

How grit mediates the relations between personality and GPA in university students?

Zeynep Aydin Sunbul*, Kocaeli University, Kocaeli Universitesi Egitim Fakultesi Kabaoglu Mahallesi, 41000
Izmit/Kocaeli, Turkey

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Abstract

The study tested the relationships between personality, grit and grade point averages (GPAs) among university students. The sample was 406 undergraduate students (299 females and 107 males) from three universities in Istanbul. The instruments used in the study were Grit-S and the Big-Five Inventory. The data were analysed through a path analysis. The results of the path analysis for the first model exploring the relationship between personality and GPA through the mediating role of grit showed that the model did not seem sufficiently applicable for the data. In the second model, grit and neuroticism were determined as independent variables predicting GPA, whereby it seemed that conscientiousness mediated this relationship. The results for the second model showed that the neuroticism has significantly negative relationship with grit; grit has significantly positive relation to conscientiousness and conscientiousness has a significantly positive relationship with GPA.

Keywords: GPA, academic success, grit, personality, university students.

* ADDRESS FOR CORRESPONDENCE: **Zeynep Aydin Sunbul**, Kocaeli University, Kocaeli Universitesi Egitim Fakultesi Kabaoglu Mahallesi, 41000 Izmit/Kocaeli, Turkey. *E-mail address:* zeynepadn@yahoo.com / Tel.: +90-262-303-2496

1. Introduction

The role of intellectual and cognitive abilities in the academic success and commitment to the college programs have been elaborately displayed in various examinations. Yet, intellectual skills are nowadays viewed as insufficient and tentative predictors for the completion of enrolled programs at university (Bazelis, Lemay & Doleck, 2016). According to Duckworth, Peterson, Matthews and Kelly (2007), personality traits, such as perseverance and grit, can also be used to explain the diversity of academic success among students, as well as their achievements in later life. With this in mind, studies focusing on the precursors of academic achievement have turned their attention to combine various personality types and motivational elements in order to explain these differences in various populations (Bazelis, Lemay & Doleck, 2016).

Grit is one of such personality dimensions and motivational factors that researchers have directed studies into in order to clarify individual diversities in academic success. The findings of studies examining the relations between grit and academic success in specifically college settings, however, seem to demonstrate rather contradictory results vis-a-vis this otherwise logical alliance. For instance, while some of studies disclosed positive relations between grit and academic achievement in college students (Duckworth et al., 2007; Lee & Sohn, 2017; Mason, 2018; Strayhorn, 2013), others point out no association at all (Bazelis, Lemay & Doleck, 2016; Jaeger, Freeman, Whalen & Payne, 2010; Palisoc et al., 2017).

1.1. What is grit?

Grit was typically defined as an ambition and constancy for long term goals. More broadly, grit is functioning hard in the face of adversity and maintaining effort and interest in spite of failures, challenges and stagnation in order to achieve a goal. Gritty individuals accept the success as the product of marathon-like effort and the most favourable characteristics of these individuals involve being able to endure, remain patient and withstand the heat. While many respond to disappointments and challenges by adapting or abandoning their goals, gritty individuals stay on course and go all the lengths despite the obstacles on their paths (Duckworth et al., 2007).

Grit is accepted as a higher order personality feature associated with superior success and performance, psychological resilience and well-being in diverse populations (Duckworth and Quinn, 2009; Duckworth, Quinn & Seligman, 2009; Duckworth et al., 2007). Gritty individuals act determined and are concerned with fulfilling their goals/desires in such important life domains and milestones as marriage, school success, outstanding exam performance, graduation from school and work-related performance (Duckworth, Kirby, Tsukayama, Berstein & Ericsson, 2011; Duckworth et al., 2007; 2009).

The personality literature initially defines grit as a part of the personality dimension of 'responsibility'. The theoretical literature also supports positive relations between grit and the trait 'responsibility' (Duckworth & Quinn, 2009). Although some consider grit as falling under the traits of those with responsibility, others prefer to group it as a form of courage (Maddi, Matthews, Kelly, Villarreal & White, 2012). One can see clear links to the latter as, courage being the ability forego fear in order to realise an action, grit similarly involves the courage to fulfil a duty with determination in spite of the fear of failure. Along with such courage, gritty individuals progress decidedly and make distinct efforts to commit to their life goals (Maddi et al., 2012, p. 21).

