An Exploration of Grit and Research Efficacy in Graduate Students

Poonpilas Asavisanu
Graduate School of Human Sciences
Assumption University

Watana Vinitwatanakhun
Graduate School of Human Science
Assumption University

Abstract

Grit, as a non-cognitive factor, has emerged as a concept of interest in relation to achievement in various groups such as employees, athletes, and students in both school and university. This research looks at grit and its relationship to research efficacy in graduate students. Two major objectives form the basis for this study. The first being to add to the knowledge base about grit and its relationship to demographic variables such as age, gender and academic achievement. The second objective of this study was to determine if there is a relationship between grit and research self-efficacy. This study involved 131 graduate students from Assumption University who were asked to respond to the Grit Scale and an adapted version of the SERM (Self-Efficacy in Research Measure). Statistical analysis was carried out to find correlations between grit and demographic variables such as gender and age and GPA. The findings from this study concluded that there was no significant difference in levels of grit for male and female graduate students. Grit was found to be positively correlated with age, while it was not found to be correlated with GPA. In relation to research self-efficacy, a linear multiple regression found a statistically significant relationship with grit and research efficacy: $r(131) = .339$, $p > .01$. The results of this study both confirm and refute some of the previous research done on grit in various populations. Nonetheless, there are implications for the use of grit in enhancing research self-efficacy, increasing graduate student research productivity and subsequently, the success of graduate programs.

Keywords: grit, research self-efficacy, academic achievement

Introduction

Identifying predictors of success and achievement has been an important area of research. Research has been conducted that has looked at both cognitive and non-cognitive factors and their relationship to outcomes in the labor market (Nikoloski & Ajwad, 2014) and in education (Farrugia, Han, Watson, Moss & Bottoms, 2016). Cognitive factors are those mental processes such as thinking and memory, that can both facilitate or hinder learning. Non-cognitive factors can include the expectations, motivations, persistence of the individual. Both non-cognitive factors such as academic mindset, perseverance, social skills, learning strategies and academic behaviors play a role the successful academic performance of students at various levels and from various populations (Farrugia et al., 2016). Of these non-

cognitive factors, grit has become one of the particularly studied concepts in recent years. The heightened interest in grit as a predictor of success has been enhanced by Angela Duckworth's bestselling book, "Grit: Why Passion and Resilience are the Secrets to Success" and has increased non-academic interest in grit. The concept of grit, as proposed by Duckworth, Peterson, Matthews, & Kelly (2007), is defined as 'the perseverance and passion for long-term goals'. According to the research, grit is an essential component of achievement and is identified as one of the factors that high achievers in different fields, whether they be in medicine, law, business or academia have, notwithstanding their intelligence or cognitive abilities. According to Duckworth et al., cognitive factors like intelligence or other inborn abilities, although important to achievement, may not be as imperative to success as once thought and non-cognitive traits such as grit, may be just as important. People with high levels of grit or 'grittier' individuals are those people who not only finish what they start, but are also capable of maintaining consistent goals and interests over long periods.

The eventual development of the psychometric 12-item Grit Scale consisted of self-report measures that measured both focused effort (perseverance of effort) and interest over time (consistency of interest). In their initial research, Duckworth et al. conducted six studies to evaluate the predictive ability of grit to predict success outcomes in various groups. It was found that older people tended to have higher levels of grit, that grittier individuals attained higher levels of education, had higher GPA's, made less career changes and that grit was a predictor of student retention. A subsequent Short Grit Scale (Grit-S) was developed and tested a few years later that had four fewer items but retained the 2-factor structure of the original scale (Duckworth & Quinn, 2009).

Demographic factors such as gender and age have been studied in relation to grit. Some research has shown that grit tends to be higher in females than males (Kannangara, et al., 2018; Christensen & Knezek, 2014; Jaeger, Freeman, Whalen & Payne, 2010). In contrast, there has also been research that has shown no significant difference in levels of grit between males and females (Zhong et al., 2018; Hodge, Wright & Bennet 2017; Bazelais, Lemay & Doleck, 2016; Ali & Rahaman, 2012). As for grit and age, in Duckworth et al.'s (2007) original study a positive relationship was found between higher levels of grit and older individuals. Similarly, in a study of non-traditional doctoral students, grit was found to be higher in older students (Cross, 2014).

