

The Gritty: Grit and Non-traditional Doctoral Student Success

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Abstract

As higher education is changing to reach larger numbers of students via online modalities, the issue of student attrition and other measures of student success become increasingly important. While research has focused largely on undergraduate online students, less has been done in the area of online non-traditional doctoral student success, particularly from the student trait perspective. The concept of grit, passion and persistence for long-term goals, has been identified as an important element of the successful attainment of long-term goals. As doctoral education is a long-term goal the purpose of this study was to examine the impact of doctoral student grit scores on student success. Success was measured by examining current student GPA and other factors. Significant relationships were found between grit and current student GPA, grit and the average number of hours students spent on their program of study weekly, and grit and age. The results of this research maybe important for informing how doctoral education is structured and how students might be better prepared for doctoral work.

Keywords: Higher education, grit, doctoral education, non-traditional students, online education, academic success, attrition

INTRODUCTION

Recently a report commissioned by the Educational Testing Service (ETS) suggested that many individuals who earn a doctoral degree do not work in the academy (Wendler, Bridgeman, Markle, Cline, Bell, McAllister, & Kent, 2012). In fact, the same study noted that about half of all new doctorate recipients in the U.S. find work outside of the academy (Wendler et al., 2012). Despite the seeming decrease in demand for academics, doctorally prepared individuals are being sought out by organizations of all kinds (Council of Graduate Schools in the United States, 2007). Many point to the shifting landscape of the American economy from post-industrial to information and knowledge based as an important driver of the demand for doctorally prepared workers (Offerman, 2011; Servage, 2009).

Within this knowledge-based economy there is a perceived mounting demand for workers skilled in applied research and analytical skills most often associated with doctoral level education (Servage, 2009). As one reports' authors wrote, "Between 2010 and 2020, about 2.6 million new and replacement jobs are expected to require an advanced degree, with a projected increase of about 22% for jobs requiring a master's degree and about 20% for jobs requiring a doctorate or professional degree" (Wendler et al., 2012, p.1). In reaction to the current and expected need for workers trained above and beyond undergraduate and typical master levels, the professional or non-traditional doctorate has emerged as one solution to supplying highly trained workers to industry and other settings (Servage, 2009). Thus, the burgeoning growth of non-traditional doctoral programs can be seen in the context of the demands of a new knowledge economy (Archbald, 2011; Pappas & Jerman, 2011).

However, these new non-traditional programs differ from tradition conceptions of doctoral degree programs. Unlike traditional doctoral programs that require students to devote full-time study to their degree programs and to participate in teaching and research apprenticeships, nontraditional doctoral programs are often populated by working professionals that cannot study fulltime in person or on campus (Archbald, 2011; Offerman, 2011). As such, these programs require flexible part-time programmatic designs that incorporate both synchronous and asynchronous learning (Archbald, 2011). In order to accommodate this unique population of students, online course delivery has emerged as a popular modality of instruction for nontraditional doctoral programs (Archbald, 2011).

Even as the market demands more doctorally prepared workers and institutions of higher education begin to offer nontraditional programs to working adults via online modalities to fill this need, the question of doctoral student attrition still remains a prominent and perplexing problem, especially as traditional programs have historically reported attrition rates at or near 50% (Golde & Walker, 2006). Within the realm of student retention and attrition, non-traditional programs at the doctoral level become of particular interest when one takes into consideration that online programs at the undergraduate level are often cited to have even higher attrition rates than their brick and mortar counter parts (Carr, 2000; Chyung, 2001; Council of Graduate Schools in the United States, 2007; Walton, 2011). This may suggest that non-traditional doctoral students are at a higher risk of non-degree completion than even their peers in traditional programs.

In short, doctoral education is beginning to adopt online modalities as evidence in the appearance of non-traditional doctoral programs (Archbald, 2011; Pappas & Jerman, 2011). As has been noted at the undergraduate level for online courses, attrition rates appear to be higher than in traditional classroom settings (Carr, 2000, Chyung, 2001, Rovai, 2002). This along with the notion that completion times and attrition in traditional doctoral programs are problematic, points to the idea that it may be important to understand measures of student success in non-traditional doctoral programs (Bowen & Rudenstine, 1992; Golde & Walker, 2006; Thurgood et al., 1995). Further, because non-traditional or professional doctorate programs, as they are sometimes called are so new they generally, "...remain an under-investigated area" (Kot and Hendel, 2012, p. 346). Hence, not only is it important to add more knowledge to this understudied area, but also to examine the idea of student success within doctoral education. Therefore, it is important to understand if internal student characteristics can impact measures of success amongst non-traditional doctoral students. By so doing, it may be possible to not only create space for more students to attend courses through online education, but also for more students to be successful in passing their courses (Berg, 2005).

