ONLINE DOCTORAL STUDENT GRADE POINT AVERAGE, CONSCIENTIOUSNESS, AND GRIT: A MODERATION ANALYSIS

Michael James Walsh, University of Illinois Urbana-Champaign

ABSTRACT

This study examined the relationship between grit, conscientiousness, and online doctoral grade point average. Self-reported grit scores were calculated using the Grit-S scale and conscientiousness scores were calculated using the Big Five Inventory. Grade point average was self-reported; however, it was also verified by a screen shot of the student system of record. Multiple regressions were then used to determine the predictability of grade point average using grit and conscientiousness. Participants include 478 online doctoral students in their doctoral course of study from a university in the Southwestern United States. Regression modelling found that grit did not statistically significantly predict grade point average ($F(1, 477) = 2.25$, $p = .135$) and conscientiousness did not moderate the effect of grit on grade point average ($F(1, 474) = .206$, $p = .650$); however, there was a statistically significant positive linear relationship ($B = 0.089$, $SE = 0.029$) between conscientiousness and grade point average ($p < .05$). These findings add to the growing body of research regarding success factors for online doctoral programs and suggest that, despite the opinions in the popular press, grit does not add incremental value beyond other personality traits. Before educators and administrators make lasting changes to curriculum, further research should be completed.

Keywords: Grit, conscientiousness, doctoral education, online education, online, moderator

INTRODUCTION

The advent and continuation of online learning have provided a learning avenue that is more easily accessible to remote students (Archbald, 2011; Mills, 2015). This ease of access has raised questions about the profiles of successful students whose primary method of instruction is online (Gomez, 2013) and the alignment between student expectations and the reality of completing a terminal degree in their chosen field (Harrison, Gemmell, & Reed, 2014). Preliminary research suggests that success in online programs may partially rely on student personality traits (Cross, 2014), specifically, grit and conscientiousness.

Grit, defined by Duckworth, Peterson, Matthews, and Kelly (2007) as the "perseverance and passion for long-term goals," (p. 1087) has been the topic of many studies since 2007. A person who is conscientiousness, as defined by John and Srivastava (1999), is someone who "perseveres until the task is finished" (p. 115), and conscientiousness has also been studied in the academic field. Although academic researchers have studied both traits independently, grit and conscientiousness have not yet been studied together in the online doctoral environment. The purpose of this study is to determine if grit predicts student success, as measured by grade point average (GPA), and whether conscientiousness moderated the relationship between grit and GPA.

This study builds on the work of Duckworth et al. (2007) by refuting the claim that grit is a higher-level personality trait that is separate from conscientiousness. From a practical perspective, the findings from this study can add to the growing body of knowledge on the nature of success in education that reflect on online learning modalities. Finally, earlier academic researchers have called for further investigation into these personality traits that may lead to a higher likelihood of success in online doctoral education (Credè, Tynan, & Harms, 2016; Cross, 2014).

LITERATURE REVIEW

Although research on the effect of personality in an academic setting identifies conscientiousness as the greatest predictor of success as measured by grade point average (Stajkovic, Bandura, Locke, Lee, & Sergent, 2018), the body of work on success in the online doctoral setting points to broader factors that researchers need to explore in more detail. According to Golde (2000), "Paradoxically, the most academically capable, most academically successful, most stringently evaluated, and most carefully selected students in the entire higher education system—doctoral students—are the least likely to complete their chosen academic goals" (p. 199). Academic institutions have tried to support and retain doctoral students (Martinez, Ordu, Della Sala, & McFarlane, 2013), but attrition of these students nationwide remains high (Jairam & Kahl, 2012), especially in the online environment (Cross, 2014).

Predicting the outcomes of achievement has long been a research focus dating to as early as 1892 (Duckworth et al., 2007). Several studies have highlighted the influence of personality traits in student outcomes and have found that certain personality traits can have a positive impact on outcomes (Gray & Mannahan, 2017; Köseoglu, 2016; Nakayama, Mutsuura, & Yamamoto, 2014). Much of this research has focused on the Big Five Personality traits of Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Due to interest in the Big Five personality traits, researchers have been keen to separate which of these traits really make a difference in student outcomes. Many studies on academic achievement have zeroed in on conscientiousness as the greatest predictor of academic success and grade point average (McAbee & Oswald, 2013; Rimfeld, Kovas, Dale, & Plomin, 2016; Vedel, 2014).

For several years, undergraduate students have been the focus of personality studies using the Five Factor Model (FFM). Allport and Odbert (1936) developed the first iteration of this model. Although this model has been clarified since then, its structure remains one of the most common in personality research (Ryckman, 2013). Morris and Fritz (2015) found that higher conscientiousness levels paired with lower procrastination levels and predicted academic coursework grades better than performance in examinations. In a study of conscientiousness across three universities, Stajkovic et al. (2018) found that conscientiousness was the best predictor of academic performance, and other studies have shown that conscientiousness is predictive of academic achievement (Camps & Morales-Vives, 2013; Huang & Bramble, 2016).

