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GRIT AND STUDENT-ATHLETE PERFORMANCE: A CASE STUDY

by

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DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of

Doctor of Philosophy
Physical Education, Sports and Exercise Sciences

The University of New Mexico
Albuquerque, New Mexico

May, 2016

DEDICATION

This work is dedicated to my entire family whose unconditional love and enduring support has made this journey possible. Without my parents encouragement to dream big and to believe in and work for something bigger than myself, this study would have never taken place.

To my mom for instilling in me a love of education.

To my dad for teaching me and my siblings how to compete.

To my siblings for being the best teammates anyone could have.

Finally, to my loving wife Amanda: I can't imagine life without you.

ACKNOWLEDGEMENTS

I would first like to acknowledge the support, encouragement, and intellect of my dissertation chair, Dr. David Scott, without whom this pursuit would have never taken place. Your leadership, mentorship, and loyalty have had profound impacts in my career path. Thank you.

I would also like to thank my committee members: Dr. Todd Seidler, Dr. Colleen Colles, and Dr. Matthew Lemberger-Truelove for their contributions and flexibility throughout this study.

I would also like to thank the coaches and athletics department at Metropolitan State University of Denver for their commitment to player development and cooperation in this study.

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ABSTRACT

The purpose of this study was to investigate the relationship between grit and student-athlete academic and sport performance. An exploratory study was conducted using a case study methodology, utilizing both quantitative and qualitative research. The Grit Short Scale (Duckworth, 2007) was employed on student-athletes at an NCAA Division II university in the American Southwest Rocky Mountain Region. Results included a positive correlation between student-athlete grit level and informant grit report, indicating that student-athlete consistently rated their grit higher than their coach rated their grit. Also, in this case study, grit does not account for more predictive value of college academic performance than traditional factors of academic success of college student-athletes. Lastly, through triangulation, two major themes emerged around how head coaches view grit and sport performance: 1) grit increases individual development and sport performance, and 2) team culture is enhanced by increased individual grit.

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CHAPTER 1

INTRODUCTION

"Now bid me run, and I will strive with things impossible."

(Ligarius, Act II, Scene I, Lines 335-336)

This quotation from William Shakespeare's Julius Caesar, which is historically a play of ambition, power, and persistence, illustrates the personal characteristic of grit and exemplifies the ethic of the modern day sportsman. It appears that Shakespeare knew in 1599 what so many coaches try to instill in their athletes today – that even with a bleak opportunity for success one should not accept unfavorable circumstance, but rather should engage in hard, strenuous, and gritty work in order to overcome perceived impossibilities and achieve individual and team success.

Man's nature has always been to compete and strive for success (Adler, 1927), including stakeholders of sport. People from all over the world have been attempting to gain an edge over their opponent dating back 17,000 years as depicted in cave dwelling throughout France (Schlesinger, Patel, Rabinovitch, Walker, Brunwasser, Curry, & Zorich, 2007). While moving away from competition for survival and dominance, the toil of competition in the present day has championed the use of high tech innovation, specialized training, and performance enhancing drugs. In a day and age where sporting pursuits play a central role not only in the lives of athletes, but also in those of the greater community, it is no wonder that an expanding industry has been created to increase sport performance and team success. From Greek wisdom to modern technology and innovation, athletes have been encouraged to sculpt their bodies and sharpen their minds to pin-point accuracy in order to excel at the challenges of physical endurance, power,

and coordination. However, it has become the task of the coach and sport scientist to unwrap the mechanisms that activate the good sportsman to become great, and the great to become legends.

In-depth and complex systems have been created that cover a wide range of factors influencing sport performance; these include multilayered systems of talent identification (professional scouting and amateur recruiting), skill development (private instruction, early specialization, year round sport commitment and training), intensely regulated diets and complex cardiovascular and strength training regimens. The interdependent systems of physiological, psychological, and skill specific development has become broadly known as "player development" and accepted as industry standard jargon. The interdependent systems of player development illustrate a challenge for sport scientists known as "multifinality," which is a concept that refers to different outcomes emanating from similar or identical causes.

While the structure and terminology associated with player development is broadly accepted, many processes and interrelated systems can vary from one entity to another. For instance, the concept of multifinality can be found in the player development field of professional baseball in the United States. The player development departments across Major League Baseball (MLB) operate largely out of a system that includes distinct departments of scouting, coaching, strength and conditioning, psychological skills training, minor league operations, and position specific specialists for each team; yet, these departments operate differently and with obvious disparate outcomes in terms of team success. Moreover, comparable players can be found within each level of competition beginning with elementary and then on through secondary

school, college, and the professional ranks. With physical and skill similarities between players at similar levels of competition, could grit be what makes individual athletes, as well as a team unit, more successful than their opponents? What makes some athletes want to "strive with things impossible"?

Many organizations are invested in the performance of individual athletes and whole teams. Over the years, sport performance organizations have developed various methodologies of learning about and trying to predict the performance of individual athletes and teams alike. The evolution of athlete performance projection is a curious process because there have been many phases and methods found throughout sport performance organizations in the United States. In the four major sports in the US, football, baseball, basketball, and hockey, observational techniques by sport specific experts, who typically have included long time coaches and former athletes, has been and continues to be the gold standard.

Personal assessment by an expert is believed to be the best way to understand and project the athlete's performance (Helsen & Starkes, 1999). Sport organizations employ various techniques to gain a better picture of an athlete's ability to perform from both an investment and production standpoint. Various professional baseball teams have been known to give prospective draft picks personality tests to gain a better understanding of the athletes in whom they are potentially going to invest millions of dollars. However, the frequency of use and importance of results to the sport organizations are not known.

Similarly, every year the National Football League (NFL) puts on a tryout camp for draft eligible college football players where the attendees complete the Wonderlic test (1936). The Wonderlic tests cognitive ability by putting pressure on the test taker to

answer arithmetic questions in a certain amount of time. According to Lyons, Hoffman, and Michel (2009), the results have consistently shown that with a 50 being the highest possible score, offensive linemen (specifically the center position) have scored the highest as a whole with an average of 26 and quarterbacks on average score 24. Furthermore, as a general rule, teams prefer a minimum score of 21 for quarterbacks. A score of 20 represents average.

While the NFL has been the most accepting of using a non-physical unit of sport performance assessment, the other major sports have been more stubborn in their adoption and continued use of such techniques. Assessing an athlete's psychological makeup, while anecdotally talked about frequently, has generally failed to become industry standard throughout the major sports in the US.

Historically, professional baseball has been more hesitant than the other major sports to deviate from tradition, both on and off the field, perhaps because baseball can trace its roots back to the interconnected rise of professional baseball and the development of American culture. In fact, technology is one area where the national pastime has notoriously been resistant to change and incorporation of innovation.

However, more recently, possibly due to a younger, more tech-savvy and tech-dependent generation matriculating into positions of influence within the sport institution, advancements and implementation of technology, such as instant replay to contest "out of bounds" calls, has had a positive affect and response from major sport organizations. While technology use in games has been slow in materializing, there has been earlier acceptance and sustained use in the utilization of technology in training and research. For example, high-resolution cameras are being used to track a variety of aspects of

athletes' sport specific movements, such as a pitcher's arm motion and a hitter's eye movements in professional baseball, as well as athlete tracking software that is designed to act as a dashboard for the vital statistics of the physiology of a training athlete. In addition to becoming more accepting of technology, professional baseball has begun to re-conceptualize the use of statistics. Advanced predictive models of production, that until recently were only found in a statistician's office hidden away in an ivory tower, are regularly being created and brought from the ivory tower to the green pastures of sport fields.

The relevance in advanced statistical models is part of a larger reframing of organizational success in professional baseball, conceptually known to most people as *Moneyball* (Lewis, 2004). Summarily, this model is understood to place less emphasis on traditional factors in assessment of sport performance not only of individual measures, but also of the team as a whole. This philosophy illustrated to the traditional gatekeepers of "the show" that while observational talent identification and sport performance projection (scouting) was and still is an integral part of identification of prospects, with the use of predictive models, sport organizations can hone in more acutely on various aspects of athlete performance with greater efficiency based on statistics.

Player development, as already outlined, should be viewed as an umbrella term that refers to many aspects that result in increased athlete performance. For the purposes of this research, the concepts of player development can be divided into two broad categories that help to identify areas of universal sport performance—physical and psychological. Improving the athlete's physical performance has been the most evident and practiced area of sport performance. While interacting with the psychological

makeup of an athlete is not particularly new, it has, however, undergone a resurgence in talent development research (Cote, 1999; Durand-Bush & Salmela, 2001, 2002; Gould, Dieffenbach, & Moffett, 2002; Vernacchia, McGuire, Reardon, & Templin, 2000) and is pervasive at many levels of competition today. However, in the sport world, psychological services are not necessarily aimed at psychological well being and mental health, but rather are to provide the athlete with cognitive tools, such as mental imagery, self-talk, and stress relief meant to improve sport performance both in practice and in contest (Jones & Stuth, 1997).

Equipped with the physical and mental tools that are necessary for competitive athletic performance, sport organizations such as the United States Olympic Committee (USOC), National Governing Bodies (NGBs), MLB, NFL, and the National Basketball Association (NBA), have also devised systems of analysis and evaluation. However, one area that is not formally assessed is the psychosocial variable that has the potential to activate the athlete's physical and mental preparation for sustained athletic performance. The psychosocial variable of grit is anecdotally bandied about by sportsmen and women, but lacks any verifiable information as to the power it holds on the performance of athletes.

This study was one of the first research studies complementing the extant literature first promulgated by Duckworth, Peterson, Matthews, and Kelly (2007) and furthered by Duckworth and Quinn (2009) by investigating the psychosocial variable in a new population. In pursuit of finding the place that grit holds in success, it is important to find a place to start. As such, prior research into grit has been scant. However, the extant literature has provided profound results and implications for many human

endeavors requiring sustained passion and perseverance, such as a high level of athletic competition. Due to recent research delving into the power of grit that has been focused on academic achievement and the cultural significance that sport has in our society, it would be natural to focus the study where the two domains of academia and sport overlap and where a gap exists in the literature – college athletics.

These two institutions of American society became intertwined during the First World War when sports served as a training ground for youth to develop and prepare the necessary skills and character to become soldiers (O'Hanlon, 1982). As time went on, sport continued to be used in the educational setting albeit to develop physical attributes, not necessarily to increase academic outcomes. Also, the institutions of sport and education found that another unifying characteristic existed between them—that characteristic being the pervasiveness of *development* as a central focus of those participating in both institutions.

While the term "development" has been used widely and evokes the minds and emotions of academics, as well as the general population, it possesses an array of meanings and functions for stakeholders of both institutions (Black, 2010; Cooper & Packard, 1997; Holt & Sehn, 2008), and has spawned a diverse field of inquiry into the performance of elite musicians, artists, scientists and athletes (Bloom, 1985; Ericsson, 1996; & Howe, 1999). In regard to the institution of sport, development can and often does possess a variety of meanings and functions. For example, the development of social and moral values, beginning in the early 1960's and continuing through today supports the belief that sport participation benefits the development of character, self-esteem, leadership skills, and socialization (Videon, 2002).

In regard to the institution of education, development is connected to school sports participation because it has enabled students to demonstrate a wide range of pro-social and interpersonal skills, as well as provide them with the opportunity to build "interpersonal competence and formulate educational plans for the future" (Fredericks & Eccles, 2006, p. 710). Furthermore, studies have shown that sport participation can contribute to educational attainment and behavioral growth in high school students by providing an area where high school students can become part of a culture that values academic achievement. Fox, Barr-Anderson, Neumark-Sztainer, and Wall (2010) indicate that "it has been argued that sports team participation fosters student identification with schools and school-related values, including performing well academically" (p. 35).

Although studies dating back to the 1970's investigating the relationship between student participation in sports and academic indicators (Hauser & Lueptow 1978; Camp, 1990; Fejgin, 1994; McCarthy, 2000; and Crosnoe, 2002) have consistently turned up mixed results, recent studies done in Arkansas and Kansas (Lumpkin & Favor, 2012) have found that participation in athletics and other extra-curricular activities leads to positive academic results. Additionally, the Colorado High School Activities Association (CHSAA) espouses in their organizational mission statement the beneficial effects of sport participation on academic achievement and explicitly states on their website as a core value that "participation supports the academic mission of the school." Consequently, the overwhelming majority of previous research has demonstrated that sport participation is associated with an array of positive development outcomes, including educational achievement and cognitive development.

With respect to the widely used terminology *personal development* through sports, researchers have identified various factors seemingly unique to athletes, as well as those participating in physical activities. One such factor is motivation, or the drive to succeed, which has become immortalized in famous quotations from sports heroes and heroines alike, as well as becoming the catalyst of sport psychology and a central and continuously studied psychosocial factor in sport and athletic success. Furthermore, recent studies have been done concerning the relationship between motivation and other psychosocial factors, such as the interpersonal context (Bengoechea & Strean, 2007), parent influence on youth sport participants (Gershgoren, Tenenbaum, Gershgoren, & Eklund, 2011), and coach influence on motivation (Keegan, Harwood, Spray, & Lavallee, 2009).

However, if looking at development as a continual process that can and does occur throughout the lifespan, and more particularly throughout the sports career of an athlete, it may be informative to look at traits that are best realized when given sufficient time to manifest themselves. One such trait is *grit*. According to Duckworth et al. (2007), *grit* consists of "working strenuously towards challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress" (p. 1088). Sport participants at the collegiate level and higher have undoubtedly experienced failures; in-fact, stretches of failures in sports are referred to as *slumps*, and are an inescapable aspect of sport by all who take part in it. In order to realize the grit of an individual through observation, it takes time and a contextual understanding of the athlete's performance.

While valuable research on academic success of college student-athletes exists, as mentioned above, continued investigation can produce a deeper understanding of the identification, development, and evaluation of factors, specifically grit, that have direct connections to increasing both academic and sport related success of student-athletes. There is no better person to make such assessments of student-athletes than the coaches who recruited them and interact with them on a daily basis. This interaction often starts years before the athlete ever plays for a college coach and involves the coach investing untold amounts of effort, time, and distance in order to assess the high school athlete's physical ability, personal character, academic ability, and educational aspirations to name just a few personal characteristics that influence college coaches (Personal communication, Morgan, 2015). Many conversations between coach(es) and recruits take place in person, over the phone, through email, and, more recently, through social media outlets including Facebook, Twitter, Snapchat, and Instagram.