Grit and academic success have been studied in several populations. Strayhorn (2013) in a study of black, male college students found grit to be statistically related to college grades. Grit has also been shown to be related to college students' self-regulated learning (Wolters & Hussain, 2015). In a study of grit as a predictor of educational achievement, it was found that grit predicted various outcomes related to college such as GPA, college satisfaction and curricular engagement (Bowman, Hill, Denson & Bronkema, 2015). Similarly, in Hodge et al.'s (2018) study of Australian college students, grit was positively related to engagement and academic productivity.

Research Self-Efficacy

While many studies have been carried out in relation to grit with student and undergraduate populations, there is less research on graduate student populations, which is a distinct population that merits research. Individuals who decide to pursue graduate studies are typically older and have some work experience. Graduate students may be married with children, may work part-time and may have other obligations and life responsibilities that set them apart from full-time undergraduate students. There is a tendency to expect more in terms of ability and motivational drive from graduate students in comparison to undergraduates. According to the Association of College & Research Libraries, some ideal graduate student characteristics include: the ability to think for themselves, motivation, tenacity, critical thinking, research experience and a familiarity with the research process ("Ideal Graduate Characteristics," 2006).

As the curriculum of a graduate program typically includes some facet of research whether it be included in a course project or in the culmination of a degree such as in a thesis or dissertation, studies related to improving the research efficacy of graduate students is needed as research has shown that increasing research self-efficacy leads to increased research output (Kuo, Woo & Bang, 2017; Quimbo & Sulabo, 2014); Bieshcke, Herbert & Bard, 1998; Philips & Russel, 1994). Research self-efficacy is defined as an individual's confidence in successfully performing tasks related to research (Forester, Kahn & Hesson-McInnis (2004). Therefore, as graduate programs train future faculty in academia, the development of research skills is a necessary component of success.

According to Bandura (1994), Self-efficacy is defined as a person's belief about their own ability to produce some work or perform at a designated level. A strong sense of self-efficacy enhances that individual's sense of accomplishment and spurs them on to more challenging goals and the commitment to achieve them despite setbacks or failures. Predictors of research self-efficacy include: the research training environment, number of years in a graduate program, research experience, and interest in research (Bieschke, 2006). As research is considered a crucial component of success in graduate programs, there have been several measures of research efficacy developed in previous years. Some examples of these scales include the RSES (Research Self-Efficacy Scale) developed by Bieschke, Bishop, & Garcia in 1996; the RAM (Research Attitudes Measure developed by O'brien, Malone, Schmidt, & Lucas in 1998; and the SERM (Self-Efficacy in Research Measure developed by Philips & Russel in 1994. Each of these scales are intended to measure the research self-efficacy of graduate students in a variety of academic fields (Forester et al., 2004).

Objectives of the Study

There are two major objectives for this study. Firstly, this exploratory study is designed to add to the knowledge base about grit and its relationship to demographic variables such as gender and age and the relationship between grit and academic performance

as measured by graduate students' self-reported grade point average or GPA. The second objective of this study is to determine if there is a relationship between grit and research-self efficacy in graduate students. The research questions for this study are:

1. Is there a relationship between grit and demographic variables such as gender and age in graduate students?
2. Is there a relationship between grit and academic performance as represented by self-reported GPA in graduate students?
3. Is there a relationship between grit and research self-efficacy in graduate students?

Methodology

Participants

The participants in this study were graduate students from two graduate schools (Business and Human Sciences) at Assumption University. Participants were contacted both through email and in person and asked to complete a survey containing questions about grit and research self-efficacy. After an inspection of the 132 completed surveys, it was found that one participant showed a patterned response to the questions and was thus removed from the sample. The final sample size consisted of 131 participants.