REVIEW OF THE LITERATURE

Grit

Thus, because the doctoral experience is somewhat self-directed and is a highly independent enterprise, the degree itself may lead to higher attrition rates (Denecke et al., 2004). Further, because internal characteristics of students may be an important part of student success in online courses, it may be important to study which characteristics contribute to student success. One possible such characteristic is the notion of grit. Building on the theories of positive psychology and more specifically within the character classification of temperance is the notion of grit

(Duckworth et al., 2007; Duckworth & Quinn, 2009; Park, Peterson, & Seligman, 2006). Grit, as defined by Duckworth et al. (2007), is passion and persistence for long-term goals. This concept is rooted in the ideas of self-control and even more broadly conscientiousness. Conscientiousness, one of the Big 5 personality traits, describes a person's aptitude for being organized, following-through, and being self-reflective (Wiggins, 1996). Further, some authors note a connection between higher levels of conscientiousness and higher measures of self-control (Ameriks, Caplin, Leahy, & Tyler, 2004). Thus, it appears there may be a link between the broad category of conscientiousness and self-control. Moreover, beyond self-control is the idea of persistence. Persistence describes the ability to continually overcome obstacles within one's life path. This is often associated with the idea of being able to pursue a goal and achieve it. From the combination of persistence, self-control, and more broadly conscientious, emerges the concept of grit (Duckworth et al., 2007; Duckworth & Quinn, 2009).

In general, much of psychology has not only been focused on remediating mental illness but also on understanding intelligence (Buckingham & Clifton, 2001; Duckworth et al., 2007). However, not as much attention has been paid to how people employ their intelligence, or in other words "Why do some individuals accomplish more than others of equal intelligence?" (Duckworth et al., 2007, p. 1087). In answer to the question of why some people achieve more, while others do not, even when all things are equal Duckworth et al. (2007) argue that there are some characteristics that are common amongst all successful people and that one of these characteristics is grit.

For years intelligence quotient (IQ) was used as the main predictor of success and with some accuracy (Gottfredson, 1997; Hartigan & Wigdor, 1989). However as Terman, Oden, and Bayley

(1947) note in their seminal study of gifted children, something more than IQ was at play for predicting life success. These authors concluded that non-cognitive abilities were more important than IQ for success. Though Terman et al. noted the importance of non-cognitive abilities, much of modern psychology surrounding success is still based on what Tough (2013) calls the *cognitive hypothesis*. This is the idea that success, today, as once predicted by Terman et al. depends mostly on IQ. The allure of the cognitive hypothesis may, in part, lie in the ease with which IQ can be measured and moreover how promising things like improving standardized test scores amongst students have been (Tough, 2013).

However, there is evidence, as Terman et al. (1947) suggested, that non-cognitive or particular personality traits may be more important than IQ (Tough, 2013). Thus, Duckworth et al. (2007) argue that non-cognitive factors like grit are more important to success than IQ. In fact these authors argue that grit is a common characteristic to all successful individuals. This conclusion that grit is a common antecedent to success across fields was a result of numerous interviews with top performing professionals. From these observations the authors state, “We define grit as perseverance and passion for long-term goals” (p. 1087). And in characterizing grit, they note that, “The gritty individual approaches achievement as a marathon; his or her advantage is stamina” (p. 1088). Thus, grit is a non-cognitive measure of one’s ability to persevere in pursuit of a long-term goal without desisting or changing interests along the way.

Related to grit is the notion of conscientiousness (Goldberg, 1990). Conscientiousness, one of the Big 5 personality traits has been linked more often to better job performance than any of the other traits in the Big 5 (Barrick & Mount, 1991). Thus, conscientious individuals are

“...thorough, careful, reliable, organize, industrious, and self-controlled” (Duckworth et al., 2007, p. 1089). In many ways conscientious individuals are highly achievement oriented. However, while these characteristics likely contribute to achievement, Duckworth et al. (2007) argue that conscientiousness as a character trait has its limitations in that the above-mentioned characteristics alone are not enough to result in distinctively high achievement (Galton, 1869).

