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# Mental Toughness, Grit, and Motivational Differences in Single-sport and Multi-sport Athletes

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Mental Toughness, Grit, and Motivational Differences in Single-sport and Multi-sport Athletes

A dissertation submitted in partial fulfillment of  
the requirements for the degree of  
Doctor of Philosophy in Kinesiology

by

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## Abstract

Whether it is at work, school or sports, mental toughness (MT), grit and motivation are essential to accomplishing goals. Sports can be an integral platform for developing MT, grit, and factors that increase motivation levels, and it is during childhood and adolescence that these characteristics may develop. All of this could prove beneficial into adulthood. Therefore, the purpose of this study was to examine MT, grit and motivational orientations of single-sport and multi-sport athletes at different levels of competition. Considering MT, a 2 x 2 ANOVA indicated no significant interaction effect between athlete type and competition level,  $F(1, 387) = .06, p = .812, \text{partial } \eta^2 < .001$ , but significant main effects for athlete type,  $F(1, 387) = 4.87, p = .028, \text{partial } \eta^2 = .012$ , and competition level,  $F(1, 387) = 17.33, p < .001, \text{partial } \eta^2 = .043$ . Furthermore, regarding grit, a 2 x 2 ANOVA indicated no significant interaction effect between athlete type and competition level,  $F(1, 382) = .32, p = .571, \text{partial } \eta^2 = .001$ , and no significance for the athlete type main effect,  $F(1, 382) = 1.22, p = .270, \text{partial } \eta^2 = .003$ . However, a significant main effect was found for competition level,  $F(1, 382) = 5.42, p = .020, \text{partial } \eta^2 = .014$ . As for motivation, a 2 x 2 ANOVA indicated a significant interaction effect between athlete type and competition level  $F(1, 373) = 4.11, p = .043, \text{partial } \eta^2 = .011$  and a significant main effect for competition level  $F(1, 373) = 9.50, p = .002, \text{partial } \eta^2 = .025$ . However, there was no significant finding for the type of athlete,  $F(1, 373) = .76, p = .385, \text{partial } \eta^2 = .002$ . Examining the simple main effects for competition level, it was discovered that single-sport athletes only achieving high school level playing experience scored significantly lower than single-sport high school athletes that went on to play collegiately,  $F(1, 373) = 13.61, p < .001$ . Moreover, multi-sport high school athletes scored significantly higher than single-sport high school athletes,  $F(1, 373) = 5.42, p = .020$ .

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## **Dedication**

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# CHAPTER 1

## INTRODUCTION

Sports have become a vital part of the lives of youth and their families, sometimes to an obsession. Significant time is poured into youth sports starting at young ages. Children, as young as 10 years old, will sometimes travel nationally to compete, playing in tournaments multiple weekends throughout the year (Butler, 2011; Keown, 2011). The financial commitment is intense as well, with some households spending as much as 10 percent of the family's gross income on travel, private coaching, and equipment (Sullivan, 2015).

One phenomenon that is seen today is youth choosing to play a single sport at early ages (Ferguson & Stern, 2014). Many times, the adolescent, or his or her parent, has decided that it is in the adolescent's best interest to focus on one sport in order to maximize success in that particular sport and attain an athletic scholarship (Malina, 2010; Wojtys, 2013). Armour (2015) provides an example of a 12 year old that has his eyes set on being an NFL quarterback. He attends football camps, works with a private quarterback coach, and even has an online athletic profile touting his talents. The potential for achieving expert status at the earliest possible age is very attractive to those that choose to specialize in a sport (Ferguson & Stern, 2014). However, while focusing on one sport, youth may be missing out on valuable experiences that can be gained from participating in multiple sports.

The disadvantages, as well as the advantages, of youth specialization in sports are well known. Mental and physical disadvantages cited are participant burnout and overuse injury (DiFiori et al., 2014; Gould, 2010). According to DiFiori et al. (2014), sport specialization puts an individual at "high risk" to develop overuse injuries at various parts of the body like the shoulder, elbow, hip/pelvis, lower back, knee, lower leg, ankle, and foot. Likewise, when

specializing, youth experience added pressure to win, mental stress from longer practice sessions and seasons, and boredom of a sport after playing for several years (Woods, 2016).

While many youth choose to specialize in a single sport, others choose to diversify their sport experiences. Choosing to play multiple sports as a child has few disadvantages, but a couple of the perceived disadvantages include falling behind peers in skill development and becoming over-involved in activities having negative implications like decreased academic performance (American Alliance for Health, Physical Education, Recreation and Dance [AAHPERD], 2013; Gould & Carson, 2004). The advantages to participating in multiple sports throughout adolescence has numerous benefits (National Association of Youth Sports [NASPE], 2010). These benefits include greater overall skill development, more opportunity for social development, skill transferability to other sports, and a longer sports career (Bailey, 2006; Baker, Cogley, Fraser-Thomas, 2009; Gould, 2010; NASPE, 2010). With the idea that skills transfer from sport to sport, several elite and professional figures have promoted the multi-sport track. For example, a survey by ESPN found that 95% of NFL quarterbacks were at least two sport athletes in high school (Seifert, 2015). Furthermore, Abby Waumbach, arguably one of the best women's soccer players today, credits basketball with some of her success in soccer (Rogers, 2015). Urban Myer, head football coach of The Ohio State Buckeyes, has expressed his favor of multi-sport athletes (O'Sullivan, 2015). Finally, in 2014, 88 percent of Olympic athletes surveyed felt participating in multiple sports helped them become better at their main sport (Riewald & Snyder, 2014). Additionally, 71 percent of the Olympians considered themselves multi-sport athletes through high school before specializing.

Affective benefits to diversifying in sports during adolescence have been examined (AAHPERD, 2013). However, little is known concerning the constructs of mental toughness, grit

and motivational orientations in single-sport and multi-sport athletes. Mental toughness (MT) may mean various things to different people (see Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015 for review). When an individual talks about someone being mentally tough they could be referring to one's ability to address pain effectively (Bull, Shambrook, James, & Brooks, 2005), to not give up (Jaeschke & Sachs, 2012), or to perform successfully in stressful situations (Jones, Hanton, & Connaughton, 2002). Like MT, grit is connected to adversity (Duckworth & Gross, 2014). For instance, there is a popular billboard with a picture of John Wayne (i.e. the actor that played Rooster Cogburn in the classic movie True Grit) that states, "Don't much like quitters, son", with the phrase "GRIT Pass It On" printed at the bottom ("Grit," n.d.). Being gritty is about not quitting, however there is more to it. Grittiness can also be used to describe someone that is diligent and determined over an extended period of time (Duckworth, Peterson, Matthews & Kelly, 2007).

Being mentally tough, as well as being gritty, may explain why some individuals succeed while taking on a task when most cannot. For example, as discussed in a 2013 news article by Sloane, Hanna, & Ford, Diana Nyad had a dream of swimming from Cuba to Florida. On her fifth attempt at the age of 64, she successfully completed her goal having to overcome numerous environmental and psychological obstacles. In a similar fashion, motivation answers the "why" question, but instead of explaining why one is successful, it answers why one would participate. In Nyad's case, she set her aims high early in her life. Once she aged and her mother passed away, she decided that she wanted to commit to her aspiration of the long swim. In her mind, she was motivated to complete it before she got any older.

Finally, according to Ryan and Deci's (2000a) Self-Determination Theory, an individual can be intrinsically motivated, extrinsically motivated or amotivated. Individuals that participate

in activities for the pleasure of doing so, or for a sense of accomplishment, are said to be intrinsically motivated. Those that are seeking an external reward are extrinsically motivated, and sometimes individuals are not motivated at all – amotivated.

### **Significance of the Study**

People encounter multiple situations that require high levels of MT and grit every day. Likewise, motivation plays a significant role in everyday life. Experiences requiring adolescents to be mentally tough or gritty could prove beneficial to them as they mature into adulthood. Obviously, the quality of our experiences plays a huge role in developing MT and grit (Connaughton, Hanton, & Jones, 2010). To an extent, motivation levels can be affected by the quality of our experiences as well (Álvarez, Balaguer, Castillo, & Duda, 2009). But, what about the quantity of our experiences? One would think the greater the variety of stressful situations to which one is exposed, the greater the opportunity to learn how to best cope with that stressful condition. It stands to reason, the more exposure a person has to stressful experiences, the better equipped that person will be in effectively facing troublesome incidents as they arise (Connaughton, Wadey, Hanton, & Jones, 2008). As the expression goes, “there’s nothing like experience.” Simply put, exposure to a variety of demanding situations may provide an opportunity to build confidence in consistently controlling stressful circumstances.

Stressful conditions in sports occur abundantly. The opportunity to play multiple sports provides greater exposure to a variety of situations than playing just one sport (NASPE, 2010). Thus, the individual may be allotted greater opportunity to develop MT and grit (Thelwell, Weston, & Greenless, 2005). This could prove beneficial to them later in life. However, too much stress can create an unpleasant setting that is exhaustive (DiFiori et al., 2014). Thus, when

one experiences burnout, it may result in amotivation and the individual giving up the activity (DiFiori et al., 2014).

### **Purpose of the Study**

Being extremely popular today, sports have become a tremendous avenue for adolescents to develop skills they can carry on throughout their lifetime (AAHPERD, 2013; National Council of Youth Sports [NCYS], 2008). Teamwork, persistence, resiliency, character and leadership are all life skills that can be enhanced through participation in youth sports (Theokas, 2009). Thus, sports provides a pathway to develop these life skills (AAHPERD, 2013)

Hardiness and resiliency have both been linked to MT and grit (Clough, Earl, & Sewell, 2002; Kelly, Matthews, & Bartone, 2014). In addition, perseverance and hard work, qualities needed to complete goals despite setbacks, are attributes connected to mentally tough and gritty individuals (Duckworth & Gross, 2014; Jaeschke & Sachs, 2012; Winerman, 2013). Motivation has been associated with MT and grit as well. According to Jones, Hanton, & Connaughton (2002), individuals that are mentally tough are highly motivated from deep within to succeed. Additionally, Middleton, Marsh, Martin, Richards, and Perry (2004) maintained that MT motives originate internally. Similarly, grit has been tied to motivation (Duckworth & Gross, 2014). Moreover, Hochanadel and Finamore (2015) suggest that grit can be developed through internalizing the motivation for participation. Lastly, in a study by J. Reed (2104), it was noted that gritty individuals look for activities with internal rewards when selecting physical activity.

MT characteristics such as hardiness, resiliency, and perseverance can be related to sport (Bawa, 2010; Ramzi & Besharat, 2010; Theokas, 2009). These MT attributes can be observed when sport offers adverse conditions allowing one the possibility to learn how to cope with stressful situations (Hedstrom & Gould, 2004; Russell & Limle, 2013). Also, sports provide the

opportunity to understand and develop work ethic. According to Duckworth and Gross (2014), spending years or more dedicated to a task may develop grit within an individual. Likewise, developing a gritty mentality allows one to be resilient in difficult situations. Finally, motivation plays a huge role in sports. Children first start playing sports because they are interested in them and enjoy them (Sage & Eitzen, 2013; Watts, 2002). This intrinsic motivation leads to other advantages from sport like psychological and skill development (AAHPERD, 2013; Côté, Lidor, & Hackfort, 2009). In addition to intrinsic motivation, individuals may become externally motivated as well, by striving to maintain a healthy lifestyle for the benefits of overall health (Fraser-Thomas & Côté, 2006).

Specialization versus diversification in sport is frequently discussed in today's sporting world, as can be seen by several professional organizations issuing position statements regarding the topic (Ferguson & Stern, 2014). Likewise, MT, grit and motivation are highly discussed topics within physical activity and sport (Álvarez, Balaguer, Castillo, & Duda, 2009; Butt, Weinberg, & Culp, 2010; Connaughton, Hanton, & Jones, 2010; Crust, 2007; Fraser-Thomas & Côté, 2006; Jalili, Hosseini, Jalili, & Salehian, 2011; Kelly, Matthews, & Bartone, 2014; Li, Wang, Pyun, & Kee, 2013; Mahoney, Gucciardi, Ntoumanis, & Mallett, 2014; Middleton et al., 2004; Readdy, Raabe, & Harding, 2014; J. Reed 2014; Thelwell, Weston, & Greenless, 2005). During an investigation of elite sport performers, Jones, Hanton, and Connaughton (2002) highlighted a connection between MT and motivation. Similarly, Hochanadel & Finamore (2015), as well as Duckworth and Gross (2014), associated grit with motivation. However, there has been no past research investigating the relationships between MT, grit, or motivation between single-sport and multi-sport athletes specifically. Therefore, the purpose of this study is

to examine MT, grit and motivational orientations of single-sport athletes and multi-sport athletes at different levels of competition.

### **Research Questions**

In order to examine MT, grit and motivation in athletes at different levels of competition, the following research questions were developed to guide the research: 1) Do single-sport athletes or athletes participating in multiple sports throughout high school score higher in MT as measured by the Sports Mental Toughness Questionnaire (SMTQ)? 2) Do single-sport athletes or athletes participating in multiple sports throughout high school score higher in grit as measured by the Short Grit Scale (Grit-S)? 3) Are there motivational differences between single-sport and multi-sport athletes as measured by the Sport Motivation Scale-6 (SMS-6)? 4) Is there a difference in MT between those that played a sport collegiately or above and those that did not play sports past high school? 5) Is there a difference in grit between those that played a sport collegiately or above and those that did not play sports past high school? 6) Are there motivational differences between those that played a sport collegiately or above and those that did not play sports past high school?

