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# An examination of factors and perceptions related to steroids/human growth hormone in college baseball

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An Examination of Factors and Perceptions Related to

Steroids/Human Growth Hormone in College Baseball

(TITLE)

BY

Benjamin D. Riegle

**THESIS**

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF

Master of Science in Physical Education

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY  
CHARLESTON, ILLINOIS

2007

YEAR

I HEREBY RECOMMEND THAT THIS THESIS BE ACCEPTED AS FULFILLING  
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## ABSTRACT

This study examined the role modeling effect from professional baseball through an anonymous survey aimed at the prevalence, potential precursors, and deterrents of steroid use among 173 intercollegiate baseball players. Results indicated that 2.3% of participants admitted to using steroids, but this low incidence was not due to low access as 58.4% said they knew how to obtain steroids and 37.8% had previously been offered steroids. Just over one-third (34.1%) agreed that performance enhancement was a precursor to steroid/HGH use and a mean score of 2.53 (SD = 1.46) indicated that it was a greater precursor than improving appearance (19.7%, M = 2.02, SD = 1.25) and peer pressure (14%, M = 1.8, SD = 1.09). Potential punishment (80.9%, M = 4.38, SD = 3.24), health consequences (83.2%, M = 4.27, SD = .99), and being viewed as a cheater (83.8%, M = 4.25, SD = 1.11) were all prominent deterrents among the variables. Over 51% of participants believed that 11-50% of professional baseball players use steroids/HGH and another 29.5% believed that 51-75% of players at the professional level are users. The perception at the collegiate level was second highest in that 66.5% of subjects perceived usage to be between 11-50% and 14.1% perceived usage to be between 51-75%. Perceived usage rate of steroid/HGH was higher at the high school than the pre-high school level based on greater percentages within the 1-10% (61.3% vs. 57.2%) and the 11-50% (36.4% vs. 26%) intervals. In addition, 11% perceived pre-high school steroid/HGH usage to be non-existent. Reported usage rate of the legal supplement creatine was 53.2%. Discussion of the findings provides practitioners and coaches with essential information to combat steroid use.

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## CHAPTER 1

### INTRODUCTION

Anabolic androgenic steroids (steroids) were discovered in the late 1930s as an initial treatment for hypogonadism in males (National Institute Drug Abuse, 2005). Further research determined that these compounds could facilitate skeletal muscle growth in laboratory animals. This discovery has led to many years of misuse and mistrust among athletic competitors indulging baseball at levels (pre adolescent, high school, college, and professional). As of 1990, the Anabolic Steroid Control Act defines an anabolic steroid as any drug or hormonal substance chemically and pharmacologically related to testosterone (other than estrogens, progestins, and corticosteroids) that promotes muscles growth. Under this act, testosterone and anabolic steroids are classified as Schedule III drugs and cannot be sold over the counter or possessed without a prescription (Powers, 2002). This knowledge of illegality does not stop sellers from making them easily accessible to others as 38% of 9-13 year old students in Massachusetts reported being offered to them (Faigenbaum, Zaichkowsky, Gardner, & Micheli, 1998). Kindlundh, et al. (1999) reported that adolescents who participate in athletics used steroids for performance enhancement, improving their looks, and because their peers do it. Athletes have also been found to stack many different types of drugs simultaneously to enhance the effects of steroids, ultimately improving performance (Parssinen & Seppala, 2002).

Recently the media has focused a spotlight on steroid/HGH use largely due to Jose Canseco's 2005 book, "JUICED: Wild Times, Rampant 'Roids, Smash Hits, and How Baseball Got Big" where he admitted that he, and various other major league baseball players used steroids. Canseco's personal account of the events brought forth national attention from the United States Congress. Canseco maintained that 85% of all professional baseball players were using some type of anabolic steroid while Ken Caminiti, a former Major League Baseball player, claimed 50% of MLB players of using steroids. A similar report from SI.com (2006), excerpting the book "Game of Shadows," written by chronicle reporters Mark Fainaru-Wada and Lance Williams, attempted to reveal the truth about Barry Bonds and his alleged abuse of steroids/HGH. The after effects of increased scrutiny could be seen when ESPN.com reported that the number of home runs in the major leagues through the first five weeks of 2005 was at its lowest since 2002. Statistical reports also showed a decrease in runs per game, hits per game, and overall batting average. These low numbers were viewed as significant considering they followed the first year of a toughened steroid policy set by the commissioner of Major League Baseball. Many questions were raised throughout Major League Baseball after Rafael Palmeiro tested positive for steroid use following his denial of use before the U.S. Congress. Many of these cases lack firm evidence, but the media's portrayal of these athletes and their new found success provides a link for society to assume that steroids/HGH are the source of success.

Of great concern is that young people will see the record breaking performances of the accused athletes as proof that steroids/HGH contributed to their baseball success. North Carolina State head baseball coach Elliott Avent told the East Carolina News

Bureau, "...most things from pro sports trickle down...Something as serious as steroids, you'd just think that they'd be more careful". However, the temptation of steroids is strong. Canseco can be quoted in his biography as saying,

"He (Mark McGwire) and I were thriving examples of what steroids could do to make you a better ball player ...steroids gave Mark strength and stamina, but they also gave him a more positive attitude. However, when you're working with steroids and your muscles are so dense, you're strong enough to swing your shoulders right out of their sockets." (pg. 75, 2005).

Stricter guidelines have been called for by organizations such as the American College of Sports Medicine and the National Collegiate Athletic Association (NCAA) to help stop this growth of illegal performance enhancement. Rose (1999) reports that the ACSM organization called for stronger prevention programs to avert athletes from using steroids to boost athletic performance. Since 1985, the NCAA has been conducting surveys every fourth year to study the use and abuse habits of their sanctioned teams (Green, Uryasz, Petr, & Bray, 2001). Many non-FDA approved dietary supplements (i.e. creatine) promise similar benefits as steroids, but without the legal and health implications that steroids present, are being advertised. Rockwell, Nickols-Richardson, and Thye (2001) surveyed American university coaches and trainers to determine the prevalence of nutrition supplements being provided to their athletes and found that 94% provided them with some type of nutritional supplement. A 1994 study by Sobal & Marquart reported that athletic use of legal supplements (46%) is higher than in the general school population (35-40%) over a variety of age levels, with some variation in the results due to gender, etc.

This study examined whether a trickle down effect has occurred from professional baseball by examining Division I and junior college baseball players perceptions of steroid use within a sample of players. This study also investigated the ease of accessibility of steroids/HGH, potential precursors, and possible deterrents from using steroids/HGH. Representative Tom Davis, chairman of the House Committee on Government Reform states that, "A majority of players think steroids are influencing individual achievements- that's exactly our point. We need to understand the vicious cycle that perception creates" (Jenkins, 2005). Such a statement from a significant political icon provides basis for the need to examine these issues. The belief that steroids/HGH are playing a large part in the success of professional baseball players is sending the wrong message to younger athletes. This study will provide a scientific look into the degree of the trickle down effect to collegiate baseball players.

#### Purposes of the Study

The purpose of the current study was fivefold. First, the severity of the steroids/HGH issue in college baseball will be examined through self-reporting of access and use of steroids/HGH. Second, potential motives (i.e., performance enhancement, appearance) of steroid/HGH use were analyzed. Third, deterrents (i.e., fear of punishment, negative health consequences) of steroid/HGH use were examined to determine an appropriate educational approach for eliminating future steroid/HGH use. Four, the use of the legal substance creatine was analyzed as a possible alternative to steroids/HGH. Finally, players' perceptions of steroid use at different levels of baseball were assessed.

### Hypotheses

1. Steroid/HGH use in the current sample will be relatively low (less than 5%) as previous studies of NCAA athletes have reported few positive tests.
2. Performance enhancement is likely to be the primary reason for beginning steroid/HGH use.
3. The primary deterrent to steroid/HGH use will be potential punishment.
4. A large percentage of these athletes will report using the legal substance creatine.
5. Collegiate baseball players' perception is that steroid/HGH use increases as the level of baseball increases.

### Limitations of the Study

1. The subjects may have answered untruthfully because of the sensitive subject content and they were asked to make perceptions of current teammates.
2. The investigators assume that all participants completed the survey within the agreement stated in the informed consent.
3. Some students may have withdrawn due to the subject content.

### Definition of Terms

**Creatine:** A compound the body synthesizes (makes) and then utilizes to store energy.

The storage of energy occurs when phosphate molecules are attached to creatine to form creatine phosphate. (*MedicineNet.com*)

**Human Growth Hormone:** biosynthetic derivative of the growth hormone secreted by the anterior pituitary gland that promotes muscle growth through creation of new muscle cells. (*MedicineNet.com*)

**Steroid:** any drug or hormonal substance chemically and pharmacologically related to testosterone, other than estrogens, progestins, and corticosteroids, that promotes muscle growth (Powers, 2002). Steroid is the more commonly used term for androgenic anabolic steroid or AAS.



