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An Examination Of Implicit And Explicit Attitudes Toward Steroids/Hgh In A Sample Of College Athletes And Nonathletes

Dominic Gray Morais
Eastern Illinois University

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An Examination of Implicit and Explicit Attitudes Toward

Steroids/HGH in a sample of college athletes and nonathletes

(TITLE)

BY

Dominic Gray Morais

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Chapter I

Abstract

Recently, media has placed more attention on the use of anabolic-androgenic steroids (AAS) and human growth hormone (HGH) due to confessions and positive drug tests by professional athletes concerning their use. The idolization of these athletes by younger individuals, especially athletes, incites concern about their attitudes toward such substances. Therefore, the purpose of this study was to explore the attitudes toward AAS and HGH in athletes and nonathletes. One hundred forty three male and female intercollegiate athletes (N = 83) and undergraduate and graduate Kinesiology and Sports Studies majors (N=60) at a Division I Midwestern University volunteered for the study. Literature in this area supports the assertion that alternatives to explicit measures (surveys, interviews) be employed when investigating socially sensitive issues. Therefore, implicit attitudes were assessed using the Implicit Associations Test protocol with "Legal Supplements" and "Illegal Banned Substances" serving as categories. Explicit attitudes were assessed using the Performance Enhancement Attitude Scale. However, for this study, the word "doping" was substituted with words such as "steroids". The implicit and explicit attitudes toward AAS and HGH in males, females, athletes, and nonathletes were all generally negative. No significant correlation was found between implicit and explicit attitudes. Moreover, perceptions of estimated use of AAS and HGH increased at each successive level of sport (prior to high school, high school, collegiate, professional) indicating a professionalization of performance enhancing substance use. Regarding the purpose of the study, it was determined that increasing attention garnered by these substances is unfounded as most individuals hold negative views toward them. Furthermore, although more

research is necessary, this study supports the use of alternative (implicit) measures in assessing the attitudes toward AAS, HGH, and illegal substances in sport.

Chapter II

Introduction

In recent years, media has placed a growing emphasis on anabolic-androgenic steroids (AAS). Human Growth Hormone (HGH) has also garnered much attention, and, because of mainstream media, has become associated with and, at times, synonymous with AAS (The Associated Press, 2007). The emphasis on AAS and HGH is especially true in the professional sport realm. In 2005, Mark McGwire, Sammy Sosa, and Jose Canseco were summoned to testify on steroid use in major league baseball by the United States Congress (Committee on Government Reform, 2005). Troubles with AAS are evident in other professional leagues as well as Julius Peppers, Shawne Merriman, and Brian Cushing were all suspended for violating the NFL steroid policy in 2002, 2006, and 2010, respectively (Vecsey, 2010). Moreover, media attention resulted in 43% of United States citizens believing that either most or half of U.S. professional athletes used steroids to enhance their athletic performance (CBS & The New York Times, 2003).

The implications of these events and statistics are vast. Adolescents and youth idolize and see professional athletes as role models. A 2003 Kaiser Foundation study revealed that 73% of youth desire to be like high-profile athletes and 52% believe that high-profile athletes are using performance-enhancing drugs (The Henry J. Kaiser Family Foundation, 2000). Subsequently, similar to the use of chewing tobacco by young baseball players, youth may be inclined to emulate the actions of professional athletes by using AAS and HGH as well (Denham, 2006). Furthermore, after hearing of a large number of professional athletes using AAS and HGH,

athletes with goals of entering the professional ranks may deem such use necessary, or even an accepted part of the game.

In order to protect individuals from the adverse effects of AAS and HGH, a movement for "cleaning up" sports has commenced (Saugy et al., 2006; Hartgens & Kuipers, 2004). Campaigns have been created to fight performance enhancing drug use in sport. Additionally, the attention attracted by these substances prompted Ex-President George W. Bush to rebuke such problems in his 2004 State of the Union address (Office of the Press Secretary, 2004), and heads of many sport organizations have placed a priority on increasing penalties and/or making the drug policy of their organizations more stringent (Reiss, 2007; Kiely, 2005).

However, based on research conducted by Strelan & Boeckmann (2006), utilizing legal means (drug testing, etc.) to prevent and deter doping in sport are not effective. Rather, the moral beliefs and health concerns of individuals have the greatest effect on individual decisions to use banned substances. Therefore, the importance of knowing and understanding the attitudes of individuals toward banned substances such as AAS and HGH are imperative in the effort to deter and prevent their use, thereby maintaining the safety of sport participants as well as the integrity of sport.

As explained by the social desirability theory (Crowne & Marlowe, 1960; Edwards, 1957), however, self-reports are apt to distortion and dishonesty when concerned with a socially sensitive subject. And, in the case of AAS and HGH, it is obvious the media has created an overwhelmingly negative view, and individuals do not wish to share attitudes they feel may be disdained by others.

Therefore, in order to discover the attitudes and perceptions of individuals toward these banned substances, it is essential to utilize measures that are not subject to the aformentioned

distortion. Thus, the purpose of this research is to explore the explicit and implicit attitudes of intercollegiate varsity athletes and nonathletes toward AAS and HGH. The goal is not only explore the effectiveness of implicit measures of attitutes toward AAS and HGH, but to discover and understand how athletes and college-aged students truly view and perceive them.

Hypotheses

1. Athletes will show explicit negative perceptions of AAS and HGH.
2. There will be less of an explicit and implicit bias toward AAS and HGH in males compared to females.
3. The correlation between the explicit and implicit attitudes of athletes toward AAS and HGH will not be significant.
4. Nonathletes will have less of an implicit and explicit bias against AAS and HGH than athletes.
5. Estimates of performance enhancing drugs will increase with each successive level of sport.

Limitations

1. Social desirability might influence answers to the explicit measures questionnaire.
2. The familiarity with terms on the Implicit Associations Test may differ with each individual and affect results.
3. The environment of participants during assessements may be distracting and not optimal for completing tests.
4. Utilizing athletes from a single university may limit the generalizability of the findings.

5. Attitudes toward AAS and HGH do not necessarily dictate future use.
6. Mentalities of Kinesiology and Sports Studies students may be similar to that of athletes and not adequately represent true nonathlete attitudes.

Operational Definitions

Anabolic-Androgenic Steroids (AAS) – Any of a group of usually synthetic hormones that are derivatives of testosterone, are used medically especially to promote tissue growth, and are sometimes abused by athletes to increase the size and strength of their muscles and improve endurance (Merriam-Webster Inc., 2010). These are declared illegal by many governing bodies in sport and are considered so in this study. *Testosterone, Anabolic Substance, and Synthetics are also included in this definition.*

Caffeine – a bitter alkaloid $C_8H_{10}N_4O_2$ found especially in coffee, tea, cacao, and kola nuts and used medicinally as a stimulant and diuretic (Merriam-Webster, Inc., 2010). This supplement is deemed illegal in high doses by many governing bodies. However, it is considered legal in this study.

Creatine – A white crystalline nitrogenous substance $C_4H_9N_3O_2$ found especially in the muscles of vertebrates either free or as phosphocreatine; a synthetic usually hydrated form of creatine taken especially as a dietary supplement (Merriam-Webster, Inc., 2010). Creatine is considered legal in this study.

Doping – The use of a substance (as an anabolic steroid or erythropoietin) or technique (as blood doping) to illegally improve athletic performance (Merriam-Webster, Inc., 2010).

Ginseng – Either of two herbs of the family Araliaceae, *Panax quinquefolius* and *P. schinseng,* or their roots. The root has long been used as a drug in China and as the ingredient for a stimulating tea (Encyclopedia Brittanica, 2010). It is considered legal in this study.

Human Growth Hormone (HGH) – The naturally occurring growth hormone of humans or a genetically engineered form that is used to treat children with growth hormone deficiencies and has been used especially by athletes to increase muscle mass (Merriam-Webster, Inc., 2010). HGH is considered illegal in this study.

Implicit Attitude – Implicit attitudes are manifest as actions or judgments that are under the control of automatically activated evaluation, without the performer's awareness of that causation (Greenwald & Banaji, 1995).

Juicing – A slang term referring to the use of AAS.

Masking Agent – Drugs or compounds taken in order to hide or "mask" the presence of specific illegal drugs that are screened for drug testing. They have the potential to impair or conceal the banned substance in the urine (Furlanello, Bentivegna, Cappato, & De Ambroggi, 2007).