Research Instrument

Two research instruments were used in this study. The first instrument was the original Grit Scale developed by Duckworth et al. in 2007. The scale contained 12 questions, with six questions pertaining to Perseverance of Effort and six questions pertaining to Consistency of Interest. The original Grit Scale had an internal consistency of $\alpha = .85$ for the overall Grit Scale and $\alpha = .78$ for Perseverance of Effort and $\alpha = .84$ for Consistency of Interests. The internal consistency for this study was: $\alpha = .67$ (overall Grit Scale); $\alpha = .70$ (Perseverance of Effort); $\alpha = .71$ (Consistency of Interest). The second research instrument used in this study was adapted from the Self-Efficacy in Research Measure or SERM developed by Phillips & Russel (1994). The SERM is a 33-item measure of graduate student self-efficacy in regard to five areas related to research; design skills, practical skills, quantitative and computer skills, and writing skills. Respondents to the scale are asked to rate themselves from 0 (no confidence) to 9 (total confidence) to questions in each of the five areas. Since the original instrument was developed in 1994, some of the question items were dated, such as "understanding computer printouts" and "manipulating data to get it onto a computer system" or not relevant to the current context, for example, "writing statistical computer programs" and "getting money to help pay for research". Therefore, these items were removed. Some item wordings were also adjusted to more closely follow the current research context of the current graduate programs. Additionally, as the majority of students in the sampled population were students who use English (the language of instruction at the university) as a second language, it was decided to include some items related to the use of

English skills and research. Examples of these items included, "use of academic words and phrases in English" and "mastery of English language skills such as grammar, punctuation, capitalization". The total number of questions for the instrument, including the Grit Scale, was 40 questions. Internal consistency for the adapted research self-efficacy instrument was $\alpha = .94$.

Results

The results of the study are divided into two parts: first, a presentation of the descriptive data. Second, the results of the statistical analysis for each of the research questions are presented.

Descriptive Data

A total of 131 graduate students participated in the study. Of these,70 were female and 61 were male, representing 53 percent and 47 percent respectively. The participants ranged in age from 22 to 64 years, with the mean age being 31 years. Ninety-three of the students were Master's degree students and 38 were Ph.D. students. The average self-reported GPA was 3.59. Out of the 131 graduate students, 101 (77 percent) were from the Graduate School of Human Sciences and 30 (23 percent) were from the Graduate School of Business. Table 1 shows the mean grit scores by gender and level of graduate study.

Table 1

Differences in Grit Scores by Gender and Type of Graduate Study

Demographic Characteristics		N	Total Grit Score (Mean)	SD
Gender	Female	70	26.47	3.97
	Male	61	27.77	3.82
Level	Masters	93	26.18	3.39
	Ph.D.	38	29.30	4.36

Results from the Research Questions

Grit and Demographic Variables of Gender and Age: statistical analysis was carried out to determine if there was a relationship between grit and gender and grit and age. An independent samples T-test was conducted to compare the overall Grit scores in male and female graduate students. There was no significant difference in the scores for males ($M = 27.77$, $SD = 3.81$, $n = 61$) and females ($M = 26.47$, $SD = 3.97$, $n = 70$); $t(129) = 1.29$, $p < 0.05$. These results suggest that there is no difference in overall Grit scores between male and female graduate students in the sample. A 2-tailed Pearson product-moment correlation was carried out to test if age was correlated with overall Grit scores. There was a positive

correlation between age and grit, r = .285, n = 115, p = .002. It was found that older graduate students tended to have higher Grit scores.

Grit and GPA: Results of the 2-tailed Pearson product-moment correlation analysis of grit and GPA revealed no significant results. The results of the correlation analysis were r = .112, n = 98, p = .271. It was found that there was no statistical significance between GPA and Grit scores. The results suggest that student academic performance, as represented by self-reported GPA scores, are not influenced by students' overall Grit scores.