### **Definition of Terms**

There are a handful of terms that need to be clarified. For the purpose of this study, the following definitions will be used for the terms below.

**Amotivation:** lack of motivation; the state of lacking an intention to act (Ryan & Deci, 2000a).

**Autonomy:** having a personal “will” to act. Autonomy within Self-Determination Theory does not mean being selfish or independent, but instead refers to an individual volition to act (Ryan & Deci, 2000b).

**Diversification (sport):** sampling or participating in multiple sports throughout childhood and adolescence (Wiersma, 2000). Sport diversification often leads to a more well-rounded individual athlete.

**External regulation:** behaviors performed to satisfy an external demand or obtain an externally imposed reward contingency. External regulation is classified as coming from an *external* perceived locus of causality (Ryan & Deci, 2000a).

**Externalized motivation:** motivation that is said to be from an external perceived locus of causality. Associated process of externalized motivation include external regulation and introjected regulation (Ryan & Deci, 2000a). *Externalized* motivation is not to be confused with *extrinsic* motivation.

**Extrinsic motivation:** attempting a task in order to attain a separable outcome (Ryan & Deci, 2000a). Extrinsically motivated individuals pursue an activity, not because it is inherently interesting, but in order to gain something from it (Ryan, Williams, Patrick, & Deci, 2009). *Extrinsic* motivation is not to be confused with *externalized* motivation.

**Grit:** perseverance and passion for long-term goals (Duckworth, Peterson, Matthews & Kelly, 2007).

**Gritty:** displaying perseverance and passion for long-term goals.

**Identified regulation:** motivated by the personal importance seen in the behavior. Identified regulation is classified as coming from a somewhat *internal* perceived locus of causality (Ryan & Deci, 2000a).

**Integrated regulation:** the most autonomous form of extrinsic motivation. It occurs when an individual has assimilated extrinsically motivating factors with one's own personal values. Many qualities of integrated regulation are shared with intrinsic motivation. Integrated

regulation is classified as coming from an *internal* perceived locus of causality (Ryan & Deci, 2000a).

**Internalized motivation:** motivation that is said to be from an internal perceived locus of causality. Associated processes of internalized motivation include identified regulation, integrated regulation, and intrinsic motivation (Ryan & Deci, 2000a). *Internalized* motivation is not to be confused with *intrinsic* motivation.

**Intrinsic motivation:** doing something because it is inherently interesting or enjoyable (Ryan & Deci, 2000a). Factors associated with intrinsic motivation include conscious valuing of activity, hierarchical synthesis of goals, interest, enjoyment, and inherent satisfaction. *Intrinsic* motivation is not to be confused with *internalized* motivation.

**Introjected regulation:** motivation stemming from ego or pride; can be caused by the pressure to perform in order to avoid guilt or anxiety. Introjected regulation is classified as coming from a somewhat *external* perceived locus of causality (Ryan & Deci, 2000a).

**Mental toughness:** the emotional and psychological ability to withstand, or recover from, setbacks by staying focused, controlled, and committed during an adverse task or condition. Mentally tough individuals are thought to be emotionally resilient, confident, focused and able to cope with pressure (Jones et al., 2002; Loehr, 1995; Clough, Earl & Sewell, 2002; Jones & Moorhouse, 2008).

**Motivation:** to be moved to do something (Ryan & Deci, 2000a).

**Multi-sport athlete:** An athlete that finished high school playing two or more sports (Definition utilized by the researcher.)

**Perceived locus of causality:** According to Self-Determination Theory, one's perceived locus of causality can be attributed to one's sense of autonomy (Ryan & Deci, 2000b).

**Single-sport athlete:** An athlete that finished high school playing only one sport  
(Definition utilized by the researcher.)

**Specialization (sport):** year round training in a specific sport with the exclusion of other sports at a young age (Ferguson & Stern, 2014).

## CHAPTER 2

### REVIEW OF LITERATURE

From the professional ranks to the pee-wee leagues, sports in American culture are extremely popular. A little over 60 million youth participate in sports every year (NCYS, 2008). Adolescents grow up admiring their favorite teams and players. They see them performing on television or in person, and they believe with a little dedication, they too can reach the elite level. So, just like their heroes, they start at an early age playing the games they love in hopes of one day being the next Peyton Manning, LeBron James, or Bryce Harper.

#### **Youth Sports**

There are several benefits to adolescents participating in youth sports. These benefits include learning new skills and improving on existing skills to become better at something, having the chance to be around friends and make new ones, and having the opportunity to discover one's own strengths and weaknesses (AAHPERD, 2013; Watts, 2002). But, most importantly, kids just want to have fun (Sage & Eitzen, 2013; Watts, 2002)!

It is obvious that participating in a sport provides physical benefits to the individual (AAHPERD, 2013). Adolescents playing sports can see improvements in both health-related and performance-related fitness measures (National Strength and Conditioning Association [NSCA], 2009). This fitness during youth lays the foundation for their adult life. In fact, adolescents participating in sports are more likely to carry on their positive physical activity habits into adulthood (Bailey, 2006). Additionally, adolescents who participate in youth sports are reported to have a higher metabolic rate as adults (Yang, Telama, Hirvensalo, Viikari, & Raitakari, 2009). The expansion of physical development attributes have also been found to be beneficial to adolescents playing sports (NASPE, 2010).

While participating in sports, adolescents can learn social skills that can be useful to them later in life, and these social skills allow them to learn sportsmanship, cooperation skills, respect for others and how to build strong relationships with their peers (Bailey, 2006). Moreover, Cranmer and Myers (2015) indicated sport allows adolescents to develop communication skills. Effective communication with a teammate or coach, and accountability to those individuals, are skills similar to interacting with colleagues in a professional work place. Understanding that one is accountable to others may lead some to rise to the occasion and set higher expectations for themselves, thus uniting everyone in an overall purpose (Gould & Carson, 2004). Learning to strive towards a common goal with other individuals is of the utmost importance in preparing for a professional working career (Messmer, 2003). Overall, sports may provide a setting where kids can learn to be good teammates (Theokas, 2009).

Along with physical and social benefits, maybe more importantly, affective benefits may be realized while participating in sports (AAHPERD, 2013; Wiersma, 2000). Sports can teach things such as responsibility, persistence, dedication, and discipline (Theokas, 2009). Learning responsibility in fulfilling one's duties is a similar characteristic to being accountable to others. The responsibility of being on time, caring for your equipment, and generally, fulfilling your duties are essential skills to being an effective employee (Robles, 2012). It takes discipline and dedication to learn these valuable skills. With the development of the specific skills, increased confidence in oneself can be realized (DiFiori et al., 2014; AAHPERD, 2013; Watts, 2002). The more responsible an individual becomes, the greater the confidence he or she will have in his or her abilities (AAHPERD, 2013). This, in turn, can boost one's self-esteem. However, failures are sure to happen, but this isn't necessarily a bad thing. Experiencing failure provides the opportunity to persevere through difficult situations (Thelwell et al., 2005). Learning from one's

mistakes by positively bouncing back is a skill that can prove beneficial later in life (Bailey, 2006). Finally, we can learn humility in sports (Austin, 2014). Success will come and go. Sometimes it is during our failures that humility understood, which helps an individual to better realize how to be humble when one wins (AAHPERD, 2013). Being humble is a characteristic that can foster success, and in general, it makes us more enjoyable to be around. Learning these characteristics about oneself aids in developing one's personality (Bailey, 2006).

Participating in sports provides opportunity for cognitive development as well. In Prosser and Jiang's (2008) review of literature investigating the relationship between physical activity and academic performance, it was noted that, while some studies found no significant correlations between physical activity and academic performance, there are multiple research studies that have found a positive relationship between the two (see Prosser and Jiang's article "Relationship between school physical activity and academic performance of children" for full list of suggested studies). Because of this, Prosser and Jiang (2008) were cautious in their conclusion pointing out the weak correlation in some studies. However, their literature review produced more findings suggesting a relationship between physical activity and academic performance than against. Further review of literature produced more research positively connecting physical activity and athletic performance. When comparing athletes to non-athletes, athletes tend to have better grades, test scores, and attendance (AAHPERD, 2013; Watts, 2002). It has also been noted that problem solving skills can be positively influenced by sport activity. For example, youth participating in sport are able to increase their strategic skills, generating plans and applications for successful completion of objectives (Baker, 2003). An increase in mental alertness, attention and working memory have been attributed to sports as well (AAHPERD, 2013).

## **Sport Specialization**

A popular phenomenon within sport culture today is focusing on one sport during adolescence (Ferguson & Stern, 2014; Hedstrom & Gould, 2004). This is happening at younger and younger ages. Children can be seen specializing in one sport as early as age nine (K. Reed, 2014). The reasons for specialization vary. The most obvious explanation of an individual choosing to specialize in a sport is for mastery of skills (Ferguson & Stern, 2014; Gould, 2010; Wiersma, 2000). Back in the early 1980's, Newell and Rosenbloom (1981) discovered a positive relationship between achievement and practice time. In fact, research by Andres Ericsson and colleagues (1993) concluded that in order to achieve expert status, individuals must dedicate themselves to 10,000 hours of deliberate practice of a skill for a minimum of 10 years. This allows individuals greater early skill acquisition, allowing them to gain a competitive edge (Ferguson & Stern, 2014; Wiersma, 2000).

Sometimes individuals are not as worried about achieving elite status as they are about falling behind their peers (Gould, 2010). Particular demands of sports influence whether youth decide to specialize or not (DiFiori et al., 2014). Some activities, like soccer and baseball, are very sport specific. For example, the specificity of foot-eye coordination involved in soccer is very unique (Neto, Barbieri, Barbieri, & Gobbi, 2009). Likewise, the timing involved in hitting a baseball or softball is exclusive to those sports and requires great time and dedication to master (Epstein, 2013). Even if mastery isn't the ultimate goal, individuals may feel they will fall behind their peers if they choose not to specialize in a sport at a young age (Gould, 2010).

As children get older, many start dreaming of playing for their high school, collegiately, or even professionally (Gould, 2010). By choosing to specialize, they believe they will have a better chance of realizing those dreams (Hill, 1991; Watts, 2002). Sometimes it may not even be

the child who is choosing to specialize, but it is the parents who have made that decision (Gould, 2010). Some parents decide it is in the best interest of their child to focus on one sport in hopes of realizing the prized college athletic scholarship (Hill, 1991). Coaches, too, see the benefits of kids specializing. Many coaches today will encourage youngsters to focus on one sport, because they do not want to share time with another sport (Watts, 2002). They believe the more exclusively they have their individual athletes, the better the team will become and, likewise, will have a better chance of winning (Watts, 2002).

While there are advantages to specializing in one sport at an early age, there has been numerous literature discussing the disadvantages to it (Branta, 2010; DiFiori et al., 2014; Hill, 1991; NASPE, 2010; Watts, 2002; Wiersma, 2000). The two most cited reasons against sport specialization are athlete burnout and overuse injury (DiFiori et al., 2014; Watts, 2002). Mentally, adolescents are burned out and no longer wish to participate. An example of this comes from a study by Shibko (2015), which found adolescents who specialize in a single sport before the age of 10 are more likely to drop out than those who wait to specialize. Physically, adolescents wear out as well. Repetitive stress on the same muscles, ligaments, tendons, and joints causes the body to become vulnerable, and thus, overuse injuries occur (DiFiori et al., 2014). As someone plays the same sport year round, the same body tissues and structures are getting overloaded with stress without an opportunity to recuperate (Hollander, Meyers, & LeUnes, 1995). Therefore, experts suggest that adolescents need an offseason to recuperate (NASPE, 2010). Even with this advice, sometimes both parents and coaches will encourage young athletes to focus on one sport year round (Hedstrom & Gould, 2004; Malina, 2010). With parents and coaches asking young athletes to specialize, it places tremendous stress on the adolescent to not disappoint (Wiersma, 2000).

## **Sport Diversification**

The benefits to specialization that were previously discussed naturally can be seen as disadvantages to sport diversification. It is believed by some that youth choosing to play multiple sports throughout the year are at risk of falling behind their peers in specific skill development due to not devoting all of one's time to a given sport (Ferguson & Stern, 2014). This purported "lack of expertise" hinders those diversifying from keeping up; the time spent playing a second or third sport is thought to diminish the development of specific skills of the first sport (Wiersma, 2000).

While specialization in sport has become more common (Ferguson & Stern, 2014), there are still some youth who choose to diversify themselves in their sporting endeavors, and the reasons for doing so are numerous. Sport diversification allows one to develop as a well-rounded athlete (Griffin, 2008). It provides the opportunity to experience multiple skill demands, coaching personalities, and teammate interactions (NASPE, 2010).

There is a lot that goes into becoming a well-rounded athlete. There are physical, social, and cognitive benefits to playing multiple sports (NASPE, 2010). Athletes diversifying in sports have the opportunity to balance out activities throughout the year, reducing the chance of both burnout and overuse injury (NASPE, 2010). Physically, humans need rest. As an adolescent dabbles in different sports, he or she is able to stay active, while not repetitively putting stress on the same body parts (DiFiori et al., 2014). Similarly, the body benefits physically from expanding the possible movements encountered while playing multiple sports (Branta, 2010). According to Gallahue, Ozmun, and Goodway (2012), it is very important that young people are provided a variety of experiences when it comes to motor skill development. These experiences allow for development of fundamental motor skills (Branta, 2010); specialized skills needed for

sport are dependent on proficiency of fundamental movement skills (Gallahue et al., 2012). Finally, adolescents, and adults as well, need time to let their bodies rest and recover (DiFiori et al., 2014). Participating in multiple sports throughout the year limits overuse injury, since a variety of sports require different sport specific muscles and body parts like those involved in the overhand throw in baseball (NASPE, 2010).

