Bryant University

HONORS THESIS

Running and Grit

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ABSTRACT

Building from the work of Angela Duckworth and others in the nexus between sports, motivation, and psychology, this study explores the relationship between running and grit. Does grit grow over time with age or number of years running? For what reasons do grittier runners run? Is there a correlation between grit, factors relating to running, and income? Is running an indicator for grit? Do grittier people run? Furthermore, grit and perseverance are measured indicators of success in other areas of life, such as in the workplace, college, or hobbies and special interest activities. Therefore, if running is an indicator of grit, can running be an indicator of success? These questions and others are examined through a nationally distributed survey, based on 1,269 responses from runners who are a part of a running club or organization. The top 33% of grit scores among these runners report running more miles per week, have a higher level of dedication towards running, and have greater incomes. Higher grit scores were also associated with those with greater levels of education, and ran because they found the sport interesting, or for their children or pets. Finally, a multiple linear regression model was developed in order to analyze which variables contribute to a higher level of grit, which include: education, dedication to running, years running, running for running (each statistically significant), and age.

INTRODUCTION

My interest in this topic starts with my passion: running. My passion for running has carried this research through the many stumbling blocks to reaching fruition. This research was seeking an answer to questions like why many doctoral medical students or MBA students have run a marathon, when only 0.5% of the United States population has completed a marathon?[1] What types of runners are tougher, and why? Why do they run? Through the lens of grit, and tools like the grit scale developed by Duckworth (Duckworth 2006, Duckworth and Quinn 2009, Eskreis-Winkler 2014), these questions and others in regards to the relationship between running and grit can be analyzed. The literature review will review grit, its definition, and how it fits with other personality trait research. Then the methodology for the study will be discussed, followed by results and discussion. The study was largely exploratory and open. The questions in the survey allowed the results to guide the research, and from the data, many interesting findings were made. While there are limitations to this and any other study, they are opportunities for future study.

Research into sports, psychology, motivation, mental toughness in life and sports, well-being, success, and more is a rapidly growing field. The findings among athletes not only help make better athletes, but a stronger, healthier human race.

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[1] "Marathon Running Statistics – Statistic Brain." *2013 Statistic Brain Research Institute*. Publishing as Statistic Brain. 2012 September 11. http://www.statisticbrain.com/marathon-running-statistics/

LITERATURE REVIEW

The base of the study on grit begins with Angela Duckworth. As reviewed in some detail below, Duckworth's work on grit is rich with potential research from which to build. While Duckworth is not the first researcher to identify grit and perseverance as indicators for success, she developed the first questionnaire to quantify grit levels called the "Grit Scale." She was able to test the relationships between achievement and talent, and the relationship between perseverance and talent. Grit is defined as "passion and perseverance towards long term goals" (Duckworth 2007). The gritty individual is one who "approaches achievement as a marathon… in [their] emphasis on long-term stamina rather than short-term intensity." Other concepts similar to grit in psychology are perseverance, resilience, and mental toughness (Weinburg 2009, McDougall 2011, Ratey and Hagerman 2009).

It is important to note that the definition of grit suggests that passion will lead to persistence and motivation. As suggested by Vallerand (2011), passion for an activity does not always lead to persistence. Furthermore, Vallerand (2011) acknowledge that passion is not the only reason why people engage in an activity. The hypothesis is in line with Self Determining Theory in that people engage in activity only in order to achieve "autonomy (a desire to feel a sense of personal initiative), competence (a desire to interact effectively with the environment), and relatedness (a desire to feel connected to significant others)" (Vallerand 2011). The definition used for passion is a strong inclination towards a self-defining activity like that one likes, finds important, and invests time and energy in. These activities define the person – a person passionate for running is a runner.

In order to test passion, Vallerand develops a Passion Scale, a 34-part questionnaire to test the two different types of passion: Obsessive and Harmonious Passion. The difference between the two types of passion is how they are internalized into the person's identity. Harmonious Passion (HP) is the autonomous internalization of the activity into the person's identity. The individual has freely chosen to engage in this activity. It is important to the individual, but does not occupy an overpowering use of time. The opposite is Obsessive Passion (OP), whereby the activity is undertaken due to external pressures for social acceptance purposes. Eventually, this type of passion takes an unhealthy level of time.

These are important concepts for the overall discussion of grit and running, especially if the working definition used involves passion towards long term goals. Vallerand (2011) posits that only Harmonious Passion eventually leads to positive psychological well-being, whereas Obsessive Passion does not. Both types of passion lead to improved performance because both involve a high number of hours and regimental discipline, though only Obsessive Passion will lead to mastery and performance approach goals because this type of passion is more external. Therefore, either type of passion will lead to improvement in the chosen field, but while only one is psychologically healthy (HP), the other will lead to mastery (OP). Duckworth and Vallerand both hypothesize that grit and passion can be learned, but the best practices to develop either are still to be determined.

An assumption of much of the research from Duckworth, Bloom, Vallerand, and others is the Self-Determination Theory (SDT). Mentioned above, SDT was introduced by Deci and Ryan (1985) as a framework suggesting that there are three psychological needs: autonomy, competence, and relatedness. This framework of the three psychological needs make it easier to "explain affective, cognitive, and behavioral responses" (Lox, et al. 2003, page 48) when it comes to motivation. This theory designs a framework to explain motivation within a field where achievements could be made.

This theory is supported by five "minitheories" (Deci and Ryan 1980, Deci and Ryan 1985, Ryan and Deci 2000, Ryan 2009, Vansteenkiste 2010). The first of these is the Basic Psychological Needs minitheory (BPNT) that further defines the Self-Determination Theory. The BPNT asserts that growth, development, and well-being are most readily achieved by satisfying all three of psychological needs: competence, relatedness, and autonomy. Without one of the needs satisfied, people may feel "alienated or ill-being" (Deci and Ryan 1985).

The second, Cognitive Evaluation Theory (Deci and Ryan 1985), looks at the different events, both external and internal that factor into intrinsic motivation. The third, Organismic Integration Theory (Deci and Ryan 1985), asserts that the level extrinsic motivation is dependent upon how internalized the motivation is. The fourth, Goal Content Theory (Vansteenkiste et al. 2010), holds that different types of goals, intrinsic and extrinsic, have different types of rewards. These rewards fulfill the basic psychological needs in different

ways. Finally, Causality Orientations Theory (Deci and Ryan 1985), finds that all people already have different levels of the psychological needs of relatedness, autonomy, and competence satisfied, however the goals set by the individual work to enhance the need that is least fulfilled.

An understanding of the work done by Deci and Ryan (1985), Vansteenkiste et al. (2010), Vallerand (2011), and others is vitally important because these theories look towards the reasons why individuals pursue their chosen activity. Why people set the goals they set in the activities that they participate in leads to the discussion of passion. The discussion of passion leads to the discussion of working towards long-terms goals and the motivation of behind working. The topic of this study is the approach work as a marathon, where gritty people have the advantage of stamina (Duckworth 2007). Duckworth predicts that grit can be taught. It is general accepted that motivation can be enhanced and there are those (Vallerand et al. 2007, Vallerand 2011, Starkes 2011) that suggest that passion can also be enhanced or diminished based on external or internal events.

There are several motivations to perform a specific activity, and running is not exception an (Vallerand 2011, McDougall 2011, Ratey 2009, Carmac and Martens 1979, Hausenblas and Symon Downs 2002). People are motivated to run because of addiction, sport commitment, exercise dependency, boost energy, abatement of depression, obesity, diabetes, memory loss, weight loss, and other external motivators. Other motivators that have been less researched are the effects of socializing with friends, running with a pet or with children, beating previous personal records, or simply because it is interesting. Furthermore, there is limited discussion on the most compelling reasons for practitioners to engage in a given sport, only the types of motivation, extrinsic versus intrinsic or self-determination theories of motivation, that push athletes to engage in a particular sport.

There are several ways to measure how well-off an individual is from engaging in a particular activity. Vallerand (2007) and Blanchard et. al (2009) use subjective well-being in order to determine how well-off an individual is from running. This measure uses an individuals' own assessment of their life in order to determine their well-being, which is used to correlate to other variables.

Ultimately, possessing the personality trait of grit involves seeing life as a marathon and not as a sprint (Duckworth). However, if this analogy shows what grit is, then does it actually hold true for those best in the position test it—runners? What is actually the relationship between running and grit among runners?