Grit and Research Self-Efficacy: To test if Grit was related to Research Self-Efficacy, a linear regression analysis was performed. The results of the regression analysis were $R^2 = .115$, $F(1,128) = 16.65$, $p = .000$. There was a statistically significant relationship between Grit scores and Research Self-efficacy scores. The results suggest that Research Self-efficacy scores are influenced by Grit scores. Additionally, a Pearson product-moment correlation was carried out to determine the correlation coefficients between Grit and each of the five areas related to research efficacy: Design Skills, Practical Skills, Quantitative Skills, Writing Skills, and English Skills. The following table shows the correlation results.

Table 2
Pearson Correlation Coefficients for Grit and Five Research Efficacy Areas

Measure	1	2	3	4	5	6
(1) Grit	-					
(2) Design Skills	.300**	-				
(3) Practical Skills	.362**	.735**	-			
(4) Quantitative Skills	.192**	.706**	.651**	-		
(5) Writing Skills	.268**	.604**	.654**	.661**	-	
(6) English Skills	.246**	.472**	.576**	.514**	.715**	-

** Correlation is significant at the 0.01 level (2-tailed).

Nonetheless, when Grit scores were broken down into the two components, Perseverance of Effort and Consistency of Interest, it was found that although there were significant correlations between Perseverance of Effort and all areas of research self-efficacy, there was no significant correlation between Consistency of Interest and research self-efficacy. Similarly, there were also no significant correlations between Consistency of Interest and any of the five research efficacy areas.

Conclusion and Discussion

The results of this study show that there is no significant difference in levels of grit among female and male graduate students. The findings of this study are in line with other studies that have shown similar findings in levels of grit according to gender (Zhong et al.,

2018; Hodge, Wright & Bennet 2017; Bazelais, Lemay & Doleck, 2016; Ali & Rahaman, 2012). Similarly, in Duckworth et al.'s (2007) original study, no gender differences in levels of grit were found. As for the relationship between grit and age, there are studies that have shown that there is a positive correlation between grit and age (Kannangara et al. 2018; Cupitt & Golshan, 2015; Cross, 2014). Similarly, results of this study confirm that grit is positively correlated with age and that increases in age are related to increases in levels of grit.

No statistical significance was found between the variables of grit and GPA. This study utilized the students' self-reported GPA as the source of data. The use of GPA has been a typical measure of student academic success in many studies (York, Gibson, & Rankin, 2015). Previous studies have shown that grit has been related to academic achievement and other measures of academic success such as GPA (Hodge et al., 2018; Bowman, Hill, Denson & Bronkema, 2015). However, some studies of grit and academic achievement have not yielded conclusive results (Crede, Tynan & Harms, 2017; Bazelais, Lemay, & Doleck, 2016). Thus, the findings of this study are inconclusive in terms of grit and academic performance. These seemingly contradicting results of grit research have led to some questions as to the validity of grit as a predictor of certain outcomes, particularly in the area of academic success. Crede et al. (2017) carried out a meta-analysis to evaluate the relationship of grit and measures of success. It has been suggested by the study that although there are modest relationships between grit and academic success, in comparison to other factors such as cognitive ability or study habits, the correlations shown have been weak and more conclusive studies need to be carried out to increase the validity of grit as a predictor of academic success.

In relation to grit and research self-efficacy, the results of this study show a modest relationship. However, this suggests that grit has a potential to be a predictor of research self-efficacy as well as a focus of interventions that can lead to increased success in the area of research for graduate students. Separate statistical analysis showed that Perseverance of Effort was correlated with Research Self-efficacy while Consistency of Interest was not. This is in line with other research which has shown that Perseverance of Effort is a better predictor of both academic and non-academic outcomes that Consistency of Effort (Bowman et al., 2015). As has been stated earlier, research skills and eventually research productivity are at the core of successful graduate programs. Individuals who possess high levels of grit are said to have a clear purpose of what they want to achieve and do not give up when faced with obstacles (Duckworth et al., 2007). These characteristics are exactly the characteristics needed for successful graduate students in the area of research. These characteristics are particularly salient given the context of graduate study where other factors such as cultural, language and research experience may influence students' ability and experience of doing research. If successful interventions to increase grit can be applied, it may have a positive effect on the quality and amount of research produced by graduate students. Helping students to engage in self-regulated learning may be one way in which grit can mediate behavior that leads to academic success (Wolters & Hussain, 2014). Some research has suggested that even becoming more mindful of the feedback given to students, that providing feedback that

emphasizes perseverance and focuses on the process of learning instead of talents and abilities, may have an overall positive influence on increasing grit (Jaeger et al., 2010). Research internships, experiential learning, mentoring and project-based learning (PBL) are some ways that can enhance grit and research efficacy in college students (Reed & Jeremiah, 2017).

