January 2014

Physical, Emotional, and Competitive Aggression Tendencies in Contact and Non-Contact Collegiate Athletes

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PHYSICAL, EMOTIONAL, AND COMPETITIVE AGGRESSSION TENDENCIES

IN CONTACT AND NON-CONTACT COLLEGIATE ATHLETES

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Bachelor of Science
University of South Florida
Tampa, FL
2012

Submitted to the Faculty of the Graduate School of
Eastern Kentucky University
in partial fulfillment of the requirements
for the degree of
MASTER OF SCIENCE
May, 2014

DEDICATION

This thesis is dedicated to my mother
for her unwavering love and support
throughout my education.

ACKNOWLEDGMENTS

I would like to thank my committee chair, Dr. Joel Cormier, for his guidance, enthusiasm, and great patience as I completed this major project over the short span of one year. I would also like to thank Dr. Mathew Sabin, Dr. Dustin Wygant, and Dr. Heather Adams-Blair for their encouragement to keep moving through this process in an effective and timely manner. The support my committee formed for me was much appreciated and I thank all four members deeply. Outside of the committee, I would like to thank Dr. Eric Fuchs for his help in getting the final survey online and for his sincere interest in the present research. I would like to thank Dr. Daniel Mundfrom for the much needed review of statistics and even more so for his kindness when I asked such questions as "what exactly does effect size measure?" Once again, I would like to thank all of the professors at Eastern Kentucky University who contributed to the success of this thesis.

Alongside my professors, I would like to thank the university athletics department and Simon Gray for allowing me to email the student-athlete population. In particular, I thank the sports medicine staff for their patience and cooperation as I attended thesis meetings during treatment hours and asked them to "read this sentence" or "look at that graph." Jacob Ryan and Eugene Santos, I especially thank you for being there through all the good times and the bad. I would like to thank the 2014 track and field team of Eastern Kentucky University for their special patience and willingness to help in the research process. I especially thank my "recruitment crew" for the social media shout outs and Bratski runs. I would like to extend my sincerest gratitude to a future doctor of psychology, my friend and consultant at the Noel Studio, Alexandra Szarabajko, for proof reading the pages of this thesis with the careful and critical eye it deserved.

Finally, I would like to thank my mother, to whom this project is dedicated for her love and support throughout the years of my life. My whole family, including close family friends, has helped me to achieve so much in my life and I would like to name them all but I am running out of room here. I will list as many as I can fit: Mom and Darin, Dad and Khadija, Johara, Malika, Nana, Barbara and Don, Danny, Patricia, Lala and Basidi, Betty, Billy, Adam, Kiersten.

ABSTRACT

Differences in aggression tendencies between athletes who play a contact sport and athletes who play a non-contact sport at the collegiate level were investigated. Specifically, emotional, physical, and competitive aggression tendencies were measured for both groups and then compared to each other using independent *t* tests and effect sizes. One hundred student-athletes from a medium sized midwestern university participated in the study, with an even split between contact and non-contact athletes. Student-athletes were sent an electronic survey via email and Survey Monkey; all materials were approved by the university's Institutional Review Board (IRB) and Athletics department.

It was determined that a significant difference exists between athletes who play a contact sport and athletes who play a non-contact sport. Athletes participating in a contact sport displayed higher levels of aggression in all three categories: emotional aggression, physical aggression, and competitive aggression. Football was the most aggressive sport in all three categories of aggression and golf was the least. Tennis scored higher than any other non-contact sport, particularly in emotional aggression. Soccer scored lower than any other contact sport and even lower than a few of the non-contact sports in competitive aggression.

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CHAPTER 1

INTRODUCTION

Fierce, strong, unyielding – today's athletes are modern day warriors competing for glory and fame just as the gladiators of Rome were and the Olympians of ancient Greece were before them. Athletes are an exceptional population within the world's past and present societies. Held to a high level of performance, always in the public eye and often envied or resented by less capable individuals, athletes do more than entertain. Athletes compete; they compete against each other, the clock, and anything that stands in the way of winning.

Fortunately enough for modern athletes, losing a competition does not mean death or humiliation to the point of social extrication as it did in the coliseum or at Olympia. That being said, losing is still an undesirable outcome to any sporting event. Winning can mean everything to an athlete from a monetary or material reward, such as a medal, to the very personal, highly desirable feeling of elation at being crowned victorious over one's opponent(s). Whether it is external or internal factors that drive competitiveness, they exist in every serious athlete.

All across the media, in classroom discussions around the world, and even in leisurely barroom chatter, the compromise of ethical behavior for winning is a problem in sports today. Propagated by the atmosphere of athletics itself, winning at all costs is an accepted mentality for too many athletes and their coaches. The performance ethic seen in nearly all athletes to push oneself to his or her respective limits is admirable in many cases, but in others is contemptible. One such area where an overzealous performance ethic can be distasteful is in displayed physical and emotional aggression. These aggression tendencies as a means to an end with winning being the final accomplishment are the primary focus of this paper and the research associated with it.

By definition, sport includes physicality and competition (Thirer, 1993). Sport has also been described as an outlet for natural human aggression; certain violent actions are sanctioned so as to eliminate the chances of acting out in society (Zillman, 1974; Shields, 1999; Bredemeier, 1975). Thirer defines aggression as intentional physically or psychologically harmful behavior that is directed at another living organism who wishes to avoid such treatment (1993). Certain

physically and emotionally aggressive behaviors related to a competitive nature and desire to win are permitted and accepted in today's athletic environment that would otherwise be disapproved of in civilized society. Indeed, many athletes have come forward indicating that they accept a certain degree of abuse while playing their respective sport (Grange and Kerr, 2011). However, the degree and type of aggression tendencies seen in each sport varies according to a variety of studies explored in chapter two. Furthermore, the link between sport aggression and interpersonal violence outside of competition is strong. In a study by Pappas and McKenry (2004) the extent of this relationship was determined and it was made clear that highly aggressive athletes during competition were also more violent outside of the playing field. For this reason, it is important to continue learning and researching sport aggression to better understand and prevent this phenomenon.

One determinant to athlete aggression is thought to be whether or not an athlete plays a contact or non-contact sport. The differences between contact and non-contact athletes' aggression tendencies have been examined by previous researchers such as Bredemeier, Weiss, and Shields (1986), Silva (1983), and Keeler (2007). In Keeler's study, it was found that contact athletes were more aggressive outside of competition. However, in competition aggression was not exclusively compared between athletes of different sport contact levels. Gender was almost always evaluated alongside contact level in these studies where it was found that males behaved more aggressively than females. Likewise, many studies exist on contact and heavy-contact athletes' aggression, most notably men's' ice hockey players (Pappas, McKenry, 2004; Donahue, 2009; Grange and Kerr, 2011). In these studies it has been determined that individual competitive aggression leads to aggression tendencies outside of competition. The present study does not seek to find a reason for athlete aggression, but rather explore the extent of athlete aggression across multiple collegiate sports. With this information, future researchers and educators can better explore how to identify and control for negative aggression tendencies in athletes.

Purpose

The purpose of this study was to determine if a difference in aggression tendencies exists between athletes who play a contact sport and athletes who play a non-contact sport. Specifically, the study's purpose was to observe if participating in a contact verses a non-contact sport related to how aggressive an athlete is during and outside of competition. During

competition aggression was termed “competitive” aggression. Outside of competition aggression was further divided into emotional and physical aggression.

Research Hypotheses

The research hypotheses for this study were that: (1) B&P emotional aggression for athletes competing in a contact sport will be higher than B&P emotional aggression for those competing in a non-contact sport; (2) B&P physical aggression for athletes participating in a contact sport will be higher than B&P physical aggression for those playing a non-contact sport; (3) CAAS Competitive aggression for athletes competing in a contact sport will be higher than CAAS Competitive aggression for those involved in a non-contact sport.

To illustrate, men’s tackle football is a heavy contact sport often referred to as a “collision” sport, and is therefore the most physical sport represented in this study. It is expected that football will have the highest self reported measures of aggression. However, in a non-contact sport like tennis where players are separated by a net, the measures of physical aggression are expected to be low and emotional aggression is expected to be high when compared to athletes competing in a contact sport. In sports with contact, there is a lot of touching but little opportunity to legally use excessive force with the intention of harming an opponent or gaining an advantage. The close contact and competitiveness of contact sports may be enough to instigate an aggressive response, but not satisfy a need to outperform or bully an opponent. This may lead to more physically aggressive tendencies than one would expect to witness in non-contact athletes. Previous research supports these hypotheses (Pappas, McKenry, Catlett, 2004; Guilbert, 2006; Shields, 1999; Maxwell, Visek, Moores, 2009).

Definitions

The independent variables for this study were specific sport played and contact level. The dependent variable was aggression. Aggression is divided into three categories. The following terms are operationally defined for the study: (1) Physical aggression involves acts of physical touching between an aggressor and a victim or between an aggressor and an inanimate object. Examples include hitting or shoving someone, breaking or throwing an object; (2) Emotional aggression involves acts of verbal abuse and intimidating gestures. Examples include taunting, teasing, and arguing; (3) Competitive aggression involves both physical and emotional aggression tactics that relate to scenarios in athletics and that are of a competitive nature; (4)

Contact sports are those with competitions that allow physical touching between opponents. Examples include men's tackle football and women's basketball; (5) Non-contact sports are those with athletic events where physical contact is not permitted during play. Two examples of non-contact sports are tennis and cross country.

Assumptions

The assumptions made in this study were that: (1) the researchers would be permitted to survey the university's student-athlete population; (2) at least 100 of those student-athletes would complete the survey; (3) participants would be able to read and understand the survey presented to them; (3) participants would be honest and without bias while completing the questionnaire.

Limitations and Delimitations

The limitations of this study were that: (1) participants were not required to take the survey and there were no incentives for taking it, thus student-athletes could have chose not to take the survey at all, resulting in a potentially low effect size; (2) unequal numbers of athletes in each sport; (3) there was a chance for outside influence on participants i.e. "bad day bias"; (4) some athletes were surveyed while in season, some were out of season due to the short data collection period; (5) human errors in reporting and analyzing the data may occur.

The delimitations of this study included: (1) being inclusive to only NCAA athletes with current eligibility status at the medium sized Midwestern university chosen for the study; (2) utilizing only previously existing instruments for the questionnaire; (3) the use of a social desirability measure, to determine participant honesty while taking the survey; (4) restating any potentially confusing or outdated survey items, in addition to the original item(s); (5) presenting the survey electronically, assuring consistency in the delivery and introduction to the research and associated survey.

Significance of the Study

Athlete aggression is a social issue, originating from a desire to win and compromise of moral reasoning. Aggression is present in and out of competitive environments and is manifested in physical and emotional forms. It has been proven through extensive research that anger and aggression leads to injury on the field or court for victims and that family, friends, and

acquaintances of aggressive athletes are at risk for bodily and psychological harm (Grange, Kerr, 2011; Pappas, McKenry, Catlett, 2004).

Much of the research on athletes' aggressiveness and anger has been done at the high school and professional levels, especially professional ice hockey. However, college athletics remain greatly understudied. It is suggested but not absolute what the differences between various sports are in terms of aggressive tactics. Thus, the present study is significant in that it sought to add to the growing knowledge of collegiate athlete aggression tendencies on and off the field.

CHAPTER 2

LITERATURE REVIEW

Generally, aggression is acceptable on the field or court as long as one stays within the rules of his or her respective sport. Aggression is not well received in other settings such as family gatherings, the workplace, public spaces, or even gyms. Only in organized athletic competition may one taunt, shove or tackle another individual and not be punished for it by officials. On the contrary, he or she is often encouraged and appraised for such aggressive behavior, even given trophies, scholarships, and hall of fame status despite it (Grange, Kerr, 2010). It is all a "part of the game" (Shields, 1999).