Participating in multiple sports provides an opportunity for social benefits as well (NASPE, 2010). Being involved in multiple sports, provides the opportunity to develop relationships with a variety of individuals, such as peers and authority figures (NASPE, 2010). As an adult, one will interact with a variety of individuals, especially in the workplace. While playing multiple sports, there is the possibility of experiencing varying coaching styles and personalities (Theokas, 2009). Being given the chance to develop a variety of relationships provides for greater social development (Bailey, 2006).

Cognitive benefits can be found from playing multiple sports as well. Exposure to an assortment of strategies from differing sports could allow for more creativity from sport to sport due to the increased ability to process incoming information from a variety of situations (Baker et al., 2009). Strategies and conceptual skills may carry over and be useful in another sport (Hill, 1991).

### **Mental Toughness (MT)**

An often reported study by Gould, Hodge, Peterson, and Petlichkoff (1987) found that 82 percent of wrestling coaches stated MT as the most important characteristic in their athletes' success. In his book, "Mental Toughness Training for Sports: Achieving Athletic Excellence", Loehr (1986) states characteristics making up MT as being responsible for 50 percent of the success found in athletics. Those who have been around sports have probably heard the term MT

being used. It is a term that is often applied in connection with sports, but when it is used, there are frequently different meanings in mind.

The definition of MT has been highly discussed over the past decade or two (see Gucciardi, et al., 2015 for review). With varying definitions being used by coaches and athletes, researchers have spent the last decade attempting to nail down a definition. In literature addressing MT in sport, the most utilized definition is by Jones et al. (2002). In this definition, MT is both innate (natural) and developed within an individual. These researchers define mental toughness as the natural or developed psychological edge that enables one to:

- Generally, cope better than your opponent with many demands (competition, training, lifestyle) that sport places on a performer.
- Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.

Research by Thelwell et al. (2005) employed the same definition as Jones and colleagues (2002) with one exception. Thelwell et al. (2005) concluded that mentally tough individuals *always* cope better than their opponents with demands that sport places on a performer. Words and concepts highlighted in both of these definitions include coping, consistency, and taking on pressure. Moreover, Gucciardi et al. (2015) defined MT as the personal capacity to produce consistently high levels of subjective or objective performance despite everyday challenges and stressors as well as significant adversities. Like Jones et al. (2002) and Thelwell et al. (2005), consistency is used in the definition of MT. Additionally, Gucciardi et al. (2015) mention in their definition that mentally tough performers can overcome adversity. One last definition presents a few additional characteristics of a mentally tough person. Middleton et al. (2004) also discuss facing adversity and taking on pressure, and these researchers have the only definition that

mentions perseverance; perseverance is often referenced when describing someone that is mentally tough (Jaeschke & Sachs, 2012).

Along with defining MT, several models have been created featuring characteristics of individuals that exhibit MT. In his book “The New Toughness Training for Sports”, Dr. Loehr (1995) outlined his four markers of toughness: emotional flexibility, emotional responsiveness, emotional strength, and emotional resiliency. Clough, Earl and Sewell (2002) highlighted commitment, control, challenge, and confidence as the 4 C’s model of MT. Motivation, self-confidence, attentional focus, and coping with pressure have been tagged the four pillars of MT by Jones and Moorhouse (2008). Connaughton et al. (2010) created a framework that described which of the 30 total attributes they claim to affect MT should fall within four dimensions (i.e. attitude/mindset, training, competition, and post-competition). Bull et al. (2005) generated a MT pyramid. With this pyramid, upbringing establishes the base which is titled “environmental influences”. It is this base that influences the next three levels of the pyramid – tough character, tough attitudes, and tough thinking. Lastly, Middleton and colleagues (2004), after interviewing 25 elite-level athletes, discovered 12 characteristics of MT. These characteristics include self-efficacy, mental self-concept, potential, task-specific attention, perseverance, task familiarity, personal bests, task value, goal commitment, positivity, stress minimization, and positive comparisons. This final model tackles that which has been the deficiency in past MT research: the complete nature of MT. Specifically, it addresses the notion that MT can be influenced by stable personality characteristics (i.e. self-belief, goal commitment) and more impressionable MT actions (i.e. task-specific attention, stress minimization, potential).

Common themes emerging from the definitions and models of MT should be noted. Emotional strength, tough character, tough attitude, commitment and the ability to minimize

stress were highlighted above (Bull et al., 2005; Clough et al., 2002; Loehr, 1995; Middleton et al., 2004). This suggests that mentally tough individuals will display a strong disposition. Self-confidence, self-efficacy, mental self-concept, and confidence are terms inferring that a mentally tough person is self-aware (Clough et al., 2002; Jones & Moorhouse, 2007; Middleton et al., 2004). To be mentally tough, one needs to be attentive to how an individual best functions in completing tasks. Therefore, MT requires task-specific attention, attentional focus, and control (Clough et al., 2002; Jones & Moorhouse, 2007; Middleton et al., 2004). Tough thinking, emotional resiliency, emotional flexibility, coping, and perseverance are said to be important (Bull et al., 2005; Jones & Moorhouse, 2007; Loehr, 1995; Middleton et al., 2004). Adapting to, and fighting through, difficult situations are characteristics of someone with great MT. Additional characteristics of MT throughout the literature include persistence and motivation (Jaeschke & Sachs, 2012; Ryan & Deci, 2000a). In summary, literature suggests mentally tough individuals consistently cope better than their opponents by continuing to be determined, focused, confident, and controlled during stressful situations.

The nature vs nurture debate can apply to MT (Crust, 2007). Meaning, you are either born mentally tough or you learn to become mentally tough. While some research findings state the development of MT to be mostly shaped by a person's experiences, others acknowledge that it can be "trait-like" in nature (Bull et al., 2005; Jones et al., 2002; Thelwell et al., 2005). Currently, the general thought process is that MT is guided by both experiences (learned) and nature (innate) (Crust, 2007; Jones et al., 2002).

Externally, MT is swayed by the environmental conditions afforded to the individual (Crust & Swann, 2011). Aspects of the environment that play a role include coaching style, competition level, and the amount of time in the setting. According to Bull et al. (2005), the type

of attitude displayed by the coach may affect a player's level of MT. It has been reported that an enjoyable environment that affords the opportunity to display one's skills aids in MT development (Connaughton et al., 2008). Additionally, a competitive setting and a tough physical environment can contribute to the development of MT (Butt et al., 2010; Connaughton et al., 2008). According to Jones and Parker (2013), accumulating of years of experience positively contributes to becoming MT. This supports Middleton et al. (2004) which found that being accustomed to a specific type of environment leads to greater MT, as well as the finding that when expending effort over time, MT increases (Mahoney et al., 2014).

Internally, MT is thought to be "trait-like" (Jones et al., 2002). It has been noted that MT can be the result of an "internalized motive" within an individual (Jones et al., 2002; Ryan & Deci, 2000a). Desire is another term that has been used, and as previously mentioned, MT comes naturally to some (Jones et al., 2002). Lastly, MT is said to come from having "tough character" (Bull et al., 2005). This is another example of MT being considered a personality trait that someone acquires at birth.

## **Grit**

The concept of grit has been around for over a century (James, 1907). Long ago researchers identified passion and hard work as distinguishing factors of successful individuals (Galton, 1892). Recently, grit has been defined as perseverance and passion for long-term goals (Duckworth et al., 2007). Furthermore, "grit entails working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress" (Duckworth et al., 2007, pp. 1087-1088).

Several characteristics of gritty individuals have been discussed recently. Kelly, Matthews, and Bartone (2014) have associated grit with hardiness, relating hardiness to a strong

feeling of commitment to an activity. Gritty individuals are said to display passion and perseverance over time (Winerman, 2013). Perseverance for extended amounts of time requires stamina to pursue those activities into the future (Duckworth et al., 2007). To maintain this level of perseverance commands self-control. Thus, individuals that are said to be gritty display great self-control and are diligent (Duckworth & Gross, 2014; Winerman, 2013). Additionally, individuals with grit follow through with plans (Duckworth et al., 2007). This is done by maintaining interest in an endeavor over time even when obstacles are present (Kelly et al., 2014; Duckworth & Gross, 2014). In summary, gritty individuals are committed and can persevere in tackling tasks that extend over a longer period of time.

## **Motivation**

The term used to address the question of why people choose to participate in activities is known as motivation. According to Merriam-Webster Collegiate Dictionary (2005), motivation is a force or influence that causes someone to do something. The fact is, people experience various motivational orientations. Sometimes, people engage in activities because they are interested in them, and other times, individuals are looking for a separate outcome from completing the activity (Ryan & Deci, 2000a). Occasionally, it is a combination of both interest in the activity and seeking a separate outcome that motivates an individual (Ryan & Deci, 2000a).

Dr. Richard Ryan and Dr. Edward Deci (2000b) are well-known in the psychology field for the development of their theory on motivation, known as Self-Determination Theory (SDT). According to SDT, humans have three basic psychological needs that are inherent in all individuals and are considered essential for ideal development (Deci & Vansteenkiste, 2004). These three needs are the need for autonomy, relatedness (connectedness), and competence

(Ryan & Deci, 2000a; Deci & Vansteenkiste, 2004). Autonomy in SDT does not necessarily represent the need for independence, but rather, represents one's craving to have control over one's will (Ryan & Deci, 2000c). This attitude of volition can be accomplished individually or collectively (Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008). The need for relatedness states that humans innately want to feel connected to others, and it also suggests that individuals need to feel like they belong in the world around them (Deci & Vansteenkiste, 2004). Lastly, the need for competence signifies a desire to effectively master the world around them (Deci & Vansteenkiste, 2004).

The central tenet of SDT is that humans are both extrinsically and intrinsically motivated (Ryan et al., 2009) to pursue the three basic needs of autonomy, relatedness and competence. Extrinsic motivation relates to action that is done to fulfill the need to accomplish a "separable outcome" from the activity itself, whereas intrinsic motivation is action not to achieve external rewards but that which is done for the sheer enjoyment of participating in the activity (Ryan & Deci, 2000a). SDT also defines a lack of motivation for an activity as amotivation (Ryan & Deci, 2000a).

In SDT, motivation falls along a continuum of no motivation (amotivation) to full inherent satisfaction and joy of participating in an activity (intrinsic motivation) (Ryan & Deci, 2000a). In the middle of this are four types of extrinsic motivation: external regulation, introjection, identification, and integration (Ryan & Deci, 2000a). Levels of autonomy can differ greatly within extrinsic motivation. This is recognized by the perceived locus of causality (PLOC) for the behavior. PLOC was a concept introduced by Fritz Heider (1958) in a book titled, "The Psychology of Interpersonal Relations." A PLOC refers to how one internalizes a motive (DeCharms, 1968). Sometimes an individual will play strictly for a tangible reward or to

avoid a consequence (i.e. external regulation), and other times an individual will participate to accomplish a personal goal (i.e. integration). Therefore, identifying the level of extrinsic motivation is done by considering the PLOC for the behavior.

According to SDT, extrinsic motivation can stem from the desire to obtain solely external rewards (i.e. external regulation) to understanding the “value” of accomplishing a task (i.e. integrated regulation) (Ryan & Deci, 2000a). External regulation is seen as the least autonomous level of extrinsic motivation (Ryan & Deci, 2000b). External demands drive externally regulated actions. That is, an externally regulated behavior is performed to accomplish an external reward (Ryan & Deci, 2000b). Introjected regulation is the next type of extrinsic motivation. Self-esteem plays a large role in this type of extrinsic motivation. Actions to avoid guilt or anxiety, or to boost pride, are seen as being introjected (Ryan & Deci, 2000b). This manner of egotistical behavior is not fully internalized and as a result, is considered being “somewhat” external in regards to one’s PLOC (Ryan & Deci, 2000b). The next type of extrinsic motivation is identified regulation. This type of extrinsic motivation is considered to have a somewhat internal PLOC. Here an individual values a behavior as personally important or satisfying (Ryan & Deci, 2000b). The most autonomous type of extrinsic motivation is integrated regulation. It is often seen as very similar to intrinsic motivation, but it is still a behavior that is performed for a separable outcome. However, this separable outcome is seen as being assimilated with oneself (Ryan & Deci, 2000b). For example, participating in a sport because that individual identifies oneself with that activity. The sport is not performed for the enjoyment it brings, but rather, it is because one feels it is a part of them as a person.

Lastly, according to Ryan et al. (2009), intrinsic motivation is closely associated with feelings of autonomy. Individuals naturally seek out sporting activities that are enjoyable,

interesting, and challenging to them (Frederick & Ryan, 1995). As noted by Ryan and Deci (2000a), being intrinsically motivated means one acts for reasons other than an external prompt, pressure, or reward. This natural curiosity of acting on one's interests allows for overall personal growth. In short, intrinsically motivated individuals engage in an activity to fulfill the inherent gratification that it brings (Ryan et al., 2009).

### **Mental Toughness, Grit & Motivation**

MT, grit and motivation all play a significant role in the world of youth sports.

Motivation is important in the development of young athletes. Having an internal desire to persevere is a characteristic of gritty individuals (Hochanadel & Finamore, 2015). Additionally, Csikszentmihalyi, Rathunde, & Whalen, (1993) found that talent development is dependent on an athlete being motivated to participate in his or her activity. However, past research has shown that the personal characteristic of grit can predict success as much as talent does, if not more so (Duckworth et al., 2007). Finally, according to J. Reed (2014), gritty individuals seek out difficult activities that are also intrinsically rewarding.

