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## The Relationship Between Grit and Growth Mindset in Professional Athletic Training Students

### Cover Page Footnote

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## ***The Relationship Between Grit and Growth Mindset in Professional Athletic Training Students***

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**Purpose:** The demands of athletic training students are substantial between academic and clinical responsibilities are substantial, potentially creating problems with commitment and retention. Grit and growth mindset have been associated with academic achievement and success; however, little research has assessed the presence of either within athletic training students. The purpose of this study was to investigate the differences in grit and growth mindset (broken into intelligence and talent subscales) between undergraduate Athletic Training Students and General health science students. Secondary, the purpose was to assess the relationship between grit and growth mindset in both groups. **Methods:** A cross-sectional study was conducted utilizing a web-based survey to assess demographics, grit, and growth mindset in undergraduate students. Univariate analyses and correlations were conducted to determine group comparisons and relationships between variables. **Results:** A total of 96 undergraduate students participated. Of the respondents 83% were Caucasian, 75% were female, and 56% were athletic training students. There was a significant difference in grit ( $U=800.50$ ,  $p=.014$ ) between groups with athletic training students ( $M=3.70$ ,  $SD=.408$ ) reporting lower levels of grit than non-athletic training students ( $M=3.93$ ,  $SD=.413$ ). Intelligence and talent growth mindset yielded no significant differences. A weak, positive correlation was found between grit and intelligence growth mindset ( $r=.341$ ,  $p=.001$ ) as well as between grit and talent growth mindset ( $r=.342$ ,  $p=.001$ ). **Conclusion:** The current study indicated differences in grit between athletic training and non-athletic training students, but not in growth mindset. Further research is needed to identify how these factors influence success and retention within athletic training programs. **Keywords:** *stress, mental health, education*

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### ***INTRODUCTION***

Athletic Training Students have academic and clinical education demands that in excess of most traditional college students.<sup>1-4</sup> While many core course requirements remain similar amongst all university students, Athletic Training Students must also complete major-specific courses which are often academically rigorous due to the nature of the professional program and frequently containing an accompanying laboratory section.<sup>1-4</sup> In addition, Athletic Training Students attend mandatory clinical education experience which must be completed in tandem with coursework. Many Athletic Training Students spend approximately 30 hours per week in clinical education rotations depending on the requirements of the program while also fulfilling the responsibilities of a full-time college student.<sup>3,5-7</sup> The number of hours devoted to

clinical rotations can reach more than the expected 30 hours per week depending on if the sport is in competitive season and if the Athletic Training Student is offered the opportunity to travel with the team to away games or matches. Although these extra demands are essential to meet the standards set forth by the Commission on Accreditation of Athletic Training Education (CAATE) and be eligible for the Board of Certification (BOC) exam, Athletic Training Program Directors are often concerned about the stress levels and retention rates of their students.<sup>1-3</sup>

While Athletic Training Programs are challenging, the professional development and personal growth achieved are substantial and may outweigh any negative effects such as stress and burnout.<sup>5</sup> Athletic Training Students tend to develop high-quality healthcare skills and admirable

characteristics throughout their educational process.<sup>8</sup> These include, but are not limited to: communication and problem-solving skills, good work ethic, and perseverance.<sup>8</sup> Grit and growth mindset are two additional desirable qualities which have recently been areas of interest within studies of the general college population.<sup>9-11</sup>

Grit is defined as “perseverance and passion towards long-term goals.”<sup>12,13</sup> The personality trait described as being diligent and careful refers to conscientiousness.<sup>12,13</sup> Conscientiousness and grit are often used interchangeable, but one key difference is the long-term aspect of grit that is not present when discussing conscientiousness.<sup>12,13</sup> High levels of grit result in grittiness, or the capacity to approach goals with stamina, and understanding results will not be achieved immediately.<sup>12-15</sup> Individuals with high levels of grit are consistent in the pursuit of their goals regardless of the presence or absence of positive feedback from others.<sup>12-15</sup> Previous studies have identified significant differences in grit scores associated with age but not biological sex.<sup>11-13,15</sup> As individuals got older, they developed more grit which was likely associated with having more life experience.