Athletes thrive on competition (Grange, Kerr, 2011; Donahue, 2009). It is what drives them out of bed at 5:30am for morning weight lifting. It is that desire to win which pushes a track athlete to run one more sprint over and over again. The same desire that compels a baseball pitcher to throw one more pitch repeatedly until he gets it just right. So what happens when it's not enough? If an athlete feels inadequate or outnumbered or otherwise pressured to win, what will he or she resort to? Performance enhancing drugs, cheating, and quitting are some options. Drug testing for steroids is more common than ever in today's athletic environments and outright cheating carries with it a high chance of being caught. Furthermore, most people are honest and try to do the right thing; steroids and cheating are blatantly wrong and have heavy consequences (Shields, 1999). This leaves overly aggressive tactics as a viable option to gain a competitive advantage in sport.

It has been well studied that referees, umpires, officials in general cannot observe every player 100% of the time (Guilbert, 2006; Grange, Kerr, 2011; Maxwell, 2004). Where an athlete blocks an opponent cannot always be helped and if he or she accidently trips an opponent, is it really wrong? These are thoughts that may cross the mind of a desperate athlete wanting to win. Speaking to the opposition is something generally discouraged in athletics but not banned. Taunting therefore is a common occurrence and can emotionally harm an individual or even prompt physical aggression (Zillman, 1974).

Aggression can be provoked or unprovoked as Zillman explained in a 1974 study on aggression in athletes; it may be a requirement of the sport or highly avoidable. For example, in football an offensive lineman must rush at the opposing team and make a tackle. If he does not, the quarterback may become vulnerable and be subsequently sacked (something to be avoided in football). However, in the sport of golf there should be no contact; the players do not even need to speak to one another throughout the game, other than polite how-do-you-dos. So there are varying levels of opportunity for aggression throughout the many sports available to play in America and around the world.

Along with this opportunity come those who would take advantage of it (Shields, 1999; Maxwell, Visek, Moores, 2009; Guilbert, 2006). There have been many instances throughout the history of sport where it was clearly evident that one player means to emotionally or physically harm another player. These instances have generally come to be known as fouls. In a study done by Shields, fouls were exclusively examined by high school administrators as the evidence of aggression in sport at the secondary school level. Their findings were then reported to researchers (1999). However, there were potentially numerous incidents of aggression not reported in that study because a peer nominated approach was used rather than a self reporting style. It is for this reason that the present study surveyed athletes directly (self reported technique) and did not use coaches or administrators as peers. Little research of this type has been done on college athletes.

Silva (1983) determined that sport aggression can be hostile or instrumental. Hostile aggression is any behavior with the solitary goal of harming someone. Instrumental aggression is violent behavior performed in order to complete a non-violent goal. In sports, the non-violent goal would be scoring or earning points and overly aggressive tactics would be the instrumental aggression. The present study was more concerned with instrumental aggression in sport.

And so, the purpose of the present study was to determine what extent athletes will venture to aid their skills and abilities with aggressive tactics. Which sports are most likely to create opportunities for physical aggression? Emotional aggression? Competitive aggression? How often do athletes feel unjustly victimized by their opponents and how often do they commit overly aggressive acts during play? Again, it is an accepted normality that aggression is present on the field; but how much is too much? At what point should coaches step in and teach to avoid such incidents? And then on the other side of the argument, do aggressive tactics

actually help teams or individuals to win? These questions and more will be explored in the chapters to follow.

The review of the literature on athlete aggression has been divided into two parts. First, aggressive behaviors displayed outside of competition as a result of playing competitive sports. Second, aggressive behaviors during competition directed at the opponent(s).

Athlete Aggression Outside of Competition

This section on athlete aggression outside of competition deals with aggressive displays of emotion toward teammates, friends and family, and intimate partners that would arguably not result if the individual were not an athlete. There are arguments for and against aggression arising from athletics, each is explained here. Also in this section, explanations of aggression origins both in daily living and on the playing field are presented.

Zillmann (1974) proved that athletes are less aggressive than non-athletes. He agreed with the ethologist Lorenze (1963) who said that athletics provide an outlet for natural, pent-up aggression that would otherwise be displayed at inappropriate times. Furthermore, he proposed that it was healthy for an individual to allow himself or herself to be aggressive in sport. Aside from comparing athletes to non-athletes, Zillmann also compared athletes who played contact sports to those who participated in non-contact sports. Sixty participants took part in the study, 20 each in the non-athlete, contact, and non-contact athlete groups. Subjects played a one-way version of battleship for the study, where one subject was the "attacker" and the other the "defender" (Zillmann, 1974). The attacker tried to locate the defender's battleship on a grid, similar to the well known children's game "Battleship." During this time, the defender had the opportunity to distract and even hurt the attacking subject through a noxious stimulant (a loud, painful noise in headphones worn by the attacker). The defender controlled the intensity & duration of the stimulant and aggressive behavior was measured by those actions. Zillmann found that under unprovoking conditions (not playing the strategic game of battleship), all participants behaved with a consistent level of aggressiveness. However, once the treatment was introduced, the non-athletes were significantly more aggressive than the non-contact athletes. Non-athletes were also more aggressive than the contact athletes but that finding was not significant. Overall, Zillmann's theory was proven correct by his methods.

One study which negates Zillmann's findings was conducted by Pappas, McKenry, and Catlett at Ohio State University and DePaul University in 2004. Together, these researchers

determined the level of aggression hockey players utilize in their sport and more notably in their personal lives. Five former college or professional hockey players agreed to participate in the study, four of whom had been coached by the first author in college. A semi-structured interview on perspectives of aggression was used to collect the data. These in-depth interviews revealed that hockey creates a culture of violence that leaks into the personal lives of its players (Pappas, McKenry, Catlett; 2004). Many instances were provided of observed and experienced aggression toward teammates, acquaintances, and intimate partners. Aside from the hockey culture, alcohol consumption and female objectification was admitted to also playing a role in displayed aggression off the ice.

Similar research on athlete aggression outside of his sport was conducted with Australian football players in 2011 (Grange and Kerr). This exploratory, qualitative study was used to determine if athletes who are notably aggressive on the field transfer their aggression to situations outside of his sport. Eight elite Australian football players playing in the Australian Football League (AFL) consented to participate in semi-structured interviews with research staff. Proven qualitative measures and reversal theory were used during the interview process. This study shows that athletes often feel targeted but do not instigate arguments. When provoked, a higher percentage of those interviewed responded aggressively rather than peaceably. Furthermore, those who responded negatively to hypothetical situations reported being aware of the risks associated with that behavior and knew that "they were crossing a line" (Grange and Kerr 2011). It should be noted that the eight athletes chosen for the study were known for their aggressive tendencies on the field and that there was no control group.

A fourth study on athlete aggression outside of competition deals with the relationship between anger rumination and aggressiveness in athletes (Maxwell 2004). Anger rumination can briefly be described as obsessively recalling past events that cause one to become angry. Maxwell predicted a positive correlation between anger rumination and aggressive tendencies during and outside of competition. Three-hundred and five male and female athletes completed a questionnaire, which included an anger rumination scale, self-reported aggression and demographic questions. Team and individual sports were represented. Maxwell determined through his questionnaire that males tended to anger more frequently and more severely than females and that those on teams were more aggressive than individual athletes. It was also proven that anger rumination and aggression were in fact positively correlated with one another. Maxwell's study supports the idea that outside events have the capacity, through

anger rumination, to influence behavior in an unrelated situation. This is concerning when one considers athletics. If an athlete is angry over a past event that he or she cannot cease to think about, that anger is likely to be displayed during competition. An athlete with tendencies of anger rumination is an increased threat to others in the competition.

Another outside factor that can influence aggression in athletes is passion. A positive correlation exists between obsessive passion for basketball and displayed aggression in various settings and situations (Donahue, Rip, Vallerand 2009). The purpose of the research was to determine if overly passionate basketball players (referred to in the literature as obsessively-passionate) show more aggression on and off the court than less obsessed athletes (referred to as "harmoniously-passionate") in scenarios of self identity and threat. Self identity scenarios included questioning the players' love of the game, commitment, and skill. Threatening scenarios involved the athlete being threatened by an outsider of the game. A dualistic model of passion was used. Athletes also self-reported their passion for the game as well as their aggressive tendencies in various situations.

A study by Keeler (2007) examined what she termed "sport aggression" (both sanctioned and unsanctioned violent tactics in athletic events), and "life aggression." Keeler compared numerous competitive levels of the same sport as well as gender and overall sport differences in displayed aggression. There were 161 athletes involved in a collision, contact, or non-contact sport that completed a questionnaire. Rugby was used as the collision sport, soccer for the contact sport and volleyball for the non-contact sport. The Buss-Durkee Hostility Inventory (Buss, Durkee, 1957), Rathus Assertiveness Scale (Rathus, 1973), seven true/ false questions and one scale on guilt were included in the questionnaire, along with demographic inquiries. Sport aggression and life aggression were concluded to be constant across various levels of play for each particular sport. However, it was found that males were significantly more aggressive than females in both categories. Also, the sports varied in aggressiveness, although this finding was insignificant and no correlation was found between level of contact and aggressive behavior during play and in life. Means and standard deviations were used to compare the various groups in Keeler's study.

Athlete Aggression During Competition

The section *Athlete Aggression During Competition* deals with various modes of aggressive and violent behavior by one athlete toward another athlete during athletic

competition. Several surveys are mentioned here, along with brief descriptions. Diverse populations are represented.

One study carried out by Maxwell and Moores (2007) held the objective of developing a measurement tool for athlete aggression and anger. The authors wanted a valid, reliable way to assess these qualitative variables; and they succeeded. The Competitive Aggressiveness and Anger Scale (CAAS) has appeared in numerous studies since its development in 2007. It is a good measure of anger and aggression levels in athletes. Maxwell and Moores created this scale because the existing measurements were said to have insufficient validity, were not sport specific, and reflected moods rather than anger or aggression traits. The existing measurement systems were the Bredemeier Athlete Aggression Inventory (Bredemeier, 1975) and the Buss & Durkee Hostility Inventory (Buss, Durkee, 1957). The development of the CAAS first began with "item development." In its original creation, there were fifteen items on the scale to which respondents gave a rating between one and five, dependent on how applicable each given statement was to him or her. The items were rated by severity by a group of 49 males, 32 females in a sports science program who were previous athletes. An exploratory factor analysis followed, completed by 309 student athletes. No significant errors were found with the scale. Confirmatory factor analysis was then done to retest the CAAS, this time with 230 athletes. AMOS software was used in the confirmatory factor analysis. In this manner, test-retest validity was confirmed; discriminatory validity was also assured, through teammates' testimonies.

According to Ruiz and Hanin (2011) ample amounts of research exist on how anxiety affects performance, but little exists on the relationship between anger and performance. The researchers sought to determine if anger aids or hinders performance in an athletic setting, specifically in karate. Twenty "high-level" karate athletes aged 17-38 (mean of 24.95) participated in the study. Each was asked to recall two past athletic performances in karate, their perceived best and worse. The subjects were then prompted to recall a specific event before, during, and after each of these performances. The state anger subscale portion of the State/ Trait Anger Expression Inventory 2 (STAXI-2; Spielberger, 1999) was then administered to each of the subjects, who were then asked to complete an inventory on each of the six recalled specific events. A STAXI-2 is a measurement tool used to determine level of anger during a given situation. Ruiz and Hanin found that there was a low association between anger and performance and that more research was needed on the topic. It was also discussed in the

literature that there was “large inter-individual variability in anger intensity,” meaning that the twenty athletes were difficult to compare to each other (Ruiz and Hanin, 2011).

Guilbert conducted a comparative study on aggression in athletics in 2006 examining the differences in violent behavior between sportsmen (those who compete in archery or rifle) and sports competitors (basketball players or swimmers). A 92 question questionnaire was administered to 300 French athletes; 60 each from basketball, swimming, rifle, karate, and table tennis. Thirty athletes from each sport competed at the national level and 30 from regional or local levels. The questionnaire included parts on physical violence, verbal violence, psychological violence, and cheating. Guilbert found that sportsmen do not show the same type, level, or frequency of sport violence as those in traditional sports do.