METHODOLOGY

A survey was developed to be distributed to all runners in order to measure their grit, inquire about their running habits, and demographic questions. The survey is included in Appendix A.

Survey Part 1: Grit Scale

The first part of the survey is the short grit scale developed by Duckworth. Duckworth's 8-question grit score is included in Appendix B, which includes scoring and how to calculate grit from the responses. Responses are linked to a value between 1 and 5, and the average of these values is taken to derive the grit score.

Survey Part 2: Running Questions

Variables examined by the running questions included:

a) Number of miles run per week: an open text box with only numerical responses accepted.

b) Number of years the individual has been running: an open text box with only numerical responses accepted.

c) Dedication to Running: a 1-5 scale where 1 is not very dedicated at all to running and 5 is very dedicated to running.

d) Reasons for running: 14 reasons for running were included in order to evaluate why respondents were engaging in running in order to evaluate which, if any, would correlate to higher levels of grit. These reasons include the following:

   1. Sleep benefits

   2. Boosts energy

   3. Find it interesting

   4. Socialize with my friends

5. To beat my personal records

6. Weight loss or management

7. To become stronger and faster

8. Stress relief, coping with stress

9. Boosts self-esteem and confidence

10. To spend time with my children or my dog

11. Meditation and cognitive benefits: mental acuity, memory

12. Running addiction, and face withdrawal symptoms if I don't

13. Cheap form of exercise: avoid expensive gyms or other sports

14. Cope with clinical mental conditions such as depression, ADHD, ADD, anxiety, or others

Survey Part 3: Demographic Questions

Variables that looked at demographic information were as follows:

a) Gender

b) Year of birth: A variable asked in order to gather age data, and control for the number of years running.

c) Ethnicity: Caucasian/White, Hispanic/Latino, Asian, African American/Black, Pacific Islander, and American Indian/Alaskan Native

d) Marital status: Never married, Committed long-term relationship, Married, Divorced, and Widowed.

e) Highest level of education: Categorical variable Some high school or less, High school diploma, GED, Some college, Associates degree, Bachelors degree, Masters degree, Ph.D., Professional or non-Ph.D. doctoral degree (e.g. J.D., Psy.D., Ed.D.)

f) Personal income before taxes: an open response that only accepted numerical responses, and was the only question not required in order to complete the survey.

g) Occupation: and open variable inviting a wide variety in responses.

In order to send the survey out to a population of runners, data was collected from runningintheusa.com of all running clubs and associations across the United States. Runningintheusa.com provides a comprehensive list of running clubs and associations that is actively monitored and policed. While there are other sites that provide the same services, such as coolrunning.com or forums such as runningahead.com, runningintheusa.com provides more up to date information about its running clubs.

This was also how the study defines a runner: by their association with a running club or association. While this has many limitations and encourages a response bias, this population of runners is a reliable and stable definition of runners. Determining the different ways a runner can be defined is important because questions arise as to what classifies a runner. For example, is there a minimum threshold of years or mileage in order to qualify as a runner, or should be subjective where the responder is simply asked, "Are you a runner?" Being a member of a running club or association presents the least challenging way to create a baseline population, and the least challenging way to define what constitutes runner because they are identified and reached through an association with a community of individuals.

In total, email addresses were found for 1,200 running clubs and associations across the United States. The administrators of the running clubs and associations were emailed the survey, imploring them to send out the survey to their members. Of this number, 5% of running club and association administrators were expected to respond and send the survey to their membership. With an average of 100 members per club, and a response rate of another 5% among runners, expected sample of data was 300 responses.
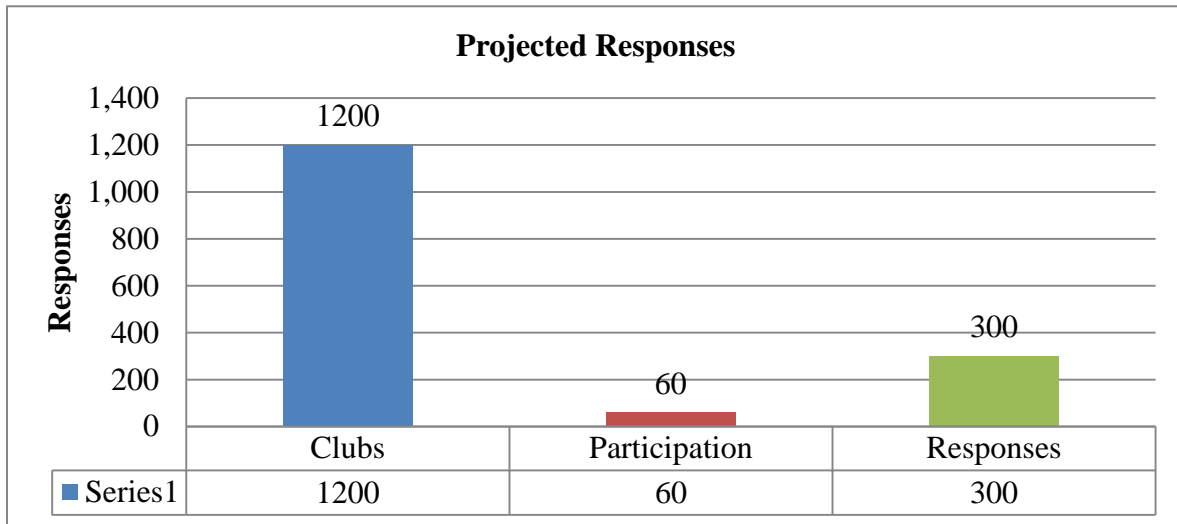
Chart 1: Expected Survey Response Rate

However, as a testament to the tight knit communities often formed around running clubs and associations, the compelling research topic, and the huge number of runners who are members of running clubs and associations, participation rates were much higher.

1,269 completed survey responses were recorded from all 50 states and 12 other countries. A summary of results from the survey are provided in Appendix C.

RESULTS

Grit scores among the population of runners was an average of 3.78, with a standard deviation of 0.56. This is comparable to the grit scores exhibited by Duckworth's studies of West Point Cadets (2007), who displayed average grit levels of 3.78 (0.53), and 3.75 (0.54). While higher grit scores in West Point cadets was correlated to greater retention rates, the following analysis will analysis what levels of grit means for the runner.

Grit among runners:
M: 3.78   SD: 0.56

Grit among runners who did not complete the survey:
M: 3.84   SD: 0.58

Grit among adults, aged 25 and older:
M: 3.65   SD: 0.73
M: 3.41   SD: 0.67

Grit among West Point Cadets:
M: 3.78   SD: 0.53
M: 3.75   SD: 0.54

Table 1: Grit Scores among various studies. As seen above, grit among runners in this study is comparable to grit levels of West Point Cadets. Furthermore, grit scores of those who did not complete the full survey were higher when compared to grit levels of all other studies. This will be further explored in Discussion.

Average dedication, miles per week, and income to running and grit

Dedication to running was a self-reported evaluation of the respondent's level of dedication to running. It was reported on a scale from 1-5, where a score of 5 was "very dedicated," and 1 was "not very dedicated at all." In Appendix C.4, a chart is provided of the levels of dedication among survey respondents. Unsurprisingly, the responders, all members of running clubs and associations indicated that they were highly dedicated and committed to their running. Dedication to running had the highest correlation to grit as compared to any other variable in this study at 0.2348.
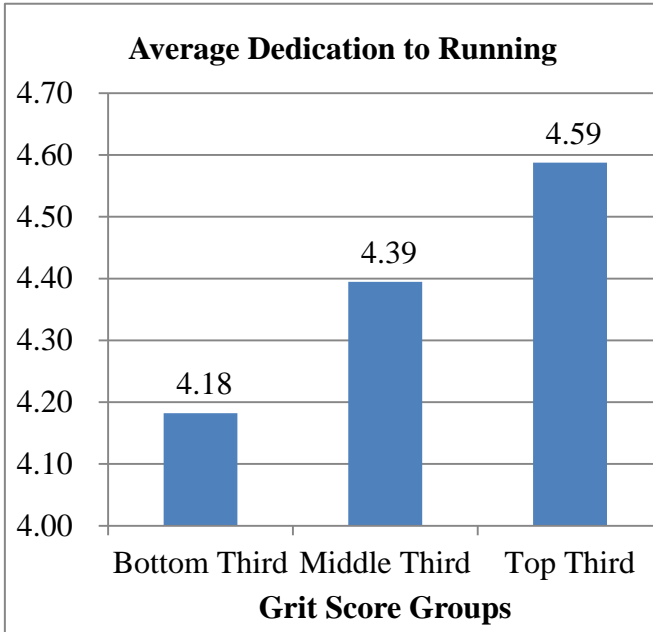
Average Dedication to Running

Chart 2: Average dedication to running by 3 percentile groups of grit scores.

