

EPIDEMIOLOGY OF INJURIES IN COLLEGIATE
MALE CHEERLEADERS IN THE UNITED STATES

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Chapter I

Introduction

Cheerleading has evolved and grown rapidly since the first cheer was led at a University of Minnesota in 1898. Initially, the focus of cheerleading was leading crowds at sporting events (Boden, Tacchetti, & Mueller, 2003). Over the years, athleticism involved in cheerleading has increased, and for some teams competition has become the main focus, in fact, nearly half the states conduct a state championship for competitive cheerleading (Mueller & Cantu, 2009). Cheerleaders are expected to perform various athletic tricks and stunts as part of their sidelines, entertainment, and competition activities; therefore, they must now possess strength, power, balance, agility, and endurance. The majority of the changes in cheerleading have occurred since the 1980s.

Cheerleading originally started with male team members leading the crowd in various chants and cheers at sporting events, most often football. Women were first allowed to cheer in 1923, and during this time acrobatics and tumbling skills began to be added to the cheers (International Cheer Union [ICU], 2010). Participation of women dramatically increased in the 1940's, a time when college age men were at war. Cheerleading had expanded to most high schools, grade schools, and even youth leagues by the 1960s (ICU, 2010). The National Cheerleaders Association (NCA) was formed in 1961 to instruct various clinics and camps for cheerleaders around the United States

(ICU, 2010). A competing company, the Universal Cheerleaders Association (UCA) was founded in 1974 and instructed more difficult skills and put routines to music (ICU, 2010). The American Association of Cheerleading Coaches and Administrators (AACCA) was started in 1988, the first group focusing on teaching safety in cheerleading (American Association of Cheerleading Coaches and Administrators [AACCA], 2009a).

All-star cheerleading began gaining popularity in the 1980s and grew exponentially through the '90s. Throughout this time, cheerleading started to gain international popularity. The International All-star Federation (IASF) along with the United States All Star Federation (USASF) was formed in 2003 and together began hosting a Cheerleading World Championship (ICU, 2009). The first Cheerleading World Championship was hosted in 2004 with 14 team participating (ICU, 2009). At the 2010 World competition, teams from 60 countries and 5 continents competed (IASF, 2010). The International Cheer Union (ICU) was formed in 2009 in an effort to gain more recognition by international sport authorities and safe cheerleading and now governs 97 member National Federations (ICU, 2009).

Along with the increased athleticism, cheerleading has been linked with high injury rates, which can sometimes be catastrophic (Shields & Smith, 2009a). According to data of the National Center for Catastrophic Sport Injury Research (NCCSIR), cheerleading accounts for over half the injuries for females in sport (Mueller & Cantu, 2009). Since this report first appeared in 2003, cheerleading related injuries have attracted more media and research attention. Although cheerleading is increasing in popularity, it is not recognized as a sport by the National Collegiate Athletic Association (NCAA). Due to the lack of recognition as a sport by the NCAA, minimal injury data is reported or known pertaining to cheerleading because it is not included in the Injury Surveillance System tracking. The National Cheer

Safety Foundation (NCSF) was recently established to compile injury information for cheerleaders, but this is still dependent on the athletes, parents, or coaches recording the data. Through various research studies, some information has been established regarding cheerleading injuries in females.

Mueller (2009) has attributed some of the injury risk to cheerleading not being considered a sport and held to the same standards as other sport teams. The training regime, coach qualifications, practice facilities, and lack of certified athletic trainers at practice are just a few of the standards that differ when comparing cheerleading to other sports and even when comparing different cheer programs. The lack of recognition as a sport has the potential to greatly reduce the standards held for practices and competitions for cheer teams compared to other sport teams. It is also possible that due to recent changes and developments, co-ed teams will not be supported at the same level as all-girl teams by their respective schools, therefore, increasing the potential for risk.

The National Association of Intercollegiate Athletics (NAIA) lists cheerleading as an emerging sport and is striving to be the first college organization to recognize competitive cheer (National Association of Intercollegiate Athletics [NAIA], 2010). Teams competed this past year in an NAIA division at the NCA Collegiate National championship in both large and small co-ed divisions. Some collegiate all-girl teams have recently been recognized by their individual NCAA schools as a sport. Due to the complications related to Title IX and classifications of sports, no co-ed teams have been identified as a sport by a NCAA school. In fact, some schools have a “varsity” all-girl team and an additional non-varsity co-ed team. These teams compete under the classification of stunt and tumble. A new format designated under the name STUNT held a collegiate national championship this

year for cheerleading teams and is applying for emerging sport status under the NCAA. If STUNT is approved it has the potential of replacing stunt and tumble teams and meet the Title IX requirement as a female sport.

Several steps have been taken to prevent further injuries in cheerleaders such as skill limitations, rule changes for different surfaces, and more levels of progression at competitions. Cheerleading is divided among three main sectors: school, college, and all-star. Different rules exist for each component based on expected skill level of the participants. It is not uncommon for individuals to participate on both school and all-star cheer teams at the same time. Different governing bodies exist in each sector of cheerleading. The National Federation of State High School Associations (NFHS) governs school cheerleading, individual schools and their respective sport conferences often oversee collegiate cheer programs in conjunction with AACCA for safety and standards, and the USASF oversees all-star cheerleading. Among the various sectors and levels of cheerleading, competitions and additional instruction are operated by various companies. While most rules stem from the rules set by AACCA, each agency has created their own version of safety rules for their respective teams. In addition, safety certification has been improved and more strictly enforced. Improvements in standards and rules to increase safety among cheerleaders are still occurring slowly, therefore, more information regarding injuries can help to enhance and speed up the changes occurring.

Very few research studies have been conducted to record injury patterns and frequency of injury. Furthermore, most of the research completed to this point has focused on injuries of females. Cheerleading has been identified as the most dangerous sport for females, but no research study has focused on injuries in males (Shields & Smith, 2010).

Females in cheerleading accounts for a greater percent of total sport participation compared to the number of males in cheerleading. According to estimates from high school cheerleading the majority of the participants are female, however, males are still members of many teams (ICU, 2010). Due to the lower number of male participants, statistics regarding male cheerleading injuries is very limited. Males attempt many of the same skills, and some different and even more difficult skills, as their female counterparts, therefore, injury patterns and prevalence should also be investigated (Shields & Smith, 2010). Males often perform single base stunts, they are holding all of the weight of the top, as opposed to all girl team that stunt with three bases holding one top.

Injuries have been shown to occur during the execution of all skills. The different parts of cheerleading include: stunts, pyramids, tumbling, jumps, and basket tosses. Stunts involve a base or bases holding a top girl in the air. Several variations of stunts exist which increase the difficulty. Pyramids are groups of interconnected stunts and at the college level can be performed to the height of two and a half body lengths. Tumbling involves any gymnastic-like flips and can be done from a stationary or running start. Jumps involve jumping off the group and hitting a specified position in the air. They can be performed in succession or connected to tumbling skills to increase difficulty. Basket tosses involve throwing a top into the air and catching her after an airborne skill is performed. The overall greater strength of males leads to more power, difficulty of skills able to be performed, and height of basket tosses. This creates an environment which could possibly lead to more injuries for both the males and females on co-ed team. Male cheerleaders are more common at the college level than at the high school level, since many colleges have co-ed teams. Previous research that included male cheerleaders, demonstrate that they are also at risk for

injury and the type of injuries are similar (Shields & Smith, 2010). More research is needed to determine whether the risk of injury is similar for both male and female cheerleaders and to compile injury information for male cheerleaders.

With participation rates estimated to be 3.73 million for all sectors of cheerleading and 90% of those participants are female, it is no wonder cheerleading accounts for so many sport injuries in females (AACCA, 2009b). A study of injuries in female high school sports found that the sports with the highest number of participants also had the largest number of injuries (Rauh, Macera, Ji, & Wiksten, 2007), supporting the idea that injuries in cheerleading have increased with increased participation. Even though males account for a lower percentage of cheerleaders, however, does not mean they are not at risk for the same injuries. The lack of data regarding male cheerleading injuries has been identified as an area of future research by both Shields and Smith (2010) and Jacobson, Redus, and Palmer (2005).

Statement of the Problem

Injuries in cheerleading have been identified as a significant problem in recent years, however, very little information has been collected about male cheer injuries. Although many skills performed by females and male are similar, some differences could actually put males more at risk for specific types of injuries. One major difference is in the type of stunts that co-ed teams perform compared to all-girl teams. On most co-ed teams, a single male supports the weight of a top girl, while for most all-girl teams three females equally distribute the weight. Due to the extra weight and strain on the body while performing single base stunts, shoulder and core injuries may be more common among males (Shields & Smith, 2010). Furthermore, male cheerleaders tend to be stronger and more powerful than their

female counterparts, therefore allowing more difficult skills to be attempted. It is important to identify injuries among males to further prevent and decrease injuries among all cheerleaders.

Purpose of the Study

The purpose of this study was to describe the epidemiology of cheerleading injuries of collegiate male cheerleaders. The study identified the most common injuries, mechanism of injuries, and the body part injured. Associations between injuries and skill level, years of experience, competitiveness and spotting information, among others items, were also determined. The results of this study can be used to help prevent injuries and help establish more rules and standards aimed at injury prevention.

Null Hypotheses

1. There is not a relationship between the number of career injuries reported and years of cheerleading experiences.
2. There is no correlation between the number of injuries an individual reported in the last 12 months and years of cheerleading experience.
3. There is not a relationship between the number of practice days per week and if a cheerleader was injured in the last 12 months.
4. A relationship does not exist between the typical length of a practice and the likelihood of being injured in the last 12 months.
5. There is not a relationship between the off season and being injured within the last 12 months.

6. There is no difference in the likelihood of being injured in the last 12 months for members of teams that compete compared to members of teams that do not compete.
7. There is no difference in injuries in the last 12 months based on the team's cheer company association (NCA, UCA, USA, or other).
8. There is no difference in the number of injuries an individual reported in the last 12 months based on primary skills performed (stunts, tumbling, or both).
9. The most common body part injured does not differ based on the primary skills (stunts, tumbling, or both) performed by the cheerleader.
10. The mechanism of injury is not different for cheerleaders depending on the primary skills performed.

Significance of the Study

This was the first study to look specifically at injuries among male cheerleaders at the collegiate level. This provided a better understanding of the risk and type of injuries among all cheerleaders, not just females. As a result, new standards and rules can be established to make cheerleading safer for all participants.

Delimitations

1. This study was delimited to male members of co-ed collegiate teams attending camp or competition for either NCA, UCA, or USA.

Limitations

The following have been identified as limitation in this study:

1. Injury information was based on participant recall over a long period of time, which may have resulted in a larger ratio of major injuries being reported since they are easier to recall.
2. Due to the methodology of this study, injury rates based on the number of injuries per athletic exposure could not be calculated.
3. Although what is categorized as an injury was defined, each athlete has a subjective view about what he considers a reportable injury.
4. Self-report was being used by participants on previous injuries.
5. There was not a safeguard against multiple questionnaire submissions by any one individual or any confirmation that it was the targeted individual completing the questionnaire.

Assumptions

Throughout this study, the following assumptions were made:

1. Participants completed the questions honestly and as accurately as possible.
2. The participants were knowledgeable about cheerleading and its various components.
3. The terminology used was understood and correctly interpreted by the participants.

Definition of Terms

Athletic exposure: An athlete participating in one game, practice, or other athletic event, in which he/she is at risk for athletic injury

Base: The person supporting the weight of another person.

Basket toss: A skill performed when three or four individuals throw another cheerleader into the air and catch them in a cradle after a series of flips and/or twists are performed

Catastrophic injury: “sport injury that results in a brain or spinal cord injury or skull or spinal fracture (Mueller & Cantu, 2009).”

Cradle: A type of dismount catch involved in stunts, pyramids, and basket tosses, that results in the top girl landing in a slight hollow body position in the arms of three catchers. Two catchers are on each side of the body supporting weight of the middle back and upper legs areas and one catch under the arms of the top girl supporting the weight of the head, neck and shoulders.

Fatal injury: A category of catastrophic injury that results in the death of the injured individual (Mueller & Cantu, 2009)

Group stunt: When two or more bases simultaneously support the weight of another cheerleader.

Mechanism of injury: The direct cause of an injury.

Non-fatal injury: A category of catastrophic injury that “results in a permanent functional disability of the injured individual (Mueller and Cantu, 2009).”

Off-season: period of time without any mandatory practices, training sessions, or events

Partner stunt: When a single based supports the weight of another cheerleader.

Pyramid: A group of interconnected stunts, sometimes at heights greater than two body lengths for collegiate teams.

Rewind: A stunt where the top girl flips and lands in the hands of the base or bases.

Running tumbling: Tumbling skills executed following a running start.

Serious injury: A category of catastrophic injury involving “any severe brain or spinal cord injury without resulting in permanent functional disability (Mueller & Cantu, 2009).”

Spotter: A person not involved in the actual performance of the skill, but providing additional support or assistance in the event that the skill is not executed correctly.

Spring floor: often used in gymnastics and the performing surface for all star cheerleading consisting of mats covering plywood with springs attached helping to give the performer extra bounce

Standing tumbling: Tumbling skills originating from a stationary position.

Stunter: A term used to describe a person on a cheerleading team who primarily performs stunts

Top: The individual being supported or thrown in the air during stunts, pyramids, and basket tosses.

Tumbling: Skills involving flipping and twisting the body.

Tumbler: A term used to describe a person on a cheerleading team who primarily performs tumbling skills

Chapter II

Review of Literature

Cheerleading

In order to successfully examine the injury patterns associated with cheerleading it is necessary to define who is a cheerleader and what activities are included in cheerleading. Cheerleading originated from the University of Minnesota in 1898, when a student stood and led the crowd in organized cheers and chants at a sporting event (Mueller, 2009). The primary role of cheerleading since its creation has been the support of teams at athletic events. Texas A & M University still follows the traditional role with the “yell leaders” keeping the crowd involved and cheering at sporting events. Starting in the 1940s, female participation increased and now females compose a large number of cheer team members (ICU, 2010). High school level competitive cheerleading is ranked in the top ten most popular girl’s sports (Schulz, Marshall, Yang, Mueller, Weaver, & Bowling, 2004).

In the past 30 years, however, the emphasis of most cheerleaders and cheer teams has changed dramatically. Not only do cheerleaders support other athletic teams, perform at pep rallies and other similar events, but now many teams also compete. Today cheerleading generally consists of three categories of participation: sideline, entertainment, and competitive (Appenzeller, Mueller, & Appenzeller, 2008). At all

participation levels, the athleticism required and involved in cheerleading has increased dramatically. Cheerleading now involves acrobatic and gymnastic skills such as tumbling, partner stunts, pyramids, and basket tosses. Sideline activities occur at other sporting events and include leading the crowd in cheers in support of another athletic team. Many teams incorporate stunts and tumbling into the sideline activities at sporting events. During pep rallies and other performances, cheerleaders act in an entertainment role. They may perform a variety of skills or simply help enhance the atmosphere at an event by leading cheers. The competitive level of cheerleading has expanded with the appearance of more all-star teams and has further increased the skill level and athleticism required for cheerleaders. In fact, competition is the only role for some cheer teams. As of May 2009, the National Federation of State High School Association (NFHS) estimated that there were 400,000 participants in high school cheerleading (Mueller & Cantu, 2007). The number of participants at the college level is difficult to obtain since it is not a National Collegiate Athletic Association (NCAA) sport and a comprehensive list of teams does not exist.