Grange and Kerr, whose research was examined earlier, did another study on Australian football players one year previous to their study on transferring aggression to non-sport settings. This previous study on Australian football was a qualitative study which sought to explore aggression types using Kerr’s proposed types of aggression. Kerr proposed that there are four distinct types of aggression in sport: play or sanctioned aggression (within the rules), power aggression, anger aggression, and thrill aggression. Eight interviews were conducted with the AFL’s most elite and supposed aggressive players. It was determined through these interviews that power and anger aggression were the most common types of unsanctioned aggression displayed in Australian football. Power aggression was displayed most frequently with intimidation tactics, whereas anger aggression was revealed with retaliation. Thrill aggression was noted in some cases and was characterized as being done for the enjoyment of the perpetrator and with the intention to physically harm the opponent. Grange and Kerr provide one of the first and few studies where it is determined that some athletes do indeed behave aggressively during competition with the intent to harm their opponent. In this study, aggressive behavior is carried out for the thrill of the act rather than for gaining a competitive advantage.

Shields (1999) was concerned with the magnitude and frequency in which high school male athletes used intimidation and violence in a sports setting, and what some possible causes for this behavior might be. A questionnaire was sent out to 325 high school athletic directors (ADs) in North Carolina; 148 were completed and returned, representing a 45.5% response rate. The researchers used a peer nominated style questionnaire, based on observations from the ADs and reports from coaches and officials to the ADs. Variables of the study included verbal

intimidation, physical intimidation, and physical violence. It was found that verbal intimidation was far more common than physical intimidation or violence; and that physical violence only accounted for 14% of all infractions observed and reported. Furthermore it was determined that soccer was the sport most associated with verbal intimidation, while football had more incidence of physical intimidation and violence. Basketball was least aggressive for both forms of intimidation, but most aggressive when it came to physical violence! Of the three sports examined (basketball, football, and soccer), soccer was the least physically violent. This leads one to suspect that more "trash talking" occurs in soccer, while more violent acts actually occur in basketball and football.

Since most studies on athlete aggression focus on western sport, Maxwell, Visek, and Moores turned their focus elsewhere in 2009. These researchers chose to examine aggression in Chinese athletes, whose culture is very different from many other parts of the world. Maxwell, Visek, and Moores surveyed a total of 471 athletes from male rugby, basketball, tennis, and squash. All athletes were Chinese and located in China at the time of the study. Many different surveys were used in the study. First, the CAAS, developed by Maxwell and Moores themselves, was used. Second, the Sport Behavior Inventory (SBI), which measures athlete perceptions of legitimacy of aggressive acts. The Provocation in Sports Questionnaire (PSQ) includes six incidents of provocation in sport. The participant is instructed to rate how likely each incident is to influence their aggression. The PSQ is included in Maxwell, Visek, and Moores's study. A STAXI is also included in the overall questionnaire, along with demographic information. Through these extensive surveying methods, aggression was found to be more prevalent in high level rugby play and low level soccer, squash, and tennis competitions. Although an exact study to this one has not been done on western athletes, similar studies exist and they show similar results. Culture does not seem to play a crucial role in athlete aggression during competition.

Conclusion

In conclusion, athlete aggression is a social issue affecting many people both within and outside of athletics. It is present in many arenas, on innumerable fields, and across the nation's courts. It has even been proven through the research that anger and aggression leads to injury for victims on the field and that this injury is the goal of aggressive tactics during play (Grange and Kerr, 2010). It has also been found that playing competitive sports leads to aggression and inappropriate behavior outside of competition (Grange, Kerr, 2011; Pappas, McKenry, Catlett,

2004). Several root causes of aggression in athletics has been identified including anger rumination, desire to win, feelings of being disadvantaged, and passion.

Much of the research on athletes' aggressiveness and anger has been done at the high school and professional levels, especially professional ice hockey, but college athletes remain greatly understudied. Thus, the purpose of this study was to add to the growing knowledge of collegiate athlete aggression trends on and off the field. Specifically, the researchers sought to discover if a significant difference exist between two categories of sports teams with regard to aggression: contact and non-contact. The researchers included separate emotional and physical aggression measures from the same tool for out-of-competition aggression and a single measure from a separate tool to determine competitive aggression. Each of these measures was then compared between contact and non-contact athletic participants.

CHAPTER 3

METHODS

The Review of Literature examined studies concerned with athlete aggression mainly at the high school and professional levels. This leaves collegiate athletics curiously understudied in the area of aggression. The focus of this research was to quantitatively discover aggression tendencies in collegiate athletes. Specifically, to determine if playing a contact or non-contact sport is an appropriate predictor of aggression type and intensity in collegiate athletes. Two reliable and valid testing tools (see *instruments* section) were included within a final survey, along with an informed consent section, a demographics section, a social desirability scale, and a single qualitative question for additional exploration of aggression tendencies in the collegiate athlete. Specific procedures were followed (see *procedures* section) in administering the survey to voluntary participants. Post data collection, a statistical analysis was completed to discover the tendencies of aggression in the surveyed population (see *analysis* section).

Participants

Athletes competing in the National Collegiate Athletic Association (NCAA) who study at a medium sized midwestern university were asked to participate in the study. Each participant must have had current eligibility status and be on a varsity team at the time he or she filled out the survey. Only student-athletes aged eighteen years or older were asked to complete a survey. Students from all academic levels are represented including freshmen, sophomores, juniors, seniors, and fifth year seniors or graduate students, classified as “senior+.” Males and females were included in the study. There are no exclusions for participation in the study other than the previously mentioned age restriction and not possessing student-athlete status at the participating university. A total of 104 student-athletes from the medium sized midwestern university participated in the study, with 100 participants completing the survey entirely.

The particular university’s student-athlete population was determined to be the best group to survey due to several factors. First, the close proximity and daily interaction of the primary investigators and student-athletes made the school a practical choice. There are over

300 student-athletes in attendance at the selected university who all have access to the internet and Survey Monkey. Additionally, the Athletics program at the school is an NCAA Division I program, meaning that its athletes are serious competitors in the collegiate arena. This is important to the integrity of the research.

Teams included in the study were men's tackle football, men's and women's basketball, women's soccer, baseball, softball, women's volleyball, men's and women's tennis, men's and women's track and field, men's and women's cross country, and men's and women's golf. This combination breaks down into having: five contact sports composed of six teams, five non-contact sports composed of nine teams, seven men's teams, and eight women's teams. Teams included were based on availability. For example, there is no men's soccer team incorporated in this study because the participating university did not have a men's soccer program.

Instruments

The final survey included three instruments for the purposes of data collection. Two measures dealt specifically with aggression tendencies and the third is a social desirability measure. All of the instruments may be viewed in their entirety with all items and factor loadings listed in the appendix.

The first instrument that participants encountered is a 13-Item short form of the Marlowe-Crown Social Desirability Scale (13-MCSDS). The purpose for including this measure in the final survey was to determine the extent to which participants tailor their responses to be more socially acceptable or "desirable." William Reynolds notes in his research that social desirability is a common quandary in self-reported measures (1982). The Marlowe-Crown Social Desirability Scale is used to establish truthful reporting by participants. Having been included in many research projects throughout its existence, the scale is considered reliable and valid.

In the original 33-item Marlowe-Crown Social Desirability scale (MCSDS), there is a reliability of .82. In the 13-MCSDS, the reliability is reported as .76 (Reynolds; 1982). While lower than the standard form, the 13-MCSDS is the best short form social desirability scale available in terms of reliability. Other shortened forms have reliability measures of .74, .75, .63, and .66. Concurrent validity of the 13-MCSDS compared to the Standard MCSDS and the full Edwards Social Desirability Scale (another social desirability measure, shortened here to ESDS) is also reported by Reynolds. Of the various shortened forms, the 13-MCSDS is the most valid. The MCSDS validity and 13-MCSDS validity have a .93 correlation where $p < .001$. 13-MCSDS and

ESDS have a .41 correlation whereas the MCSDS and ESDS have a .47 correlation. Factor loadings for the 13 items on the 13-MCSDS range from .40 to .54. The 13-MCSDS can be viewed in Appendix B.

The second instrument included in the final survey was the Buss-Perry Aggression Questionnaire (B&P). The B&P measures a quartet of aggression tendencies including: physical aggression (items 1-9), emotional aggression (items 10-14), anger (items 15-21), and hostility (items 22-29). This questionnaire was used to determine emotional and physical aggression tendencies across the multitude of independent variables in the study (sport, contact level, gender). The items for anger and hostility were not scored. Item 7 is reverse scored. A complete listing of all items and factor loadings for the B&P are located in appendix C.

When tested with a sample of 372 subjects twice, separated by nine weeks, the test-retest correlation for physical aggression was .80. For emotional aggression, it was .76 (Buss A., Perry, M.; 1992). These numbers display an excellent reliability rating for the B&P. A second confirmatory factor analysis was done with the B&P to discern which of the proposed three models would become the final product. The second and third models yielded ratios of 1.94 and 1.95, respectively. It is stated in the original article by Buss and Perry that a ratio under 2.0 displays a "reasonable fit." Lastly, when the B&P is compared to a peer nomination style aggression measure (the Minnesota Multiphasic Personality Inventory), the B&P had correlations of .40 and .34 for men and women, respectively, across all measures. Thus, the B&P is a highly reliable, moderately valid measure of self reported aggression tendencies.

The final instrument that participants in the study encountered as they moved through the survey was the Competitive Anger and Aggression Scale (CAAS) developed by Maxwell and Moores in 2007. This 12-item scale was made specifically to determine anger and aggression tendencies in competitive athletes. The developers were unsatisfied with existing tools for measuring aggression in athletes because they were not sensitive to the specific issues and confrontations experienced by athletes. Thus, the CAAS was developed with astounding results.

The reliability coefficient for anger in the CAAS is .87 and for aggression it is .91. The validity for anger and aggression is .86 and .92, respectively. The coefficients are significant at $p < .001$. The CAAS therefore is the most reliable and valid instrument seen for determining competitive aggression in the sample population. Furthermore, the CAAS takes into account the competitiveness factor of aggression that other instruments in the literature do not.

Procedures

Upon Institutional Review Board (IRB) approval, the process of data collection was begun. The electronic survey was prepared using a well respected and popular survey generating and distributing website called Survey Monkey (http://www.surveymonkey.com/; accessed 10/30/12). With Survey Monkey, one can create a custom survey utilizing multiple choice, scroll down, true and false, rating scales, and even open ended response types. The survey creator may require an answer to some questions (like consent, or age) and leave the option to skip other questions (like items from an instrument). A status bar can be added to show participants how much of the survey they have completed and what is left to finish. Page breaks help to distinguish between different content areas of the survey and break up long pages of questions. Instructions can be given at the top of the page, even a consent form can be made to appear at the beginning of a survey. All of these features were included in the final survey for this study. To view the consent form used at the beginning of the survey, see appendix A.

The final survey took approximately five to ten minutes to complete. There were six sections for a total of seven pages: (1) informed consent; (2) demographics; (3) the 13-item Marlowe-Crown Social Desirability Scale (13-MCSDS); (4) the Buss-Perry Aggression Scale (B&P); (5) a second page of the B&P; (6) the Comparative Anger and Aggression Scale (CAAS); and (7) an open-ended qualitative question. The question on page seven was not included in the formal data collection for this project and was for discussion purposes only. The electronic survey was completely anonymous as no names were asked anywhere in the survey and there was no possible way to trace who had responded and who had not.

A web address for the survey was generated by Survey Monkey and permission was obtained from the university's athletic director to email all student-athletes the link. The athletics staff also provided the researchers with a list of emails for all current student-athletes. In the email sent to all student-athletes, information on the research was provided, as well as at the beginning of the survey. In addition, opportunities to take the survey in person at convenient locations for the participants were provided. Athletes could take the same survey in the email at these collection sites on a provided tablet or computer: the main athletic training room, a satellite athletic training room, and the student academic success center. These in person survey locations were provided as a convenience for potential participants; furthermore, athletes were not repeatedly asked to take the survey if they had indicated that they did not want to participate.

Contact information for the primary investigator and committee chair were given to all participants. Questions on the research were encouraged before, during, and after taking the survey. It was expressed clearly, prior to beginning the survey that participation was voluntary and there would be no punishment for not taking the survey. In addition, a statement making it clear that denying to participate would not adversly affect the student-athlete's relationship with their University, the athletics department, or the primary investigator were made. Likewise, it was expressed prior to beginning the survey that participants may stop taking the survey at any time. Any sensitive research documents, printed or electronic, will be destroyed after three years as is customary. After the collection phase, the data was analyzed as described in the following section.