Moreover, it is also common practice for coaches and recruiting coordinators to have multiple conversations with important people in the lives of the recruits. For instance, coaches will talk for obvious reasons with their recruits' high school coaches, but also the college coaches have been known to speak with school teachers, principals, employers, and even the recruits' significant others in order to develop a better understanding of the athlete as an individual outside of sports. From these conversations, coaches attempt to gauge the character of the recruits because of the factors in addition to physical and sport specific ability that affect athletic success (Personal communication, Morgan, 2015). Prior to high school athletes beginning their college athletic careers, the coaching staff will have already gained a relatively accurate understanding of the student-

athletes. Once the student-athletes are on campus, their interaction with the coaching staff increases and the intensity of those interactions also increase because sports are embedded in the emotional psyche of student-athletes, particularly those who are highly competitive (Yopyk & Prentice, 2005).

Interactions such as these can happen on a daily basis for the entirety of the school year—and potentially for four or five years. A result of these long, intense, and repetitive interactions is a relationship permissive of interpersonal connection that is conducive to learning, understanding, and knowing an individual, which places college sports coaches in a prime position to assess and describe the personal makeup of the student-athletes who play for them.

The need for continued and novel investigation is also true for the relationship between sports and education because these two areas of American life have proven to be difficult to separate. Amateur sport participants often times participate in their sport through affiliation of an academic institution. In fact, the socialization process into the sport social system starts at a young age and is embedded early within the educational institution in the United States, ironically, the middle school years of ages twelve or thirteen are also when 70-80% of kids drop out of participating in organized sports (Visek, Achrati, Mannix, McDonnell, Harris, & DiPietro, 2015).

The strong tie between education and sport is further reinforced by the wildly popular National Collegiate Athletic Association (NCAA), Football Bowl Subdivision (FBS) college football system, and the NCAA Division I March Madness Basketball Tournament. With a limited number of professional sports teams across the United States, college sports have filled that void and even have a more natural connection to

youth and adolescent sports because they are closer in age, more community based, the athletes are not professional, and they are assumed to be playing the game for the same reasons that they played as kids—to have fun and for the love of the game (Allender, Cowburn, & Foster, 2006). These factors along with the NCAA's positioning of college athletes as a uniquely identified subgroup of the overall student population with the dual identity of student-athlete has for better or worse, tied sports to education in the United States.

Therefore, because of the centrality of sport and the importance of education in the United States, in addition to the place of sport in our educational institutions, a case study was used as the methodology to investigate the relationship between grit and indicators of academic and sport related performance of NCAA Division II college athletes. Rudestam and Newton (2007) state that a case study is "an intensive effort to understand a single unit of study within a complex system" (p. 50). With a larger sociological context of the interconnectedness of sport and education in US society established, it is important to develop a more contextualized understanding of the bounded system under investigation, with special interest given to the social importance of sport and physical activity of that social system, as observed by the sports and physical activity social emphasis, academic success, team success, geographic location, competitive level, as well as rules and regulations.

Colorado Sport and Physical Activity Landscape

Denver is the capitol city and largest of Colorado. Downtown Denver is the site of an NCAA Division II athletics programs. According to the University's website, the fall 2014 enrollment was 21,179.

In addition, the University provides a fact sheet on their website for the 2015-2016 academic year. Based on the fact sheet, 1 in 5 people from Colorado seeking a bachelors degree chose to attend the urban campus; moreover, 75% of MSU's 77,000 alums keep their place of residence in Colorado, making the University one of the largest, if not the single largest educator of the state of Colorado's workforce. Athletically, the Univesity fields fourteen athletic teams with 194 total student-athletes, 72% of whom went to high school in Colorado. Due to the high percentage of Colorado high school athletes who make up the overwhelming majority of student athletes at the University, gaining a realistic idea of sport and physical activity within the community helps to position the overall study, and may have implications of geographic location and personal grit level.

Looking at sport participation on a continuum where one end is youth unrestricted free play and the other end is professional sports at the highest level of competition, professionalization, and commercialization, the metropolitan area of Denver serves as an exemplary site of analysis. The Denver Parks and Recreation offer a plethora of youth sport opportunities throughout the year, along with various private and select sports teams and leagues that also provide a multitude of sport participation opportunities for Denver youth and adolescents. Interscholastically, Denver Public School system houses over 200 schools with fifty four (54) high schools, which, according to the Colorado High School Activities Association (CHSAA), had 136,143 students playing high school sports in 2012-2013, revealing 60% of the total high school population in Colorado as being sport participants.

Additionally, over the past 10 years, CHSAA has reported an increase in overall sport participation of almost 4%, indicating the ongoing interest in sport participation of high school students, and there is no reason to believe that sport participation will depart from its current trend. Furthermore, Denver and the surrounding area is also home to multiple intercollegiate institutions that field sporting teams at various levels of competition, as well as with a varying degree of state and national prominence.

Finally, but by no means last, the professional sports market of Denver is consistently ranked as a top sports city in the United States and internationally, which demands a much greater share of overall influence than its amateur counterparts. Specifically, Denver is home to six (6) professional sport teams, including; Major League Baseball Colorado Rockies; National Basketball Association Denver Nuggets; National Hockey League Colorado Avalanche; Major League Soccer Colorado Rapids; Major League Lacrosse Denver Outlaws, and defending World Champions of the National Football League the Denver Broncos. The social importance of sport in the Denver metropolitan area does not go unnoticed and is clearly highlighted through the vast opportunities to consume sports on various levels and to various degrees of involvement.

Problem Statement

The pursuit of improved student-athlete performance continues to be a priority for academic institutions across the nation. College student-athletes represent a minority of the overall undergraduate population, yet they are a frequently studied sub group of undergraduate students because they are unique in many aspects. In fact, the dual identities that they possess as both a student and athlete are central to this study. No other sub group of college students are contractually obliged, identified, or positioned in

popular culture or academic literature through the dual identity and responsibility that are given to student-athletes. College students who are musicians, writers, thespians, engineers, cooks, or artists, are not referred to as student-musicians, student-writers, student-thespians, student-engineers, student-cooks, or student-artists, respectively. As such, when studying college student-athletes, it is important to take into consideration the overlapping roles of being both student and athlete.

Studies have explored a variety of factors relating to athletic as well as academic success within the student-athlete population. These factors include personal demographics, socio-cultural aspects, available resources, cognitive measures, past performances, as well as non-cognitive and psychosocial factors of academic success (e.g. time management, study habits, and campus involvement). Moreover, due to the evolving policies and procedures of the college athletics governing body, the NCAA, coupled with consistent academic violations by universities across the nation, policies and rules have been implemented that add to the complexity of academic success for college student-athletes. Therefore, through the perspective that the student-athlete does not operate in a dichotomous vacuum, but rather develops simultaneously as an athlete and a student, it is critical to explore, identify, evaluate, develop, and predict antecedents of academic as well as sport performance.

Historically, cognitive variables, such as IQ, were given credit as the predominant individual difference that influenced and predicted success in many and various fields of study (Gottfredson, 1997; Mehrabian, 2000). However, recent research on success has focused on factors that include time management, amount and degree of preparation, and the psychosocial variable of grit, which is central to this study. *Grit* (Duckworth, 2007)

can be conceptualized as "the perseverance and passion an individual holds towards a long term goal" (p. 1088). As such, the relationship between grit and success has been studied in various populations: West Point Military Academy Cadets and their success in completing the "Beast Barracks," Scripps National Spelling Bee contestants and final round attainment, and, specific to this study, the relationship between grit and retention of college students. What cannot be found in the extant literature is research on the relationship between grit and student-athlete academic and sport performance.

The variable of grit was chosen for this study for multiple reasons, with the first being the inherent and anecdotal connection between historical and contemporary understanding of sporting pursuits that revolve around a hard work ethic, sacrifice, and delay of instant gratification for long-term achievement.

The second reason for using the variable of grit for this study is that earning a roster spot on an intercollegiate varsity team is highly competitive and typically is a product of years of practice and participation. According to the NCAA (2013), just under three million US high school athletes played men's basketball, women's basketball, football, baseball, men's ice hockey, and men's soccer. However, when looking at those same sports at the NCAA level, the number of participants reduced to less than two hundred thousand. A further breakdown reveals that the percentage of high school athletes who eventually play their sport at an NCAA member institution is 3.3% for men's basketball, 3.7% for women's basketball, 6.5% for football, 6.8% for baseball, 11.3% for men's ice hockey, and 5.7% for men's soccer.

A third reason for using grit as a variable is that in order to stay competitive and contribute to the team's success, the athlete must display a high level of perseverance and passion. Because college sport seasons are spread over multiple months and a given student-athlete has four years to play, the ability to sustain the discipline, motivation, and resiliency to continue to develop is critical.

Fourth, grit is believed to be malleable. While cognitive factors, such as IQ and personality are commonly believed to be relatively static, in contrast, psychosocial factors, such as grit are believed to be controllable; therefore, they are attractive to coaches, sport psychologists, and parents.

The final reason to center grit as the main variable is that grit is no longer only anecdotally relevant, but rather has been operationalized and has become a scientifically sound predictor of success in various pursuits (Duckworth, 2007, 2009).

Purpose Statement

The purpose of this study was to investigate the relationship between grit and student-athlete academic and sport performance.

Given the influx of resources to the development and success of college student-athletes both in the classroom and on the field, coupled with their formal dual identity of being college students contractually obligated to meet academic standards, as well as athletes representing their school, a crucial need to investigate the athletes' ability to fulfill these roles exists. As such, employing a case study methodological approach extends the field of research on grit and college student-athlete academic and sport performance by: a) determining if athletes' self perception of grit is congruent to that of their coaches' perception of their grit; b) determining if grit is more predictive of

academic success as measured by self-report GPA, than traditional factors in college student-athletes, such as parents education level, high school GPA, and SAT scores; c) determining if a relationship exists between an aggregate team grit score and team academic success; and d) determining what the personally held beliefs of college coaches on the value of grit in individual and team sport performance.

Research Questions

RQ 1:

Is there a correlation between student-athletes' self-reported perception of grit and coaches' perception of their athletes' grit?

RQ 2:

Is grit more predictive of college academic performance for student-athletes than high school GPA, SAT score, and highest level of parents education.

RQ 3:

Is there a correlation between an aggregate team grit score and team academic performance?

RQ 4:

What are the personally held beliefs of college sport coaches towards grit and sport performance?

Significance of Study

This study is significant due to its theoretical implications because it adds to the literature on psychosocial variables of sport as well as to the practical significance for sport professionals, such as coaches, scouts, and sport psychologists who have to assess sport performance. Moreover, this study has further significance because it extends past sport performance and informs academic performance as well. Therefore, there is also practical significance for athletic academic counselors who oftentimes find themselves as the only academic advocate for student-athletes in a stadium full of sport fans.

Limitations

- Generalization of findings to larger populations of athletes would be remiss due to the fact that this study was undertaken through a case study framework that purposely only investigated the sports teams of one NCAA Division II university as a whole, acting as a single bounded system. However, outcomes of the study can inform further quantitative and qualitative research.
- Those who were surveyed in this study were student-athletes who were eligible to participate in their sport during the 2015-2016 academic year and who were at least eighteen years old. In addition, only the head coach of each sport was asked to provide the informant-report grit survey of each of their athletes.
- In order to address any privacy and confidentiality issues, the demographic section of the survey was entirely self-reported, including; age, race, gender, as well as the predictor variables of parents highest level of education, high school cumulative GPA, and SAT/ACT score.

Assumptions

Assumptions of this study are as follows:

- The confidentiality of the data will be preserved through the use of non-identifying numbers assigned to each data entry point. No names or personal identifying information will be gathered, and data will be secured via the UNM Lobo Vault secure data system.
- The case study was representative of the total population of student-athletes at the Division II university.
- Responses from the interviews between the researcher and coaches reflected their personal lived experiences.
- The student-athletes can accurately remember their high school academic success, including their GPA and SAT scores.
- The participants and coaches in this study answered all of the survey and interview questions openly and honestly.

Definition of Terms

Student-athlete(s) – A term coined by the first president of the NCAA, Walter Byers. Originally conceived to protect the NCAA and member institutions from liability and workers compensations law suits. Today, the term still carries the same purpose while also distinctly identifying a subgoup of the student body.

Grit – Operationalized as "perseverance and passion towards long term goals" (Duckworth et al, 2007, p. 1088).

Academic Success – Determined by the student-athletes grade point average (GPA).

Team Academic Success – Based on the teams Academic Progress Rate (APR) provided by the NCAA.

Sport Performance – Refers to the personal attributes that contribute to athletic development and performance in a specific sport.

Psychosocial – Involving the overlapping aspects of social and psycholoigcal behavior.

Traditional Predictors of College Success – Highest level of parent(s) education, high school GPA, and the SAT score.

CHAPTER 2

REVIEW OF THE LITERATURE

This study is largely exploratory in nature in an attempt to begin to understand some of the dynamics between grit and college student-athlete academic and sport performance. While this study is not a developmental study, as no developmental processes are being observed or measured, it will begin to lay the groundwork from which sport performance specialists, as well as academic developmental professionals can draw in future research. As such, the overarching framework for this study is student-athlete success; therefore, a review of literature surrounding sport and physical activity participation and academic achievement was presented first, then the scope will narrow to the most recent and pertinent research on sport participation and academic success of college student-athletes. Next, a review of the latest literature on sport performance will be presented, followed by a description of the research surrounding team success of college student-athletes. Lastly, a description of the psychosocial factor of grit will be presented because it is the variable of interest.