Cheerleading, however, falls into a gray area when attempting to categorize it as either a sport or an activity. The American Association of Cheerleading Coaches and Administrators (AACCA), a governing body for cheerleading, defines cheerleading as an “athletic activity,” which includes the roles of both promoting school-spirit and participating in competitions (Shields & Smith, 2006). States are also divided when categorizing cheerleading as a sport or an activity (Shields & Smith, 2006). The NCAA does not recognize cheerleading as a sport, however, as of 2011 eight universities (University of Oregon, University of Maryland, Baylor University, Quinnipiac, Fairmont

State University, Azusa Pacific University, Fort Valley State, and Ohio State University) recognize cheerleading as a sport under the National Collegiate Stunt and Tumble Association (Baylor, 2010). Another new format for cheerleading competitions operating under the name of STUNT is petitioning for emerging sport status with the NCAA this year. Just over 20 teams competed in the all-girl only competition format this past year. Standards among cheerleading programs and school may become more universal if it becomes a recognized sport and part of Title IX compliance.

Types of Cheerleading Teams

Today cheerleading is composed of several different types and levels of teams. These teams include recreational, interscholastic, all-star, collegiate, special needs and professional (Appenzeller et al, 2008). Different rules exist for each level based on expected skill and experience of the participants. Different governing bodies also exist in each sector of cheerleading, but some agencies may reign over more than one type of team. Each agency has created safety rules for teams operating under their designated sector or sanctioned event.

Although they share the same title, recreational, special needs, and professional cheerleaders and teams differ significantly in their role and skills typically performed from school, college, and all-star teams. Furthermore, current research has only included data on interscholastic, college, or all-star teams. Since there are many overlapping characteristics of interscholastic, college, and all-star teams, the review of literature will include research on each of these types of teams. Information on male cheerleaders is very limited, therefore, examining all research will allow a better understanding of what is already known about cheerleading injuries. This study only collected data from

collegiate teams, however, since male participation is often highest at this level of cheerleading.

Interscholastic cheerleading. Interscholastic teams include any team sponsored by schools that include students from that school on the team (Appenzeller et al, 2008). Teams can exist from the high school level all the way down through elementary teams. The main activity for most interscholastic teams includes supporting other athletic teams at sporting events. Also included in their roles is performing at pep rallies and other school sponsored events. Interscholastic teams may or may not choose to compete. High school cheerleaders have been a main component of research up to this point.

Collegiate cheerleading. College cheer teams are similar to other interscholastic teams, but they are associated with colleges and universities. The main role for most collegiate teams is support of other athletic teams. They also have the responsibility of enhancing school spirit at various events. Some teams also compete at a national competition. Collegiate teams have different safety rules than other interscholastic teams. For example, skills that are only permitted at the collegiate level include two and a half high pyramids, flipping stunts and flipping basket tosses (AACCA, 2009a). Teams can be all-girl or co-ed. Only a few collegiate teams are recognized by their school as a sport, but the NCAA does not include cheerleading in its list of sports (Mueller, 2009). Previous studies on cheerleading have also included collegiate level cheerleaders; however, most studies have only included females.

All-star cheerleading. Many sports have all-star teams, but all-star teams for cheerleading only started to gain popularity in the 1990s (Appenzeller et al, 2008). Now all-star cheerleading is a major subdivision of cheerleading. The only purpose for these

teams is to compete. Members of school and college teams may also be members of an all-star team. Most all-star teams represent cheerleading or gymnastic gyms (Shields & Smith, 2009a). They do not support other athletic teams and have different rules than school sponsored and collegiate teams (Shields & Smith, 2009a). All-star teams compete several times a year, typically starting in October and ending in April. Participants can start competing before they are five years old (United States All Star Federation [USASF], 2009). In an attempt to be the most competitive, the teams focus on learning advanced stunts, pyramids, baskets, and tumbling skills. All-star competition routines are only two minutes and 30 seconds in length, but teams train year round (USASF, 2009). Different levels exist for teams in all-star cheerleading much like in gymnastics, ranging from level one to level six (USASF, 2009). As skills improve, individual cheerleaders and teams progress to a higher level. International expansion of cheerleading is linked with all-star teams. The first Cheerleading World Championship was hosted by the United States All Star Federation (USASF) and International All Star Federation (IASF) in 2004 (ICU, 2010). Little research on cheerleading injuries has included all-star teams, since they typically represent a private business. Furthermore, international participation has increased, but current research still focuses on only United States cheerleaders.

Safety Rules and Regulations

While changes have occurred slowly, there have been improvements and more emphasis on preventing cheer injuries. Rules changes have been made in response to and in the hope of preventing injuries. Some of the most recent rule changes include restrictions on skills allowed to be performed on basketball courts for collegiate teams (George, 2006). Past rule changes have included prohibiting the use of mini trampolines

and limiting the number of throwers for basket tosses (Boden, et al, 2003). These changes have all occurred to the rules set forth by AACCA, a guideline and basis for many other cheerleading organizations' rules. AACCA also determines the rules followed by collegiate teams.

Furthermore, a variety of different companies offer cheerleading camps, competitions, and apparel. Each company follows different standards and regulations. For example, some competitions provide additional spotters when a team performs while other companies do not. Not only does a uniform set of standards and rules not exist for cheerleading, those rules that are in place are not always followed (Shields & Smith, 2006). The College Cheerleading Safety Initiative was created in 2006 by a joint effort of NCAA, Varsity Brands, and ACCAA (Mueller & Cantu, 2009). One of the purposes of this initiative is to punish coaches who are willfully not following rules outlined by ACCAA.

One standard that has become more universally accepted is the requirement for coaches to be safety certified. Certification requirements has been linked with research evidence showing that injury rates are lower for teams that are supervised by safety certified coaches (Mueller, 2009). AACCA and the National Council for Spirit Safety and Education (NCSSE) have created coaches' safety certifications, which are both recognized by the NCAA for collegiate coaches (Appenzeller et al, 2008). The USASF governs all-star cheerleading and has standards requiring coaches to be safety certified as well (Appenzeller et al, 2008). A uniform set of safety rules and safety standards should be developed to decrease the risk of injury in cheerleading due to inadequate standards. More data about the injuries occurring in cheerleading, and to different types of

participants, may help to establish further safety initiatives and improve standards cheer teams and their supporting schools must follow.

Injury Reporting in Cheerleading

Over the years, cheer injury information has increased, but one standard reporting system does not exist. The NCAA uses the Injury Surveillance System to collect injury data for all collegiate sports. As previously mentioned, the National Federation of High School Associations (NFHS) and the NCAA do not recognize cheerleading as a sport, therefore, injury data is not collected for cheerleading like other recognized sports. In the 2009-2010 report by the National High School Sports-Related Injury Surveillance Study cheerleading was included among the sports with injury data (Comstock, Collins, McIlvain, 2010).

The National Center for Catastrophic Sport Injury Research (NCCSIR) has been collecting cheer injury data for over 30 years, but only for catastrophic injuries (Mueller & Cantu, 2009). The Consumer Product Safety Commission (CPSC) uses information from hospitals to accumulate data for the Annual Reports on Catastrophic Sport Injuries (Mueller & Cantu, 2009). Since colleges often have a certified athletic trainer or physician available for use by the cheerleading teams, many college cheerleaders do not go to the hospital for injuries. This limits the data collected by the CPSC. Researchers have developed their own reporting systems as part of studies on cheer injuries. These systems often rely on a team representative to enter all injury information.

Recently, a parent group has attempted to start an injury report system as part of the National Cheer Safety Foundation (Mueller & Cantu, 2009). The Foundation has collaborated with the NCCSIR to combine injury data collected. When comparing the

two databases, however, the injury information submitted by the foundation only included a few injuries previously recorded by the NCCSIR (Mueller & Cantu, 2009). This demonstrates the gaps in injury recording that still exist in cheerleading. Despite all the attempts to improve the recording of injuries in cheerleaders, a universal system still does not exist.

Injury Rates in High School and College Athletes

Since most studies investigating cheer injuries include both high school and college, injury rates for other sports will also be examined at both the high school and college level to see how results compare. The number of injured athletes per athletic event (AE) determines injury rates. An AE is defined as one athlete participating in one practice or game (Hootman, Dick, & Agel, 2007; Rechel, Yard, & Comstock, 2008). Reportable injuries are defined by most researchers with the same criteria used for the NCAA Injury Surveillance System. The three criteria for reportable injuries include: a.) it was the result of participation in the sport, b.) it required medical attention, and c.) it restricted the athlete's participation for at least one day (Darrow, Collins, Yard & Comstock, 2009; Dick, Agel, & Marshall, 2007; Hootman et al, 2007; Jacobson, Hubbard, Redus, Price, Palmer, Purdie et al, 2004; Jacobson, Redus, & Palmer, 2005; Rechel et al, 2008; Schulz et al, 2004; Shields, Fernandez, & Smith, 2009; Shields & Smith, 2009a).

Hootman et al (2007) conducted a study summarizing the injury data for 15 collegiate sports over a 16 year period. Injury rates across all sports were significantly higher during the season than during pre or post season (Hootman et al, 2007). Furthermore, all divisions had a higher injury rate for games (13.8 per 1000 AEs) than

the rate of injuries for practice (4.0 per 1000 AEs) (Hootman et al, 2007). The number of injuries that actually occurred during practice was higher than the number of injuries per games, but teams practice with more frequency than they play in games (Hootman et al, 2007). When looking at individual collegiate male sports, some sports had much higher injury rates than others. Football had the highest injury rates for both practice (9.6 per 1000 AEs) and games (35.9 per 1000 AEs) (Hootman et al, 2007). According to Hootman et al, the lowest injury rate for practice was 1.9 per 1000 AEs was associated with baseball.

A similar study, conducted by Rechel et al (2008), compared the injury rates of nine high school sports during the 2005-2006 school year. Overall, results were similar to those found when looking at collegiate sports. This study also found a higher rate of injury per 1000 AEs in games (4.63) than in practice (1.69) (Rechel et al, 2008). Unlike the results Hootman et al (2007) found in the study of collegiate sports, the actual number of injuries was also higher for competition when looking at high school sports (Rechel et al, 2008). An overall injury rate for all sports in practice and games was found to be 2.51 injuries per 1000 AEs (Rechel et al, 2008). Once again, football accounted for the highest injury rates in both practice (2.54 per 1000 AEs) and games (12.09 per 1000 AEs) (Rechel et al, 2008).

Injury Rates in Cheerleading

Injuries in cheerleading have been a hot topic in both the media and research in recent years. Several studies have been conducted to identify the risk of injury for cheerleaders (Boden et al, 2003; Jacobson et al., 2004; Jacobson et al., 2005; Shields et al., 2009; Shields & Smith, 2006; Shields & Smith, 2009a, Shields & Smith, 2009b).

Cheerleading has been identified as the most dangerous sport for females, but injury rates found in these studies are less than that found for girls' soccer when looking at high school sports in 2005-2006 (Rechel et al., 2008). Accurate injury rates and number of injuries are difficult to establish, however, since a universal injury recording system does not exist (Jacobson et al., 2005). The increase in injuries has been attributed to the inclusion of gymnastic type maneuvers in cheerleading. Another factor that may contribute to the increase in injuries is the increase in participation. It is estimated that there was an increase of over 500,000 cheerleading participants in the U.S. in 2003, totaling about 3,579,000 participants (Shields & Smith, 2009a).

In 2009, Shields and Smith reported epidemiological results of a one-year study of over 400 cheerleading teams. Teams were representative of all-star, high school, college, and recreation. Findings were not supportive of the claims that cheerleading is the most dangerous sport for females (Shields & Smith, 2009a). Injury rates were calculated by total number of injuries divided by the total number of AEs. An AE was defined as "1 cheerleader participating in 1 cheerleading event" for this study (Shields & Smith, 2009a). The researchers calculated a rate of injury per athletic exposure for high school teams of 0.5 per 1000 AEs and 2.4 per 1000 AEs for college teams (Shields & Smith, 2009a). College teams also had the highest injury rates of strain/sprain injuries in both practice (1.3) and competition (1.5) (Shields & Smith, 2010). Schulz and colleagues investigated injury incidence among competitive high school cheerleaders in North Carolina from 1995 to 1999. Their research compiled a sample size of 1675 athletes over a three year period. When looking at strictly competitive teams, Schulz et al. (2004) found an injury rate of 0.9 per 1000 AEs. The level of skills attempted may be higher on

competitive teams, which explains the higher injury rate. For the studies performed by both Shields and Smith and Schulz et al., the overall injury rates are lower than the injury rates found for other sports in separate studies (Hootman et al., 2007; Rechel et al., 2008).

Cheerleading has also been identified as being the leading cause of days missed due to injury than any other sport (Jacobson et al., 2004). The design of cheerleading inherently contributes to the number of injuries and days lost due to injury. Cheerleading is a year round sport. For all other sports the highest injury rate is during the season, and cheerleading is consistently in season (Hootman et al., 2007). Throughout the year, cheerleaders may participate in a summer camp, cheering at various sporting events, performances at pep rallies or similar events, and competition. The lack of a rest period in the sport of cheerleading also contributes to the likelihood of overuse injuries that may lead to other more serious injuries. In addition, if an athlete in another sport is injured, very few days may be lost due to the injury depending on point during the season. Cheerleaders injured while cheering the final football game are still likely to miss practice for other performances or competition. There are many facets to the sport of cheerleading that require different skills and preparation for each appearance. While some studies have found very high number of days missed due to injury for cheerleaders, a study of college cheerleaders from six of the major athletic conferences found an average of only 1.8 days missed due to injury in the past year (Jacobson et al., 2005).

Similar to other sports, injury rates are higher in competition than practice for all-star, collegiate, and high school teams (Shields & Smith, 2009a). All-star cheerleaders are the most likely to be injured at a competition (Shields & Smith, 2009a), which is easy to understand since all-star teams compete several times a year, but other teams may only

compete once a year. Hootman et al. (2007) found that injury rates were higher during games for 15 different collegiate sports. The higher intensity during games most likely accounts for more injuries. Another study specifically looking at injuries in women's gymnastics also shows that injuries occur more often during competition (Marshall, Covassin, Dick, Nassar, & Agel, 2007).

Although the injury rate is lower, the number of injuries that occur during practice is actually higher. This is consistent among both high school and college cheerleading, as well as looking at other sports overall (Hootman et al., 2007; Jacobson et al., 2005). This is attributed to the quantity of practices that cheer teams have compared to other athletic exposures. A study of collegiate cheerleaders by Jacobson et al (2005) reported an average of 205 practices per year lasting an average of 2.8 hours. Jacobson et al. also found that 88% of respondents reported being injured during practice. When looking specifically at injuries that occur during practice, another study showed that this accounted for 83% of injuries and most of them occurred after the first hour of practice (Shields & Smith, 2009a). The researchers concluded that fatigue and a lack of focus may have contributed to the injuries; however, a different study did not find a correlation between injury frequency and practice duration among female high school cheerleaders from the Midwest (Jacobson et al., 2004).

Injury Types in High School and Collegiate Athletes

When looking at injuries in all sports, at both the college and high school level, similar patterns are seen in the types of injuries. Hootman and colleagues (2007) found that the most common injury was to the lower extremity. These results were consistent with previous studies on collegiate athletic injuries. Similar results were found in a study

of high school athletes by Rechel and colleagues (2008). When looking at epidemiological injury information for nine different high school sports it was found that the most common type of injury was lower extremity injuries (Rechel et al., 2008). For lower extremity injuries, ankles sprain and knee ligament injuries were the most common for both high school and college athletes (Hootman et al., 2007; Rechel et al., 2008).