A growth mindset is characterized by believing intelligence and talent are malleable.<sup>10,16,17</sup> Individuals with a growth mindset value the ability to develop new skills over time and continually seek out opportunities to expand their knowledge and skillset.<sup>10,16,17</sup> Conversely, people with a fixed mindset believe someone cannot continue to learn past a certain capacity. Within mindset research, there are two interpretational approaches: entity and incremental.<sup>9</sup> The entity approach is associated with a fixed mindset and describes people reacting in a defenseless way as if nothing can be done to resolve the problem when faced with adversity or setbacks.<sup>9</sup> The incremental approach is associated with a growth mindset and depicts an individual perceiving adversity

or setbacks as an opportunity to improve.<sup>9</sup> Previous research hypothesizes growth mindset and grit may be positively associated with one another.<sup>9,17</sup> When an individual believes personal traits are malleable, they are more likely to commit to the pursuit of long-term goals. Both grit and growth mindset have been linked to deliberate practice which is a focused type of professional preparation where the purpose and goal are defined.<sup>12,15,17</sup> People who display more grit are more likely to participate in deliberate practice and engaging in deliberate practice naturally enhances growth mindset by believing a new skill can be acquired.<sup>9,17</sup>

While interest in grit and growth mindset has increased, little is known about their relationship. In addition, Athletic Training Students are a highly specialized and underrepresented group of college students. Therefore, the purpose of the current study is three-fold: (1) to investigate the differences in grit and growth mindset between Athletic Training Students and General health science students, (2) to assess the relationship between grit and intelligence growth mindset in Athletic Training Students and General health science students, (3) to assess the relationship between grit and talent growth mindset in both Athletic Training Students and General health science students. Having a better understanding of these differences and relationship may help guide future planning within Athletic Training Programs specifically as they transition to a professional master’s degree.

## **METHODS**

### **Participants**

A total of 96 undergraduate students at a single, four-year institution in the southeastern region of the United States participated in the survey. Participants were enrolled in at least one course taught by Athletic Training Program faculty during the Spring 2021 semester. Of the 96 undergraduate students, 54 participants were

students currently enrolled in the professional Athletic Training Program, and 42 were General health science students. The General health science students were currently enrolled in common pre- or co-requisite health courses, such as First Aid and CPR, taught by Athletic Training Program faculty. The average age of participants was

20.07 ± 1.6 years. Participants consisted of 72 (75%) females and 24 (25%) males, with 83% being Caucasian. Class status among the participants included 31 freshmen, 24 sophomores, 18 juniors, and 23 seniors.

Major Status	Total	Athletic Training Student	General Health Science Student
		96	54 (56.3)
Sex			
Male	24(25.0)	13(24.1)	11(26.2)
Female	72(75.0)	41(75.9)	31(73.8)
Race/Ethnicity			
Caucasian/White	80(83.3)	45(83.3)	35(83.3)
African American/Black	12(12.5)	6(11.1)	6(14.3)
Asian	1(1.0)	1(1.85)	0
Other	3(3.1)	2(3.70)	1(2.38)
Class Status			
Freshman	31(32.3)	0	31(73.8)
Sophomore	24(25.0)	17(31.5)	7(16.7)
Junior	18(18.8)	15(27.8)	3(7.14)
Senior	23(24.0)	22(40.7)	1(2.38)

**Table 1. Demographic characteristics, n(%)**

**Measures**

Participants completed an online questionnaire containing 35 items and included demographics as well as scales measuring grit and growth mindset. Demographic questions included age, race, gender, and class status. If students were currently enrolled into the Athletic Training Program, information about class standing in the Athletic Training Program and clinical experiences were obtained. Class standing and clinical experiences were part of the survey but were not investigated in the current study as these variables did not align with the purposes of the study.

*Grit Scale*

Grit was assessed utilizing the Grit Scale developed by Angela Duckworth.<sup>12</sup> The scale consists of 12-items evaluating two constructs of grit: perseverance of effort and consistency of interest. Six items examined perseverance of effort (e.g., “I am diligent.”), and six items

assessed the consistency of interest (e.g., “My interests change from year to year.”). The items were scored on a 5-point Likert scale with 1 being “not like me at all” and 5 being “very much like me.” The consistency of interest items were reverse coded. A composite average score was calculated by averaging all 12 items.