Sport / Physical Activity and Academic Performance

According to The Aspen Institute's Project Play, over 20 million youth aged 6-17 play sports in the US every year. Paradoxically, sports are organizationally structured and intertwined with the educational life-span of a substantial amount of United States youth and adolescents; yet, only a fraction of those who played in organized high school sports will have the opportunity to continue participating in college. According to the National Federation of State High School Associations' (2013-2014) Athletics Participation Survey, a total of 3,960,932 high school students played school sports in

1971-72 compared to 7,795,658 in 2013-2014. According to the NCAA.org website, "of the nearly 8 million students currently participating in high school athletics in the United States, only 460,000 of them will compete at NCAA schools" (2015). In addition to NCAA member schools, there are also many opportunities to participate in college athletics through a National Association of Intercollegiate Athletics (NAIA), National Christian College Athletic Association (NCCAA), or National Junior College Athletic Association (NJCAA) member schools.

Additionally, the number of high school and college athletes who play professionally is extremely low with NCAA Division 1 student-athletes representing most college student-athletes who play professionally (NCAA, 2015). While the social interest in sport is unmistakably present in youth, community, interscholastic, and intercollegiate sports, it is partially driven by a small percentage of the overall sport participants. The juxtaposition of participation rates and social interest in sports helps to illuminate the rich and diverse research potential of sport performance.

In the United States since WWI, sport and education have developed in stride and cannot be entirely separated from one another. Therefore, the question a researcher must address is not whether to research these connections, but rather by what methodology of inquiry will best inform and contribute to answering the research questions; perhaps due to the complexity and diversity of sports and education in the United States, it is wise to address these issues in their particular and specific context so that implications are more direct to the bounded system from which it comes.

Because a goal of this research is to contribute to the study and practice of the development of college student-athletes (CSAs) both academically and athletically, it would be remiss to start the research at the CSA level. Instead, because people are not blank slates, including CSAs, a background of adolescent athletes prior to entering the intercollegiate ranks of competition is critical in order to understand the framework that both defines and limits the population that become CSAs. Thus, in order to identify gaps that support the purposes of conducting the current study, this section of the review inclusively analyzes the literature concerning the connection between academic achievement and sport/physical activity participation of adolescent high school students.

The relationship between sport/physical activity and academic or educational development has become an increased area of attention and research in the current US culture and academic disciplines surrounding sport(s). The early investigations into sport/physical activity participation are split between two primary camps of thought concerning the fundamental attributes of sport and physical activity—education *of* the physical and education *through* the physical. The camp that this study and, subsequently, this review falls under is education *through* the physical.

The idea of education through the physical is framed to emphasize the place of sport and physical activity in the educational process, as first presented by Hetherington (1910):

> This paper aims to describe the function and place of general neuromuscular activities, primarily general play activites, in the educational process. We use the term general play to include play, games, athletics, dancing, the play side of gymnastics, and all play activities in which large muscles are used more or less

> vigorously. . . . To present the thesis four phases of the educational process will be considered: organic education, psychomotor education, character education, and intellectual education (p. 630).

Since Hetherington's statement, sport/physical activity participation have been investigated, scrutinized, and tested in a multitude of frameworks and developmental areas including educational development. Through extensive research, this review of literature has uncovered over 100 published articles dating back to 1954 and progressing to 2012 dealing with the broad topic of sport/physical activity participation and academic performance (Biddulph, 1954). A historical approach was used to format the remainder of this section in order to illustrate the progression of research on this broad area and bring a more narrowly defined understanding of the current research that supports the need to investigate the factors affecting the relationship between sport participation and academic achievement in CSAs.

In Howie and Pate's (2012) review of literature on physical activity and academic achievement, they found "72 [articles] published prior to 2007 and 53 published from 2007 to April 2012" (p. 162). They go on to state that "In the past 5 years, 10.6 primary articles have been published per year, compared to 1.4 studies per year in the previous 50 years" (p. 162), which highlights the recent increased interest of sport science scholars in the relationship of physical activity and academic achievement.

The literature review uncovered eighty-nine (89) articles regarding sport and physical activity participation and academic achievement. Of the 89, fifty-four (54) studies were observational in nature and thirty-five (35) were, to some degree, experimental. However, a review of the 35 experimental studies, while a critical element

in the research, will not be included due to the limitations of the current study; instead, the attention will be focused on the 54 non-experimental studies because they are more aligned with the methodology of the current study. While there was a diverse set of definitions of physical activity used across the studies, 17 studies used sport participation as an independent variable.

Other operationally defined variables include: level of fitness, physical education exposure and duration, amount of recess, and self- reported measures of unstructured physical activity in terms of time spent. To further narrow this section of the literature review, attention will be given to the 17 studies within the observation methodological approach that used sport participation as an independent variable and academic achievement as an outcome variable.

Sport Participation and Academic Achievement

According to the U.S. Department of Education (1995) and supported through more recent studies (Eccles & Barber, 1999; Eide & Ronan, 2001; Miller, Melnick, Barnes, Farrell, & Sabo, 2005), amongst the litany of extracurricular activites offered to high school students, school-sponsored sports tend to be the most popular in terms of numbers of participants, as well as social and cultural importance. One of the earliest studies looking at that relationship that was uncovered in this review was Davis and Cooper's (1934) comparison of high school sport participation and academic achievement, in which they found a positive relationship and, consequently, started a research line that has since manifested itself in many perspectives and variables of interest. Later, Eidsmoe (1964) compared high school football players' GPA to the class average and discovered that the students who played on the high school football team

were generally out performing their non-football playing counterparts. A few years later, Schafer and Armer (1968) expanded on this study by not only looking at GPA, but also observing attrition rates. Their findings on GPA were consistent with that of Eidsmoe (1964), and also discovered that high school sport participants were less likely to dropout of school than were their non-sport participant counterparts. Later studies supported these results as well (McNeal, 1995; Whitley, 1999; Overton, 2001; Lumpkin & Favor, 2012). This finding is consistently supported in academic research and espoused by the National Federation of State High School Associations (2008).

Researchers believe that because of the amount of time and dedication invested into a team sport, interpersonal connections are made that strengthen social belonging and networks (Mahoney & Cairns 1997, Mahoney, 2000), and which serve as a critical aspect of studying team dynamics. The strong bond made between athletes in general and teammates specifically have fueled another line of interest with relation to team dynamics and academic outcomes.

Published articles on the relationship between participation in specific high school sports teams and academic achievement are sparse. However, a few studies (Crosnoe, 2002; Fredricks & Eccles, 2006; Fox, Barr-Anderson, Neumark-Sztainer, & Wall, 2010) analyze the self-reported participation on sports teams of high school sport participants as a way to code as *sport participant* or *non-sport participant*; however, the studies do not indicate the individual sports team relationship with academic achievement. In addition, White and McTeer (1990) also gave individual sport teams some attention in high schools in Ontario, Canada, though still not directly on the topic of interest. They split sports teams into two categories—high-status sports and low- status sports—and found

that high-status sports, such as golf and tennis, are associated with higher academic achievement than are low-status sports, such as football. However, within the high-status sport group, findings were not consistent because down-hill skiing is considered a high-status sport, yet does not have a positive relationship with high academic achievement.

Similarly, Fox et al. (2010) looked at sport participation and student grades, albeit in a dose-response relationship, and discovered a positive correlation between number of sports participated in and GPA. At face value, this find is interesting because the opposite of the findings could be expected—the more activities that a student-athlete is involved in, the less time, energy, and focus the student-athlete has for academic success.

Academic Achievement and Sport Participation at the Intercollegiate Level

With an understanding of the climate of interscholastic athletics that serve as the primary source of college sports participants, focus is now directed towards research done at the collegiate level. Past research has revealed that the acceptance rate for entering student-athletes is statistically higher than the acceptance rate for non-student-athletes. Graduation rates for student-athletes have also proven to be much different than the graduation rates of the general student population (NCAA, 2013). Statistical information from revenue producing sports, such as football and men's basketball, have revealed that graduation rates for these student-athletes are noticeably lower than the remaining student population (NCAA, 2013). Keeping in mind that the crux of this study is the academic and sport performance of college student-athletes, it is imperative to explore the academic policy structure that student-athletes must navigate, and that all athletic participation depends on.

This section of the literature review explores indicators of academic success amongst college sport participants and non-participants, such as admission rates and standards, as well as graduation ratios between sport participants and sport non-participants. Attention will be given to prominent differences (if any) in admission rates for student-athletes compared to non-student-athletes. Comparisons will also be made between the graduation rates for the two populations. Information will be provided that attempts to help explain why these differences (if any) exist.

Relevant Information Pertaining to Admission Rates

The proliferation of admissions for entering college students has grown rapidly over the past thirty years. This "open admissions" philosophy has been garnered by nearly 80% of higher education institutions today and, thus, has eliminated much of the prestige associated with earning a college degree (Sperber, 2000, p. 53). Open admission in higher education has been promoted in order to help feed institutional desires for tuition revenues. This policy has diluted much of the student population into a population that may not necessarily have the academic prowess that should be required to earn a college degree. Institutions have marketed themselves as being "highly selective," but this statement isn't necessarily truthful (Sperber, 2000, p. 54).

With lower admission standards, lower graduation rates have resulted due to lower competencies of students to earn a college education. By the mid 1980's, the NCAA began to notice that student-athletes were becoming a particular population with markedly low graduation rates. To help curb this dilemma, the NCAA implemented legislation that raised the eligibility requirements for incoming student-athletes. Known as Proposition 48, this piece of legislation mandated that incoming athletes must carry at

least a 2.0 GPA in 11 different core courses and a combined 700 score on the SAT (Pound, 2009).

Proposition 48's implementation came with much scrutiny, as Pound (2009) describes, While proponents of the plan praised Proposition 48 for championing the seemingly forgotten cause of academics, critics condemned the policy as racist. In their view, enforcing these stern requirements would prevent a disproportionate number of poor and African-American athletes from attending the colleges they desired.

The NCAA defended the legislation as being a tool to help improve the already poor graduation rates for student-athletes. However, the legislation was also found to hinder the ability of low-income student-athletes to enter college because of their lack of accessibility to financial and academic resources.

During the 86th NCAA Annual Convention in 1995, the NCAA elected to further the strictness of student-athlete admission policies. Two major changes were made through the implementation of Proposition 16, which was basically an amendment of Proposition 48. Proposition 16 increased the number of core course requirements from 11 to 13, as well as introduced a sliding-scale that combines GPA and SAT scores. Pound further explains,

> Now, the student-athlete who earns a 2.0 GPA must combine it with a minimum 900 SAT score to be eligible for Division 1 competition. The student-athlete who earns a 2.5 GPA can score 700 and be eligible. With these changes, Proposition 16 effectively superseded Proposition 48 (2009).

To further help mandate admission standards, the NCAA instituted the NCAA Initial-Eligibility Clearinghouse in 1993. The role of the Clearinghouse was to act as the governing agent in determining whether an incoming student-athlete had met all of the necessary requirements for participation in intercollegiate sports. Institutions who failed to report incoming athletes to the Clearinghouse ran the risk of NCAA sanctions as well as potentially harming the athlete's future athletic career (Pound, 2009).

Although an abundance of information pertaining to graduation rates for student-athletes exists, little attention has been given to the admissions process. Few studies have been conducted testing differences in admission rates for student-athletes versus the general student population. The NCAA has set up their admissions systems policies in accordance with most higher education institutions. In other words, if a student-athlete meets the NCAA requirements for participation, then it is likely that he or she will meet the institution requirements for admission.

Jaworski and Gilman (1998) explain that it has become a general consensus in this country that student-athletes are held to less strict admission requirements than non-athletes. In their study of DePauw University, it was assumed that this "preferential" treatment for student-athletes had created discrepancies in admission statistics showing favorability for student-athletes to be accepted into higher education institutions. In contrast, results of the study indicated that there were no statistically significant differences in admission rates for student-athletes versus non-student-athletes (Jaworski & Gilman, 1998).

In a separate study, Shulman and Bowen (2001) did find statistically significant difference in admission rates that favored incoming student-athletes. Their research took place over a 33 year span from 1976 to 1999 and measured the percent increased likelihood of admission for incoming student-athletes. The results of the Shulman and Bowen (2001) study clearly illustrate the favoritism given to entering student-athletes throughout the admissions process:

> There are obvious differences in the rationale for giving special attention to members of these three groups, [athletes, legacies, minorities] but, at a minimum, looking at them side by side causes us to reflect on the mission of the college or university as it is reflected in the admissions process (Shulman & Bowen, 2001. p. 41).

Although the Shulman and Bowen study of 2001 and the Jaworski and Gilman study of 1998 were conducted to answer similar questions, the results were not similar. It is important to remember that the Shulman and Bowen study of 2001 strictly focused on male athletes, whereas the Jaworski and Gilman study of 1998 adhered strictly to the occurrences of DePauw University. With the lack of research, it is difficult to determine whether there are significant differences in admission rates; however, for the purpose of this review, there is an assumption that discrepancies do exist.

When considering the results produced by the Shulman and Bowen study of 2001, the assumption can be made that institutions have placed an emphasis on admitting student-athletes more frequently than non-student-athletes. Why would higher education institutions allow this to happen? What implications arise from higher education advancing this sort of discrimination?

Institutions, especially at the Division I and Division II levels, view the admittance of athletes as a direct investment into the institution that will hopefully promote both the athletic and academic success of the institution and, thus, market awareness to bring future interested applicants. Shulman and Bowen (2001) noted five reasons why institutions have lowered their admissions standards for athletes. The first reason indicates that athletes have a greater impact on the makeup of the class and on campus ethos than does the general student population. This impact can help build the dynamics and diversity of an institution's campus.

Second, the recruitment of athletes has become much more complex than in years past. Therefore, institutions must find a way to modify policy in order to somewhat assure the prospective athlete that he or she meets admission requirements. Institutions basically use the admittance of an athlete as a recruiting tool.

Thirdly, the admissions advantage for athletes has steadily increased over time and is now even a greater advantage enjoyed by legacies and minority students.

Fourth, the gaps in SAT scores have also grown over time, which, in turn, have made it more and more acceptable to admit athletes with subpar test scores.

Lastly, athletes contribute to the socioeconomic and racial diversity profiles of the institution (Shulman & Bowen, 2001, p. 57, 58).