In regards to psychological concepts such as MT and motivation, a wide range of experiences and relationships has been beneficial (Gould, 2010). In contrast, specializing in one sport has been shown to reduce self-determination, which stems from an environment that stifles intrinsic motivation (Gould, 2010). Similarly, what starts out as internal motives for participation can be transformed into external motives due to reduced enjoyment levels from the activity. In other words, burnout from specializing in a single sport can change internal reasons for participation into external motives (Fraser-Thomas & Côté, 2006). The same is true in the opposite direction. What starts out as external motives for participation can be changed to internal motives as the individual begins to take ownership of the activity. This “making it their

own” attitude stems from a sense of autonomy (Ryan & Deci, 2000b). As mentioned earlier, it is often suggested that athletes narrow down their playing experiences (at the influence of their parents or coaches) to focus on mastery of one sport, in order to attain an athletic scholarship (Malina, 2010). This external pressure to do so can stifle autonomy, which in turn suppresses motivations that started out as internal (Ryan & Deci, 2000b). Consequently, it would be interesting to see if single-sport or multi-sport athletes, at different levels of sport, have varying levels of motivation.

Often times, deliberate practice is linked to specialization in a single sport (Ericsson, Krampe, & Tesch-Romer 1993). However, deliberate practice is not naturally motivating (Ericsson et al., 1993). Conversely, unsystematic play establishes intrinsic motivation for an activity (Côté, et al., 2009). To take it a step further, Côté (1999) suggested that multiple sports settings were needed to develop the intrinsic motivation that would propel an athlete to the “next level” of his or her sporting career. According to SDT, extrinsic motivation lies on a continuum from external rewards to the internal value that is obtained from the activity (Ryan & Deci, 2000b). Therefore, this research will further investigate differences between motivational perceived locus of causalities between multi-sport and single-sport athletes different competition levels.

Researchers have asserted that MT characteristics are essential from sport to sport (Jones, Hanton, & Connaughton, 2007), and Bull et al. (2005) raised the question of whether MT is specific to certain sports, be it individual versus team sports or contact versus non-contact sports. However, exploration concerning MT needs to be considered for single-sport and multi-sport athletes and their attained level of competition.

Lastly, little research has been conducted examining grit and sports. Furthermore, no research has examined grit and specialization or diversification in sport. Therefore, the same questions for MT, regarding single-sport and multi-sport athletes and competition level, apply to grit.

## CHAPTER 3

### METHODS

#### Participants

The participants for this study included 392 former high school athletes (236 males and 156 females) from individual and team sports. The sample came from students enrolled in courses within a physical education department from three Midwestern universities. The ages of participants ranged from 18 to 35, with an average age of 21.6 years ( $SD = 2.59$ ). The participants self-reported their former high school enrollments, which ranged from 50 to 6600, with a median enrollment of 800. They participated in sports such as baseball, basketball, cross country, football, golf, gymnastics, softball, soccer, tennis, track and field, and volleyball while in high school. A consent form (see Appendix A for a copy of the consent to participate form) to participate was approved by the researcher's university institutional review board (IRB#15-05-721) (see Appendix B for a copy of the IRB approval letter).

#### Procedure

The researcher contacted professors from three Midwestern Kinesiology Departments to assist in administering the surveys. Consent forms, sports history surveys, and questionnaires were hand delivered to a representative from the kinesiology departments from each university that distributed the surveys to their colleagues. The questionnaires were administered at the end of the class period. Prior to completion of the survey, participants were informed of the general purpose of the research study and of their right to withdraw at any time with no penalty. The data were stored in a manila envelope during travel and in a secure file cabinet upon return to the researcher's office.

#### Measures

**Demographics.** The survey instrument consisted of demographics questions (i.e. gender, age, race) and questions designed to gather information on participants' sports history. Sports history questions included topics such as: sports played throughout the participants' lifetime, the number of years the participant played each sport, which sports were played competitively during high school, and the highest level of competition played (i.e. freshman team, JV, varsity, college) (see Appendix C, Figure C1 for age, Figure C2 for sports, and Figure C3 for competition level breakdown of participants. Also see Appendix D for specific demographics questions and sports history questions). Along with the demographics questions, the survey instrument included three questionnaires: Sports Mental Toughness Questionnaire (SMTQ) (Sheard, Golby & van Wersch, 2009), Short Grit Scale (Grit-S) (Duckworth & Quinn, 2009), and Sport Motivation Scale-6 (SMS-6) (Mallet, Kawabata, Newcombe, Otero-Forero, & Jackson, 2007) (see Appendix E for questionnaires).

**Sports Mental Toughness Questionnaire (SMTQ).** The SMTQ, developed by Sheard et al. (2009), is a fourteen-item questionnaire arranged on a four-point Likert scale (Not at all true = 1 to Very true = 4), that is designed to measure global MT in sports settings (maximum MT score = 56; minimum score = 14). The SMTQ contains three MT subscales: confidence (e.g. "I have an unshakeable confidence in my ability," "I have what it takes to perform well while under pressure," and "I have qualities that set me apart from other competitors"), constancy (e.g. "I am committed to completing the tasks I have to do" and "I give up in difficult situations" [reverse scored]) and control (e.g. "I worry about performing poorly" [reverse scored] and "I am overcome by self-doubt [reverse scored]). The three MT subscales utilized in the development of the SMTQ were consistent with review of MT literature. According to Crust (2007), confidence is seen as having an unwavering belief in oneself. An individual that displays constancy is one

that is consistently persistent over time and control refers to one's ability to remain influential during adversity.

Utilizing 1,142 participants ranging in age from 16 to 63, the SMTQ was found to be a reliable and valid measure of MT (Sheard et al., 2009). Internal consistency was found to be high with Cronbach's alphas of .80, .74, and .71 reported found for confidence, constancy, and control, respectively. Acceptable divergent validity was acknowledged with low-to-moderate correlations with optimism, positive affect, and negative affect. Likewise, a good model fit was indicated (RMSEA = .05). (see Appendix E for SMTQ questionnaire)

**Short Grit Scale (Grit-S).** The Grit-S is an eight-item questionnaire designed by Duckworth & Quinn (2009) to measure "trait-level perseverance and passion for long-term goals" (p. 166). Question responses for the Grit-S follow a five-point Likert scale ("Very much like me" = 1 to "Not much like me at all" = 5). The maximum score of 40 signifies an extremely gritty individual and a minimum score of 8 represents an individual that is not at all gritty. The Grit-S has 2 subscales: Consistency of Interest (e.g. "I often set a goal but later choose to pursue a different one" and "New ideas and projects sometimes distract me from previous ones") and Perseverance of Effort (e.g. "I am diligent" [reverse scored] and "Setbacks don't discourage me" [reverse scored]). Consistency of Interest statements are designed to identify individuals who are persistent over time by sticking with a goal, while Perseverance of Effort statements recognize the passion with which individuals pursue that goal (Duckworth et al., 2007).

Collecting a final total of 2,526 participants from two United States Military Academy, West Point classes (2008 & 2010), Duckworth & Quinn (2009) found acceptable reliability and validity within the Grit-S. Overall Grit-S internal consistency alphas ranged from .73 to .76, with Consistency of Interest subscale alphas ranging from .73 to .74. and Perseverance of Effort

ranging from .60 to .65. Fit indexes revealed a good fit for both the 2008 and 2010 West Point classes (RMSEA = .061 and .068, respectively) (see Appendix E for Grit-S questionnaire).

**Sport Motivation Scale-6 (SMS-6).** The SMS-6 is a twenty-four item questionnaire designed along a motivation continuum within the framework of SDT (Mallett et al., 2007). The intention of the SMS-6 is to explore why athletes participate in sport. The seven-point Likert scale responses range from “Does not correspond at all” to “Corresponds exactly” and a maximum score of 168 and minimum of 24 can be achieved, with higher scores signifying greater levels of motivation. There are six subscales from which to respond when presented with the question “Why do you practice your sport?”: amotivation (e.g. “I don’t seem to be enjoying my sport as much as I previously did”), external regulation (e.g. “Because it allows me to be well regarded by people that I know”), introjected regulation (e.g. “Because I must do sports to feel good about myself”), identified regulation (e.g. “Because training hard will improve my performance”), integrated regulation (e.g. “Because it is an extension of me”), and intrinsic motivation (e.g. “For the satisfaction I experience while I am perfecting my abilities”).

A two stage confirmatory factor analysis (CFA) study conducted by Mallet et al. (2007) confirms the reliability and validity of the SMS-6. Internal consistency was found to be high with Cronbach’s alphas ranging from .70 to .86 for the six subscale items with a mean of .78. The CFA revealed acceptable root mean square error of approximation values (RMSEA = .05) (see Appendix E for SMS-6 questionnaire).

### **Statistical Analysis**

A 2 x 2 analysis of variance (ANOVA) was used to assess MT among single-sport and multi-sport athletes with differing levels of competition achieved ( $\alpha = .05$ ). Likewise, a 2 x 2 ANOVA was used to evaluate differences in grit between the type of high school athlete one was

to the level of competition attained ( $\alpha = .05$ ). A third 2 x 2 ANOVA was used to measure motivation differences among single-sport and multi-sport high school athletes and their level of competition reached ( $\alpha = .05$ ). And finally, two independent samples *t* tests were conducted to explore differences in internalized (intrinsic regulation, integrated regulation, and identified regulation) and externalized (introjected regulation and external regulation) motivation in regards to single-sport and multi-sport athletes.

## CHAPTER 4

### RESULTS

#### Mental Toughness

A 2 x 2 analysis of variance (ANOVA) was conducted to investigate the research question regarding the type of athlete (single-sport and multi-sport high school athletes), their level of attained competition (high school playing experience or college or above playing experience), and their MT scores. The ANOVA indicated no significant interaction effect between athlete type and competition level,  $F(1, 387) = .06, p = .812$ , partial  $\eta^2 < .001$ , but significant main effects for athlete type,  $F(1, 387) = 4.87, p = .028$ , partial  $\eta^2 = .012$ , and competition level,  $F(1, 387) = 17.33, p < .001$ , partial  $\eta^2 = .043$ . A post hoc test was not performed for competition level or athlete type because there are fewer than three levels for each variable. The athlete type main effects revealed that multi-sport athletes scored higher on MT than did single-sport athletes. Additionally, the competition level main effects showed that college level athletes scored higher on MT than did athletes that only played at the high school level. Means and standard deviations for motivation scores can be found in Table 1.

#### Grit

A 2 x 2 ANOVA was conducted to investigate the research question regarding the type of athlete (single-sport and multi-sport high school athletes), their level of attained competition (high school playing experience or college or above playing experience), and their grit scores. The ANOVA indicated no significant interaction effect between athlete type and competition level,  $F(1, 382) = .32, p = .571$ , partial  $\eta^2 = .001$ , and no significance for the athlete type main effect,  $F(1, 382) = 1.22, p = .270$ , partial  $\eta^2 = .003$ . However, a significant main effect was found for competition level,  $F(1, 382) = 5.42, p = .020$ , partial  $\eta^2 = .014$ . The competition level main

effects showed that college level athletes scored higher on grit than did athletes that only played at the high school level. A post hoc test was not performed for competition level because there are fewer than three levels for that variable. Means and standard deviations for grit scores can be found in Table 1.

Table 1  
*Descriptive Statistics for Mental Toughness, Grit, and Motivation*

Variable	Athlete Classification	N	<i>M</i>	<i>SD</i>
Mental Toughness	Single-Sport High School	147	42.12	5.39
	Single-Sport College	68	44.57	5.32
	Multi-Sport High School	97	43.48	5.65
	Multi-Sport College	79	45.67	4.54
	Total	391	43.60	5.44
Grit	Single-Sport High School	147	28.47	3.96
	Single-Sport College	66	29.29	4.72
	Multi-Sport High School	96	28.72	4.64
	Multi-Sport College	77	30.06	4.45
	Total	386	28.99	4.39
Motivation	Single-Sport High School	143	102.69	0.918
	Single-Sport College	66	112.52	0.785
	Multi-Sport High School	92	108.26	0.906
	Multi-Sport College	76	110.29	0.781
	Total	377	107.30	18.23

*Note:* Single-sport high school athlete = An athlete that finished high school playing only one sport and did not play in college. Single-sport college athlete = An athlete that finished high school playing only one sport and later played collegiately or above. Multi-sport high school athlete = An athlete that finished high school playing two or more sports and did not play in college. Multi-sport college athlete = An athlete that finished high school playing two or more sports and later played collegiately or above.

## Motivation

A 2 x 2 ANOVA was conducted to evaluate the research question regarding the type of athlete (single-sport and multi-sport high school athletes), their level of attained competition (high school playing experience or college or above playing experience), and their motivation scores. The ANOVA indicated a significant interaction effect between athlete type and competition level  $F(1, 373) = 4.11, p = .043, \text{partial } \eta^2 = .011$  and a significant main effect for competition level  $F(1, 373) = 9.50, p = .002, \text{partial } \eta^2 = .025$ . However, there was no significant finding for the type of athlete,  $F(1, 373) = .76, p = .385, \text{partial } \eta^2 = .002$ . Group means show college level athletes to have higher levels of motivation than high school level athletes.