Some scholars believe that personality traits are more important than IQ for predicting academic success (Duckworth, 2016), and other studies have shown the effect of conscientiousness when combined with other traits. Some researchers have accounted for the joint effect of conscientiousness and intelligence (Dumfart & Neubauer, 2016; Murray, Johnson, McGue, & Iacono, 2014) while others have found that industriousness, a lower-order trait of conscientiousness, successfully predicted undergraduate GPA (Rikoon et al., 2016).

Notwithstanding the ongoing debate about which personality traits are best for predicting academic successes, many researchers continue to support the use of some type of personality scale to predict success. For example, Schripsema, van Trigt, van der Wal, & Cohen-Schotanus (2016) stated that selecting students for medical school based on personality traits could be a beneficial practice and that personality traits are predictive of success in medical school.

Following Duckworth et al.'s (2007) seminal research, several researchers have conducted studies on the influence of grit on academic success. Across these studies, grit has shown to be a good predictor of success in nursing education (Thomas & Revell, 2016), high school (Duckworth et al., 2007; Tovar-García, 2017), and undergraduate education (Beyhan, 2016).

Although many studies show the positive effects of higher grit scores on academic achievements,

others show the opposite. Some have shown grit to have little or no effect on actual academic outcomes, and Credè et al.'s (2016) meta-analysis showed the same across multiple studies. These studies vary in breadth and scope; however, the mere existence of such a strong counter argument to the notion that gritty students perform better should be a caution to educators and policy makers alike.

Duckworth (2016) stated that the Grit Scale is not meant to measure short-term goals. Understanding this nuance and appropriately applying the Grit Scale is critical to grit research; however, psychologists have shown that, even when measuring long-term achievement, grit may not be as predictive as originally thought. For example, in a study of law school students, the total grit score did not significantly relate to final law school GPA, nor did the overall grit score relate to undergraduate GPA (Zimmerman & Brogan, 2015). In some cases, grit is positively correlated to higher academic achievement prior to graduate school, and after controlling for this earlier success, the effects of grit are minimized or nonexistent (Bazelais, Lemay, & Doleck, 2016; Wolters & Hussain, 2015).

Doctoral and Online Student Success, Persistence, and Grade Point Average

The definition of academic success in a doctoral program should be discussed. Completion of the doctoral degree is the goal of doctoral students, yet it remains one that is out of reach for many students. Some estimates put traditional doctoral attrition rates as high as 70% (Gardner & Gopaul, 2012; Lovitts, 2001; Regis, 2018; Spaulding & Rockinson-Szapkiw, 2012) and the online attrition up to 50% higher (Szapkiw, 2011). The reasons for the considerable number of students who do not complete their degrees is complex and multifaceted (Ames, Berman, & Casteel, 2018; Stallone, 2004). Although not the only predictor of success, researchers have also found a positive relationship between grade point average and completion of a doctoral degree (de Valero, 2001; Hagedorn, 1999; Malone, Nelson, & Van Nelson, 2004; Regis, 2018). Hackman, Wiggins, and Bass (1970) found that end-of-year GPA was positively related to a global assessment of success six years after enrolling in a psychology doctoral program. Ampaw and Jaeger (2012) found that students who are below the average in terms of academic ability and grade point average have difficulty completing the transitional stage from classroom work to the dissertation phase of the program.

Because this study adds to the body of knowledge not only about success factors of traditional doctoral students, but those in an online environment, factors that lead to persistence in an online environment have also been considered. Like doctoral degree completion, student persistence in an online environment is a complex issue (Ames, Berman, & Casteel, 2018). Although certainly not the only factor that leads to persistence in the online environment, several studies have shown that grade point average is related to a greater probability of persisting. (Harrell & Bower, 2011; Morris, Finnegan, & Wu, 2005; Muse, 2003). As an example, Lee and Choi (2011) found that grade point average had a significantly negative relationship with dropout rates of online students.

Purpose of the Study

Researchers have long desired to determine the personal antecedents of a successful academic career and differentiate what makes some students successful while others fail. However, limited research exists that describes doctoral student success, and even less research exists on online doctoral student success factors (Pyhältö, Vekkaila, & Keskinen, 2015; Snowden, 2014). Several studies have shown that traditional doctoral success can be predicted by personality traits, and colleges have turned to noncognitive measures to predict student success (Hoover, 2013). However, there is a gap in the literature on online doctoral students (Khanam, Quraishi, & Nazir, 2016; Sutton, 2014). Researchers have not yet studied grit, conscientiousness, and grade point average in an online setting to explain the relationship between these traits and student success.

The purpose of this study is to examine the relationship between student personality traits and online doctoral success. For this study, the predictor variables were grit, defined by Duckworth et al. (2007) as the perseverance and passion for long-term goals, and conscientiousness, defined by John and Srivastava (1999) as persevering until the task is finished. The criterion variable was online doctoral student GPA. The following research questions were developed to guide the inquiry:

RQ1: To what extent does grit predict online doctoral GPA?

RQ2: To what extent does conscientiousness moderate the relationship between grit and the GPA of online doctoral students?