Multi-vitamin – A supplement containing several vitamins all known to be essential to health (Merriam-Webster, Inc., 2010). This supplement is deemed legal.

Protein – Any of numerous organic compounds; complex polymers of amino acids that are involved in nearly every aspect of the physiology and biochemistry of living organisms (Encyclopedia Brittanica, 2010). In this study, protein is considered a legal supplement.

Vitamin C – A water-soluble vitamin $C_6H_8O_6$ found in plants and especially in fruits and leafy vegetables or made synthetically and used in the prevention and treatment of scurvy and as an antioxidant for foods (Merriam-Webster, Inc., 2010). Vitamin C is a legal supplement.

Chapter III

Literature Review

The following is a review of literature exploring the prevalence, attitudes and perceptions, and limitations of the present measures of Anabolic-Androgenic Steroids (AAS) and Human Growth Hormone (HGH). Then, the Implicit Associations Test (IAT) will be described and evidence will be provided supporting its efficacy and legitimacy as an alternative/supplementary measure to explicit forms (survey, questionnaire, interviews) of AAS and HGH measures. Unfortunately, present research on HGH is not as plentiful as AAS. Therefore, most research presented in this review pertains to AAS.

AAS

AAS are synthetic derivatives of the testosterone hormone (Kotecki, 1994). It is accepted that AAS increase lean body body mass when combined with an adequate training program (Giorgi, Weatherby, & Murphy, 1999; Kotecki, 1994). Additionally, because of this increase in muscle cross section diameter, they are shown to increase strength (Bhasin et al., 1996). As a result, AAS are often utilized with the purpose of increasing athletic performance (Green, Uryasz, Petr, & Bray, 2001).

HGH

HGH is secreted by the pituitary gland. Its function is to stimulate growth in the body (Rickert, Pawlak-Morello, Sheppard, & Jay, 1992). Although HGH is shown to reduce fat mass and increase lean body and body cell mass, a subsequent increase in performance has not been

observed (Meinhardt et al., 2010; Yarasheski, Zachweija, Angelopoulos, & Bier, 1993; Yarasheski et al., 1992). However, athletes report using HGH in order to speed recovery, and, subsequently, increase performance (The Associated Press, 2007; ESPN, 2007).

Prevalance

AAS prevalence varies based on the population studied. In the United States, it is estimated that .5% of individuals aged 12 and older have used AAS at least once in their lifetime (Yesalis, Kennedy, Kopstein, & Bahrke, 1993). In a study of 10-15 year olds, only .7% reported current or previous steroid use (Wroble, Gray, & Rodrigo, 2002). Among adolescent populations, prevalence of AAS use varies from 1.2% to 4.1% (Miller et al., 2005; Nilsson, Spak, Marklund, Baigi, & Allebeck, 2005; Naylor, Gardner, & Zaichkowsky, 2001). Recently, the Youth Risk Behavior Surveillance System (2009) found that 3.3% of adolescents from grades 9-12 have used AAS without a doctor's prescription at least once in their lifetime.

The prevalence of AAS use among college students, regardless of athletic standing, is approximately 1% (McCabe, Brower, West, Nelson, & Wechsler, 2007). Similarly, Green, Uryasz, Petr, and Bray (2001) found that 1.1% of NCAA athletes used AAS within the previous 12 month period, and an NCAA report indicated that a .6% increase in positive steroid tests during the 2008-2009 year was experienced compared to 2007-2008. The total number of positive tests was 72 (The NCAA News, 2010). However, a study of the prevelance of AAS in California Community College athletes reported a higher incidence of usage: 3.3% (Kersey, 1996).

The prevalence of AAS among individual sports differs as well. Among the male NCAA population, 1.9% of baseball players, .6% of basketball players, and 2.2% of football players

reported using AAS within the 12 months before responding to questions. Noteable responses of the female NCAA population include those from softball players, basketball players, and swimmers, who reported usage of .9%, .4%, and .8%, respectively. Other noteworthy reports of AAS prevalance include men's ice hockey (1.2%), men's lacrosse (1.3%), men's swimming (1.3%), men's water polo (2.8%), men's wrestling (1.9%), women's field hockey (1.5%), and women's volleyball (.8%) (The NCAA Research Staff, 1997).

Concerning NCAA Divisions I, II, and III, Green, Uryasz, Petr, & Bray (2001) indicated that AAS use was 1.2%, 1.1%, and 1.3%, respectively. Additionally, their research indicates the prevalence of AAS use among Caucasians and African-Americans was each 1.1%. All other ethnicities were classified as "Other" and had AAS prevalence of 2.1%. Furthermore, 95.5% of respondents estimated that none of their teammates had used AAS within the 12 months prior to answering the survey.

Although research is scarce concerning HGH, 5% of adolescent males reported past or present use of HGH (Rickert, Pawlak-Morello, Sheppard, & Jay, 1992). Of those, 64% reported concurrent use of both HGH and AAS. Reasons for use included increasing body size and strength and strengthening tendons and ligaments. Among experienced male weightlifters, 11.6% reported using HGH or Insulin Growth Factor-1, a derivative of HGH, in their lifetime (Brennan, Kanayama, Hudson, & Pope, 2010).

Attitudes and Perceptions

Among pre-adolescent and young adolescent athletes, reasons cited for using AAS were increasing athletic performance (27%), improving appearance (18%), bodybuilding (18%), and peer pressure (18%) (Wroble, Gray, & Rodrigo, 2002). A general adolescent population studied

in Sweden also cited athletic performance and appearance as reasons for AAS use (Nilsson, Spak, Marklund, Baigi, & Allebeck, 2005). Bodybuilders in the United Kingdom indicated increasing performance ("to get bigger/more muscular", "to compete") as the main reason for using AAS as well. However, 14% of those surveyed indicated that curiosity motivated their use, and 12% cited vanity/cosmetic reasons (Wright, Grogan, & Hunter, 2001).

Among NCAA athletes, 51% of users indicated their main reason for using steroids was to recover from an injury; 47% indicated their main reason was to increase athletic performance (Green, Uryasz, Petr, & Bray, 2001). Major reasons NCAA athletes do not or have stopped using AAS include "concerned about health" (27%), "against [their] beliefs" (28.4%), and "no desire to get effect" (27.8%). The reasons "fear of getting caught" and "it's illegal" were cited by 1% and 4.2%, respectively (The NCAA Research Staff, 1997). Furthermore, coaches and peers/teammates possess the most influence in using performance enhancing substances, and are the primary shapers of attitudes toward these substances (Diacin, Parks, & Allison, 2003).

In most of the literature, the belief that steroids are risky/cause harm was expressed. Sixty percent of a group of pre-adolescent and young adolescent athletes disagreed with the statement that steroids cause no harm (Wroble, Gray, & Rodrigo, 2002). High school seniors followed this pattern as approximately 88% reported the perception of moderate or great risk with AAS use (Denham, 2006). Interestingly, Nilsson, Spak, Marklund, Baigi, and Allebeck (2005) found that perceived harms of AAS was pervasive among non-users (64%), but experienced relatively low prevalance among users (21%). Oddly, AAS users also believe themselves to be more knowledgeable about AAS than non-users (Kersey, 1996). Among elite athletes, 74% express the belief that banned substances, including AAS, are dangerous (Alaranta et al., 2006).

The perceived prevalence of AAS is generally low. Only 12% of pre-adolescent and young adolescent athletes knew someone using or that used AAS (Wroble, Gray, & Rodrigo, 2002). In estimating the percentage of professionals using illicit drugs (including AAS), 33.3% of high school seniors estimated "0-10%", 27.3% estimated "11-30%", 16.8% estimated "31-50%", 12% estimated "51-70%", and 10.7% estimated "71-100%" (Denham, 2006). Among NCAA athletes, 95.5% answered "none" or "almost none" when asked to estimate how many of their teammates had used AAS within the past 12 months (Green, Uryasz, Petr, & Bray, 2001).

In the California Community College student-athlete population, most AAS users (70.4%) believed the prevalence of AAS to be low (under 10%) while few nonusers (18.4%) shared the same perception (Kersey, 1996). Thirty percent of elite Finnish athletes indicated they personally knew an athlete using banned substances, 6.1% suspected an athlete in his/her sport was using banned substances, but was not sure, and 3.4% personally knew an athlete of the same sport using banned substances (Alaranta et al., 2006). Contrastingly, 86% of bodybuilders in the United Kingdom believe AAS are "used by many sports people" (Wright, Grogan, & Hunter, 2001).