Since the interaction between competition level and athlete type was significant, the competition level main effect was ignored and instead the level of competition simple main effects were examined. In doing so, the difference in competition level between single-sport and multi-sport high school athletes was evaluated separately. To control for Type I errors across the two simple main effects, the alpha level was set at .025. Regarding motivation, there were no significant differences between attained level of competition (high school vs. college) and multi-sport high school athletes,  $F(1, 373) = .54, p = .465$ , but there was a significant difference in single-sport athletes and attained level of competition, with college level athletes that played only one sport in high school scoring higher than single-sport high school athletes that did not go on to play in college,  $F(1, 373) = 13.61, p < .001$ . In addition, there were no significant differences between single-sport and multi-sport high school athletes that went to play in college,  $F(1, 373) = .55, p = .460$ . However, for those that played only at the high school level, multi-sport athletes score significantly higher than single-sport athletes,  $F(1, 373) = 5.42, p = .020$ . Means and standard deviations for motivation scores can be found in Table 1.

To further investigate motivational orientations, an independent-samples  $t$  test was conducted to evaluate whether single-sport or multi-sport athletes have more of an internalized motive for participation or externalized motive. The  $t$  test was significant,  $t(388) = -2.49$ ,  $p = .013$ , with multi-sport athletes ( $M = 5.66$ ,  $SD = .852$ ) scoring higher in internalized motivation than single-sport athletes ( $M = 5.42$ ,  $SD = .964$ ). The 95% confidence interval for the difference in means ranged from  $-.415$  to  $-.048$ . The eta square index indicated that 2% of the variance of the internalized motivation variable was accounted for by whether or not the athlete was a single-sport or multi-sport athlete. Figure 1 shows the distributions for the two groups.

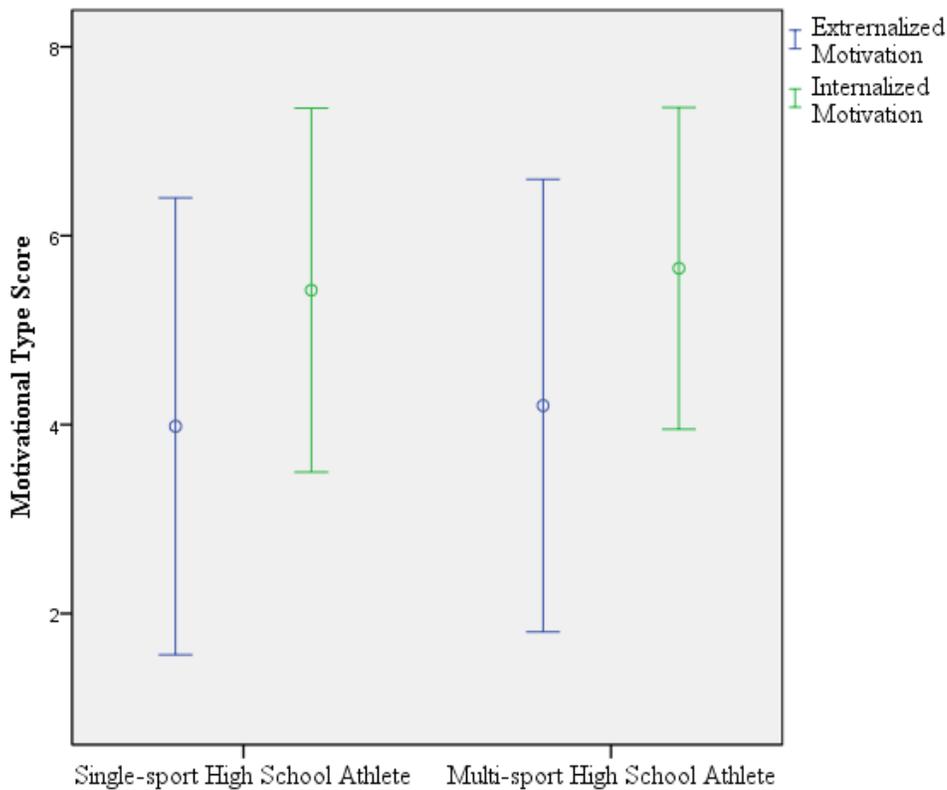


Figure 1. Error bars (two standard deviations above and below the mean) for externalized and internalized motivation for athlete type.

Exploring externalized motivational orientations for participation regarding single-sport and multi-sport athletes, an independent-samples  $t$  test was conducted. Multi-sport athletes ( $M =$

4.20,  $SD = 1.20$ ) scored higher in externalized motivation than did single-sport athletes ( $M = 3.99$ ,  $SD = 1.21$ ), but the  $t$  test was found to be non-significant,  $t(388) = -1.78$ ,  $p = .076$ . Figure 1 shows the distributions for the two groups.

## CHAPTER 5

### DISCUSSION AND CONCLUSIONS

#### **Discussion of Research Findings**

This study was conducted to investigate differences in MT, grit and motivation among different types of athletes. The results of this study revealed data indicating that multi-sport athletes score higher on MT than do single sport athletes. However, there were no significant differences in athlete type for grit or motivation. For all three dependent variables assessed, MT, grit, and motivation, significant differences were found in competition level scores with single-sport high school athletes having the lowest scores of the various group combinations. Additionally, multi-sport athletes appear to display higher levels of internalized motivation than do single-sport athletes.

#### **Mental Toughness**

A review of literature indicates mentally tough individuals demonstrate strong coping behaviors, resiliency, confidence, and commitment (Clough et al., 2002; Thelwell et al., 2005; Theokas, 2009). Both single-sport and multi-sport athletes will exhibit these characteristics at some time. Sports are obviously physically demanding, but they can also be emotionally exhausting (DiFiori et al., 2014; Gould, 2010). When asked “why did you quit playing that sport”, the single-sport athletes from this study gave several responses, but the most common replies were: “I did not enjoy the sport anymore”, “An injury wouldn’t allow me to play anymore”, “I didn’t have time to play multiple sports”, and “I wasn’t good enough”. The findings of this study may support these responses. Of course, talent is a huge factor, but when looking at single-sport athletes, one would have to consider MT as one variable that would separate those that made it to play collegiately and those that played in high school only. Single-

sport high school athletes that only played at the high school level recorded the lowest MT scores of the four levels of athlete classifications. See Table 1 for means. Furthermore, multi-sport high school athletes scored significantly higher in MT than the single-sport athletes. This may support previous research that fewer experiences limit the opportunity to develop MT (Thelwell et al., 2005).

Both single-sport and multi-sport high school athletes that played collegiately scored higher than those that only played at the high school level. Furthermore, both types of athletes that played collegiately or above did not score significantly different from each other for MT. With multi-sport and single-sport high school athletes that made it to the college level scoring significantly higher in MT than non-college athletes, it begs the question what comes first? Does MT come from playing sports, or is it the mentally tough individual that succeeds in sport? This specific question was not of primary importance and therefore, cannot be answered from this study. However, literature may suggest that MT comes first. Jones et al. (2002), Bull et al. (2005), and Ryan & Deci (2000a), have all indicated that MT may be a “trait-like” characteristic that is phylogenetic in nature. If this is true, adolescents should focus more on activities that develop MT while young, instead of being concerned about specializing in a single sport.

## **Grit**

Grit has been defined as perseverance and passion for long-term goals (Duckworth, Peterson, Matthews & Kelly, 2007). Both single-sport and multi-sport athletes can display grit. However, one would think that single-sport athletes would display more grit. If one sets their goal to excel at a task, then an individual that selects one specific task and pours themselves into it could be described as gritty. On the other hand, the same can be said for multi-sport athletes that grew up playing multiple sports. Gritty individuals, having started a sport early in life, will

tend to stick with it. However, neither single-sport nor multi-sport high school athletes scored significantly higher than the other in grit. Though multi-sport high school athletes that made it to the college level or above recorded the highest levels of grit, they did not score significantly higher than any of the three other groups.

One distinguishing characteristic of gritty individuals is the long-term aspect of achieving a goal (Duckworth & Quinn, 2009). Physically, one must have talent to succeed at high levels of sport. However, Duckworth and Quinn (2009) have noted that grit can be as much of a predictor of success as talent. With this in mind, it stands to reason that college athletes would score higher in grit than high school athletes, which is what the results of this study indicate. However, there was no significant interaction between the two independent variables for grit, suggesting no considerable advantage for any combination of athlete type or competition level. While being gritty is important to completion of long-term goals, there are other factors, both physical and mental, that might play a role in whether or not an athlete reaches college level or higher competition.

### **Motivation**

Motivation is a concept that reaches many aspects of life. There are many reasons athletes choose to compete in sports. Some athletes compete in order to receive a prize at the end, and some athletes compete for the satisfaction of accomplishing a task or goal. According to Gould & Carson (2004), “motivation is a critical component [to sport] and is greatly influenced by support and encouragement from those in the field and one’s family members” (p. 20). Again, single-sport athletes that only played at the high school level recorded lower scores for motivation than all other groups. SDT states that individuals have three basic needs: autonomy, relatedness and competence (Ryan & Deci, 2000a; Deci & Vansteenkiste, 2004). With this in

mind, it seems reasonable that those individuals that are good enough to play beyond high school will feel more competent, while athletes only playing at the high school level feel less competent, and therefore, less motivated. The same can be true of autonomy. Autonomy in SDT is related to volition. Individuals that have made their sport(s) their own will exhibit higher levels of motivation (Ryan & Deci, 2000c). Due to the popularity of specialization in sport today, adolescents are sometimes encouraged to play a single sport by parents and coaches (Hill, 1991; Watts, 2002). This pressure from authority can suppress an individual's motivation. One common reason given by parents or adolescents choosing to specialize in one sport is that college recruiters encourage it (Hedstrom & Gould, 2004). This would infer that adolescents and parents have a college athletic scholarship in mind for their future. However, internally motivated behavior is more sustaining than externally motivated behavior. If one's main motive for participating in a sport is to achieve an athletic scholarship, then over time motivation is more than likely to dwindle. To counter this, an individual should look for ways to transform what starts out as extrinsic motivation for an activity into intrinsic motivation by fully assimilating the behavior with oneself (Ryan & Deci, 2000a). Additionally, one could assume that athletes playing multiple sports would have more opportunity to become connected to others and thus increase their sense of belonging. The findings of this study supports these notions as single-sport high school athletes scored significantly lower than both multi-sport high school athletes and single-sport college athletes in motivation.

Furthermore, a review of the literature indicates that individuals involved in sports are more intrinsically motivated (AAHPERD, 2013). This would suggest that multi-sport athletes have a more internalized motive for participation. Additionally, Gould (2010) suggests that specializing in a single sport may weaken intrinsic motivation. The results of this study

reinforces these ideas since multi-sport athletes scored higher on internalized motivation than did single-sport athletes. Similarly, multi-sport athletes also reported higher externalized motives than single-sport athletes. Consequently, paralleling the discussion concerning MT, one has to ask if sports nurture motivation within an individual or individuals have natural levels of motivation prior to getting involved. If motivation is more phylogenetic, then this study would support that notion, since individuals that have made it to more advanced levels of sport reported higher levels of motivation.

### **Delimitations**

- A convenient sample of college-aged students enrolled in various Health, Human Performance, & Recreation (HHPR) courses was used for this study.
- Adolescents currently participating in interscholastic sports were not part of the sample.
- Non-athletes were excluded from this study by removing all questionnaires from participants that did not participate in at least one interscholastic sport in high school.
- There was no interest to control for gender in this study.
- High school population of participants was not considered.

### **Limitations**

- Former athletes not enrolled in HHPR courses did not have a chance to be a part of this study.
- All questionnaires were found to be reliable for the ages of the participants. However, participants that were not currently participating in a sport were asked to recollect their playing days to honestly answer the questionnaires.
- Motivations and personalities change over time and may play a role in how surveys were answered.

- With this study, there was no way to predict how much of the participant's responses were influenced by their environment. Some coaches may create a climate that is conducive to fostering certain types of motivation while others generate an environment that stifles motivation.
- Occasionally, participants from small interscholastic schools are multi-sport athletes out of necessity, while sometimes, larger schools have more single-sport athletes (Hill, 1991).

### **Assumptions**

- The researcher assumed that students enrolled in HHPR courses participated in sports in high school.
- The researcher assumes that the participants were able to accurately recall their sports history and did so honestly.
- The researcher assumes that the participants honestly completed the surveys.

### **Recommendation for Future Research**

MT has been explored by a handful of researchers recently; many have attempted to define it since there are a wide variety of definitions out there (see Gucciardi, et al., 2015 for review). Likewise, grit is a popular construct that has recently re-surfaced (Duckworth et al. 2007; Kelly et al., 2014; Winerman, 2013). Motivation has been investigated by numerous academics for several years (DeCharms, 1968; Deci & Vansteenkiste, 2004; Heider, 1958; Ryan & Deci, 2000b; Ryan et al. 2009). It can be a difficult construct to understand and is undoubtedly an important one, especially in the academic world (Ryan & Deci, 2000a).

There are many paths that one could follow from the results of this study. First, younger populations need to be considered. If MT, grit and motivation are nurtured at a young age by

participating in sports, then younger populations need to be assessed. Second, school populations should be considered. With the promotion of sport specialization of young athletes today, fewer and fewer adolescents are participating in multiple sports (Hedstrom & Gould, 2004). This is especially true of larger schools where there is more competitiveness for playing time due to the large number of athletes from which to choose; sometimes at smaller schools, adolescents may play multiple sports out of necessity (Bell, Post, Trigsted, Hetzel, McGuine, & Brooks, 2016).

Viewing the specialization phenomenon with respect to grit, future research should dissect the effects of the number of years specializing. Since gritty individuals pursue long-term goals for extended periods, do athletes that have specialized longer than athletes that have decided to specialize later in adolescence display more grit? Likewise, does the number of years participating affect MT levels?