METHODS AND MATERIALS

Participants

The sample consisted of 478 online doctoral students from a university in the Southwestern United States. To collect data for this study, a university administrator sent an electronic message to 5,900 potential participants. Of those, 1,004 clicked on the link that took them to the survey instrument. Of those who entered the survey, 526 did not complete the entire survey needed for calculation of grit or conscientiousness scores or failed to enter a GPA or upload a screen shot of their GPA. Removing this population resulted in a total sample size of 478 participants for this study. Using G*Power analysis software (Faul, Erdfelder, Buchner, & Lang, 2009), it was decided that the study sample size necessary for a power of 0.8 and effect size of 0.3 was 55 nontraditional doctoral students.

Of the 478 participants, 324 (67.8%) were female, 153 (32%) were male, and 1 (.2%) was transgender male. The age of the participants ranged from 24 to 74 years old, including 87 (18.2%) participants age 24–35, 157 (32.8%) age 36–45, 150 (31.4%) age 46–55, 75 (15.7%) age 56–65, and 9 (1.9%) age 65 and above. Most participants, 287 (60%), reported being White, 115 (24.1%) Black/African American, 42 (8.8%) Hispanic/Latino, 21 (4.4%) Other, 10 (2.1%) Asian, 2 (0.4%) American Indian/Alaska Native, and 1 (0.2%) Native Hawaiian or other Pacific Islander. The tenure in the doctoral program ranged from first-year to fifth-year students and beyond with 94 (19.7%) of participants in the first year of study, 106 (22.2%) in the second year of study, 128 (26.8%) in the third year of study, 85 (17.8%) in the fourth year of study, and 65 (13.6%) in the fifth year of study or beyond. These data are represented in Table 1 below.

Instrumentation

2.2.1 Grit-S. The Grit-S is a self-report measure that collects data on an individual level and measures grit through eight questions with Likert-type scales (see Appendix A). The Grit-S measures grit across Effort and Interest, the same two-factor structure as the original Grit-O. Confirmatory factor analysis confirmed that the new, shorter scale effectively and efficiently measures grit ($\alpha = .77$). The Grit-S has been used in earlier quantitative studies to measure the effectiveness of grit on various outcomes (Ali & Rahman, 2012; Burkhart, Tholey, Guinto, Yeo, & Chojnacki, 2014; Credè et al., 2016; Cross, 2014; Ivcevic & Brackett, 2014).

Big Five Inventory (BFI). Conscientiousness was measured with the BFI and the scale defines conscientious people as individuals who "persevere until the task is finished" (John & Srivastava, 1999) (see Appendix A). Other researchers consider the BFI a reliable measure of the Five Factor Model of

Table 1.Demographic Information from Study Sample

Variable	n	% of Respondents
Gender N=478		
Female	324	67.8%
Male	153	32.0%
Transgender Male	1	0.2%
Age N=478		
24–35 years	87	18.2%
36–45 years	157	32.8%
46–55 years	150	31.4%
56–65 years	75	15.7%
65 or more	9	1.9%
Ethnicity N=478		
White	287	60.0%
Black/African American	115	24.1%
Hispanic/Latino	42	8.8%
Other	21	4.4%
Asian	10	2.1%
American Indian/ Alaska Native	2	0.4%
Native Hawaiian or Other Pacific Islander	1	0.2%
Year of Study N=478		
First Year	94	19.7%
Second Year	106	22.2%
Third Year	128	26.7%
Fourth Year	85	17.8%
Fifth Year and Beyond	65	13.6%

personality (FFM), and the BFI has been used in many studies, especially for predicting academic success (Burkhart et al., 2014; Credè et al., 2016; Ivcevic & Brackett, 2014). In a study of the BFI's internal consistency, the scale registered α = .83 (John & Srivastava, 1999). The BFI is a self-report, individual-level assessment that uses a five-point Likert-type scale across a series of 44 items. According to John and Srivastava (1999), these items measure the personality traits of openness (α = .81), conscientiousness (α = .82), extraversion (α = .88), agreeableness (α = .79), and neuroticism (α = .84). Researchers have used the BFI in earlier quantitative studies (John & Srivastava, 1999), and it was developed to give researchers a more efficient version of an instrument that effectively measures the Five Factor Model of personality.

Online doctoral student GPA. Online doctoral student GPA was the criterion variable in the study. Researchers have used this measure in previous studies to measure the effect of various predictors on student outcomes (Bair & Haworth, 2004; Cross, 2014; Dole & Baggaley, 1979; Johnson-Motoyama, Petr, & Mitchell, 2014; Ren & Hagedorn, 2012; Williams et al., 1970; Williams, Gab, & Lindem, 1969). Even though self-reported GPAs and GPAs reported from the school registrar have been found to correlate as high as .97 (Cassady, 2001), self-reported GPAs were also verified via screen shot. The GPA was obtained by participants who had to log into the official system of record. Participants then entered their numeric GPA into a field in the survey instrument and were then asked to upload a screenshot of the web page displaying the GPA into the same instrument. Participants who did not provide a matching self-reported GPA and screenshot for verification were excluded from the study.