AAS are deemed unnecessary by pre-adolescent and young adolescent athletes; 66% believed AAS would not improve performance in sport, and 90% believed they do not need to take AAS to improve their chances of athletic success (Wroble, Gray, & Rodrigo, 2002). Approximately 97% of elite Finnish athletes shared the belief that they can reach the zenith of their sport without banned substances. However, 72.6% acknowledged that AAS produce performance enhancing effects. Approximately 7% also indicated they would use banned substances if allowed, however none admitted to actually using them (Alaranta et al., 2006).

Concerning HGH, approximately 78% of male adolescents had heard of it; over half of those reported received their information through media sources (television, newspapers, magazines). Approximately 65% of those surveyed had poor knowledge of its effects, but 24.5% knew someone who had used it. Furthermore, reasons for use included increasing body size and strength, and strengthening tendons and ligaments (Rickert, Pawlak-Morello, Sheppard, & Jay, 1992). Additionally, although unsubstantiated, NFL players have estimated the use of HGH among players to be 30% (USA Today, 2009).

In 2006, Alaranta, et al. (2006), studied the self-reported attitudes of elite athletes toward doping. Doping in this study included the use of stimulants, narcotic analgesics, anabolic steroids, diuretics, peptide hormones, beta-blockers, oral glucorticoids, sedatives, and blood doping and plasma expanders. This research was conducted on athletes financially supported by the National Finnish Olympic Committee. The respondents (n=446) were categorized by the types of sports in which they competed (speed and power events, endurance events, motor skills demanding events, and team sport events).

Based on responses from all athletes, anabolic steroids were thought to be the most effective category of banned substances. Furthermore, 73% believed anabolic steroids aid in improving sports performance. All banned substances were believed to help increase performance by 90.3% of the athletes. The highest percentage of perceived use was found in speed and power athletes as 42.5% reported knowing someone using banned substances, and 21.2% of them reported being offered a banned substance. Endurance athletes also reported high levels of perceived use as 47% reported knowing someone using banned substances, and 10.2% reported being offered a banned substance. Motor skills demanding events participants had the

least reports of knowing someone using banned substances with only 17.8%, and 13.8% of them had been offered a banned substance.

Of all athletes, 7.3% indicated they would use currently banned substances if allowed. Slightly over three percent of all athletes reported banned substances can be used with no or almost no adverse health effects. Contrastingly, 74% of all athletes consider the use of banned substances dangerous or very dangerous. No athlete reported ever using a banned substance.

With over a 90% response rate, the sample size is representative of Finnish Olympic Athletes. However, further research should be conducted in different populations rather than transposing the results. Furthermore, as indicated by the lack of use of any banned substance by any athlete surveyed, results may not be valid. Although anonymity was stressed and confirmed to the participants, fear of repercussions may have caused distortions in self-reporting.

In a study conducted by Denham (2006), the effects mass communication had on the attitudes of high school seniors (n= 2,560) toward anabolic steroids was researched. Three hypotheses were formulated: (H1) there is a significant relationship between exposure to mass communication and higher estimates of use of illicit drugs by professional athletes, (H2) there is a significant relationship between exposure to mass communication and negative attitudes toward the use of anabolic steroids, (H3) there is a significant relationship between exposure to mass communication and estimates of self-inflicted harm caused by anabolic steroid use.

These hypotheses were explored through the use of surveys. The variables in question were examined by extracting data from a national probability sample conducted by the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan as part of *Monitoring the Future: A Continuing Study of American Youth.*

Higher estimates of illicit drug use in professional sports, more negative attitudes toward steroids, and higher estimates of self-inflicted harm from steroids were all correlated with more exposure to mass communication. Furthermore, higher frequency of exposure to anti-drug spots on television and radio resulted in higher estimates of illicit drug use among professional athletes and more negative attitudes toward anabolic steroid use. However, in regard to the relationship between the frequency of exposure to anti-drug spots on television and radio and estimates of self-inflicted harm caused by use of anabolic steroids, it was found that with more exposure to anti-drug spots, estimates of self-inflicted harm caused by the use of anabolic steroids increased, but only to a certain point. Once this point of saturation was encountered, the estimates of self-inflicted harm matched those found with low exposure to the spots. The study suggests this occurs because a component of hyperbole occurs which leads those studied to grow weary of the message.

Although the methodology is sound, the time in which the sample was taken, 2003, may have lead to bias in the findings. Because of the large outcry against steroids in the baseball world, and the large amount of coverage steroids in sport received at the time, the effects found by the study may be anomalous.

Green, Uryasz, Petr, & Bray (2001), conducted an NCAA sponsored study attempting to investigate substance abuse patterns of NCAA student-athletes. A method of sampling for this study was developed so that at least 10% of NCAA member institutions that sponsor a certain sport would be asked to survey their athletes in that sport. This allowed data to be gathered on many NCAA sports despite each institution being asked to provide data on one or two sports. Overall, data from 13,914 student-athletes from 637 NCAA member institutions was collected. The research instrument was divided into four sections: student-athletes' attitudes toward drug

use, drug testing, effects of drug use, and the relationship of sports participation and academic performance. The response rate was 76.1% for Division I institutions, 63.8%, for Division II institutions, and 55.5% for Division III institutions. The overall response rate was 64.3%. The findings of the study regarding prevalence are provided in the prevalence section.

Prompted by a well-known professional athlete's disclosure of using HGH and AAS concurrently, Rickert, Pawlak-Morello, Sheppard, & Jay (1992) explored the prevalence and perceptions of HGH. Their sample (n=224) included male 10^{th} graders from two suburban Chicago high schools. Initially, they included 208 females in their investigation, but because only one reported use of HGH, which was for medical reasons, they disregarded the female data because of its inability to provide statistical descriptive analyses. Their data was gathered by distributing 15-item self-report questionnaires about the use of HGH. Results are provided in the prevalence section.

Despite the relatively small percentage of users, 78% of respondents had heard of HGH, and slightly more than 50% of the sample received their information about HGH from the media (television, newspapers, and magazines). Moreover, 24.5% of those surveyed indicated they knew someone who uses or had used HGH. Although awareness of HGH was high, most respondents (users and non-users) were unaware of the side effects of HGH.

Limitations of Explicit Measures

The degree of honesty of the responses athletes provide to explicit methods of questionning (surveys, investigative journalism, etc.) is unkown, and subject to distortion. Underreporting, overreporting, and dishonesty are concerns in regard to explicit measurements

of AAS (Yesalis, Kennedy, Kopstein, & Bahrke, 1993). Social desirabilty is likely the cause of such distortion. As stated by Yesalis, Kopstein, Bahrke, Wilson, & Derse (2001):

> According to social desirability theory (Crowne & Marlowe, 1960; Edwards, 1957), distortion of self-reports occurs as a function of the perceived social acceptability of the behavior in question. Survey respondents may under-report their drug use to conceal their behaviors from the interviewer, the general public, sponsors of the survey, and other members of their households in order to present themselves, or perhaps their sport, in a way they feel is more socially acceptable. Conversely, respondents who view substance use positively may exaggerate reported use in order to impress others or to live up to a self-image they perceive in a positive light.

Additionally, respondents may also be wary of reporting use of AAS because of the illegality of using them, per their national government and/or the governing body of the sport in which they participate (Yesalis, Kopstein, Bahrke, Wilson, & Derse, 2001).

Morevoer, instances of confounding and contradictory findings illustrate and provide concrete examples of these limitations. For example, according to Wroble, Gray, & Rodrigo (2002), 12% of pre-adolescents and young adolescents reported they knew someone using or that had used AAS. However, the reported use of AAS among most populations is several percentage points lower. Although it could be argued that all of the pre-adolescents and young adolescents referred to the same few people in knowing they used AAS, the likelihood is low. This same inconsistency is found within HGH research as well. Rickert, Pawlak-Morello, Sheppard, & Jay (1992) found that 5% of 10^{th} grade students had used or were presently using HGH, yet 24.5% of the respondents knew someone who used or were presently using HGH.

Another example lies within the research of Wroble, Gray, & Rodrigo (2002). Their research indicated 66% of their sample believed AAS do not improve performance in sport. However, 90% believed they do not improve chances of athletic success. The similarity between improving performance/improving chances of athletic success and the dissimilary between the corresponding percentages indicates a need for further and/or alternative methods of research in this area.