Upper extremity injuries were a distant second most common type of injury among collegiate athletes in a study of 15 NCAA sports (Hootman et al., 2007). Similar results were found by Rechel and colleagues (2008) for high school sports. In both studies, upper extremity injuries generally have similar injury rates in both practice and competition (Hootman et al., 2007; Rechel et al., 2008). Shoulder injuries are a common upper extremity injury among high school athletes. A study looking specifically at shoulder injuries among high school athletes, found that 8% of injuries sustained were shoulder related (Bonza, Fields, Yard, & Comstock, 2009). Contrary to other upper extremity injuries, Bonza et al. (2009) found shoulder injuries were three times more likely to occur during competition than practice. Most of these injuries were attributed to player contact (Bonza et al., 2009), which increases during competition for many sports. Similar to lower body injuries, sprains and strains accounted for the largest type (39.6%) of shoulder injuries (Bonza et al., 2009).

In a descriptive, epidemiological study conducted by Darrow and colleagues (2009) for both male and female high school sports during the 2005-2007 sport seasons, the researchers found that the rate of severe injuries was also higher in competition (0.79 per 1000 AEs) than in practice (0.24 per 1000 AEs). A severe injury was any injury that prevented sport participation by the athlete for greater than 21 days. It was also found

that severe injuries accounted for 14.9% of all injuries in high school sports (Darrow et al., 2009). Similar to patterns seen in less severe injuries, the knee, ankle and shoulder were the three most commonly injured body parts in that order (Darrow et al., 2009). Fractures were the most commonly diagnosed injuries, followed by complete or partial ligament sprains (Darrow et al., 2009).

Cheerleading is often compared with gymnastics so it is useful to look at injury patterns in gymnasts as well. In a descriptive epidemiological study by Marshall et al (2007) examining injuries in collegiate gymnastics, it was found that lower extremity injuries were also most common for this group. Furthermore, the results indicate that ankle sprain and knee injuries were the most common type of lower extremity injury for collegiate gymnasts (Marshall et al., 2007). Contact from landings were the primary source of injury (70.7%) (Marshall et al., 2007). This would indicate that a majority of cheerleading injuries caused by tumbling would be injuries to the lower extremities.

Types of Cheerleading Injuries

Studies involving cheerleading have found similar results regarding the types of injuries cheerleaders sustain compared to other athletes. Several studies indicate that lower extremity injuries are also the most common for cheerleaders (Jacobson et al., 2004; Schulz et al., 2004; Shields et al., 2009; Shields & Smith, 2009a). A study of over 400 cheer teams by Shields and Smith (2009a), found that lower extremity injuries accounted for 30% of the injuries and upper extremity injuries accounted for 21% of total injuries. The same study indicated that all-star cheerleaders were more likely to injure upper extremities; however, it was still the second leading type of injury for all teams (Shields & Smith, 2009a). Jacobson et al. (2004) also found that ankle injuries were the

most commonly reported injuries to female high school cheerleaders in another study, followed by back then wrist and hand injuries. In a study involving college cheerleaders, Jacobson et al.'s (2005) results were similar to other studies involving cheerleading-ankle injuries were the most common injury site, followed by wrist then knee. This is consistent with injury patterns from other high school and college sports, which also show lower and upper extremity injuries as the two leading types of injuries (Fong, Hong, Chan, L.-K. Yung, & Chan, K.-M., 2007; Hootman et al., 2007, Mueller & Cantu, 2009; Nelson, Collins, Yard, Fields, & Comstock, 2007; Rauh et al., 2007; Rechel et al., 2008).

Shields and Smith (2005) found that strains and sprains were the most common type of injury to cheerleaders, age 5 to 18 years old. Injuries to the lower extremities were the most common, followed by upper extremity injuries, in the same study by Shields and Smith. The study by Shields and Smith in 2009 also found strains and sprains as the main type of injury among all cheerleaders. When considering stunting related injuries only, strains and sprains were still the most common type of injury (Shields et al., 2009). In a recent study looking specifically at strains and sprains, male cheerleaders were most often injured during practice while attempting a stunt or pyramid (Shields & Smith, 2010). The most commonly injured body part in the males was their neck, followed by the lower back and ankles. This is different than results found for females, which indicates that males are susceptible to different injuries which need to be identified.

Catastrophic Injuries in Sport

Catastrophic injuries in sport often receive the most attention from the media; however, they are not the most common type of injury sustained by athletes (Zemper,

2010). A catastrophic injury is any sport injury that results in either non-fatal brain or spinal cord injury, skull or spinal fracture, or death (Zemper, 2010). While catastrophic sport injuries are rare, some sports appear to put athletes at greater risk for them. Catastrophic injuries are divided into three categories: fatal, non-fatal, and serious (Mueller & Cantu, 2009). A non fatal injury is any injury with permanent functional disability (Zemper, 2010). A serious injury is considered any severe brain or spinal cord injury without permanent functional damage (Zemper, 2010). According to data gathered by Mueller and Cantu (2009), football accounts for the greatest number of catastrophic injuries for athletes. Football averages about 24 catastrophic injuries per year while cheerleading averages only about three per year (Zemper, 2010). Most of the injuries are categorized as either non-fatal or serious (Zemper, 2010). The highest rate per participant, however, is for the sports of both gymnastics and ice hockey (Mueller & Cantu, 2009). Excluding the sports of ice hockey and cheerleading, males have much higher rates of catastrophic injuries than females (Zemper, 2010).

Catastrophic Injuries in Cheerleading

Although more recent research has disputed the dangerousness of cheerleading, a report published in 2003 identified cheerleading as the most dangerous sport for females (Mueller, 2009). This is due to the number of catastrophic cheerleading related injuries. Cheerleading accounts for over 50% of the catastrophic injuries for females in high school and collegiate sports (Mueller & Cantu, 2009). Cheerleading was the cause of 65% of the catastrophic injuries to high school female athletes (Mueller & Cantu, 2009). Almost all of the cheerleading related injuries (98%) during the 2006-2007 years, however, were treat and release cases (Mueller & Cantu, 2008). According to data

recorded by the Consumer Product Safety Commission, head and neck injuries accounted for 15.1% of cheerleading injuries in 2007, a decline from the previous year (Mueller & Cantu, 2008). Head injuries resulted in 783 concussions during the same year (Mueller & Cantu, 2008). This is also a decrease from the number of concussion reported the previous year by about 300 concussions (Mueller & Cantu, 2007).

In college cheerleading, there have been a larger number of catastrophic injuries to cheerleaders. Most of the reported injuries were to females. The lack of an injury recording system, however, increases error in the actual number of injuries that occur compared to what is reported. This is especially true for collegiate level teams. Most colleges have a certified athletic trainer and physician available to the cheerleaders, therefore, college cheerleaders do not necessarily have to go to the hospital for a serious injury. For example, the researcher personally witnessed a male cheerleader fracture his skull from the elbow of the top girl he was attempting to catch during a practice in 2007. Although this is considered a catastrophic injury, it is not included in the list of catastrophic cheer injuries in the 26th annual report by Mueller and Cantu (2008). This study will aid in collecting catastrophic injury information in males that may not have been previously recorded.

The increase in serious injuries has been associated with the increase in acrobatic and gymnastics like elements included in cheerleading (Jacobson et al., 2005). Just like any other contact sport, cheerleading puts athletes at risk for injury. Cheerleading could be categorized as a contact sport, since the amount of athlete to athlete contact is very high. Contact with another cheerleader or surface is the most common mechanism of injury according to several studies, demonstrating that cheerleading is indeed a contact

sport. Although, contact results in injuries among cheerleaders, no protective equipment is worn, even though this may help prevent some future injuries.

Mechanism of Injury for Cheerleaders

Contact, both player and other contact, is a main cause of injury (78%) in competition for many sports (Hootman et al., 2007). Contact can occur during stunts, landings during tumbling, and falls, which puts contact as a main mechanism of injury for cheerleaders as well. Injuries have been associated with all parts of cheerleading. Stunting has been found in several studies as the main cause of injury. Jacobson and colleagues (2005) found that just over half of the injuries resulted from stunt related skills including partner stunts, pyramids, and basket tosses for collegiate cheerleaders. This is similar to the conclusions Boden et al. (2003) found that pyramids and basket tosses were the most common stunts resulting in injury. These results were also similar to those found by Schultz et al. (2004) where 55.7% of injuries occurred during partner stunts and pyramids. In an epidemiologic study of stunt related injuries in 2009, it was found that during the course of a year 60% of injuries were stunt related (Shields et al., 2009). College cheerleaders were shown to have the highest stunt injury rate (1.59 per 1000 AEs) compared to all other types of teams, however, a majority of the injuries were to high school cheerleaders (Shields et al., 2009). Most sprain/strains among males resulted while basing or spotting another cheerleader (Shields & Smith, 2010). Furthermore, most of the stunt related injuries were new injuries (89%) (Shields et al., 2009).

Shields and Smith's (2009a) study revealed that injuries due to tumbling are more common among all-star cheerleaders. Interestingly, rule changes occurred in 2004 that limited the number of twists that can be performed while flipping in tumbling skills for

collegiate cheerleaders, but all-star cheerleaders are still able to execute these more advanced skills in the higher levels. Since they are attempting more advanced tumbling skills, it makes sense that they are at higher risk for injury. The injuries occurred more often on a spring floor than for other types of teams (Shields et al., 2009). These results are expected since all-star competitions occur on spring floor; therefore, they also typically practice on spring floor. Other types of teams generally do not compete on a spring floor so the exposures that occur on that surface are significantly less.

Falls are another mechanism of injury for cheerleaders. According to injuries reporting to the Cheerleading RIO used for data collection by Shields and Smith (2009a), falls accounted for only 14% of injuries. Unfortunately, many past studies have shown that falls are a main cause of catastrophic injuries (Boden et al., 2003; Mueller & Cantu, 2008; Schulz et al., 2004). Most of the falls were from stunts or pyramids, which was the number one cause of injury, according to an epidemiologic study of fall related injuries in cheerleading (Shields & Smith, 2009b). Surprisingly, in the study by Shields & Smith (2009b) more injuries occurred while basing or spotting another cheerleader than from falls. This could be attributed to the fact that there are often more bases than top girls involved in stunts, pyramids and baskets. When a stunt is not performed correctly bases and spotters are responsible for catching the top girl, which often results in the top falling on the people under them. The second leading cause of injury for all-star teams was collisions with other cheerleaders (Shields & Smith, 2009b). This would suggest that males have an increased risk for injury by a top girl falling and landing on their base.

Much like in other sports, some cheerleading teams have members with specialized roles. Typically these “positions” are termed as either a tumbler or a stunter –

named for the primary skills the individual athletes perform. Most cheerleaders perform an almost equal combination of stunting and tumbling skills, however, it is expected that injuries would differ based on the type of skill performed most often. This study will examine the differences in the most common types of injury and mechanism of injury among groups of tumblers, stunters, and non-specialized individuals. No previous studies have distinguished injury differences based on the member's role.

Injury Prevention

Injury prevention is preferred, and more economical, than the treatment of injuries (Sands, 2000). Several studies have included recommendations for injury prevention among cheerleaders. One main injury prevention solution is the presence of a certified athletic trainer or team doctor (Shields et al., 2009; Shields & Smith, 2009a). Not only would this help to identify and treat current injuries, it may help in preventing new ones. A trainer or doctor may be able to recognize the warning signs of potential injury and limit the activity of specific cheerleaders during practice or have the cheerleader engage in therapy programs to overcome any weaknesses. While an athlete is working to return to competition after an injury, the trainer may also provide additional bracing or taping to support a weak joint or area of the body.

In the Shields and Smith (2009a) epidemiological study of cheer injuries only 45.9% of collegiate teams had a certified athletic trainer or doctor at practices and other types of teams were even lower percentages. Overall, only 28% of the teams in the study (high school, college, all-star, and recreational) had an athletic trainer (Shields & Smith, 2009a). Colleges had the highest percentage of teams with an athletic trainer or doctor available, however, they still had a higher injury rate suggesting that more research is

necessary to determine the actual benefits of having an athletic trainer available at practices. The benefits may actually occur after injury in the proper identification and treatment of injuries.

Furthermore, conditioning and strength training have become accepted means of injury prevention. Several studies recommend more conditioning and strength training for cheerleaders (Jacobson et al., 2004; Shields et al., 2009; Shields & Smith, 2009a). AACCA includes these same recommendations in their safety guidelines (George, 2006). Generally, more collegiate teams (91.9%) participate in weight training than high school teams (24.3%) according to Jacobson et al (2005). Shields and Smith (2009a) found similar results.

Schulz et al (2004) showed that the level of education and experience of the coach was a significant factor related to the number of catastrophic injuries. Coach safety certification requirements are becoming more common, even though no correlation existed between coach experience and certification in some studies (Shields et al., 2009, Shields & Smith, 2009). Rules are often enforced through coaches, therefore, a safety certification should be required to ensure that each coach is knowledgeable of the safety rules. In addition, more knowledge and experience instructing skills allows coaches to better understand skill progression, which in turn allows cheerleaders mentally and physically prepared to do a skill attempting them.

Skill progression is another major component to injury prevention. Collegiate cheerleaders often perform more difficult stunts; however, some athletes do not start cheerleading until college. Furthermore, new tricks in basket tosses are sometimes learned before technique on easier baskets is perfected. Additional spotters are normally

utilized when a new or non-mastered skill is attempted. Unfortunately, Boden et al. (2003) found that six catastrophic injuries were due to a spotter mistake. Only attempting skills and routines that are at the skill level of the team, including the spotters, is important (Zemper, 2010). In addition, while learning new skills, coaches should focus on proper technique to help prevent injuries. It is a joint responsibility of the coach and the cheerleader to determine the athlete readiness to perform a skill in order to prevent unnecessary injuries. In Spring 2009, a male who classified himself as a stunter, was attempting a standing back tuck at a cheerleading tryout for a Division I University. He had attempted the skill several times before with a spot, however, still landed on his hands and knees. The skill was a requirement for tryouts so he performed the standing back tuck with two spotters present for the tryout. As a result the cheerleader fractured his hip when he landed primarily on his left knee. He has since had three surgeries and walks with a limp (Personal communication, December 6, 2010).

Preventing catastrophic injuries in cheerleaders can be difficult since rules are still being developed and no uniform guidelines are used (Zemper, 2010). One of the most recent rule changes occurred following a well-publicized cheerleading fall from a pyramid during a basketball game in 2006 (Shields & Smith, 2009b). Rules now limit the height of pyramids to two persons high, no twisting during tumbling, no one arm stunts (with the exception of awesome if an additional spotter is present), and no basket tosses on a non-mat, grass, or turf surface (George, 2006). Safety rules need to be more strictly enforced and a uniform set need to be developed. Injuries that occur from three person high pyramids, basket tosses on concrete, and double twisting layouts in college would not exist if teams were not performing illegal skills at the college level.

Summary

Although attempts are being made to rectify the problem, a universal injury reporting systems does not exist for cheerleaders. The research completed to date is still very limited and often omits male cheerleaders. The roles of male cheerleaders, while similar to females, still have some differences. Just as in other sports, different positions are at risk for different injuries. Understanding the injury patterns among male cheerleaders can aid in further attempts at injury prevention for cheerleading teams. This study will identify the most common type of injury, body part injured, mechanism of injury, skill performing when injured, and event at which the injury occurred. Furthermore, the researcher will attempt to identify predictors of types of injuries based on demographic information such as year in school, years of experiences in cheerleading, number of practice days a week, competitiveness of the team, and the division of the college or university.