Analysis

The statistical analysis determined differences between the independent and dependent variables. The independent variables included specific sport, contact level, and gender. The dependent variables were physical aggression, emotional aggression, and CAAS competitive aggression. Means were determined for each dependent variable across each independent variable. Independent t-tests were calculated to determine if contact and non-contact athletes differed significantly from each other in any and all dependent variables. The alpha level was set at .05. *p* was calculated by hand. A second independent t-test was calculated to determine if males differed significantly from females with regard to aggression tendencies explored by the study. Again, alpha was set at .05 and *p* calculated by hand. Effect size (*d*) was calculated with a pooled standard deviation to determine if a meaningful difference existed between variables (contact and non-contact, males and females). Tables and figures reflecting the data and results were employed for ease of understanding and organization (see chapter four).

Conclusion

The present study was conducted with NCAA division I collegiate athletes who attended a medium sized midwestern university in the spring of 2014. A variety of sports were represented including: men's tackle football, men's and women's basketball, women's soccer, baseball, softball, women's volleyball, men's and women's tennis, men's and women's track and field, men's and women's cross country, men's and women's golf. The aforementioned athletic

teams consisted of male and female, contact and non-contact student-athletes. Their aggression tendencies were self-reported and analyzed by the researchers to determine: physical aggression, termed Buss and Perry (B&P) physical aggression; emotional aggression, termed B&P emotional aggression; and competitive aggression, termed Competitive Anger and Aggression Survey (CAAS) aggression. Athletes who competed in contact sports were compared and contrasted to those who competed in non-contact sports. Gender was also evaluated as a secondary possible determinant of displayed aggression tendencies in college athletics.

CHAPTER 4

RESULTS

Response Rate

The athletic department of the university gave 373 student-athlete email addresses for the study. Two of these addressed were deemed undeliverable. Of the 371 student-athletes sent an electronic survey, 104 responded. However, four of these responses were incomplete. This results in a total of 100 full participants for the study, a 27.0% response rate.

Participation by Specific Sport and Contact Level

Of the 100 student-athletes to respond to the study, 50 played a contact sport and 50 played a non-contact sport. The sport with the highest number of responses was track and field with 22 responses (22%) and the sport with the lowest number of responses was golf with 3 total responses (3%). Women's tennis had the highest response rate of any team, with a total of 8 on the roster and 7 surveys completed. This represents an 87.5% response rate for women's tennis. For a complete response count by specific sport, see table 4.1.

Table 4.1: Specific Sport Response Count

What sport do you most identify with (or play) at [HIDDEN] University?		
Answer Options	**Response Percent**	**Response Count**
Baseball	14.0%	14
Basketball	6.0%	6
Cross Country	9.0%	9
Football	16.0%	16
Golf	3.0%	3
Soccer	8.0%	8
Tennis	10.0%	10
Track & Field	22.0%	22
Softball	6.0%	6
Volleyball	6.0%	6
	answered question	**100**

Participation by Gender

Of the 100 participants, 49 were male (49%) and 51 were female (51%). Of the 49 males, 31 identified with a contact sport and 18 with a non-contact sport. Alternatively, 19 females associated themselves most with a contact sport and 32 with a non-contact sport. Table 4.2 describes participation by gender.

Participation by Academic Year in School

As mentioned previously, freshmen, sophomores, juniors, seniors, and fifth year seniors or graduate students (classified as "senior+") were surveyed for the study. Any underclassmen under age 18 were not permitted to advance past the first page of the survey (the informational page in appendix A). Responses across lower academic levels were fairly even with 24 surveys completed by freshmen, 22 by sophomores, 27 by juniors, and 22 by seniors. Five self designated "senior+" student-athletes participated in the study. This is to be expected as many students are able to graduate in four years or less and do not continue their education into a fifth year. Those few student-athletes who remain with a team for five years or more do so under the assumption that they sat out at least one season or "red shirted" or continued their education by getting an advanced degree. "Red shirted" is a term used to describe the decision to sit out for the majority of a competitive season or all of a season for medical reasons or other hardships. Table 4.3 and figure 4.1 show participation by academic year.

Participation by Injury Severity

In the demographics section of the survey, participants were asked about their most severe injury. Only 20 student-athletes reported never having been injured while playing their sport (20%), while 80 survey respondents did report an injury (80%), see table 4.4. Of the study participants who indicated that they had been injured while playing their respective sport, 19 reported that their injury was minor, requiring only 0-2 missed days; 15 reported an injury requiring 3-13 missed days; 26 sustained a moderate injury lasting 14+ missed days; 8 indicated an injury requiring surgery or hospitalization with less than 3 months missed playing time; and 21 student-athletes reported having had a major injury requiring surgery or hospitalization with 3+ months of missed playing time.

Table 4.2: Gender Response Count

What is your gender?		
Answer Options	**Response Percent**	**Response Count**
Female	51.0%	51
Male	49.0%	49
Other	0.0%	0
	answered question	**100**

Table 4.3: Academic Year Response Count

What is your academic year in school?		
Answer Options	**Response Percent**	**Response Count**
Freshman	24.0%	24
Sophomore	22.0%	22
Junior	27.0%	27
Senior	22.0%	22
Senior+	5.0%	5
	answered question	**100**

Table 4.4: Injury Occurrence Response count

Have you ever been injured while playing intercollegiate sports?		
Answer Options	**Response Percent**	**Response Count**
Yes	80.0%	80
No	20.0%	20
	answered question	**100**

Outcomes by Contact Level and Sport

For each sport the means for B&P emotional aggression, B&P physical aggression, and CAAS competitive aggression were calculated according to each measure's associated survey items (see appendix C and appendix D). Means were generally higher in all measures for contact sports than for non-contact sports, although there were a few exceptions. For instance, tennis scored high in emotional aggression at m = 2.94, which is higher than the emotional aggression averages for soccer (m = 2.88), baseball (m = 2.78), and softball (m = 2.6). Cross Country provides another example of a non-contact sport scoring higher than a contact sport in an area of aggression. Cross country's mean rating for competitive aggression was m = 1.64, whereas

soccer's mean for competitive aggression was m = 1.19 and softball's was m = 1.49. Congruent with the general finding that those who play contact sports are more aggressive than those participating in a non-contact sport, football scored highest in all measures of aggression; and golf scored lowest in all measures of aggression. All means for all sports can be viewed in table 4.5. The information is graphically represented in figures 4.1, 4.2, and 4.3.

Along with the aggression means for each sport, the means for all aggression measures (emotional, physical, competitive) for all athletes participating in a contact sport (n = 50) and in a non-contact sport (n = 50) are represented in table 4.5. The means for both Buss and Perry measures for contact and non-contact athletes are graphically represented in figure 4.4. The means for CAAS competitive aggression by contact level are shown in figure 4.5. In addition, the means, medians, modes, and standard deviations are given for each measure of aggression by contact level in tables 4.6, 4.7, and 4.8.

To determine if the aggression means for contact and non-contact athletes differ significantly from each other, multiple independent *t* tests were performed with the data. The *t* tests were two tailed because the difference between the means for contact and non-contact

Table 4.5: Aggression Means by Contact Level and Sport

	B&P Emotional Aggression (m) (SD)	B&P Physical Aggression (m) (SD)	CAAS Competitive Aggression (m) (SD)
CONTACT	**2.91 (0.821)**	**2.55 (0.775)**	**2.02 (1.077)**
Football	3.29	2.89	2.97
Basketball	3.03	2.48	1.92
Soccer	2.88	2.34	1.19
Baseball	2.78	2.21	1.68
Softball	2.6	1.81	1.49
NON-CONTACT	**2.48 (0.776)**	**2.05 (0.762)**	**1.38 (0.576)**
Volleyball	2.37	1.89	1.42
Tennis	2.94	2.07	1.35
Track & Field	2.55	2.05	1.33
Cross Country	2.05	1.71	1.64
Golf	1.93	1.55	1.0