Furthermore, grit scores among those that indicated more dedication were higher than those with lower dedication. In order to analyze these results most effectively, grit scores were divided into three percentiles: the bottom 33% of grit scores, the top 33% of grit scores, and the middle 33% of grit scores. As the Chart 2 makes clear, those in the top 33% of grit scores were more dedicated to running. The same trend is identified in the average miles per week and grit, and income and grit when the sample was divided into three percentile groups, as by Charts 3 and 4 respectively.

While causal relationships cannot be explored through this cross sectional data, the correlations by the top percentiles of grit are clear. For the three variables above, the greater the income, average miles per week, or average dedication to running, the higher the average grit score. In terms of statistical correlation, the both miles per week and income had a positive correlation at 0.1555 and 0.0505, respectively.

Chart 3:Average Miles Per Week

Chart 4: Income by Grit Score Groups
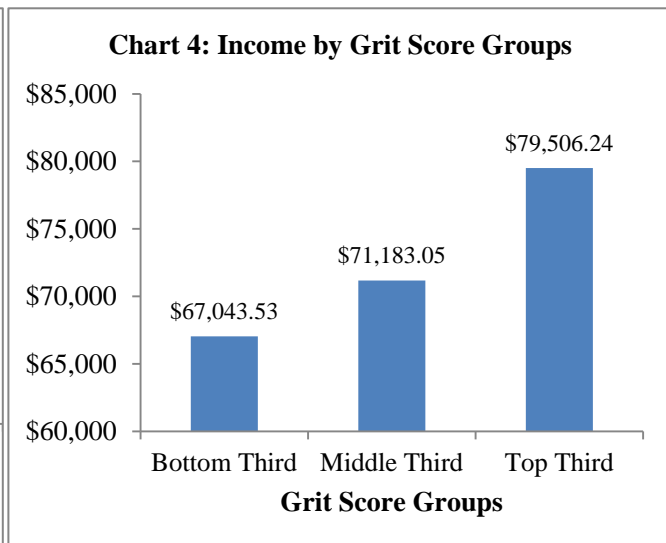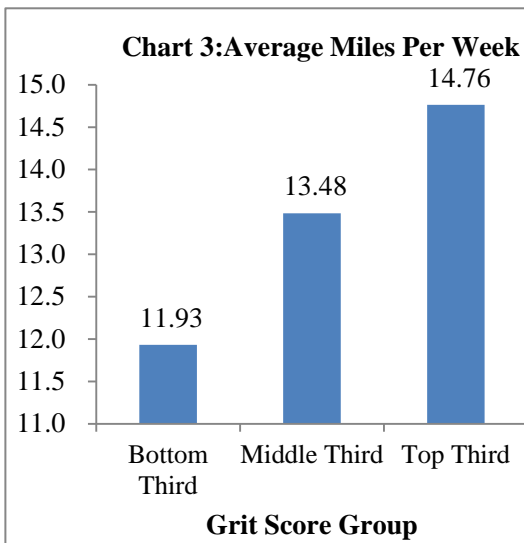
Age

Age is a variable that Duckworth (2007) finds in studies of grit scores among adults aged 25 or older at the 1% level. For this reason, age was analyzed as a variable that may have an impact on grit scores of runners over time. It was also kept in the bilinear regression model as a variable, though the data here did not support this claim. When looking at age in terms of grit, as shown in the chart in Appendix D, it is clear that some ages overtime grow grittier, for example, the sequence of ages 30-69. However, grit is shown to drop off after 70, but so, too, does the total number of responses in those age groups.

Furthermore, another interesting aspect of this chart is grit scores among young people. Young people reported grit scores that were higher than candidates as West Point. Perhaps the young people that responded actually were grittier because they are on sports team and need to be grittier than their peers in order to balance home, work, and socializing. On the flipside, perhaps these young people are reporting that they are grittier because they are surrounded by a majority of millennials that research suggests are much less gritty. This, this group could be reporting that they are grittier, especially when compared to their peers. Finally, this group of unnaturally high grit scorers could also have not been as truthful

Gender, ethnicity, and education

For gender, there was a 0.03 difference in average grit between the two groups. Furthermore, this variable's correlation to grit was the least impactful on grit scores, only correlating to 0.0077 of the grit score.

Ethnicity was not taken into the model or analyzed further because nearly 89% of respondents were Caucasian. The other ethnicities were only represented at a level at or below 4% in the population size.

Education, however, showed interesting results. With the exception of respondents in high school, or with a GED, grit levels went up as the individual had more education. While this was not a variable necessarily related to running, it did confirm findings in earlier studies by Duckworth (2007) that education levels have a significant correlation with grit. Education was

a variable that was kept in the model, even though education was a variable outside the sphere of running.

Reasons for running

Some of the most interesting findings were pertaining to the reasons why individuals were choosing to run. Appendix C.5 displays a chart with the ranked reasons in terms of popularity. What is interesting is that the most popular reasons why people run are purely individual: running to cope with stress, to be stronger and faster or to boost self-esteem and self-confidence, are all internal, intrinsic reasons to run. Even though the survey was sent to members of running clubs and associations, the reasons for running had nothing to do with friends, social interaction, or camaraderie. Friends as a reason to run ranked ninth of the fourteen listed.

Furthermore, in Appendix F, grit score data is plotted with the ranked reasons why people run in order to determine if there are reasons why people run that correlate to higher grit scores. When grit scores are overlaid, of those people who responded that coping with stress was the truest reason for running actually had the lowest average grit score. In fact, as seen in Appendix F.2, coping with stress had a negative correlation with grit. Conversely, those that run simply because running is interesting have the highest grit scores.

Another important aspect of looking at grit levels of those who chose a certain reason to run is that is it possible to be analyze how different attitudes towards running is correlated to the grit score. For example, for those who run for their children or their dog: while it is the least popular reason to run, it correlates to one of the highest populations of grit. Runners who run for their dogs or children are, on average, grittier than those who run to cope with stress or to become stronger and faster.

This could be due in part because a dog needs to be taken out, and the owner of the dog thus has an extrinsic motivator to go out and run with the dog. This extrinsic motivation may have forced the runner to become grittier as a result of constantly being unable to compromise the run, and may have permeated to other aspects of their life. While this is only one explanation, it is certainly not the only one.

Multiple Linear Regression Model

A multiple linear regression model was developed in order to determine if variables that had been tested for and were highly correlated could actually be used to predict grit levels in runners, thereby testing if there could be a formulaic approach to grit levels by analyzing the reasons why people run, in conjunction with other variables regarding their running or other aspects of life.

Ultimately, the multiple linear regression models would pursue conditions of running or a person's life that could be a predictor to success. If factors relating to running could be attributed to higher levels of grit, and if grit is a predictor of success, then perhaps the multiple linear regression model could be a tool to analyze if running can be linked to success.

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5$$

Variable Name:	Beta Coefficient:
Age:	$\beta_1 = -0.0005355$
Education:	$\beta_2 = 0.04424$***
Dedication to Running:	$\beta_3 = 0.1197756$***
Years Running:	$\beta_4 = 0.0036174$**
Reason: Find running interesting	$\beta_5 = -0.0600784$***
Constant:	$\beta_0 = 3.062435$

Adjusted R-squared: 0.0798

In the regression model, five variables are taken, and each were significant at least at the 5% level. For the *Reason: Find running interesting* variable, it is important to note that this is negative because as the value of *Reason: Find running interesting* goes up, the subject is reporting that this is further and further from that actual reason why they are engaging in running. The closer this variable is to 1, the truer it is that the subject is running because they find the sport interesting. Therefore, the lower the value for "*Reason: Find running interesting*" the more true it is for the respodant that they find running interesting, hence the negative correlation.

Age is rejected by the model as a predictor of grit; however, it is kept in the model as Duckworth (2007) and others have found that age is actually in factor in grit, and grit grows as a person ages.

DISCUSSION

This study allowed for insight into many different components of running, grit, and other factors in life, and sought to make connections between these several links. The variables chosen allowed for an inquiry into many facets of the relationship between running and grit.