1.2. Grit and Big-Five personality traits

The Big-Five personality trait model demonstrates an extensive personality framework. The model consists of five broad categories of personality dimensions that include specific and constricted traits. Costa and McCrae (1992) disclosed one of the recognised frameworks to operationally define the five dimensions of personality specified in Big-Five model. Based on this framework, neuroticism accounts for challenges in adaptation and emotional stability. Neurotic individuals may suffer from such negative feelings as anxiety, depression, fragility, hatred and impulsivity. On the other hand, the

extraversion dimension discriminates between individuals who are assertive, active, talkative, enthusiastic, social, dominant and energetic and those who are not (Costa and McCrae, 1992).

Openness to experience dimension of the Big-Five model refers to the individuals' tendency to curiously cultivate novel ideas and experiences. Those who are characterised as open to new experiences are considered curious, creative, unconventional, passionate and innovative (McCrae, 1987). Another personality dimension cultivated in the model is agreeableness, which is associated with individuals' interpersonal tendencies. This personality factor is accompanied with the sub-traits of trustiness, forgiveness, selflessness, helpfulness and foolishness. Finally, the conscientiousness personality factor of the model refers to organisation, perseverance, diligence and motivation of individuals to fulfil their goals (Costa and McCrae, 1992).

Studies that have associated grit to the personality dimensions specified in the Big-Five model indicate both similar and also somehow divergent results. In one such study, Duckworth et al. (2007) found that grit has robust correlations with conscientiousness ($r = 0.77, p < 0.001$) followed by neuroticism ($r = -0.38, p < 0.001$), agreeableness ($r = 0.24, p < 0.001$), extraversion ($r = 0.22, p < 0.001$) and openness to experience ($r = 0.14, p < 0.001$). In another study, Lin and Chang (2017) explored the connections of personality dimensions to grit among high school students. Similarly, the results of the latter study also showed that conscientiousness is the superior predictor of grit ($\beta = 0.44, p < 0.001$) followed by neuroticism ($\beta = -.17, p < 0.001$), openness to experience ($\beta = 0.13, p < 0.001$) and agreeableness ($\beta = 0.11, p < 0.001$). Furthermore, extraversion has been found to have no predictive effects on grit as a result of these studies.

In spite of the fact that studies on personality, grit and its relations to cognitive processes, such as academic success, have increased over the last decade, there is still a long way to go in order to anatomise the personality constructs along with its relations with such dimensions in various populations. Motivated by this premise, the purpose this study has been to examine the mediating role of grit for the relation between Big-Five Factor Model of personality dimensions, namely, extraversion, conscientiousness, neuroticism, openness to experience and agreeableness and GPA in college students.

2. Method

2.1. Participants

The sample group of the study was 406 undergraduate students (299 females and 107 males) attending various departments of three universities in Istanbul—one a private university and the other two public. The departmental distribution of the participants was as follows: psychological counselling and guidance (33.5%), psychology (23.4%), architecture (18.5%), science education (6.7%), political science (4.4%), pre-school education (3.9%) and other departments, such as mathematics, English language teaching, international relations and special education (9.6%). The mean age of participants was 20.33 (SD = 1.76). In order to achieve the highest level of participants, the convenient sampling steps were followed up (Fraenkel, Wallen & Hyun, 2011).

2.2. Instruments

2.2.1. Grit-S

Grit-S (Duckworth and Quinn, 2009) is a eight-item measurement tool of grit along with consistency of interest and perseverance of effort. The internal consistency indicator showed Cronbach alpha values of 0.70 for the perseverance of effort sub-scale, 0.77 for consistency of interest sub-scale and 0.82 for the whole scale. The Turkish adaptation of the scale conducted by Saricam, Celik and Oguz (2016) confirmed the two-factor structure of the instrument ($\chi^2/SD = 2.06, p = 0.00011$, root-mean-square error of approximation (RMSEA) = 0.046, comparative fit index (CFI) = 0.95, GFI = 0.94, AGFI = 0.93, SRMR = 0.047). Furthermore, the Cronbach alpha values for the adapted version of the

scale came to 0.80 for the consistency of interest sub-scale, 0.71 for the perseverance of effort sub-scale and 0.83 for the whole scale.