Chapter III

Methods

Subjects and Recruitment

The population for this study was current male collegiate cheerleaders at Division I, Division II, and Junior Colleges across the United States. This subject group provided a random assortment of skill levels and program differences that can be assumed to be representative of all co-ed collegiate cheerleading programs, although a comprehensive list of teams does not exist. Schools were selected from a list compiled of teams participating in either summer camp or competition for the National Cheerleaders Association (NCA), the Universal Cheerleaders Association (UCA), or the United Spirit Association (USA). These three companies have a strong history of collegiate cheer team participation. Only teams identifying themselves as co-ed were contacted. This resulted in a total of 70 teams contacted. Prior to contact, Institutional Review Board (IRB) approval was acquired from Oklahoma State University for an online survey to obtain self-report injury data from members of teams from different collegiate divisions and skill level to help better understand injuries in cheerleading.

Beginning in March 2011, the researcher sent an email to the coach or spirit coordinator from each school informing them about the research study and requesting the

email addresses of current male team members (see Appendix A). Email addresses for the coaches were obtained from either the school's respective cheer team website or the athletic staff directory. Following the initial email, 12 coaches responded, which illustrated a response rate of 17%. Six emails were returned for invalid email addresses. Three coaches opted to forward the email to their team members and have the interested males email the researcher. This resulted in email contact with 127 cheerleaders. Two weeks later, the email was resent to those coaches who had not yet responded. After the second contact attempt, five coaches responded out of the 53 emails sent. Again three coaches of those coaches opted to forward the email to their team members. Contact information for another 24 cheerleaders was obtained resulting in a total population size of 151 through the use of random sampling. Three coaches stated their school would not be participating in the study.

Upon receiving team member email addresses, individual subjects were then contacted by email requesting their voluntary participation in the study (see Appendix B). A link to an online survey was included in the email. Reminder emails were sent out two weeks after the initial contact to all the cheerleaders (Appendix C).

After reviewing the sample size, IRB modification was approved to include contacting coaches by phone (Appendix D) and Facebook messages (Appendix E) to cheer team members in an attempt to increase the sample size. Telephone numbers were retrieved from staff directories of their respective schools for all the coaches that had not responded to the first two attempts at contact. Only two coaches answered or returned the phone call and agreed to forward the survey information to their team members. This increased the population size by 27 males. A total of 40 Facebook messages, which

included the link to the survey, were sent to cheerleaders on teams that the coach did not respond to emails, but were “friends” of the researcher. Through a combination of random and snowball sampling techniques, a total of 218 collegiate male cheerleaders were contacted. The final sample size was 89 cheerleaders.

Selection of Instruments

As is common with NCAA sports, a universal injury reporting questionnaire does not exist throughout the literature of research regarding injuries in cheerleading. A single online survey was developed specifically for this study (Appendix F). The survey was developed using Microsoft FrontPage 2007 software and hosted on the server of Oklahoma State University. Subjects acknowledged their informed consent by clicking on the questionnaire website link as approved by the Oklahoma State University IRB. The format and content was based on data collected in other cheer and sport injury studies, as well as the injury report form used by the National Collegiate Athletic Association (NCAA) Injury Surveillance System (Shields and Smith, 2009; Dick, Agel, and Marshall, 2007; Jacobson et al, 2005). A reportable injury had to meet all of the following criteria: (a) it occurred during participation in cheerleading, (b) it prevented participation for at least the remainder of that event or longer, (c) and it required medical attention. The questionnaire was tested for test retest reliability using a sample of 9 male college cheerleaders. A test retest reliability of $r = 0.778 - 0.996$, $p < 0.05$ was calculated. Participants accessed the online questionnaire following a link provided in the electronic communication sent to each potential participant. The questionnaire is divided into two sections – demographic information and injury history.

Demographic Information. The first survey section requested demographic information about the individual cheerleader, their cheer team, and their university. This information was used to determine differences in injuries based on the various categories. Information obtained included participant characteristics, cheerleading experience and information about their current team. The participants also reported the total number of injuries throughout their cheerleading career. If the participant had never been injured they were instructed to “stop here.”

Injury Reporting Questionnaire. In the second section of the survey, more detailed information about each injury occurring from February 1, 2010 to January 31, 2011 was recorded. To obtain a better understanding of severe injury information among male cheerleaders, the most serious injury, as determined by the cheerleader, was also reported, even if it did not occur within the appointed time frame. The injury reporting section collected information regarding body part injured, type of injury, circumstances of the injury, mechanism of injury, and medical treatment received. As mentioned previously, this information is similar to data collected in other cheer and sport injury research studies. Data was collected from March 1, 2011 through May 9, 2011.

Procedures

Upon receiving IRB approval, emails were sent to coaches or spirit advisors from a list of teams participating in either camp or competition for three different cheerleading companies. As responses were received, a different email requesting their voluntary participation in the research study was sent to the cheerleaders including a link to the online questionnaire. Coaches that had never responded to the email contact attempts were also called and voicemails were left if the coach did not answer. Facebook

messages were also sent to subjects who were “friends” with the researcher and were members of teams that had not yet been contacted. Cheerleaders who wished to participate in this voluntary study followed the webpage link, where they anonymously completed an online survey after agreeing to the participant rights and informed consent page. At the completion of the survey the participants clicked the ‘submit’ button on the webpage, which recorded all their responses into an Excel data file where all data was collected and stored. Data collection was completed two weeks after the phone calls were completed and Facebook messages sent. At the completion of the research project, the researcher transferred the data from the Excel file to a Statistical Package for Social Sciences [SPSS] data file for analysis.

Data Analysis

All data were analyzed using SPSS software (version 17.0; SPSS Inc, Chicago, IL). Statistical analyses included calculations of χ^2 tests and Pearson correlations. The level of significance for all statistics was set at $\alpha = 0.05$. Descriptive statistics were calculated for each participant and their injury data. The mean and standard deviation was calculated for all numerical variables. Frequencies were calculated for the categorical variables. X^2 values were found for relationships between occurrences of injury and individual or team differences. Pearson r correlations were calculated to find if any relationships existed between the number of injuries and age and years of cheerleading experience.

Chapter IV

Results

Participants

From the 218 cheerleaders contacted, a total of 91 participants (40.8% response rate) completed the survey. The data for two participants had to be omitted because their responses indicated that they did not meet the criteria of a current collegiate, male cheerleader leaving a sample size of 89 cheerleaders. Characteristics of the cheerleaders participating in the study are included in table 1. Participants included freshmen through graduate students, with the most participants classifying themselves as juniors (23.6%; 21) and sophomores (22.5%; 20). Graduate student participation accounted for 20.2% (18) of the population sample. The age range was from 18 to 31 years old, with a mean of 21.99 (± 2.96) years old.

The average years of cheerleading experience was 5.29 (± 3.26) years, but it ranged from 0 to 13 years. Most participants (37%, 33) reported one to three years of prior cheerleading experience. When asked what skills they primarily performed 44.9% (40) reported stunting, 16.9% (15) reported tumbling and 38.2% (34) reported an equal combination of both stunting and tumbling. A total of 72 (80.9%) participants reported being injured throughout their cheerleading career. The most total career injuries reported was 11 by one individual, but the highest number of participants (30.6%; 22) reported

two career injuries. Of the 72 males having ever been injured, 48 (66.7%) were injured sometime between February 1, 2010 to January 31, 2011.

Table 1.

Individual characteristics of participants separated by injury status.

	Total Sample	Ever Injured	Injured Last Year
	N=89	n=72	n=48
Age (years)	21.99 (\pm 2.96)	22.25 (\pm 3.08)	22.42 (\pm 3.27)
Year in school (%)			
Freshman	11.2	8.3	10.4
Sophomore	22.5	23.6	18.8
Junior	23.6	23.6	25.0
Senior	14.6	15.3	14.6
Fifth year	7.9	6.9	6.3
6 th year or Graduate	20.2	22.2	25.0
Years of experience (%)	5.29 (\pm 3.26)	5.72 (\pm 3.21)	5.35 (\pm 3.39)
1 – 3 years	37.1	31.9	39.6
4-6 years	28.1	27.8	23.0
7-9 years	22.5	26.3	23.0
10 + years	12.3	13.9	14.6
Skills (%)			
Stunts	44.9	41.7	39.6
Tumbling	16.9	18.1	18.8
Both	38.2	40.3	41.6
Career Injuries	3.85 (\pm 2.83)	3.71 (\pm 2.76)	3.67(\pm 2.44)
Injuries last year			
0 injuries (%)	46.0	33.3	-
1 injury	22.4	27.8	41.7
2 injuries	22.4	27.8	41.7
3 injuries	4.5	5.6	8.3
4 injuries	2.2	2.7	4.2

Team Demographics

A majority of the sample (64%, 57) were members of teams representing NCAA Division 1A schools. Twenty two percent (20) were members of NCAA Division 1 team and the remaining 14% (13) consisted of members from NCAA Division 2, NJCAA, and

NAIA schools. A majority (62.9%; 56) of the males reported that their current team had an off-season. The length of the off season ranged from one to four months, but most participants (24.7%, 22) reported an off season lasting two months. The most commonly reported number of practice days was three days per week (46.1%, 41) followed by four days per week (30.3%, 27). Actual practice length varied from one and a half to more than two and a half hours. Half of the participants (45) reported a practice length between two and two and a half hours. Almost all of the participants (98%, 87) were on teams that competed. A majority of the participants (76.4%, 68) were members of teams that competed in collegiate national championships for NCA and 20.2% (18) of the males competed at the UCA collegiate national championships. Although almost every person responded that his team competed, only 55.1% (49) reported that they had an athletic trainer present at every practice. Characteristics of the team and schools represented by the cheerleaders are presented in table 2.

Injury Epidemiology

Forty eight of the participants reported an injury having occurred between February 1, 2010 and January 31, 2011. This accounted for a total of 87 injuries during the indicated time frame. Injured cheerleaders had a mean age of 22.46 (± 3.29) years, slightly older than the overall sample. Junior and graduate students each accounted for 24.5% (12) of the injured cheerleaders, a larger portion than the total sample. The average years of cheerleading experience (5.39; ± 3.41) was similar to that of the total sample (5.29), but 32.6% (15) of the participants injured last year had only one or two years of cheerleading experience. Over half of the people (58.3%; 28) who were injured last year suffered from two injuries or more. Four respondents were injured three times

Table 2.

Participant's team and school information.

	Total Sample N=89	Ever Injured n=72	Injured Last Year n=48
Athletic division (%)			
NCAA 1A	64	62.5	58.3
NCAA 1	22.5	22.2	25.0
NCAA 2	4.5	5.6	4.2
NJCAA	2.2	1.4	2.1
NAIA	6.7	8.3	10.4
Off season (%)			
No	37.1	40.3	35.4
1 month	14.6	13.9	16.7
2 months	24.7	23.6	20.8
3 months	13.5	13.9	20.8
4 + months	7.9	8.3	6.3
Practices per week (%)			
2 days	7.9	6.9	8.3
3 days	46.1	47.2	50.0
4 days	30.3	30.6	29.2
5 days	13.5	13.9	10.4
6 days	2.2	1.4	2.1
Practice length (%)			
1.5 to 2 hours	20.2	19.4	25.0
2 to 2.5 hours	50.6	50.0	43.8
2.5 to 3 hours	29.2	30.6	31.3
Athletic trainer (%)			
Yes	55.1	55.6	47.8
No	44.9	44.4	52.2
Cheer company (%)			
NCA	75.3	80.6	75.0
UCA	20.2	18.1	22.9
USA	2.2	1.4	2.1
N/a	2.2	-	-

and only two people were injured four times. Figure 1 shows the number of participants reporting one to four injuries occurring within the last year. Overall, the average number of career injuries was 3.67 (± 2.44), but the most people reported only two career injuries

(31.3%, 15). Other responses were similar between those people injured last year and the total sample.

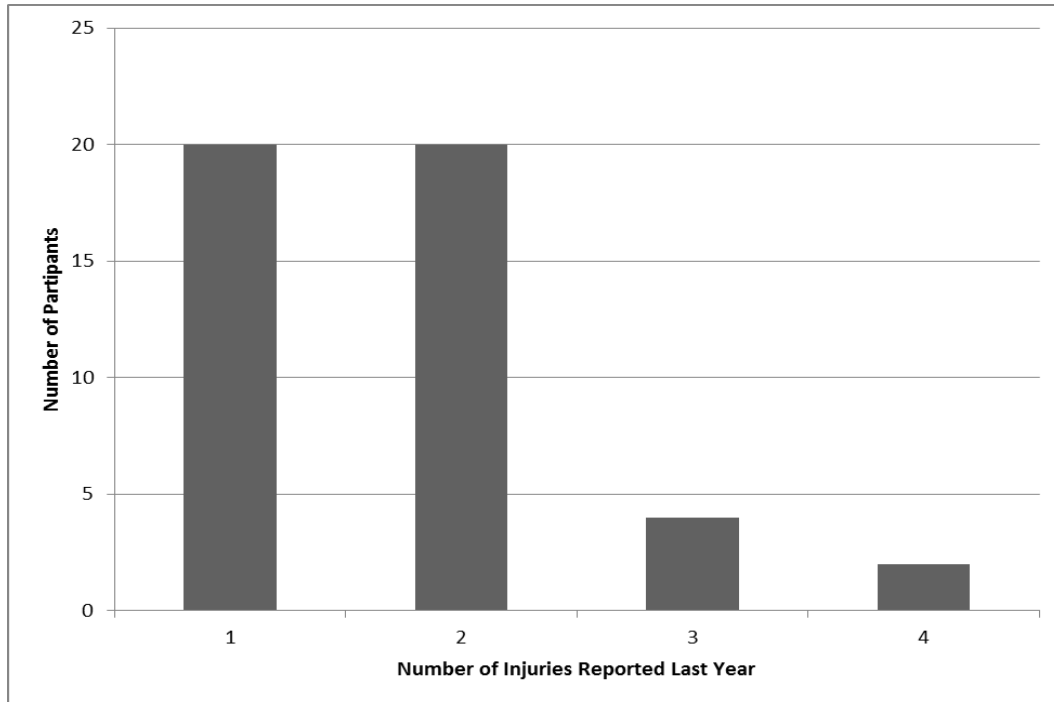


Figure 1. Number of participants reporting a certain amount of injuries occurring within the last year.

Injury Sustained. Participants reported injuries to different body parts or different types of injuries occurring at the same time as a single injury incident, therefore, the number of body parts injured and type of injury may actually be greater than the total number of injuries events reported from last year. For example, if a participant sprained their ankle and strained their hamstring at the same time they would record both injuries under injury number one since it occurred at the same time. A total of 84 injury incidents were reported.

For each incident the participant reported body part(s) injured and type(s) of injury sustained. From the 84 injury incidents a total of 92 different body parts sustained an injury. Body parts are classified into body regions for reporting results. Upper

extremity injuries include any injuries from the shoulder to the fingers. Lower extremity injuries are classified as injuries occurring from the hip to the toes. Trunk injuries include the back and abdomen. Head/neck injuries include any injury to the head, neck, or face. Thirty four (40.0%) of the injuries were to the lower extremities, with 16 of the injuries being classified as ankle injuries, 13 knee injuries, 4 shin, and 1 thigh injuries. There were no injuries to the hip or foot occurring in the last year that were reported by the participants. Upper extremity injuries were reported 31 (36.5%;) times. The most common type of upper extremity reported was an injury to the shoulder (9) and hand/finger injuries (9), followed by the wrist (8) then the elbow (5) injuries. Trunk injuries were reported 15 (17.6%) total injuries – 14 back injuries and 1 abdomen. Injuries involving the head, neck, and face also accounted for 15 (15.2%) injuries. The frequency of injury by body part is outlined in table 3.