In essence grit is more than the combined self-control traits that make up conscientiousness.

“Grit overlaps with achievement aspects of conscientiousness but differs in its emphasis on long-term stamina rather than short-term intensity” (Duckworth et al., 2007, p. 1089). In this way, people who possess grit not only finish current goals but also are able to continually seek after long-term goals. Grit enables a person not only to be self-controlled enough to fight off current temptation, but also to keep continually fixed on long-term goals. “The gritty individual not only finishes his tasks at hand, but pursues a given aim over years” (p. 1089). Also, grittier people tend to exhibit a differentiated self-control from what is explained in conscientiousness, as having a “...specification of consistent goals and interests” (p. 1089). It is this differentiation that places grit over and beyond conscientiousness and its associated self-control and achievement orientation. Duckworth et al. (2007) write, “an individual high in self-control but moderate in grit may, for example, effectively control his or her temper, stick to his or her diet, and resist the urge to surf the Internet at work—yet switch careers annually” (p. 1089). Similarly, grit differs from achievement orientation or need for achievement, in that, rather than seeking goals with positive feedback loops that are relatively short, gritty individuals seek long-term goals and “...do not swerve from them—even in the absence of positive feedback” (p. 1089). Further, grit requires a cognitive decision to pursue a long-term destination rather than an incessant

subconscious drive for achievement (Duckworth et al., 2007; McClelland, Koestner, & Weinberger, 1989). Grit is the combination of the self-control aspects of conscientiousness coupled with a long-term and narrowed focus on achieving intrinsic or extrinsic goals (Duckworth et al., 2007).

In short, grit is a trait level measure of perseverance and passion for long-term goals (Duckworth et al., 2007). While, grit as a construct shares commonalities with self-control measures and the Big 5 notion of conscientiousness, it differs in several ways. Self-control and other measures such as perseverance have been studied extensively as outcomes rather than predictors, grit is considered to be predictive in nature for the perseverance in the pursuit of the accomplishment of difficult tasks and/or goals. In addition, grit is different than conscientiousness in the traditional Big 5 sense in that grit centers on stamina. Or in other words “grit entails the capacity to sustain both effort and interest in projects that take months or even longer to complete” (Duckworth & Quinn, 2009, p. 166). This last notion of sustaining interests over long periods of time is one defining aspect of what makes grit different from other self-control or conscientiousness measures. Grit, requires a centrality or unity of interest focused on long-term goals. Grit also differs from achievement measures in that grit does not require short feedback loops to complete attainment of goals. Rather, the gritty individual persists even when feedback loops are spread out over months or years (Duckworth & Quinn, 2009). Grit has been shown to be predictive of several aspects of success ranging from retention in the West Point cadet-training program, higher GPAs amongst undergraduates, higher education attainment among adults, and further progress in the Scripps Spelling Bee (Duckworth et al., 2007; Duckworth & Quinn, 2009).

In sum, this study examined the construct of grit, perseverance and passion for long-term goals, in relation to non-traditional doctoral student success. Specifically, grit scores were compared to current student programmatic GPA. In this case, current GPA served as a proxy measure for students' success and as a steppingstone measure of trajectory toward degree attainment (Duckworth & Quinn, 2009). In this way, student grit scores were compared to current programmatic GPAs of non-traditional doctoral students enrolled in a largely online doctoral program.

METHODS

This study was based in a post-positivist worldview and was designed from a quantitative research perspective (Creswell, 2009; Devlin, 2006). The study was largely explorative in nature as it sought to understand a factor of student success amongst a narrow population of non-traditional doctoral students and was also passive in its design as there was no intent to manipulate variables (Denscombe, 2009; Devlin, 2006). Also this project utilized a correlational design to analyze the relationship between student grit and current student GPA (Bechhofer & Paterson, 2000; Cone & Foster, 1993; Denscombe, 2009; Devlin, 2006). This design aimed at testing the impact of grit on student success as defined by current programmatic GPA. Thus, the independent variable in this design was student grit total scores. The dependent variable was current student GPA. Last, the controlling variables consisted of the student demographic or characteristic information collected. Hence, the study was designed to examine the relationships between the above-mentioned variables and their possible interactions with each other. The study sought to understand if the independent variable of student total grit score was related to the dependent variable of current student GPA. This relationship also was examined when

controlling for student demographics or characteristics. Thus the research questions were:

1. Is there a relationship between student grit scores and current student GPA?
2. After controlling for student characteristics, is there a relationship between student grit scores and current student GPA?