Some key findings include the following:

- The top 33% of gritty runners have greater incomes, report greater dedication to running, run more miles on average per week, and have been running for a greater number of years.

- After a GED, runners with more education have higher grit scores for education.

- Age, while it is a significant factor in grit among adults aged 25 and older (Duckworth 2007), it was not statistically different from zero in this analysis.

- The reasons why the grittiest runners run are not necessarily the most popular reasons. These reasons include (1) finding it interesting, (2) boosting self-esteem and self-confidence, (3) to spend time with a child or a pet, (4) to cope with depression or other clinical medical conditions, and (5) to beat personal records. Of these reasons, finding the sport interesting is the highest correlating reason for grit at 0.16.

- Gender and ethnicity were not factors in determining grit levels

So what?

This study is important because running is a major pastime for people around the world. Whatever the reason, thousands of people run in the United States alone, and that number is increasing as Americans are more aware of health concerns and better educated regarding the benefits of leading a healthy lifestyle. Since 1990, growth in running event finishers has nearly tripled, and the running shoe market has doubled in size since 1998[2].

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[2] Running USA. "2013 State of the Sport – Part II: Running Industry Report." 2013 June 26. http://www.runningusa.org/state-of-sport-2013-part-II?returnTo=annual-reports

Studies have shown that grit is an indicator of success in reaching goals, and if factors relating to running can be indicators of grit, this is important because it means that through running perhaps people can find success.

Limitations of the study

There are several limitations to the study:

1. Self-reported data: All of the data used in this study was derived through self-reported data. The grit scale, as many indicated, including Duckworth (2006), can be manipulated by respondents who may want to indicate that they have a higher grit score. This response bias may affect the grit scores, but may also affect several other questions, such as income, average miles run per week and overall dedication to running.

2. No development of grit over time: As this data is only cross-sectional, it is not within the scope of this project to track respondent's running activities and grit levels over periods of time. For this reason, it is not possible to determine if grit causes people to run, or if running builds grit. However, this is an interesting question to explore in future studies.

3. No data to compare with non-runner: Other than the data presented by Duckworth through numerous studies and publication, the only comparable data is that of means and standard deviations to other groups of people who took the survey. Other than comparing average scores, there is now to point out that runners are actually grittier than non-runners. Runners are looked at exclusively through this study, and all measurements are based off of members of the running community.

4. Did not account for all reasons for running: The survey opens up to collect other reasons why people run. In the comment section, runners had answers such as "I love nature" and "Because I was born to run" and "Just for some fresh air" and "For the challenge" – these reasons, and others indicated in the open section, were not included

in the study as reasons why people run. These missing reasons are an interesting area to explore in future studies.

5. Similar demographics for many survey respondents: In analyzing the summary of responses in Appendix C, it is clear that this study collected survey responses from an overwhelmingly narrow group of individuals, socially, racially, and ethnically: 89% of the survey responses were Caucasian, 66% were married, 60% were female, and 66% had either a bachelor's or master's degree. While this study concluded that gender and ethnicity were statistically insignificant, a more diverse pool of respondents may prove otherwise. Furthermore, this could have been a limitation of the methodology used when sending the survey to a targeted audience. Though the sample size is very robust, perhaps it is not all encompassing of the various institutions that support runners.

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APPENDICES

Appendix A – Survey

Introduction:

Hi,

I am a Senior Honors student at Bryant University, completing my capstone research project. Like you, I am a runner, and I am interested in the relationship between running and a personality trait called grit. Angela Duckworth, an Associate Professor at the University of Pennsylvania, defines grit as "perseverance and passion towards long-term goals." The question I am trying to answer is if running is an indicator of grit, or do gritty people run? What is the relationship, and how do running and grit build upon one another? Duckworth has developed the following Grit Score assessment, which will allow me to explore the relationship in your life between running and grit. Information about the Grit Test, Duckworth's research, and more can be found here: https://sites.sas.upenn.edu/duckworth/

This survey consists of 3 short sections that should take a total of 15 minutes to complete.

    (1) Questions about you and grit

    (2) Questions about your running life

    (3) Demographic information questions

Please feel free to email me if you have any questions at rohan.vakil@yahoo.com. Your individual survey results will be kept completely confidential, and your participation is totally voluntary. By clicking below, you are acknowledging that you are at least 18 years of age and have read the information provided above. You may opt out of the study at any time.

All the best, and happy running!

-Rohan Vakil

Directions for taking the Grit Scale: Here are a number of statements that may or may not apply to you. For the most accurate score, when responding, think of how you compare to most people -- not just the people you know well, but most people in the world. There are no

right or wrong answers, so just answer honestly!

	Very much like me	Mostly like me	Somewhat like me	Not much like me	Not like me at all
1. New ideas and projects sometimes distract me from previous ones.	❏	❏	❏	❏	❏
2. Setbacks don't discourage me.	❏	❏	❏	❏	❏
3. I have been obsessed with a certain idea or project for a short time but later lost interest.	❏	❏	❏	❏	❏
4. I am a hard worker	❏	❏	❏	❏	❏
5. I often set a goal but later choose to pursue a different one.	❏	❏	❏	❏	❏
6. I have difficulty maintaining my focus on projects that take more than a few months to complete.	❏	❏	❏	❏	❏
7. I finish whatever I begin.	❏	❏	❏	❏	❏
8. I am diligent.	❏	❏	❏	❏	❏

What is your average number of miles run per week:

How many years have you been running?

How dedicated are you to running?

	1	2	3	4	5
Please move the sliding scale to correspond with your level of dedication to running.	❏	❏	❏	❏	❏

The reasons I run include...

	Most true for me	Somewhat true for me	Neutral	Somewhat untrue for me	Not at all true for me
Sleep Benefits	❏	❏	❏	❏	❏
Boosts Energy	❏	❏	❏	❏	❏

Find it interesting	❏	❏	❏	❏	❏
Socialize with my friends	❏	❏	❏	❏	❏
To beat my personal records	❏	❏	❏	❏	❏
Weight Loss or Management	❏	❏	❏	❏	❏
To become stronger and faster	❏	❏	❏	❏	❏
Stress relief, coping with stress	❏	❏	❏	❏	❏
Boosts self esteem and confidence	❏	❏	❏	❏	❏
To spend time with my children or my dog	❏	❏	❏	❏	❏
Meditation and Cognitive benefits: mental acuity, memory,	❏	❏	❏	❏	❏
Running Addiction, and face withdrawal symptoms if I dont	❏	❏	❏	❏	❏
Cheap form of exercise: avoid expensive gyms or other sports	❏	❏	❏	❏	❏
Cope with clinical mental conditions such as depression, ADHD, ADD, anxiety, or others	❏	❏	❏	❏	❏

Other reasons?

Gender

1. Male

2. Female

3. Choose not to respond

Year of Birth (YYYY)

Do you currently live in the United States

1. Yes

2. No

Ethnicity (please check all that apply)

1. Caucasian/White

2. Hispanic/Latino

3. Asian

4. African American/Black

5. Pacific Islander

6. American Indian/Alaskan Native

Marital Status

1. Never married

2. Committed long-term relationship

3. Married

4. Divorced

5. Widowed

Highest level of education:

1. Some high school or less

2. High school diploma

3. GED

4. Some college

5. Associates degree

6. Bachelors degree

7. Masters degree

8. Ph.D.

9. Professional or non-Ph.D. doctoral degree (e.g. J.D., Psy.D., Ed.D.)

What is your personal income before taxes?

What is your occupation?

Appendix B – Duckworth's 8-Point Grit Scale

Short Grit
Scale

Directions for taking the Grit Scale: Here are a number of statements that may or may not apply to you. For the most accurate score, when responding, think of how you compare to most people -- not just the people you know well, but most people in the world. There are no right or wrong answers, so just answer honestly!