Several problems arise when institutions engage in admission practices that favor one subgroup over another. The practice of admitting student-athletes more frequently than non-student-athletes does not seem to promote the academic mission of universities. According to Sperber (2000),

> In the hunt for applicants, universities with prominent college sports programs felt that they had an advantage over schools with mediocre or no NCAA Division 1 teams . . . . These institutions believed that they could clinch the application-and-enrollment deal if they could 'get the buyer inside the store,' i.e., onto campus (p. 55).

Furthermore, admission quotas have driven much of the questionable recruitment and admissions processes in higher education. Because institutions receive a large portion of their revenues from application fees, it makes sense to push for admissions to increase the university's bottom line. Concerning the impact of favorable admission rates for incoming student-athletes on higher education, Price (2010) noted the following:

> Universities are willing to compromise admissions criteria for athletic ability. The result has been institutional acceptance of lower graduation rates of student athletes who participate in revenue-producing sports. However, student athletes collectively graduate at rates comparable to their peers. The academic concession for athletic purposes amplifies an implicit institutional value on winning athletic contests in football and men's basketball, which are the primary users of "special admits" (students admitted with profiles significantly lower than the university average) and the teams with the lowest graduation rates.

Athlete Academic Progress Background

College athletics are an integral part of higher education in the United States, and the importance is in the name itself—"college" athletics. Consequently, student athletes are a unique sub group of the undergraduate population at higher education institutions, and it is important to track and consistently gather reliable data and information that

presents an accurate reflection of student-athletes' academic progress and graduation success. In addition, because of a high level of competition and placing great emphasis on athletics in higher education, a place reserved for intellectual thought, development, and ground breaking research, it is imperative that exceptional research and understanding of collegiate athletics be available.

Therefore, college presidents have assumed the responsibility of ensuring that student athletes are committed and show progress in their academics. They "mandated the development of a system of campus accountability in academic reform" (NCAA, 2013), which lead to the implementation of the Academic Progress Rate (APR) and the NCAA Graduation Success Rate (GSR) at the Division 1 level, and the Academic Success Rate (ASR) at the Division II level. Other progress indicators and policies that relate to governing of student athlete academic progress is known as the *40, 60, 80 rule*, which means that student-athletes entering college are required to complete 40 percent of their degree by the end of their second year, 60 percent by the end of their third year, and 80 percent by the end of their fourth year. Another NCAA rule states that in order to compete, a sport participant must earn a minimum of six hours in the current semester to remain eligible the next semester.

The NCAA set forth these guidelines and policies to keep student athletes on track to graduate; however, these guidelines and policies are not graduation qualifications. Those qualifications and requirements come from the respective institution in which the student athletes are enrolled and vary between academic institutions.

GSR, APR, ASR

The NCAA Graduation Success Rate (GSR) and Academic Progress Rate (APR) at the Division 1 level and the Academic Success Rate (ASR) at the Division II level are improvements on the federally mandated graduation rate by including students who were omitted from the federal calculation. The GSR measures graduation rates at Division I institutions and includes students transferring into the institutions. The GSR also allows institutions to subtract student-athletes who leave their institutions prior to graduation as long as they would have been academically eligible to compete had they remained. The GSR and ASR represent a six year cohort and are both calculated and released on an annual basis.

The Academic Progress Rate (APR) is a semester-by-semester measure of eligibility and retention for Division I student-athletes that was developed as an early indicator of eventual graduation rates. The APR includes eligibility, retention, and graduation as factors in the rate calculation and provides a much clearer picture of the current academic culture in each sport.

The Academic Success Rate (ASR) is very similar to the GSR and developed for similar reasons. While the GSR is more commonly used by Division I athletics, the ASR is generally reserved for Division II athletics. The ASR is nearly identical to the GSR with the exception that the ASR includes the academic success of non-scholarship athletes in addition to the scholarship athlete, who are only measured by the GSR.

These various academic indicators of success that can be objectively tracked and assessed have allowed for the discussion of current trends in academic success of college student-athletes. In collegiate athletics, a popular view held of student-athletes and

academics is not a favorable one. A tendency exists for people to believe that graduation rates and academic performance of student athletes are inferior to those of the general student population. In actuality, that is not entirely the case: "It should also be noted that the overall graduation rates for athlete are roughly the same as, and actually slightly higher than, the overall graduation rates for all students" (Shulman & Brown, 2001, p. 60). Furthermore, regardless of the data collection method (GSR, APR, ASR) employed, finding tend to be consistent that student-athletes overall graduate at a higher rate than their non student-athlete classmates.

Shulman and Brown collected data spanning a 38 year period of graduation rates amongst student athletes and other undergraduate populations. The four populations are classified as: High Profile athletes (HP), Lower Profile athletes (LP), Extracurricular participants (EX), and participants in Neither athletics nor extracurricular activities (NON). They found that in 1951, the EX athletes had the highest graduation rate at 90%, followed by LP at 84%, HP at 80%, and lastly NON at 60%. This trend continued over the next 38 years. In fact, in 1976 the EX grew to a 93% rate, LP grew to 88%, HP grew to 82%, and NON made the biggest jump in percentage to 75%. In the last year, 1989, again all four groups of undergraduates increased their graduation rate. EX went from 93% to 95%, LP rose to 91%, HP up to 86%, and the NON group had another big jump to 85% graduation rate. These findings conclude that the lower profile and higher profile sports were both consistently graduating more students than were the participants in Neither athletics NOr extracurricular activities group.

Consequently, a few questions are raised: (1) What enables student-athletes to have continually better graduation rates than students not involved with athletics? (2) How did the students not involved with athletics nor with extracurricular activities make such large leaps in their graduation rates over the 38 year span of records compared to the rest of the categories of students? The combined percentage increase for High profile athletes, Lower profile athletes, and EXtracurricular students was 22%. The total increase in graduation rates for the students not involved with athletics or extracurricular activities was 25%.

All in all, there has been an overall steady increase in the graduation rates of all cohorts in the study, though even more so in the group of students not involved either in athletics or in extracurricular activities. Therefore, it may be safe to presume that athletics at one time provided greater opportunities to succeed through college and graduate.

The data from Shulman and Brown's study provide a longitudinal view of a positive trend of graduation rates between certain subjects. What that same study shows is that when ranked by their Grade Point Average:

> Averages obscure the extremes of the ranges, which are even more revealing. Among the members of the 1989 entering cohort, 72 percent of the High Profile athletes and 49 percent of the Low Profile athletes ranked in the bottom third of the class (Shulman & Brown, 2001, p. 63).

With evidence indicating a need for change in the amount of success that student athletes have in the classroom, the late Dr. Myles Brand, former president of the NCAA, set out on a mission for academic reformation. As a result, the NCAA member colleges

and universities adopted a comprehensive academic reform package designed to improve the academic success and graduation rate of all student-athletes.

The APR is a major indicator used to assess the progress of student athletes' academic achievements, as well as predict graduation. The implementation of this academic reform has increased accountability of the institutions, the NCAA, and the student athletes. Each Division I sports team receives an APR score, and high-performing teams receive public recognition from the NCAA. Teams that score below 925 and have a student-athlete who failed academically and left school can lose scholarships. Teams can lose up to 10 percent of their scholarships each year for poor academic performance under the immediate penalty structure. Teams with APR scores below 900 face additional sanctions under the penalty structure.

First-year sanctions are a public warning letter for poor performance. Second-year sanctions include restrictions on scholarships and practice time. Third-year sanctions result in loss of postseason competition for the team, such as a bowl game or the men's basketball tournament. Four consecutive years of poor academic performance result in restricted membership status for an institution, which means the school will not be considered a Division I college or university.

The Committee on Educational Policy (CEP) submitted a report to the Academic Senate, Santa Cruz Division (2005), with recommended considerations pertaining to the desired academic achievement of their undergraduates. The first and foremost recommendation was that they wanted to "adopt a campus goal of achieving a 6-year graduation rate of 80% by 2012" (Bullock, Hankamer, Hunt-Carter, Larrabee, Leikin, Padgett, & Hughey 2006, p. 1). From the study of Shulman and Brown, figures clearly

state all groups of subjects had over an 80% graduation rate in all three data years except for the general student population group, which in 1989, the last data set of the year, did rise above the 80 percent mark to 85%. According to the latest (2013-2014) NCAA Graduation Success Rate data, 79 percent of freshmen student-athletes who entered college in 2002 earned their four-year degrees.

Sport Performance

Research shows acquisition of high abilities requires a long and intensive process of encouragement, education, and training (Bloom, 1985: Howe, 1999). Moreover, Ericcson, Krampe, and Tesch-Romer (1993) proposed in order to achieve expert performance levels, an average of ten years of deliberate practice is required. These two statements are instinsically tied to the idea of grit as the two underlieing factors of grit are perseverance and passion, which are required for long and intensive pursuits, not to mention deliberately working towards a goal for over a decade.

Sport performance is often looked at as a developmental process that is dependent on physical maturity and ability. From the mentality of free play of a child to the focused and technically sound and sequential unlocking of key body parts at the right moments in competition of elite athletes. As outlined by Bloom (1985) and Cote (1999), as well as being championed by the United State Olympic Committee (USOC) in their Long Term Athlete Development model (LTAD), there are specific stages in sport performance including the unrestricted play of youth, increasing investment in adolescents, and perfection of skills in mature adults.

Sport performance, while having never been operationally defined, can be understood as referring to the personal attributes that contribute to athletic development

and performance in a specific sport. These attributes include a range of physiological elements and processes (Peterson, Rhea & Alvar, 2004; Barnett, 2006; Huston &Wojtys, 1996), and cognitive and psychosocial elements and processes (Hall, Mack, & Paivio, 1998; Craft, Magyar, & Becker, 2003; Koivula, Hassmen, & Fallby 2002). While physical and mental aspects of sport performance are widely understood, researched, and practised; psychosocial aspects of sport performance, on the other hand, are not as obvious and less understood.

Sport performance is an area of tremendous growth in academia as well as on the field. The magnitude of importance for developing athletes might be at an all time high, as year round sport commitment, employment of personal trainers, and strict daily physical regimens are not just for the elite Olympic athletes any more. Far from it, sport organizations of all competitive levels have adopted, developed, molded, bended, and even broken their athletes in an attempt to increase sport performance, many times at the expense of actual performance (Kellman, 2010; Lemyre & Roberts, 2007; Hollander, Myers, & LeUnes, 1995).

Team Success

Teams are not successful based on the accomplishments of any one player; instead, the team's collective amount of effort and accomplishments are needed to translate into team success. Similarly, individual players do not develop in vacuums, but rather develop in an environment that is intimately comprised of the team in which they are members.

Ultimately, the success of a team takes precedent and is held in higher esteem than individual success and accomplishments, which is illustrated through sport participants' superlative-filled statements of gratitude, respect, and dependence upon teammates and coaches. While individual accomplishments and accolades are still celebrated and respected, as is evidenced by being voted for All-Star selection throughout sports, these individual accomplishments pale in comparison, both in social perception and sports folklore, to winning the World Cup, World Series, Super Bowl, or NBA Final. As such, resources have poured into the development of team success and are of particular interest to coaches, player development specialists, and administrators.

Also, because performance and productivity are critical individual factors, they are also critical team factors. In fact, individual team members will oftentimes have weaknesses and struggles that would not be beneficial to the individual, but in the context of a team where team members compliment one another the team can still be successful. As such, sport professionals and researchers alike have spent many years investigating the precursory elements that lead to team success.

Research into team success has come from many fields of study including psychology (Mahoney & Avener, 1977; Carron, Bray, & Eys, 2002; Birrer & Morgan, 2010; Johnson, Hrycaiko, Johnson, & Halas, 2004; Ericsson, Krampe, & Tesch-Romer, 1993), social-psychology (Bird, 1977; Smith, Smoll, & Barnett, 1995; Hanin, 1992; Duda, Balaguer, Jowett, & Lavallee, 2007), and management (Zaccaro, Rittman, & Marks, 2002; Watson, Ponthieu, & Critelli, 1995; Morgenson, Reider, & Campion, 2005), not to mention the various and in-depth systems of talent identification and development of professional sports leagues. Findings from the various fields have

illustrated a dynamic process that leads to sports team success; in other words, no one answer or way to gain team success exists. While team success has been studied through many perspectives with various variables of interest at the center, one undisputed and celebrated trait of team success is perseverance (Feltz & Lirgg, 2001; Fraser-Thomas & Cote, 2009; Fraser-Thomas, Cote, & Deakin, 2008), and is a central factor of the concept of grit (Duckworth, 2007).

Perseverance is important at the intercollegiate level and higher due to the length and intensity of involvement of sport participants. In college sports, the NCAA regulates each sport's season by allowing only a certain number of games within the season as well as their overall sport related time investment. Even so, student-athletes expected obligations far surpass the expectations of their non student-athlete counterparts. Notwithstanding the fact that student-athletes constantly engage in activites related to their sport that take considerably more time than the mandated time by the NCAA.

Because of the the unique research question driving this particular section of the literature review coupled with an aim of this study being to determine if there is a relationship between the overall grittiness of a college sports team and team success, a review of research that has focused on team athletic success will be highlighted. While it could be argued that team dynamics are a direct product of the individual team member differences and similarities, coaches, players, and other sport leaders often refer to how the team interacts and acts as a collective whole (Carron et al., 2002; Fletcher & Wagstaff, 2009). To understand team dynamics, recent research has focused on two major topics: cohesion and resiliency.

Cohesion, as described by Festinger (1950) is a "field of forces" providing a team with stability, is one of the earliest mentions of the effect of cohesion within a group or team. Since Festinger's study cohesion has been expanded upon with an understanding that cohesion can take place in three different domains within a group or team—task and social cohesion, and group pride. *Task cohesion* refers to the group or team's shared commitment to their tasks and goals (Hackman, 1976; Beal, Cohen, Burke, & McLendon, 2003; Chiocchio & Essiembre, 2009; Castano, Watts & Tekleab, 2013). Social cohesion, however, is more illustrative of general liking of the group, emotional connections, and enjoyment of each other's presence and time (Evans & Jarvis, 1980; MacCoun, 1996; Chiocchio & Essiembre, 2009).