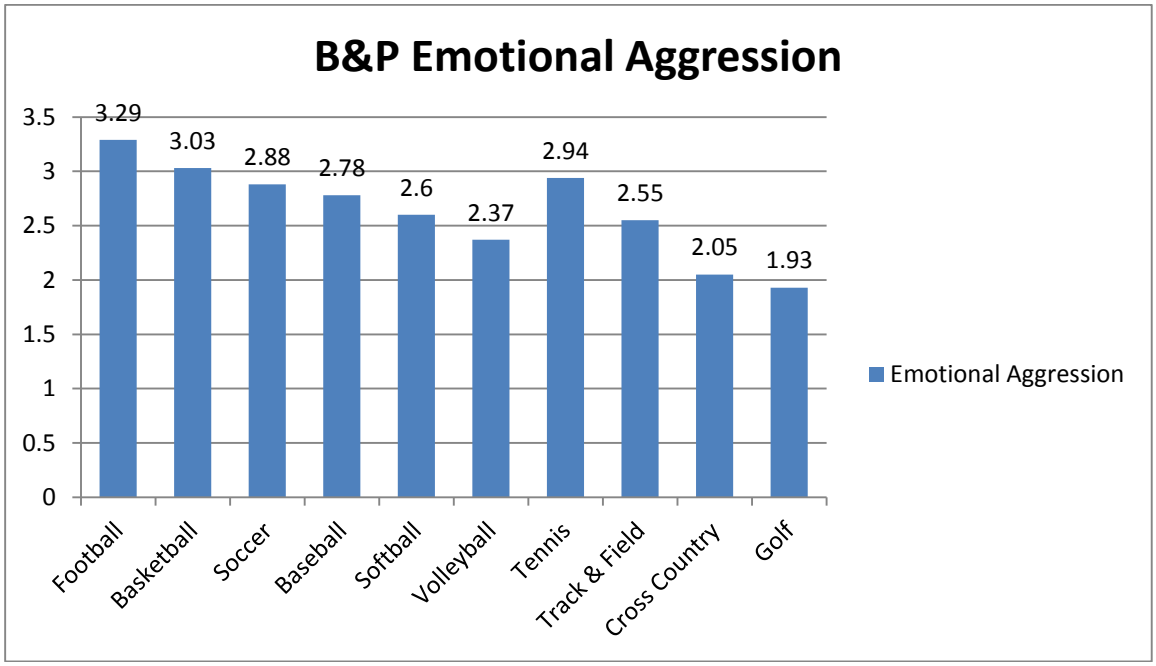

Figure 4.1: B&P Emotional Aggression Means by Sport

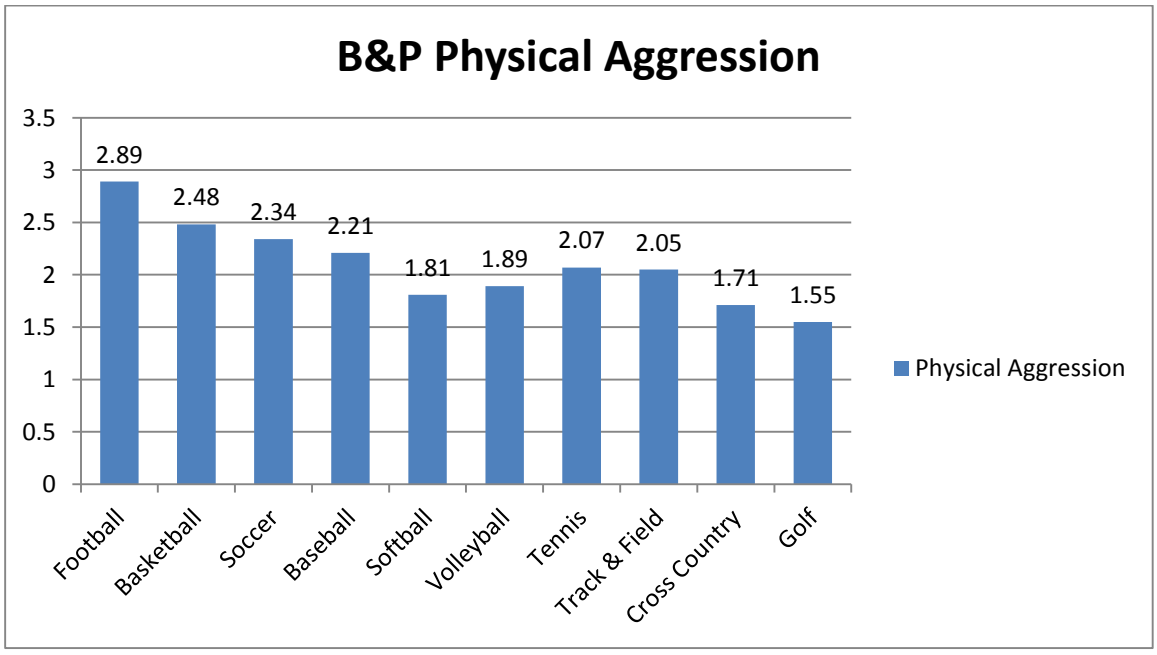

Figure 4.2: B&P Physical Aggression Means by Sport

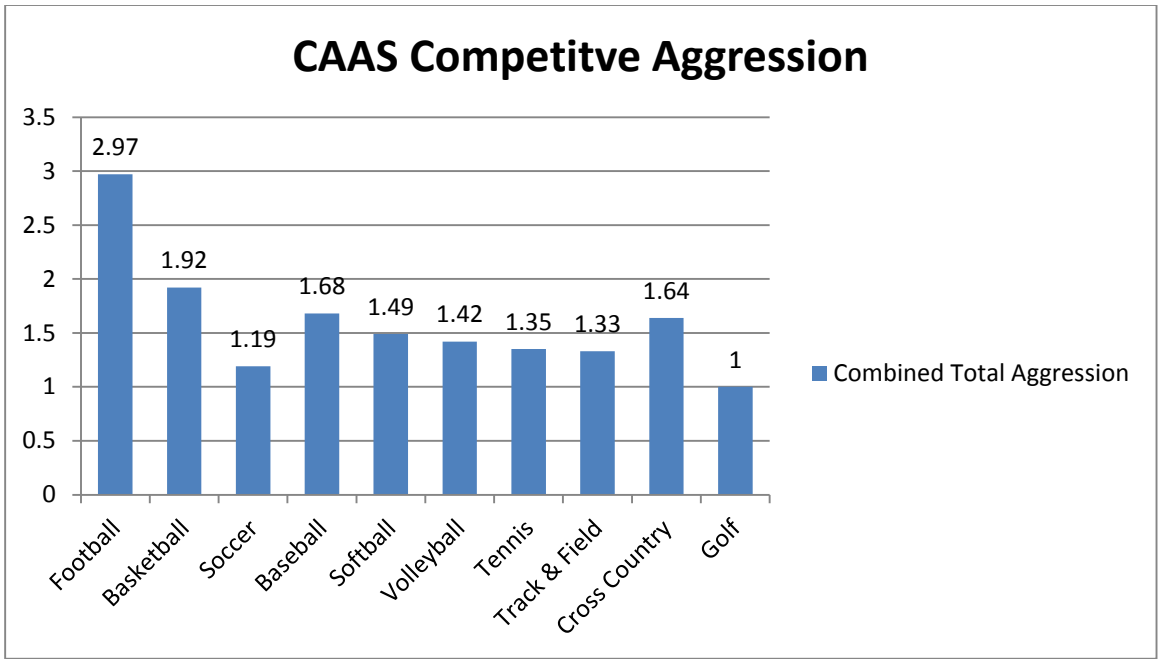

Figure 4.3: CAAS Competitive Aggression Means by Sport

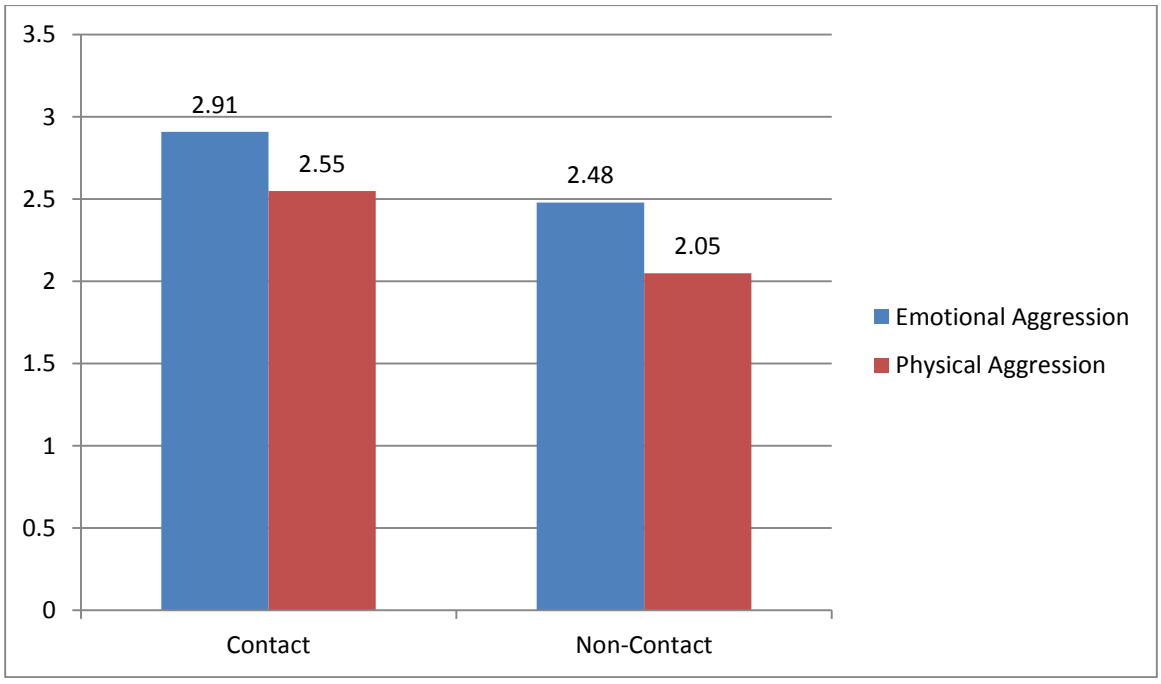

Figure 4.4: B&P Aggression Comparison by Contact Level

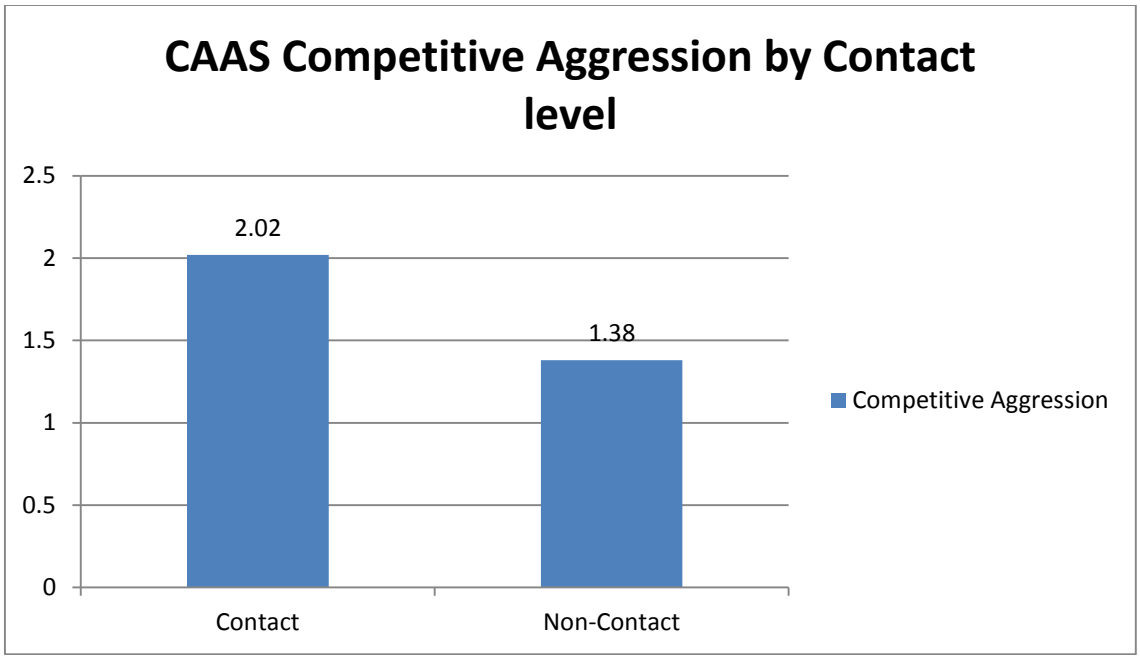

Figure 4.5: CAAS Competitive Aggression Means by Contact Level

athletes could have favored either group. Alpha was set at 0.05 and *p* was calculated using a critical values chart. To determine meaningfulness of each aggression measure, effect size was calculated per measure using a pooled standard deviation. All equations used for the independent t tests and effect sizes are shown in appendix E. Effect size (*d*) and *t* test results (*t*) are located in tables 4.6, 4.7, and 4.8.

At the conclusion of statistical testing it was found that: **(1)** the level of emotional aggression experienced by athletes who play a contact sport is significantly higher than in those who play a non-contact sport, $t(98) = 2.6925$, $p < 0.01$. The Figure
difference between contact athletes' and non-contact athletes' emotional aggression tendencies is meaningful at $d = 0.5$; **(2)** the level of physical aggression experienced by athletes who play a contact sport is significantly higher than in those who play a non-contact sport, $t(98) = 3.2530$, $p < 0.002$. The difference between contact athletes' and non-contact athletes' physical aggression tendencies is meaningful at $d = 0.7$; **(3)** The level of competitive aggression experienced by athletes who play a contact sport is significantly higher than in those who play a non-contact sport, $t(98) = 3.7053$, $p < 0.001$. The difference between contact athletes' and non-contact athletes' competitive aggression tendencies is meaningful at $d = 0.7$.

Table 4.6: B&P Emotional Aggression Summary by Contact Level

	n	m	Mdn	Mode	*SD*	*t*	*d*
Contact	50	2.91	2.8	2.6	0.821	---	---
Non-Contact	50	2.48	2.5	2.6	0.776	---	---
	---	---	---	---	---	**2.6925***	0.5

α = 0.05

*The level of emotional aggression experienced by athletes who play a contact sport is significantly higher than in those who play a non-contact sport, $t(98) = 2.6925$, $p < 0.01$. The difference between contact athletes' and non-contact athletes' emotional aggression tendencies is meaningful at $d = 0.5$.

Table 4.7: B&P Physical Aggression Summary by Contact Level

	n	m	Mdn	Mode	*SD*	*t*	*d*
Contact	50	2.55	2.33	2.33	0.775	---	---
Non-Contact	50	2.05	1.89	1.44	0.762	---	---
	---	---	---	---	---	**3.2530****	0.7

α = 0.05

**The level of physical aggression experienced by athletes who play a contact sport is significantly higher than in those who play a non-contact sport, $t(98) = 3.2530$, $p < 0.002$. The difference between contact athletes' and non-contact athletes' physical aggression tendencies is meaningful at $d = 0.7$.

Table 4.8: CAAS Competitive Aggression Summary by Contact Level

	n	m	Mdn	Mode	*SD*	t	*d*
Contact	50	2.02	1.5	1	1.077	---	---
Non-Contact	50	1.38	1.17	1	0.576	---	---
	---	---	---	---	---	**3.7053*****	0.7

α = 0.05

***The level of competitive aggression experienced by athletes who play a contact sport is significantly higher than in those who play a non-contact sport, $t(98) = 3.7053$, $p < 0.001$. The

difference between contact athletes' and non-contact athletes' competitive aggression tendencies is meaningful at $d = 0.7$.

Outcomes by Gender

Males in the study generally scored higher than females in all areas of aggression. It should be noted however that the difference between the means for each type of aggression varied considerably. For instance, the difference between the means for B&P emotional aggression for males and females was very slight (0.13); by comparison, the difference between the means for competitive aggression for males and females was large (0.75). All aggression tendency means for males and females are shown in table 4.9. Figures 4.6 and 4.7 illustrate the differences between the means for B&P aggression measures and CAAS aggression, respectively.

