, (1968), self-confidence and motivation (Tavani & Losh, 2003), self-esteem (Joshi & Srivastava, 2009), self-efficacy (Shkullaku, 2009), family, and income (Aremu, 2004; Zellman & Waterman, 1998) were necessary for success. On the other hand, Duckworth and others (2007) emphasized that grit and perseverance were key concepts for success. Perseverance has always existed as one of the primary factors to attain academic achievement when combined with incentive which triggers people to fulfil their objectives in the face of despair and enables people to seize the biggest delights of life (Singh, 2011). Grit has been evaluated as allowing students to succeed in learning willingly and exerting effort to this end. It was acknowledged that success would be obtained as a result of the above-mentioned factors and this was also established in implementations (Carroll, 1963). Grit is as important as intelligence in terms of academic achievement (Duckworth et al., 2007).

Academic Achievement

Academic achievement, which can be defined as reaching the objectives set in terms of education, refers to behavioral changes of the individual except for his/her psychomotor and emotional development (Rivkin, Hanushek, & Kain, 2005). On the other hand, success in school environment is perceived as an indication of the degree to which a student benefits from any lesson (Carter & Good, 1973). Motivation contributes to individuals attaining academic achievement rather than their interest in ideas. Studies conducted in the past show that learning approaches always turn out to be important factors in terms of academic achievements of students (Diseth & Martinsen, 2010). Although academic achievement is closely related to individual characteristics of students, their ethnic characteristics can also affect their academic achievement, even to a very little degree (Borman & Rachuba, 2001).

Academic achievement can individually be affected by a number of variables such as motivation and competence, and positive alterations can occur in their academic achievements as a result of their out-of-class studies and activities. This applies to areas where students have different

capabilities (Nonis & Hudson, 2006). If academic achievement is targeted, the studies aimed at this should be conducted in connection with each other as in-class studies and out-of-class studies.

Academic and social concerns of students have a strong impact on their school success. The social context where learning takes place increases students' social and academic motivations at school in terms of their academic achievement (Wentzel & Wigfield, 1998). Academic achievement requires to be handled as a whole. It is considered inadequate to interpret academic achievement only in terms of success obtained in examinations being held periodically.

It will be seen that academic achievement encompasses a broader definition when academic achievement is addressed together with the concept of academic performance. Only a score obtained from final examination of a lesson remains insufficient to define academic achievement of students. Academic achievement can be revealed through the performance of the student as a result of both in-class and out-of-class activities (Kuncel & Hazlet, 2004).

Motivation

The concept of “motivation” is derived from motive in English and "movere" in Latin and is used to mean moving (Stipek, 1996). “Motivation” is a driving force that causes people to take action, think and behave (Hidi & Harackiewicz, 2000). When the matter is handled from the perspective of academic achievement, it is seen that existence of motivational concerns bears quite a lot of importance in materialization of this state. For example, while some students fulfil their duties despite extreme hardships, some others do not fulfil their responsibilities by using small problems as excuses (Broussard & Garrison, 2004). We can understand the concept of "motivation" more easily by considering it based on typical achievement behaviors such as studying for an exam. Psychologists studying motivation see some matters about human behaviors as factors that drive them to behave in ways that they reckon these matters will provide benefits in explaining motivation (Ames, 1992, Stipek, 1996). These matters are such elements as what the individual does, his/her behavioral choice, the period of time elapsing before starting the activity, how hard he/she studied for the activity, and intensity of the behavior (Dweck, 1986). These are considered as factors that motivate the individual to achieve an activity (Graham & Weiner, 1996).

There are several theories that explain the concept of motivation. In the self-determination theory “motivation” is the internal and external reasons that drive the organism to behave in a certain way, direct the behaviors and ensure their continuity and the mechanisms that affect functionality

of them (Deci, Koestner, & Ryan, 2001; Deci & Ryan, 2008; Saricam, 2015). Three main elements are included in the definition of motivation which is necessity, behavior and persistence. Necessity refers to the inadequacy experienced by the organism; behavior refers to taking action and tending towards persistence in being determined to continue the behavior for a certain period of time to remedy the inadequacy (Arnold, Robertson, & Cooper, 1993). Motivation takes place as a result of stimulation of the organism by motives and directing the behavior to a certain purpose (Furnham, 2002).