1. New ideas and projects sometimes distract me from previous ones.*
    o Very much like me
    o Mostly like me
    o Somewhat like me
    o Not much like me
    o Not like me at all

2. Setbacks don't discourage me.
    o Very much like me
    o Mostly like me
    o Somewhat like me
    o Not much like me
    o Not like me at all

3. I have been obsessed with a certain idea or project for a short time but later lost interest.*
    o Very much like me
    o Mostly like me
    o Somewhat like me
    o Not much like me
    o Not like me at all

4. I am a hard worker.
    o Very much like me
    o Mostly like me
    o Somewhat like me
    o Not much like me
    o Not like me at all

5. I often set a goal but later choose to pursue a different one.*
    o Very much like me
    o Mostly like me
    o Somewhat like me
    o Not much like me
    o Not like me at all

6. I have difficulty maintaining my focus on projects that take more than a few months to complete.*
- o Very much like me
- o Mostly like me
- o Somewhat like me
- o Not much like me
- o Not like me at all

7. I finish whatever I begin.
- o Very much like me
- o Mostly like me
- o Somewhat like me
- o Not much like me
- o Not like me at all

8. I am diligent.
- o Very much like me
- o Mostly like me
- o Somewhat like me
- o Not much like me
- o Not like me at all

Scoring:
1. For questions 2, 4, 7 and 8 assign the following points:
   5 = Very much like me
   4 = Mostly like me
   3 = Somewhat like me
   2 = Not much like me
   1 = Not like me at all

2. For questions 1, 3, 5 and 6 assign the following points:
   1 = Very much like me
   2 = Mostly like me
   3 = Somewhat like me
   4 = Not much like me
   5 = Not like me at all

Add up all the points and divide by 8. The maximum score on this scale is 5 (extremely gritty), and the lowest score on this scale is 1 (not at all gritty).

Grit Scale
citation

Duckworth, A.L, & Quinn, P.D. (2009). Development and validation of the Short Grit Scale (Grit- S). Journal of Personality Assessment, 91, 166-174. http://www.sas.upenn.edu/~duckwort/images/Duckworth%20and%20Quinn.pdf

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, 9, 1087-1101. http://www.sas.upenn.edu/~duckwort/images/Grit%20JPSP.pdf

Appendix C – Summary of Survey Responses

C.1. Survey Completion rate:
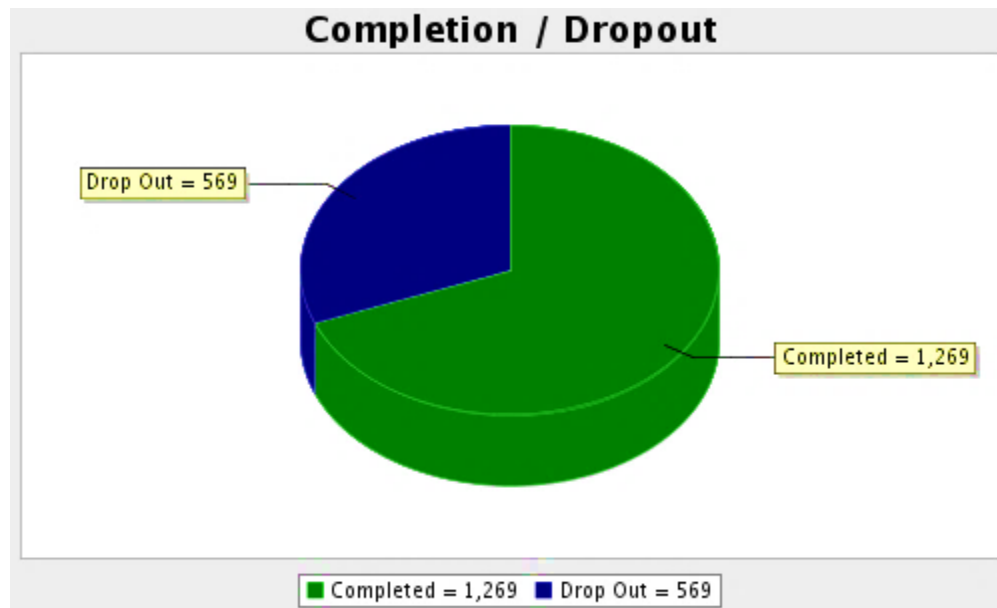
C.2. Miles Per Week