*Dweck Mindset Instrument*

Growth mindset was assessed using the Dweck Mindset Instrument developed by Carol Dweck.<sup>16</sup> The scale consists of 16-items examining perceptions of the two constructs of growth mindset: intelligence and talent. Items were scored on a 6-point Likert scale with 1 being “strongly agree” and 6 being “strongly disagree.” Incremental belief statements were reverse coded. Average scores were calculated for intelligence and talent items separately as different factors.

**Procedures**

The data were previously collected as part of an internal evaluation of the Athletic Training Program. The survey was distributed via Qualtrics to undergraduate students enrolled in at least one athletic training class to gain baseline information for overall program and coursework improvements. The university’s institutional review board (IRB) approval was acquired prior to analyzing the data for the current study.

**Data Analysis**

All data collected was analyzed via Statistical Package for Social Sciences (SPSS) Version 27. Exploratory and screening process analysis was conducted to assess assumptions of parametric data. Testing for normality indicated intelligence growth mindset was normally distributed; however, talent growth mindset and grit were not. A t-test was conducted to evaluate differences between grit and intelligence growth mindset between Athletic Training Students and General health science students. A Mann-Whitney U tests was utilized to evaluate the difference between grit and talent growth mindset between Athletic Training Students and General health science students. Due to non-parametric data, to examine the relationship between intelligence growth mindset, talent growth mindset, and grit, a Spearman correlation was conducted. The significance level was set a priori at  $P \leq 0.05$ . The number of participants was based on how many students enrolled in the classes completed the survey; however, a post hoc power analysis was conducted after data cleaning indicating 92% power which was sufficient.

**RESULTS**

For the overall sample, the average scores were 4.45 (SD=.839) for intelligence growth mindset, 4.18 (SD=.990) for talent growth mindset, and 3.80 (SD=.424) for grit. The average intelligence growth mindset score was  $M=4.50$  (SD=.703) for Athletic Training Students and  $M=4.39$  (SD=.992) for General health science students. Results of the Mann-

Whitney U tests indicated no difference between groups on talent growth mindset ( $U=890.50, P=.071$ ). There was a significant difference in grit ( $U=800.50, P=.014$ ) between groups with Athletic Training Students ( $M=3.70, SD=.408$ ) reporting lower levels of grit than General health science students ( $M=3.93, SD=.413$ ). Significant correlations were expressed between intelligence growth mindset, talent growth mindset, and grit ( $P < .001$ ). Specifically, a moderate, positive correlation was examined between intelligence and talent growth mindset ( $r=.531, P=.000$ ). A weak, positive correlation was presented in the relationship between grit and intelligence growth mindset ( $r=.341, P=.001$ ) as well as the relationship between grit and talent growth mindset ( $r=.342, P=.001$ ).

	Mean±SD	Median (IQR)
<i>Athletic Training Students</i>		
Intelligence GM	4.50±0.49	4.44±(0.88)
Talent GM	4.04±0.94	4.00±(1.38)
Grit	3.70±0.40	3.79±(0.58)
<i>General Health Science Students</i>		
Intelligence GM	4.39±0.99	4.50(1.44)
Talent GM	4.36±1.03	4.56(1.25)
Grit GM	3.93±0.41	3.92(0.60)

**Table 2. Mean, standard deviation, median, and interquartile range (GM: Growth Mindset)**

	Intelligence GM	Talent GM	Grit
Intelligence GM	-	-	-
Talent GM	0.531**	-	-
Grit	0.341**	0.342**	-

**Table 3. Spearman Correlation**  
\*\*correlation is significant at the 0.01 level (2-tailed)

**DISCUSSION**

High stress levels and poor retention rates have continued to negatively affect Athletic Training Programs.<sup>1,2,19-21</sup> As programs are required to transition to masters-level coursework given the updated CAATE standard requirements, faculty must identify ways of implementing pedagogical techniques that will result in the development of quality athletic trainers who can successfully

graduate, pass the board of certification exam, and continue into professional Athletic Training practice. The purpose of the current study is three-fold: (1) to investigate the differences in grit and growth mindset between Athletic Training Students and General health science students, (2) to assess the relationship between grit and intelligence growth mindset in Athletic Training Students and General health science students, (3) to assess the relationship between grit and talent growth mindset in both Athletic Training Students and General health science students. There was no significant difference between groups in intelligence or talent growth mindset; however, General health science students reported higher levels of grit than Athletic Training Students. While the correlation analysis indicated significant findings, the association between grit and both intelligence and talent growth mindset were weak. Tang et al. also examined a weak relationship between grit and growth mindset; however, their study also examined goal commitment and engagement.<sup>25</sup> Tang et al. indicated goal commitment had a stronger correlation to grit rather than growth mindset.<sup>25</sup> Tang et al. suggested that improving goal commitment and grit would increase school engagement which could potentially positively affect growth mindset.<sup>25</sup>