## CHAPTER 2

### LITERATURE REVIEW

In order to best examine and evaluate research done in this study, it is necessary to analyze previous studies done on the various aspects of steroid usage. The majority of these articles provide statistics on how many athletes are using steroids, why or why not they are using them, and perceptions of steroid use. A specific sub-group, Major League Baseball (MLB) acknowledged steroids as a problem following the recent scandal, which is why this issue needs to be re-evaluated. These and other issues regarding steroid use will be addressed in the following review of literature.

The relationship between today's athletics and steroids, is like watching a fertile field become flooded with unwanted agricultural chemicals (Bode, 2004). Though much investigation and media attention has been brought to scores of professional athletes, the problem seeps much deeper. As many athletes are motivated by society's demand for success and a heavy wallet, it is hard to imagine younger athletes will not follow in the foot steps of these role models. Steroids allow athletes to become stronger, faster, and become much more appealing to the prospective college or professional scouts. Bode (2004) suggests random, unannounced year-round testing, including the off-season, as viable options for controlling the "flood" of steroid use. The following literature presents further information on steroid use.

As of 1988, the United States put laws into effect that govern the use of steroids, making it a felony to sell or possess steroids (Berning, Adams, and Stamford, 2004).

Many individuals compare taking steroids to training at a state-of-the-art facility or other advantageous equipment that gives one competitor an edge over the other. If those types of available assets are not illegal, then some people question, "Why are steroids?" While certain risks exist, conflicting forums differently portray the level or degree of risk that steroids present. The real issue may be whether or not athletes are able to make sound decisions about steroid use due to the pressures that success places on them. This pressure to succeed can be seen in all different levels of baseball.

Steroids are synthetic derivatives of the male hormone testosterone and can possibly exert muscle-building effects on the human body that may be beneficial for athletic performance (Hartgens and Kuipers, 2004). The research does not name any particular sports that may benefit substantially from steroid use. Also noted is that past research supports steroids positive effects on strength and weight gain, while no endurance or fat mass reduction is noted. After the International Olympic Committee (IOC) began to fight doping in the 1960's, steroids were added to the list of banned substances in 1976. A decade later, the IOC introduced the out-of-competition doping controls to help fight the rumor that athletes were using steroids during this period and then stopping their use during competition to avoid detection. The review also noted that assessing the exact effects of steroids during clinical trials was skewed because self-administration is usually 5-20 times higher. Research also showed that the effect of steroids on type I (slow twitch) or type II (fast twitch) muscles fibers is not clearly defined. In the upper body, type II fibers seem to increase more, while type I fibers increase more in the lower body. This information may relate to the increase in power numbers of baseball players who rely on powerful upper body muscles.

The pressure to succeed that athletes face may still not outweigh the value they place on avoiding potential punishment. Anecdotal evidence from many professional players indicates a 40-50% steroid use in their league. However, heightened steroid policies have led to current follow-up studies done by the MLB that show steroid use to be less than 5%. A 2001 study by the NCAA after its new year-round testing program revealed steroid use to be decreasing. Other college level studies showed decrease in usage from the 1970's and early '80's (15-20%) (Dezelsky et al., 1985) to 1985 where Anderson & McKeag found that usage was fewer than 5% in all three college divisions.

The high school population also has had its share of steroid users with 60% of those using steroids believing that 10 or more of their fellow seniors were using steroids. However, only 26% of nonusers believed that 10 or more of their fellow seniors are using steroids (Yesalis et al., 1989). Scientific evidence points to the theory that steroid use decreases with an increase in competition level, but why does the opposite relationship occur when perceptions are analyzed? It could simply be that the media has become the information outlet for young athletes and a lack of proper steroid education has left them inclined to determine the answers for themselves. The varying results among steroid use can be related to the variation in self-reporting and perception of steroid use.

#### Trickle Down Effect

The Department of Health and Human Services (1991) feared most athletes have a strong desire to be successful at sports, but it may ultimately be pressure from society that causes them to try steroids. Society, in general, holds to a win at all costs mentality and this may result in athletes viewing certain behaviors as satisfactory for enhancement purposes. Many adolescents revealed feelings that parents and coaches place great

pressure on them to win, while sending mixed message of acceptable ways to achieve success. Respondents also mentioned that other reasons for starting use are better appearance and peer approval. Although the percentage of adolescent steroid users may be significantly less than other drugs, it can still be viewed as a problem based on the values or reasons that adolescents have for using them. A 1999 Kaiser Foundation study revealed that 73% of youth desire to be like high-profile athletes and 52% believed that high-profile athletes are using performance-enhancing drugs.

#### Professional Prevalence

A report from ESPN.com (2003) outlines the beginning of steroid testing in Major League Baseball. Under baseball's labor contract that took effect September 30, 2002, testing penalties would be enforced after any season in which more than 5% of survey were positive. Of the 1,438 anonymous tests collected during the 2003 season, 5-7% were positive. However, the World Doping Agency suggested that the various current penalties are not severe enough. Major League Baseball indicated that testing would continue among its players until positive tests drop below 2.5% over a two year period. This would require greater enforcement as new forms of steroids such as THG are discovered.

An article by Chris Jenkins (2005) in the USA Today examined the perceptions of MLB players on the prevalence of steroids within professional baseball. A survey of 568 players that ran from February 17, 2005-March 9, 2005, examined whether they felt that steroids played a role in record-breaking performances. A startling 79% reported that they felt that steroids played a part in better performance and 27% indicated that they believed recent achievements were steroid enhanced. When examining prevalence, only

3.9% believed that more than half of the players are using steroids. Commissioner Allan Selig reported a decrease in positive tests from 2003 (7%) to 2004 (1.2%). Only a minute 3.7% responded "none" when asked what percentage of players were using steroids. Sixty-nine percent of the athletes surveyed reported that they felt that current testing policy and punishment was sufficient. One statistic that may indirectly indicate the prevalence of steroid use is that only 35% of players feel that records should be removed or asterisked if a player tests positive for steroids. This statistic could imply that players know they are being cheated by other teammates who use illegal supplementation. However, this statistic was overshadowed by the 82% of fans that believe records set by athletes using steroids should be either eliminated or kept on the league with a warning notation (USA Today/CNN/Gallup poll, Dec. 2004).

In 2001, the first-ever comprehensive drug testing policy for minor baseball was initiated (Selig, 2005). The positive test rate for minor league baseball in 2001 was 11% followed by a decrease in use each subsequent year with 4.8% (2002), 4% (2003), and 1.7% (2004). The testing was expanded into the Venezuelan Summer League for the 2005 summer season. Following the 5-7% positive tests at the major league level in 2003, more rigorous policies resulted in a 1-2% decrease the following year. Following the decrease, Commissioner Selig reopened negotiations with the MLB Players Association, calling for even stronger policies against illegal performance enhancing substances. In a statement from MLB Commissioner Allan H. Selig (2005) before the House of Representatives Committee on Government Reform, a new era of steroid testing was outlined. His statement detailed four specific alterations to the new Major League policy: 1) the list of banned substances not only includes steroids, but precursors,

such as androstenedione, ephedra, HGH, diuretics, and other masking agents; 2) the players can be tested randomly, multiple times in a given year; 3) off-season or “out-of-competition” testing introduced for the first time and; 4) increased penalties. Another important change was that players would be tested at the World Anti-Doping Agency laboratories. MLB hosted the first-ever international baseball tournament in 2006 with Olympic-style drug testing procedures intact. Commissioner Selig noted a collaboration with the Partnership for a Drug Free America organization to determine proper timing and content to provide televised announcements discouraging young people from using steroids. The Commissioner stated that regardless of the progress that has been made thus far and the quality of its strong policy, baseball will continue to strive for zero tolerance.

#### Collegiate Prevalence

According to the NCAA (2001), drug-testing programs have been administered by the National Center for Drug Free Sport since 1999. The center randomly tests football and track players with less than 48 hours notice, while with other sports’ athletes are randomly tested based on rosters. Every Division I and Division II football program undergo testing at least once in each academic year, but not Division III athletes. However, the NCAA recently released a statement in April, 2006 on their website calling for a two-year pilot program of year-round drug testing for Division III athletes. If the athletes test positive for any banned substance they are ruled ineligible for at least one calendar year along with losing one year of eligibility. The cost for a year’s worth of drug testing was reported at \$2.9 million dollars. Studies between 1996-97 and 1999-2000 showed an overall rise in positive tests while the number of protocol problems had

gone down. Approximately 55% of the college athletes surveyed said that drug testing has deterred college athletes from using illegal substances and 56.5% of the athletes felt that all collegiate athletes should be tested by the NCAA. The NCAA's Committee on Competitive Safeguards and Medical Aspects of Sports (CSMAS) attempted to extend testing into Division I & II baseball programs. The Division II schools found this as promising while the Division I representatives showed little support for the expansion. Reasons were not given as to why they did not support this type of expansion.