At the conclusion of statistical testing for gender differences, it was found that: **(1)** the difference between levels of emotional aggression experienced by male athletes and female athletes was not significant (see table 4.10); **(2)** the level of physical aggression experienced by male athletes was significantly higher than in female athletes, $t(98) = 2.5462$, $p < 0.02$. The difference between the two groups physical aggression results was meaningful at $d = 0.5$ (see table 4.11); **(3)** the level of competitive aggression experienced by male athletes was significantly higher than in female athletes, $t(98) = 4.3937$, $p < 0.001$. The difference between males' and females' competitive aggression tendencies was highly meaningful at $d = 0.9$ (see table 4.12).

Table 4.9: Aggression Means by Gender

	MALES (n=49)	FEMALES (n=51)
B&P Emotional Aggression (M)	2.76	2.63
B&P Physical Aggression (M)	2.39	2.0
CAAS Competitive Aggression (M)	2.08	1.33

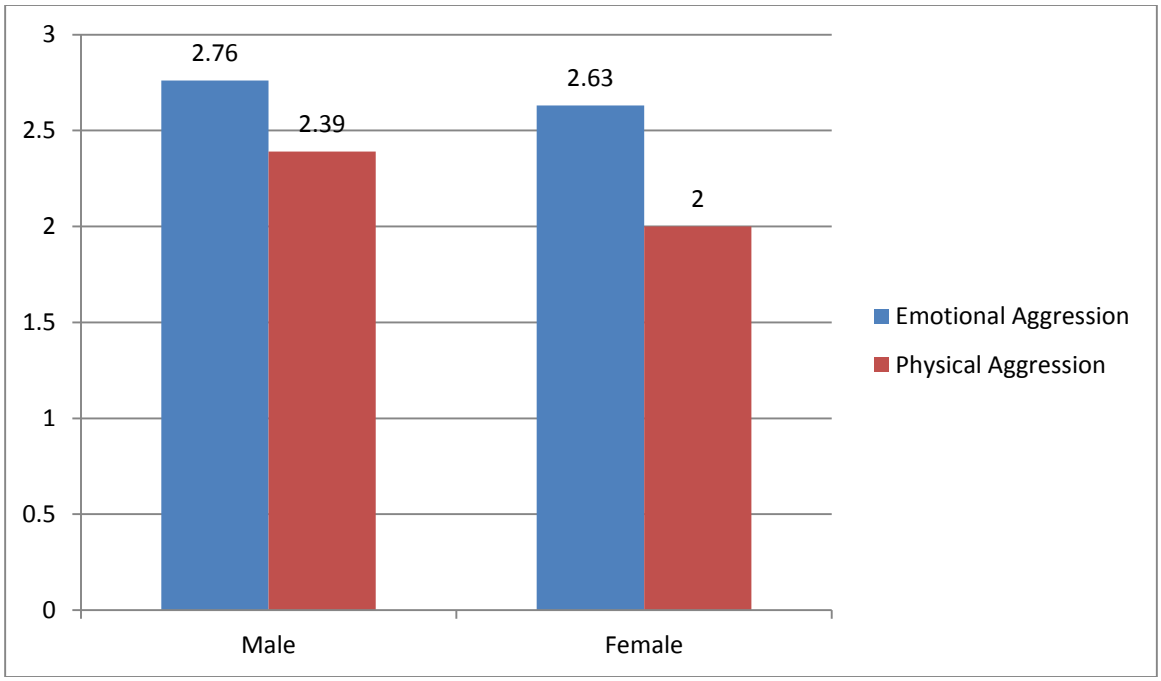

Figure 4.6: B&P Aggression Comparison by Gender

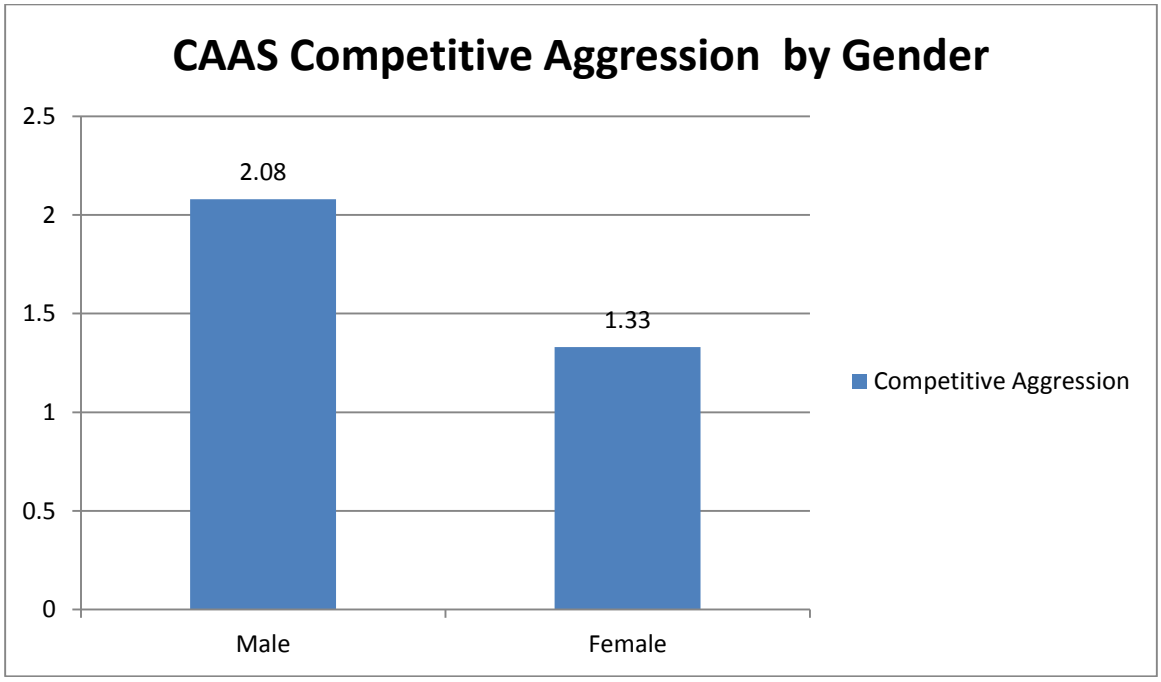

Figure 4.7: CAAS Competitive Aggression Means by Gender

Table 4.10: B&P Emotional Aggression Summary by Gender

	n	m	Mdn	Mode	*SD*	*t*	*d*
Male	49	2.76	2.6	2.6	.924	---	---
Female	51	2.63	2.6	2.6	.718	---	---
	---	---	---	---	---	.7836*	.2

α = 0.05

*Data from this study did not show a significant difference between male and female athletes in regard to emotional aggression tendencies. Likewise, the slight difference between the two variables was not meaningful with an effect size equaling 0.2.

Table 4.11: B&P Physical Aggression Summary by Gender

	n	m	Mdn	Mode	*SD*	*t*	*d*
Male	49	2.5	2.33	1.89	.842	---	---
Female	51	2.11	2	1.44	.721	---	---
	---	---	---	---	---	2.5462**	0.5

α = 0.05

**The level of physical aggression experienced by male athletes is significantly higher than in female athletes, $t(98) = 2.5462$, $p < 0.02$. While this is not a strong significance, the difference between male athletes' and female athletes' emotional aggression tendencies is moderately meaningful at $d = 0.5$.

Table 4.12: CAAS Competitive Aggression Summary by Gender

	n	m	Mdn	Mode	*SD*	t	*d*
Male	49	2.08	1.67	1	1.098	---	---
Female	51	1.33	1.67	1	.481	---	---
	---	---	---	---	---	4.3937***	0.9

α = 0.05

***The level of competitive aggression experienced by male athletes is significantly higher than in female athletes, $t(98) = 4.3937$, $p < 0.001$. The difference between male athletes' and female athletes' emotional aggression tendencies is similarly highly meaningful at $d = 0.9$.

Social Desirability Outcomes

Social desirability in the population examined was higher yet less varied than the normative values provided by the developer of the shorted form, the MCSD-13 (Reynolds, 1982). In a study done on undergraduate students from a medium sized university, the average response to items in the MCSD-13 was M = 1.44 where M = 2 would indicate a strong tendency for socially desirability and one indicates the opposite. The standard deviation was SD = 0.27. The average response to MCSD-13 items for athletes competing in a contact sport was M = 1.62 with a standard deviation of SD = 0.15. For athletes participating in a non-contact sport the average response was M = 1.64 and the standard deviation was SD = 0.15. These values are given in table 4.13.

Table 4.13: Social Desirability Outcomes

	M	**SD**
MCSD-13	1.44	0.27
Contact	1.62	0.17
Non-Contact	1.64	0.15

CHAPTER 5

DISCUSSION

Hypotheses

The researchers hypothesized that B&P emotional aggression for contact sports would be higher than for non-contact sports. The data supported this hypothesis with a *t* score of $t(98) = 2.6925$, $p < 0.01$. The difference between contact athletes' and non-contact athletes' emotional aggression tendencies was meaningful at $d = 0.5$ (n = 100). For this study, any hypothesis tested with an effect size under 0.4 was not considered meaningful. While cause for emotional aggression in athletes was not researched in this study, it can be sensibly assumed that athletes who play a contact sport tend to be more emotionally aggressive.

The researchers hypothesized that B&P physical aggression would be higher in those who play a contact sport than in those who play a non-contact sport. This hypothesis was accepted with a significant *t* score of $t(98) = 3.2530$, $p < 0.002$. The difference in physical aggression between the two levels of contact was highly meaningful at $ES = 0.7$ (n = 100). Based on the data, it can be presumed that those who play a contact sport are more likely to be physically aggressive than those who play a non-contact sport.

The researchers hypothesized that CAAS competitive aggression would be greater in athletes who play a contact sport than in those who play a non-contact sport. With the data from both groups, $t(98) = 3.7053$, $p < 0.001$. This is not surprising since opportunities for aggressive tactics to be utilized exist more frequently in a contact sport setting. Likewise, aggressive displays in a non-contact sport are more noticeable by officials and fans and therefore less tolerable by athletics in general. The results of the CAAS were highly meaningful between contact and non-contact athletes with an effect size of $ES = 0.7$ (n = 100). An effect size of 0.7 is moderately high when compared to the rating for emotional aggression and is above 0.4, meaning that the results were meaningful enough to be accepted by the researchers for the study. One may conclude based on the data that the most competitively aggressive athletes play a contact sport rather than a non-contact sport.

Implications

When the researchers set out to answer the question "Do contact athletes have different aggressive tendencies than non-contact athletes," the expected result was that they would. Specifically that contact athletes would have higher levels of emotional, physical, and competitive aggression than non-contact athletes. The data backed up these hypotheses, with levels for emotional, physical, and competitive aggression all being higher in the contact athlete population than in the non-contact athlete group. This finding could support one of the following two or both ideas about aggression in athletics. First, that participating in a contact sport influences an athlete to become more aggressive than if he or she played a non-contact sport. Second, that aggressive people (to begin with) are drawn to contact sports rather than non-contact sports. This dual theory explanation behind the correlation between aggression and contact level remains an unanswered question by the present research. However, there have been previous studies that attempted to answer the question.

The primary idea that playing a contact sport inspires an individual to be more aggressive is not a new idea in the intellectual community. This idea is supported by such researchers as Pappas, McKenry, and Catlett (2004) who found that ice hockey players (with a similarly high level of contact to the game of tackle football) formed a culture of violence that transferred into the personal lives of the players. Through semi-structured interviews, the researchers observed many instance of aggression toward teammates, friends, and girlfriends that were attributed to the masochistic culture of ice hockey as described by those players interviewed for the study. Grange and Kerr (2010) determined that Australian football players often act aggressively during competition and outside of competition for several reasons. Power, anger, thrill, and sanctioned aggression tendencies were all observed through a qualitative approach. Most notably in Grange and Kerr's research was the finding that athletes do indeed behave aggressively outside of sanctioned aggression for reasons of excitement and to gain a competitive advantage that they would otherwise be unable to do in a non-contact event. Research on aggressive individuals being drawn toward contact sports is a less researched topic in academia but certainly an alternative to the previous assumption that contact sports influence behavior. One researcher, Stephens, found that female athletes tend to be more aggressive if they play multiple sports as opposed to a single sport (2004). This conclusion was reached by studying aggression tendencies and their contextual factors in 449 college-aged intramural athletes.