Population, Sample, and Unit of Analysis

Population. The population for this particular study was non-traditional doctoral students in the United States. This population is growing in demand, and if growing undergraduate and graduate non-traditional modalities are an indicator, this group is also growing in size (Allen & Seaman, 2005, Allen et al., 2011; Council of Graduate Schools in the United States, 2009; Pappas & Jerman, 2011). Further, the definition of non-traditional or contemporary doctoral students encompasses several key characteristics that contrast strongly with that of traditional doctoral students. Offerman (2011) describes this distinction thus:

Rather than a single white male, studying full time, on campus, and working in the department to help fund his education, the contemporary doctoral student is more likely to be a married woman with children and a career who is studying part time, often at a distance, and is funding her own education either through her current income or by borrowing. (p. 29)

Thus, non-traditional doctoral students are very different than traditional doctoral students both in demographics and in learning modalities and work responsibilities.

Sample. The sample for this study was made up of doctoral students from a mid-sized private university situated in the southwestern United States of America, however because the students were largely online, non-traditional students came from all across the country. In addition, the students were all doctoral students in various stages within their programs of study.

The students were enrolled in a variety of doctoral programs ranging from business, education, and psychology; DBA, Ed.D., and Ph.D., respectively. Within each of these programs are several emphasis areas. These range from management, to organizational leadership, to industrial organizational psychology. Also, the students came from diverse ethnic, social, and educational backgrounds. Every admitted applicant to any of these doctoral programs had an earned Master's degree from an accredited degree granting institution. Further, as these doctoral students were all enrolled in non-traditional programs that require little to no in-person class time, working adults generally populated the programs. In this way, the sample was a sample of convenience because it focused on the target population (Creswell, 2009; Devlin, 2006). The appropriate number of responses for this study to be generalizable to this doctoral population at this university was approximately 350, based on a general population of 3,200 non-traditional doctoral students at the sample site university (Isaac & Michael, 1995).

Programmatically, these students experienced a similar course sequences. For instance, all students had programs of study that were set and followed a similar progression across disciplines. In this way, students did not choose their classes from a course catalog, but rather followed a predesigned program of study. In addition, students took only one course at a time and each course lasted 8 weeks. This class progression is followed year round in order to complete the course work within 2 years from initiation, with a third and if needed fourth year and beyond for dissertation work. Thus, in general the sample was made up of non-traditional doctoral students in several programs at one mid-sized private university in the southwestern United States. Because of the non-traditional nature of the program, students came from various parts of the country and from diverse backgrounds; however, these students shared

commonalities, such as the requirement to hold a master's degree and follow similar courses of study. Last, these students, by and large, were working adults with limited time for schoolwork.

Unit of analysis. The definition of the unit of analysis for this research study was the individual student.

Procedures

It is important to understand how this study worked logistically. After the research proposal passed through the university Institutional Review Board, students were solicited to participate in the study in two ways: first a link to the electronic version of the survey (Deutskens, De Ruyter, Wetzels, & Oosterveld, 2004) that contained the informed consent, grit survey, and demographic questions was e-mailed to all current students within the doctoral programs. This e-mail was sent to their school affiliated e-mail address under the name of the provost of the university. The survey link was also posted, under the name of the provost of the university, inside a password protected website that housed materials to support doctoral students at the sample site university. The link, when activated, opened a fluidsurvey.com survey that contained an electronic version of the informed consent information and a field for acknowledgment, an electronic version of the eight-item grit survey, and fields to gather nominal data from the students such as age, sex, hours per week spent on studies, courses successfully completed and so forth. The links to the survey remained open until an appropriate number of responses were gathered (Isaac & Michael, 1995). While the survey was live, fluidsurvey.com served as a repository for the data gathered. After the data was gathered via fluidsurvey.com, the researcher downloaded and stored the survey data to both his laptop and a secure Cloud storage service.