2.2.2. The Big Five inventory

The Big Five inventory (Benet-Martinez & John, 1998) is a 44-item instrument measuring five major personality dimensions. The five-point Likert type scale measures personality through the sub-dimensions of neuroticism, extraversion, openness, agreeableness and conscientiousness. The Cronbach alpha value for the scale was calculated as 0.83 in the original development phase. The Turkish adaptation of the inventory yielded that the internal consistency indicator Cronbach alpha value ranges between 0.64 and -0.77 for the sub-scales (Sumer and Sumer, 2005).

2.3. Data analysis

In order to complete the data collection process, raw data were looked at and refined and adjusted for false entries, missing data and outlier cases. These procedures were tracked by the SPSS 20 (Statistical Package for Social Sciences). Then, AMOS 18 (Analysis of Moment Structures) software was run in order to examine the model fit indicators and standardised path values of the proposed model of the study.

2.4. Procedure

When ethical permission was received from the Human Subjects Ethics Committee, the researcher contacted the related administrative and academic staff of three different universities located in Istanbul. The aim of the study as well as the steps that would be followed during the data collection were explained to the staff. The availability of the departments and times were determined by personally contacting to academic staff, who gently allowed the researcher to collect data during their class hours. All of the administrations of the measurement package along with a voluntary participation form were conducted by the researcher. In average, it took 10–15 minutes for participants to fill out the scales.

3. Results

3.1. Descriptive statistics

At the first step of the data analysis, the Pearson product-moment correlation was run in order to investigate the inter-correlations between the variables of the study. The correlation coefficient values are presented in Table 1. As demonstrated in Table 1, there appear significantly positive relations between the dependent variable, general point average (GPA), and the personality traits of conscientiousness ($r = 0.26, p < 0.001$), openness ($r = -0.12, p < 0.05$) and grit ($r = 0.16, p < 0.01$). Plus, the mediator variable of grit has significantly positive relationships with other personality traits of extraversion ($r = 0.34, p < 0.001$), conscientiousness ($r = 0.68, p < 0.001$), agreeableness ($r = 0.31, p < 0.001$), openness ($r = 0.17, p < 0.001$) and a significantly negative relationship with neuroticism ($r = -0.32, p < 0.001$).

Table 1. Inter-correlations between variables

Variable	1	2	3	4	5	6	7
1. Extraversion	-						
2. Conscientiousness	0.35***	-					
3. Agreeableness	0.25***	0.35***	-				
4. Neuroticism	-0.31***	-0.25***	-0.34***	-			
5. Openness	0.34***	0.14**	0.06	-0.16**	-		
6. Grit	0.34***	0.68***	0.31***	-0.32***	0.17***	-	
7. GPA	-0.05	0.26***	0.08	-0.01	-0.12*	0.16**	-

$N = 406$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (2-tailed).

3.2. Path analysis for the proposed model

A path analysis was conducted so as to test the relations of personality dimensions with GPAs through the mediating role of grit. The Maximum Likelihood Estimation was utilised to conduct a path analysis for the proposed model (Kline, 2011).

In order to examine the goodness of fit indicators of the proposed model, the chi-square value (χ^2), normed chi-square index (χ^2/df), CFI, Tucker–Lewis index (TLI) and RMSEA were selected as the criteria indexes. The goodness of fit values appeared for the proposed model is given in Table 2.

Table 2. Model fit indices for the proposed model and acceptable ranges

Goodness of fit indexes	Model fit indices of the proposed model	Criterion ranges
χ^2 , df	34.15; 5	Non-significant
χ^2/df	6.83	$\chi^2/df < 3$
CFI	0.95	CFI \geq 0.90
TLI	0.78	TLI \geq 0.90
RMSEA	0.12	RMSEA $<$ 0.05

According to the data shown in Table 2, the chi-square indicator was significant $\chi^2(5) = 6.83$, $p = 0.00$ not meeting the requirement of being non-significant (Schumacker & Lomax, 2004). Furthermore, the normed chi-square value was 6.83 exceeding the criterion value of three (Kline, 2011). Given the comparative fit index CFI and TLI are expected to come to above 0.90 (Bentler, 1990), it can be said that the CFI value of 0.95 satisfies this requirement, while the TLI value of 0.78 does not meet this criterion. Finally, the RMSEA value came out as 0.12—which was also not in the expected range lower than five (Browne & Cudeck, 1993).