Many of the same studies have shown that task cohesion is more important than social cohesion as it relates to team success. In other words, team members do not have to like each other on a personal level to have team success, which is demonstrated in Lenk's (1969) conceptualization of a championship German rowing team that had a high degree of internal team conflict, yet still consistently managed to produce a champion-level performance. Mullen and Cooper (1994) and Beal et al (2003), through their meta analyses of the cohesion and performance literature, found that although group pride was an area of group or team cohesion, it was not found to have been tested adequately or to have produced any significant effects in its relationship to team or group success. Coincidentally, one area that they found that group pride did produce positive correlations with group or team success was in sports (Castano et al, 2013).

Grit

The term *grit* while conjuring up the very essence of sports through anecdotes and metaphors of discipline, perseverance, and triumph, also serves as a valid and reliable measure of success throughout diverse life pursuits. Duckworth, Peters, Matthews, and Kelly (2007) define *grit* as "perseverance and passion towards long term goals" (p. 1088). Grit is no longer left to the annals of sport autobiographies or of subjective fairytales of hard work and pre-game pep talks because it can now be objectively measured with the Grit Scale – short (Grit-S).

In an in-depth investigation of the development and structure of expertise, Ericson and Charness (1994) found that in multiple fields of pursuit, such as sport, music, visual arts, and chess, the factor that distinguished the experts from the rest was consistent, focused, daily practice for ten years. Similarly, after the extensive biographical review of geniuses throughout history, Howe (1999) challenged the pervading view that intellectual ability was the most important and influential trait of success in any given domain. He went as far as to say that "[p]erseverance is at least as crucial as intelligence . . . . The most crucial inherent differences may be ones of temperament rather than of intellect" (p. 15). These studies and concepts were popularized in Malcom Gladwell's 2008 best seller *Outliers*, with the 10,000 hour rule. Gladwell, based on his research, posited that in order to gain expertise in any domain, an average of 10,000 hours spent in deliberate, focused, consistent practice is needed to succeed. This illustration of perseverance is the fundamental driving force of grit.

Duckworth et al (2007) sought to investigate the non-cognitive trait of grit, as a predictor of achievement. To do this, they developed their own measure--Grit-O—to fit their criteria: psychometric soundness, face validity for adolescents, low likelihood of ceiling effects in high-achieving populations, and a direct alignment with the construct of grit (p. 1089). To test the validity of the measure, they employed the scale and looked at achievement in various settings including educational attainment among adults, GPA of Ivy League students, retention of incoming West Point Military Academy cadets, and final rankings in the Scripps National Spelling Bee. On average, grit accounted for 4% of the variance in success outcomes across the individual studies.

The 12 question Grit-O was subsequently modified to an 8 question measure (Grit-S) that used four fewer items, but retained the 2-factor structure—consistency of interest and perseverance of effort—of the Grit-O. Duckworth and Quinn (2009) then conducted six studies to test and affirm internal consistency, test-retest stability, consensual validity with informant-report versions, and predictive validity of the Grit-S.

Due to the physical and mental commonalities between pursuing college athletics and successfully completing a highly physical and prolonged challenge, the West Point Military Academy cadet study is of particular interest. Moreover, to date, there has not been any published studies investigating the formal construct of grit in other physical, athletic, or sporting pursuits and populations. West Point Military Academy has a mandatory summer training program commonly known as “Beast Barracks.” Traditionally, West Point uses what is known as the Whole Candidate Score (WCS) as an important and influential factor of admission into the highly competitive and selective institution. The WCS is the sum of a formula that considers a “weighted average of SAT

scores, class rank, demonstrated leadership in extracurricular activities, and physical aptitude" (Duckworth & Quinn, 2009, p. 170). Interestlingly, the Whole Candidate Score did not predict retention, while grit "was a significant predictor over and beyond the Whole Candidate Score" (p. 170).

Grit and Academic Success

With a limited breadth and depth of research surrounding grit in general, there have been studies within various educational domains. In the construction of the original grit scale, Duckworth et al (2007) studied the relationship between grit, age, and educational attainment in two separate studies and found that "more educated adults were higher in grit than were less educated adults of equal age" (p. 1091).

In a similar study, the authors introduced the Big 5 personality traits (openness, conscientiousness, extraversion, agreeableness, neuroticism) because of the relationship of the factors making up the Big 5 and the two factor structure that comprises the grit scale. The authors wanted to determine whether the Big 5 traits or grit had stronger predictive value. They hypothesized that there would be a relationship between the Big 5 factor of conscientiousness and grit. As predicted, a correlation between the two did exist, more so than with any other Big 5 trait. Moreover, the results revealed "[t]he incremental predictive validity of grit for education and age over and beyond conscientiousness and other Big Five traits was supported" (p. 1093), supporting the current study.

Once Duckworth et al (2007) uncovered relationships between grit and educational attainment, they then adjusted their focus to a more defined understanding of how grit influences educational attainment by investigating grit and measures of

academic success, such as cumulative GPA of undergraduate students. They found that higher GPA's were associated with higher SAT scores, as was expected based on the large body of knowledge that surround the SAT and educational outcomes. They also found that higher grit scores were correlated with higher cumulative GPA's, yet interestingly grit was related to lower SAT scores.

However, because SAT scores can be seen as a representation of general aptitude, they are also a record of one point in time, while GPA's represent an aggregate understanding of an individual's academic achievement, which highlights that less intellectually astute undergraduates compensate with hard work, a sustained passion, and a consistency of effort. Similarly, Duckworth et al (2009) conducted a study in which they again looked at the relationship between grit and the educational outcome of GPA, albeit in high school students. In this longitudinal study, they discovered that grit was predictive of GPA a year later and possessed an inverse relationship with hours spent watching television.

While Padilla-Walker, Day, Dyer, and Black's (2013) study investigating predictors and outcomes of adolescent persistence did not explicitly research the construct of grit, however they did persistence, which is inexorably linked to grit. They partially supported their hypothesis that "persistence would be longitudinally related to higher levels of school engagement and prosocial behavior, and to lower levels of delinquency, even when controlling for self-regulation, optimism, and self-esteem" (p. 448). They found that higher levels of persistence were positively correlated to school engagement, however "were only marginally associated with prosocial behavior over time" (p. 448), indicating that one does not have to be liked in order to be gritty.

CHAPTER 3

METHODOLOGY

College sports is a particularly complex and overlapping social system, rendering it and its participants are extremely difficult to study as a whole. As such, this study did not aim to generalize to all college athletes, but rather to advance theoretical implications of student-athlete academic and sport performance by focusing on one bounded sports and academic system. Stake (2000) conceptualized an ideal case study as one whose intention is to illuminate a particular issue or challenge a broader generalization. Therefore, this study sought to shed light on the concept of grit and its place in student-athlete academic and sport performance.

Furthermore, the importance of framing studies in a case study methodology has been highlighted by the newly created *Case Studies in Sport Management* peer reviewed journal. Having an academic journal and a corresponding annual conference dedicated to the focus and richness of case studies has promoted research in the field of sport science as a whole.

Target Population

The target population for this study was NCAA Division II student-athletes attending a large urban university.

Sample

Prior to any interaction with study participants or data collection, the researcher sought and received human subjects approval by the University of New Mexico's Institutional Review Board to survey and interview participants. The sample for this study included all NCAA Division II student-athletes at a large, racially and ethnically

diverse, urban campus in the Rocky Mountain region during the 2015-2016 academic year. The sample consists of 194 student-athletes (95 males and 99 females) representing fourteen sports (six male and eight female). Combined, in-state males and females make up 72% of the overall student-athlete population (62% and 89%, respectively).

Design

Due to the unique geographical locations and dynamics of individual universities' sport and academic structure within a larger complex system of sports and education, this study was framed as a case study in order to capture the in-depth and rich information pertaining to the relationship between grit and college student-athlete academic and sport performance of one NCAA Division II university's student-athletes.

The structure of this case study is influenced by a constructionist epistemological philosophy and a phenomenological approach to knowledge formation. My epistemological position regarding this study espouses 1) those who are subjects of inquiry possess the most accurate data, whether participants or informants, 2) in order to collect the data, personal engagement is required. In order to also work towards trustworthiness, the specific methodology navigates through three data sources that will be utilized as a form of triangulation; the participant survey responses, informant survey responses, and informant interviews.

The diversity of information sources helps to triangulate the place of grit in college student-athlete's academic and sport performance. Moreover, the researcher employed a traditional member checking technique in order to provide reliability of the coding process and ultimately the overall themes that emerged from the coaches interview responses. The researcher followed up with as many of the coaches from the

case study that participated in the interviews as possible. However, due to conflicting schedules it was predicted that there would be fewer coaches who "member check" than who participated in the interviews. This assumption proved to be correct as college coaches have increasing workloads, primarily during their respective seasons.

This case study incorporates a cross-sectional survey design utilizing both primary and secondary data to assess the influence that grit has on college student-athlete academic and athletic success. Additionally, to add richness to the data interpretation and work toward trustworthiness of the research methodology, semi-structured interviews were conducted between the researcher and coaches.

Primary data were collected directly by the researcher, while secondary data were data already collected by an outside party and obtained through them (Creswell, 2007). The primary data in this study are the individual grit scores, coach's informant-report grit scales, demographics of participants, and individual academic indicators of success, such as GPA, SAT score, and highest level of parents' education. Individual academic indicators of success, such as GPA, SAT scores, and highest level of parent's education is self-reported by each student-athlete. The secondary data is the academic success of sports teams. Team academic success is represented by the annual NCAA Academic Success Rate (ASR) team score, and was collected from the NCAA official website (NCAA.org).

Lastly, a semi-structured interview protocol was employed between the researcher and coaches from both individual sport oriented teams and coaches from the team oriented sports teams, to add substance and context to the grit and demographic surveys.

Data Collection

Primary data for this study were comprised of student-athlete participant grit scores as well as informant grit score, and demographics. In a prearranged meeting with each team, the researcher administered and collected the demographic and grit questionnaires. One source of secondary data is the ASR obtained from the NCAA that acted as the indicator of team academic success. After all the data were collected and analyzed, meetings between each sports team head coach—the coach who completed the informant grit survey—were conducted to inform and capture the coaches' reactions to the findings as well as their team's aggregate grit score.

Following the data analysis of the two quantitative research questions, semi-structured interviews were conducted between the researcher and head coaches of the sports. Initially each coach was asked the same questions, then later asked to expand or clarify during a follow up discussion with the coaches who were able to perform as member checkers.

Constructs

Dependent variables. There were multiple dependent variables for this study, depending on which research question is being investigated. The first research question asked if a correlation exists between student-athletes' self-reported perception of grit and coaches' perception of their athletes' grit; therefore there were no true dependent variables, rather two ordinal data points.

The second research question explored whether grit is more predictive of academic success than traditional factors in college student-athletes. As such, the dependent variables are current cumulative GPA and credit hours completed because

these variables have been shown to represent accurately the current academic standing of college athletes.

The third research question sought to explore whether a relationship exists between aggregate team scores on grit and team academic success. Thus, the dependent variables were the team ASR scores.

The fourth and final research question is concerned with factors of grit that lead to individual and team sport performance, as held by the case study coaches.

Independent Variables. The independent variables used for this study consisted of basic demographics to control for randomness and included age, race, years playing respective sport, on scholarship or not, parent's level of education, high school GPA, and SAT score. The independent variable of particular interest revolves around grit, both the self-report scores of the individual college-athletes and the informant report grit score of each sport head coach.

The grit questionnaire is adopted directly and verbatim from the original validated Grit-S survey (Duckworth & Quinn, 2009). The Grit-S has repeatedly demonstrated construct and predictive validity possessing an internal consistency range over four distinct and separate samples of .73 to .83. Directly related to this study, the Grit-S has demonstrated moderate to strong predictive validity with a range of .22 to .55 in grit scores predicting academic success outcomes of college students.

The Grit-S survey is a self-report 8 question survey measured on a five-point likert type scale where 1—"not at all like me"—to 5—"very much like me"--represent the answer to each question. Example survey items include: "I finish whatever I begin," and "Setbacks don't discourage me." Similarly, the responses possess corresponding

values with the minimum score being 1—"not gritty at all"—and 5—"very gritty" (Duckworth & Quinn, 2009). After completing the survey in its entirety, the corresponding response values are added together then divided by 8 (the total number of questions) producing the end grit score.

Data Analysis

In order to embrace the exploratory nature of this study, the author of the current study employed a case study designed to address each of the research questions. In particular, research questions one through three were constructed to use a quantitative approach and research question four was designed in a qualitative manner to provide more depth to the quantitative data collected in research questions one through three. Each of the research questions that follow are presented below, including a description of the analysis plan for each research question.

RQ1: Is there a correlation between student-athletes' self-reported perception of grit and coaches' perception of their athletes' grit?

This is a correlational hypothesis based on discrete data. In order to identify a correlation and the strength of a correlation, a Pearson R analysis was conducted in addition to a Chi Square to test the differences between the student-athletes personal grit scores and their coach's perception of their grit.

RQ2: Is grit more predictive of college academic success than high school GPA, SAT score, and highest level of parents education in college student-athletes?

This is a predictive hypothesis based on continuous (HS GPA, current GPA, SAT score, age), categorical (highest level of parents education, race, sex), and discrete (grit score) data. Multiple regression analysis was used to ascertain whether the independent

variable of grit can account for more predictive value of college academic success than the traditional factors of college academic success also as independent variables.

RQ3: Is there a correlation between an aggregate team grit score and team academic success?

This is a correlational question that warrants the use of the Pearson R.

RQ4: What are the personally held beliefs of the college sport coaches towards grit and sport performance?

The formation of this research question is two fold: first, from my experience in the athlete development and sport performance industry and literature review, the concept of grit can be misunderstood or elusive to capture and implement. Second, as both player development and sports team success is heavily philosophical, approaching this research question with an open mindset and understanding that these philosophically held beliefs are often what fuels the approach to success, and thus are as many and as diverse as those who have a stake in the success of sports teams. Consequently, in addressing RQ4 the researcher employed open coding procedures based on semi-structured interviews with head coaches of the case study sport teams.