Maslow's (1943) and McClelland's (1958) theory of needs stated that motives of people have a hierarchical order and that unless a motive at any level is satisfied, the motives of the next level will not affect the individual (Pardee, 1990). In these theories, the fact that needs of the organism such as hunger and thirst make it tense and ready for movement is referred to as motivation.

Present Study

It is important to obtain and be able to use information in the 21st century, which is the information era. People have to compete with each other in order to attain information and therefore, the number of individuals placing importance on material values raises day by day (Uzunboylu, 2004). One of the most significant indicators of obtaining information is academic achievement. Individuals have to be successful in academic terms in order to get a job, establish a career and obtain things they value. For this reason, the factors that have an impact on academic achievement were studied by many researchers. For example, motivation and academic achievement are related. There is also a relation between determination and academic achievement. However, no study was found that analyses the relation among academic motivation, grit and academic achievement. The main purpose of this study is to analyze the mediator role of grit in the relation between academic motivation and academic achievement. In direction of this aim, the following hypothesis will be tested.

H₁: Grit is positively associated with academic achievement.

H₂: Grit is positively associated with academic motivation.

H₃: Academic motivation is positively associated with academic achievement.

H₄: Grit mediates the link between perceived academic motivation and academic achievement.

Method

Participants

Research was carried out with 334 under-graduate university students attending the Faculty of Education in Ağı Ibrahim Cecen University, and Dumlupınar University in Turkey. The study group was made up through convenient sampling. Ages of the students were between 19 and 25 and average of age was calculated as 21.2. Besides, 41 (12.27%) students are sophomores, 148 (44.31%) students are juniors, and 145 (43.41%) students are seniors. On the other hand 183 (54.79%) participants are women 151 (45.21%) participants are men.

Instruments

The Short Grit Scale (Grit-S): This scale was developed by Duckworth and Quin (2009). This scale has 8 items and two subscales; consistency of interest (four items; e.g. “I often set a goal but later choose to pursue a different one”) and perseverance of effort (four items; e.g. “I am a hard worker”). Each item was rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). It was adapted to Turkish by Sarıcam et al. (2015). The goodness of fit index values of the model were ($\chi^2/df=2.06$, RMSEA= .046, CFI=.95, GFI=.94, AGFI=.93, SRMR=.047). In the concurrent validity significant relationships ($r= .68$) was found between the Motivational Persistence Scale and Short Grit Scale. Cronbach alpha internal consistency coefficient was found as .83 for whole scale, .80 for sub-dimension of consistency of interest, .71 for sub-dimension of perseverance of effort. Test-retest reliability coefficient was .69 for whole scale. Corrected item-total correlations ranged from .33 to .65.

Academic motivation Scale-AMS (Vallerand et al., 1992, 1993): This scale consists of 28 items and seven subscales (Intrinsic motivation to know (IMTK); intrinsic motivation to accomplish (IMTA); intrinsic motivation to experience stimulation (IMES); extrinsic motivation external regulation (EMER); extrinsic motivation introjected regulation (EMIN); extrinsic motivation identified regulation (EMID), and Amotivation). The items are rated on a 7 point scale, ranging from 1 (does not correspond at all) to 7 (corresponds exactly). Each subscale consists of four items; thus, subscale scores can range from four to twenty-eight. A high score on a subscale indicates high endorsement of that particular aspect of academic motivation. It adapted to Turkish by Unal Karagüven (2012). The goodness of fit index values of the model were [$\chi^2(df=329, p=.000)=1017.74, \chi^2/ df=3.094$, CFI =.94, NFI =.91, NNFI =.93, GFI =.84, AGFI =.81, IFI =.94, RMR =.18, SRMR =.65, RMSEA =.73, 90% RMSEA =.068-.079.]. Cronbach’s Alpha of the AMO was .67 compared with .87 for the English version. In the end of the item-total correlation, the correlation values ranged from .22 to .64 for total scores, and from .30 to .73 for subscores.