Based on the model fit indicators which emerged in the proposed model, it can be claimed that most of the indices do not support the fit of the model to the data. In addition, examination of standardised estimates for the model yielded that as well as the significant paths, there are also non-significant relations between some of the variables in the model (See Figure 1).

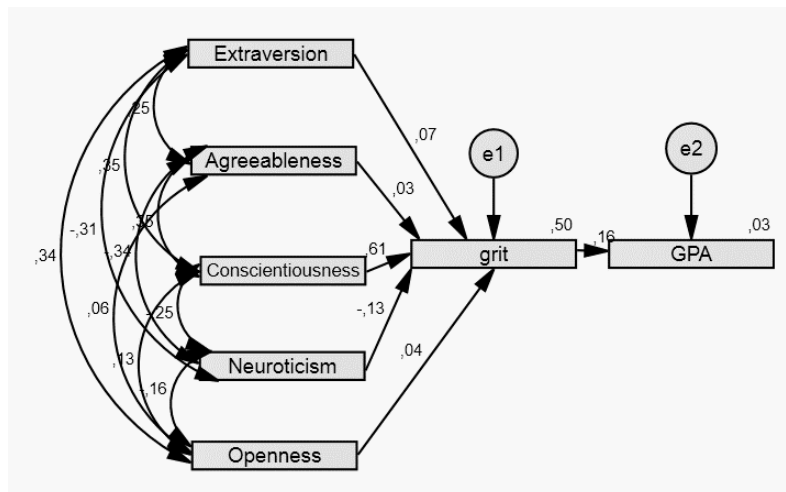


Figure 1. Standardised path coefficients for the proposed model

3.3. Path analysis for the adjusted model

Due to poor model fit values and non-significant relations between study variables, a number of adjustments were made to improve the model fit values as well as the utility of the proposed model. One such adjustment made in the second path analysis was to exclude the non-significant paths in the

proposed model as well as adding a direct path between conscientiousness and GPA as emerged through the modification indices in the first path analysis. The goodness of fit values appeared for the adjusted model is presented in Table 3.

Table 3. Model fit indices for the adjusted model and acceptable ranges

Goodness of fit indexes	Model fit indices of the proposed model	Criterion ranges
χ^2 , df	1.89; 3	Non-significant
χ^2/df	0.633	$\chi^2/df < 3$
CFI	1.00	CFI \geq 0.90
TLI	1.00	TLI \geq 0.90
RMSEA	0.00	RMSEA $<$ 0.05

As shown in Table 3, the chi-square value that is non-significant $\chi^2 (3) = 0.63$, $p = 0.59$ and the normed chi-square value of 0.63 both satisfy the requirements for these criteria (Kline, 2011; Schumacker & Lomax, 2004). The comparative fit index CFI and TLI that should be above 0.90 (Bentler, 1990) were found 1.00 also meeting the requirement for these assumptions. Similarly, the RMSEA value emerged as 0.00, falling below the cut-off point of 0.05 (Browne & Cudeck, 1993) and indicating a perfect fit for the model.

At the next step, standardised path coefficients were determined and these values are presented in Figure 2.