A study strictly related to the NCAA by Green et al. (2001) examined 13,914 student-athletes from 991 schools (Divisions I, II, & III). Just over one percent of the participants reported steroid use in each of the three divisions. Almost half of those that admitted to steroid use stated that they were using them for sports enhancement purposes (47%), while 51% were using them for injury recovery. An alarming statistic related to this research is that many of the athletes (40%) reported receiving the steroids from an outside physician, while only 0.7% stated that the reason they did not use steroids was because they were hard to get. The lower divisions may be more likely to use steroids or other drugs because they are trying to compensate for a lack of talent in comparison to Division I athletes. However, a 1999 study reported that only 8% of Division III schools conducted drug education or testing as compared to the 75% of Division I schools (NCAA). Many other drugs are also taken in conjunction with steroids. This associated usage with other drugs may relate to the rising rate of steroid abuse.

The 2002-2003 test results released by the NCAA drug testing committee showed promising results. During this testing season, Division II baseball programs had 127 samples analyzed from the year round program and 48 samples from their championship

series. Only two positive cases were reported. The NCAA reported zero positive tests for the Division III baseball programs that were subjected to testing during the postseason. No results from Division I baseball were available at the time the report was viewed. This data indicated a small percentage of use among this population. More comprehensive testing of leagues would need to be done for a more accurate analysis of usage.

Stanford University was used as a testing site for Chris Minaker's thesis project examining the social pressures athletes face to take performance-enhancing drugs (Baker, 2007). He is quoted by The Seattle Times as saying, "...it becomes clear that baseball has the biggest problem with steroids...It seems that the problem of the professional ranks has trickled down into the collegiate ranks." Of the 89 Stanford athletes that responded to Minaker's question on steroids, nine of the athletes felt that they needed to take them, and five of the nine were baseball players. (It was reported that teammates exerted the strongest external pressure on the athletes to use supplements, while coaches were cited as the group second as likely to pressure athletes to use). Forty-two percent of the athletes had used a creatine supplement in hopes of enhancing their performance.

The NCAA has received scrutiny from college baseball coaches because of the lack of testing being done. In light of the allegations against the Duke University baseball team in 2005 and the MLB steroid scandal, many college coaches feel it is necessary to show a strengthened stand against steroid use. An NCAA (2001) conducted survey of college baseball players revealed an increase in steroid use from 1993 (0.7%) to 2001 (2.3%). Based on current NCAA regulations, any teams outside of football undergo a limited number of steroid tests each year. Jaymes Powell, Jr. of the East Carolina



University New Bureau researched an NCAA report showing that zero Division I baseball players were tested during the 2003 regular season (NCAA, 2003). Other divisions were tested based on whether they achieve regular season success and make it to the post season.

Meldrum & Feinberg (2002) set out to determine whether or not random drug testing was a viable solution to deterring college athletes from steroid use. They refer to research by Catlin & Murray (1996) which showed that athletes are more likely to avoid steroids for fear of reprisal rather than health consequences. Meldrum & Feinberg's (2002) study found that two of the 197 professed non-drug using NCAA Division I athletes tested positive for steroids. Based on the anonymity and conditions (professing non-drug using) of the study, the results showed that testing alone will not halt steroid usage. The researchers concluded that the athletes testing positive during an anonymous procedure would draw more attention to themselves if they did not participate.

#### Adolescent Prevalence

Numerous allegations regarding adolescent use prompted Buckley and associates (1987) to do the first study on high school athletes. They found that 6.6% of male high school seniors reported having used these drugs. They did not find any correlation between urban vs. rural populations, but did find significant data with the larger schools indicating higher steroid prevalence. Many users had begun using prior to the age of 16. This research lead to numerous larger studies that indicated a 1.4-12% range of male adolescent steroid use (Buckley, et al, 1988; Yesalis et al., 1993; Windsor & Dumitru, 1989; Terney & McLain, 1990; Komoroski & Rickert, 1992; DuRaunt et al., 1995; Whitehead et al, 1992; Tanner et al., 1995; Middleman et al., 1995). According to

Bahrke, Yesalis, Kopstein, and Stephens (2000), high levels of steroid use have been attributed more to power and strength sports (i.e. football, weightlifting, powerlifting, etc.). However, only anecdotal evidence was available to testify whether these statements were false or true. Research done in other countries including Canada (Adalf & Smart, 1992; Killip & Stennett, 1990; Canadian Centre for Drug-Free Sport, 1993), Sweden (Nilsson, 1995; Kindlundh et al., 1999), South Africa (Schwellnus et al., 1992; Lambert et al., 1998), Great Britain (Williamson, 1993), and Australia (Handelsman & Gupta, 1997) show a slightly lower range of steroid incidence (1-3%) among adolescents, but this behavior is attributed to the cultural views of America being focused on athletic performance and physical appearance. Even though negative national attention has been brought to numerous high profile athletes, it is still of great concern that adolescent athletes are tempted to use steroids.

A study of 16,000 high school students conducted by the Center for Disease Control and Prevention in 1997 (Youth Risk Behavior Survey) showed a decline from the aforementioned research with only 4.1% of male adolescents reporting steroid use (Miller, Barnes, Sabo, Melnick, & Farrell, 2002). The NIDA reported that 56% of the male users had tried steroids for the first time by tenth grade. Seventy-eight percent tried them by the eleventh grade.

A report issued by the National Institute of Drug Abuse (2005) examined the perceptions of 12<sup>th</sup> grade students on the harmfulness of steroids. From 1998-2005, a percentile decrease was seen in the number of students that felt steroids were harmful. It remains alarming that 56.8% of those surveyed viewed steroids as not being harmful. The NIDA also did research on the incidence of steroid use among high school students.

In 8-10<sup>th</sup> grade students, a consistent decrease was seen since the peak usage in 2000 (3.0% / 3.5%), where the usage in 2003 was reported as 2.5% for 8<sup>th</sup> grade and 3.0% for 10<sup>th</sup> graders. The 12<sup>th</sup> grade students, however, demonstrated an increasing trend until 2005, when usage decreased from 2.5-1.5%. Follow up research by the NIDA (2005-2006) showed that the perceived risk of 12<sup>th</sup> grade students' steroid abuse increased from 56.8% to 60.2%. The prevalence of steroid use among males was highest among 12<sup>th</sup> grade students (2.7%), followed by 10<sup>th</sup> grade (1.8%) and then 8<sup>th</sup> grade (1.6%), respectively. The study claimed that one of the main reasons people give for using steroids is to enhance athletic performance. Although much evidence states that usage is below six percent, anecdotal evidence theorizes that usage is much higher.

Two past studies examine external factors that may help to promote steroid use. The students that are at highest risk for use are those participating in sports that require power (Faigenbaum et al., 1998). Another study examining contributing factors was the steroid study done in San Antonio by Windsor & Dumitru (1989) revealing a higher prevalence for students living within a higher income area rather than lower income residences. The authors point out that steroids may be expensive, but the limitations on attainability are minimal.

In trained athletes, performance was found to improve with the use of steroids. Reference is made to Major League baseball players sending the message to other athletes that using steroids is okay for the end goal of improving performance. Rickert, Pawlak-Morello, Sheppard, et al. (1992) found 5% of the 432 tenth grade respondents in their study had taken HGH at some point. They reported a first time usage at age 14-15 and there was a high association with steroid use among those admitting HGH use.

Irving, Wall, Neumark-Sztainer, & Story (2002) used survey research to analyze a large population (4,746) of middle school and high school students in the Minneapolis public school system. The research found that 5.4% of the 118 male adolescents reported using steroids. The study shows that the level of usage among the male adolescents decreased from middle school (7.6%) to high school (4.4%). This is startling evidence to suggest that middle school usage is greater than high school aged students. Regarding sport specificity, the research found that the athletes participating in “weight conscious” sports (i.e. wrestling, football) were more likely to engage in steroid use. This association may also be encouraged by family or peer pressure.

Approximately 15,000 students were interviewed to determine the prevalence of steroid use and what effect sports had on this (Dodge & Jaccard, 2005). Of the respondents, 1.6% reported steroid use within the last year. The findings revealed that the adolescents participating in sports were at a much greater risk of using steroids than those not involved in sports. Also reported was that adolescents who participate in high school sports are one and half times more likely to use some type of dietary supplement during young adulthood. The researchers link this to male sports needing more muscle and therefore the use of steroids is more frequently condoned to improve overall athletic performance.