In order to suit the nature of the largely exploratory study a phenomenological approach was used as a model to gain understanding of the concept of grit. As part of that process, an open coding system was used to extrapolate concepts, themes, and patterns from interviews between the researcher and coaches. First, a word count analysis was performed to identify patterns in coach responses. Second, the researcher categorized the patterns in words based on their meaning and relation to sport

performance. Lastly, based on member checking procedures, the categories were positioned into overall themes of responses.

CHAPTER 4

Results / Findings

The purpose of this study was to investigate the relationship between grit and student-athlete academic and sport performance.

To begin identifying this relationship, the researcher determined that using a case study would render an illustrative picture as this is the first study of grit in its relation to sport performance, as well as using college student-athletes as a unique population of inquiry. Part of a case study methodology is to gain trustworthiness (Creswell, 2013), which can be attained in various ways. The particular route the researcher took was to employ demographic questionnaires of college student-athletes, grit measurements of student-athletes, informant grit measurements of the same athletes' level of grit, and personal interviews of the case study college sport coaches. This data collection broke down to three quantitative research questions and one qualitative research question.

Specifically, this study was designed to answer the following research questions:

RQ1: Is there a correlation between student-athletes' self-reported perception of grit and coaches' perception of their athletes' grit?

RQ2: Is grit more predictive of college academic success than high school GPA, SAT score, and highest level of parents' education in college student-athletes?

RQ3: Is there a correlation between an aggregate team grit score and team academic success?

RQ4: What are the personally held beliefs of the college sport coaches towards grit and sport performance?

Each research question was answered using separate data analyses. Data collected to answer questions 1 and 2 were analyzed using quantitative analyses, while data collected to answer question 4 were analyzed using qualitative analyses. Data for answering question 3 were unattainable leaving research question 3 unanswerable. The following will present each of the research questions followed by the statistical analysis and explanation.

Demographic Variables

In total, 194 student-athletes were eligible to be included in the case study. The researcher coordinated with the head coaches specific times in which to meet with the teams to employ the demographic questionnaire and grit survey. Completion of the surveys was voluntary, and not all student-athletes who were eligible to be in the case study showed up to the pre-arranged meeting time; however, 76% (n=148) of the overall N=194 student-athletes chose to do so. With this population size, a sample of at least 130 participants was needed for adequate representation. This number was selected using sample size calculators with a confidence level of 95% and margin of error of 5% (Thompson, 1992).

The ages of the participants ranged from 18 to 26 years with a mean age of 20.18 (standard deviation = 1.43 years). The sample was comprised of 67 (45.3%) male participants with a mean age of 20.48 (standard deviation = 1.481), and 81 (54.7%) female participants with a mean age of 19.95 (standard deviation = 1.359).

The case study included self-reported racial identification that included: 107 student-athletes (72%) identifying as White, 18 student-athletes (12.2%) identifying as Hispanic, 14 student-athletes (9.5%) identifying as Black / African American, 4 student-

athletes (2.7%) identifying as Asian, and Native American and Pacific Islander both had 1 student-athlete (.7%) claim identification, and lastly, 1 student-athlete (.7%) identified as other.

RQ1: Is there a correlation between student-athletes' self-reported perception of grit and coaches' perception of their athletes' grit?

As stated in the methods section, answering research question one relied on the results of a Chi Square and Pearson R analysis being conducted on discrete survey data of athlete grit score and informant grit score. This section reports on the survey response rates, results of each survey, and the correlational analyses, and a summary of the quantitative data analysis. Participants, without their coaches present, were instructed to complete both surveys.

Table 1 **Mean Grit Score (Binned) * Coach Mean Grit Score (Binned) Crosstabulation**

		Coach Mean Grit Score (Binned)					
		<= 2.28	2.29 - 2.94	2.95 - 3.61	3.62 - 4.27	4.28 - 4.93	Total
Mean Grit Score (Binned)	<= 2.52	3	0	0	2	0	5
	2.53 - 3.09	0	1	2	5	0	8
	3.10 - 3.67	1	4	16	17	2	40
	3.68 - 4.25	3	6	9	33	3	54
	4.26 - 4.82	0	3	3	11	4	21
	4.83+	0	0	0	1	1	2
Total		7	14	30	69	10	130

Table 2

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	50.962[a]	20	.000
Likelihood Ratio	33.241	20	.032
Linear-by-Linear Association	8.628	1	.003
N of Valid Cases	130		

a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .11.

Table 3

Chi Square Pearson R Summary

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Interval by Interval	Pearson's R	.259	.099	3.029	.003[c]
Ordinal by Ordinal	Spearman Correlation	.229	.088	2.660	.009[c]
N of Valid Cases		130			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation.

During the course of the research, 18 athletes did not receive a grit score from their coach. Consequently, in analysis, the correlation between the athletes self reported grit score and the coaches' informant grit score could be assessed, but there were an unequal number of respondents in each category. In other words, n, which is 148, is used for student-athlete respondents; whereas, informant grit scores were figured with only 130 respondents.

Nonetheless, a chi square analysis was conducted to determine whether or not a correlation existed between athletes' self-reported grit score and their coaches informant grit score. In order to perform the analysis, the researcher had to convert ordinal data to categorical data by visual binning. The parameters of the bins were created using two standard deviations away from the mean because assumptions are that the scores are normally distributed. In addition to the assumption of normal distribution, converting ordinal data into categorical using a Likert type scale, in essence, forced normalcy.

In the course of analysis, the researcher found that the informant (coaches') mean grit score (3.61) was slightly lower than the athletes mean grit score (3.67). The Pearson's R analysis did, in fact, reveal a correlation between athletes' mean grit score and coach mean grit score. The Pearson's Chi Square value is 50.962, with 20 degrees of freedom, and asymptotic significance $p < .05$. In order to determine the strength of the correlation, a Pearson R analysis was conducted that revealed a weak relationship with a Pearson's R value of 0.259.

In summary, the coaches consistently rated their athletes' grit lower than the athlete did.

RQ2: Is grit more predictive of college academic success than high school GPA, SAT score, and highest level of parents' education in college student-athletes?

A bivariate (Grit and College GPA) regression analysis and a multivariate regression analysis were performed in order to determine which of the variables accounted for more academic success in college?

To determine if grit is more predictive of college academic success a bivariate regression was conducted to determine the Pearson R value. A one tailed test was conducted because it was hypothesized that grit is correlated with academic success.

In running the regression, the Pearson R Square value was 0.014, at a $p < 0.05$, ($F(1, 146) = 2.147$, $p > .05$) indicating no statistical significance. In other words, grit in this sample, does not account for any more predictive value of college academic success than the traditional predictors of academic success:

Table 4

Bivariate Regression Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Mean Grit Score[b]	.	Enter

a. Dependent Variable: Current Cumulative GPA
b. All requested variables entered.

Table 5

Bivariate Regression Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.120[a]	.014	.008	.89785

a. Predictors: (Constant), Mean Grit Score

Table 6

Bivariate ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.731	1	1.731	2.147	.145[b]
	Residual	117.695	146	.806		
	Total	119.426	147			

a. Dependent Variable: Current Cumulative GPA
b. Predictors: (Constant), Mean Grit Score

Table 7

Bivariate Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.154	.477		6.612	.000
	Mean Grit Score	.188	.128	.120	1.465	.145

a. Dependent Variable: Current Cumulative GPA

To determine if grit is more predictive of college academic success than traditional factors of success (HS GPA, Parents' Education, SAT/ACT Score), a multivariate regression analysis was conducted for comparison to the bivariate analysis. In other words, the Pearson R Square value will reveal the predictive strength of grit as contrasted to traditional factors.

Traditionally, factors such as high school GPA, parents' education, and SAT or ACT scores have been used as indicators of college academic success. For the present case study, the participants had a mean high school GPA of 4.06 (standard deviation = .92) and a mean ACT score of 23.72 (standard deviation = 4.43).

In running the regression, the Pearson R Square value was 0.399, $p < 0.05$, indicating a statistically significant correlation between the traditional factors of success and cumulative college GPA. In other words, in this study grit is not more predictive of college academic success than traditional factors.

These results do not support Duckworth's original results on grit and college GPA. However, this difference is believed to be due to the misrepresented college GPA scores that were constricted due to the limiting nature of collecting GPA's in a range

form. Participants reported their GPA's on a Likert type scale. For example: high school GPA's ranged from less than 2.0 to greater than 4.0. One participant reported a HS GPA less than 2.0 (.7%), 5 participants (3.4%) reported between a 2.0 – 2.5, 32 participants (21.6%) reported a HS GPA between 2.6 – 3.0, 61 participants (41.2%) reported between a 3.1 – 3.5 HS GPA, 44 participants (29.7%) reported between a 3.6 – 4.0 HS GPA, and 5 participants (3.4%) reported having a HS GPA of greater than 4.0. The researcher believes that by using the raw GPA score in future research the model will produce similar results to Duckworth (2007, 2009).

Table 8

Multivariate Regression Method Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Highest education of parents, High School GPA, SAT or ACT Score[b]	.	Enter

a. Dependent Variable: Current Cumulative GPA

b. All requested variables entered.

Table 9

Multivariate Regression Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.632[a]	.399	.387	.70576

a. Predictors: (Constant), Highest education of parents, High School GPA, SAT or ACT Score

Table 10

Multivariate ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.699	3	15.900	31.920	.000[b]
	Residual	71.727	144	.498		
	Total	119.426	147			

a. Dependent Variable: Current Cumulative GPA

b. Predictors: (Constant), Highest education of parents, High School GPA, SAT or ACT Score

Table 11

Multivariate Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.031	.369		2.796	.006
	High School GPA	.591	.066	.603	8.939	.000
	SAT or ACT Score	.014	.014	.069	1.016	.311
	Highest education of parents	.028	.049	.038	.581	.562

a. Dependent Variable: Current Cumulative GPA

RQ3: Is there a correlation between an aggregate team grit score and team academic success?

This research question depended on the acquisition of data collected and disseminated by the NCAA. As outlined in the literature review section of this study, the ASR is a formula that reflects the academic success of each sport team and an aggregate athletic department score. The most recent NCAA data were prior to the participants' responses used in the case study, and the NCAA's upcoming release of data was expected

to be used in order to provide an accurate representation of team and department-wide academic success of the case study participants. However, the NCAA will not be releasing this information by the time expected for completion of this research question. As such, this research question has been rendered void.

RQ4: What are the personally held beliefs of the college sport coaches toward grit and sport performance?

The final research question was qualitatively guided with the findings representing the only data directly addressing grit and sport performance. As interview question 4, 5, 6, 7, and 8 were built to address grit and the individual athlete, it was no surprise that the final category or theme would be that grit can and does improve sport performance. However, as questions 2, 3, 9, and 10 were built to address grit and team success, an unexpected final category or theme emerged – team culture. The presentation of these findings will begin with how the final themes emerged through the raw data with the remainder of the findings couched in the overarching themes of sport performance and team culture that emerged from the totality of the interview correspondence.

Coding Procedures

The coding procedure began with the traditional open coding guidelines. The questions were grouped into the initial categories of sport performance related questions and team success related questions. Grouping the responses together into one of the two categories increased the ease of identifying patterns. In addition, word counts were performed in order to capture common terminology and phrasing directed at the same questions and categories. After performing the word counts and identifying patterns in

responses, similarities became apparent. These similarities were listed and developed into concepts.

When looking at questions geared towards sport performance, three patterns were conceptualized: recruiting, development, and performance. In addition, when looking at the questions geared toward success, three concepts emerged after identifying patterns in these questions – culture, development, and leadership. Finally, after comparatively assessing each set of three concepts with the original interview data and patterns, two final categories were identified and act as the overarching themes that illustrate the case study coaches' beliefs concerning grit as a factor to sport performance and team success; a) grit is a mechanism that enhances individual sport performance, and b) a team culture of grit provides team success.

Member Checking

A traditional member checking technique (Lincoln & Guba, 1985) was used to help work towards trustworthiness and provide a sense of reliability. Coaches who participated in the interview process were contacted to discuss their responses as well as the patterns, categories, and overall themes of their responses in order to verify interpretations were accurate with original responses. Not all coaches were available to member check, however, the patterns, categories, and two themes extrapolated from all the interviews were presented to the coaches who participated in the member check, to illicit the overall themes of grit and it's relation to sport performance in general. With the verification of interview transcripts and acceptance of final themes by the participating case study coaches, the researcher felt comfortable with the substantive and procedural trustworthiness of the study.

Grit and Sport Performance

The coaches were torn between talent and grit as the most important factor in affecting sport performance. The coaches stated the same belief regarding the importance of the two attributes, but came to opposite conclusions. For instance, some coaches alluded to the belief that talent is innate and grit is learned, with coach 5 stating, "Talent is inborn, while grit can be developed." In contrast, other coaches responded with the exact opposite belief with Coach 1 concluding that, "it's [grit] more important, because when times get hard a player with grit will get through them without breaking down." However, when asked about sustaining sport performance, the majority of coaches agreed that grit was more important than talent, with Coach 4 describing why:

> "We have a long season, we play a lot of games, our athletes are asked to handle a lot more than just those games including to thrive in the classroom. We need players that can be consistent throughout the season."

Similarly, a number of coaches made remarks indicating that over the course of time, grit helps increase player development. This idea emerged thematically as coaches described that regardless of their athletes' talent level that grit would activate it and transform it into long-term success.

While all coaches responded that they look for grit when recruiting, a unanimous agreement of the elements that identify a gritty athlete was not apparent. In fact, responses indicated a diverse web of elements that the coaches looked for when assessing grit. However, even without a unified conception of gritty traits, the majority of the coaches believe they are better off identifying grit than cultivating it. Coach 6 states, "We try to cultivate it in our program but it is not always the easiest to accomplish. So, if

we can identify it, we are better off." When asked to explain, four separate coaches (1, 3, 5, 6) used some variation of the phrase, "how they play the game," when asked how to identify a gritty player. Additionally, the feeling that cultivating or coaching grit was too difficult and time consuming emerged as a pattern in responses. The coaches responded that time could be better served learning the technicalities of certain plays, skill development, physical training, and systems of offenses, defenses, and transitions.