Mean: 26.28, Standard Deviation: 15.1

Min: 0, Max: 120
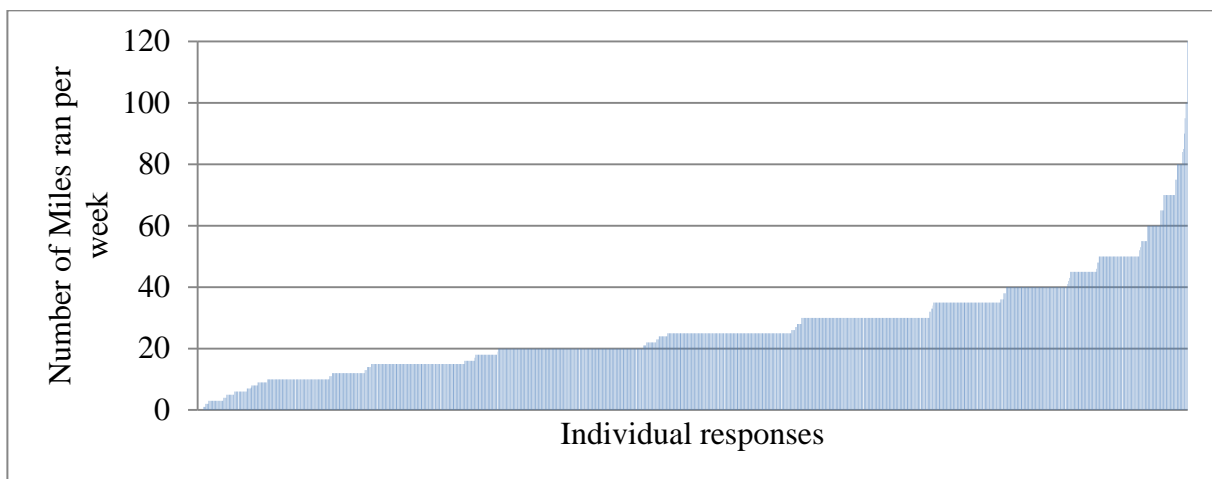
C.3. Years Running

Mean: 13.2, Standard Deviation: 11.8

Min: 0, Max: 60
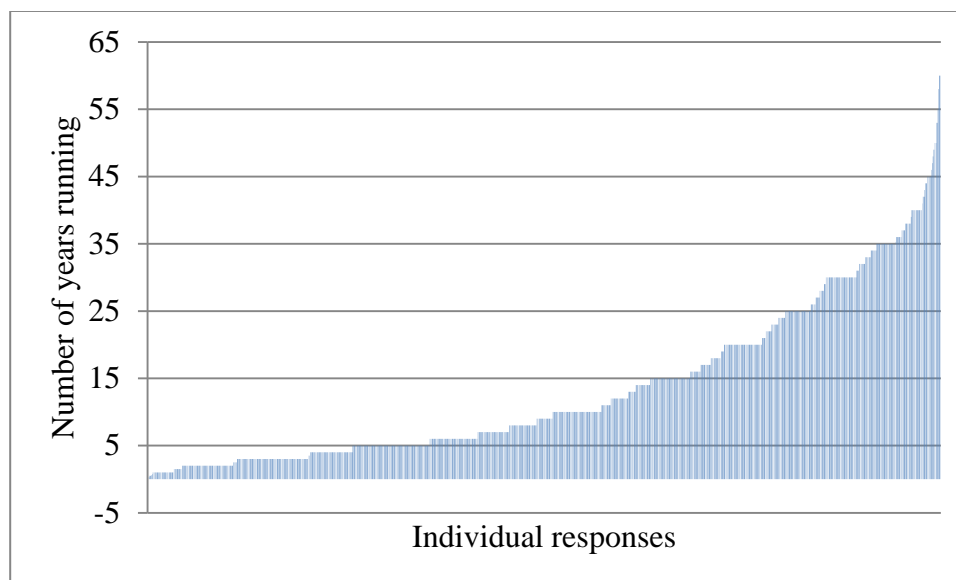
C.4. Dedication to Running
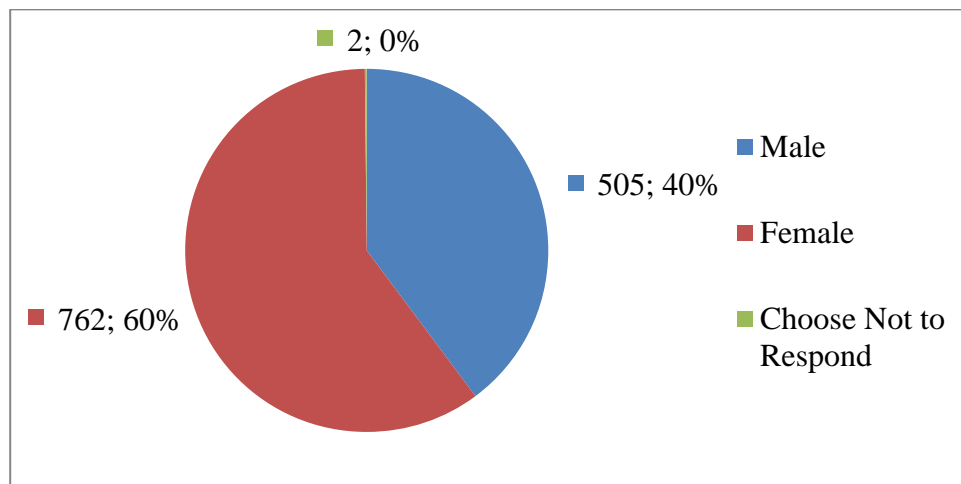
Mean: 4.38, Standard Deviation: 0.876
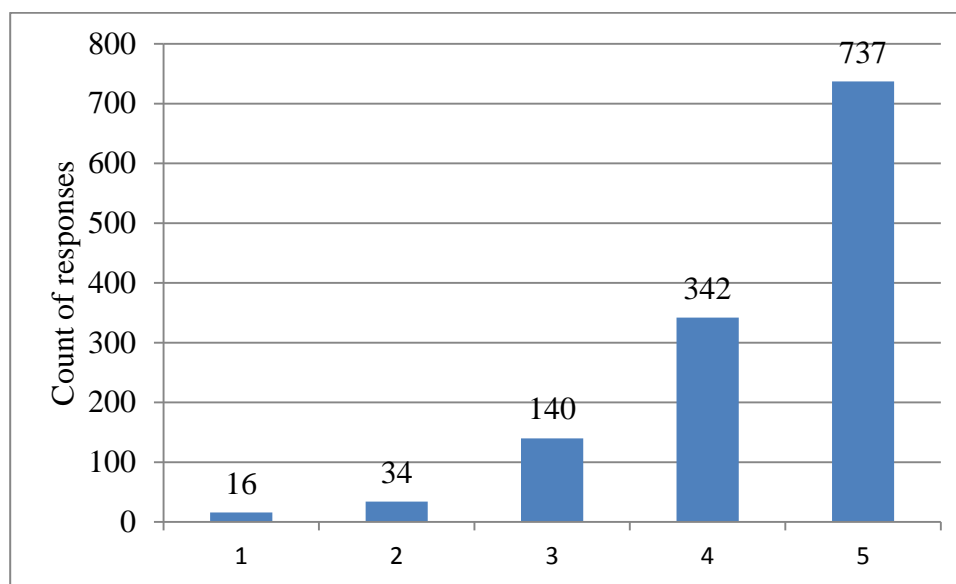
C.5. Ranked Reasons for Running

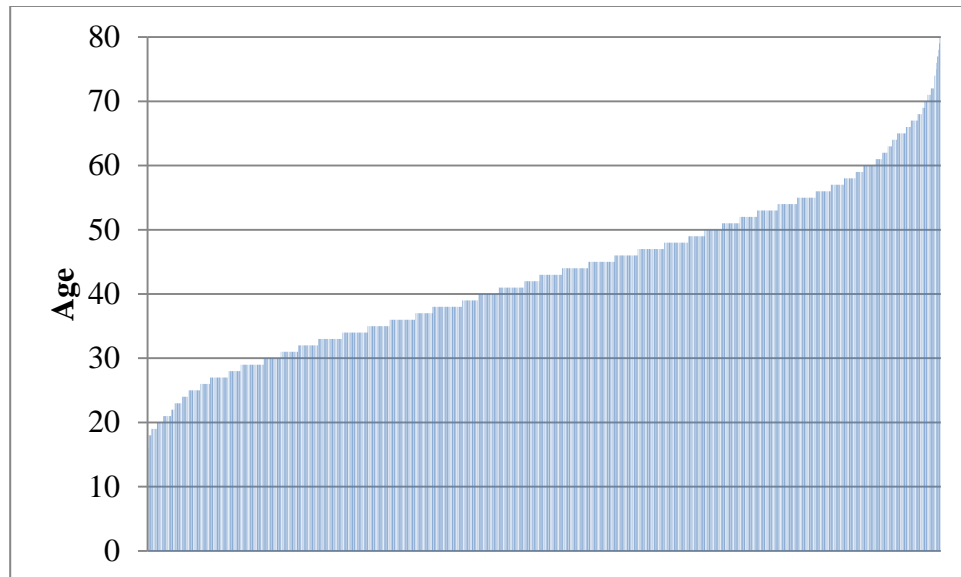Note: A lower score is indicative to more popularity as a reason for running

Reason	Score
Cope with stress	1.64
Stronger and faster	1.75
Boost self esteem and confidence	1.79
Interesting	1.88
Energy	1.9
Weight Loss	2.12
Beat my PRs	2.24
Meditation, Mental acuity	2.48
Friends	2.54
Running Addiction	2.75
Cheap form of exercise	2.82
Sleep Benefits	2.84
Cope with Depression, ADHD, ADD	3.81
Time with my kids or dog	4.17

C.6. Gender

Male: 505; 40%
Female: 762; 60%
Choose Not to Respond: 2; 0%
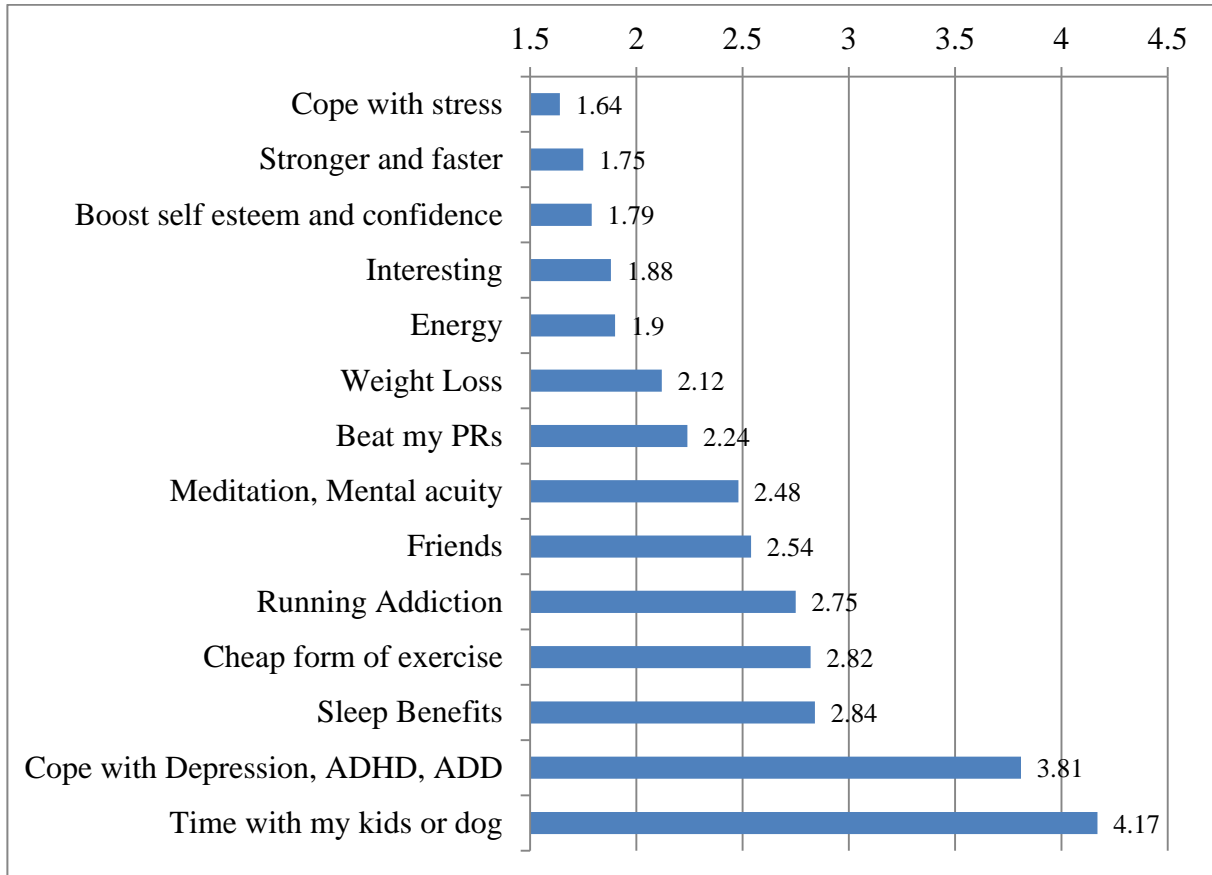
C.7. Age