Next, it would be interesting to see if certain sports are correlated with higher or lower levels of MT, grit or motivation. Prior research suggests that there are no significant differences in MT between team and individual sport athletes (Jalili et al., 2011). But, what about grit and motivation? Do individual sport or team sport athletes exhibit varying levels of motivation or grit? Finally, again with the phenomenon of sports specialization, it would be intriguing to investigate college athletes to see which athletes, from what sports and how many, chose to specialize versus diversify in sports while growing up.

In general, MT, grit and motivation should be further explored, as all three can be found useful in everyday life. MT, a construct that includes resiliency, emotional strength, and the ability to overcome adversity, is important for success in almost any endeavor in life. Similarly, gritty individuals are able to persevere over time to accomplish goals, which is also crucial in everyday life. Lastly, without motivation, one will likely not be successful. We all need a reason

“why” to do something. If all three of these psychological constructs can be fostered in sports participation, then it is important to continually explore that connection.

## References

- Álvarez, M. S., Balaguer, I., Castillo, I., & Duda, J. L. (2009). Coach autonomy support and quality of sport engagement in young soccer players. *The Spanish Journal of Psychology*, *12*(1), p. 138-148.
- American Alliance for Health, Physical Education, Recreation and Dance [AAHPERD]. (2013). *Maximizing the benefits of youth sport* (Position Statement). Retrieved July 15, 2014, from <http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=3A6E6143CCAC2DBD76C2146F72ACCB67?doi=10.1.1.391.9036&rep=rep1&type=pdf>
- Armour, N. (2015, February 25). He's 12 years old, not the next Tom Brady. *USA Today Sports*. Retrieved from <http://usatoday.com>
- Austin, M. W. (2014). Is humility a virtue in the context of sport? *Journal of Applied Philosophy*, *31*(2), 203-214. doi: 10.1111/japp.12049
- Baker, J. (2003). Early specialization in youth sport: A requirement for adult expertise? *High Ability Studies* *14*(1), p. 85-94.
- Baker, J., Cobley, S., & Fraser-Thomas, J. (2009). What do we know about early sport specialization? Not much! *High Ability Studies*, *20*(1), 77-89.
- Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *Journal of School Health*, *76*(8), 398.
- Bawa, H. S. (2010). Personality hardiness, burnout and sport competition anxiety among athletics and wrestling coaches. *British Journal of Sports Medicine*, *44*, I57-I58. doi:10.1136/bjism.2010.078725.193
- Bell, D. R., Post, E. G., Trigsted, S. M., Hetzel, S., McGuine, T. A., & Brooks, M. A. (2016). Prevalence of sport specialization in high school athletics: A 1-year observational study. *The American Journal of Sports Medicine*, *44*(6), 1469-1474. doi: 10.1177/0363546516629943
- Branta, C. F. (2010). Sport specialization: Developmental and learning issues. *Journal of Physical Education, Recreation & Dance*, *81*(8), p. 19-28.
- Bull, S., Shambrook, C., James, W., & Brooks, J. (2005). Towards an understanding of mental toughness in elite English cricketers. *Journal of Applied Sport Psychology*, *17*, 209-227. doi:10.1080/10413200591010085
- Butler, S. (2011, April 29). \$4,000 for youth baseball: Kids' sports costs are out of control. *CBS News*. Retrieved from <http://www.cbsnews.com>
- Butt, J., Weinberg, R., & Culp, B. (2010). Exploring Mental Toughness in NCAA Athletes.

*Journal of Intercollegiate Sport*, 3, 316-332.

- Clough, P., Earle, K., & Sewell, D. (2002). Mental toughness: The concept and its measurement. In I. Cockerill (Ed.), *Solutions in sport psychology* (pp. 32–45). London: Thomson
- Connaughton, D., R., Hanton, S., & Jones, G. (2010). The development and maintenance of mental toughness in the world's best performers. *The Sport Psychologist*, 24, 168-193.
- Connaughton, D., Wadey, R., Hanton, S., & Jones, G. (2008). The development and maintenance of mental toughness: Perceptions of elite performers. *Journal of Sports Sciences*, 26(1), 83-95. doi:10.1080/02640410701310958
- Côté, J. (1999). The influence of the family in the development of talent in sport. *The Sport Psychologist*, 13, 395-417.
- Côté, J., Lidor, R., & Hackfort, D. (2009). ISSP Position Stand: To sample or to specialize? Seven postulates about youth sport activities that lead to continued participation and elite performance. *International Journal of Sport and Exercise Psychology*, 9, 7-17.
- Cranmer, G. A., & Myers, S. A. (2015). Sports teams as organizations: A leader-member exchange perspective of player communication with coaches and teammates. *Communication & Sport*, 3(1). 100-118. doi: 10.1177/2167479513520487
- Crust, L. (2007). Mental toughness in sport: A review. *International Journal of Sport and Exercise Psychology*, 5, 270-290.
- Crust, L., & Swann, C. (2011). Comparing two measures of mental toughness. *Personality and Individual Differences*, 50(2), 1-18. Retrieved May 5, 2015, from [http://eprints.lincoln.ac.uk/3702/1/MT\\_Measures\\_pdf.pdf](http://eprints.lincoln.ac.uk/3702/1/MT_Measures_pdf.pdf)
- Csikszentmihalyi, M., & Rathunde, K. (1993). *Talented teenagers: The roots of success and failure*. New York, NY: Cambridge University Press.
- DeCharms, R. (1968). *Personal causation: The internal affective determinants of behavior*. New York: Academic Press.
- Deci, E. & Vansteenkiste, M. (2004). Self-Determination Theory and basic need satisfaction: Understanding human development in positive psychology. *Ricerche di Psicologia*, 27, 23-40.
- DiFiori, J., Benjamin, H., Brenner, J., Gregory, A., Jayanthi, N., Landry, G., & Luke, A. (2014). Overuse injuries and burnout in youth sports: A position statement from the American Medical Society for Sports Medicine. *Clinical Journal of Sport Medicine*, 24(1), 3-20.
- Duckworth, A., & Gross, J. (2014). Self-Control and Grit: Related but Separable Determinants of

- Success. *Current Directions in Psychological Science*, 319-325.  
doi:10.1177/096372141541462.
- Duckworth, A., & Quinn, D. (2009). Development and validation of the Short Grit Scale (Grit-S). *Journal of Personality Assessment*, 91(2), 166-174. doi:10.1080/00223890802634290
- Duckworth, A., Peterson, C., Matthews, M., & Kelly, D. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92(6), 1087-1101. doi:10.1037/0022-3514.92.6.1087
- Epstein, D. J. (2013). *The sports gene: Inside the science of extraordinary athletic performance*. New York, NY: Penguin Group (USA) Inc.
- Ericsson, A., Krampe, R., Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100, 3. 363-406.
- Ferguson, B., & Stern, P. (2014). A case of early sports specialization in an adolescent athlete. *The Journal of the Canadian Chiropractor Association*, 58(4), 377-383.
- Fraser-Thomas, J., & Côté, J. (2006). Youth sports: Implementing findings and moving forward with research. *Athletic Insight*, 8(3), 12-27.
- Frederick, C. M. & Ryan, R. M. (1995). Self-determination in sport: A review using Cognitive Evaluation Theory. *International Journal of Sport Psychology*, 26(1), 5-23.
- Gallahue, D. L., Ozmun, J. C., & Goodway, J. D., (2012). *Understanding motor development: infants, children, adolescents, adults* (7th ed.). New York: McGraw-Hill.
- Galton, F. (1892). *Hereditary Genius: An inquiry into its laws and consequences*. London: Macmillan.
- Grit featuring John Wayne. (n.d.). Retrieved March 16, 2016, from <http://www.values.com/inspirational-sayings-billboards/72-grit>
- Griffin, J. (2008). Sport psychology: Myths in sport education and physical education. *Journal of Physical Education, Recreation & Dance*, 79(8), p. 11-13.
- Gould, D. (2010). Early sport specialization: A psychological perspective. *Journal of Physical Education, Recreation & Dance*, 81(8), 33-37.
- Gould, D. & Carson, S. (2004). Myths surrounding the role of youth sports in developing Olympic champions. *Youth Studies Australia*, 23(1), 19-26.
- Gould, D., Hodge, K., Peterson, K., & Petlichkoff, L. (1987). Psychological foundations of coaching: Similarities and differences among intercollegiate wrestling coaches. *The Sport Psychologist*, 1(4), 293-308.

- Gucciardi, D., Hanton, S., Gordon, S., Mallett, C., & Temby, P. (2015). The Concept of Mental Toughness: Tests of Dimensionality, Nomological Network and Traitness. *Journal of Personality, 83*, 26-44.
- Hedstrom, R. & Gould, D. (2004). *Research in Youth Sports: Critical Issues Status* (Institute for the Study of Youth Sports Research Report). Retrieved January 27, 2015, from <http://www.pysc.org/projects/documents/ResearchinYouthSports-CriticalIssuesStatus.pdf>
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- Hill, G. (1991). One-sport high school athletes. *Education Digest, 56*(6), 70-72.
- Hochanadel, A. & Finamore, D. (2015). Fixed and growth mindset in education and how grit helps students persist in the face of adversity. *Journal of International Education Research, 11*(1), 47-50.
- Hollander, D., Meyers, M., & LeUnes, A. (1995). Psychological factors associated with overtraining: Implications for youth sport coaches. *Journal of Sport Behavior, 18*(1), 3-20.
- Jaeschke, A. & Sachs, M. (2012). 100,000 miles closer to a definition of mental toughness: The farther you run, the more the mind dominates. *Marathon & Beyond, 16*(5), 44-67.
- Jalili, F., Hosseini, S. A., Jalili, F., & Salehian, M. H. (2011). Comparison of personality dimensions, mental toughness, and social skills of female students athletes (team-individual) and non-athletes. *Annals of Biological Research, 2*(6), 554-560.
- James, W. (1907, March 1). The energies of men. *Science, 25*, 321–332.
- Jones, G., Hanton, S., & Connaughton, D. (2002). What is this thing called mental toughness? An investigation of elite sport performers. *Journal of Applied Sport Psychology, 14*, 205-218.
- Jones, G., Hanton, S., & Connaughton, D. (2007). A framework of mental toughness in the world's best performers. *The Sport Psychologist, 21*, 243-264.
- Jones, J., & Moorhouse, A. (2008). *Developing mental toughness: Gold medal strategies for transforming your business performance* (2nd ed.). Oxford: Spring Hill.
- Jones, M. I., & Parker, J.K. (2013). What is the size of the relationship between global mental toughness and youth experience? *Personality and Individual Differences, 24*, 519-523.
- Kelly, D., Matthews, M., & Bartone, P. (2014). Grit and hardiness as predictors of performance among West Point cadets. *Military Psychology, 26*(4), 327-342. doi:10.1037/ml0000050.

- Keown, T. (2011, August 24). Elite travel baseball and basketball teams make for a youth sports industrial complex. *ESPN*. Retrieved from <http://www.espn.go.com>
- Li, C., Wang, C. K., Pyun, D. Y., & Kee, Y. H. (2013). Burnout and its relations with basic psychological needs and motivation among athletes: A systematic review and meta-analysis. *Psychology of Sport and Exercise, 14*, 602-700. doi:10.1016/j.psychsport.2013.04.009.
- Loehr, J. (1986). *Mental toughness training for sports: Achieving athletic excellence*. Lexington, MA: S. Greene Press.
- Loehr, J. (1995). *The new toughness training for sports: Mental, emotional, and physical conditioning from one of the world's premier sports psychologists*. New York, NY: PLUME.
- Mahoney, J., Gucciardi, D., Ntoumanis, N., & Mallet, C. (2014). Mental toughness in sport: Motivational antecedents and associations with performance and psychological health. *Journal of Sport and Exercise Psychology, 36*, 281-292. doi:10.1123/jsep.2013-0260
- Malina, R. M. (2010). Early sport specialization: Roots, effectiveness, risks. *9*(6), 364-371. doi:10.1249/JSR.0b013e3181fe3166.
- Mallett, C., Kawabata, M., Newcombe, P., Otero-Forero, A., & Jackson, S. (2007). Sport motivation scale-6 (SMS-6): A revised six-factor sport motivation scale. *Psychology of Sport and Exercise, 8*, 600-614. doi:10.10016/j.psychsport.2006.12.005
- Messmer, M. (2003). Encouraging teamwork in the workplace. *The National Public Accountant*, p. 32-33.
- Middleton, S. C., Marsh, H. W., Martin, A. J., Richards, G. E., & Perry, C. (2004). Discovering mental toughness: A qualitative study of mental toughness in elite athletes. *Self Research Centre Biannual Conference, Berlin*. Available from [http://www.sectionone-wrestling.com/discovering\\_mental\\_toughness.pdf](http://www.sectionone-wrestling.com/discovering_mental_toughness.pdf)
- National Association of Youth Sports [NASPE]. (2010). *Guidelines for participation in youth sport programs: Specialization versus multiple-sport participation* (Position Statement). Retrieved May 6, 2015, from <http://www.shapeamerica.org/advocacy/positionstatements/pe/loader.cfm?csModule=security/getfile&pageid=4651>
- National Strength and Conditioning Association [NSCA]. (2009). *Youth resistance training: Updated position statement from the National Strength and Conditioning Association* (Position Statement). Retrieved June 13, 2016, from [http://journals.lww.com/nsca-jscr/Fulltext/2009/08005/Youth\\_Resistance\\_Training\\_\\_Updated\\_Position.2.aspx#](http://journals.lww.com/nsca-jscr/Fulltext/2009/08005/Youth_Resistance_Training__Updated_Position.2.aspx#)
- National Council of Youth Sports [NCYS]. (2008). *Report on trends and participation in*