Another belief that drew closer attention was the value of grit transcending the sport domain and having valuable properties and implications in their athletes' lives beyond the sport field. Coach 4 stated, "If an athlete is gritty in their everyday life, he will be gritty on the field." Furthermore, Coach 5 indicates that by observing how the athlete behaves outside of their sport role, and by talking with other adult figures the athlete has relationships with, they can gain diverse and therefore better understanding of the athletes grit overall. The coach states, "We like to talk with adults in their lives; coaches, teachers, mentors, and parents, in order to get alternative perspectives and see if they are congruent with each other or not." These are both interesting statements because of the assumption that grit in ordinary life is the same as sport specific grit.

Grit and Team Success

Every head coach interviewed directly indicated that grit, as defined by Duckworth (2007, 2009) and adopted for this study, as an important factor to their teams success. A number of recurring terms were used by the coaches to describe factors most important to their teams' success, these included: talent, work ethic, competitiveness, will to win, grit, training, self-confidence, coach-ability, and control over aspects that teams have the power to influence.

The coaches indicated that while grit is important to team success, the majority agreed that the whole team does not need to be gritty, but rather just a few key players. Similarly, all coaches agreed that the few gritty players needed to affect the whole team were typically the team leaders.

Another emergent pattern was how to develop grit in their players. The coaches shared a unifying belief that in order to develop grit in their players, that they, the coaches, should replicate game scenarios as accurately and frequently as possible during training.

Figure 1

Sport Performance Thematic Matrix:

Patterns in Responses	**Concept of Patterns**	**Theme of Concepts**
Talent vs Grit	Performance	Sport Performance
Grit is more important than talent for sustained performance	Performance	Sport Performance
Grit activates talent	Performance	Sport Performance
Prefer to identify than cultivate	Recruiting	Sport Performance
Sought out in recruiting	Recruiting	Sport Performance
Diversity in identification	Recruiting	Sport Performance
Hard to cultivate	Development	Sport Performance
Difficulty and time consuming	Development	Sport Performance
Benefit of grit transcends sport	Performance	Sport Performance

Figure 2

Team Performance Thematic Matrix

Patterns in Responses	Concept of Patterns	Theme of Concepts
Talent, work-ethic, competitiveness, will to win, grit, training, self confidence, coachability, composure.	Individual Attributes	Culture
Grit vital to team success	Development	Culture
Grit more important than talent in team success	Development	Culture
Simulate game in practice	Development	Culture
Whole team does not need to be gritty	Leadership	Culture
Key players need grit	Leadership	Culture
Gritty players typically team leaders	Leadership	Culture

Lastly, the first question of the interview was not directed at either sport performance or team success, but rather if the coaches thought the Grit-S was a sound representation of grit in athletes. All the interviews began by asking the coaches about their feelings towards the Grit-S measurement. A consensus of coaches felt that the measurement asked appropriate questions, which were likely to be a reliable tool to assess grit. However, multiple coaches pondered if the results would be similar if the Grit-S was geared toward sport and athletics and was more specifically designed to capture the intricacies of each sport, which is a suggestion not to be lost for follow up research.

In contrast, one of the last questions asked was designed to compliment and provide context for research question 1, which investigated the congruency between the student-athletes' perception of their grit and their coaches' perception of their athletes' grit. As was described in RQ1 analysis, a relationship existed between how the athletes and coaches perceived their athletes grit, albeit a slight positive relationship. On average, the coaches perceived their athletes grit to be lower than the athletes rated their own grit. This analysis is consistent with the findings of the interview question that asked if coaches felt their athletes had an accurate perception of their (the athletes') grit, and almost every coach answered with a resounding no, that their athletes had inflated perceptions of their own grit. This result illustrates the cognitive bias known as the Dunning-Kruger effect. A phenomenon where an unskilled person incorrectly assesses their own ability in a specific domain higher than it actually is.

CHAPTER 5

Discussion and Conclusion

The purpose of this study was to investigate the relationship between grit and student-athlete academic and sport performance.

Through a case study methodology, the researcher came to the conclusion that many factors influence academic and sport performance of college athletes and that the psychosocial variable of grit is among them. The two answerable quantitative research questions shed some light on and contributed to the literature of grit within a new population of study. While research question 1 illustrated that athletes perceive their grit to be higher than their coaches perceived it to be, research question 2 did not support prior research, indicating that grit is a more powerful predictor of academic performance than traditional factors. It is the belief of the researcher, however, that the difference in results may be due to a host of reasons, notwithstanding the analysis performed, the type of athlete of inquiry, location of study, collegiate level of sport participation (NCAA division I, division II, division III, NAIA, NJCAA) and with a different approach results might indeed support prior research. However, this study's finding that grit is not more predictive of academic success is still worth discussion because it included a novel population of inquiry, which may explain the differing results.

Perhaps the most enlightening part of this study comes out of research question 4. A major implication of the study is that grit is necessary but not sufficient by itself in the production of sport performance and team success. Coaches, in terms of their positioning of how grit affects sport performance, have developed a conceptual understanding, a mindset, that is built on knowledge, experience, and psychosocial awareness that

manifests itself when speaking of athlete's psychological make-up. Therefore, this constructed mindset dictates decisions related to sport performance and team success.

This mindset allows coaches to understand the psychosocial aspects of sport performance, particularly in terms of how grit is identified and developed. For instance, an overarching theme of the study, in particular the qualitative research question, is that the place of grit might be as a mechanism playing an important, yet fairly abstract, role in an interdependent system of player development and sport performance.

Conventional wisdom, in all of its glory, "must be simple, convenient, and comforting – though not necessarily true" (Leavitt & Dubner, 2005, p. 90), and the belief that sport performance is solely a product of talent is indeed simple, convenient, and comforting. In addition, based on multiple responses indicating that grit acts as a key that unlocks potential talent, as well as develop skills, it is illustrative that while talent is an important piece of sport performance, grit is also an important aspect of the overall process of player development. In fact, multiple coaches hesitated to definitively state which was more important and indicated a balance of grit and talent was necessary for increased athlete and team performance. Coach 6's highlighted this sentiment by stating,

> "I do not believe grit is more important than talent. I think they go hand in hand in team sports. If you have a team of players that have all talent and no grit, then I do not believe they can achieve ultimate success. If you have a team with no talent and all grit, then I do not believe they can achieve ultimate success. Instead, I believe in a team sport you have to have a little bit of both to reach ultimate success. Talent is only as important as the athlete's ability to use it. Grit helps put talent to use."

Similarly, Coach 4 provides a more nuanced perspective of the relationship between talent and grit. The coach seems to offer a rudimentary formula that balances the two forces;

> "I believe that grit and talent are complimentary of each other for success. I believe that in order to perform at a high level, talent is needed. However, one must have true grit in order to maximize the talent one possess. If an individual has lots of talent, but little grit, they are usually wasting their talent and do not reach their potential. If two athletes have the same level of grit, but one has more talent than the other, the person with more talent should theoretically win. I do not believe that talent and grit can be mutually exclusive, but rather they must work together in order to achieve the highest maximum results."

Lastly, Coach 5 holds a similar perspective that grit tips the scales for higher performance. The coach explains that grit is the element that separates talented athletes:

> "All things being equal, grit is more important than talent. In college there are going to be a lot of talented players. It is the grit that athletes have that will separate them from the rest and eventually give an advantage to the gritty athlete."

These beliefs offer a structural understanding of grit and may be beneficial in an overall philosophy of the place grit holds in sport performance.

These responses conjure up the age-old debate of whether nature or nurture play a greater role in success. However, framing the question in a dichotomous vaccuum eliminates alternative possibilities and relegates the non-talented athlete to the sidelines.

The nature vs nurture argument presents the extremes of the modern day dialogue as the psychological understanding falls somewhere in between (Sikczentmihalyi, 1998), giving grit and other psychosocial related attributes more space to account for success. Moreover, Howe, Davidson, and Sloboda (1998) state "talent tends to refer to innate abilities, whereas development reflects how capabilites are nurtured and enhanced" (p. 200).

Another concept emerged from the patterns in coaches responses of how to develop grit in their players. A unifying belief indicated that in order to develop grit coaches should replicate game scenarios as accurately as possible during training as highlighted by Coach 1 when stating, "We try to put them in tough situations and see how they react to them throughout the year"; Coach 2 stating, "I try to put them in tense or pressure situation in practice"; Coach 4 stating, "I put them through challenging situations on a daily basis"; Coach 5 stating, "We try to put athletes in as many competitive and game scenarios as possible in order to always foster a competitive mindset that propels one toward improvement"; and lastly Coach 6 stating, "We try to put them in game like competitive environments and challenge them to find ways to win regardless of the obstacles."

When replication of game competition cannot be achieved for whatever reasons, coaches still attempt to make all training sessions as challenging and intense as possible. They believe that continued exposure to challenging situations acts under a scaffolding principle where the athletes build of preceding accomplishments and progress. After consistent and sustained training in this fashion, the belief is that when athletes face challenging scenarios in competitive action they will not be affected because the actual

game scenarios lack novelty. They will simply push through and perform their necessary behaviors, which is consistent with the defining trait of perseverance as described by Duckworth (2007 & 2009).

While there is an overall theme regarding sport performance which includes how to develop grit in their athletes, the overwhelming majority of the coaches still believe they are better off identifying grit than cultivating it as highlighted by Coach 3 stating, "I think you can help develop it to a point, but I think those with the most grit are those who already have a good level of it coming into the program"; Coach 3 stating, "If you can identify athletes who are gritty you are better off because it makes your job easier." Coach 6 echoes these same sentiments by saying, "We try to cultivate it in our program but it is not always the easiest to accomplish. So, if we can identify it, we are better off."

Many of the coaches believe they can and should identify grit in a prospective athlete for various reasons. One such reason is that it provides a foundation for the coaches to build upon. The less gritty athletes a coach recruits, the weaker the foundation that will propel them to high performance. Coach 5 explained why grit is important:

> "We would like to begin with an already gritty person as an athlete we would want to recruit. Athletes bring 18 years of developed habits with them when we sign them to play for us. In turn, we only have at most five years and many times less than that to get them to where we want them in our system. I believe grit starts with the parents, so if they are not gritty and we recruit [them] it can be a constant battle to get the athlete on the same page with the requirements, obligations, and sacrifices it takes in order to be successful student-athlete."

This response highlights boundaries and parameters that coaches have to work through when recruiting prospective players.

Additionally, Coach 1 illustrated how the absence of grit within a team can quickly become a roadblock to individual development and team success. Due to having a weak foundation of gritty players, cultivating grit becomes an everyday and intentional focus of the coaching staff, possibly taking away time, resources, and energy needed for more advanced technicalities. Coach 1 states;

> "If you bring in multiple non-gritty players to your team the time that we could be working on technicalities of plays, skill development, and systems of defense and offense can quickly become used on trying to stress work-ethic, mental approach, or toughness."

With regards to the coaches' beliefs concerning grit and team success, most coaches indicated that grit is clearly important to team success. Coach 1 stated, "The two most important factors for our program are work-ethic and competition. Those are two things that you control everyday and the ones that help to succeed in our world," and he continues to say "to have grit you have to have a work ethic and have the ability to move forward through challenges and failure." This statement speaks to the tumultuous trajectory of being an athlete. The constant peaks and valleys that athletes go through throughout the course of their career demand passion and perseverance (central characteristics of grit) in order to continue on with their sport. Coach 2 echoes this idea by saying, "My team may not be the most talented or best team, but my team still has the ability to win and be successful."

These sentiments are not surprising as it would be odd for any coach to have a consequentialist attitude. Moreover, if coaches did portray this outlook it would be antithetical to the ethos and meritocracy that is resolutely intertwined with competitive sport. However, it does reiterate the place and importance of grit in sport performance.

Another point of discussion is the amount of grit a team needs to have in order to be successful. As the team is made up of individual players, the question becomes how many 'gritty' players are needed in order to have a gritty team. A pattern emerged clearly indicating that the coaches believed only a few players need to have grit in order for a team be gritty. Coach 1, 3, 5, and 6 all indicated that only the "key" or "leaders" of a team need to have grit, and that as long as a few players have grit the team as a whole could be considered gritty. These commonly held beliefs introduce a staple of team sports culture yet to be discussed in this study, team captains and their roles within a team.

In contrast, a couple coaches indicated that they, in fact, do want the whole team to be gritty. Coach 4 cites the personal responsibility and accountability that is inherent in being a teammate. The Coach states,

> "I believe so [that a whole team needs to be gritty]. I believe that the grit each player displays, the higher the reward that the team will see. Every player has to be ready to go. You would be a bad teammate if you allowed only a couple players to carry responsibility of carrying the grit for the whole team. Just as you would be a bad teammate if you allowed others to have to carry the full responsibility of producing the runs, baskets, outs, and turnovers."

Interestingly, this same coach's responses toward cultivating grit was more personally accountable than other coaches.

Recommendations for Future Research

The resulting implications for this study are multifaceted. Throughout the course of the research, interesting ideas emerged that sparked further research considerations. In addition to the findings of the study, the recommendations for future research are based on my experience as a former athlete, high school and college coach, professional scout, and student of athlete development and sport performance. Four topics of future research include a) building a sport specific grit scale, b) investigating any relationships between the location in which an athlete grows up and level of grit, c) methodological changes to the current study for replication purposes, and d) how grit as a psychosocial variable can inform and compliment contemporary sport performance systems.

The original grit researchers are sure to position the grit scale as a measurement of life grit. They never claimed it to be specific to any certain life domain or pursuit. Instead, they show how grit can be influential in the success of various domains and pursuits that require sustained passion, practice, and perseverance. While the overall finding of the current study supports the general consensus that grit is influential to increased performance, it also highlights the need to devise a measurement specific to the nuances, wisdom, and ethic of a specific sport. This is the same criticism handed out to the NFL's use of the Wonderlic aptitude test given to NFL prospects. While the Grit Short Scale, like the Wonderlic, measures an individual construct that interacts with its environment, neither the Grit Short Scale nor the Wonderlic measure characteristics or aptitudes geared toward the unique and nuances of a specific sport. Thus, from

identification to projections, the benefits of a sport specific grit scale may manifest in the entire athlete development and sport performance process.