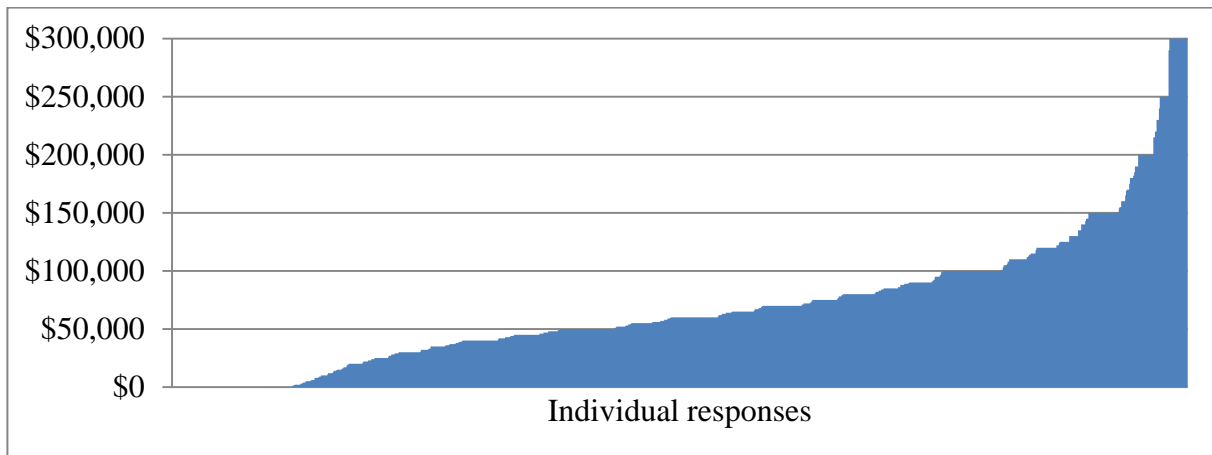Mean: 43.0, Standard Deviation: 12.3

Min: 16, Max: 89

C.8. Marital Status
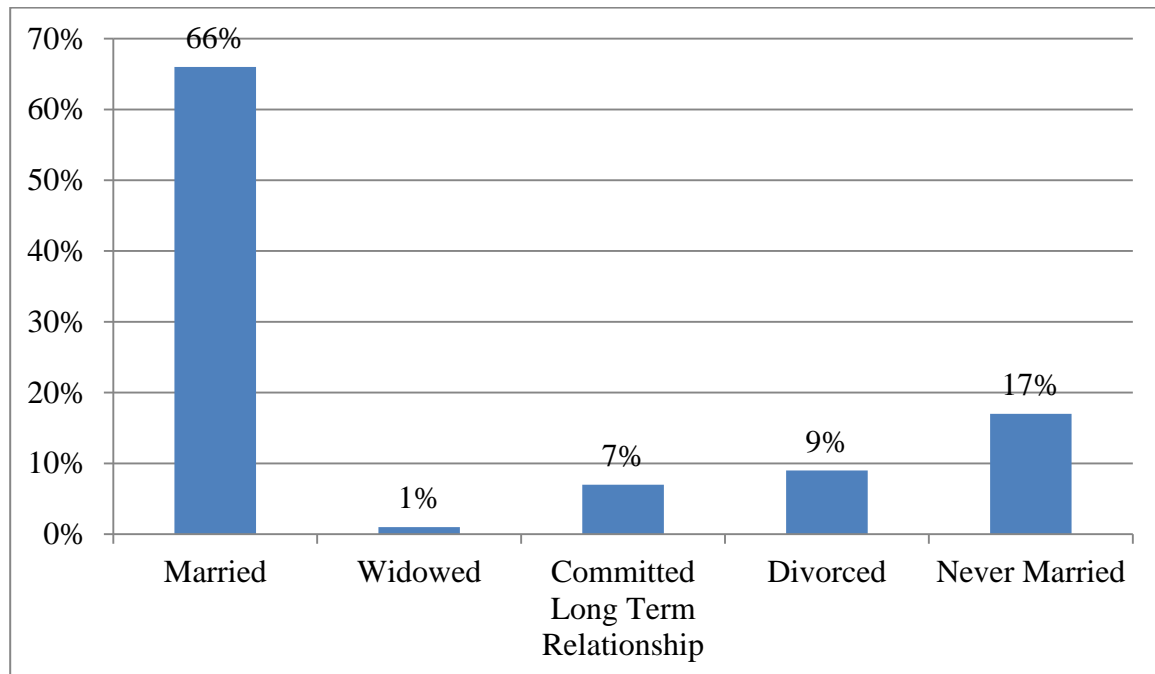
C.9. Education
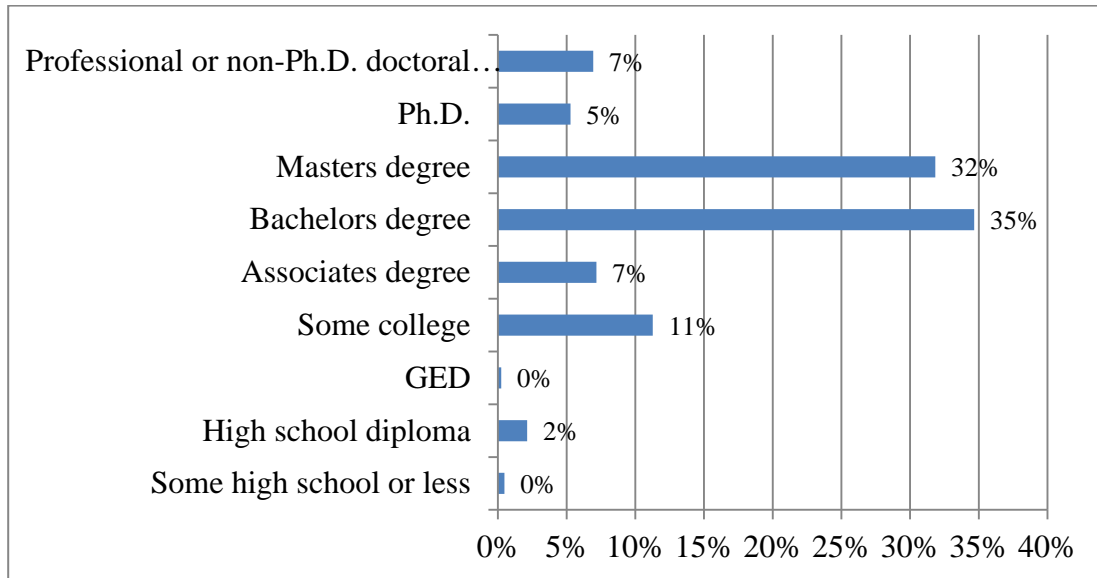
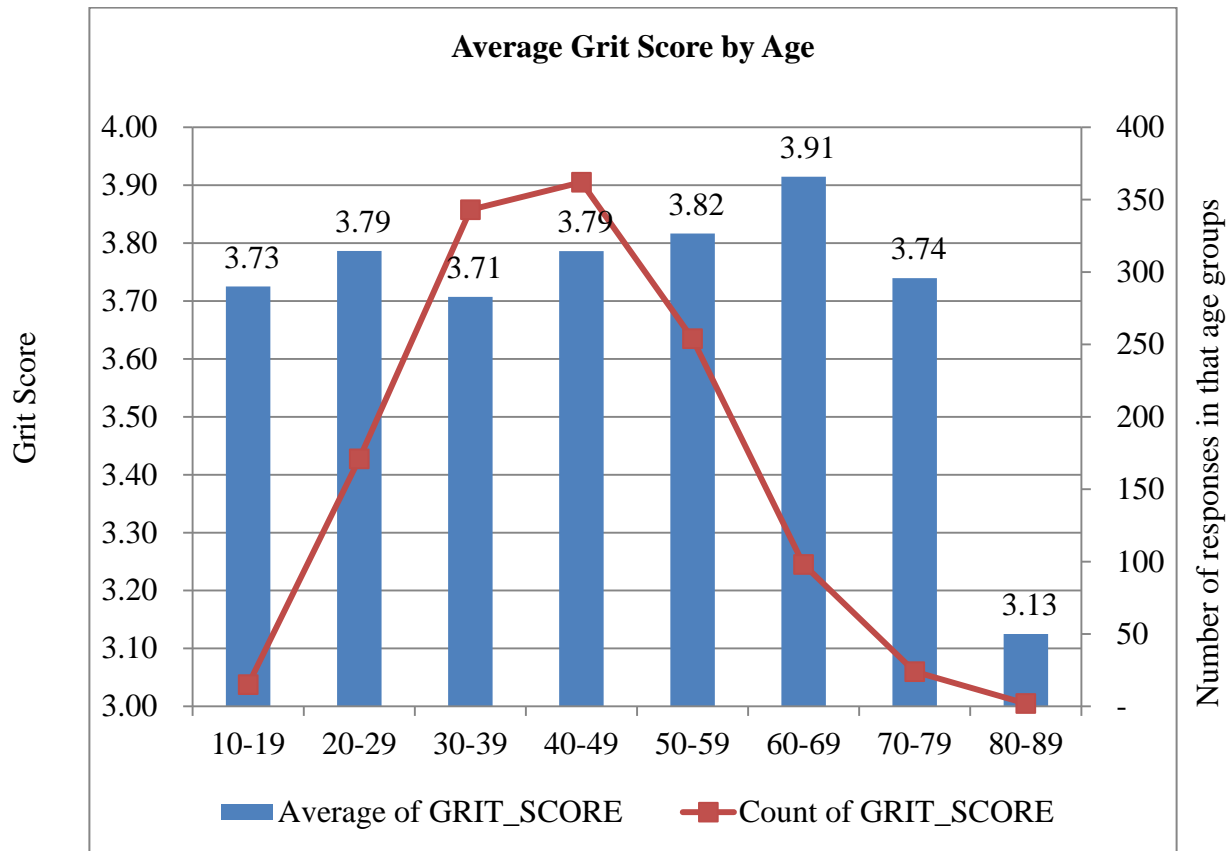