Finally, the most striking discrepancy within the research comes from Alaranta et al., (2006). Despite the amount of information provided by the elite athletes about banned substances and AAS (beliefs about improving performance, knowing athletes in the same sport that use banned substances, being offered banned substances), no athlete reported ever using any banned substance. Although this is also possible, it is unlikely.

Because of both the conceptual limitations, and material examples of such, it is clear that alternative and/or supplementary methods of measure are needed in order to more accurately explore and report on issues involving AAS and HGH.

Implicit Measures and the Implicit Associations Test

Implicit measures address the aformentioned limitations. These types of measures:

> Aim to assess attitudinal responses that do not stem from an active, intentional search for relevant information, but instead are the result of passive processes that run their course automatically following exposure to the attitude object. Because of its spontaneous nature this initial attitudinal response is not controllable and should therefore not be open to monitoring for purposes of self-presentation. As a result, implicit assessment techniques promise an innovative way to effectively

assess attitudes free of intentional distortions or strategic manipulation.

(Wittenbrink & Schwarz, 2007)

One form of implicit measures is the Implicit Associations Test (IAT). During the IAT, as quickly and accurately as possible, participants classify stimuli that represent a category and an attribute into one of four discrete classifications using only two responses at a time. These stimuli have been presented in the form of words, symbols, and pictures. The IAT is based on the assumption that when closely associated categories (these associations may be different based on the individual) share a response, that response will occur faster than if the categories are not closely associated (Wittenbrink & Schwarz, 2007).

For example, the first published IAT report assessed implicit attitudes toward flowers relative to insects (Greenwald, McGhee, & Schwartz, 1998). The difference in response time to a concept and attribute pair (flower/good, insect/bad), compared to the response time to another pair (flower/bad, insect/good), provides relative strength of association between the first set of pairs compared to the second set. If the first set resulted in overall faster response times than the second set, it is concluded that there is a greater relative strength of association between the first set (flower/good, insect/bad) than the second set (flower/bad, insect/good). Therefore, a relative implicit preference toward flowers over insects is reflected. In this scenario, attitudes toward flowers were expected to be more positive than attitudes toward insects. Therefore, participants were expected to respond faster when flower and good and insect and bad shared a response, than when the categories were reversed (Wittenbrink & Schwarz, 2007).

The IAT has demonstrated it is sensitive to automatic evaluative associations, and that its predictive validity significantly exceeds self-report measures (Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Greenwald, McGhee, & Schwartz, 1998). Therefore, it can provide an adequate

measure of attitudes toward AAS by avoiding distortion of aforementioned limitations. Furthermore, the IAT has displayed construct validity (Banse, Seise, & Zerbes, 2001; Rudman, Greenwald, Mellott, & Schwartz, 1999), convergent validity (Cunningham, Preacher, & Banaji, 2001), content validity (Petróczi, Aidman, & Nepusz, 2008), and incremental validity (Greenwald, Poehlman, Uhlmann, & Banaji, 2009).

IAT Literature

Since its original publication (Greenwald, McGhee, & Schwartz, 1998), the IAT has been utilized to study implicit attitudes concerning a multitude of issues. Various applications of the IAT include exploring associations involving Asian Americans, religions, Native Americans, race, gender and its effect on one's career, weapons, Arab-Muslim(s), gender and its relation to perceived performance in liberal arts or science, skin tone, age, weight, and sexual orientation (Project Implicit, 2010). The IAT has also been utilized in research involving implicit attitudes toward anti-fat bias and obesity (Robertson & Vohora, 2008; O'Brien, Hunter, Halberstadt, & Anderson, 2007; Teachman, Gapinski, Brownell, Rawlins, & Jeyaram, 2003), homosexuality (Banse, Seise, & Zerbes, 2001), disability (White, Gordon, & Jackson, 2006), vegetarianism (De Houwer & De Bruycker, 2007), and doping among athletes (Petróczi et al., 2010; Petróczi, Aidman, & Nepusz, 2008). These issues are all prone to social desirability concerns, and successful use of the IAT in such research increases its legitimacy in the present study.

The main purpose of a study conducted by McConnell and Leibold (2001) was to investigate whether the IAT can predict intergroup discrimination. Additionally, the study explored the relationship between the IAT and explicit measures of prejudice. Furthermore, the

IAT and its relationship to explicit reports of prejudice as well as explicit reports of prejudice and the relationship to behavior toward a black experimenter were also examined.

The participants in the study (n=41) consisted of white undergraduates from Michigan State University introductory psychology classes. In order to determine explicit measures of prejudice, they completed semantic differential scales for blacks, semantic differential for whites, a feeling thermometer for blacks, and a feeling thermometer for whites – in that order. The participants were misdirected by being told they were being tested on "word perception." Additionally, the researcher explaining the experiment and guiding the participant in the process was white, and the room in which she interacted with the participant was being videotaped.

After, the participants were instructed to complete the IAT. This particular test used black-associated names and white-associated names in order to determine implicit prejudice. However, before leaving the participant, the white female researcher told the participant she would be replaced because she had reached the end of her shift.

Once participants finished the IAT, a black female researcher retrieved them and conducted a follow up interview similar in length and fashion to the briefing interview conducted by the white female researcher. This interaction was also videotaped.

In order to measure the videotaped interactions, two trained judges unaware of participants' attitudes rated each individual in different categories: friendliness during the interaction, the abruptness or curtness of the participant's responses to questions, the participant's general comfort level, how much the participant laughed at the experimenter's joke, and the amount of participant's eye contact with the experimenter. They also assessed the participant's forward body lean toward the experimenter (vs. leaning away), the extent to which the participant's body faced the experimenter (vs. facing away), the openness of the participant's

arms (vs. crossed arms), and the expressiveness of the participant's arms (vs. not moving at all). Number of smiles, speaking time, number of speech errors, speech hesitations, fidgeting body movements, and extemporaneous social comments were also recorded by the judges.

The study found that significant prejudice was revealed in the implicit and explicit measures. For each measure – IAT, feeling thermometer, and semantic differential – the effect size was large, moderate, and small, respectively. Furthermore, the IAT does provide an indication of intergroup social interactions as the implicit measures of prejudice were related to behavior. Unlike previous studies, (Greenwald, McGhee, & Schwartz, 1998), the study did find a relationship between implicit and explicit measures.

Teachman, Gapinski, Brownell, Rawlins, & Jeyaram (2003) explored the impact of providing causal information and evoking empathy on implicit anti-fat bias. Their research included three discrete studies.

The purpose of the first study was to examine implicit attitudes toward the obese, compare those to explicit attitudes, and determine whether information about the causes of obesity would influence either of these attitudes. The participants in this study (n=144) were random individuals on a Connecticut beach. All participants were over 18 years of age, completed the study alone or in a group of up to three people, and were mostly Caucasian (89%).

Participants completed a general demographics questionnaire, and the Fat Phobia Scale (FPS; Robinson, Bacon, & O'Reilly, 1993), a 50-item differential scale in which people indicate the characteristics of obese people. Then, the participants were divided into three groups. The first group (n=48) was not given a prime, the second (n=48) was given a fabricated article reporting the primary cause of obesity to be genetics, and the third (n=48) was given a fabricated article reporting the primary cause of obesity to be overeating and lack of exercise. The purpose

of the articles was to attribute obesity to causes either within (genetics) or outside (overeating and lack of exercise) of personal control. After, each participant completed the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The FPS and IAT measured explicit and implicit attitudes, respectively.

This first study found a strong presence of implicit anti-fat attitudes contrasted with a virtual absence of explicit anti-fat attitudes. Additionally, it was found that manipulating information concerning the cause of obesity can exacerbate negative attitudes. However, attitudes toward obesity cannot easily be made more positive.

In the second study, the effect of empathy on implicit and explicit attitudes toward the obese was investigated. This study consisted of female participants (n=90) recruited from the Yale University community.

Before completing an explicit attitude measure and the IAT, participants were given a story prime that either evoked empathy toward an obese person, evoked empathy toward a person in a wheelchair, or was neutral in valence and was expected to not evoke empathy. The number of individuals in each group was not provided.

Results of this study found that, overall, the primes had no effect. However, in participants with a BMI of 25 or greater, anti-fat bias was reduced with both story primes aimed at evoking empathy. Contrastingly, concerning participants with a BMI of less than 25, the story primes did not alter explicit or implicit attitudes. This finding suggests that overweight individuals experience an in-group bias in that they are more responsive to contextual factors that can lessen anti-fat bias.