In sum, students were solicited to participate in the survey via their school affiliated e-mail and

by posting an announcement inside the website designed to support these particular doctoral students at the sample site university. The survey contained informed consent information, questions to gather demographic information, and an electronic version of the 8-item grit survey instruments (Duckworth & Quinn, 2009). The survey data was gathered and stored via fluidsurvey.com and was later downloaded, backed up, and stored as a further precaution and for analysis purposes.

Data Gathering Instruments

There were several ways that data was gathered in this experiment. First, all data was gathered via an electronic survey (Deutskens et al., 2004) instrument created in fluidsurvey.com by the principal researcher. This instrument was sent as a link to the sample population's school affiliated e-mail addresses, under the name of the provost of the university. The link to the survey was also posted along with an announcement in the website designed to support doctoral students in these particular programs, under the name of the provost of the university. Also, there were specific instruments that were used to gather data contained within the general construct of the online electronic survey. In this case the 8-item grit survey was employed to assess and gather data on the students' passion and persistence for long-term goals (Duckworth & Quinn, 2009). This short survey was preceded by a series of questions aimed at collecting demographic data. In both these cases, fluidsurvey.com was used as a means of collecting survey answers and storing the data.

Validity, and Reliability of Data Gathering Instruments

For this study there were several data-gathering instruments. First, nominal data gathered on student demographics were collected via the electronic survey that housed both the demographic and grit survey questions. Because the demographic data were self-reported, the reliability of the

demographic information was dependent on the accurate self-appraisal of the student completing the survey.

Validity and reliability. In the absence of a previously created and validated instrument that would test the characteristics of grit through a self-reported survey instrument, Duckworth et al. (2007) created and validated a 12-item questionnaire intended to measure grit. To begin, the authors generated a pool of 27 items intended to narrow in on the construct of grit. These items were based on the authors' previous "... exploratory interviews with lawyers, business people, academics and other professionals" that were "high achieving" (p. 1090). Next, through analysis of the 17 common results the authors by, "... conducting exploratory factor analysis..." narrowed down the items to 12 (p. 1090). The remaining 12 items split evenly into two factors: consistency of interests and perseverance of effort. "The resulting 12 item grit scale demonstrated high internal consistency ($\alpha = .85$) for the overall scale and for each factor (Consistency of Interests, $\alpha = .84$; Perseverance of Effort, $\alpha = .78$)" (p.1091). Later, the authors concluded that the factors together were more predictive than either one in isolation. In this way, the grit scale was developed using exploratory factor analysis and later confirmatory factor analysis that eventually centered on two factors, consisting of six items each.

The survey was later tested in several studies and has shown to be predictive of success in several areas. In two initial studies grit was found to be associated with education level, with higher grit scores being associated with higher levels of education. Also, grit was noted to be higher on average in older participants than in younger study participants (Duckworth et al., 2007). Further, in a third study that examined "...139 undergraduate students... majoring in psychology at the University Pennsylvania" (p. 1093), it was noted that gritty students had higher

GPA than their less gritty counterparts with a relationship that was a stronger predictor than traditional SAT scores in relation to GPA. However, the study also revealed that the grit score was inversely correlated to the SAT score. As such, the authors note, "...that among elite undergraduates, smarter students may be slightly less gritty than their peers" (p. 1093). Thus far, grit had been shown to be predictive of undergraduate GPA, as well as related to educational attainment and age, with grittier individuals having higher levels of education as well as being older, and to be inversely related to SAT score.

Next, Duckworth et al. (2007) tested the grit construct's ability to predict retention of West Point cadets more than the typically used *Whole Candidate Score* and other measures such as self-control. The whole candidate score is "... a weighted average of SAT scores, class ranking, demonstrated leadership ability, and physical aptitude," despite these and other extremely competitive and scrupulous admissions criteria and processes "...about 1 in 20 cadets drops out during the first summer training" (p. 1094). In the end, grit was not correlated to the whole candidate score, but was related to self-control. Conversely, "...grit predicted completion of the rigorous summer training program better than any other predictor" (p. 1095). However, grit was not a good predictor of first-year GPA. Duckworth et al. explained that this difference should be expected as first-year GPA is more of a short-term goal that requires day to day self-regulation, whereas persisting through the first summer training requires "...a different sort of fortitude" that allows an individual to persevere through a training designed "...to test the very limits of cadets' physical, emotional, and mental capacities" (p. 1095). Thus, grit was predictive of who would complete the summer training regimen for West Point cadets.