Data Collection

After permission was granted from the university, a university administrator sent an online survey instrument containing the Grit-S scale, the BFI and instructions on how to enter one's GPA and upload a screenshot of the same to the email accounts on file for online doctoral students. Participants were assured that their data would remain completely confidential and that participation in the survey was voluntary. Participation took approximately 15 minutes.

RESULTS

Procedures

Once the scores were calculated for the Grit-S and the BFI, multiple regression techniques were used to answer each research question. The following sections describe the analysis procedures for each of these research questions separately because different techniques were used.

Research Question 1. To what extent does grit predict online doctoral GPA? To answer this question, a simple linear regression was run to understand the effect of grit on grade point average. Upon checking assumptions to ensure integrity of the analysis, the planned analysis was conducted.

Research Question 2. To what extent does conscientiousness moderate the relationship between grit and the GPA of online doctoral students? To answer this question, a moderated regression analysis was run to understand the effect of conscientiousness on the relationship between grit and grade point average. Before any analysis could be completed, the predictor variables were mean centered, and an interaction term was created (Cohen, Cohen, West, & Aiken, 2013). Mean scores for each of the predictor variables can be seen in Table 2.

Table 2. Mean Scores for Original Predictor Variables (N=478)

Variable	M
Grit	4.12
Conscientiousness	4.27

To conduct the moderator analysis, a hierarchical multiple regression was run. The criterion variable was placed into the "dependent" field of the analysis and the mean centered variables of grit and conscientiousness were placed in Block 1. The interaction term was then placed into Block 2. By inserting the moderator variable into the second block, the change, if any, of the ability to predict online doctoral grade point average beyond the predictor variables of grit and conscientiousness was observed.

Additional analysis based on results of moderator analysis. Based on the results of the moderator analysis, which are presented in the next section, the moderator was removed from Block 2 of the regression model to assess the main effects

model. All of the necessary assumptions were met in this main effects model and the results are presented in the following section.

Results

This section is organized by research question and will be answered in order of presentation above.

Research Question 1. To what extent does grit predict online doctoral GPA?

A simple linear regression showed that grit did not statistically significantly predict grade point average, F(1, 477) = 2.25, p = .135. As seen in Table 3, grit accounted for 0.5% of the variation in grade point average with an adjusted r square = 0.3%. The results of the current study support the null hypothesis that grit does not predict online doctoral grade point average.

Table 3. Regression Model Results (N=478)

Variable	R Square	Adjusted R Square	Sig.
Grit (centered)	.005	.003	.135

Research Question 2. To what extent does conscientiousness moderate the relationship between grit and the GPA of online doctoral students?

A hierarchical regression was run to assess the increase in variation of grade point average explained by the addition of the interaction term between grit and conscientiousness to a main effects model. As seen in Table 4, conscientiousness did not moderate the effect of grit on grade point average, as shown by an increase in total variation explained of 0.0%, F(1, 474) = .206, p = .650.

Table 4. Moderation Model Results (N=478)

Model	R Square	Adjusted R Square	R Square Change	Sig. F Change
Model 1	.024	.020	.024	.003
Model 2 (with interaction variable)	.025	.019	.000	.650

As such, the interaction term was dropped from the model. This new model revealed that there was a statistically significant positive linear relationship (B = 0.089, SE = 0.029) between conscientiousness and grade point average (p < .05). In addition, there was not a statistically significant relationship (B = -0.033, SE = 0.029) between grit and grade point average (p = .257) in this main effects model. These results are represented in Table 5.

Table 5. Main Effects Model Results (N=478)

Variable	B	Std. Error	Significance
Constant	3.669	.012	.000
Conscientiousness (centered)	.089	.029	.002
Grit (centered)	-.033	.029	.257

Summary

In summary, the current study only found one statistically significant result, that conscientiousness can predict online grade point average when controlling for grit. The null hypotheses for research questions one and two were accepted because there was not a statistically significant relationship between grit and online doctoral grade point average (F(1, 477) = 2.25, p = .135), nor did conscientiousness moderate the relationship between grit and online grade point average (F(1, 474) = .206, p = .650).

DISCUSSION AND RECOMMENDATIONS

This study explored personality in the context of online grade point average. The two personality traits that were included in the study were grit and conscientiousness. The results reinforce the notion that personality traits may influence academic outcomes. Although the only trait that showed an effect on grade point average was conscientiousness, this highlights the need for further research into the interaction between grit and conscientiousness and how other personality traits within the FFM are related to doctoral success.

As noted above and throughout this study, researchers disagree about the incremental utility of the personality trait that Duckworth et al. (2007) have coined: grit. Some researchers have found that higher levels of grit provide incremental value to success (Beyhan, 2016; Cross, 2014; Duckworth et al., 2007; Thomas & Revell, 2016; Tovar-García, 2017) while others have found that grit does not add incremental value, especially when controlling for other personality traits (Credè et al., 2016; Kundu, 2014). The current study would support the latter finding as it did not show incremental value of grit when predicting online grade point average. The implication of this finding is that the evidence

against grit as a separate and distinct personality trait continues to mount.