Limitations and Recommendations

This research has looked at the construct of grit in relation to demographic variables, academic success and research self-efficacy in a specific population of graduate students. The results of the study have both confirmed and disputed previous research regarding grit in other contexts and has demonstrated a statistically significant relationship with regards to research self-efficacy. Nonetheless, even though the research has shown a modest relationship, there is potential for further study regarding the impact of interventions to increase grit and influence research self-efficacy which is considered to be an important aspect of a successful graduate student and graduate program. The limitations of the current research include the following: firstly, the study is restricted to only one institution and the sample size is small. To fully test the relationships, additional studies in different groups of graduate students, in different contexts and from different universities should be carried out. Secondly, the data obtained for these studies are reliant of self-report measures and may be potentially biased and/or wrongly reported or omitted. Future research may benefit from obtaining information for student GPA from the registrar's offices and including other specific institutional variables such as year of study, nationality or race, and other information. These limitations aside, it is hoped that the study has made some contributions to understanding grit, how it functions within this specific population of graduate students and how organizations, mainly educational related institutions and programs might enhance their student outcomes by reflecting on and implementing various activities and teaching methods to supplement and encourage the non-cognitive factors that play a role in student success.

References

Ali, J. & Rahaman, A. (2012). A comparative study of grit between male and female fencers of Manipur. *Shield: Research Journal of Physical Education & Sports Science*, 7, 32-35.

Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). New York: Academic Press. (Reprinted in H. Friedman [Ed.], *Encyclopedia of mental health*.) San Diego: Academic Press.

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.

Bieschke, K. J., Bishop, R.M., & Garcia, V.L. (1996). The utility of the research self-efficacy scale. *Journal of Career Assessment*, 491), 59-75, doi: 10.1177/106907279600400104

Bieschke, K., Herbert, J., & Bard, C. (1998). Using a social cognitive model to explain research productivity among rehabilitation counselor education faculty. *Rehabilitation Education*, 12(1), 1-16.

Bieschke, K. J., (2006). Research self-efficacy beliefs and research outcome expectations: implications for developing scientifically minded psychologists. *Journal of Career Assessment*, 14(1), 77-91, doi: 10.1177/1069072705281366

Bowman, N., Hill, P. L., Denson, N., & Bronkema, R. (2015). Keep on truckin or stay the course? Exploring grit dimensions as differential predictors or educational achievement, satisfaction, and intentions. *Social, Psychological a Personality Science*, 6(6), 639-645, doi.org/10.1177%2F1948550615574300nd

Crede, 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*, 1-20. Retrieved from: http://www.ippanetwork.org/wpcontent/uploads/2016/06/ MuchAdoAboutGrit.pdf

Christensen, R. & Knezek, G. (2014). Comparative measures of grit, tenacity and perseverance. *International Journal of Learning, Teaching and Educational Research*, 8(1), 16-30.