Next, Duckworth et al. (2007) tested the construct of grit among 273 finalists who competed in the 2005 Scripps National Spelling Bee. Of the recruited participants 175 of the children elected to participate. The study examined grit in the context of how many hours participants studied and later how far they made it in the Spelling Bee. In other words, the study was seeking to find out if grittier children would perform better, and thus make it further into the Spelling Bee rounds. In reporting their findings the authors conclude, “study 6 suggest that gritty children work harder and longer than their less gritty peers and, as consequence, perform better” (p. 1098). Because this section of the study was semi-longitudinal in nature it points to a more robust explanation that grit “...is driving the observed correlations with success outcomes rather than the other way around” (p. 1098).

After establishing the grit scale as a feasible measure of passion and persistence for long-term goals, Duckworth and Quinn (2009) further honed the grit scale from a 12-item survey instrument to an 8-item instrument. Through another set of factor analysis the authors removed four items but still retained the two-factor structure of the previous 12-item grit scale. After confirming the reliability and validity of the scale through six studies the authors concluded that the short grit scale, named the Grit-S was “... a more efficient measure of trait level perseverance and passion for long-term goals” (p. 172). In this way, the original 12-item grit scale was refined to an eight-item Grit-S instrument. This instrument was tested and re-tested and shown to have “... predictive validity, consensual validity and test–retest stability” (p. 172).

In addition, through development of the Grit-S with its associated studies designed to test the validity and reliability of instrument, several new things about grit were revealed. In one study

grit was predictive of which adults "...progress further in education" and even controlling for conscientiousness made less career changes than their less gritty counterparts" (Duckworth & Quinn, 2009, p. 172). In another study, family report, peer report, and self-reports of the Grit- S were compared and were related, in that the data indicated that grit could be assessed by outside informants. Adolescents with higher grit scores were shown to have higher GPAs in school and to have watched less television at home overall. Further, when re-testing West Point cadets, the Grit-S was predictive of who would complete the strenuous summer training. Last, grittier Spelling Bee participants were more likely to advance further in the Spelling Bee. Taken together, this data indicate that the Grit-S is a more efficient, but reliable measure of perseverance and passion for long-term goals (Duckworth & Quinn, 2009).

The eight-question grit survey was designed to assess an individual's persistence and passion for long-term goals (Duckworth & Quinn, 2009). This instrument differs sharply from other measures of perseverance or conscientiousness in that it is predictive in nature. This led Duckworth and Quinn (2009) to write, "Perseverance is more often studied as an outcome than as a predictor" (p. 166). The questionnaire is focused on trait level "grit as a compound trait comprising stamina in dimensions of interest and effort" (p. 166). Thus, grit can be conceptualized as being comprised of two distinct parts: stamina. The development of the 8-item grit scale began with the creating and testing of the 12-item grit scale.

As there was not a previously created and validated instrument that tested for grit, Duckworth et al. (2007) created and validated the 12-item grit questionnaire. Starting with a series of open-ended interviews the authors came up with 27 items that emerged across the interview process.

Later, through factor analysis, the authors narrowed down the items to 17 and then to 12. The remaining 12-items fit into two factors: perseverance of effort and consistency of interests. Through statistical testing the authors found that the 12-item grit scale had high internal consistency of $\alpha = .85$ overall, and separately, consistency of interest was $\alpha = .84$ and perseverance of effort was $\alpha = .78$. Through more testing the authors found that the two factors together were more predictive than either one alone. The 12-item grit scale was then tested in studies and shown to be predictive of educational level, age, undergraduate GPA, lower SAT scores amongst undergraduates, which candidates at West Point would make it through summer training, and which students would make it further in the Scripps Spelling Bee. While the 12-item grit survey proved valid and reliable, the researchers determined that they could improve upon and shorten the instrument (Duckworth & Quinn, 2009). Thus, they revised the 12-item survey to an 8-item survey. The authors did this by conducting another set of factor analysis and removed 4 items leaving 8. However these 8 items still fell within the 2-factor structure that was previously established in the 12-item grit scale. This shorter version of the grit scale was tested and re-tested and was shown to have strong predictive validity, test and retest stability, and consensual validity. The authors concluded that the 8-item grit survey (Grit-S) is more efficient “and psycho-metrically stronger than the 12-item Grit-O” (p. 175). Thus, Duckworth and Quinn (2009) summed it up by stating, “...we recommend the Grit-S as an economical measure of perseverance and passion for long-term goals” (p. 175). In this way, the 8-item grit survey is both reliable and valid.