- organized youth sports* (Market Research Report). Retrieved March 27, 2015, from [www.ncys.org/publications/2008-sports-participation-study.php](http://www.ncys.org/publications/2008-sports-participation-study.php)
- Neto, O. B., Barbieri, F. A., Barbieri, R. A., Gobbi, L. T. (2009). Agility, speed and motor skill performance of practitioners and non-practitioners of soccer. *Fitness & Performance Journal*, 8(2), p. 110-114.
- Newell, A., & Rosenbloom, P.S. (1981). Mechanisms of skill acquisition and the law of practice. In J.R. Anderson (Ed.), *Cognitive skills and their acquisition* (pp. 1–55). Hillsdale, NJ: Erlbaum
- O’Sullivan, J. (2015, January 25). The perils of single-sport participation. *Changing the Game Project*. Retrieved from <http://www.changingthegameproject.com>
- Prosser, L., & Jiang, X. (2008). Relationship between school physical activity and academic performance of children. *The International Journal of Learning*, 15(3), 11-15.
- Ramzi, S., & Besharat, M. A. (2010). The impact of hardiness on sport achievement and mental health. *Procedia - Social and Behavioral Sciences*, 5, 823-826.  
doi:10.1016/j.sbspro.2010.07.192
- Readdy, T., Raabe, J., & Harding, J. S. (2014). Student-athletes’ perceptions of an extrinsic reward program: A mixed-methods exploration of Self-Determination Theory in the context of college football. *Journal of Applied Sport Psychology*, 26, 157-171.
- Reed, J. (2014). A Survey of Grit and Exercise Behavior. *Journal of Sport Behavior*, 37(4), 390-406.
- Reed, K. (2014, October 31). Youth Sports Specialization Defies Logic. *The Huffington Post*. Retrieved May 12, 2015, from [http://www.huffingtonpost.com/ken-reed/youth-sports-specializati\\_b\\_6084732.html?utm\\_hp\\_ref=sports&ir=Sports](http://www.huffingtonpost.com/ken-reed/youth-sports-specializati_b_6084732.html?utm_hp_ref=sports&ir=Sports)
- Riewald, S. & Snyder, C. (2014). The path to excellence: A view on the athletic development of U.S. Olympians who competed from 2000-2012. *Initial report: Results of the Talent Identification and Development Questionnaire to U.S. Olympians*. Retrieved from <http://www.teamusa.org>
- Robles, M. M. (2012). Executive perceptions of the top 10 soft skills needed in today’s workplace. *Business and Professional Communication Quarterly*, 75(4), p. 453-465.
- Rogers, M. (2015, July 3). U.S. women were multi-sport athletes before focusing on soccer. *USA Today*. Retrieved from <http://www.usatoday.com>
- Russell, W. D. & Limle, A. N. (2013). The relationship between youth sport specialization and involvement in sport and physical activity in young adulthood. *Journal of Sport Behavior*, 36(1), 82-98.

- Ryan, R., & Deci, E. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25, 54-67. doi:10.1006/ceps.1999.1020
- Ryan, R., & Deci, E. (2000b). Self-Determination Theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68-78.
- Ryan, R., & Deci, E. (2000c). The darker and brighter sides of human existence: Basic psychological needs as a unifying concept. *Psychological Inquiry*, 11(4), 319-338.
- Ryan, R., Williams, G., Patrick, H., & Deci, E. (2009). Self-determination theory and physical activity: The dynamics of motivation in development and wellness. *Hellenic Journal of Psychology*, 6, 107-124.
- Sage, G., & Eitzen, D. (2013). Youth and Sport. In *Sociology of North American Sport* (9th ed., p. 70). New York, NY: Oxford University Press.
- Seifert, K. (2015, February 5). QB survey: Cross-training only helps. *ESPN*. Retrieved from <http://www.espn.go.com>
- Sheard, M., Golby, J., & van Wersch, A. (2009). Progress toward construct validation of the sports mental toughness questionnaire (SMTQ). *European Journal of Psychological Assessment*, 25(3), 186-193. doi:10.1027/1015-5759.25.3.186
- Shibko, J. R. (2015). *Factors associated with youth athletes discountinuing vs. staying in a sport*. (Distinction Paper, Otterbein University). Retrieved from [http://digitalcommons.otterbein.edu/cgi/viewcontent.cgi?article=1003&context=stu\\_dist](http://digitalcommons.otterbein.edu/cgi/viewcontent.cgi?article=1003&context=stu_dist)
- Sloane, M., Hanna, J., & Ford, D. (2013). 'Never, ever give up': Diana Nyad completes historic Cuba-to-Florida swim. *CNN*. Retrieved from <http://www.cnn.com>
- Sullivan, P. (2015, January 16). The rising costs of youth sports, in money and emotions. *The New York Times*. Retrieved from <http://www.nytimes.com>
- Thelwell, R., Weston, N., Greenless, I. (2005). Defining and understanding mental toughness within soccer. *Journal of Applied Sport Psychology*, 17, 326-332. doi:10.1080/10413200500313636
- Theokas, C. (2009). Youth sport participation-A view of the issue: Introduction to the special section. *Developmental Psychology*, 45(2), 303-306. doi:10.1037/a0015042
- Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress: An International Journal of Work, Health & Organisations*, 22(3), p. 277-294.

- Watts, J. (2002). Perspectives on sport specialization. *Journal of Physical Education, Recreation & Dance*, 73(8), 32-37.
- Webster Inc. (2005). *Merriam-Webster's collegiate dictionary* (11th ed.). Springfield, MA: Merriam-Webster.
- Wiersma, L. (2000). Risks and benefits of youth sport specialization: Perspectives and recommendations. *Pediatric Exercise Science*, 12, 13-22.
- Winerman, L. (2013). What sets high achievers apart? *Monitor on Psychology*, 44(11), 28-31.
- Wojtys, Edward, M., (2013). Sports Specialization vs Diversification. *Sports Health*, 5(3), 212-213. doi:10.1177/1941738113484130
- Woods, R. B. (2016). *Social issues in sport* (3rd ed.). Champaign, Ill.: Human Kinetics.
- Yang, X., Telama, R., Hirvensalo, M., Viikari, J., & Raitakari, O. (2009). Sustained participation in youth sport decreases metabolic syndrome in adulthood. *International Journal of Obesity*, 33, 1219-1226. doi:10.1038/ijo.2009.171

# Appendix A

## Research Study Consent Form

### Consent Form-Research Study

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*Title: Mental Toughness and Motivation differences in Single-Sport and Multi-sport Athletes*

*Principal Researchers*

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*Faculty Advisor*

Dr. Dean Gorman  
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University of Arkansas  
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**Description:** The purpose of this study is to better understand the advantages and disadvantages of mental toughness and motivation attributes of a high school athlete while either specializing in one sport or diversifying in multiple sports. Students will be given one survey assessing mental toughness and motivation within sport. The survey should take no more than fifteen minutes to complete.

**Risk and Benefits:** There are no risks to participating in the study. If your child feels uncomfortable at any time while taking the survey they can leave out an answer to a question or quit the study at any time. While completing the survey, your child will have the opportunity to reflect on their level of mental toughness and motivation type for their sport(s).

**Voluntary Participation:** Participation in this study is completely voluntary. If you do not want your child to be in this study, you may refuse to have them participate.

**"How will my confidentiality be protected?"** All information will be kept confidential to the extent provided by law and university policy. Surveys will be coded for each child, so no names or personal information will be used for the study or survey.

**Right to Withdraw:** Your child is free to refuse to take part in the research and to withdraw from this study at any time. Your decision to withdraw will bring no negative consequences-no penalty to you or your child.

**PARENT Informed Consent:** I, \_\_\_\_\_, have read the above information,  
(PARENT please print)

including the description and purpose of the study, the procedures to be used, the confidentiality, as well as the option to withdraw from the study at any time. My signature below indicates that I agree for my child, \_\_\_\_\_, to participate in this experimental study and understand all items above.

(please print CHILD'S name)

\_\_\_\_\_  
(PARENT SIGNATURE)

\_\_\_\_\_  
(DATE)

**STUDENT-ATHLETE Informed Consent:** I, \_\_\_\_\_, have read the above  
(STUDENT-ATHLETE please print)

information, including the description and purpose of the study, the procedures to be used, the confidentiality, as well as the option to withdraw from the study at any time. I understand I am not required to participate, even if my parent has given consent. My signature below indicates that I agree to participate in this experimental study.

\_\_\_\_\_  
(STUDENT-ATHLETE SIGNATURE)

\_\_\_\_\_  
(DATE)

## Appendix B

### IRB Approval Letter



Office of Research Compliance  
Institutional Review Board

June 9, 2015

#### MEMORANDUM

TO: Cole Shewmake  
Dean Gorman

FROM: Ro Windwalker  
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 15-05-721

Protocol Title: *Mental Toughness and Motivation Differences in Single-Sport and Multi-Sport Athletes*

Review Type:  EXEMPT  EXPEDITED  FULL IRB

Approved Project Period: Start Date: 06/09/2015 Expiration Date: 05/26/2016

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<https://vpred.uark.edu/units/rscp/index.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

**This protocol has been approved for 500 participants.** If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or [irb@uark.edu](mailto:irb@uark.edu).

## Appendix C

### Demographics of Participants

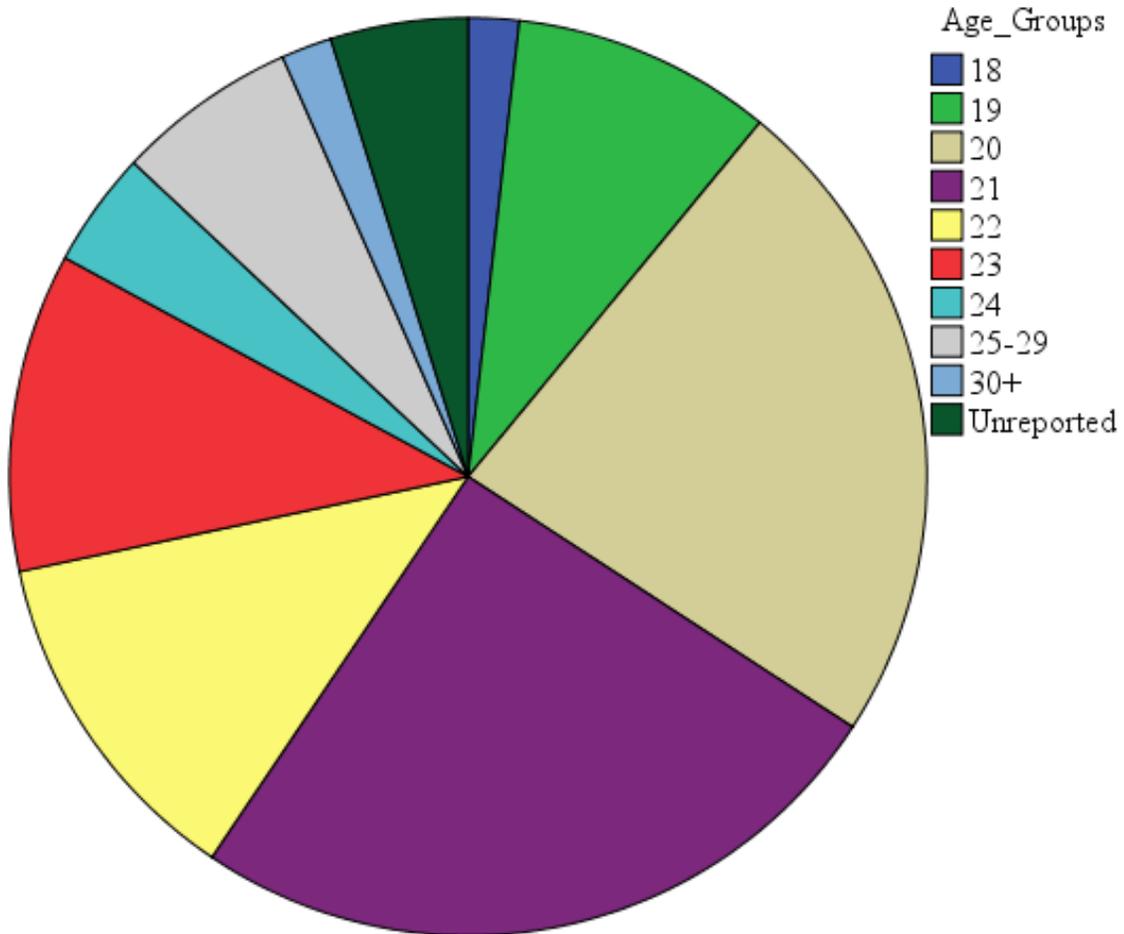


Figure C1. Pie chart of age of participants.