The third study aimed to examine the effect of empathy on implicit and explicit attitudes in a more extreme manner. In order to include a larger proportion of overweight individuals than

the previous study, participants (n=63) were recruited from the same Connecticut beach in the first study.

In this study, half the participants were given no prime, and the other half were given a prime in which an obese woman experienced extreme discrimination and died because of being forced to exercise in extreme conditions while at a "fat camp." After, the participants completed the same explicit test and IAT as in the previous study. As in the second study, no change in implicit or explicit bias occurred after reading the prime. However, overweight participants that read the prime showed less implicit bias than those who did not read it. In participants with a BMI below 25, the prime had no effect.

Overall, the correlations between implicit and explicit attitudes in each of the studies conducted by Teachman, Gapinski, Brownell, Rawlins, & Jeyaram (2003) were small and not significant. This provides evidence that these attitudes are not necessarily related. This supports the necessity of exploring both explicit and implicit attitudes in order to ascertain a better understanding of attitudes toward AAS and HGH.

White, Gordon, and Jackson (2006) studied the implicit and explicit attitudes toward athletes with disabilities. One hundred fifteen undergraduate students receiving research participation credit for volunteering were the subjects. Implicit attitudes were assessed using the IAT. However, rather than classifying words, subjects were instructed to classify pictures of athletes playing one of five sports (soccer, tennis, track, basketball, and skiing). Pictures included an athletes with a disability participating in a sport and athletes without a disability participating in a sport. The pictures were selected in such a way that for every picture of an athlete with a disability, a similar photograph of an able-bodied athlete was available. Per IAT protocol,

participants classified these pictures as "Disabled Athlete" or "Able-Bodied Athlete". Subjects also discriminated between the attribute "Pleasant" or "Unpleasant".

Explicit attitudes were then assessed with the Attitudes Toward Disabled Persons scale, Form O (SADP; Yuker, 1988; Yuker & Block, 1986), the Scale of Attitudes Toward Disabled Persons, Form R (SADP; Antonak, 1985, 1982), and the Crowne-Marlowe Social Desirability Scale (SDS; Crowne & Marlowe, 1960). These Likert-format scales were completed on a computer by clicking the appropriate choice with the mouse.

Explicit measures of attitudes toward athletes with disabilities were mixed. ATDP and SDS scores were slightly more positive than normal, while SADP scores were slightly more negative. Implicit attitudes toward athletes with disabilities were consistently negative. The explicit scores were all correlated. There was no significant correlation between explicit and implicit scores. This underscores the discreteness of these attitudes and the need to assess both phenomena.

IAT Literature Regarding Doping

A study conducted by (Petróczi, Aidman, & Nepusz, 2008) investigated the implicit attitudes toward banned substances compared to permissible substances. The participants (n=78) were undergraduate sports and exercise science students of Kingston University in Great Britain. They completed an IAT called the Performance Enhancement IAT.

In this version of the IAT, the category pair of doping vs. nutritional supplements was added to the usual good vs. bad stimuli. Participants completed the Performance Enhancement IAT in a supervised computer lab through a web based protocol delivery. After, participants completed the Performance Enhancement Attitude Scale (PEAS), and the Five Doping Scenarios

Test. The former is an explicit measurement scale including questions such as "doping is necessary to be competitive," and "the risks related to doping are exaggerated." The latter presents 5 competitive scenarios in which the certainty of the opponent's doping behavior differs. The participants are then asked if they would resort to doping.

The study found a higher implicit association to nutritional substances than to doping despite 66% of participants indicating they believe doping helps performance. Although not statistically significant, the implicit preference against doping was higher in those that reported competitive involvement. Despite this being a methodology study, it is helpful in that is the most similar to the present study.

Lotz and Hagemann (2010) also measured the attitudes of athletes toward doping. One hundred thirty participants were placed into two groups. Group A consisted of individuals participating in bodybuilding while Group B consisted of athletes participating in handball and tennis. All subjects completed the IAT by categorizing items into concepts of doping and tea or as having a positive or negative attribute. A second task was also completed in which the evaluated attribute discrimination was replaced with neutral words.

Results indicated implicit attitudes toward doping were more positive in Group A than in Group B. The authors postulated that the findings provide evidence of the existence of processes unrelated to associations between concept and attribute categories. Furthermore, it was speculated that the findings may have resulted from a greater familiarity with the concept of doping by participants in Group A.

Chapter IV

Methods

Participants

The sample for this study consisted of 143 male and female intercollegiate athletes (N = 83) and undergraduate and graduate Kinesiology and Sports Studies majors (N=60) at a Division I Midwestern University. The age of participants ranged from 18-23. Ethnicity and race varied, but was not a variable being studied.

Procedure

The principal investigator briefed varsity teams about the study in person before weight training or practice. They were told the subject of the study was attitudes toward AAS and HGH. They were also told they would receive an email consisting of a URL that would direct them to the instruments utilized for data collection. These individuals were then contacted through their school email addresses. They were sent an email including a reminder about the study, Informed Consent, and the URL link to the questionnaires utilized in the current study (the clicking of which indicated their comprehension of the Informed Consent). The Kinesiology and Sports Studies majors in the study were informed of the study in a class and were offered 10 points extra credit for participation. All potential students were sent an email containing the URL of the study questionnaire.

The Performance Enhancement Attitude Scale (PEAS) and Implicit Associations Test (IAT) utilized in this study were distributed through Inquisit 3.0.4.0 web edition software. Participants were taken to a URL containing instructions for completing the study on a PC computer. The data collection was organized so that the order of the PEAS and IAT alternated

with each participant (i.e., participant one received the IAT followed by the PEAS; participant two received the PEAS followed by the IAT). Participants were encouraged to complete the study in a quiet area where they would be undisturbed.

Instrumentation

Implicit Association Test

The Implicit Association Test is a tool administered through computer software utilized to determine the strength of associations between concepts. In line with the basic tenets of theories of associative learning and representation, the IAT is based on the assumption that it should be easier to make the same behavioral response (i.e., pressing a single key on a keyboard) to concepts that are strongly associated (i.e., flowers and good) than to concepts that are weakly associated (i.e., insects and good) (Greenwald et al., 1998). The IAT procedure requires respondents to identify stimulus items and categorize them into one of four superordinate categories. Association strengths are measured by comparing the speed of categorizing (i.e. response latencies) members of the superordinate categories in two different sorting conditions. For example, because the concepts "Flowers" and "Good" tend to be more strongly associated than the concepts "Insects" and "Good," respondents are able to identify and categorize items faster in a condition in which items representing "Insects" and "Bad" share the same response compared to a condition in which items representing "Insects" and "Good" share the same response.

The IAT's procedure has five steps (or blocks), with Steps 3 and 5 providing critical data.

Step 1: Learning the concept dimension. First, respondents sort items from two different concepts into their superordinate categories (e.g., words such as "Juicing" representing

"Steroids/HGH" and words such as "Vitamins" representing "Legal Supplements"). Categorizations are made using two keys on a computer keyboard that are mapped to the superordinate categories (e.g., the "e" key for "Steroids/HGH," and the "i" key for "Legal Supplements") and stimulus items appear sequentially in the middle of the computer screen. If a stimulus item is incorrectly identified, a read "X" appears in the middle of the screen and the participant must pair the stimulus word correctly.

Step 2: Learning the attribute dimension. In Step 2, respondents perform the same task with the same two keys, but now sort items representing two poles of an attribute dimension (e.g., words such as "Terrible, Nasty" representing "Bad" and "Wonderful, Beautiful" representing "Good").

Step 3: Concept-attribute pairing 1. In the third stage, these two sorting tasks are combined such that, on alternating trials, respondents are asked to identify a word (i.e., "Ginseng") as a "Steroid/HGH" or a "Legal Supplement", and then a word (i.e., "Superb") as "Good" or "Bad". In this case, one key ("e") is the correct response for two categories ("Steroids" and "Good") and the other key ("i") is the correct response for the other two categories ("Legal Supplements" and "Bad"). Respondents first perform a block of 20 trials with these sorting rules (often referred to as the "practice" block). After a brief pause, they repeat it for a second block of 40 trials (often referred to as the "critical" block).

Step 4: Learning to switch the spatial location of the concepts. In the fourth stage of the task, only stimulus items for the target concepts ("Steroids/HGH" and "Legal Supplements") are sorted for 20 trials, but this time the key assignment is reversed. In the present example, "Steroids/HGH" items would now require an "i" key response and "Legal Supplement" items would require an "e" key response.