Data gathering procedures. Data for this experiment was gathered via the 8-item grit survey as well as through responses provided for the demographic questions (Duckworth & Quinn, 2009). The demographic questions were included after the informed consent section and after the grit

survey. Also, the 8-item grit survey was converted to an electronic survey within fluidsurvey.com. Also, only fully completed surveys were analyzed and participants were not be able to skip questions, but rather could choose to quit the survey at any time.

The link for this survey that included the informed consent, the demographic questions, and the short grit survey was e-mailed directly to the students' e-mails and was posted in the online doctoral support website in announcement form under the name of the provost of the university. This allowed students to take the survey and give informed consent within the same survey and in a convenient format. The link to the survey both in e-mail and announcement forms remained active until an appropriate number of responses were gathered. This constituted the data collection period of four days.

In sum, the data for this study were gathered via an electronic survey hosted on fluid surveys.com. The survey contained informed consent information with a place for participants to acknowledge consent, the short grit survey instrument to ascertain the students' grit score, and questions to collect demographic information.

Results

Research question 1 asked: Is there a relationship between student grit scores and current student GPA?

The related hypothesis for research question 1 was: There will be a significant relationship between student grit scores and current student GPA. The descriptive statistics with the mean grit scores, GPA, standard deviations, and sample size are shown in Table 1.

Table 1
Mean Grit Scores, Mean GPA, Standard Deviations, and Participants

	Mean	Std. Deviation	N
Grit Score	4	.479	669
GPA	3.729	.282	669

Note. N = total number of participants.

A Pearson correlation was performed in order to see if there was a significant relationship between grit score and GPA. The analysis revealed a positive significant correlation between grit and GPA, $r(667) = .093$, $p < .016$. The results of the Pearson correlation are shown in Table 2.

Table 2
Pearson Correlation of Grit and GPA

	Grit Score	GPA
Grit Score	Pearson Correlation	1
	Sig. (2-tailed)	.016*
	N	669

Note. * = correlation is significant at the $p < .05$ level (2-tailed); N = total number of participants.

Research question 2 asked: After controlling for student characteristics, is there a relationship between student grit scores and current student GPA?

The related hypothesis for research question 2 is: After controlling for student characteristics there will be a significant relationship between student grit scores and current student GPA. This hypothesis was tested by first performing separate Pearson correlations for grit and GPA by gender. First the Pearson correlation for grit and GPA (males) was performed, revealing no significant relationship, $r(245) = .103$, $p < .107$. Next the Pearson correlation for grit and GPA (females) was performed, revealing a significant relationship, $r(420) = .1$, $p < .041$. The results of

these Pearson correlations are shown in Table 3.

Table 3
Pearson Correlations of Grit and GPA by Gender

Gender	Grit Score	Pearson Correlation	Grit Score	GPA
Male	Grit Score	Pearson Correlation	1	.103
		Sig. (2-tailed)		.107
		N	247	247
Female	Grit Score	Pearson Correlation	1	.100
		Sig. (2-tailed)		.041*
		N	422	422

Note. * = correlation is significant at the $p < .05$ level (2-tailed); N = number of participants.

Further, a multiple regression was run in order to test for the significance of the relationship between grit and GPA while attempting to control for age. A significant model emerged from the regression analysis, $F(2,666) = 3.033$, $p = .049$, Adjusted R Square = .006. The coefficients in the regression model revealed that age was not significantly related to GPA, but that grit score was. The predictor variables are shown in Table 4.

Table 4
Predictor Variables of Regression Model of Age, Grit, and GPA

Predictor Variable	Beta	Sig.
Age	.018	.650
Grit Score	.023	.019*

Note. * = correlation is significant at the $p < .05$ level.