Although only 97 body parts were injured, a total of 111 injury types were reported. The type of injury reported most often was a strain or sprain. A total of 47 (42.3%) strains or sprains were reported by participants as part of their injuries occurring last year. The second most prevalent type of injury was overuse injuries, which was reported 19.8% (22) of the total reported injuries.

Injury Circumstances. About 86% (73) of the injuries occurred during a practice. Injuries occurring while cheering at other athletic events accounted for 9.4% (8) of the incidents last year. The remaining 4.8% (4) of injuries occurred at either a competition, pep rally, routine exhibition, or during a personal practice. At the time of injury, the skill being attempted most often (48.2%; 41) was stunting. Running tumbling was being performed when the cheerleader was injured for 18.8% (16) of the injuries.

About 13% (11) of the injuries were sustained while attempting standing tumbling. Together injuries occurring during all tumbling skill was 31.8% (27), still lower than the number occurring from stunts. The individual was performing a part of a pyramid at the time of injury during 11.8% (10) of the injuries reported. Six injuries (7.1%) occurred while the cheerleader was doing a basket toss. In only one injury (1.2%) was the cheerleader jumping.

Table 3.

Number of injuries reported to specific body parts.

Body Part	Number of Injuries Report	
	Injury Last Year	Most Serious Injury
	n = 97	n = 87
Ankle	16	14
Knee	13	11
Thigh	1	0
Shin	4	5
Foot/toe	0	1
Hip	0	1
Wrist	8	4
Shoulder	9	10
Elbow	3	1
Hand/finger	9	12
Head	5	7
Face	9	7
Neck	1	2
Abdomen	1	0
Back	14	8
Other	4	4

Not only was stunting the skill most commonly being performed at time of injury, but the main cause of injury reported by 41.2% (35) of those injured last year was basing or spotting. Similarly, the second most often reported cause of injury was tumbling (20.0%; 17). Failure to complete the skill being attempted and slipping or twisting a body part was each listed as the cause for 9.4% (8) of injuries from last year. Colliding

with another person was the cause of injury in 5.9% (5) of the incidents. Only two participants (2.4%) reported jumping as the mechanism of injury. Six cheerleaders (7.1%) cited other as the cause of injury listing items such as miscommunication and recurring issue. Figure 2 shows the distribution of causes of injury reported last year.

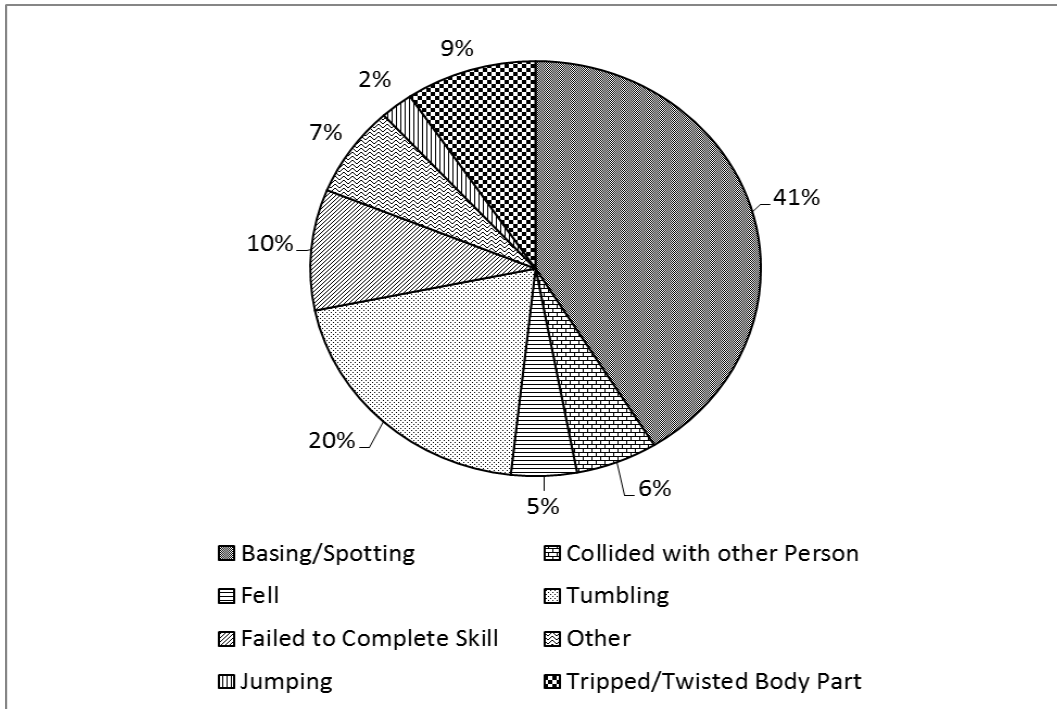


Figure 2. Percentage of injuries occurring last year by reported cause of injury.

The majority of injuries (55.3%; 47) occurred while on a foam floor, which is the standard surface for collegiate cheerleading competition. Sixteen injuries (18.8%) were suffered when the cheerleader was practicing or performing on a spring floor. Participants were performing on a wooden surface during 8.2% (7) of the injury occurrences. An extra mat was being used when the injury occurred for 7.1% (6) of the cheerleaders. Artificial turf was the performing surface for 7.1% (6) of the injury.

Spotters were not being used during 44.7% (38) of the injury incidents. Thirty percent (26) of the time only one spotter was present. In 11.8% (10) of the cases two

additional spotters were being used. In the remaining 13.0% of the cases more than two spotters were present. Details of the circumstances of the injury event are in table 4.

Table 4.

Description of injury events.

	Injury Last Year n = 85	Most Serious Injury n = 72
Event (%)		
Practice	85.9	81.9
Athletic event	9.4	5.6
Competition	1.2	8.3
Pep rally	1.2	1.4
Other	2.4	2.8
Skill Attempting (%)		
Stunt	48.2	33.3
Running tumbling	18.8	22.2
Standing tumbling	12.9	16.7
Pyramid	11.8	13.9
Basket toss	7.1	8.3
Jump	1.2	1.4
Other	-	4.2
Primary Cause of Injury (%)		
Basing/spotting	41.2	34.7
Tumbling	20.0	23.6
Failed to complete skill	9.4	11.1
Tripped/twisted body part	9.4	4.2
Collided with other person	5.9	12.5
Fell	4.7	4.2
Jumping	2.4	-
Other	7.1	9.7
Surface Type (%)		
Foam Floor	55.3	48.6
Spring Floor	18.8	29.2
Wood	8.2	6.9
Extra Mat	7.1	4.2
Artificial turf	7.1	6.9
Concrete asphalt	1.2	-
Grass	1.2	2.8
Other	1.2	1.4

Treatment. Participants reported all methods of treatment received following the injury. A certified athletic trainer provided treatment for the greatest number of injury incidents (68.2%, 58). Sixteen individuals (18.8%) reported treatment being done by a doctor not associated with the school. In 12.9% (11) of the cases, participants received medical treatment at the hospital and 7 (8.2%) participants visited the emergency room for treatment. A school doctor provided treatment for 17 (20.0%) participants. Eight individuals (9.4%) reported to be treated by someone else citing chiropractors or teammates. Ten (11.8%) of the injuries occurring within the last year required surgery. The average number of days participants missed due to injury was 17.09 (± 40.37), but median was 5 days and the most was 0 additional days missed.

Most Serious Injury

A total of 72 (80.9%) participants responded that they had been injured at least once throughout their cheerleading career. Again, the age of the injured cheerleaders was slightly greater (22.25; ± 3.08) than the overall sample (21.99; ± 2.96). Sophomores, Juniors, and Graduate students still made up the largest portion of the injured population. The number of years the participants had cheered was 5.72 (± 3.21), which was longer than the time reported by all of the participants. The average number of career injuries was 3.71 (± 2.76) with a range from 1 to 11 and mode of 2. Participants that had been injured were comparable to the rest of the sample in skills performed, school athletic division, length of off season, number of practice days, and practice length.

Participants that reported being injured were asked to record information about their self-determined most serious injury. Most catastrophic injury data among

cheerleaders includes only females, therefore, this was trying to provide a better understanding to serious and catastrophic injuries suffered by male cheerleaders.

Most serious injury sustained. When considering their most serious injury, cheerleaders reported injuring the ankle 16.1% (14) times. Injuries involving the knee were reported 12.6% (11) of the time as the cheerleader’s most serious injury. Injuries to the head and face were each reported to account for 8.0% (7) of the body parts injured. The shoulder was reported 11.5% (10) times as the injured body parts. Injuries to the hand or fingers were the most seriously injured body part 13.7% (12). The back was reported to be injured as 9.2% (8) of the injuries. Overall, 36.7% (32) of the most serious injury events results in injuries involving the lower extremity, 31.0% (27) injuries to an upper extremity, 9.1% (8) to the trunk; and 18.4% (16) to the head area.

Table 5.

Type of injury

Injury	Percentage (n) of Injury Type	
	Injury Last Year	Most Serious Injury
Strain/Sprain	42.3% (47)	30.6% (30)
Overuse	19.8% (22)	9.1% (9)
Ligament/Cartilage Tear	9.9% (11)	20.4% (20)
Abrasion/Hematoma/Contusion	8.1% (9)	5.1% (5)
Fracture	6.3% (7)	14.3% (14)
Concussion	4.5% (5)	7.1% (7)
Dislocated	2.7% (3)	4.1% (4)
Other	6.3% (7)	9.1% (9)

The percentage of participants suffering from each type of injury is detailed in table 5. The most common type of injury sustained was a strain or sprain (30.6, 30).

Ligament or cartilage tears were the resulting injury 20.4% of the time. Fractures were identified 14.3% (14) of the time as the type of injury sustained.

Description of the injury event. When combining standing and running tumbling, tumbling was the skill that was being performed at the time of injury for 40.0% (28) of the injury incidents. Standing tumbling accounted for 16.7% (12) of the injuries and running tumbling was being attempted in 22.2% (16) of the incidents. Stunting was the skill being performed at time of injury for 33.3% (24) of the participants. The skill attempted at the time of injury was pyramiding for 13.9% (10) of the cheerleaders. Six (8.3%) of the participants were injured while doing a basket toss. All stunting related skills (stunts, pyramids, basket tosses) accounted for 55.5% (40) of the skills attempted at the time of the most serious injury.

The mechanism of injury for 34.7% (25) of the participants was basing or spotting. Another 12.5% (9) were injured from colliding with another person. Two of the people citing “other” as the cause of injury identified catching a cradle as the cause of injury. This is a skill performed as stunting; therefore, it can be grouped with basing or spotting as the cause of injury. Tumbling was listed as the cause of injury for 23.6% (17) of the injury cases. Failure to complete the skill resulted in 11.1% (8) of the injuries.

Most of the injuries occurred on foam floor (48.6%; 35) and during practice (81.9%; 59). Spring floor was the surface at the time of injury for 29.2% (21) of the participants. Six (8.3%) participants experienced their most serious injury during a competition. Only four (5.6%) were injured at an athletic event.

Treatment. Table 6 shows the percentage of the participants receiving different medical treatment. Over half (56.9%; 41) of the participants received some form of treatment from an athletic trainer following their most serious injury. About 13.9% (10) of participants were treated at a hospital and 18.1% (13) went to the emergency room. A

doctor provided some medical treatment in 62.5% (45) of the injury cases, but for only 40.0% (18) of those was it a school doctor providing the treatment. Only 22.2% (16) of the injuries required surgery, but the average number of days missed was 42.373 (64.063). The range of time missed was zero days past the day of injury up to one year. The median number of days missed was only 14 days. Forty seven percent (34) of the injuries reported would actually be classified as serious injuries based on the number of days missed - 20 or more days (Darrow et al, 2009).

Table 6.

Medical treatment for injuries reported

	Injury Last Year	Most Serious Injury
	n = 85	n = 72
Treatment (%)^a		
Certified Athletic Trainer	68.2	56.9
School Doctor	20.0	25.0
Non-School Doctor	18.8	37.5
Hospital Admission	12.9	8.3
Emergency Department	8.2	18.1
Other	12.9	13.9
Surgery (%)		
Yes	11.8	22.2
No	88.2	77.8

a. Total is equal to more than 100% because participants could list all different types of treatment received so the number listed represent the percentage out of the portion of the sample receiving that form of treatment.

Hypothesis

When looking at the whole sample a correlation was not found between the years of cheerleading experience and the number of career injuries. On the other hand, when looking at only cheerleaders who have been injured a positive correlation (.243; N = 72; p = 0.039) was found between the number of years of cheerleading experience and the total number of injuries indicating that if a person has already been injured if he continues to

cheer he will more likely experience additional injuries. No other significant relationships were identified.

There were significant differences identified in the primary skill set of an individual and the skill attempted at the time of injury. This relationship was identified both with injuries reported last year and in all the participants that had ever been injured. Based on data reported about injuries occurring last year, the skill attempted at time of injury differed based on the skills primarily performed by an individual, $\chi^2(10, N = 49) = 27.161, p = .002$. This relationship is reflected in figure 3.

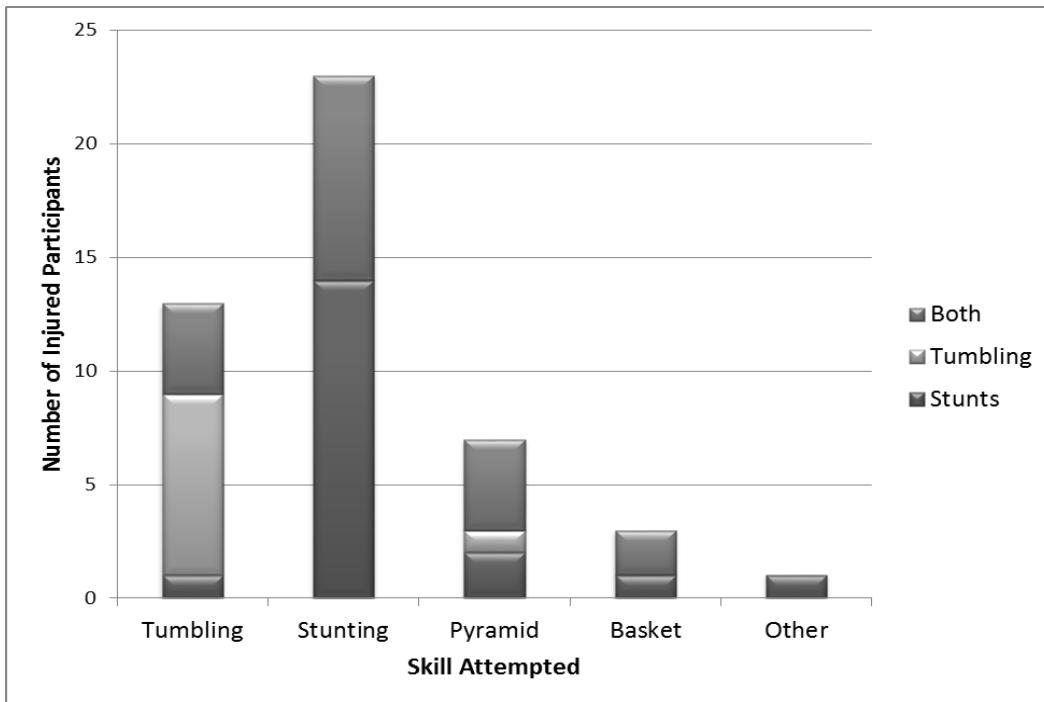


Figure 3. Number of participants among male collegiate cheerleaders in the United State reporting an injury based on skilled attempted from February 1, 2010 to January 31, 2011 Skill attempted at time of injury by primary skills performed.