Based on the research cited above about grit leading to greater success in an academic setting (Beyhan, 2016; Cross, 2014; Duckworth et al., 2007; Thomas & Revell, 2016; Tovar-García, 2017), some administrators and teachers have started to explore the possibility of teaching grit in schools to help students succeed. For example, Cross (2014) found that grittier doctoral students had higher grade point averages; however, he did not control for conscientiousness in his study, and Duckworth et al. (2007) found that higher levels of grit led to higher grade point averages in grade school students.

Based on these preliminary findings, some educators have started to change institutional curriculum to try and teach grit to students. For example, Beyhan (2016) recommends that curriculum standards should be redesigned to increase the level of student grit. In addition, Tovar-García (2017) suggests that educational institutions should teach students how to be grittier. The findings from the current study would suggest that educational resources could be better spent in other areas.

The results of this study could differ from other studies for several reasons. One reason is because most of the research about grit and its incremental value to educational attainment has been done throughout the educational system with students who are in lower grades. Much of the research on grit has been done using undergraduate students or even grade school students. Because this study worked with doctoral students, the results may be different than others. Doctoral students may be naturally grittier than others, which is partially what could have led them to pursue a terminal degree. The current study could also differ from earlier studies because the students used in this study were in programs that used computer-mediated learning. This learning modality in and of itself could have changed the student-environment relationship and resulted in different outcomes. The frequency of students in a program of study under this modality who have full time jobs or family obligations is higher than those in other modalities of delivery. This need to balance work, school, and personal life may result in grittier individuals.

One study that was similar in nature to the current study was Cross' (2014) study of online doctoral students. Cross found that grit had a positive impact on the GPA of online doctoral students at a similar university as this study. The difference between that study and the current study was that Cross did not control for conscientiousness. The control for conscientiousness in the current study could have accounted for the difference in results.

Future Research

Based on this study, there are future implications for research about grit, personality traits in an academic environment, and the relationship between grit and other personality traits. As noted above, researchers have differing opinions about the incremental value of grit. Some researchers see added value in measuring and training this personality trait while others either do not believe that the trait exists or do not believe that it adds incremental value above other personality traits. This study did not find incremental value for grit and, in fact, found that grit had a nonsignificant, but negative, coefficient when placed in the regression model with conscientiousness.

Personality traits in an academic environment continue to be studied by researchers. This study found that, when controlling for grit, conscientiousness provided predictive power when trying to predict online grade point average. The changing profile for online students warrants further research in relation to personality traits, interactions with teachers, and interactions with the learning environment. This research would be worthwhile because many institutions are starting to give online options for their students and would benefit from knowing the implications of various personality traits on student success.

RECOMMENDATIONS

The results of this study highlight the need to conduct further study along several dimensions.

Recommendations for future research

- Continue to research the success profile of online doctoral students. Given that the results of the current study did not find a strong link between personality traits and grade point average, further research should be conducted to determine if there is a link between other personality traits and online grade point average. Researchers should also consider lower-order traits besides the Big Five in this

line of study. The use of qualitative research in the form of case studies could prove a valuable means of further research into the success profile of online doctoral students.

- Continue to study grit in various settings. The academic research is conflicting and further research into this trait may be able to clarify the utility of this trait. Given that the popular press and administrators at schools have taken this concept and are starting to place importance on it, further research should be done quickly so that training resources are not mismanaged in schools or other environments.
- Conduct a similar line of study with doctoral students who are learning in a traditional, on-the-ground learning modality. Limited research and questioning about this population and the traits that make successful students exists. There may also be differences in the success factors of online doctoral students and traditional students. Because these advanced degrees are a large investment of time and resources, the factors that lead to success should be studied by researchers.
- Incorporate other personality traits into the regression models to predict online grade point average. The current study collected this information through the BFI; however, the analysis of these traits was outside of the scope of this study. Further research into these traits as well as other environmental factors should be considered.
- Conduct a similar study using successful completion of the degree as the criterion variable. A binomial logistic regression model could be used to determine if these personality traits demonstrate a relationship with the completion of an online doctoral degree. Given that grade point average is only one measure of student success, this study would help to give a more holistic picture of the success profile of an online doctoral student.

Recommendations for future practice

The results of this study have several practical implications as mentioned above; however, this study also provides insight into recommendations for future practice. The following section will provide details on these recommendations.