A very significant study was done by Faigenbaum, Zaichkowsky, Gardner, & Micheli (1998) on steroid use among fifth through seventh grade students in Massachusetts. The ages of the students ranged from 9-13 years old. A total of 965 students participated in the study and provided the researchers with valuable data. Steroid use was reported by 2.6% of the respondents. One respondent was in the fifth

grade, 17 were in the sixth grade, and 8 were in the seventh grade. Of the 26 total positives, 12 were males. The prevalence of use increased from 11-13 years old. Those reporting use were more likely to be involved with three to four sports and believed that steroids would improve athletic performance. Baseball was the third highest reporting sport of male users (7) behind basketball (9) and football (8). Of the 26 respondents, 23% reported that they knew someone their own age taking steroids and 38% were offered them. Over one-third (35%) of those taking steroids reported that they would take them in the future. Also distressing is that only 54% of users thought that steroids were bad or potentially dangerous. Previous research on this age group from Gray (1990) reported 2% of 10-14 year old soccer players admitted steroid use and Nutter (1997) indicated 3.4% of 12-16 year old students admitted to steroid use.

The American Academy of Pediatrics (1989) and the American College of Sports Medicine (1997 & 1984) both made strong statements against the use of steroids, but admit that the drug may induce strength gains (Pediatrics, 1997). Both sources give the impression that lacking efficacy and potential health risks are not enough to curtail the current use. They feel that adolescents have a hard time differentiating between all the potential negatives of steroid use and society's view of winning at all costs. Past studies have viewed the efficacy of steroids to find that the potential size and strength gains will only be beneficial in a few sports. This may conflict with evidence that points them strictly towards power sports because strength and power require different actions. Research by Smith and Perry (1992) showed that steroid use ranged from 6.6% (12<sup>th</sup> grade) to 11.1% (11<sup>th</sup> grade). The researchers of the pediatric article had not found a single piece of literature that identified adolescents within the study to be at zero risk of

steroid use. The educational programs presented to athletes are having a reverse effect. They feel that scaring athletes with potential health risks or even acknowledging the smallest benefit will encourage steroid use. Even though drug testing is being utilized at the collegiate levels, it does not appear to deter use among the adolescent population. The medical community must be willing and able to help confront these problems when necessary.

A report from Healthy People 2010 (Dept. of Health and Human Services, 2000) showed the estimated use of steroids among the adolescent population to be decreasing. From 1989-1997, steroid use was on a reported decline from 4.7% to 4.1%. This trend continued into 1998 where the report dropped to 2.8% for senior males. These reports may be viewed as unsubstantiated by other research due to the possibility of underreporting (Yesalis, 1993).

Results of the National Youth Sports Research and Development Center (1989) noted that 12% of respondents knew where to obtain steroids and a slightly larger population (15%) indicated that they might use steroids for performance enhancement. Wroble, Gray, & Radrigo (2002) used over 1500 youth sports participants to determine if knowledge had increased from these past studies. A very small percentage (0.7%) reported current steroid use while three percent (49 participants) had been offered steroids at some time. Eleven of the subjects that were offered steroids admitted to use. Athletic performance was the dominant factor in steroid use among the 11 participants, while personal appearance and peer pressure were secondary. Only 64% of the total participants had had the side effects of steroid abuse explained to them while 40% agreed that if used carefully, steroids would not harm them. Approximately two-thirds of the

participants believed that steroids would not improve performance in their sport and 90% stated that they did not need steroids to improve their success. Males were twice as likely to believe that steroids would improve performance in sport (17%) and three percent believed that they needed them for athletic success. The most common source of steroid information was printed material, while parents, trainers, and educators were secondary.

Wichstrom and Pedersen (2000) used Norwegian students (8,508) in grades 7-12 to conduct a study on steroid use. A total of 72 (.8%) subjects reported actual steroid use while 5.1% (430) reported being offered them. The researchers also found that current (5.9%) and past (6.9%) sports competitors had been offered steroids more frequently than those not involved with sports (3.4%). Power sport involvement (more anaerobic) was correlated with lifetime users of steroids. Because the main sports in Norway are soccer, team handball, and cross-country skiing, the researchers felt that there was reasonable suspicion that steroid use there was not as much of a problem as in the United States, where more explosive sports are encouraged (wrestling, track, football). The investigators also found that there is less of a distinction between users and non-users of steroids because sports competition is normal for most adolescents in Norway. The study did find that as the levels of competition increased, the participants were more likely to use steroids (community, .5%; county, .9%; national, 1.3%; international, 2.5%). They also used past research from Taylor and Black (1987) to support the concept that weight lifting in private gyms encourages steroid use, especially in the United States (90%).

Several studies by (Kindlundh et al., 1999; Yesalis & Bahrke, 1995; Tanner et al., 1995; Nilsson, 1995) suggested that adolescents use steroids for performance enhancement. Of the Swedish male high school students represented (1353), 2.7%

reported using steroids (Kindlundh et al., 1999). Twenty-two of the 37 boys reported a lifetime use of doping agents used them for enhancing sports performance and 36 reported being currently active in sports. Students that reported sports activity in their spare time had a higher incidence of steroid use (3.3% of 1008) compared to the non-active males (1.2% of 331). Determining an athlete's reason for steroid use was difficult because many of them use strength training for multiple purposes, one of which is performance enhancement.

#### Overview of Steroid Use

Through the use of an anonymous online survey, Parkinson & Evans (2005) analyzed anecdotal evidence of 500 participants' personal accounts of steroid use. Many of the participants were non-athlete users with the sole intention of improving physical appearance. Startling information is that 60% of the subjects were under 30 years of age while 25% of them had begun using during their teenage years. Because the results were self-reported, the researchers expected the usage reports to vary widely. They did discover that in comparison to past reports (Evans, 1997), the dosages had doubled from approximately 500 mg/week to 1000 mg/wk among the majority. Additionally, 95% reported stacking, or combining two or more different formulas of steroids simultaneously. Of the 500 subjects, 496 reported some type of side effect, and 70% experienced three or more adverse side effects. These side effects included acne, testicular shrinkage, insomnia, sexual dysfunction, injection site pain, fluid retention, mood alterations, and gynecomastia. Acne and testicular atrophy were the most reported side effect. A large majority (89%) reported obtaining their steroids from an illegal source while 11% used a physician's prescription. Even though many of the users



reported concern for potential health risks, only 37% reported discussing their habit with a physician. This may be related to potential legal consequences or lack of intuition on behalf of the physician. The research displayed significant evidence (70% experienced three or more side effects) that potential health consequences are not significant deterrents to steroid use.

#### Perceptions of Health Consequences

A 1996 study of 1600 Canadian students in sixth grade and higher with a self-reported steroid usage of 2.8% (Melia, Pipe, & Greenberg, 1996). Of the 2.8%, just over one-quarter of those students reported using needles for injection while 29% of the needle users admitted to sharing the needles. Melia et al. (1996) also indicated that 54% of those admitting steroid use knew steroids had adverse side effects. The opposite was found in other research where the adolescents felt that steroids were a safe substance.

Approximately 43% of 10-14 year old participants of a survey sponsored by the National Youth Sports Research and Development Center in 1989 felt that steroids would not harm them if used carefully. Supporting this from other research is that 46% of surveyed adolescents felt that steroids were bad or potentially dangerous and 43% felt that if used carefully, steroids would not harm them (Faigenbaum et al., 1998; Wroble et al., 2002). This is why it is not surprising that research estimates 1 to 3 million athletes in the United States alone have used steroids (Silver, 2001).

Despite increased health warnings, adolescents are not taking notice of them as expected. According to information gathered by the NIDA (2005), steroid use among 8<sup>th</sup> and 10<sup>th</sup> graders has increased 50% since 1991. They currently estimate that 500,000 young Americans are currently using. The researchers point out the students' "need" for

societal and peer approval of how they should look. They are trying to find the fastest and simplest way to achieve these goals and satisfy their pride. Because athletes are less likely to engage in risky behaviors in concurrence with steroid use, it appears that their reason for use may be used as an alternative for exercise (Miller, Barnes, Sabo, Melnick, & Farrell, 2003). Past research has found that 36% of seventh grade students believed that taking steroids without exercising or eating well would induce muscle growth (Radakovich, Broderick, & Pickell, 1993).

#### “Natural” Supplements

Since its introduction in 1992, creatine has become the most popular nutritional supplement on the market (Tokish, Kocher, & Hawkins, 2004). Creatine has become popular in anaerobic sporting events likely due to its ability to replenish creatine stores within the muscles ultimately enhancing the phosphocreatine levels. Studies indicate that creatine use among college male athletes ranges from 41-48% (Greenwood, Farris, Kreider et al., 2000; LaBotz & Smith, 1999). With the increased emphasis on athletic performance, it is not likely to see these types of supplements disappearing any time soon.

Research reports that adolescents are more likely to use legal substances (i.e. creatine) rather than steroids for performance enhancement (Dodge & Jaccard, 2005). Their research also shows that adolescents who reported legal supplement use were 26 times more likely to report anabolic steroid use. This supports the theory that although these supplements are legal and minimal side effects are known, they can likely lead to further experimentation with illegal supplements.