Except for MS, there were statistically significant and positive correlations, from .79 (p .01) to .27 (p .01) between all subtests.

Procedure

The participants of this research were attending Agri Ibrahim Cecen University and Dumlupınar University. Researchers administered the self-report measures to the students in the classroom environment. Students were volunteer to fill the instruments out. All participants were informed about the aim of the study before completing the measures. Participants completed the instruments in about 25 minutes. Academic achievement was evaluated by students' GPA. To test whether grit mediated and moderated the relation between academic motivation and academic achievement, we followed the recommendations for testing mediation and moderation outlined by Baron and Kenny (1986). Firstly, academic motivation must be associated with academic achievement, and second, with grit. Thirdly, grit must be related to academic achievement. Fourthly, when grit is controlled, there must be a statistically significant reduction in the effect of academic motivation on academic achievement. If the relation is reduced to non significant levels, full mediation is demonstrated. Partial mediation occurs when the correlation between academic motivation and academic achievement is reduced but is still significant. Hierarchical regression analysis was used to test each of these conditions. The analyses were carried out via SPSS Statistics 17.

Results

Correlations between academic motivation, grit, and academic achievement

Table 1

Descriptive Statistics, Cronbach's Alpha Coefficients, and Inter correlations of the Variables

Variables	1	2	3
1. Academic motivation	1		
2. Grit	.64**	1	
3. Academic achievement	.67**	.53**	1
Mean	121.23	25.02	2.90
SD	39.67	5.54	.58
Alpha	.76	.88	

** Correlation is significant at the .01 level (2-tailed).

Table 1 show that there are significant correlations between academic motivation, grit, and academic achievement. Academic motivation ($r=.67$) and grit ($r=.53$) are related positively to academic achievement. Moreover, academic motivation ($r=.64$) was found to be positively associated with grit.

Regression Analysis

Following the steps of the mediation procedure, second, it was verified that grit and academic achievement (dependent variable) were positively related ($\beta= 0.53$, $t= 11.49$, $p < 0.001$). The results are shown in Table 2.

Table 2

The regression results of the relationship between grit and academic achievement

Variables	Unstandardized		Standardized				
	Coefficients		Coefficients				
	B	SE _B	β	t	R	R ²	F
Grit	.056	.005	.53	11.49*	.53	.28	132.14*

* $p < .001$

For the third and fourth steps of the mediation procedure, two stepwise multiple regression analysis was applied to assess which variables were the best predictors of academic achievement. Table 3 showed the results of multiple regression analysis where the independent variables were grit and academic motivation scores; and the dependent variable was academic achievement. Academic motivation was entered to the equation first, accounting for 45% of the variance in predicting academic achievement. Grit was entered in the second step accounting for an additional 1% of the variance. This means that grit and academic motivation explain 46% of the variance in predicting academic achievement. The standardized beta coefficients indicated the relative influence of the variables in the last model with grit. Academic motivation was significantly related to academic achievement, and academic motivation was the strongest predictor of academic achievement.

Table 3

Mediation of grit in relation between academic motivation and academic achievement: hierarchical regression analysis with dependent variable academic achievement

Variables	Unstandardized		Standardized		t	R	R ²	F
	Coefficients		Coefficients					
	B	SE _B	β					
Step1								
Academic motivation	.01	.001	.67	16.39*	.67	.45	268.58*	
Step2								
Academic motivation	.08	.001	.56	10.57*	.68	.46	143.97*	
Grit	.02	.006	.17	3.34*				

*p < .001

The results of the hierarchical regression analysis demonstrated that academic motivation was positively associated with academic achievement ($\beta = .669$, $t = 10.389$, $p = .000$). However, when academic motivation and grit were taken together in the regression analysis, the significance of the relationship between academic motivation and academic achievement ($\beta = .556$, $t = 10.570$, $p = .000$) decreased, yet the relationship between academic motivation and academic achievement was significant. According to Kenny et al. (2003), Shrout and Bolger (2002), this result indicated a partial mediation. Therefore, it can be said that grit partially explains the relationship between academic motivation and academic achievement.