- Provide enhanced onboarding for their students. Educators in higher education, especially online doctoral programs, should provide enhanced onboarding for their students. Based on the results of this study, conscientiousness may lead to higher grade point averages in online doctoral programs. To capitalize on this finding, onboarding programs should help online doctoral students learn ways to set and complete short-term goals. Providing students with short-term goals and the tools necessary to complete those goals, such as checklists and training courses about how to thoroughly check work, could result in students acting more conscientious, even if they score low on the conscientious scale.
- Provide a conscientious "buddy" for incoming students. This mentor should be someone who has been through the same or a similar program who can help the current student stay motivated throughout the program (Flores, 2013). Conscientious mentors selected for online students could help them to follow through on their commitments and finish tasks and teach current students how to work more efficiently—all characteristics of a conscientious individual. In this scenario, even if the student is not high on the conscientious scale, he or she will be exhibiting behaviors that coincide with this trait that has shown to have an influence on grade point average. Although some institutions may choose to implement the use of a "buddy" for purposes of increasing conscientious behaviors, the student's chair could also play this role.
- Implement an academic readiness assessment. This assessment could be taken by students prior to starting classes to ensure that they have the right skills to succeed in doctoral education. This assessment could include a personality self-assessment to allow students to better understand how their personality might

help or hinder their academic journey. Admissions should not be decided based on the results of this assessment and the results should only be used for developmental purposes with each student; however, results should allow students to understand how they might interact with their environment once enrolled in classes and should provide recommendations for how to succeed in classes. This assessment should also provide resources for students to increase the probability of success in an online doctoral environment.

REFERENCES

Allport, G. W., & Odbert, H. S. (1936). Trait-names: A psycho-lexical study. Psychological Monographs, 47(1), i–171. doi:10.1037/h0093360

Ames, C., Berman, R., & Casteel, A. (2018). A preliminary examination of doctoral student retention factors in private online workspaces. International Journal of Doctoral Studies, 13, 79–107. doi:10.28945/3958

Ampaw, F. D., & Jaeger, A. J. (2012). Completing the three stages of doctoral education: An event history analysis. Research in Higher Education, 53(6), 640–660. doi:10.1007/s11162-011-9250-3

Archbald, D. (2011). The emergence of the nontraditional doctorate: A historical overview. New Directions for Adult & Continuing Education, 129, 7–19. doi:10.1002/ace.396

Bair, C. R., & Haworth, J. G. (2004). Doctoral student attrition and persistence: A meta-synthesis of research. In J. C. Smart (Ed.) Higher education: Handbook of theory and research, vol. 19 (pp. 481–534). Dordrecht: Springer. doi:10.1007/1-4020-2456-8_11

Bazelais, P., Lemay, D. J., & Doleck, T. (2016). How does grit impact college students' academic achievement in science? European Journal of Science and Mathematics Education, 4(1), 33–43. Retrieved from ERIC database. (EJ1107756)

Beyhan, O. (2016). University students grit level and grit achievement relation. Social Sciences and Education Research Review, 3(2) 13–23. Retrieved from http://sserr.ro/wp-content/uploads/2016/12/3-2-13-23.pdf

Burkhart, R. A., Tholey, R. M., Guinto, D., Yeo, C. J., & Chojnacki, K. A. (2014). Grit: A marker of residents at risk for attrition? Surgery, 155(6), 1014–1022. doi:10.1016/j.surg.2014.01.015

Camps, E., & Morales-Vives, F. (2013). The contributions of psychological maturity and personality in the prediction of adolescent academic achievement. International Journal of Educational Psychology, 2(3), 246–271. doi:10.4471/ijep.2013.27

Cassady, J. C. (2001). Self-reported GPA and SAT: A methodological note. Practical Assessment, Research & Evaluation 7(12). Retrieved from http://PAREonline.net/getvn.asp?v=7&n=12

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.). New York, NY: Routledge.

Credè, M., Tynan, M. C., & Harms, P. D. (2016). Much ado about grit: A meta-analytic synthesis of the grit literature. Journal of Personality and Social Psychology, 113(3), 492–511. Retrieved from: doi:10.1037/pspp0000102

Cross, T. M. (2014). The gritty: Grit and nontraditional doctoral student success. Journal of Educators Online, 11(3), 1–30.

de Valero, Y. F. (2001). Departmental factors affecting time-to-degree and completion rates of doctoral students at one land-grant research institution. The Journal of Higher Education, 72(3), 341–367.

Dole, A. A., & Baggaley, A. R. (1979). Prediction of performance in a doctoral education program by the Graduate Record Examinations and other measures. Educational and Psychological Measurement, 39(2), 421–427. doi:10.1177/001316447903900222

Duckworth, A. (2016). Grit: The power of passion and perseverance. 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(6), 1087–1101. doi:10.1037/0022-3514.92.6.1087

Dumfart, B., & Neubauer, A. C. (2016). Conscientiousness is the most powerful noncognitive predictor of school achievement in adolescents. Journal of Individual Differences, 37(1), 8–15. doi:10.1027/1614-0001/a000182

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. Behavior Research Methods, 41(4), 1149–1160. doi:10.3758/BRM.41.4.11

Gardner, S. K., & Gopaul, B. (2012). The part-time doctoral student experience: A literature review. International Journal of Doctoral Studies, 7, 63–78. doi:10.28945/1561

Golde, C. M. (2000). Should I stay or should I go?: Student descriptions of the doctoral attrition process. Review of Higher Education, 23(2), 199–227. doi:10.1353/rhe.2000.0004

Gomez, D. (2013). Leadership behavior and its impact on student success and retention in online graduate education. Academy of Educational Leadership Journal, 17(2), 13–37. Retrieved from https://www.abacademies.org/articles/aeljvol17no22013.pdf#page=21