C.10. Income

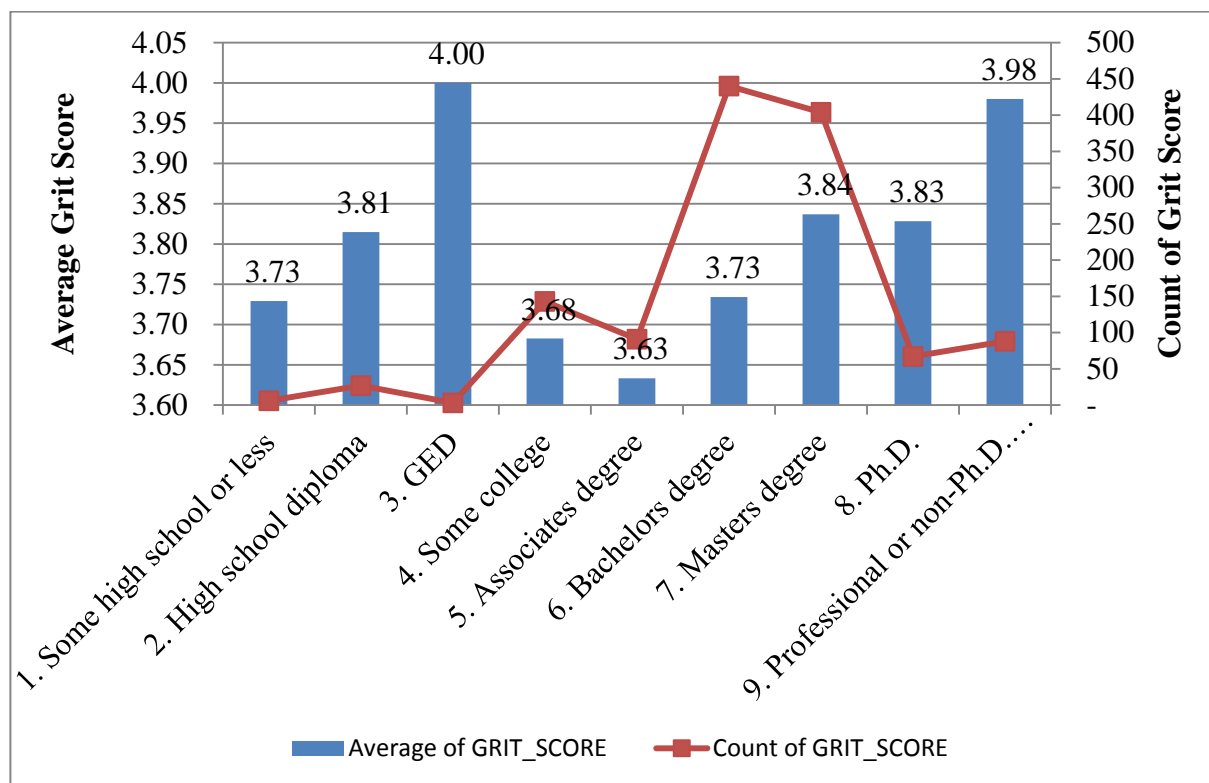Mean: $72,378.42, Standard Deviation: 76,586.25

Min: $0, Max: $1,000,000.00

Appendix D – Age and Grit

Average Grit Score by Age

In this chart, levels of grit in blue are averaged between age groups. These age groups have various levels of grit. Furthermore, included is a line chart showing the responses rate for that particular age range.

Appendix E – Education and Grit

Appendix F – Reasons to Run, Grit Levels, and Correlations
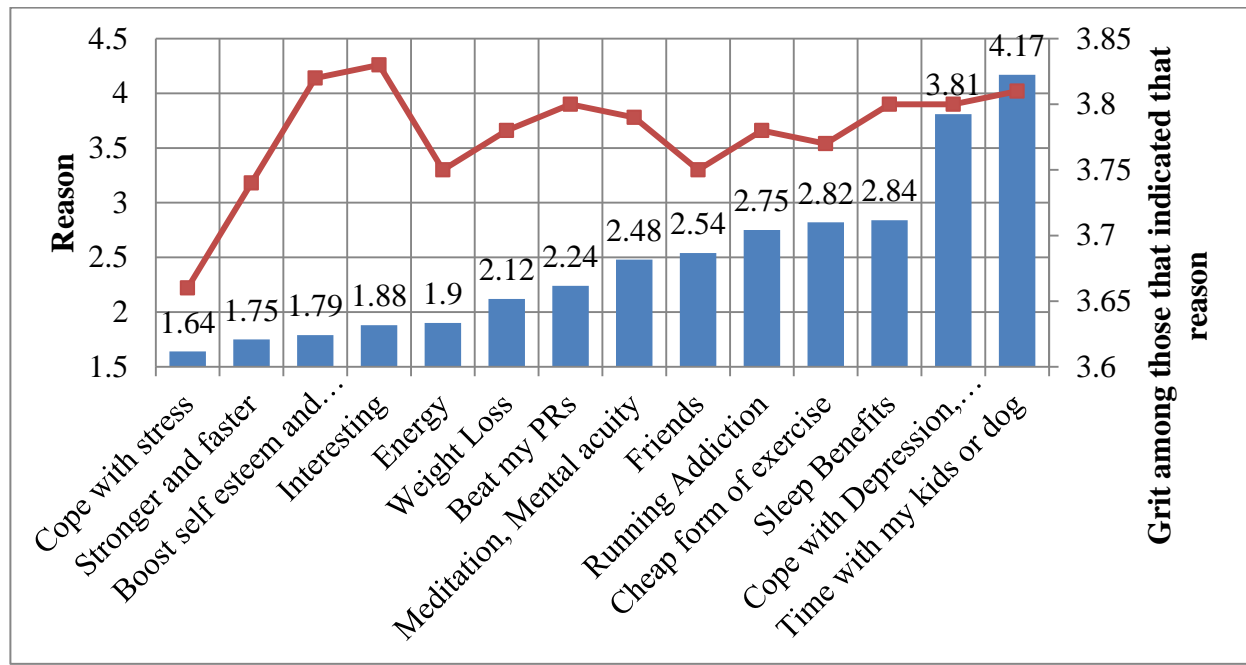
F.2. Statistical correlations to grit