Step 5: Concept-attribute pairing 2. In the fifth stage of the task, respondents sort items from both the attribute and target concept categories again, except the response key assignments now require "Steroids/HGH" and "Good" items to be categorized with one key and "Legal Supplements" and "Bad" items to be categorized with the other key – the opposite association from the earlier block. Respondents sort stimulus items with this response assignment for 20 trials and then again for 40 more trials.

The IAT effect is calculated using latency data from Steps 3 and 5. In the above example, sorting the stimulus items faster when "Steroids/HGH" and "Bad" (and "Legal Supplements" and "Good") share a response key than the reverse pairings indicates a stronger association strength between "Steroids/HGH" and "Bad" and "Legal Supplements" and "Good" compared to the reverse mapping, or an automatic preference for "Legal Supplements" relative to "Steroids/HGH". Greenwald, Poehlman, Uhlmann, & Banahji (2009) describe the scoring algorithm for calculating the IAT effect in detail. It involves calculating the difference in average response latency between the two sorting conditions and dividing by the standard deviation of all latencies for both sorting tasks. Thus, the IAT score (called *D*) is a cousin of Cohen's *d* calculation of effect size for an individual's responses in the task.

The IAT has demonstrated predictive validity that significantly exceeds self-report measures (Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Greenwald et al., 1998). Furthermore, it has displayed construct validity (Banse, Seise, & Zerbes, 2001; Rudman, Greenwald, Mellott, & Schwartz, 1999), convergent validity (Cunningham, Preacher, & Mahzarin R. Banaji, 2001), content validity (Petróczi et al., 2010), and incremental validity (Greenwald et al., 2009).

Performance Enhancement Attitude Scale (PEAS)

The Performance Enhancement Attitude Scale is a 17-question unidimensional-scale assessing self-declared attitudes toward doping on a six-point Likert scale ranging from (1) "strongly disagree" to (6) "strongly agree". The scale was modified in the current study in order to specifically investigate attitudes toward AAS and HGH. Therefore, words such as "doping" and "drugs" were substituted with "steroids/HGH". Examples of statements in the scale include "steroids/HGH are necessary to be competitive," and "the risks related to steroids/HGH are exaggerated". The PEAS has demonstrated acceptable reliability (ranging from r= .71 to .91 across various samples) and construct validity (Petróczi & Aidman, 2009).

Chapter V

Results

In general, participants showed an implicit bias toward legal supplements, d = -.669 (N=143, SD=.461). Additionally, participants showed explicit negative attitudes toward AAS and HGH, M = 37.92 (SD=11.83). They also felt more strongly about the reasons not to use AAS and HGH than the reasons to use them.

Hypothesis 1: Athletes will show explicit negative perceptions of AAS and HGH.

Hypothesis 1 was supported as results of the PEAS indicated athletes "Disagreed" with the use of AAS and HGH. The mean PEAS score for athletes in the sample was 37.43 (SD=11.74). The nonathlete group shared a similar mean (M=38.80 SD=11.76). Results can be found in Table 1.

Hypothesis 2: There will be less of an explicit and implicit bias toward AAS and HGH in males compared to females.

Hypothesis 2 was not fully supported. Results of a one-way ANOVA indicated that males have less explicit negative attitudes toward performance enhancing drug use in sport than females, $F(1,141) = .296$, $p = .587$. However, it was found that the explicit attitudes of males and females were in the same direction. Average Likert scale responses from females fell between "Disagree" and "Strongly Disagree," on the scale, whereas the average responses for males fell between "Disagree" and "Slightly Disagree". This can be seen in Table 1. Implicit attitudes did

not follow the same pattern as results of a one-way ANOVA indicated males and females did not differ on the Steroid IAT, $F(1,141) = .738$, $p = .392$.

Table 1

PEAS Results by Group

Group	N	Mean	SD
Nonathlete	60	38.52	11.86
Athlete	83	37.50	11.87
Female	56	37.25	12.07
Male	87	38.36	11.73

Hypothesis 3: The correlation between the explicit and implicit attitudes of athletes toward AAS and HGH will not be significant.

Hypothesis 3 was supported as the correlation between the PEAS and the Steroid IAT was not significant ($N = 81$ $r = .116$, $p = .304$). This supports similar findings in the literature (Petróczi, Aidman, & Nepusz, 2008) as well as the assertion that explicit attitudes are apt to distortion due to social desirability theory (Yesalis, Kennedy, Kopstein, & Bahrke, 1993; Crowne & Marlowe, 1960; Edwards, 1957).

Hypothesis 4: Nonathletes will have less of an implicit and explicit bias against AAS and HGH than athletes.

Hypothesis 4 was not supported by the findings. Results of a one-way ANOVA indicated there was no significant difference between the implicit attitudes of athletes and nonathletes toward AAS and HGH, $F(1,141) = .024$, $p = .887$. The explicit attitudes of athletes and

nonathletes toward AAS and HGH also did not differ, as indicated by results of a one-way ANOVA, $F(1, 141) = .259$, $p = .612$.

Hypotheses 5: Estimates of performance enhancing drugs will increase at each successive level of sport.

Hypothesis 5 was supported as results of a series of paired samples t-tests with a bonferroni adjustment indicated that participants estimated AAS/HGH use to be higher with each successive level of sport, as seen in Table 2. This indicates a perception of professionalization of performance enhancing drug use in sport.

Table 2

Perception of Use of AAS and HGH by Level of Sport Participation

Level of Sport	**N**	**Mean**	**SD**
A. Prior to High School A***,C***, D***	143	16.09%	16.83
B. High School A***,C***,D***	143	21.03%	17.24
C. Collegiate A***,B***,D***	143	30.22%	19.05
D. Professional A***,B***,C***	143	34.26%	21.75

A,B,C,D, *** significant @ $p < .001$

Chapter VI

Discussion

With the frequency and amount of attention AAS and HGH receives, one is lead to believe the prevalence of use is high and their proponents are many. Furthermore, the relatively recent call for increased regulation concerning these substances prompts assumptions that a myriad of athletes are using, or desire to use them. In this study, however, this was not the case. Although the prevalence of their use was not ascertained, the general attitude toward AAS and HGH was negative among athletes, nonathletes, males, and females.

The finding that athletes had an implicit bias toward legal supplements, which supports the literature (Petróczi, Aidman, & Nepusz, 2008), is the likely result of collegiate athletes being flooded with lectures, posters, and messages of the dangers and illegality of performance enhancing substances by the NCAA. Moreover, coaches and administrators also reiterate these messages to the athletes as it is their responsibility to ensure compliance of the rules and regulations of the governing body. The issue of AAS and HGH is also continually stigmatized and shed in a negative light by the media. It is difficult to not be made aware of these issues, especially as an athlete. This public scrutiny of those involved with AAS and HGH coupled with the persistent warnings and counsel against the use of these substances are likely to be internalized by the athletes, resulting in the bias found in this study.

Despite athletes hearing these same messages, they may appeal differently to each. The idea of morality may be of a major concern to some. Athletes may desire to compete fairly and without the illegal use of substances. They may want to rely only on their natural skills and abilities without the help of AAS and HGH. Another concern may be the potential dangers and side effects resulting from the use of the substances. These assertions are supported by Strelan

and Boeckmann (2006) who found that morality and health concerns were the two strongest influences – even stronger than legal sanctions – on athletes when making a hypothetical decision to use performance enhancing substances. Regardless of the reasoning of the athlete, the ultimate result is an implicit bias toward legal supplements.

The negative attention AAS and HGH receives from the media, NCAA, and administrators and coaches may also aid in explaining the explicit negative perceptions toward them by the athletes in this study – a finding supporting previous literature (Petróczi, Aidman, & Nepusz, 2008; Alaranta et al. 2006). As explained by the social desirability theory, self-reports may be distorted in order to feel more socially acceptable (Crowne & Marlowe, 1960; Edwards, 1957). In this particular scenario, whether athletes actually percieve them negatively or not, it is likely athletes report a negative attitude toward AAS and HGH in order to conform to external pressures. Indicating anything other than a negative perception would most likely invite unwanted attention from individuals in positions of power within the athletic department. Additionally, as indicated by Feinberg (2009), individuals form negative opinions of athletes with a history or suspected history of steroid use. This can be avoided by expressing an explicit negative perception of steroids.