Gray, J. P., & Mannahan, K. K. (2017). How well do trait measures of achievement predict students' perceptions of the link between personal effort and academic performance? Journal of Effective Teaching, 17(1), 16–27. Retrieved from ERIC database. (EJ1139902)

Hackman, J. R., Wiggins, N., & Bass, A. R. (1970). Prediction of long-term success in doctoral work in psychology. Educational and Psychological Measurement, 30(2), 365–374. doi:10.1177/001316447003000219

Hagedorn, L. S. (1999). Factors related to the retention of female graduate students over 30. Journal of College Student Retention: Research, Theory & Practice, 1(2), 99–114. doi:10.2190/LKWC-EJUB-V5KM-BRNQ

Harrell, I. L. & Bower, B. L. (2011). Student characteristics that predict persistence in community college online courses. American Journal of Distance Education, 25(3), 178–191. doi: 10.1080/08923647.2011.590107

Harrison, R., Gemmell, I., & Reed, K. (2014). Student satisfaction with a web-based dissertation course: Findings from an international distance learning master's programme in public health. International Review of Research in Open & Distance Learning, 15(1), 182–202. doi:10.19173/irrodl.v15i1.1665

Hoover, E. (2013, January 14). 'Noncognitive' measures: The next frontier in college admissions. The Chronicle of Higher Education, (19). Retrieved from https://www.chronicle.com/article/Noncognitive-Measures-The/136621

Huang, J. L., & Bramble, R. J. (2016). Trait, state, and task-contingent conscientiousness: Influence on learning and transfer. Personality and Individual Differences, 92, 180–185. doi:10.1016/j.paid.2015.12.043

Ivcevic, Z., & Brackett, M. (2014). Predicting school success: Comparing conscientiousness, grit, and emotion regulation ability. Journal of Research in Personality, 52, 29–36. doi:10.1016/j.jrp.2014.06.005

Jairam, D., & Kahl, D. H. (2012). Navigating the doctoral experience: The role of social support in successful degree completion. International Journal of Doctoral Studies, 7, 311–328. Retrieved from http://ijds.org/Volume7/IJDSv7p311-329Jairam0369.pdf

John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), Handbook of personality: Theory and research (Vol. 2, pp. 102–138). New York, NY: Guilford Press.

Johnson-Motoyama, M., Petr, C. G., & Mitchell, F. M. (2014). Factors associated with success in doctoral social work education. Journal of Social Work Education, 50(3), 548–558. doi:10.1080/10437797.2014.916955

Khanam, A., Quraishi, U., & Nazir, H. (2016). A study of reasons and implications of the dropout phenomenon in women at university. Journal of Research & Reflections in Education, 10(2), 159–172. Retrieved from http://ue.edu.pk/jrre/articles/102006.pdf

Köseoglu, Y. (2016). To what extent can the Big Five and learning styles predict academic achievement. Journal of Education and Practice, 7(30), 43–51. Retrieved from ERIC database. (EJ1118920)

Kundu, A. (2014). Grit, overemphasized; agency, overlooked. Phi Delta Kappan, 96(1), 80. doi:10.1177/0031721714547870

Lee, Y., & Choi, J. (2011). A review of online course dropout research: Implications for practice and future research. Education Technology Research and Development, 59(5), 593–618. doi:10.1007/s11423-010-9177-y

Lovitts, B. E. (2001). Leaving the ivory tower: The causes and consequences of departure from doctoral study. Lanham, MD: Rowman & Littlefield.

Malone, B. G., Nelson, J. S., & Van Nelson, C. (2004). Academic and affective factors contributing to degree completion of doctoral students in educational administration. The Teacher Educator, 40(1), 33–55. doi:10.1080/08878730409555350

Martinez, E., Ordu, C., Della Sala, M. R., & McFarlane, A. (2013). Striving to obtain a school-work-life balance: The full-time doctoral student. International Journal of Doctoral Studies, 8, 39–59. Retrieved from http://ijds.org/Volume8/IJDSv8p039-059Martinez0375.pdf

McAbee, S. T., & Oswald, F. L. (2013). The criterion-related validity of personality measures for predicting GPA: A meta-analytic validity competition. Psychological Assessment, 25(2), 532–544. doi:10.1037/a0031748

Mills, J. D. (2015). Learning management systems must evolve to curb student attrition. Journal of Applied Learning Technology, 5(4), 41–45. Retrieved from http://search.ebscohost.com.proxy.lib.wayne.edu/login.aspx?direct=true&db=eue&AN=114811445&site=ehost-live&scope=site

Morris, L. V., Finnegan, C., & Wu, S. (2005). Tracking student behavior, persistence, and achievement in online courses. The Internet and Higher Education, 8(3), 221–231. doi:10.1016/j.iheduc.2005.06.009

Morris, P. E., & Fritz, C. O. (2015). Conscientiousness and procrastination predict academic coursework marks rather than examination performance. Learning and Individual Differences, 39, 193–198. doi:10.1016/j.lindif.2015.03.007

Murray, A. L., Johnson, W., McGue, M., & Iacono, W. G. (2014). How are conscientiousness and cognitive ability related to one another? A re-examination of the intelligence compensation hypothesis. Personality and Individual Differences, 70, 17–22. doi:10.1016/j.paid.2014.06.014

Muse, H. E. (2003). The web-based community college student: An examination of factors that lead to success and risk. The Internet and Higher Education, 6(3), 241–261. doi:10.1016/S1096-7516-(03)00044-7

Nakayama, M., Mutsuura, K., & Yamamoto, H. (2014). Impact of learner's characteristics and learning behaviour on learning performance during a fully online course. Electronic Journal of E-Learning, 12(4), 394–408.