There were also significant differences identified in the primary skill set of an individual and the skill attempted at the time of injury. Based on data reported about injuries occurring last year, the cause of injury was different depending on the skills

primarily performed by an individual, $\chi^2(14, N = 49) = 24.588, p = .039$. This relationship is reflected in figure 4.

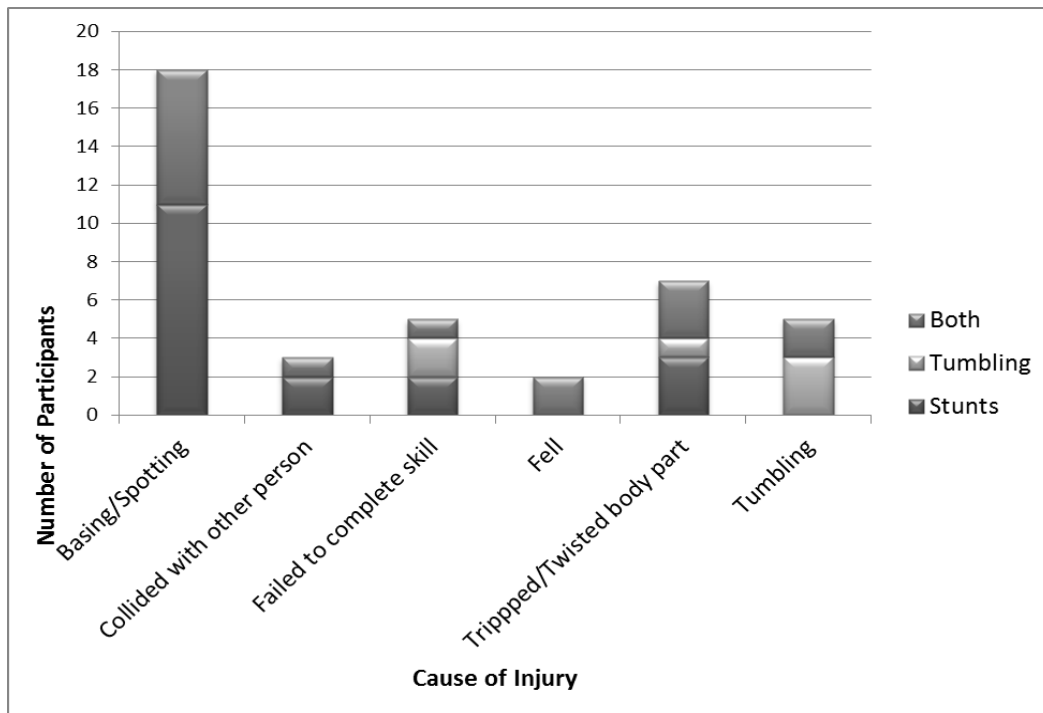


Figure 4. Number of injuries reported during the last year by male collegiate cheerleaders in the United States. Cause of injury based on the position of the cheerleader.

Similar results were found when looking at the skill attempted at the time the participants most serious injury occurred. Again, participants varied in the skill attempted at time of injury based on their primary skill set performed, $\chi^2(12, N = 72) = 23.114, p = .027$. See figure 5 for a visual representation.

Additionally, participants performing different skills also were different based on reported cause of injury for their most serious injury, $\chi^2(12, N = 72) = 24.367, p = .018$. Figure 6 shows that stunters or people performing both tumbling and stunting equally were more likely to be injured by basing/spotting.

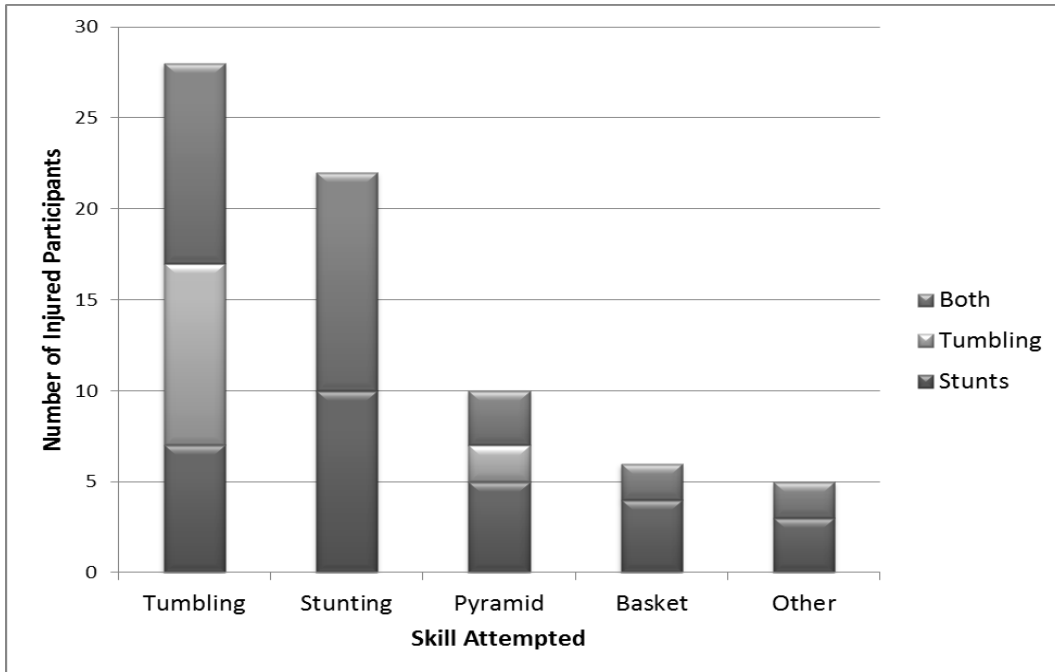


Figure 5. Cheerleading injuries occurring among male collegiate cheerleaders in the United States separated by skill attempted at time of injury. Skill performed at time of injury by primary position on team.

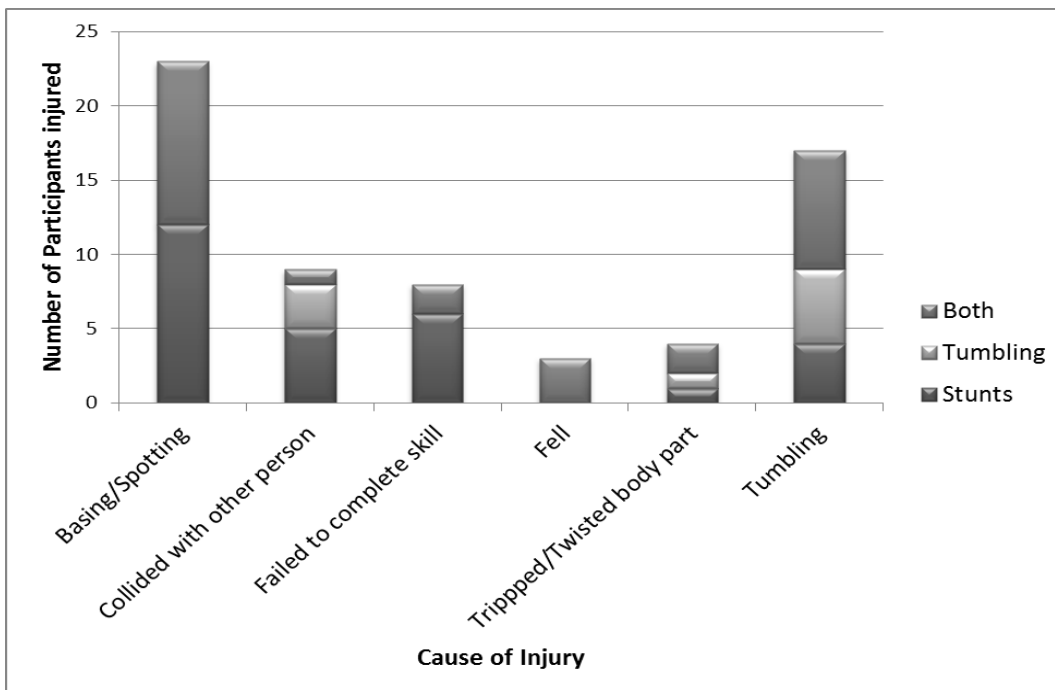


Figure 6. Cause of injury for most serious injury reported by male collegiate cheerleaders in the United States. Cause of injury based on the position of the cheerleader.

The skill being attempted at the time of injury had a significant impact on the body part injured based on the responses for the most serious injury, $\chi^2(24, N = 72) = 55.348, p < .001$. As represented in figure 7 tumbling results in significantly more injuries to the lower extremity and stunting results in more upper extremity injuries.

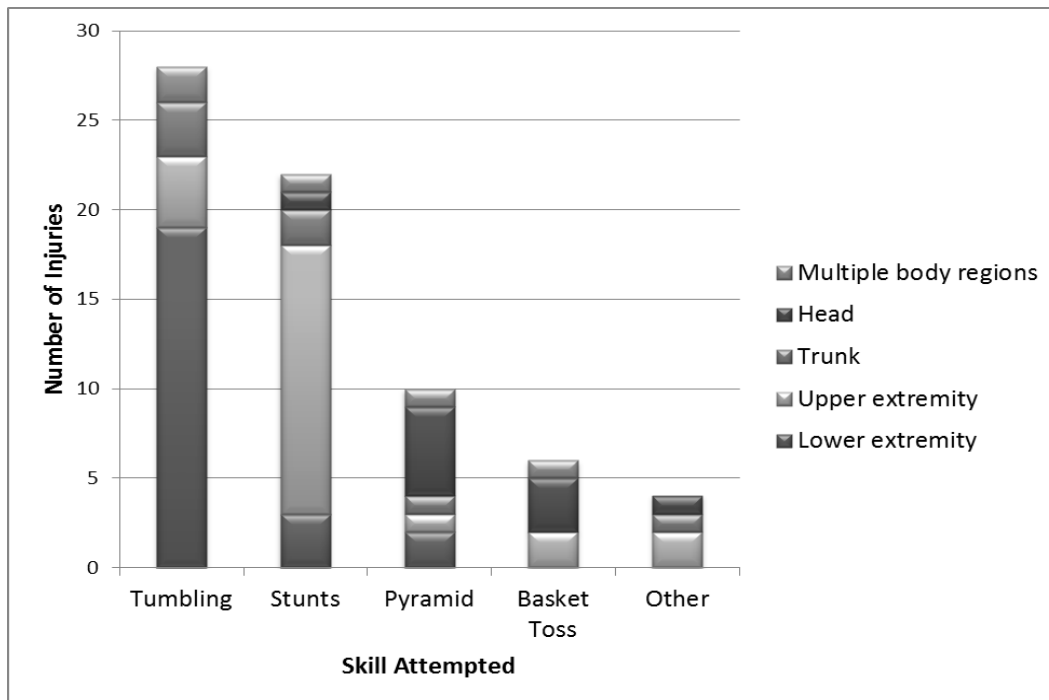


Figure 7. Number of injuries to specific body regions separated by the skill attempted at time of injury.

Using chi square values, no difference was found in the number of injuries occurring last year for those individuals who competed and those who did not, however, the number of participants who did not compete was very low. Significant differences were not identified in the number of injuries last year and the competition format either. In addition, the skills performed did not have a bearing on the number of injuries in the last year.

Chapter V

Conclusion

Discussion

Males have been included in other research studies concerning cheerleading injuries, but were only a small portion of the overall sample (Jacobson et al, 2005; Shields et al, 2009; Shields & Smith, 2010; Shields & Smith, 2009a; Shields & Smith, 2009b; Shields & Smith, 2005). The findings of these previous studies have challenged the claim that cheerleading is the most dangerous sport for female athletes; however, the danger of the sport cannot be fully evaluated without including all types of participants. The lack of data regarding male cheerleading injuries has been identified as an area of future research by both Shields and Smith (2010) and Jacobson et al (2004). This is the first research study to collect data about cheerleading injuries among males only.

Overall, the findings suggest that cheerleading is not any more dangerous for females than it is for males. Although catastrophic injuries were not identified in this study, the injury information gathered is reflective of previous research. As found in other studies lower extremity injuries were the most common followed by upper extremity injuries, the ankle was the most injured body part, strains and sprains were the most common type of injury, and stunting and tumbling resulted in the largest number of injuries. There was a smaller difference among the number of lower extremity and upper

extremity injuries in this study than previous research.

According to the results, stunting resulted in the largest number of injuries last year. This supports the findings of previous studies of cheerleading injuries. The National High School Injury Surveillance System and Shields, Fernandez, & Smith (2009) both reported 60% of the injuries were due to stunts. Similarly, when Shields and Smith (2010) looked specifically at strain and sprains among collegiate male cheerleaders, the results indicated that stunting and pyramiding accounted for just over half (55%) of the injuries. According to the results of this study, the primary skill being performed at time of injury was stunting (47.1%) and the main mechanism of injury was basing or spotting injuries reported last year. Shields and colleagues (2009b) found that bases and spotters were more likely to be injured when performing stunts compared to the tops, suggesting that males are actually more at risk for injury than females while stunting. On the other hand, tumbling was more often the cause of injury for the most serious injury reported. Additional research should be conducted with more teams to identify which skill in cheerleading results in the most serious injuries.

The finding of this study supported previous research identifying the ankle as the most commonly injured body part among cheerleaders. In this study, ankle injuries were the most common injury location for both injuries occurring last year and the most serious injury identified. In a study involving college cheerleaders, Jacobson et al's (2005) results, similar to other studies involving cheerleading, identified ankle injuries as the most common injury site, followed by wrist then knee. Following ankle injuries last year back (14) and knee injuries (13) accounted for the largest number of injuries. This supports the findings by Shields and Smith (2010) that males were more prone to back

injuries than females. When performing single base stunts, the base supports all of the weight of the top, which could place increase strain on the core and lead to more back injuries among male cheerleaders.

The most injured body parts reported for the most serious injuries, however, were the ankle, hand and fingers, knee, and shoulder. Stunts that flip or twist before landing in the base's hands could lead to the large number of wrist and hand injuries reported in this study. Potentially, this could also be the reason for the higher percentage of upper extremity injuries (35.5%) seen in the males of this study compared to results from other studies focusing on females. In other studies, lower body injuries accounted for a much larger portion of injuries than in this study.

Differences among injuries were dependent upon the skill being performed. Stunting more often resulted in an upper extremity injury and tumbling more often resulted in lower extremity injuries. Furthermore, participants reporting that tumbling was their primary role on the team reported no injuries related to stunting. On the other hand, participants that reported an equal combination of stunting and tumbling were more likely to be injured by stunting than tumbling. This again indicates that stunting may lead to more injuries than other skills involved in cheerleading.

As discussed previously, males share some similarities in the skills performed in cheerleading, however, it is the differences that might make them prone to different injuries. Not only do they preform single base stunts (one guy holding one girl), they often become the extra spotters instead of the females on co-ed teams when learning new skills. The bases are responsible for catching the tops during stunts, pyramids, basket tosses, and if they fall, therefore, still increasing their chance for certain types of injuries.