Not all potential explanations for the explicit negative perceptions found in athletes fall under the social desirability theory contention, however. According to Alaranta et al. (2006), 96.9% of elite Finnish athletes sampled believed they did not need steroids in order to reach the pinnacle of their sport. Additionally, a majority of NCAA student athletes reported not needing drugs in order to keep up with the competition (The NCAA Research Staff, 1997). These could serve as potential explanations for the findings in this study as well.

The fact that males showed less of an explicit bias against AAS and HGH supports previous literature (Zelli, Lucidi, & Mallia, 2010; Yusko, Buckman, White, & Pandina, 2008; Miller et al., 2005; Kersey, 1996; Yesalis, Kennedy, Kopstein, & Bahrke, 1993) indicating males have a higher prevalence of performance enhancing substance use. The implicit bias against AAS and HGH did not significantly differ between males and females, however.

There are a number of explanations as to why the explicit bias was lower in males than females, yet the implicit attitudes were similar. A likely explanation involves the higher number of collision and contact sports offered to males versus females. The opportunities to play these sports are not equal. For example, football, a sport with a large number of players on the roster and a historically higher prevalence of AAS use (The NCAA Research Staff, 1997) is only offered to males. This combinatinon of a higher number of opportunities to play sports in which being bigger, stronger, and faster (which is aided by AAS/HGH) is encouraged, results in a much greater benefit to males using AAS and HGH. This benefit is then likely reflected in lower explicit bias in males versus females.

The way society views males and their role in sport may also facilitate explaining the concurrent similar implicit attitudes and differing explicit attitudes. Denham (2006) explains that just as females seek to emulate the women in magazines and on television, so do males. Those that grace the pages of *Muscle & Fitness*, *Flex,* and *ESPN The Magazine* are usually extraordinarily muscular. Furthermore, the male form is often presented unrealistically in popular culture. As Luciano (2001) explains, the life size measurements of the orignial G.I. Joe would have measured as follows: 32 inch waist, 44 inch chest, and 12 inch biceps. Conversely, the present day life size bicep measurement of a G.I. Joe action figure is 32 inches. Furthermore, it is difficult to not be exposed to male mentalities emphasizing toughness, competitiveness, and

assertiveness, especially in sport. These representations of males may result in ways of achieving such a product (AAS and HGH) as being perceived less negatively in society. This perception may result in expressing less explicit bias in males.

Another explanation as to why similar implicit attitudes toward AAS and HGH were found in males and females, yet males had less explicit bias may lie in the side effects of AAS. Adverse effects of AAS experienced by females include deepened voice, enlarged clitoris, increased aggression and appetite, and increased facial hair (Strauss, Liggett, & Lanese, 1985). Furthermore, AAS also increases muscle mass with an adequate training program (Giorgi, Weatherby, & Murphy, 1999; Kotecki, 1994). These masculinizing effects may result in the expressing explicit negative attitudes by females toward AAS.

Although the expectations of society regarding AAS and HGH seem to differ with gender, which may result in the different explicit attitudes, the similar implicit attitudes toward AAS and HGH shared by males and females may be explained by the negative attention it garners from the media. The amount of publicity they receive is difficult to avoid. Continually hearing messages regarding adverse health consequences and the illegality of these substances, both of which do not differ in resonance based on gender, may cause them to be internalized the same by both groups, resulting in similar implicit attitudes.

The lack of a significant correlation between explicit and implicit attitudes adheres with previous literature involving the IAT (Petróczi, Aidman, & Nepusz, 2008; Devine, Plant, Amodio, Harmon-Jones, & Vance, 2002; Rudman & Kilianski, 2000; Greenwald, McGhee, & Schwartz, 1998). However, the explicit and implicit attitudes were in the same direction. This finding is not surprising. Implicit and explicit attitudes are defined as two separate concepts defined and formed by different factors. Explicit measures are apt to self-presentational

manipulation (Cunningham, Preacher, & Banaji, 2001), and, as explained by White, Gordon, and Jackson (2006), if explicit and implicit measures were highly correlated, despite distortion due to social desirability concerns, then the attitudes would behave similarly. This would abate the need for exploration of implicit attitudes as explicit measures would provide adequate means of discovering attitudes toward socially sensitive subjects such as AAS and HGH.

This phenomenon of explicit and implicit attitudes lacking significant correlation when the subject is socially sensitive is accepted as being due to social desirability theory (Crowne & Marlowe, 1960; Edwards, 1957). When confronted with a controversial issue or socially stigmatized issue, individuals will distort their explicit attitudes in order to avoid negative attention and/or ostracism. Therefore, even if the implicit attitude of an individual toward AAS and HGH is positive, the explicit attitude toward them will likely be negative. Moreover, social desirability may cause a distortion with the explicit attitude even if the implicit attitude is negative, thereby ensuring no undesired negative attention is garnered. Thus, as highlighted by Gucciardi, Jalleh, & Donovan (2010), it is necessary to control for social desirability when assessing athletes and their attitudes toward performance enhancing drugs. By doing so, a more accurate assessment of their attitudes toward and susceptibility of use of performance enhancing drugs can be attained.

Although this study found no difference between both the explicit and implicit attitudes of athletes and nonathletes toward AAS and HGH, the lack of significant difference in implicit attitudes of athletes and nonathletes supports previous literature (Petróczi, Aidman, & Nepusz, 2008). This can be interpreted to mean that both athletes and nonathletes share the same attitude, both explicitly and implicitly, toward AAS and HGH. A possible explanation for this is, again, the amount of media attention these substances receive. Because of this significant consideration

by the media, rather than athletes receiving different messages and having more knowledge about them because of the repercussions of their use in sport, the frequency and intention of messages regarding these substances may be similar for both athletes and nonathletes. Thus, it follows that the attitudes regarding them are similar in both groups.

Another consideration regarding this finding is the orientation of the participants surveyed. Because the nonathletes were recruited from undergraduate Kinesiology and Sports Studies classes, the possibility they were involved in competitive sports in high school is worth noting. Therefore, this nonathlete group may have been more similar – in regard to the particular attitudes studied – to the athlete group than a randomly sampled nonathlete group. This could have led to the similarities in explicit and implicit attitudes of both groups.

The increased estimates of AAS and HGH prevalence at each successive level of sport indicate a professionalism of performance enhancing substance use. This is the view that as the level of sport increases, the acceptability of using performance enhancing substances also increases. This phenomenon is not limited to performance enhancing substances. Evidence of the professionalization of aggression is sport has also been observed (Visek & Watson, 2005; Conroy, Silva, Newcomer, Walker, & Johnson, 2001).

This supports the finding of Wichstrom & Pederson (2001) that individuals competing at higher levels are more prone to using AAS. One reason for this may involve the belief of participants that more is at stake as the level of sport increases. For example, a high school senior may be competing for an athletic scholarship, a college senior may be competing for a chance to be drafted into a professional league, and a professional sport player may be competing for the chance to earn a living.

Moreover, a perception of overconformity to the "win at all costs" mentality, which results in the use of AAS and HGH to gain a competitive edge, may also explain the finding. As the level of sport increases, the competition is greater and the desire for a competitive edge increases, which adds to the appeal of AAS and HGH. The perception of increased prevalence may also result from be the association of easier access of information, knowledge, and AAS and HGH at higher levels of sport.

Chapter VII

Conclusion

The IAT has proven itself a valuable tool in assessing attitudes toward controversial and socially sensitive issues. This was also the case when investigating the attitudes toward AAS and HGH. Generally, both implicitly and explicitly, the attitudes toward AAS and HGH were negative. Those participating, even when investigated as groups of males, females, athletes, and nonathletes, did not agree with their use. Furthermore, all groups also indicated an implicit preference toward legal supplements versus AAS and HGH.

Although more research is needed in order to improve and ultimately implement the exploration of implicit attitudes in intervention and prevention programs targeting performance enhancing substances, the evidence of its promise is clear. Exploring both explicit and implicit attitudes allows for a better understanding of the true potential for individual use. Without targeting both spheres, an important aspect of attitudes is neglected. If managers, governing bodies, and institutions intend to adequately address the use of performance enhancing substances in sport, the exploration of implicit and explicit attitudes should be utilized.

This study was prompted by the amount of attention given to these types of substances in sport. Considering the recent slew of media attention, it seems performance enhancing substance use is the norm in sport. Therefore, an understanding of the actual attitudes of collegiate athletes and nonathletes was desired. Although the adverse effects should not be underestimated and prevalence of such substances was not assessed, after examination of the generally negative attitudes found toward AAS and HGH, it is the belief of the authors that the attention these substances elicit is tenuous and belies the actual use and perception of AAS and HGH.