Taken together, while the overall Pearson correlation for grit and GPA was significant as noted in Table 4, the Pearson correlations for grit and GPA by gender showed that grit was related to

GPA for females but not for males, though the correlation was small. Also, the multiple regressions revealed that age was not a significant predictor of GPA, but that grit score was, as noted in Table 4. Thus, grit was positively related to GPA, but only for females.

Several other post hoc analysis also revealed significance. The Pearson correlation to examine the relationship between grit and age was significant, $r(669) = .11, p < .003$. The Pearson correlation to examine the relationship between grit and the average number of hours spent on the program of study per week was significant, $r(669) = .11, p < .006$. The Pearson correlation for age and the average number of hours worked per week revealed a negative relationship, $r(669) = -.16, p < .000$. The correlation for age and average number of hours spent on program of study per week showed a positive correlation $r(669) = .25, p < .000$. The correlation for the average number of hours worked per week and that average number of hours spent on the program per week revealed a negative correlation $r(669) = -.17, p < .000$.

Discussion

This study confirms that grit was related in some ways to non-traditional online doctoral student success, and as such warrants further investigation. The study confirmed what previous authors have found in relation to grit and age as well as self-motivation and related character traits; namely that they are important for successful doctoral students (Duckworth et al., 2007; Pauley, et al., 1999). However, tempering these findings is the fact that the correlations were small. This may be due to the fact that doctoral students, at least in this case, appeared overall to be a largely gritty group. This does align with Duckworth et al. (2007) previous finding that higher grit scores are associated with higher educational attainment. As such grit—at least as currently measured may or may not be as powerful of a construct amongst this population as it would be

among other populations, because the grit scale's gradation is not fine enough to detect slight difference amongst highly gritty populations. However, it may not be that grit is the problem here, but rather, that for abnormally highly gritty groups like doctoral students, new measures of grit that are more sensitive need to be developed.

Following from the findings in this study, administrators, faculty, staff and students of non-traditional online doctoral programs might want to consider the implications of grit on doctoral student success. For instance, as noted in this study, older students exhibited higher grit scores than younger students. Also, grittier students, especially women, had higher GPAs than less gritty students. Grittier students also spent, on average, more time per week working on their program of study than less gritty students. Thus, it might be important to continue to encourage older individuals and/ or women to enroll in non-traditional online doctoral programs, even while focusing on recruiting all populations. Further, these results imply that it might be helpful to spend remediation resources on younger students who appear to be less gritty as revealed in this study. In addition, as previous research has shown, relationships are often important catalysts for helping students successfully complete their degrees; it might be helpful to encourage more gritty students to interact with and develop relationships with less gritty students (Radda & Mandernach, 2012; Rockinson-Szapkiw, 2011). This is not to say that grit will be transferred from the more gritty individuals to the less gritty ones, but rather that gritty students may be able to provide an example of fortitude and perseverance for their less gritty peers. All in all, this strategy represents the heterogeneous mixing of gritty students with less gritty students in an effort to have students form relationships that might be mutually beneficial. Thus, grit may become an integral tool to assisting administrators, staff, and faculty of non-traditional online

doctoral programs help students to be successful, however more research is needed to confirm and add to the results of this study.

CONCLUSION

As doctoral education changes both in purpose and format helping students be successful in their programs of study becomes not only important for institutions of higher education but for society at large. As many newly minted graduates will not enter the ranks of academia, but rather be employed in industry or other organizational settings, successful doctoral education becomes an integral solution to the increasing demand for knowledge workers trained in pragmatic research skills (Servage, 2009). While others have studied how to help students in non-traditional online programs be successful, less has been done in the realm of non-traditional doctoral education (Pauley et al., 1999).

This study, was concerned with understanding how individual character traits, specifically grit, impact doctoral student success. Success was conceptualized as current student GPA. Further, grit was examined in relationship to other success based variables and demographics. The study examined a population of 3,400 non-traditional doctoral students with a sample size of 669 responses. In comparing student grit scores to GPA, a small but significant relationship was present. In addition, other significant relationships between grit and—age, gender, and self reported hours worked per week on course work were also found. The results of the study indicate that further research on grit and non-traditional doctoral students may be warranted and that longitudinal data on the relationship of grit and non-traditional doctoral students may be especially useful (Duckworth et. al., 2007).

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