While the present research was a quantitative study, there was a qualitative section at the end of the survey to which eight people responded (see Appendix F for a collection of all open-ended responses). Two football players left a response in the space provided that demonstrated the culture of aggression in football. One study participant left a response that said “If I am able to get away with it, I will do anything to help my team win. That's football.” Another student-athlete responded with “Typical aggressiveness that comes with the game of football.” These responses indicate that aggressive tactics are an integral part of the game of football and furthermore suggest that these players would not be surprised to learn that they (football players) scored higher than any other team in all aspects of aggression tendencies. Similar results occurred in Shields study on violence and intimidation in high school athletes (1999). In Shields study, football was the most intimidating and violent sport, compared to soccer and basketball. These conclusions were reached through peer nominated surveying methods. Contact level was thought to be one reason for the increased incidence of intimidation and violence in football, backed up by the findings of Snyder and Spreitzer (1989).

Alternatively, a track and field athlete said this at the end of his survey: “In the [Competitive Anger and Aggression Survey] some of those questions that had the "almost never" option should have also had the never option only because some people really would never do those things but it implies that there is sometimes a time and place for violence, when there really isn't.” Another track and field athlete responded with “Track and field does not invlove that much aggression…” These comments imply the absence of an aggressive culture as seen in football or hockey (Pappas, McKenry, Catlett; 2004) and further separate contact sports from non-contact sports in regard to aggressive tendencies. Furthermore, these open ended responses coupled with the results suggest that there is a distinct difference between what is acceptable in contact verses non-contact sports.

One non-contact sport that scored equally high in emotional aggression to the contact sports in the study was tennis. Tennis also scored near the top of the spectrum in physical and competitive aggression tendencies. This is an interesting finding made even more peculiar by the following open-ended response left by a female tennis athlete “I get easy frustrated during my match , I have broken 2 racquets during my match. Once I got very mad at opponents coach and after I finished match I turned at hit the ball in his direction but i missed and got into other person and after got warning for that.” This athlete clearly lets her emotional aggression come out during competition and even attempts to physically harm the opposing team’s coach by

hitting a ball in his direction at the conclusion of her match. Therefore, tennis is considered an outlier of the research, barely fitting into the norms created by the study and even directly opposing them at times.

Other Findings

Outside of the hypotheses made for the study, several other interesting results were found by the researchers. First, the variability in response rate (RR) per sport was noticed. Response rates are given in table 5.1: Response Rates by Sport. The highest response rate by sport was tennis with 55.6% of players completing the survey; and the sport with the lowest response rate was football with 12% of its players completing a survey. This could be due to a number of reasons, including whether or not the teams were in season or out of season, individual schedules of the athletes, and the level of outside encouragement to complete a survey from coaches, athletic trainers, and teammates.

An additional finding from the study was the response to intentional harming. Of the 100 participants in the study, not one athlete indicated that they had been intentionally harmed by an opponent during competition. This was not for a lack of injuries either since 80% of those surveyed reported having been injured while playing their respective sport. This finding

Table 5.1: Response Rates by Sport

SPORT	On Roster	n	**RR**
Football	133	16	12%
Basketball (coed)	30	6	20%
Soccer	28	8	29.6%
Baseball	35	14	40%
Softball	20	6	30%
Volleyball	12	6	50%
Tennis (coed)	18	10	55.6%
Track & Field (coed)	60	22	36.7%
Cross Country (coed)	29	9	31%
Golf (coed)	15	3	20%

contradicts two direct questions asked later in the survey which ask “violent behavior, directed towards an opponent is acceptable” and “Opponents accept a certain degree of abuse.” The averages for these questions were 1.68 and 1.92 respectively. In addition, seven people marked “almost always” to the above mentioned item “violent behavior…” This suggests that athletes do not consider themselves victims of aggressive acts on the field or court but do acknowledge that these acts exist. To a certain degree, participants of the study believe that violent acts are okay and perhaps even carry them out themselves.

While gender differences were not the main focus of the research, the notable disparity between the means could not be ignored, especially when examining the differences in competitive aggression between genders. Thus, multiple independent *t* tests and effect size calculations were done to determine the significance of these extraneous results. It was found that the difference of emotional aggression between males and females was insignificant, the difference between the means only being 0.13 and an unremarkable effect size of 0.2. However, the difference in physical aggression between males and females was much greater, with a significance of $t(98) = 2.5462$, $p < 0.02$ and meaningfulness scored as 0.5. The results were moderately meaningful with an effect size slightly above 0.4.

The largest aggression measure discrepancy between two groups in the study occurred between males and females around CAAS competitive aggression. Here, the difference between the means was 0.75 and the results of the t score were highly significant at $t(98) = 4.3937$, $p < 0.001$. The effect size between the two groups was $d = 0.9$. This is a large effect size rating, meaning that the *t* score for the two groups was effectively meaningful. Thus, based on the data one can say with confidence that male collegiate athletes are more competitively aggressive than female collegiate athletes. It should be observed however, that there were more non-contact athletes who were female (n = 32) than male (n = 18) and more contact athletes who were male (n = 31) than female (n = 19). Keeler (2007) had a similar result in her study on the differences between “sport aggression” (both sanctioned and unsanctioned) and “life aggression” between genders. In her study, males were significantly more aggressive than females in both categories.

The outcomes for social desirability are given in table 4.14 on page 33. The true or false, 13-item Marlowe-Crown Social Desirability scale (MCSD-13) is rated on a scale from 1-2 where M = 2 would indicate a strong tendency for socially desirability and M = 1 would indicate the opposite. The average rating for an undergraduate population of 608 at a medium sized

university was M = 1.44 with an associated standard deviation of SD = 0.27 (Reynolds, 1982). The social desirability outcomes for the present research were higher and less varied than this average. For athletes competing in a contact sport the average rating for social desirability was M = 1.62, an eighteen percent increase from the average for a normal college student population. The standard deviation however was lower for contact athletes when compared to the general collegiate population at SD = 0.17. For non-contact athletes, the average rating was M = 1.64 with a standard deviation of SD = 0.15. To conclude, athletes involved in the present study gave answers that were more socially desirable than average for a population of college aged students, but their responses as a whole were much less varied than what is normal.

Social desirability was an expected complication of the present study since self-reported surveying techniques were used. It is well studied that social desirability is nearly impossible to filter out of self-reported research (McPeake, Bateson, O'Neill, 2014). To recognize the potential for social desirability and measure its presence was essential in validating the present findings. Since both groups (contact athletes and non-contact athletes) scored similarly for social desirability, a fair comparison could be made between the two groups. Thus, social desirability did not affect the final outcome of the study focusing on aggression tendencies.

Limitations

The overall response rate was 27% for the population of student-athletes surveyed. This is a below average rating when compared to results from a study on electronic survey methods by McPeake, Bateson, O'Neill (2014) who had a response rate of 62%. The researchers determined that despite all of the benefits that accompany electronic surveys, there are still limitations. The most notable limitation being that electronic surveys have lower response rates than paper and pen surveys dispensed by a person. It was also determined in this study on electronic surveys by McPeake, Bateson, O'Neill (2014) that multiple recruitment attempts are necessary to achieve an adequate response rate; they determined that at least two additional attempts were appropriate. In table 5.2, response rates (RR) from each email attempt are given.

Other possible reasons for the present study's low response rate are numerous. Besides being electronic, there was no compensation for taking the survey. Another possible explanation was that the survey was voluntary. It is easier for a potential study participant to delete an email than to deny a researcher in person who is asking for compliance. Furthermore, if there is no foreseeable reward for taking the survey, people are less likely to spend time completing it. Had

Table 5.2: Response Rates from Each Email Attempt

	RR from Email	Overall RR after Email
Initial Email	17%	17%
2nd Email Attempt	4.6%	21.6%
3rd Email Attempt	5.4%	27%

there been a cash reward for completing the survey, it is suspected that the response rate would have been higher. Furthermore, if the study had been portrayed as mandatory for all student-athletes, it is expected that the response rate would have been higher. The reasons for utilizing a voluntary electronic survey without compensation in the study were: (1) data analysis was quicker and more accurate; (2) it was cost effective; (3) ethical practices dictate that vulnerable persons not be forced into being research participants. Since athletes are subject to their coaches and school's rules, using that connection would have been considered unethical.

Along with the survey being voluntary, participants were able to skip any questions they did not want to answer. This being the case, five questions that were to be included in the final data analysis were skipped by participants. Skipped questions were taken into account and averages were calculated without the unanswered items. Thus, skipped questions did not alter or misrepresent any data; however, results would have been more complete had all questions been answered. Again, ethical considerations were of the highest importance to the researchers and allowing participants to skip any questions was a part of voluntary participation.

104 student-athletes responded to the survey, however only 100 advanced past the demographics section of the survey. This could be due to participants willingly withdrawing themselves from the survey, from technological error, or from an error on behalf of the participant. For example, while taking the survey one may have accidently or purposefully exited the browser, or a computer may have died. It is unknown whether or not the four potential participants attempted to retake the survey at a later time.

Buss and Perry (1992) briefly mention in their study on the Aggression Questionnaire that self reporting is a less valid method of measuring aggression than peer nominated style surveying. While the 13-MCSDS used in the present study was included help to discourage the phenomenon of giving more socially desirable answers to survey questions, self reporting could still be a limitation of the research. Perhaps this was why Shields (1999) used ADs to report on athlete aggression rather than the HS athletes themselves.

One study participant left this response in the open ended section of the survey: “In the [Competitive Anger and Aggression Survey] some of those questions that had the "almost never" option should have also had the never option only because some people really would never do those things but it implies that there is sometimes a time and place for violence, when there really isn't.” This athlete makes a sensible argument that perhaps there should have been an option indicating that there is never a time or place for aggressive acts during competition. It is acknowledged here that this is a limitation of the CAAS and perhaps it affected the results of the study.

In the present study there were more males who competed in a contact sport (n = 31) than females (n = 19). Likewise there were more female athletes competing in a non-contact sport (n = 32) than male athletes (n = 18). It was also observed that men scored significantly higher than women in physical and competitive aggression measures. This finding reveals a limitation to the study in that the most aggressive gender was overrepresented in the contact athlete group. It is acknowledged here that the uneven numbers of men and women per contact and non-contact athlete groups may have skewed the results of the study. Specifically, that the uneven gender representation per group may have lead to the significant difference among contact and non-contact athlete groups.

Future Research

As mentioned earlier in this chapter, the present study did not investigate causes behind the difference in aggression tendencies between athletes who play a contact sport and athletes who play a non-contact sport. This is certainly an important question that future researchers can attempt to answer. In addition, it would be interesting to know if it is the level of contact that determines how aggressive an athlete will be verses the phenomenon of aggressive athletes being inclined toward a contact sport rather than a noncontact sport. It is also possible that other, underlying personality traits affect aggressiveness in athletes.

Another plausible approach to studying aggression causation in a population is by investigating their Big Five personality traits. Big Five personality traits include openness, conscientiousness, extraversion, agreeableness, and neuroticism (Loveland, 2007). By comparing the relative levels of each board personality trait and relating those to a measure of aggression tendency, one may observe an underlying correlation between aggression and one or more of the big five personality traits. Loveland did just that, comparing academic success

with the big five and also with a measure of physical aggression. He found that decreased physical aggression accounted for academic success more so than any of the big five traits did. Furthermore, that none of the big five traits correlated consistently across groups with physical aggression.

Another area for future research based on the current study is to broaden the level of play. The current study examined only collegiate level athletes. Do the findings of this study translate into the high school setting? Into the professional setting? Studies of the same type done on lower and higher levels of competition would provide yet another basis for comparison between groups on aggression tendencies. The same could be done for comparing international athletes to domestic athletes.