Maughen (2005) uses a literature review to look at how many athletes become unsatisfied with the “all natural” gains that they are making in weight room and look to other sources of nutrition or other means to boost their confidence. Past research indicates that supplementation is five to ten percent higher among athletes than non-athletes (Sobal & Marquart, 1994). This statistic can be supported by the coaches and trainers that are providing these supplements to their athletes (Rockwell, Nickols-Richardson, & Thye, 2001). Although a strong correlation between supplement use and immediate success does not exist, positive endorsement by successful athletes is enough to persuade aspiring athletes. However, the contents of these substances are not strictly controlled. In a study that analyzed 634 nutritional supplements, 14.8% revealed hormones not declared on the label (Geyer et al., 2000). The United States ranked fourth (18.8%) on the list of countries that purchased these types of products and was listed as one of the only five countries that was responsible for producing these substances. Without the Food and Drug Administration regulating the production of these substances, they will be readily available for use by athletes of all ages.

Because steroids may be more expensive and may have a few more adverse side effects, many athletes are using creatine, a nonregulated dietary supplement (Gomez, 2002). Creatine is relatively inexpensive, widely available, and very few side effects are known. Increasing muscle stores of creatine (phosphocreatine) is presumed to increase the energy to do work. The increased strength, power, speed, and explosiveness will likely lead to enhanced performance. A large number of reviewed studies by Gomez showed a more significant improvement in normal athletes (26 out of 48) than in elite athletes (13 out of 39).

Research has brought about the realization that administering performance enhancing pharmacological agents to achieve goals is no longer limited to just elite athletes, it is relevant at all levels of sport. Kutscher, Lund, & Perry (2002) reaffirmed the thought that as athletic competition continues to intensify, athletes must strive for higher levels of performance to achieve success. Based on past information, this article was written with the hopes that clinicians would enhance their knowledge of steroids in order to better the quality of care for steroid users. A study by the Blue Cross and Blue Shield Association (2003) reported that steroids were the second most common substance known to be used for athletic performance among 12-17 year old adolescents, second only to creatine (34% vs 38%). This involves the use of a legal substance that may or may not contain all the ingredients that the manufacturer claims on the label.

In an attempt to find a relationship between steroid and creatine use among adolescents, Dodge & Jaccard (2006) found that there is a positive relationship between the two enhancers. Those using a legal supplement were 26 times more likely to report steroid use than those not using natural supplementation. The use of legal supplements was reported to be eight percent. The males were much more likely to use the supplement than a female. Those participating in a sport were one and half times more likely to use a supplement than those that did not participate in a sport. Steroid prevention may need to focus on natural supplements in addition to discouraging steroid use.

In addition to elaborating on the Anabolic Steroid Control Act, Powers (2002) points to various other supplements that are not governed by this policy. These types of supplements are usually referred to as a "natural supplement" while that is not always the

case. Because of the Dietary Supplement Health and Education Act of 1994, these products can be sold legally over the counter as natural supplements within the United States. Even though the product may be advertised as safe, the unmonitored self-use of these substances can create potential health risks. The lack of adequate research on these products also provides sufficient evidence for heightened concern. One of the primary concerns is that manufacturers do not always list the ingredients on the labels, therefore leaving the consumer to trust the contents of the package. A number of subjects tested a few steroid precursors within the natural supplement title and many of them would have tested positive for banned substances. Research has shown the importance of allied health professionals (i.e. athletic trainers) properly educating athletes on how to perform at optimal levels without the use of steroids.

#### Conclusion of Literature Review

In conclusion, the widely varying percentages of steroid usage in published reports should be expected considering other factors (i.e. self-reporting, steroid testing, athlete vs. non-athlete, etc.). Steroid use has proven itself a relevant topic in that there are positive reports from users of all different performance levels. The evidence supports the notion that adolescents and college athletes alike are using illegal substances for a variety of reasons. Although it is impossible to speculate a specific reason for use, it does appear that sports enhancement may be the biggest factor in pushing athletes to use steroids and society may be to blame. Factors do exist that cause athletes to avoid steroids. It is also important to note that the amount of money and commitment it takes to run a successful prevention program may be putting smaller programs and adolescents at a larger risk. There does not appear to be any type of organization or funding that is

allotted to help alleviate these costs and therefore the wrong message may be being sent to those athletes in particular. The athletes resisting steroid use are very likely to try other supplements that allegedly do not contain any type of testosterone derivative. This may also be a significant indicator that athletes are constantly feeling the pressure to succeed and do not feel that they can do it naturally.

## CHAPTER 3

### METHODS

The purpose of the current study was fivefold. First, the severity of the steroids/HGH issue in college baseball will be examined through self-reporting of access and use of steroids/HGH. Second, potential motives (i.e., performance enhancement, appearance) of steroid/HGH use were analyzed. Third, deterrents (i.e., fear of punishment, negative health consequences) of steroid/HGH use were examined to determine an appropriate educational approach for eliminating future steroid/HGH use. Four, the use of the legal substance creatine was analyzed as a possible alternative to steroids/HGH. Finally, players' perceptions of steroid/HGH use at different levels of baseball was assessed.

#### Participants

One hundred seventy-three baseball players ranging in age from 18 to 23 years of age ( $M = 19.63$ ,  $SD = 1.21$ ) selected from six Illinois Division I universities and junior colleges participated in the current study. One participant chose to leave the room prior to completing the survey. The participants reported a mean 13.29 ( $SD = 2.64$ ) years of prior organized baseball experience. Team selection was based on previous affiliations between the coach and the researcher or faculty advisor. All of the research was approved by the Institutional Review Board at Eastern Illinois University.

## Research Instrument

The research instrument used was a four page questionnaire (Appendix A). Likert-type questions made up a large part of the survey. There were also questions that required direct “yes” or “no” responses. The Likert-type questions addressed steroid/HGH usage, reasons for use, and deterrents.

### Demographics

The participants were asked to provide demographic information such as age, collegiate athletic affiliation, number of years involved in organized baseball, various sports participation, and race. The questionnaire also asked about the athlete’s main source of steroid/HGH information.

### Actual Steroid/HGH Use, Being Offered, Obtaining Steroids, Creatine Use

Specific questions related to past history of steroid/HGH use, steroid/HGH accessibility, having been offered steroids/HGH, and creatine usage were analyzed through direct “yes” or “no” responses.

### Motives for Using

Three questions were asked to evaluate potential motivators for steroid/HGH use. The questions were evaluated on a five point Likert scale ranging from “disagree 100%” to “agree 100%”. The following question format was used: “I would use steroids/HGH ...”

### Deterrents

Seven questions were asked to evaluate potential deterrents to steroid/HGH use. The questions were asked on a five point Likert scale ranging from “disagree 100%” to



“agree 100%”. The following format was used for determining the major deterrents of steroid/HGH use: “I would NOT use steroids/HGH ...”

#### Perceptions of Steroid/HGH use

This section of the survey asked participants to perceive steroid/HGH use among the various baseball levels with scores ranging from “none at all” to “76-100%” and were scored on a five point Likert scale. The following question was used to help analyze steroid/HGH usage among various levels: “What percentage of baseball players in the U.S. do you think use steroids or HGH... (please circle only one)?”

#### Procedure

Prior to receiving the survey, each participant was provided an informed consent document (Appendix B). The informed consent was then read aloud to alleviate misunderstandings. The athletes were then given time to ask any questions. Potential participants were asked to print and sign their names on the respective lines if they were willing to participate in the current study. Those who did not want to complete the survey were asked to wait outside the testing area. Participants were given the survey with the understanding that they should not look at another’s survey or discuss the survey with another participant, as it may affect their responses. The investigators administered the surveys to alleviate coercion from the coach. Subjects completed a survey (Appendix A) with questions specifically related to the participant’s athletic affiliation, perceptions of steroid/HGH usage among various baseball levels, and reasons why they would choose to use or not use anabolic steroids or HGH. The questions were presented in a variety of formats ranging from percentile differences to 5-point Likert scale questions. Upon

completion, the surveys were laid face down in a pile so as not to reveal any one participant's answers to the investigator or other participants.

#### Data Analysis

The data was analyzed using SPSS 14.0. Frequency data was collected on the following; being offered steroids/HGH, having access to steroids/HGH, knowing where to obtain steroids/HGH, and creatine use. However, steroid/HGH motivators and deterrents of steroid/HGH use were analyzed through mean scores and standard deviations. Statistical significance was determined for precursors and deterrents through paired-sample t-test. Percentage frequencies were calculated for each of the direct yes and no questions. The Likert scale questions were analyzed on a scale of 1-5.

## CHAPTER 4

### RESULTS

The purpose of this study was to examine the perceptions of college baseball players on the prevalence of steroid/HGH use among a variety of baseball levels. This study also hoped to investigate actual use, accessibility, precursors to use, and potential deterrents of steroid/HGH use.