The first aim was to investigate differences in grit and growth mindset between groups. Although there was no significant difference in talent growth mindset or intelligence growth mindset for the two groups, both Athletic Training Students and General health science student reported higher scores averaging greater than 4.04. This finding is important to consider because these students will likely pursue a career in healthcare which is an ever-changing field. Having a growth mindset will help students during their academic career as well as when they enter the workforce. Growth mindset has been found to promote information retention and academic success by reducing cognitive load

and improving mastery goal orientation.<sup>9,10,18,22-24</sup> Better engagement and higher commitment to active learning have been associated with having a growth mindset.<sup>10</sup> Similarly, Tseng et al., studied growth mindsets affect on online student engagement found significant, positive results.<sup>23</sup> These results could explain why both groups scored highly on growth mindset, considering how many students were completing some coursework online due to the COVID-19 pandemic. A study by Mosanya, indicated growth mindset helped to reduce academic stress and loneliness during the COVID-19 pandemic.<sup>18</sup>

General health science students reported higher levels of grit than Athletic Training Students. While there is no previous literature comparing Athletic Training Students to the general undergraduate population, these findings are surprising for a few reasons. Previous literature has identified that individuals who demonstrate more commitment are typically have higher grit scores.<sup>11,18,25</sup> Athletic Training Students are required to commit significant time and energy to their academic and clinical requirements. However, being required to commit more time outside of the classroom to clinical education does not necessarily translate to higher levels of commitment overall. In a longitudinal study by Weiss and Neirbert indicated a significant decrease in students' commitment from the first year to second year in the Athletic Training Program.<sup>20</sup> Another qualitative study expressed that regardless of the emphasis placed on commitment to academic and clinical expectations, students continuously enter Athletic Training Programs with inadequate perceptions of program expectations.<sup>26</sup> Unfortunately, these misconceptions can be problematic for retention of Athletic Training Students.

In addition to declining in commitment, Athletic Training Students may have reported lower levels of grit due to their environment

and/or mental health considerations. By engaging in clinical education experiences, Athletic Training Students may become overwhelmed and intimidated by the roles and responsibilities of an Athletic Trainer.<sup>5</sup> Realizing Athletic Training is not a typical job (9 AM to 5 PM with weekends and holidays off) which may lead to fewer students pursuing the profession as a career.<sup>5,26,27</sup> Dodge and Mazerolle indicated preceptors (clinical supervisors) felt obligated to avoid embellishing the profession.<sup>26</sup> While Preceptors did relay positive aspects of Athletic Training, preceptors also conveyed the requirement of working long hours and meeting high expectations. Understanding the depth and breadth of knowledge Athletic Trainers must possess on a variety of topics within the domains of athletic training which can be overwhelming in comparison to an Athletic Training Student's inexperience and knowledge level.<sup>5,19,26</sup>

Unlike many other careers, Athletic Trainers must be certified in most states to practice clinically, which requires passing a Board of Certification (BOC) exam. Consequently, Athletic Training Students participate in rigorous coursework and are constantly being evaluated by professors in the classroom and preceptors at their clinical education sites.<sup>1,2,19,28</sup> Due to the regular feedback, Athletic Training Students may be more critical of themselves and their performance when compared to other undergraduate students which may lead to burnout and could explain lower grit scores.<sup>1,2,4</sup>

Another potential factor is mental health considerations. Mental health disorders are on the rise in college-aged adults.<sup>22,29,30</sup> Athletic training students may be at increased risk of developing mental health disorders due to the added demands and responsibilities associated with their chosen major. Crutcher et al. found Athletic Training Students with moderate stress levels also experienced moderate depression

symptoms.<sup>3</sup> Similarly, Vineyard et al. indicated higher levels of stress increased the likelihood of developing burnout symptoms in undergraduate and graduate Athletic Training Students.<sup>4</sup> Although beyond the scope of this study, previous literature has indicated individuals suffering from mental health conditions reported lower grit and scores.<sup>22,25,31</sup> Additionally, in a study by Calo et al., individuals with lower grit scores were more likely to report overall lower resilience and academic resilience.<sup>22</sup> With the added stressors Athletic Training Students may experience, it is feasible to consider how mental health status may have been a factor contributing to lower levels of grit.