In addition to the importance of giving a holistic framework of the environment that the case study was situated within, another purpose of illustrating the sport and physical activity landscape of Coloradans was due to a high percentage of case study participants who played their respective sport in Colorado high schools and then were recruited out of their high schools in Colorado. It would be interesting to investigate how grit may be influenced by geographic location and to gain a better understanding of a *geo-grit* relationship. Is it possible that certain locations throughout the US have on average more or less grit than other locations of similar stature? Moreover, is it possible that there is a *socio-grit* relationship, where one might find a relationship between culture and level of individual grit?

If there are relationships to any of these questions, it may affect the recruiting territories of colleges and scouting regions of professional sports. Moreover, as we have seen families move across their town in order to be in a district that has a superior high school basketball team for their son or daughter, is it too far fetched that we might see families move across the nation to be in a location where grit is on average higher?

Another recommendation for future research, especially for replication purposes, is to form the methodology as not to artificially manufacture categories of GPA and SAT scores. Instead, it is recommended that the researcher either collect participant id numbers and gain access to the participants' school records to ensure correct information or to continue with the self-report methods but allow the student to provide the actual GPA and SAT score, not a range.

Lastly, as a student of athlete development and sport performance systems, it is curious as to how grit or perhaps a sport specific measure of an athlete's grit, should be incorporated into current structures and systems of sport performance. As highlighted earlier, physiological enhancement is the cornerstone of sport performance, and psychological training is becoming more main stream in the development of high performance athletes. Each sport, league, and team, while having similar structures, utilize extremely different systems of accumulating, synthesizing, and disseminating player development techniques.

Additionally, as promulgated by the United States Olympic Committee, the Long Term Athlete Development (LTAD) model is a system of sport development and performance that covers the life span of an individual. Ranging from infancy to the later stages of life, the model has provided an outline of age appropriate participation and development. Moreover, neuroscience and developmental psychology have informed how and when personal attributes are formed such as personality. Nave, Sherman, Funder, Hampson, and Goldberg (2010) found that ratings of youth personality by elementary school teachers were accurate with individual behavior later in life. This finding conceptualizes the early formation of personality and correlation of behavior at older ages. Together, the LTAD and personality research open up the door to studying grit in early elementary students. If personality is set by first grade, how much of an effect can college coaches hope to have on the cultivation of grit in their student-athletes'.

Moreover, this framework highlights the significance of grit in the coaching education field. It is vital that coaches have the education of how to identify and build grit in their athletes. Coaching education has become an important aspect of player development, as it is important for coaches and those training youth and adolescent athletes to have a solid foundation of how to implement psychosocial factors of athlete development and sport performance.

While this study does constitute a beginning research line into the relationship between grit and athlete sport and academic performance, it was made possible by the seminal research on grit conducted by Duckworth et al (2007 & 2009) and, hopefully, will serve as a stepping stone in the long and important process of uncovering the foundations of athlete performance.

Appendix A

Student-Athlete Demographic Questionnaire

Name:_____ Unidentified ID #:_____

Personal Demographics

1. Race:
   - Black / African-American
   - White / Caucasian
   - Hispanic
   - Asian
   - Native American
   - Pacific Islander
   - Other

2. Age:
   - 17
   - 18
   - 19
   - 20
   - 21
   - 22
   - 23
   - 24
   - 25

3. High School GPA:
   - <2.0
   - 2.0-2.5
   - 2.6-3.0
   - 3.1-3.5
   - 3.6-4.0
   - >4.0

4. SAT / ACT Score:
   - _____

5. Gender
   - Male
   - Female

6. Are you on athletic scholarship?
   - YES
   - NO

7. Current Cumulative GPA:
   - <2.0
   - 2.0-2.5
   - 2.6-3.0
   - 3.1-3.5
   - 3.6-4.0
   - >4.0

8. Highest Level of Parents Education
   - High School Diploma / GED
   - Associate Degree
   - Bachelor Degree
   - Master Degree
   - Law Degree
   - Doctoral Degree (MD, Ph.D., Ed. D., Psy.D, DPT, etc…)

9. What is your highest educational aspirations?
   - Associate Degree
   - Bachelor Degree
   - Master Degree
   - Law Degree
   - Doctoral Degree (MD, Ph.D., Ed.D., Psy.D., DPT, etc…)

Appendix B

Grit-Short Scale

Directions for taking the Grit Scale: Please respond to the following 8 items. Be honest – there are no right or wrong answers.

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

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

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

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

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

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

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

8. I am diligent.
    - Very much like me
    - Mostly like me
    - Somewhat like me
    - Not much like me
    - 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).

Appendix C

Informant Grit-Short Scale

Directions for taking the Informant Grit Short Scale: With a specific student-athlete in mind, please respond to the following 8 items.

1. New ideas and projects sometimes distract her/him from previous ones.
    - Very much like her/him
    - Mostly like her/him
    - Somewhat like her/him
    - Not much like her/him
    - Not like her/him at all

2. Setbacks don't discourage her/him.
    - Very much like her/him
    - Mostly like her/him
    - Somewhat like her/him
    - Not much like her/him
    - Not like her/him at all

3. She/He has been obsessed with a certain idea or project for a short time but later lost interest.
    - Very much like her/him
    - Mostly like her/him
    - Somewhat like her/him
    - Not much like her/him
    - Not like her/him at all

4. She/He is a hard worker.
    - Very much like her/him
    - Mostly like her/him
    - Somewhat like her/him
    - Not much like her/him
    - Not like her/him at all

5. She/He often sets a goal but later chooses to pursue a different one.
    - Very much like her/him
    - Mostly like her/him
    - Somewhat like her/him
    - Not much like her/him
    - Not like her/him at all

6. She/He has difficulty maintaining her/his focus on projects that take more than a few months to complete.
    - Very much like her/him
    - Mostly like her/him
    - Somewhat like her/him
    - Not much like her/him
    - Not like her/him at all

7. She/He finishes whatever she/he begins.
    - Very much like her/him
    - Mostly like her/him
    - Somewhat like her/him
    - Not much like her/him
    - Not like her/him at all

8. She/he is diligent.
    - Very much like her/him
    - Mostly like her/him
    - Somewhat like her/him
    - Not much like her/him
    - Not like her/him at all

Appendix D

Coach Interview Protocol

1. Do you believe the Grit-S is representative of grit in athletes?
2. What are the most important factors to your team's success, why?
3. Is grit an important characteristic of explaining your team's success, why?
4. Is grit more important than talent, why?
5. Do you look for grit when you are recruiting?
6. How do you identify grit in a prospective player?
7. Are you better off identifying or cultivating grit in student-athletes?
8. How do you increase or foster grit in your student-athletes?
9. Does the whole team need to be gritty, why?
10. Can a few gritty players affect the team positively?

Appendix E

Participant Consent Form

Grit and Student-Athlete Success: A Case Study

Informed Consent for Surveys and Interviews

October 30, 2015

Troy Morgan, a doctoral candidate from the Department of Health, Exercise, and Sport Sciences at the University of New Mexico is conducting a research study. The purpose of the research is to study the relationship between personal grit and success in the classroom and on the field of NCAA Division II college student-athletes. You are being asked to participate in this study because you fit the inclusion criteria of either being a student-athlete or head coach of a sports team at a Division II University.

Your participation will involve completing a nine (9) question demographic and an eight (8) question grit survey, and if selected through random selection you will be asked to answer an eight (10) question written interview. For the student-athletes; the demographic and grit survey should take about 15 minutes to complete. For the coaches; the informant version of the grit survey of each of your athletes should take about 25 minutes total. For coaches and student-athletes; if you are selected for the written interview, it will take about 20 minutes. The Grit survey for student-athletes and informant version for coaches includes statements such as "new ideas and projects sometimes distract me from previous ones," and are answered on a likert-type scale. The interview questions for student-athletes include questions such as "how important is grit in your athletic success?" The interview questions for coaches include questions such as "Is grit more important than talent?"

Your involvement in the study is voluntary, and you may choose not to participate. You can refuse to answer any of the questions at any time. Please provide your name on the surveys in order for the researcher to link responses to the coach's informant version responses. After linking student-athlete responses and coaches responses together, all identifying information will be destroyed and no identifying information will be associated with your responses. For the interviews, there are no names or identifying information associated with your responses. There are no known risks in this study, but some individuals may experience discomfort or loss of privacy when answering questions. Upon collection of all data, it will be stored for up to one year in a locked file in Troy Morgan's office and then destroyed through a commercial industrial shredder.

The completion of the demographic and grit surveys are taking place in a setting that includes all your teammates, and without your coaches present. You will be completing the demographic and grit surveys individually without any communication with those around you. In the case that you decide not to complete the surveys, you are provided with a blank sheet of paper to draw or write on to prevent those around you from knowing you are opting our of completing the surveys.

If you are willing to take the interview, please provide your email address on the survey in order for the researcher to contact you with the interview questions.

The findings from this project will provide information on how to better serve the academic and athletic pursuits of college student-athletes. If published, results will be presented in summary form only and pseudonyms given to student-athlete and coach interview quotes.

If you have any questions about this research project, please feel free to call David Scott at 505-277- 2925 or Troy Morgan at 785-317-4726. If you have questions regarding your rights as a research subject, or about what you should do in case of any harm to you, you may call the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu.

By completing and physically turning in your survey and emailing the completed interview questions back to the researcher, Troy Morgan, you will be agreeing to participate in the above described research study.

Thank you for your consideration. Sincerely,

Troy Morgan

troymorg@unm.edu

Doctoral Candidate – HESS

University of New Mexico

Dr. David Scott

dscott@unm.edu

Primary Investigator

University of New Mexico

Institutional Review Board

Number: 08615 Version: 10/30/2015 Approved: 11/11/2015 Expires: EXEMPT

Appendix F

IRB Approval Letter

DATE:

REFERENCE #: 08615 [762004-2]

PROJECT TITLE: Grit and Student-Athlete Success: A Case Study.

PI OF RECORD: David Scott, Ed.D

SUBMISSION TYPE: Response/Follow-Up

BOARD DECISION: DETERMINATION OF EXEMPT

EFFECTIVE DATE: November 16, 2015

REVIEW CATEGORY: November 11, 2015 Exempt category 2

DOCUMENTS:

• Consent Form - Consent Form.doc (UPDATED: 10/30/2015) • Letter-LetterofModifications(UPDATED:10/30/2015) • Protocol-Protocolv3.0(UPDATED:10/30/2015) • ApplicationForm-ProjectInformation(UPDATED:10/15/2015) • CV/Resume-(PI)DavidScottCV(UPDATED:10/12/2015)

• CV/Resume-CVTroyMorgan(UPDATED:05/21/2015)

• Letter-CoachRecruitmentLetter(UPDATED:10/15/2015)

• Letter-InstitutionalLetterofSupport(UPDATED:08/17/2015)

• Other-InterviewGuideCoach(UPDATED:08/31/2015)

• Other-InterviewGuideAthlete(UPDATED:08/31/2015)

• Other-DepartmentalReview(UPDATED:05/21/2015)

• Other-ProjectTeamform(UPDATED:05/21/2015)

• Questionnaire/Survey-ShortGritScale(UPDATED:05/21/2015)

• Questionnaire/Survey-GritShortScale-InformantVersion(UPDATED: 05/21/2015)

• Training/Certification-(PI)CitiScott(UPDATED:10/12/2015) • Training/Certification-CITIMorgan(UPDATED:05/21/2015)

Thank you for your submission of Response/Follow-Up materials for this project. The University of New Mexico (UNM) IRB Main Campus has determined that this project is EXEMPT from IRB oversight according to federal regulations. Because it has been granted exemption, this research project is not subject to continuing review. It is the responsibility of the researcher(s) to conduct this project in an ethical manner.

If Informed Consent is being obtained, use only approved consent document(s).

This determination applies only to the activities described in the submission and does not apply should any changes be made to this project. If changes are being considered, it is the responsibility of the Principal Investigator to submit an amendment to this project for IRB review and receive IRB approval

prior to implementing the changes. A change in the research may disqualify this research from the current review category.

The Office of the IRB can be contacted through: mail at MSC02 1665, 1 University of New Mexico, Albuquerque, NM 87131-0001; phone at 505.277.2644; email at irbmaincampus@unm.edu; or in-person at 1805 Sigma Chi Rd. NE, Albuquerque, NM 87106. You can also visit the OIRB website at irb.unm.edu.

Sincerely,

J. Scott Tonigan, PhD

IRB Chair

Appendix G

Institutional Letter of Support

METROPOLITAN STATE UNIVERSITY℠
OF DENVER

March 4, 2015

Office of the Institutional Review Board
University of New Mexico
Albuquerque, NM 87131

RE: IRB Letter of Support

Dear Institutional Review Board Chair and Members:

I am writing this letter of support for one of our colleagues, Troy Morgan. It is our intention to support Troy Morgan's research study: Grit and Student Athlete Success: A Case Study.

Supporting the success of student-athletes on and off the field is central to the mission of Metropolitan State University of Denver's Athletic Department and University as a whole. Troy Morgan's study is an innovative and pragmatic application of our core values of hard work and perseverance. This research study will provide insight for our coaches and student-athletes of the role that grit plays in their success as both a college student and college athlete.

After reading through and listening to the proposal at an official athletic department meeting in the Spring 2015 semester, the MSU Denver Athletic Department is aware of the proposed research project along with the responsibilities of the athletic department. We understand that the involvement of the athletic department (including coaches and student-athletes) in assisting in the accomplishment of this research study includes initial approval to approach team coaches and student-athletes, introductions and providing contact information of team head coaches, and when necessary accommodating space to conduct surveys and interviews.

As the Associate Athletic Director for Compliance at Metropolitan State University of Denver, I support the involvement of our sports coaches and student-athletes in this project and look forward to working with Mr. Morgan.

Sincerely,

Scott Groom
Associate Athletic Director for Compliance
Metropolitan State University of Denver
Denver, Co. 80203

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