The hypotheses were as follows: 1) steroid/HGH use in the current sample will be relatively low (less than 5%) as previous studies of NCAA athletes have reported few positive tests, 2) performance enhancement is likely to be the primary reason for beginning steroid/HGH use, 3) the primary deterrent to steroid/HGH use will be potential punishment, 4) a large percentage of these athletes will report using the legal substance creatine, 5) the perception of steroid/HGH use increases as the level of baseball increases.

The results section presented here is comprised of two segments. The first segment presents descriptive data related to perceptions of use, reasons for use, deterrents of use, and accessibility. The latter segment analyzes the specific hypotheses within the current study.

### Descriptive Analysis

Percentage frequencies were reported for steroid/HGH use, being offered steroids/HGH, and creatine use. Means and standard deviations were calculated for reasons to use and not to use. The descriptive analysis displays all of the results without reporting a statistical comparison.

#### Steroid/HGH Use, Being Offered, Creatine

As seen in Table 1 the actual incidence of steroid/HGH use, being offered steroids/HGH, knowing where to obtain steroids/HGH, and creatine use were analyzed through yes/no responses with the percentage of "yes" responses being calculated. The incidence of steroid use was reported to be 2.3%. Of the respondents, 37.8% (n = 173) had previously been offered steroids/HGH and 58.4% (n = 173) of those surveyed knew where to obtain steroids/HGH. Based on the surveys collected, 53.2% (n = 173) admitted to using the legal supplement creatine.

Table 1  
Percentage Responding Yes

Steroid/HGH Use	2.3%
Being Offered	37.8%
Know Where to Obtain	58.4%
Creatine use	53.2%

### Reasons for Use and Deterrents

As reported in Table 2, participants rated all three potential reasons for using steroids/HGH rather low with a mean score less than three. The deterrents to steroid/HGH, however, reported noticeably higher means of greater than 3.5 for most of the variables presented. Also seen in Table 2 are the percentage frequencies for each of the intervals. Over fifty percent of the respondents did not feel that improving looks or peer pressure were precursors to steroid/HGH use. Yet, over 80% of the respondents felt that potential punishment, health consequences, and being viewed as a cheater were deterrents to steroid/HGH use.

Table 2  
Percentage Frequencies, Means, and Standard Deviations for Surveyed Variables

Variables	Disagree 100%	Disagree somewhat	Unsure	Agree somewhat	Agree 100%	M	SD
Use							
Performance enhancement	38.20%	15.60%	12.10%	23.10%	11%	2.53	1.46
Looks improvement	50.30%	20.20%	9.80%	16.20%	3.50%	2.02	1.25
Peer pressure	56.40%	20.90%	8.70%	13.40%	0.60%	1.8	1.09
Not use							
Potential Punishment	5.80%	6.90%	6.40%	28.30%	52.60%	4.38	3.24
Health Consequences	4.00%	7.50%	5.20%	25.40%	57.80%	4.27	0.99
Viewed as a cheater	2.30%	5.80%	8.10%	29.50%	54.30%	4.25	1.11
Moral Issues	5.20%	13.30%	12.70%	26.60%	42.20%	3.87	1.24
Steroids/HGH illegal	8.70%	15.00%	8.10%	22.00%	46.20%	3.82	1.37
Obtaining Steroids/HGH	30.60%	17.90%	12.70%	22.00%	16.80%	2.76	1.5
Creatine	20.80%	17.30%	24.30%	27.70%	9.80%	2.88	1.29

\* 1 = disagree 100% 2 = disagree somewhat 3 = unsure 4 = agree somewhat 5 = agree 100%

### Perceptions of Use

The collegiate players' perceptions of frequency of steroid/HGH use at various levels of play are presented in Table 3. The collegiate respondents perceived professional steroids/HGH use to be quite high, as nearly thirty percent selected the 51-75% response. Almost two-thirds of the subjects perceived steroid/HGH use within the collegiate population to be between 11-50%. The subjects perceived steroid/HGH use at the high school level to be fairly low as over half selected the 1-10% response. Likewise, subjects perceived pre-high school athletes to be using steroids/HGH at a fairly low rate as over ten percent perceived usage to be non-existent.

Table 3  
Perceptions of Use by Level of Play

Level of Play	None	1-10%	11-50%	51-75%	76-100%
Pre-High School	11.0%	57.2%	26.0%	5.8%	0%
High School	0%	61.3%	36.4%	2.3%	0%
College	1.2%	18.2%	66.5%	14.1%	0%
Professional	0%	11.6%	56.1%	29.5%	2.9%

\* 1 = None 2 = 1-10% 3 = 11-50% 4 = 51-75% 5 = 76-100%

## Analysis of Hypotheses

### Actual Incidence of Steroid/HGH Use Will Be Less than Five Percent

Of the collegiate sample that responded to the question of steroid/HGH use, only 2.3% reported actual usage. This supported the first hypothesis suggesting that the actual incidence of steroid/HGH usage was relatively low (<5%).

### Reasons for Use

The players were asked to determine what variables (i.e. performance enhancement) would have caused them to want to use steroids/HGH. Just over one-third (34.1%) stated that performance enhancement was a precursor for steroid/HGH use. The highest mean score (2.53) also indicated that performance enhancement was a greater precursor than improving looks ( $M = 2.02$ ) or peer pressure ( $M = 1.80$ ). Hypothesis two was supported within these results in that performance enhancement was the most likely precursor to steroid/HGH use.

### Deterrents of Use

Running analysis of mean scores and percentage frequencies presented different primary deterrents. The mean scores indicate that potential punishment ( $M = 4.38$ ) was the dominant deterrent, however, being viewed as a cheater (83.8%) was the most likely deterrent based on percentage frequencies. Potential health consequences were also reported as a strong deterrent based on both mean and percentage frequencies reported. The third hypothesis was not supported by these results in that potential punishment was not the primary deterrent to steroid/HGH use.

### Creatine Use

Analysis of the fourth hypothesis revealed that a large percentage of players would admit to using creatine. This was achieved through assessing the percentage of “yes” responses within the collegiate baseball sample. The analysis revealed that 53.2% of these athletes use creatine. This supported the fourth hypothesis that a large percentage of athletes use creatine.

### Collegiate Baseball Players' Perception of Steroid/HGH Use Increases with Level of Play

Over 51% of players believed that 11-50% of professional baseball players use steroids/HGH and another 29.5% believed that 51-75% of players at the professional level are users. Therefore it is clear that the perception of use was highest for the professional level. The perception at the collegiate level was second highest in that 66.5% of subjects perceived usage to be between 11-50% and 14.1% perceived usage to be between 51-75%. Perceived usage rate of steroid/HGH was higher at the high school than the pre-high school level based on greater percentages within the 1-10% (61.3 vs. 57.2%) and the 11-50% (36.4% vs. 26%) intervals. In addition, 11% perceived pre-high school steroid/HGH usage to be non-existent. This supported the final hypothesis that proposed collegiate baseball players' perception of steroid/HGH use to increase as the level of play increases.



## CHAPTER 5

### DISCUSSION

With the looming MLB steroid scandal, it seemed pertinent to examine the steroid issue further. As part of President George Bush's 2004 State of the Union Address, he proclaimed that "athletics play such an important role in our society, but, unfortunately, some in professional sports are not setting much of an example. The use of performance-enhancing drugs like steroids in baseball...sends the wrong message -- that there are shortcuts to accomplishment, and that performance is more important than character." A study by Blue Cross Blue Shield found that the perception of steroid use within baseball had increased from 22% (2001) to 27% (2003). These findings and professional athletes such as Jose Canseco claiming that steroids are rampant throughout Major League Baseball, it is difficult to imagine that the younger generation athletes would not follow suit. Through the perceptions of collegiate baseball players, researchers can analyze whether this trickle down effect has occurred. The current study examined the incidence of steroid use and college baseball players' perceptions of steroid/HGH use at the pre-high school, high school, college, and professional levels. The research also measured dominant precursors and deterrents to steroid/HGH use among the collegiate baseball sample. Knowing where to obtain steroids/HGH and what percentage of the collegiate athletes use creatine were also analyzed. From past research and the current data collected, it is evident that the steroid/HGH endemic has not been resolved.

Researchers believe one of the main reasons for athletes beginning steroid use is because of the success that professional athletes have. A Kaiser Foundation study (1999) revealed that 73% of youth desire to be like high-profile athletes and 52% believe that these high-profile athletes are using performance-enhancing drugs. Until recently, there has been limited factual evidence brought against professional athletes for steroid use. The 2004 statistics released by Major League Baseball commissioner Selig, showed that the positive test reporting of 1-2% is clearly lower than the perceived rates. Based on results from the current study, it does not appear that this type of relationship exists among the collegiate sample in that only 2.3% admitted to steroid/HGH use and the perceived usage rate was much higher. In the current study, it appeared as though the deterrents of use were much stronger than the potential precursors. This may be a strong indicator that athletes are avoiding using steroids/HGH, not only for the potential deterrents, but because the motivators are not worth the risk.