Lastly, General health science students could have expressed higher grit due to age. Interestingly, many of the General health science students who participated in the study were younger than the Athletic Training Students, with 74% of the General health science students enrolled in the freshman class. Interestingly, multiple studies have indicated grit increases as individuals grow older. For example, a study by Barbouta et al. suggested both grit and growth mindset were improved in postgraduate students when compared to undergraduate students.<sup>9</sup> While previous literature supported the notion grit grows with age, participants responses may have been influenced by entering college during a pandemic. Although there is limited research on the effects of COVID-19 on educational experiences, students transitioning into college during this period had a vastly different experience than previous students. In the current study, many of the General health sciences courses were taught online or in a hybrid format. Conversely, due to learning hands-on skills, most athletic training courses continued to be taught in-person following strict COVID-19 protocols. Usher et al. identified an increase in stress, and a decrease in academic motivation while undergraduate students shifted to remote learning.<sup>32</sup> Although undergraduate

students felt ill-prepared to self-regulate and manage time, students eventually had to improve in these areas.<sup>32</sup> It is conceivable that students' perceptions of enduring the challenges of beginning college during a pandemic led them to answer questions in a way that suggested higher grit scores.

The second aim of the current study was to examine the relationship between grit and growth mindset (intelligence and talent) in undergraduate students. While previous literature has expressed mixed findings when evaluating this relationship, the current study found only a weak correlation between grit and growth mindset (intelligence and talent).<sup>11,18,25</sup> Similarly, in a study with international undergraduate students, the relationship between grit and growth mindset was weak.<sup>18</sup> Another study determined undergraduate students reported low grit was associated with low levels of growth mindset.<sup>11</sup> While the current study did not find a strong correlation between grit and growth mindset (intelligence and talent), the constructs of grit were not examined individually as the purpose of the study was to examine total grit scores

### **Limitations**

First, the current study was conducted within a single Athletic Training Program at one institution, making it difficult to generalize these results to other institutions across current undergraduate programs. Additionally, it is important to note that all Athletic Training Programs must transition to professional master's programs in 2022. The results may not reflect experiences of programs already transitioned to a professional master's program as these programs are structured slightly different than undergraduate Athletic Training Programs incorporating more challenging coursework including summer class and the inclusion of clinical immersion experiences. Also, there will be some overlap between programs phasing out their current bachelor's

program and accepting graduate students into their new program. Another limitation is the use of self-report measures to assess grit and growth mindset. Participants could respond inaccurately due to false perceptions or social desirability. It is important to note that socioeconomic background and person views were not inquired about in the study but could have created some bias in responses. Lastly, conducting a cross-sectional study during a pandemic limits the ability to consider how grit and growth mindset may change over time.

### **CONCLUSION**

While Athletic Training Students are a unique population, grit and growth mindset have been positively influential in academic success and retention across undergraduate and postgraduate students. As Athletic Training Programs transition to an entry-level master's degree, it is important to understand the differences in grit and growth mindset among Athletic Training Students and other health science fields. Understanding the current presence of grit and growth mindset can help identify areas of improvement as programs transition. Considering grit and growth mindset rather than relying on measurements such as grade point average (GPA) could assist with the recruitment and preservation of the Athletic Training profession. Program Directors and other Athletic Training Program faculty should consider utilizing grit and growth mindset measures as an admission requirement due to associations with academic success. Additionally, implementing pedagogical techniques that promote grit and growth mindset such incorporating goal setting skills could help the continued development of these characteristics.

Future research should examine graduation rates and professional program acceptance rates for undergraduate students and their association with grit scores. Additionally, future research should evaluate pedagogical technique's ability to improve grit and growth

mindset in Athletic Training Students. Having a better understanding of how grit and growth mindset impact aspects of education and mental health will inform program modeling to develop high-quality athletic trainers.

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