Past research has found that falls, most often experienced by females, accounted for the largest percent of neck injuries (Shields, Fernandez, and Smith, 2009b). When being caught, however, tops can often hit their bases with their elbows, knees, feet, or other unforgiving body parts. Although not resulting from falls, the participants in the present study still reported about 5% of the injuries resulting in a concussion. Results by Schulz et al (2004) and Shields et al (2009) reported concussions also accounting for only about 5% of injuries sustained in a study consisting on majority of female participants. More research should be conducted to identify the main cause of concussions among male cheerleaders and preventative measures that could be taken.

Injury due to overuse and fatigue from repeated wear and tear on the body was ranked second (25%) as the type of injury last year. Interestingly, over half the teams in this study do not have an off season or less than a month (51.7%), which could increase the risk of injury due to overtraining. Most of the participants reported their teams practicing three to four times a week for an hour and a half to three hours. As mental and physical fatigue occurs more mistakes may occur leading to injury. In other studies it was found that a majority of injuries occurred at least an hour into practice (Shields and Smith, 2009a), therefore, the longer practice times might make cheerleaders more susceptible to injury.

Other researchers have suggested that increasing the presence of certified athletic trainers at practices would help to prevent injuries and properly treat injuries (Shields and Smith, 2009a). Specifically, trainers may be able to work with athletes to prescribe preventative physical therapy based programs and with coaches to limit the participation of some athletes if they are showing signs of overtraining. Just over half of the

respondents in this study reported having a certified athletic trainer at each practice. This is a larger ratio than teams with an athletic trainer when the study included more than just collegiate teams. Differences in treatment are also evident, since most of the injured cheerleaders saw an athletic trainer as at least one part of their treatment. A very small portion comparatively was treated at the hospital or emergency room indicating that data collected by the CPSC about cheerleading injuries may not be as accurate for collegiate cheerleaders who have access to school based medical treatment.

As mentioned previously, females account for about 90% of cheerleading participants (ICU, 2010). Male participation in cheerleading is highest at the college level. The culture in the cheerleading world is much different among males and females. Most girls involved in cheerleading start during middle school or earlier if the opportunity is available. Those that did not cheer throughout primary and secondary school were often involved in gymnastics and made the transition to cheerleading at some point. Males on the other hand, generally get recruited into cheering at a much higher age. Most primary and secondary school teams do not have male participants. In fact, most male cheerleaders played different sports throughout high school and start cheering once they get to college and other sport opportunities are not available. As all-star cheerleading continues to gain popularity, this may give males the opportunity to gain cheerleading experience before college and help prevent injuries.

Shields and Smith (2009a) found the highest injury rates in collegiate cheerleaders and propose that cheerleaders are expected to have more experience at the college level and perform more difficult skills. Rules and regulations set by the American Association of Cheerleading Coaches and Administrators (AACCA) allow the

most difficult skills to be performed at the collegiate level. This includes flipping into stunts and pyramids, two and a half high pyramids, and flipping in basket tosses.

According to the results of this study, most of the participants (37%) have three or less years of cheerleading experience. Even though many of the male cheerleaders have very little practice and experience, they are allowed, and often expected, to execute the most difficult skills. This could lead to a greater risk of injury for both the newer cheerleader and their teammates trusting them during the execution of skills. Although, injury rates were not calculated in this study, 80.9% of the participants reported being injured throughout their cheerleading career. Jacobson et al (2004) found a similar number (78%) of respondents having ever been injured when looking at NCAA Division 1A collegiate cheerleaders.

Furthermore, cheerleading is not held to the same four year eligibility requirements as other National Collegiate Athletic Association (NCAA) athletes, therefore, participation into a fifth year or during graduate school is not uncommon. This is evidenced by the results of this study since 20% of the sample was in graduate school. Slightly larger percentage (25%) of the cheerleaders experiencing injuries last year were graduate students. A positive correlation was found among years of cheerleading experience and number of career injuries when looking specifically at cheerleaders with a history of injuries. Perhaps the older age or longer time allowed cheering at the collegiate level increases the risk of injury if a person has already been injured. Future studies should look at the rate of re-injury among cheerleaders. The regulation of cheerleading by the NCAA or other athletic association and a limit on eligibility may also help decrease the number of injuries by decreasing the overall athletic exposures.

Rule changes made by the American Association of Cheerleading Coaches and Administrators (AACCA) limited the skills that could be performed on certain surfaces. More specifically, baskets toss, two and a half high pyramids, and twisting in tumbling skills cannot be performed on non-mat or grass/artificial turf surfaces. This was an attempt to limit injuries based on performing skills on inappropriate surfaces. It is important to note that most of the injuries last year (86%) occurred on a mat (foam or spring floor) or turf, indicating that the rule changes may be effective at preventing skills being attempted or performed on harder surfaces.

This study has several limitations. First, only 89 cheerleaders participated in this study representing about 19 teams. This is a very small portion of the total co-ed teams at the collegiate level, however, without a comprehensive list of teams it is difficult to obtain data from every team. While the sample is diverse, it may not represent all male cheerleaders and the results may not be generalizable to the male members of every collegiate cheer team. The sample characteristics, however, were similar to the sample used by Jacobson, et al (2005) when looking at cheerleading injuries in D1A universities. Secondly, data was obtained via self-report and required recalling injuries occurring a year ago, both which could have increased the chance of error. It is possible that not every injury that actually occurred and fit the injury report criteria was actually reported due to recall issues. Likewise, injuries reported may seem more serious than all the injuries that occurred because they are easier to recall. Thirdly, due to the one time data gathering, injury rates were not able to be calculated. In addition, all injuries occurring to an individual at the same time were reported as a single injury event, therefore, the body parts and types of injuries sustained were greater than the number of injuries incidents

reported. Furthermore, although reliability data was calculated, there was no way to validate the survey, since coaches are not required to maintain injury reports.

Despite the limitations, this is the first study to specifically report on injuries in male cheerleaders. Differences were found between the results of this study and results from previous studies on cheerleading injuries, indicating that male cheerleaders may be subject to different injuries, but still at risk. Additional research should be done to establish injury rates for male cheerleaders and for a larger sample size.

Conclusions

The risk of injury is inherent in all sports. Cheerleading has been identified as a high risk activity for females, however, the results of this study suggest that male cheerleaders are also at risk for injury. The findings of this study indicate that male cheerleaders are subject to similar injuries as their female teammates. Stunting, specifically basing or spotting, has been identified as a major source of injury for collegiate male cheerleaders. Furthermore, while ankle and wrist injuries are prevalent for both male and female cheerleaders, the results of this study suggest that male cheerleaders may be at greater risk for hand injuries. Strains and sprain are the most common type of injury reported even among male cheerleaders. The participants indicating a specific role and skill set on their team were more likely to be injured while performing those skills. Stunting was the primary source of injury for male cheerleaders performing an equal amount of all skills.

Recognition by the NCAA, NAIA or other governing body as a sport may help decrease the risk of injury. Established safety standards, facility needs, season length, training requirements, coach certification, and eligibility requirements are some ways in

which the injury risk for cheerleaders may decrease with sport recognition. Injuries resulting from overtraining and overuse were common among the participants. The addition of an off season or more periodization in training through regulation as a sport could help prevent such issues. Recent rule changes and the efforts to ensure that teams and coaches follow these rules already appear to be making a difference in the occurrence of injuries. For example, over 85% of the injuries reported last year by participants of this study occurred on foam floor, spring floor, or artificial turf indicating that skills are being performed on designated surfaces.

Recommendations

Additional research should be conducted focusing on male cheerleaders. These research studies should include a larger sample size and males from other types of teams. In addition, as international popularity of cheerleading increases, research studies should start to include more diverse sample populations. Injury rates should be calculated and compared to the injury rates found for other sports and previous cheerleading injury research.

A qualitative based study should be conducted to help understand the external and internal factors contributing to injury. This can provide more information regarding the psychosocial issues surrounding the injury, such as pressure from the coach and team, comfort level with the skill, self-efficacy, and confidence in teammates. Furthermore, more details regarding the reason for injury can be obtained by talk to individuals. The specific stunt or tumbling skill being performed at the time of injury should also be obtained to identify the most dangerous skills.

Established universal guidelines and standards for all cheerleading program should be developed and enforced. The NCAA should follow the trend of the NAIA and recognize that athleticism involved in cheerleading and provide sport status. The resources available as a recognized sport could help prevent injuries and more information regarding injuries will be tracked if cheerleading becomes an official sport. Furthermore, cheerleading should be included in injury reporting like other sports even if it is not an official NCAA sport. Sporting equipment companies should consider the vast cheerleading market and develop conspicuous safety equipment for cheerleaders. Specifically, protection and padding designed to protect both bases and tops from injuries due to contact should be developed. Such equipment may help prevent injuries, but should also be designed to maintain the aesthetic aspect of cheerleading. Furthermore, additional training equipment should be developed to aid in the learned progression of skills.

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APPENDICES

Appendix A

Email to Coaches and Spirit Advisors

Subject: Cheerleading Dissertation Research Study

Dear _____ ,

My name is Lindsay Salliotte and I am a doctorate student and member of the cheerleading team at Oklahoma State University. I am currently working on my dissertation and am interested in investigating the prevalence and patterns of injuries in collegiate male cheerleaders. Teams officially recognized by their respective school that have attended either college camp or competition for NCA, UCA, or USA are part of the research population. Research involving cheerleaders has been very limited compared to other sports since the NCAA does not recognize it as a sport. Even less research has specifically focused on male cheer injuries. Research in this area will contribute valuable information for identifying common injuries and factors contributing to their occurrence among cheerleaders. This information could be used to enhance safety measures, facility standards, and injury care and prevention for collegiate level cheerleaders. Participants in the study will be requested to voluntarily complete a short online questionnaire, which will take approximately 15 minutes to complete.

If you are willing to help me contact potential research participants, could you please email me the names and emails address of all males on your team for the 2010-2011 school year. I will then send an email informing each individual about the purpose of the research study and request their voluntary participation. The email will contain a direct link to the questionnaire on a secure website where they can complete the questionnaire anonymously.

I will not be selling or releasing the names or email address of these individuals to anyone. My dissertation committee and I will be the only people to have access to the roster and contact information. The printed list of names and email addresses will be shredded after both the recruitment and reminder email have been sent. All electronic copies will also be deleted.

If you have any additional questions please do not hesitate to contact me or my dissertation advisor. I would appreciate your help by notifying your team members that they will be receiving an email requesting their participation in my research study and the potential impact of the results. Thank you very much for your time and assistance with my dissertation research.

Cheers,

Lindsay Salliotte

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Appendix B

Email to Cheerleaders

My name is Lindsay Salliotte and I am a doctorate student and a cheerleader at Oklahoma State University. I am currently working on a research study, investigating the prevalence and patterns of injury in male collegiate cheerleaders. You are being contacted requesting your participation in my study.

If you choose to participate in this study, you will be asked to fill out a short questionnaire. The first part of the questionnaire will ask characteristics about yourself and your team. The second part of the questionnaire will entail you recording injuries that you have experienced directly as a result of cheerleading. Even if you have not had a cheerleading related injury, your participation is still needed and appreciated. The entire survey should take about 15 minutes to complete depending on the number of injuries you have sustained and the speed at which you can recall what happened.

There is no cost or foreseeable risk to you associated with your participation in this research. The questionnaire is accessed via the link provided below. The website for the questionnaire is secure and all responses will be submitted anonymously online. You can choose to withdraw from the study at any time without penalty. Any information provided will be kept confidential and not released with identifying information attached. You will not be contacted further by the researcher following participation, unless you request more information.

If you have any questions or concerns about the research study, please contact the principal investigator or dissertation advisor:

Lindsay Salliotte, M.S.
Principal Investigator
734-306-7068
lindsay.salliotte@okstate.edu

Bert H. Jacobson, PhD
Dissertation Advisor
405-744-6612
bert.jacobson@okstate.edu

If you have any questions about your rights as a research participant, you may contact:
Dr. Shelia Kennison, IRB Chair
219 Cordell North, Stillwater OK 74078
405-744-3377
irb@okstate.edu

Thank you in advance for your time and assistance with my research. If you are interested and willing to voluntarily complete the questionnaire, please read the subsequent statements and click on the following link to proceed to the study:

By clicking on the link, I acknowledge that I have read this email and understand the nature of this study. My participation is voluntary. I also understand that I can choose to discontinue my participation at any time and without any penalties.

<http://frontpage.okstate.edu/coe/lindsaysalliotte>

Appendix C

Follow-Up Email to Cheerleaders

My name is Lindsay Salliotte and I am a doctorate student and a cheerleader at Oklahoma State University. I contacted you on a previous occasion requesting your participation in my research study, investigating the prevalence and patterns of injury in male collegiate cheerleaders. This is a reminder that you can still choose to participate by clicking on the link at the end of this email and filling out the subsequent questionnaire.

As mentioned in my first email, the first part of the questionnaire will ask characteristics about yourself and your team. The second part of the questionnaire will entail you recording injuries that you have experienced directly as a result of cheerleading. Even if you have not had a cheerleading related injury, your participation is still needed and appreciated. The entire survey should take about 15 minutes to complete depending on the number of injuries you have sustained and the speed at which you can recall what happened.

There is no cost or foreseeable risk to you associated with your participation in this research. The questionnaire is accessed via the link provided below. The website for the questionnaire is secure and all responses will be submitted anonymously online. You can choose to withdraw from the study at any time without penalty. Any information provided will be kept confidential and not released with identifying information attached. You will not be contacted further by the researcher following participation, unless you request more information.

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Thank you in advance for your time and assistance with my research. If you are interested and willing to voluntarily complete the questionnaire, please read the subsequent statements and click on the following link to proceed to the study:

By clicking on the link, I acknowledge that I have read this email and understand the nature of this study. My participation is voluntary. I also understand that I can choose to discontinue my participation at any time and without any penalties.

<http://frontpage.okstate.edu/coe/lindsaysalliotte>

Appendix D

Telephone Script to Coaches

Hello my name is Lindsay Salliotte and I attempted to contact you previously regarding the research I am conducting for my dissertation as part of my PhD program. I apologize if you are not interested in participating, but I wanted to confirm in case my email got lost in the shuffle or I caught you at a busy time earlier. The only work this will entail from you is forwarding an email to your current male cheerleaders. I will also need the number of male athletes on your roster for response rate purposes. Thank you for your help. Please let them know they can complete the survey up until Friday May 6th.

Appendix E

Facebook Message to Athletes

Hello my name is Lindsay Salliotte and I am a cheerleader and PhD student. I am doing a study on male cheerleaders, specifically on injuries, and could use your help in filling out a survey. If you click on the following link you will be directed to the 5 to 10 minute survey and a more detailed explanation of the research study. Thank you for your help!

[Http://frontpage.okstate.edu/coe/lindsaysalliotte](http://frontpage.okstate.edu/coe/lindsaysalliotte)

Appendix F

Male Cheerleader Injury Survey

Thank you in advance for taking the time to complete the following questionnaire. Please complete each question to the best of your ability and as accurately as possible.

Please keep the following criteria in mind when you are recalling injury information. A reportable injury must have 1) been sustained while practicing or participating in organized cheerleading activities, 2) prevented you from participating for the remainder of the practice, game or competition, and 3) required you to seek medical attention.