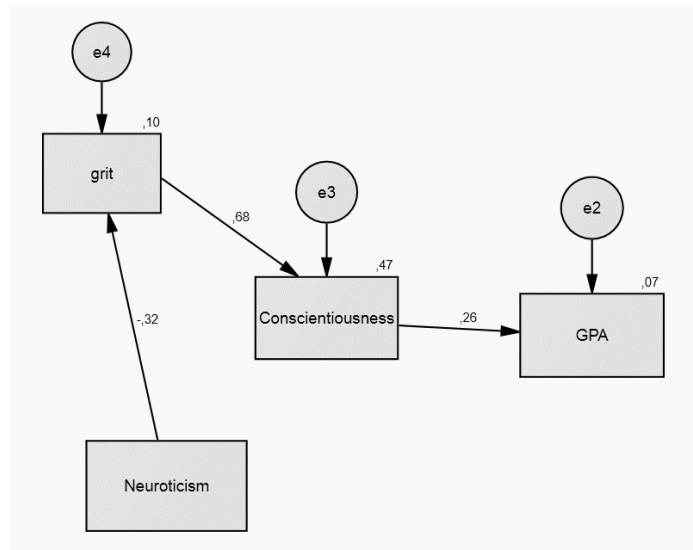


Figure 2. Standardised path coefficients for the adjusted model

As shown in Figure 2, the standardised path coefficients range between -0.32 and 0.68 for the adjusted model. Based on the effect size index of standardised coefficients (β) (Kline, 2011), it can be shown comfortably that conscientiousness has a medium direct relationship with GPA ($\beta = 0.26$, $p < 0.001$) and similarly neuroticism has a medium direct relationship with grit ($\beta = -0.32$, $p < 0.001$). Furthermore, grit was found to have a large direct relationship with conscientiousness ($\beta = 0.68$, $p < 0.001$) in the adjusted model. The squared multiple correlation coefficient (R^2) values arose in the adjusted model showed that the second model explains 7% of the variance in GPA, 10% of the variance in grit and 47% of the variance in conscientiousness scores.

4. Discussion

The objective of this study was to expand upon the links between the personality dimensions of extraversion, agreeableness, openness, conscientiousness, neuroticism, grit and the GPAs of college students. A path analysis was utilised to find out the relationship of personality to GPA through the mediating role of grit. The model fit indices showed that there were non-significant paths (agreeableness to grit, extraversion to grit and openness to experience to grit) that indicate some adjustments for the model. In the second model, the model fit values model demonstrated that all of the indices properly fit the data. Furthermore, the results showed that the standardised coefficients in the second model are all statistically significant.

The adjusted model indicated that neuroticism has significantly negative connection to grit. A neurotic personality refers to the difficulty's individuals experience in adaptation and stabilisation of their emotions. Individuals displaying such tendencies may have such unfavourable emotions as depression, anxiety, vulnerability and similar (Costa and McCrae, 1992). On the other hand, grit requires individuals to keep going and not giving up against obstacles and failure (Duckworth et al., 2007). Thus, it can be reasoned that the neurotic aspect of an individual's personality impairs their effort and persistence in reaching their goals when facing with challenges. In addition, the relation between neuroticism and grit is also supported by other studies uncovering the associations between these personality traits (Duckworth et al., 2007; Lin and Chang, 2017).

Another of the study findings noted positively significant relations between grit and conscientiousness. Conscientiousness is defined as steadiness, perseverance and incentive to attain the goals (Costa and McCrae, 1992). Likewise, gritty individuals work hard and maintain diligence and concern to fulfil their objectives in the life (Duckworth et al., 2007). Thus, the high correlation between these two traits ought not be considered too surprising given their similar descriptive nature, and, likewise, similar studies point out robust associations between grit and conscientiousness (Duckworth et al., 2007; Lin and Chang, 2017).

Given another direct path in the adjusted model, conscientiousness was found to have positively significant relationship with GPAs. As expected, conscientious individuals act decisively and are motivated to reach their goals, and this accounts for their ability to maintain a good GPA as a means of succeeding academically. A number of other studies indicate a significant link between conscientiousness and GPAs at university level (Cheng and Ickes, 2009; Nofle and Robins, 2007; Wagerman and Funder, 2007). Contrary to conscientiousness, grit was found to have no direct relationship with GPA, rather grit emerged to predict GPA through the mediating influence of conscientiousness. Likewise, the study found that neuroticism also has indirect relationship with GPA only through the mediating role of conscientiousness.

The study has a number of limitations in addition to its strengths. First of all, the sample of this study was selected through convenience sampling to allow researchers reach the most accessible participants available. However, randomisation and a strong method of sample selection may reveal more varied and objective results than this study. As well as the objectivity of the results, lack of randomisation may put into question the generalisability of the study. Moreover, in spite of the sufficient number of participants included in this study (406), larger samples with diverse groups would also indicate more representative results for such studies.

Recommendations

The study comes by a number of implications to be drawn for other studies and practitioners. One of the starting points of grit and other personality researchers in the field of academic achievement and commitment was to show that personality and motivational factors are as effective precursors of academic success as cognitive abilities. This study marks one such effort to uncover the personality factors that predict academic achievement in college populations. However, in spite of the notably

significant associations which emerged for the variables of this study, it should be noted that the adjusted model of the study only explains 7% of the variance in GPA scores. Thus, it can be advocated that other studies on the role of personality, motivation and perseverance in predicting academic achievement may also enhance their personality repertoire, explore the effects of socio-demographic characteristics as well as add motivational variables in anticipating academic success of college students.

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