Pyhältö, K., Vekkaila, J., & Keskinen, J. (2015). Fit matters in the supervisory relationship: Doctoral students and supervisors perceptions about the supervisory activities. Innovations in Education and Teaching International, 52(1), 4–16. doi:10.1080/14703297.2014.981836

Regis, T. R. (2018). Doctoral students: Attrition, retention rates, motivation, and financial constraints. Author: Lulu. com.

Ren, J., & Hagedorn, L. S. (2012). International graduate students' academic performance: What are the influencing factors? Journal of International Students, 2(2), 135–143. Retrieved from ERIC database. (EJ1057595)

Rikoon, S. H., Brenneman, M., Kim, L. E., Khorramdel, L., MacCann, C., Burrus, J., & Roberts, R. D. (2016). Facets of conscientiousness and their differential relationships with cognitive ability factors. Journal of Research in Personality, 61, 22–34. doi:10.1016/j.jrp.2016.01.002

Rimfeld, K., Kovas, Y., Dale, P. S., & Plomin, R. (2016). True grit and genetics: Predicting academic achievement from personality. Journal of Personality & Social Psychology, 111(5), 780–789. doi:10.1037/pspp0000089

Rockinson-Szapkiw, A. (2011, March). Improving doctoral candidates' persistence in the online dissertation process. In Proceedings of Global Learn Asia Pacific 2011: Global Conference on Learning and Technology (pp. 1162–1166). Association for the Advancement of Computing in Education (AACE), Melbourne, Australia. Retrieved from https://digitalcommons.liberty.edu/educ_fac_pubs/184

Ryckman, R. M. (2013). Theories of personality (10th ed.). Mason, OH: Cengage Learning.

Schripsema, N. R., van Trigt, A. M., van der Wal, M. A., & Cohen-Schotanus, J. (2016). How different medical school selection processes call upon different personality characteristics. PLOS ONE, 11(3), 1–10. doi:10.1371/journal.pone.0150645

Snowden, A. (2014). Against intimacy: Focusing on the task in hand in PhD supervision. British Journal of Nursing, 23(21), 1126–1132. doi:10.12968/bjon.2014.23.21.1126

Spaulding, L. S., & Rockinson-Szapkiw, A. J. (2012). Hearing their voices: Factors doctoral candidates attribute to their persistence. International Journal of Doctoral Studies, 7, 199–219. doi:10.28945/1589

Stajkovic, A. D., Bandura, A., Locke, E. A., Lee, D., & Sergent, K. (2018). Test of three conceptual models of influence of the big five personality traits and self-efficacy on academic performance: A meta-analytic path-analysis. Personality and Individual Differences, 120, 238–245. doi:10.1016/j.paid.2017.08.014

Stallone, M. N. (2004). Factors associated with student attrition and retention in an educational leadership doctoral program. Journal of College Teaching & Learning (TLC), 1(6). doi:19030/tlc.v1i6.1952

Sutton, R. (2014). Unlearning the past: New foundations for online student retention. Journal of Educators Online, 11(3), 1–30. Retrieved from ERIC database. (EJ1033326)

Thomas, L. J., & Revell, S. H. (2016). Resilience in nursing students: An integrative review. Nurse Education Today, 36, 457–462. doi:10.1016/j.nedt.2015.10.016

Tovar-García, E. D. (2017). The impact of perseverance and passion for long term goals (GRIT) on educational achievements of migrant children: Evidence from Tatarstan, Russia. Psicologia Educativa, 23(1), 19–27. doi:10.1016/j.pse.2017.02.003

Vedel, A. (2014). The Big Five and tertiary academic performance: A systematic review and meta-analysis. Personality and Individual Differences, 71, 66–76. doi:10.1016/j.paid.2014.07.011

Williams, J. D., Gab, D., & Lindem, A. (1969). Judgment analysis for assessing doctoral admission policies. The Journal of Experimental Education, 38(2), 92–96. doi:10.1080/00220973.1969.11011186

Williams, J. D., Harlow, S. D., & Gab, D. (1970). A longitudinal study examining prediction of doctoral success: Grade point average as criterion, or graduation vs. non-graduation as criterion. The Journal of Educational Research, 64(4), 161–165. doi:10.1080/00220671.1970.10884126

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. doi:10.1007/s11409-014-9128-9

Zimmerman, E., & Brogan, L. (2015). Grit and legal education. Pace Law Review, 36(1), 112–157). Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2646851