While gender differences were examined as an additional finding of the study, they were not the main focus of the present research. Since it was found that there is a significant difference between the groups, a more comprehensive investigation into the differences between males and females in their aggression tendencies is certainly warranted.

The suspicious finding that none of the participants in the current study thought they had been intentional harmed by their opponents opens up a new avenue for future research. Investigating athlete perceptions of intentional harming verses the reality of it admittedly is a daunting research subject but one that would be worth pursuing. Additionally, this area of research would go hand in hand with the present study on determining aggression in athletics and then perceptions of those behaviors in action.

Another opportunity for future research based on the current study is to do a similar investigation using peer nominated reporting alongside self-reported measures. Peers could include coaches, other teammates, administrators, athletic trainers, or other athletic support staff. Peer nominated results could then be compared to self-reported levels of aggression to determine the influence of social desirability or to discover discrepancies in peer nominated verses self-reported measures.

Conclusion

In summation, a significant difference exists between athletes who play a contact sport and athletes who play a non-contact sport when examining aggression tendencies. There were three areas of aggression specifically investigated by the researchers: emotional, physical, and competitive aggression. Levels of emotional and physical aggressions were measured using the

Buss and Perry Aggression Questionnaire (1992) and competitive aggression was measured using the Competitive Anger and Aggression Scale (CAAS) by Maxwell and Moores (2007). Both questionnaires were reliable and valid measures of what the developers claimed they measured. These items were placed into a final electronic survey along with a demographics section, social desirability scale, and open-ended question. The final survey was sent to 371 student-athletes attending a medium sized midwestern university. One hundred student-athletes participated in the study, representing ten different sports. There was an even split among athletes competing in a contact sport and those competing in a non-contact sport.

It was determined that athletes participating in a contact sport were more aggressive than those in a non-contact sport in all three examined areas of aggression. This could be due to a number of reasons and future research is needed to ascertain possible causes behind the results of this study. For instance, researching personality traits such as those in the big five alongside aggression could reveal predictors for competitive, physical, or emotional aggression tendencies in the athlete. It should be noted that while the present study found significant differences between contact and non-contact competitors, it alone does not predict aggressive behavior in any way. Furthermore, it is assumed by the researchers that most athletes try to behave ethically on and off the field. The following quote taken from a volleyball player's open ended question demonstrates a positive attitude toward athlete aggression and is one that the researchers hope many collegiate athletes share: "I think that I have a healthy balance of aggression/competitiveness. I would never intentionally harm or insult another athlete, but I am not afraid to show my competitiveness through my play."

While athlete aggression is a part of athletics, the above quote demonstrates that aggression does not imply callousness or even violence. Aggression can be viewed as a normal and even positive quality in athletes, when kept under control and not used as a means to an end or as a way to achieve a competitive, even unfair advantage. The goal of the present research was to better understand athlete aggression at the collegiate level, and that goal was achieved in the realization that there is a significant difference in aggressive tendencies from sport to sport and from contact to non-contact competitors.

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Appendix A:

Informed Consent Page

"Physical and Emotional Aggression Tendencies in Contact and Non-Contact Collegiate Athletes"

By: Samyra Safraoui, ATC and Joel Cormier, PhD

Information Sheet

You are being asked to take part in a research study of athlete aggression at the collegiate level. We are asking you to take part in this study because you are a NCAA student-athlete enrolled at [HIDDEN] University. To participate, you must be at least 18 years of age. Please read the following information carefully and ask any questions you may have before agreeing to take part in the study.

What the study is about: The purpose of this study is to discover aggression tendencies in the collegiate athlete. Men will be compared to women; collision, contact, and non-contact sports will be compared and contrasted with each other; and lastly, level of competition will be examined as a possible determent of aggression tendencies. You must be a student-athlete to qualify. You must be 18 years old.

What we will ask you to do: If you agree to be in this study, we will distribute a questionnaire packet to you to be collected once it is complete. The survey will include questions about your gender, sport played in college, academic year, number of years as an athlete, injuries sustained and severity. Scenarios, comments, and assumptions designed to provoke or defy anger and aggression tendencies will also be involved in the study. These items will be varied and non-specific to you as an individual. The survey will take approximately 5-10 minutes.

Risks and benefits: I do not anticipate any undue risks to you participating in this study other than those encountered in day-to-day life. There is a chance that some questions or scenarios may remind you of a previous experience that caused you to become angry or aggressive and this may invoke an emotional reaction. You may stop the survey at any time you feel emotionally unable to continue. There are no benefits to you other than learning more about yourself and your aggression tendencies in sport and in life. This could be of benefit to you in determining your ideologies toward athlete aggression.

Compensation: There is no compensation for participating in this study.

Your answers will be confidential: The records of this study will be kept private. In any sort of report we make public we will not include any information that will make it possible to identify you. Research records will be kept in a locked file; only the researchers will have access to the records.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer. If you decide not to take part or to skip some of the questions, it will not affect your current or future relationship with [HIDDEN] University, or any other academic institution. If you decide to take part, you are free to withdraw at any time.

If you have questions: The researchers conducting this study are Samyra Safraoui, ATC and Dr. Joel Cormier. Please ask any questions you have now. If you have questions later, you may contact Samyra Safraoui at samyra_safraoui@mymail.[HIDDEN].edu. You can reach Dr. Cormier at Joel.Cormier@[HIDDEN].edu or 1-859- 622-8165. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) at 859-622-3636 or access their website at http://www.sponsoredprograms.[HIDDEN].edu/institutional-review-board.

APPENDIX B:

Marlowe-Crown Social Desirability Scale

The Marlowe-Crown Social Desirability Scale is a true/ false scale measuring social desirability as a response tendency with self-reporting measures. It was developed in 1972. A shortened form is used here, arranged by William Reynolds.

Marlowe-Crown Social Desirability Scale items, first factor item loadings, item to total scale correlations, and item endorsement proportions.

Factor Items	Factor loading	rij[a]	percent[b]
It is sometimes hard for me to go on with my work if I am not encouraged.	.40	.36	.36
I sometimes feel resentful when I don't get my way.	.54	.49	.30
On a few occasions, I have given up doing something because I thought too little of my ability.	.39	.35	.44
There have been times when I felt like rebelling against people in authority even though I knew they were right.	.39	.35	.42
No matter who I'm talking to, I'm always a good listener.	.40	.36	.59
There have been occasions when I took advantage of someone.	.49	.43	.34
I'm always willing to admit it when I make a mistake.	.46	.41	.61
I sometimes try to get even rather than forgive and forget.	.48	.43	.47
I am always courteous, even to people who are disagreeable.	.44	.40	.45
I have never been irked when people expressed ideas very different from my own.	.41	.36	.41
There have been times when I was quite jealous of the good fortune of others.	.53	.48	.30
I am sometimes irritated by people who ask favors of me.	.50	.45	.50
I have never deliberately said something that hurt someone's feelings.	.42	.38	.38

APPENDIX C:

Buss-Perry Aggression Questionnaire

The Buss-Perry Aggression Questionnaire uses a 5-point likert scale where 1 = extremely uncharacteristic of me and 5 = extremely characteristic of me. It measures a quartet of various aggression tendencies including: physical aggression (items 1-9), emotional aggression (items 10-14), anger (items 15-21), and hostility (items 22-29). Items numbered 7 and 18 are reverse scored. The questionnaire was developed by Arnold H. Buss and Mark Perry at the University of Texas at Austin in 1992.

Buss-Perry Aggression Scale factors and factor loadings.

Factor	Factor loadings		
Physical Aggression			
Once in a while I can't control the urge to strike another person.	.66	.55	.62
Given enough provocation, I may hit another person.	.79	.84	.80
If somebody hits me, I hit back.	.60	.65	.60
I get into fights a little more than the average person.	.44	.52	.58
If I have to resort to violence to protect my rights, I will.	.63	.68	.58
There are people who pushed me so far that we came to blows.	.60	.62	.65
I can think of no good reason for ever hitting a person.	.47	.53	.51
I have threatened people I know.	.45	.48	.65
I have become so mad that I have broken things.	.47	.57	.47
Emotional Aggression			
I tell my friends openly when I disagree with them.	.41	.41	.48
I often find myself disagreeing with people.	.38	.49	.35
When people annoy me, I may tell them what I think of them.	.45	.45	.40
I can't help getting into arguments when people disagree with me.	.38	.41	.36
My friends say that I'm somewhat argumentative.	.37	.56	.46
Anger			
I flare up quickly but get over it quickly.	.53	.49	.49
When frustrated, I let my irritation show.	.47	.45	.37
I sometimes feel like a powder keg ready to explode.	.60	.35	.35

I am an even-tempered person.	.64	.62	.69
Some of my friends think I'm a hothead.	.63	.51	.64
Sometimes I fly off the handle for no good reason.	.75	.64	.70
I have trouble controlling my temper.	.74	.66	.69
Hostility			
I am sometimes eaten up with jealousy.	.41	.43	.49
At times I feel I have gotten a raw deal out of life.	.61	.58	.52
Other people always seem to get the breaks.	.65	.65	.63
I wonder why sometimes I feel so bitter about things.	.48	.45	.59
I know that "friends" talk about me behind my back.	.55	.37	.47
I am suspicious of overly friendly strangers.	.42	.35	.43
I sometimes feel that people are laughing at me behind my back.	.66	.64	.70
When people are especially nice, I wonder what they want.	.55	.50	.47

APPENDIX D:

Competitive Anger and Aggression Scale

The CAAS uses a 5-point likert scale (1 = almost never…5 = almost always). It was developed by Maxwell and Moores in 2007 to study anger and aggression in sport.

Competitive Aggressiveness and Anger Scale items, exploratory factor loadings, mean intensity of aggression and mean rating[a] from all athletes.

Factor Items	Factor loading
Anger	
I become irritable if I am disadvantaged during a match	.73
I feel bitter towards my opponent if I lose	.42
I get mad when I lose points	.74
I show my irritation when frustrated during a game	.73
I find it difficult to control my temper during a match	.66
Official's mistakes make me angry	.70
Aggressiveness	
Violent behavior, directed towards an opponent, is acceptable	.73
It is acceptable to use illegal physical force to gain an advantage	.86
I taunt my opponents to make them lose concentration	.62
I use excessive force to gain an advantage	.79
I verbally insult opponents to distract them	.77
Opponents accept a certain degree of abuse	.74

[a]Mean rating calculated using combined data from EFA and CFA.

APPENDIX E:

Mathematical Formulas

Formulas taken from *Research Methods in Physical Activity* by Thomas, J., Nelson, J., Silverman, S.. [M_1, S_1, n_1] all refer to the data for contact sports and [M_2, S_2, n_2] all refer to the data for non-contact sports.

Formula for Independent t-tests:

$$t = \frac{M_1 - M_2}{\sqrt{(s_1^2/n_1) + (s_2^2/n_2)}}$$

Formula for Effect Sizes:

$$ES = \frac{M_1 - M_2}{s_p}$$

Where s_p is calculated as:

$$s_p = \sqrt{\frac{s_1^2(n_1 - 1) + s_2^2(n_2 - 1)}{n_1 + n_2 - 2}}$$

Appendix F:

Open Ended Responses

Open ended responses

“Track and field does not invlove that much aggression, which is why I did not feel adressed in most of the questions.”

“I get easy frustrated during my match , I have broken 2 racquets during my match. Once I got very mad at opponents coach and after i finished match I turned at hit the ball in his direction but i missed and got into other person and after got warning for that.”

“I think that I have a healthy balance of aggression/competitiveness. I would never intentionally harm or insult another athlete, but I am not afraid to show my competitiveness through my play.”

“Pointless.....”

“If I am able to get away with it, I will do anything to help my team win. That's football.”

“When disadvantaged during a match and I lose points and i become angry for that it is because I got hurt and could not do my best.”

“In the [Competitive Anger and Aggression Survey] some of those questions that had the "almost never" option should have also had the never option only because some people really would never do those things but it implies that there is sometimes a time and place for violence, when there really isn't.”

“Typical aggressiveness that comes with the game of football.”