As compared to past research (Kindludh et al., 1999; Yesalis & Bahrke, 1995; Tanner et al., 1995; Nilsson, 1995), Green et al. (2001) reports NCAA athletes actually using steroids for performance enhancement at a rate of 47%. The current study found an opposing trend in that based on the mean score (2.53) most athletes either disagreed somewhat or were unsure of the effect that performance enhancement would have on them using. It was, however, determined that the athletes would use steroids/HGH for performance enhancement over improvement of looks or peer approval. This may lead researchers to believe that performance enhancement is not as potent of a precursor as it was less than ten years ago.

When studying potential deterrents of steroid/HGH use, it was interesting to find that potential punishment, being viewed as a cheater, and potential health consequences were all strong deterrents. However, potential punishment was the dominant deterrent among the variables based on mean scores. Also, being viewed as a cheater and health consequences proved to be very similar in significance based on the statistical analysis. The significance of potential health consequences with this study differs from other research that concluded scaring adolescents with potential health consequences will likely perk their interest rather than dissuade them from using (Yesalis & Bahrke, 2000). This also supports a 2001 NCAA study where 55% of college athletes reported drug testing as a deterrent to steroid use. Likewise, Catlin & Murray (1996) found that athletes were more likely to refrain from steroids because of the impending fear of reprisal rather than health consequences. It is unfortunate that the current testing policy does not encompass the lower Divisions of college baseball because it is apparent that the possibility of being tested for these substances will deter use. This can be seen in that three of the four athletes that admitted steroid/HGH use within the current study were currently or may have previously played junior college baseball. The deterrent of steroid testing can also be seen within MLB where Commissioner Bud Selig released a 2005 report before the House of Representatives Committee on Government Reform that showed steroid use within the minor leagues to decrease from 4.8% in 2002 and 4% in 2003 to 1.7% in 2004 in response to the first-ever comprehensive drug testing policy for minor league baseball. The drop in usage rates among baseball is not necessarily indicative of the athletes themselves, but rather the initiative of each individual organization to make use of their drug testing programs.

Based on collegiate baseball players' perceptions of steroid/HGH use, the prevalence of steroids/HGH increases as the level of play increases. Though the data is widespread across the scale, professional players were perceived to use steroids/HGH at a much greater rate than each of the other levels. Even though players perceived pre-high school athletes to be using steroids/HGH, they also had the highest percentage of perceived zero prevalence. Research of actual steroid usage by Wichstrom & Pedersen (2000) found that as the level of competition increased from community to international (community, .5%; county, .9%; national, 1.3%; international, 2.5%), the likelihood of participants using steroids increased. However, the majority of the reviewed scientific literature with the literature review points to the alternate relationship in that the level of steroid use is higher at the lower levels of competition. This may be in larger part due to adolescent studies being anonymous self-reporting studies, while most of the college and professional studies were based on actual testing. Recent testing by Major League Baseball has shown usage to be 1.2% (Jenkins, 2005) within the professional teams and 1.7% (Selig, 2005) within the minor leagues in 2004. The current study reported usage to be 2.3%, which is slightly higher than the reported MLB statistic. Green et al. (2001) reported usage within NCAA Divisions I, II, & III to be just over one percent. Smith & Perry report a significantly higher rate of steroid use within the high school age group at 6.6-11.1% (1992). A wide range of adolescent studies report general usage to be between 1.4-12% (Buckley, et al, 1988; Yesalis et al., 1993; Windsor & Dumitru, 1989; NIDA, 1990; Terney & McLain, 1990; Komoroski & Rickert, 1992; DuRaunt et al., 1995; Whitehead et al, 1992; Tanner et al., 1995; Middleman et al., 1995). It is clear that the education being provided to the athletes is not enhancing their knowledge of the

prevalence of steroid/HGH use at other age levels. These alarming statistics may also give rise to the thought that the current fight against steroid/HGH use may be too specific to competitive levels and those athletes at greatest risk are falling under the radar.

Regardless of the athlete's reason for choosing to not use steroids/HGH, it is clear that these athletes are determined to find some type of supplementation. Creatine may be the most popular legal performance enhancing substance on the market. Past research shows that between 41-48% of collegiate male athletes use creatine (Greenwood, Farris, Kreider et al., 2000; LaBotz & Smith, 1999). A study by Blue Cross Blue Shield (2001) indicated that creatine was the most commonly used substance for athletic enhancement at a rate of 57% among 12-17 year old adolescents. Based on the results of the current study with regards to creatine use (53.2%) and past literature, athletes feel that this is an effective way to get an edge on the competition. Provided that these substances do not incur future restrictions (not currently approved by the Food and Drug Administration) it is encouraging that athletes are choosing safer routes to enhance performance.

The current study provides disturbing evidence that steroids/HGH are easy to obtain. Over one-third (37.6%) of the respondents admitted that they had been offered steroids/HGH at some point in their lives, while 58.4% knew where to obtain them. Faigenbaum et al. (1998) reported that 23% of middle school (5<sup>th</sup>-7<sup>th</sup> graders) knew someone their own age taking steroids and 38% had been offered them. The National Youth Sports Research and Development Center in 1989 noted that 12% of the respondents knew where to obtain the illegal supplements. They also found that current and past sports competitors had been offered steroids more frequently than those not involved with athletics. In support of the current study, Green et al. (2001) reported that

only .7% of the surveyed athletes would abstain from steroid use because they were difficult to obtain. It is encouraging knowledge that regardless of the accessibility of steroids, a large percentage of student athletes are still choosing to not use them.

### Recommendations

The statistical data presented from this research demonstrates a need for steroid/HGH education. The amount of national attention being brought to steroids/HGH by the MLB steroid scandal is likely to be misinterpreted by adolescents as simply a careless act that results in minimal consequences. Educational programs need to constantly be evaluated and redesigned such that students are enabled to learn the current facts about steroid/HGH use. These programs need to confront the issues rather than just lend support for these athletes achieving "artificial" success. The potential health and legal consequences need to be discussed with athletes so that they do not misinterpret the meaning of potential hazards that may await them. Simply put, steroids are a synthetic drug. If more emphasis is placed on exercise science within physical education departments, many students will learn how to properly gain muscle tone and speed without compromising their health, values, or the rules of the game. Each of these topics can be broached through a preliminary test that evaluates student-athletes' knowledge prior to beginning the program. This may provide educators and practitioners with a blue-print to where the deficiencies lie and allow for more instruction in these areas.

For steroid/HGH testing to be a significant deterrent among all levels of baseball, there must be access to testing. Athletes need to anticipate that at some point in their careers they will be held accountable for what they put into their bodies. One disturbing fact that needs to be addressed is adolescent usage. Because steroid testing is not a likely

solution within the adolescent level, practitioners must find other methods of prevention. Koziris (2000) stresses the importance of the primary care physician in acting as an unbiased third party. Another potential solution is through the ATLAS (Athletes Training and Learning to Avoid Steroids) program (Goldberg & Elliot, 1999) whereby information is presented in a team setting on how to better eat and train without the use of steroids/HGH or supplements. Such an approach has led to a 50% reduction in steroid use among high school students. Though no solution is guaranteed, it is important to focus on improving the steroid/HGH situation one athlete at a time.

Other areas of research that may prove beneficial to further this study would be determining whether or not the athletes' hometown populations (urban vs. rural) are significant benefactors to steroid/HGH use. This would allow educators and practitioners to focus greater attention on areas that are at a greater risk. Also, it may be useful to conduct a larger analysis between the different Divisions (I, II, & III) to determine which has the highest incidence of steroid/HGH abuse in order to expose weaknesses within the system of prevention. A third extension of this research could be aimed at analyzing the other baseball levels to determine how the perceptions vary among the different groups. Interpreting this data will help educators develop effective ways to combat differing perceptions. Even though scientific evidence shows steroid/HGH use to be lower than anecdotal evidence, it is still disconcerting to know that some players allow the price of success to outweigh the value of playing the game the right way.

### Limitations

This study was a self-reporting anonymous survey of sensitive subject content, including admission of steroid/HGH use. It is only expected that the content of the

sensitive study may affect how the participant responds. It is vital that participants understand the anonymity and confidentiality features of their information. The athletes, in being asked to make perceptions of current teammates, may have altered their answers. Because many teammates are also friends outside of the sport, participants may want to protect the privacy of those with whom they consider friends. The investigators assume that all participants completed the survey within the agreement stated in the informed consent. As with any large group, it is difficult to monitor every individual that is participating in the exam. Some students may have withdrawn due to the subject content, therefore limiting the overall participation.