Cross, T. M. (2014). The gritty: grit and non-traditional doctoral student success. *Journal o Educators Online*, 11(3), July 2014. Retrieved from: https://files.eric.ed.gov/fulltext/ EJ1033306.pdf

Cupitt, C & Golshan, N. (2015). Participation in higher education online: Demographics, motivators, and grit. *STARS Conference.* Melbourne, Australia. Retrieved from: http://unistars.org/papers/

Duckworth, A.L., Peterson, C., Matthews, M.D., Kelly, D.R. (2007). Grit: perseverance and passion for long-ter goals. *Journal of Personality and Social Psychology*, 92(6), 1087-1101, doi: 10.1037/0022-3514.92.6.1087

Duckworth, A.L. & Quinn, P.D. (2009). Development and validation of the short grit scale (GRIT-S). *Journal of Personality Assessment*, 9(12), 166-174. doi:10.1080/00223890802634290

Farrugia, S., Han, C., Watson, L., Moss, T. & Bottoms, B. (2016). Non-cognitive factors and college student success. *Journal of College Student Retention: Research*, Theory & Practice, 20(3), 308-327, doi:10.1177%2F1521025116666539

Forestor, M., Kahn, J.H., & Hesson-McInnis, M.S. (2004). Factor structures of three measures of research self-efficacy. *Journal of Career Assessment*, 12(1), 3-16, doi: 10.1177/1069072703257719

Hodge, B., Wright, B. & Bennet, P. (2017). The role of grit in determining engagement and academic outcomes for university students. *Research in Higher Education*, doi: 10.1007/s11162-017-9474-y

Ideal graduate characteristics. *American Library Association*, August 29, 2006, Retrieved from: http://www.ala.org/acrl/issues/infolit/standards/using/idealgradcharacteristics

Jaeger, B., Freeman, S., Whalen, R. & Payne, R. (2010). Successful students; smart or tough? *ASEE Annual Conference and Exposition*, Conference Proceedings. Retrieved from: https://www.researchgate.net/publication/289703786_Successful_students_Smart_or_tough

Kannangara, C.S., Allen, R.E., Waugh, G., Nahar, H., Khan, S.Z.N., Rogerson, S., & Carson, J. (2018). All that glitters in not grit: three studies of grit in university students. *Frontiers in Psychology*, 9, 1539. Published online 2018 Aug 29. doi: 10.3389/fpsyg.2018.01539

Kuo, P.B., Woo, H., & Bang. N.M. (2017). Advisory relationship as a moderator betweem research self-efficacy, motivation, and productivity among counselor education doctoral students. *Counselor Education and Supervision*, 56(2), 130-144. https://psycnet.apa.org/doi/10.1002/ceas.12067

O'Brien, K. M., Malone, M. E., Schmidt, C. K., & Lucas, M. S. (1998, August). *Research self- efficacy: Improvements in instrumentation.* Poster session presented at the annual conference of the American Psychological Association, San Francisco.

Nikoloski, Z., and M. I. Ajwad. 2014. "Cognitive and Noncognitive Skills Affect Employment Outcomes: Evidence from Central Asia." Unpublished manuscript, Retrieved from http://eprints.lse.ac.uk/60025/

Phillips, J. C., & Russell, R. K. (1994). Research self-efficacy, the research training environment, and research productivity among graduate students in counseling psychology. *The Counseling Psychologist*, *22*, 628-641.

Quimbo, M.A. & Sulabo, E.C. (2014). Research productivity and its policy implications in higher education institutions. *Studies in Higher Education*, 39(10), 1955-1971.

Reed, L., & Jeremiah, J. (2017). Student grit as an important ingredient for academic and personal success. *Developments in Business Simulation and Experiential Learning*, *44*(1). Retrieved from: https://journals.tdl.org/absel/index.php/absel/article/view/3099

Strayhorn, T. (2014). What role does grit play in the academic success of black male collegians a predominantly white institutions? Journal of African American Studies, 18(1), 1-10.

Wolters, C. A. & Hussain, M. (2015). Investigating grit and its relationship with college students' academic achievement. *Metacognition and Learning*, 10(3), 293-311.

York, T.T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success. *Practical Assessment, Research & Evaluation*, 20(5), 1-20. Retrieved from: https://pareonline.net/getvn.asp?v=20&n=5

Zhong, C., Wang, M. C., Shou, Y., Ren, F., Zhang, X., Li, M., & Yang, W. (2018). Assessing construct validity of the Grit-S in Chinese employees. *PloS one*, *13*(12), e0209319. doi: 10.1371/journal.pone.0209319