1. Sex: M F 2. Age (years) _____ 3. Weight (lbs.) _____

4. Height (Ft. and in.) _____

5. Year in school: (circle one)

Freshman Sophomore Junior Senior 5th year Other: _____

6. School Athletic Division: (circle one)

NCAA 1A NCAA 1 NCAA 2 NCAA 3 NJCAA NAIA

7. How many years have you been a cheerleader? _____

8. What skills do you primarily perform as a member of your team?

Stunts Tumbling Equal combination of both

9. Does your team have an off season? (circle one) Yes No

10. If so, how many months long is your off season? (circle one)

N/a 1 month 2 months 3 months 4 months or more

11. On average, how many days a week does your team practice? (circle one)

1 2 3 4 5 6 7

12. How long does a typical practice last? (circle one)

Less than 1 hour 1 to 1.5 hours 1.5 to 2 hours 2 to 2.5 hours more than 2.5 hours

13. Is an athletic trainer or some other medical personal present at every practice? (circle one)

Yes No

14. Does your school compete at a college nationals? (circle one) Yes No

15. What company operates the collegiate national's competition you attend? (circle one)

NCA UCA USA NAIA Other: _____

16. Do you compete in the intermediate division? (circle one) Yes No

17. Have you ever been injured while participating in cheerleading? (circle one) Yes No

If you have never been injured, you may STOP here and return the survey. Thank you.

18. How many **total** injuries have you sustained while cheering? _____

19. Have you sustained an injury in the last 12 months? (circle one) Yes No (If you answered NO, please click here to skip to most serious injury section)

Please fill out the following information for each injury sustained from February 1, 2010 to January 31, 2011 starting with the most recent injury.

Injury Information:

20. Injured body part: (circle all that apply)

Ankle Wrist/hand Back Elbow Knee Face Head Neck Thigh
Shoulder Hip Foot/toe Leg (shin) Abdomen Other: _____

21. Type of Injury: (circle all that apply)

Abrasion (scrape)/Contusion (bruise)/Hematoma Strain/Sprain Concussion
Ligament/cartilage tear Dislocation Fracture Overuse Other: _____

22. Total time missed due to injury:

_____ # _____ days weeks months

23. Skill attempting when injured: (circle one)

Standing tumbling Running tumbling Stunt Pyramid Basket toss Jump
Dancing Other: _____

24. Event when injury occurred: (circle one)

Practice Athletic event Competition Pep rally other: _____

25. Primary cause of injury: (circle one)

Basing/spotting Collided with other person Failed to complete skill Fell
Slipped/tripped/twisted body part Jumping Tumbling Other: _____

26. Surface type at time of injury: (circle one)

Artificial turf Concrete/asphalt Grass Mat Spring floor Foam floor
Rubberized turf Wood other: _____

27. Treatment for this injury was done by: (circle all that apply)

Athletic trainer School doctor Non-school doctor Emergency department
Hospital admission Other: _____

28. Was surgery required: (circle one) Yes No

29. How many spotters were present at the time of your most serious injury? _____ # _____

30. If a spotter was present, who was spotting? (circle all that apply)

Coach Teammate Other: _____

31. Was the injury caused by an error by the spotter? (circle one) Yes No

Injury Information: If you have only been injured once from February 1, 2010 to January 31, 2011 please click here to go to question number 80.

32. Injured body part: (circle all that apply)

Ankle Wrist/hand Back Elbow Knee Face Head Neck Thigh
Shoulder Hip Foot/toe Leg (shin) Abdomen Other: _____

33. Type of Injury: (circle all that apply)

Abrasion (scrape)/Contusion (bruise)/Hematoma Strain/Sprain Concussion
Ligament/cartilage tear Dislocation Fracture Overuse Other: _____

34. Total time missed due to injury:

_____ # _____ days weeks months

35. Skill attempting when injured: (circle one)

Standing tumbling Running tumbling Stunt Pyramid Basket toss Jump
Dancing Other: _____

36. Event when injury occurred: (circle one)

Practice Athletic event Competition Pep rally Other: _____

37. Primary cause of injury: (circle one)

Basing/spotting Collided with other person Failed to complete skill Fell
Slipped/tripped/twisted body part Jumping Tumbling Other: _____

38. Surface type at time of injury: (circle one)

Artificial turf Concrete/asphalt Grass Mat Spring floor Foam floor
Rubberized turf Wood Other: _____

39. Treatment for this injury was done by: (circle all that apply)

Athletic trainer School doctor Non-school doctor Emergency department
Hospital admission Other: _____

40. Was surgery required: (circle one) Yes No

41. How many spotters were present at the time of your most serious injury? _____

42. If a spotter was present, who was spotting? (circle all that apply)

Coach Teammate Other: _____

43. Was the injury caused by an error by the spotter? (circle one) Yes No

Injury Information: If you have only been injured twice from February 1, 2010 to January 31, 2011 please click here to go to question number 80.

44. Injured body part: (circle all that apply)

Ankle Wrist/hand Back Elbow Knee Face Head Neck Thigh
Shoulder Hip Foot/toe Leg (shin) Abdomen Other: _____

45. Type of Injury: (circle all that apply)

Abrasion (scrape)/Contusion (bruise)/Hematoma Strain/Sprain Concussion
Ligament/cartilage tear Dislocation Fracture Overuse Other: _____

46. Total time missed due to injury:

_____ # _____ days weeks months

47. Skill attempting when injured: (circle one)

Standing tumbling Running tumbling Stunt Pyramid Basket toss Jump
Dancing Other: _____

48. Event when injury occurred: (circle one)

Practice Athletic event Competition Pep rally Other: _____

49. Primary cause of injury: (circle one)

Basing/spotting Collided with other person Failed to complete skill Fell
Slipped/tripped/twisted body part Jumping Tumbling Other: _____

50. Surface type at time of injury: (circle one)

Artificial turf Concrete/asphalt Grass Mat Spring floor Foam floor
Rubberized turf Wood Other: _____

51. Treatment for this injury was done by: (circle all that apply)

Athletic trainer School doctor Non-school doctor Emergency department
Hospital admission other: _____

52. Was surgery required: (circle one) Yes No

53. How many spotters were present at the time of your most serious injury? _____

54. If a spotter was present, who was spotting? (circle all that apply)

Coach Teammate Other: _____

55. Was the injury caused by an error by the spotter? (circle one) Yes No

Injury Information: If you have only been injured three times from February 1, 2010 to January 31, 2011 please click here to go to question number 80.

56. Injured body part: (circle all that apply)

Ankle Wrist/hand Back Elbow Knee Face Head Neck Thigh
Shoulder Hip Foot/toe Leg (shin) Abdomen Other: _____

57. Type of Injury: (circle all that apply)

Abrasion (scrape)/Contusion (bruise)/Hematoma Strain/Sprain Concussion
Ligament/cartilage tear Dislocation Fracture Overuse Other: _____

58. Total time missed due to injury:

_____ # _____ days weeks months

59. Skill attempting when injured: (circle one)

Standing tumbling Running tumbling Stunt Pyramid Basket toss Jump
Dancing Other: _____

60. Event when injury occurred: (circle one)

Practice Athletic event Competition Pep rally other: _____

61. Primary cause of injury: (circle one)

Basing/spotting Collided with other person Failed to complete skill Fell
Slipped/tripped/twisted body part Jumping Tumbling Other: _____

62. Surface type at time of injury: (circle one)

Artificial turf Concrete/asphalt Grass Mat Spring floor Foam floor
Rubberized turf Wood Other: _____

63. Treatment for this injury was done by: (circle all that apply)

Athletic trainer School doctor Non-school doctor Emergency department
Hospital admission other: _____

64. Was surgery required: (circle one) Yes No

65. How many spotters were present at the time of your most serious injury? _____

66. If a spotter was present, who was spotting? (circle all that apply)

Coach Teammate Other: _____

67. Was the injury caused by an error by the spotter? (circle one) Yes No

Injury Information: If you have only been injured four times from February 1, 2010 to January 31, 2011 please click here to go to question number 80.

68. Injured body part: (circle all that apply)

Ankle Wrist/hand Back Elbow Knee Face Head Neck Thigh
Shoulder Hip Foot/toe Leg (shin) Abdomen Other: _____

69. Type of Injury: (circle all that apply)

Abrasion (scrape)/Contusion (bruise)/Hematoma Strain/Sprain Concussion
Ligament/cartilage tear Dislocation Fracture Overuse Other: _____

70. Total time missed due to injury:

_____ # _____ days weeks months

71. Skill attempting when injured: (circle one)

Standing tumbling Running tumbling Stunt Pyramid Basket toss Jump
Dancing Other: _____

72. Event when injury occurred: (circle one)

Practice Athletic event Competition Pep rally Other: _____

73. Primary cause of injury: (circle one)

Basing/spotting Collided with other person Failed to complete skill Fell
Slipped/tripped/twisted body part Jumping Tumbling Other: _____

74. Surface type at time of injury: (circle one)

Artificial turf Concrete/asphalt Grass Mat Spring floor Foam floor
Rubberized turf Wood other: _____

75. Treatment for this injury was done by: (circle one)

Athletic trainer School doctor Non-school doctor Emergency department
Hospital admission other: _____

76. Was surgery required: (circle one) Yes No

77. How many spotters were present at the time of your most serious injury? _____

78. If a spotter was present, who was spotting? (circle all that apply)

Coach Teammate Other: _____

79. Was the injury caused by an error by the spotter? (circle one) Yes No

Please complete the following information about what you consider your most serious injury resulting from your participation in cheerleading even if it did not occur within the last 12 months. Even if you already recorded your most serious injury in the previous section, please complete this section as well even if information is repeated.

Most serious injury:

80. Injured body part: (circle all that apply)

Ankle Wrist/hand Back Elbow Knee Face Head/neck Thigh
Shoulder Hip Foot/toe Leg (shin) Abdomen Other: _____

81. Type of Injury: (circle all that apply)

Abrasion (scrape)/Contusion (bruise)/Hematoma Strain/Sprain Concussion
Ligament/cartilage tear Dislocation Fracture Overuse Other: _____

82. Time missed due to injury: (circle one)

____#____ days weeks months

83. Skill attempting when injured: (circle one)

Standing tumbling Running tumbling Stunt Pyramid Basket toss Jump
Dancing Other: _____

84. Event when injury occurred: (circle one)

Practice Athletic event Competition Pep rally Other: _____

85. Primary cause of injury: (circle one)

Basing/spotting Collided with other person Failed to complete skill Fell
Slipped/tripped/twisted body part Jumping Tumbling Other: _____

86. Surface type at time of injury: (circle one)

Artificial turf Concrete/asphalt Grass Mat Spring floor Foam floor
Rubberized turf Wood Other: _____

87. Treatment for this injury was done by: (circle all that apply)

Athletic trainer School doctor Non-school doctor Emergency department
Hospital admission Other: _____

88. Was surgery required: (circle one) Yes No

89. How many spotters were present at the time of your most serious injury? _____

90. If a spotter was present, who was spotting? (circle all that apply)

Coach Teammate Other: _____

91. Was the injury caused by an error by the spotter? (circle one) Yes No

92. When did your most serious injury occur?

Month/year

Thank you for taking the time to complete the questionnaire.

Appendix G
IRB Approval Letter

Oklahoma State University Institutional Review Board

Date: Friday, February 11, 2011
IRB Application No ED1117
Proposal Title: Epidemiology of Injuries in Collegiate Male Cheerleaders in the United States

Reviewed and Exempt
Processed as:

Status Recommended by Reviewer(s): Approved Protocol Expires: 2/10/2012

Principal
Investigator(s):

Lindsay Salliotte	Bert Jacobson
428 Willard	204 Willard
Stillwater, OK 74078	Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,



Shelia Kennison, Chair
Institutional Review Board

Appendix H

IRB Modification Approval Letter

Oklahoma State University Institutional Review Board

Date: Friday, April 22, 2011 Protocol Expires: 2/10/2012
IRB Application No: ED1117
Proposal Title: Epidemiology of Injuries in Collegiate Male Cheerleaders in the United States

Reviewed and Exempt
Processed as: **Modification**

Status Recommended by Reviewer(s) **Approved**

Principal Investigator(s):

Lindsay Salliotte
428 Willard
Stillwater, OK 74078

Bert Jacobson
204 Willard
Stillwater, OK 74078

The requested modification to this IRB protocol has been approved. Please note that the original expiration date of the protocol has not changed. The IRB office MUST be notified in writing when a project is complete. All approved projects are subject to monitoring by the IRB.

The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

The reviewer(s) had these comments:

The modification request to expand recruitment procedures is approved.

Signature :



Shelia Kennison, Chair, Institutional Review Board

Friday, April 22, 2011
Date

VITA

Lindsay Erin Salliotte

Candidate for the Degree of

Doctor of Philosophy

Dissertation: EPIDEMIOLOGY OF INJURIES IN COLLEGIATE MALE
CHEERLEADERS IN THE UNITED STATES

Major Field: Health, Leisure, and Human Performance with an option in Health and
Human Performance

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Health and Human
Performance at Oklahoma State University, Stillwater, Oklahoma in July, 2011.

Completed the requirements for the Master of Science in Leisure at Oklahoma
State University, Stillwater, Oklahoma in December 2009.

Completed the requirements for the Bachelor of Arts in Sport Management at
the University of Michigan, Ann Arbor, Michigan in May 2006.

Experience:

Oklahoma State University –

Graduate Teaching Assistant: September 2009 – May 2011
HHP 2603 – Total Wellness

Research Assistant - Dr. Lincoln Gibbs: September 2009 – May 2010

Graduate Teaching Assistant: September 2006 – May 2009

LEIS 1342 – Physical Fitness

LEIS 1352 – Weight Training

LEIS 2122 – Backpacking and Hiking

Professional Memberships:

AAPHERD

OAAPHERD

Name: Lindsay Erin Salliotte

Date of Degree: July, 2011

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: EPIDEMIOLOGY OF INJURIES IN COLLEGIATE MALE
CHEERLEADERS IN THE UNITED STATES

Pages in Study: 88

Candidate for the Degree of Doctor of Philosophy

Major Field: Health, Leisure, and Human Performance

Scope and Method of Study:

Injuries in cheerleading have been identified as a significant problem in recent years, however, very little information has been collected about male cheer injuries. The purpose of this study was to describe the epidemiology of cheerleading injuries of collegiate male cheerleaders. This study identifies the most common injuries, mechanism of injuries, and the body part injured. The sample consisted of 89 male collegiate cheerleaders from the United States. Subjects recruited via email or Facebook. Participants voluntarily completed an online questionnaire regarding their cheerleading injury history. Statistical analyses included calculations of χ^2 tests and Pearson correlations. Frequencies were calculated for the categorical variables. An alpha level of $p \leq 0.05$ was used to assess statistical significance.

Findings and Conclusions:

Just over half (48) of the participants reported an injury occurring within the last year. Lower extremity injuries accounted for 40% of the injuries and upper extremity injuries were 36% of the injuries reported last year. Ankle and knee injuries were most common. Forty two percent of the injuries sustained were strains or sprains. Seventy two participants reported at least one career injury. Again lower extremity injuries were most common. Sprains and strains was the most common type of serious injury followed by a ligament or cartilage tear. For both injuries within the last year and the most serious injury stunting was most often the skill being attempted and basing or spotting was the main cause of injury. Most injuries occurred at practice and on a foam floor. There were significant differences among the skill attempted and cause of injury depending on the main skills performed by the participant. The region of the body resulting in injury also differed based on the skill attempted. Overall, the results suggest that male cheerleaders have the same risk and type of injuries occur as female cheerleaders. More research should be conducted on a larger sample to calculate injury rates and include an international population.

ADVISER'S APPROVAL: Dr. Bert Jacobson