### Conclusion

In conclusion, this study's results indicated low incidence of steroid/HGH use among college baseball players. However, the reader must bear in mind that steroid/HGH use exists and is an issue worth combating. Practitioners need to go forward to deter misuse of a drug that can have severe health detriments and potentially cast a shadow over the game of baseball forever.



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## Appendix A

Please answer the following questions as honestly as possible. Please keep in mind that there are no right or wrong answers and your answers are completely confidential. Your results will not be shared with anyone and your name will not be placed with your answers as your name is not included with the questions.

Age: \_\_\_\_\_

What level of baseball are you currently participating in (please mark an X next to your current level)?

- (1) Jr. High School    (2) Recreational    (3) High School Varsity  
 (4) Jr. College    (5) NAIA Intercollegiate    (6) Division III Intercollegiate  
 (7) Division II Intercollegiate    (8) Division I Intercollegiate  
 (9) Professional

How many years have you been playing organized (league) baseball? \_\_\_\_\_

What organized sport(s), besides baseball are you, or have you participated in?

\_\_\_\_\_ Basketball    \_\_\_\_\_ Football    \_\_\_\_\_ Hockey    \_\_\_\_\_ Rugby    \_\_\_\_\_ Soccer  
 \_\_\_\_\_ Tennis    \_\_\_\_\_ Track & Field    \_\_\_\_\_ Wrestling  
 \_\_\_\_\_ Other (Identify sport) \_\_\_\_\_

Race:

\_\_\_\_\_ African American    \_\_\_\_\_ Asian American    \_\_\_\_\_ Caucasian (white)  
 \_\_\_\_\_ Hispanic    \_\_\_\_\_ Other (please state) \_\_\_\_\_

What is your primary source of information about anabolic steroids and human growth hormone (HGH) (please select only one)?

- (1) Athletic trainer    (2) Book/magazine    (3) Coach    (4) Friend/teammate  
 (5) Internet    (6) Major League Baseball Scandal    (7) Parent    (8) Steroid dealer  
 (9) Teacher/classes    (10) Television

Do you feel you have the ability to play baseball at the next competitive level (i.e. college if you are currently a high school player or professional if you are a college player)?

Not at all	Doubtful	Unsure	Probably	Definitely
1	2	3	4	5

How strong is your belief that you can play baseball at the next competitive level?

100% Doubtful	Weak	Unsure	Fairly sure	100% sure
1	2	3	4	5



Anabolic steroids/HGH improve performance in baseball (please circle only one)?

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

What percentage of baseball players in the U.S. do you think use steroids or HGH prior to high school (please circle only one)?

None at all	1-10%	11-50%	51-75%	76-100%
-------------	-------	--------	--------	---------

What percentage of high school varsity baseball players in the U.S. do you think use steroids or HGH? (please circle only one)?

None at all	1-10%	11-50%	51-75%	76-100%
-------------	-------	--------	--------	---------

What percentage of intercollegiate (Jr. College, NAIA, Division I, II, & III) baseball players in the U.S. do you think use steroids or HGH? (please circle only one)?

None at all	1-10%	11-50%	51-75%	76-100%
-------------	-------	--------	--------	---------

What percentage of professional baseball players do you think use steroids or HGH?

None at all	1-10%	11-50%	51-75%	76-100%
-------------	-------	--------	--------	---------

Professional baseball players like Barry Bonds should have their accomplishments erased from the record books if it is determined that they used steroids.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

Please rate your agreement/disagreement to the following statements related to reasons for using steroids.

I would use steroids/HGH to help me make it to the next level of my sport (i.e., high school to college: college to professional) (please circle only one)?

Definitely not	Probably not	Possibly	Definitely
1	2	3	4

I would use steroids/HGH if they would allow me to reach the highest level of baseball (major league baseball MVP) but would shorten my lifespan by 5 years?

Definitely not	Probably not	Possibly	Definitely
1	2	3	4

Please rate your agreement/disagreement to the following statements related to reasons for NOT using steroids.

I would NOT use steroids/HGH because I feel that it is morally wrong and against my belief system.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

I would NOT use steroids/HGH for fear of punishment/suspension/expulsion.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

I would NOT use steroids/HGH because they are illegal.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

I would NOT use steroids/HGH for fear of being viewed as a cheater.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

I would NOT use steroids/HGH because of the potential negative health consequences.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

I would NOT use steroids/HGH because I can get the same results from creatine without the side effects.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

I would NOT use steroids/HGH because I wouldn't know how to obtain them.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

Please rate your agreement/disagreement with the following statements related to reasons why people use steroids.

I would use steroids/HGH to improve my athletic performance.

Disagree 100%	Disagree Somewhat	Unsure	Agree Somewhat	Agree 100%
1	2	3	4	5

I would use steroids/HGH to improve my appearance/looks.

Disagree	Disagree	Unsure	Agree	Agree
100%	Somewhat		Somewhat	100%
1	2	3	4	5

I would use steroids/HGH because of my peers/teammates.

Disagree	Disagree	Unsure	Agree	Agree
100%	Somewhat		Somewhat	100%
1	2	3	4	5

Please rate your agreement/disagreement with the following statements.

Steroids/HGH, when used for non-medical purposes, are harmful.

Disagree	Disagree	Unsure	Agree	Agree
100%	Somewhat		Somewhat	100%
1	2	3	4	5

Using steroids/HGH without lifting weights will increase muscle mass and strength.

Disagree	Disagree	Unsure	Agree	Agree
100%	Somewhat		Somewhat	100%
1	2	3	4	5

Have you used steroids/HGH before?

Yes                      No

Have you been offered steroids/HGH before?

Yes                      No

Would you know where to obtain steroids/HGH if you wanted to use them?

Yes                      No

Have you used creatine before?

Yes                      No

## APPENDIX B

# CONSENT TO PARTICIPATE IN RESEARCH

## Perceptions and usage among intercollegiate baseball players

You are invited to participate in a research study conducted by Ben Riegle (graduate student) and Dr. Brent Walker (faculty/thesis advisor), from the Physical Education Department at Eastern Illinois University. Your willingness to participate in this study is entirely voluntary. Please ask questions about anything you do not understand, before deciding whether or not to participate.

### • PURPOSE OF THE STUDY

Examine the perceptions that baseball players have of steroids among various age groups. We would also like to analyze the reasons why baseball players choose to use or avoid steroids. This information will help us to determine if a problem exists or is becoming enhanced by the recent publicity given to steroids.

### • PROCEDURES

If you volunteer to participate in this study, you will be asked to:

Answer a few pages worth of questions related to steroids. These questions will not only relate to your perceptions, but also to your personal experience(s). The hand written surveys will be administered and instructed by either Dr. Walker or myself. Those participating in the online survey will be given specific instructions at the time of the survey.

### • POTENTIAL RISKS AND DISCOMFORTS

There may be questions related to your personal experiences with illegal substances. You will also be asked to make an indirect perception of your teammates, past or present.

### • POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

The potential benefit lies in the fact that your views or experiences may help us to identify certain age groups that need further steroid analysis.

### • CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Your names and team affiliations will NOT be included anywhere on the survey. The information will only be released as cumulative results with no team affiliations included. The surveys will not be viewed by anyone other than myself, Dr. Walker, or the person responsible for inputting the data into the database. Once the study is complete, you will be able to view the results at your own discretion.

## • PARTICIPATION AND WITHDRAWAL

Participation in this research study is voluntary and not a requirement or a condition for being the recipient of benefits or services from Eastern Illinois University or any other organization sponsoring the research project. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind or loss of benefits or services to which you are otherwise entitled. You may also refuse to answer any questions you do not want to answer. There is no penalty if you withdraw from the study and you will not lose any benefits to which you are otherwise entitled.

The investigator may withdraw you from this research if circumstances arise which warrant doing so. Talking with others prior to or while you are taking the survey is prohibited for the fact that it may affect your response. Also, you are not allowed to look at another survey before, during, or after completing your own. You are not allowed to view other completed tests because it will void the confidentiality agreement between the researcher and the participant.

## • IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about this research, please contact Ben Riegle at 217-254-1704 or Dr. Brent Walker at 217-581-8580.

## • RIGHTS OF RESEARCH SUBJECTS

If you have any questions or concerns about the treatment of human participants in this study, you may call or write:

Institutional Review Board  
 Eastern Illinois University  
 600 Lincoln Ave.  
 Charleston, IL 61920  
 Telephone: (217) 581-8576  
 E-mail: eiuirb@www.eiu.edu

You will be given the opportunity to discuss any questions about your rights as a research subject with a member of the IRB. The IRB is an independent committee composed of members of the University community, as well as lay members of the community not connected with EIU. The IRB has reviewed and approved this study.

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I voluntarily agree to participate in this study. I understand that I am free to withdraw my consent and discontinue my participation at any time. I have been given a copy of this form.

\_\_\_\_\_  
 Printed Name of Participant

\_\_\_\_\_  
 Signature of Participant

\_\_\_\_\_  
 Date