## Appendix C

### Demographics of Participants

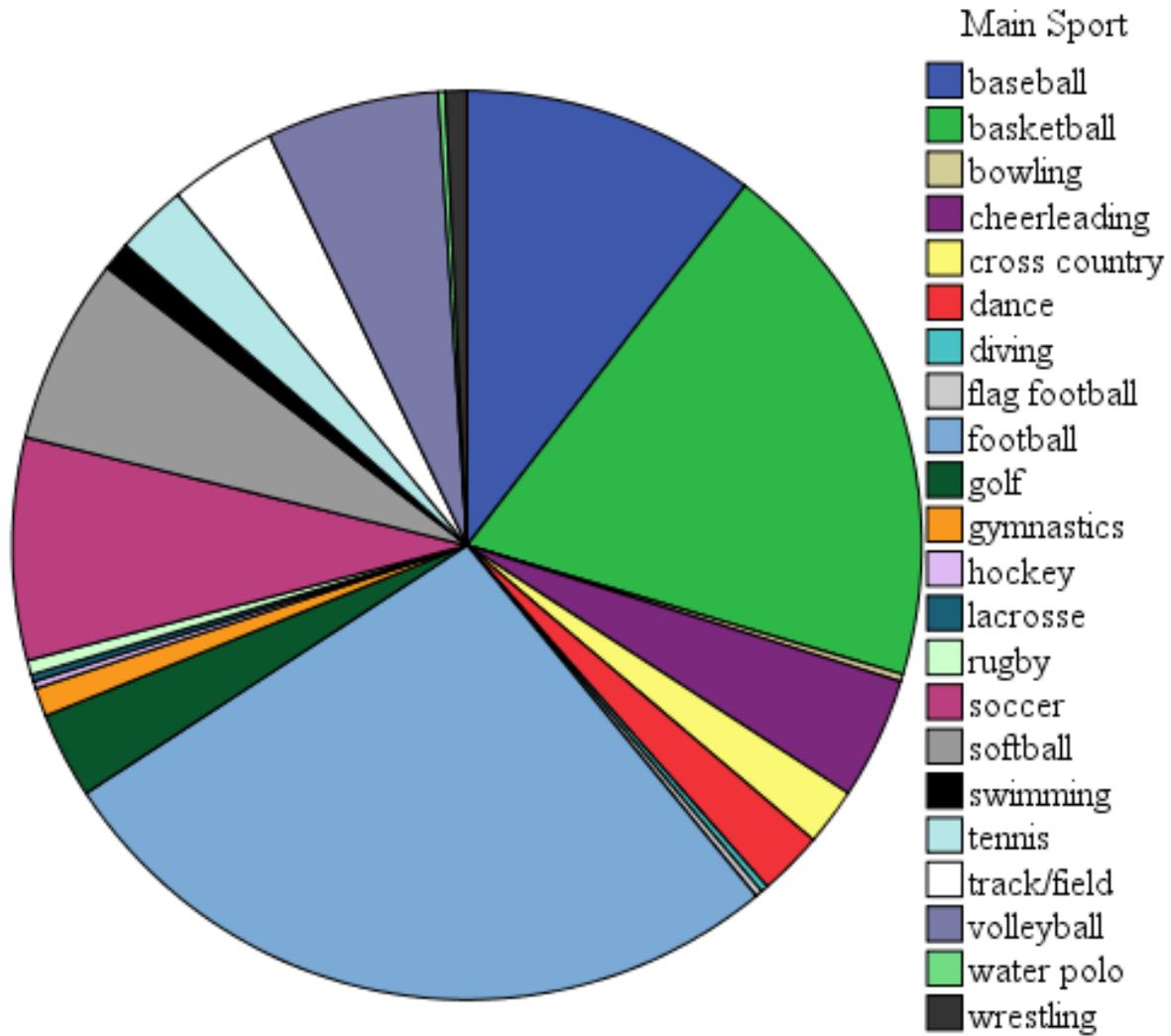


Figure C2. Pie chart of sports played by participants.

## Appendix C

### Demographics of Participants

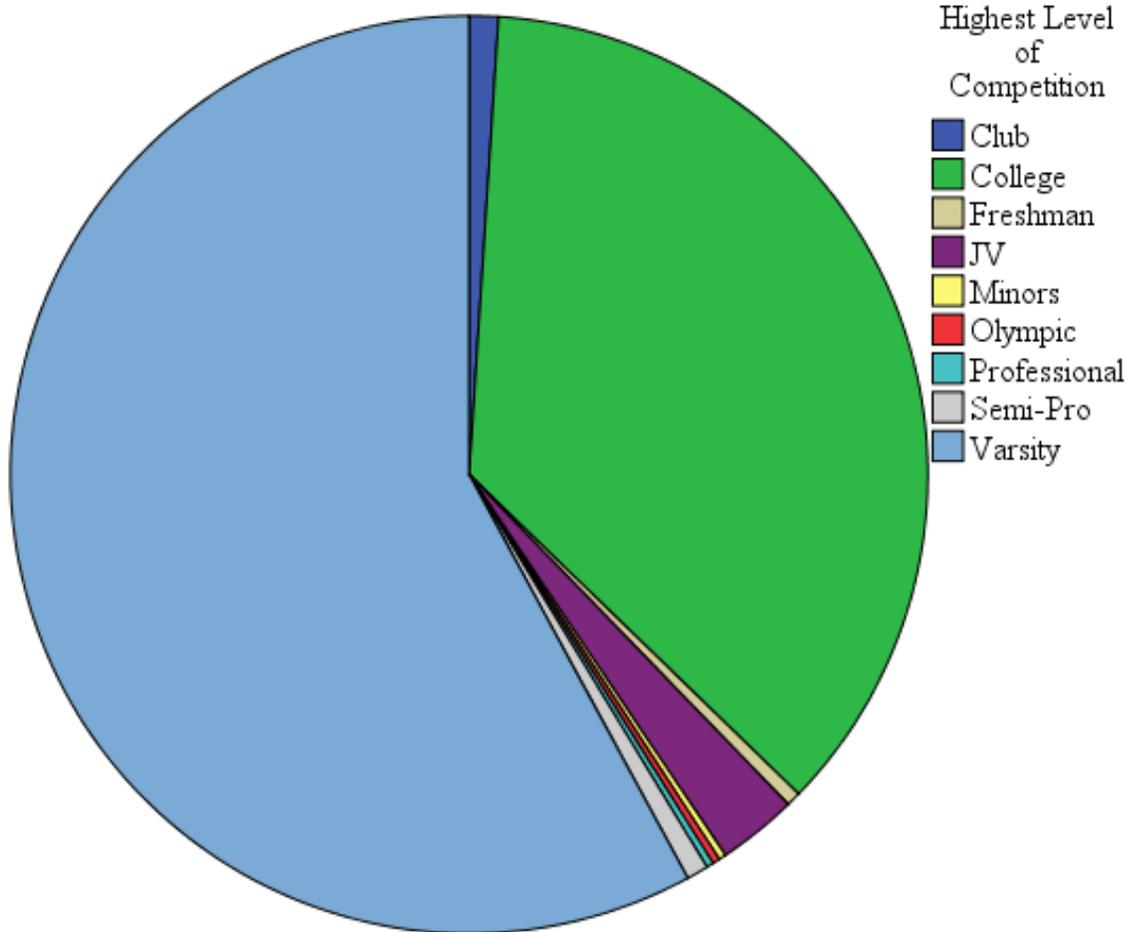


Figure C3. Pie chart of competition level achieved by participants.

## Appendix D

### Demographic and Sports History Questions

Gender: \_\_\_\_\_ Age: \_\_\_\_\_ Ethnicity: \_\_\_\_\_

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- 1) In the parenthesis next to each sport, list the **NUMBER OF YEARS** throughout your life you played that sport in a competitive league setting **WITH A COACH**. (This would be any sport that was organized or you had to “sign up” for to play, including recreational leagues, even if they didn’t keep score.)

Baseball ( )      Basketball ( )      Cross Country ( )      Football ( )      Golf ( )  
Gymnastics ( )      Soccer ( )      Softball ( )      Swimming ( )      Tennis ( )  
Track & Field ( )      Volleyball ( )      Wrestling ( )      Other: \_\_\_\_\_ ( )

- 2) Of the above sports, please **CIRCLE** the sport(s) that you **PLAYED COMPETITIVELY DURING HIGH SCHOOL**
- 3) If you had to select one sport as your “**main**” sport, what would it be? \_\_\_\_\_
- 4) What is the highest level of competition you have competed at in this “**main**” sport?(Please circle one of the following)  
**Freshman team      JV      Varsity      College Athlete (non-Intramural)      Other: \_\_\_\_\_**
- 5) What is the approximate enrollment of the high school you attended? \_\_\_\_\_
- 6) Of the sports above that you quit playing competitively while in high school, **why did you quit playing that sport?**

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## Appendix E

### Sports Mental Toughness Questionnaire (SMTQ)

Think about how you would answer the following questions if you were *PARTICIPATING IN A COMPETITIVE SPORT* and respond accordingly by circling your response. Consider your main sport selection from the second page as you answer the following questions.

	Not at all true 1	Somewhat true 2	True 3	Very true 4
1) I can regain my composure if I have momentarily lost it -----	1	2	3	4
2) I worry about performing poorly -----	1	2	3	4
3) I am committed to completing the tasks I have to do -----	1	2	3	4
4) I am overcome by self-doubt -----	1	2	3	4
5) I have an unshakeable confidence in my ability -----	1	2	3	4
6) I have what it takes to perform well while under pressure -----	1	2	3	4
7) I get angry and frustrated when things do not go my way -----	1	2	3	4
8) I give up in difficult situations -----	1	2	3	4
9) I get anxious by events I did not expect or cannot control -----	1	2	3	4
10) I get distracted easily and lose my concentration -----	1	2	3	4
11) I have qualities that set me apart from other competitors -----	1	2	3	4
12) I take responsibility in setting challenging targets for myself ----	1	2	3	4
13) I interpret potential threats as positive opportunities -----	1	2	3	4
14) Under pressure, I am able to make decisions with confidence ---- and commitment	1	2	3	4

**STOP**

*Figure E1.* Sports Mental Toughness Questionnaire. Sheard, M., Golby, J., & van Wersch, A. (2009). Progress toward construct validation of the sports mental toughness questionnaire (SMTQ). *European Journal of Psychological Assessment, 25*(3), 186-193. doi:10.1027/1015-5759.25.3.186.

## Appendix E

### Short Grit Scale (Grit-S)

Here are a number of statements that may or may not apply to you. When responding, think of how you compare to most people – not just the people you know well, but most people in the world. There are no right or wrong answers, so just answer honestly! Please circle your response

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

Over to the next page

*Figure E2.* Short Grit Scale (Grit-S). Duckworth, A., & Quinn, D. (2009). Development and validation of the Short Grit Scale (Grit-S). *Journal of Personality Assessment*, 91(2), 166-174. doi:10.1080/00223890802634290.

## Appendix E

### Sport Motivation Scale-6 (SMS-6)

Please read the following statements and determine (by circling) which response accurately answers the question, “*WHY did you practice in your sport?*” 1=Does not correspond at all; 7=Corresponds exactly

Does not correspond at all	Corresponds a little		Corresponds Moderately		Corresponds a lot		Corresponds Exactly	
1	2	3	4	5	6	7	7	7
1) For the excitement I felt when I am really involved in the activity -----	1	2	3	4	5	6	7	7
2) Because it's part of the way in which I chose to live my life -----	1	2	3	4	5	6	7	7
3) Because it was a good way to learn lots of things which were useful to me in other -- areas of my life	1	2	3	4	5	6	7	7
4) Because it allowed me to be well regarded by people that I knew -----	1	2	3	4	5	6	7	7
5) I don't know why I did; I had the impression of being incapable of succeeding in --- my sport	1	2	3	4	5	6	7	7
6) Because I felt a lot of personal satisfaction while mastering certain difficult ----- training techniques	1	2	3	4	5	6	7	7
7) Because it was absolutely necessary to do sports if one wanted to be in shape -----	1	2	3	4	5	6	7	7
8) Because it was one of the best ways I had to develop other aspects of my life -----	1	2	3	4	5	6	7	7
9) Because it was an extension of me -----	1	2	3	4	5	6	7	7
10) Because I must do sports to feel good about myself -----	1	2	3	4	5	6	7	7
11) For the prestige of being an athlete -----	1	2	3	4	5	6	7	7
12) I got to a point where I did not want to continue to invest my time and effort as ---- much in my sport anymore	1	2	3	4	5	6	7	7
13) Because participation in my sport was consistent with my deepest principles -----	1	2	3	4	5	6	7	7
14) For the satisfaction I experienced while I was perfecting my abilities -----	1	2	3	4	5	6	7	7
15) Because it was one of the best ways to maintain good relationships with my friends	1	2	3	4	5	6	7	7
16) Because I would feel bad if I was not taking time to do it -----	1	2	3	4	5	6	7	7
17) It was not clear to me anymore; I don't really think my place was in sport -----	1	2	3	4	5	6	7	7
18) For the pleasure of discovering new performance strategies -----	1	2	3	4	5	6	7	7
19) For the material and/or social benefits of being an athlete -----	1	2	3	4	5	6	7	7
20) Because training hard improved my performance -----	1	2	3	4	5	6	7	7
21) Because participation in my sport was an integral part of my life -----	1	2	3	4	5	6	7	7
22) I didn't seem to be enjoying my sport as much as I previously did -----	1	2	3	4	5	6	7	7
23) Because I had to do sports regularly -----	1	2	3	4	5	6	7	7
24) To show others how good I was at my sport -----	1	2	3	4	5	6	7	7

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*Figure E3.* Sport Motivation Scale-6 (SMS-6). Mallett, C., Kawabata, M., Newcombe, P., Otero-Forero, A., & Jackson, S. (2007). Sport motivation scale-6 (SMS-6): A revised six-factor sport motivation scale. *Psychology of Sport and Exercise*, 8, 600-614. doi:10.10016/j.psychsport.2006.12.005.