The present model was tested using the Sobel z test. The purpose of this test is to verify whether a mediator carries the influence of an interdependent variable to a dependent variable. The Sobel z test is characterized as being a restrictive test, and as such, assures that the verified results are not derived from collinearity issues (Sobel, 1982). In the current study, the test value verified was $Z = 8.97433849$; $Z_{se} = 0.0005616$; $p = 0.000$.

Discussion

The basic aim of this study was to investigate the relationships between grit, academic motivation, and academic achievement. First, as hypothesized, grit has positively predicted academic achievement. This estimation suggests that higher grit is associated with higher academic achievement. Research conducted in the past demonstrated the necessity of a certain

degree of grit and perseverance for academic achievement or degree (Rogers et al., 2004). The grit and perseverance exhibited by students emerge as the most effective factors in school success despite socio-economic conditions, family culture and pressure exerted on the students by the school and teachers (Pascarella & Terenzini, 1980).

Second, as anticipated, grit was positively related to academic motivation. Some researchers found the relationship between motivational dispositions – particularly approaches to happiness in life – and the individual differences of grit and its facets (Duckworth et al., 2007; Von Culina, Tsukayama, & Duckworth, 2014). Royas et al. (2012) also suggested that grit is correlated to motivation.

Third, as estimated, academic achievement was predicted positively by academic motivation. The results reveal that highly motivated students perform better academically than the students motivated to a lesser extent. This finding confirms Tella (2007) who pointed that successful students have significantly higher motivation for achievement than unsuccessful students. Similarly, the report by Emmanuel et al. (2014) shows that academic achievement is highly correlated with student's motivation. This lends a good support to the present findings.

Finally, grit partially mediated the relationship between academic motivation and academic achievement. Many researchers stressed that “students who have driven, stamina, perseverance and capacity for hard work do not necessarily have aptitude and talent too: Talent and drive are personal attributes that are not necessarily correlated. In many cases, individuals with less raw potential, but greater stamina, perseverance and capacity for hard work are more likely to succeed than those who are talented but have little capacity to set ambitious goals for themselves and to keep focused on achieving them” (Duckworth et al., 2007; Duckworth & Seligman, 2006; Duckworth et al., 2010; Zimmerman & Schunk, 2011). In self-determination theory, motivation types were formed by focusing on the reasons that expedite taking action. So, motivation types were divided into internal motivation, external motivation and amotivation. Internal motivation involves doing something for the reason that it is found interesting or it gives pleasure. On the other hand, external motivation involves doing something for the results to be obtained. Internal motivation is very important for educators as it leads to high quality learning and creativity (Deci-Ryan, 2000: 55). However, impacts of external motivation should not be overlooked since many duties assigned to students by their teachers are neither interesting nor fun.

In the above-mentioned theory, internal motivation was analyzed in three branches. First one is the internal motivation for the purpose of knowing. Internal motivation for knowledge involves an activity conducted for pleasure of learning something new. This type of internal motivation is an important element for efficient learning and gaining great success. The second one is the internal motivation for achievement. This type of internal motivation refers to a situation where a duty is accomplished and new things are learnt. The third and last internal motivation is the internal motivation for stimulation. This internal motivation involves taking an action to experience stimulation or excitement (Deci, Vallerand, Pelletier, & Ryan, 1991; Deci-Ryan, 2000; Vallerand, Pelletier, Blais, Briere, Senecal, & Vallieres, 1992;).

The lines written above clearly explain the significant degree of grit and perseverance in terms of academic achievement. Not only thought but also turning thought into action and a habit afterwards and finally its integration with the individual's character is required for success. It is possible to state the following based on all the information provided: one's academic achievement at school will improve through his/her motivation for, and interest in the lessons and the objectives he/she has set for the future will be fulfilled in a short time with the grit and perseverance exhibited (Renchler, 1992).

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