Chapter VIII

References

Alaranta, A., Alaranta, H., Holmila, J., Palmu, P., Pietila, K., & Helenius, I. (2006). Self-reported attitudes of elite athletes towards doping: Differences between type of sport. *International Journal of Sports Medicine*, *27*(10), 842-846.

Antonak, R. F. (1982). Development and psychometric analysis of the Scale of Attitudes Toward Disabled Persons. *The Journal of Applied Rehabilitation Counseling, 13*(2), 22-29.

Antonak, R. F. (1985). Construct validation of the Scale of Attitudes Toward Disabled Persons. *Journal of Applied Rehabilitation Counseling, 16* (1), 7-10, 48.

Banse, R., Seise, J., & Zerbes, N. (2001). Implicit attitudes towards homosexuality: Reliability, validity, and controllability of the IAT. *Experimental Psychology (formerly "Zeitschrift für Experimentelle Psychologie")*, *48*(2), 145–160.

Bhasin, S., Storer, T. W., Berman, N., Callegari, C., Clevenger, B., Phillips, J, Bunnell, T.J., Tricker, R., Shirazi, A., Casaburi, R. (1996). The effects of supraphysiologic doses of testosterone on muscle size and strength in normal men. *New England Journal of Medicine*, *335*(1), 1-7.

Brennan, B. P., Kanayama, G., Hudson, J. I., & Pope, H. G. (2010). Human growth hormone abuse in male weightlifters. *The American Journal on Addictions*, *20*(1), 1-5.

CBS & The New York Times. (2003). Poll. December 10-13, Retrieved November 29,2010 from Roper Center Public Opinion Archives.

Committe on Government Reform. (2005). *Full Committee Hearing on Steroid Use in Baseball.* Washington D.C.: United States Congress. Retrieved December 1, 2010, from The Washington Post: http://www.washingtonpost.com/wp-srv/sports/articles/steroidhearing_011508.html

Conroy, D.E., Silva, J.M., Newcomer, R.R., Walker, B.W., & Johnson, M.S. (2001). Personal and participatory socializers of the perceived legitimacy of aggressive behavior in sport. *Aggressive Behavior, 27*(6), 405-418.

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, *24*(4), 349-354.

Cunningham, W. A., Preacher, K. J., & Banaji, M. R. (2001). Implicit attitude measures: Consistency, stability, and convergent validity. *Psychological Science (Wiley-Blackwell)*, *12*(2), 163-170.

De Houwer, J., & De Bruycker, E. (2007). Implicit attitudes towards meat and vegetables in vegetarians and nonvegetarians. *International Journal of Psychology*, *42*(3), 158-165.

Denham, B. E. (2006). Effects of mass communication on attitudes toward anabolic steroids: An analysis of high school seniors. *Journal of Drug Issues*, *36*(4), 809-829.

Devine, P.G., Plant, E.A., Amodio, D.M., Harmon-Jones, E., & Vance, S.L. (2002). The regulation of explicit and implicit race bias: The role of motivations to respond without prejudice. *Journal of Personality and Social Psychology,* 82(5)*,* 835-848.

Diacin, M. J., Parks, J. B., & Allison, P. C. (2003). Voices of male athletes on drug use, drug testing, and the existing order in intercollegiate athletics. *Journal of Sport Behavior*, *26*(1), 1–17.

Edwards, A.L., (1957). *The social desirability variable in personality assessment and research.* New York: Dryden.

Encyclopedia Brittanica. (2010). *Ginseng*. Retrieved December 5, 2010, from Encyclopedia Brittanica: http://www.britannica.com/EBchecked/topic/233978/ginseng

Encyclopedia Brittanica. (2010). *Protein*. Retrieved December 5, 2010, from Encyclopedia Brittanica: http://www.britannica.com/EBchecked/topic/479680/protein

ESPN. (2007, December 18). *ESPN analyst Vina says he used HGH in 2003, but never steroids*. Retrieved November 12, 2010, from ESPN: http://sports.espn.go.com/mlb/news/story?id=3158744

Feinberg, J.M. (2009). College students' perceptions of athletes who cheat: The role of performance and history. *Journal of Sport Behavior*, *32*(4), 460-474.

Furlanello, F., Serdoz, L. V. Cappato, R., & De Ambroggi, L. (2007). Illicit drugs and cardiac arrhythmias in athletes. *European Journal of Cardiovascular Prevention & Rehabilitation*, *14*(4), 487-494.

Giorgi, A., Weatherby, R., & Murphy, P. (1999). Muscular strength, body composition and health responses to the use of testosterone enanthate: A double blind study. *Journal of Science & Medicine in Sport*, *2*(4), 341-355.

Green, G. A., Uryasz, F. D., Petr, T. A., & Bray, C. D. (2001). NCAA study of substance use and abuse habits of college student-athletes. *Clinical Journal of Sport Medicine*, *11*(1), 51.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Journal of Personality and Social Psychology, 102,* 4-27.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, *74*, 1464–1480.

Greenwald, A. G., Poehlman, T. A., Uhlmann, E., & Banaji, M. R. (2009). Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology*, *97*(1), 17–41.

Gucciardi, D.F., Jalleh, G., & Donovan, R.J. (2010). Does social desirability influence the relationship between doping attitudes and doping susceptibility in athletes?. *Psychology of Sport & Exercise, 11*(6), 479-486.

Hartgens, F., & Kuipers, H. (2004). Effects of androgenic steroids in athletes. *Sports Medicine , 34*(8), 513-554.

Kiely, K. (2005, November 15). Focus on NBA, NHL to improve drug-testing policies. *USA Today*. Retrieved December 11, 2010 from USA Today: http://www.usatoday.com/sports/basketball/nba/2005-11-15-nhl-nba-drug-testing-sidebar_x.htm

Kersey, R. D. (1996). Anabolic-androgenic steroid use among California community college student-athletes. *Journal of Athletic Training*, *31*(3), 237-241.

Kotecki, J. (1994). Anabolic steroids: Effects as an ergogenic aid for athletes. *Journal of the International Council for Health, Physical Education, Recreation, Sport & Dance*, *31*(1), 10-17.

Lotz, S., & Hagemann, N. (2007). Using the Implicit Association Test to measure athlete's attitude toward doping. *Journal of Sport & Exercise Psychology, 29*, S183-S184.

Luciano, L. (2001). *Looking good: Male body image in modern America*. New York City: Hill and Wang.

McCabe, S. E., Brower, K. J., West, B. T., Nelson, T. F., & Wechsler, H. (2007). Trends in non-medical use of anabolic steroids by U.S. college students: Results from four national surveys. *Drug and Alcohol Dependence*, *90*(2-3), 243-251.

McConnell, A. R., & Leibold, J. M. (2001). Relations among the Implicit Association Test, discriminatory behavior, and explicit measures of racial attitudes. *Journal of Experimental Social Psychology*, *37*(5), 435-442.

Meinhardt, U., Nelson, A. E., Hansen, J. L., Birzniece, V., Clifford, D., Kin-Chuen, L., Graham, K., & Ho, K.Y. (2010). The effects of growth hormone on body composition and physical performance in recreational athletes. *Annals of Internal Medicine*, *152*(9), 588-W196.

Merriam-Webster Inc. (2010). *Anabolic Steroids.* Retrieved December 2, 2010, from Merriam-Webster Dictionary: http://www.merriam-webster.com/dictionary/anabolic+steroids?show=0&t=1291308947

Merriam-Webster, Inc. (2010). *Caffeine.* Retrieved December 2, 2010, from Merriam-Webster Dictionary: http://www.merriam-webster.com/dictionary/caffeine

Merriam-Webster, Inc. (2010). *Creatine.* Retrieved December 2, 2010, from Merriam-Webster Dictionary: http://www.merriam-webster.com/dictionary/creatine

Merriam-Webster, Inc. (2010). *Doping.* Retrieved December 2, 2010, from Merriam-Webster Dictionary: http://www.merriam-webster.com/dictionary/doping

Merriam-Webster, Inc. (2010). *Human Growth Hormone.* Retrieved December 2, 2010, from Merriam-Webster Dictionary: http://www.merriam-webster.com/dictionary/human%20growth%20hormone

Merriam-Webster, Inc. (2010). *Multi-vitamin.* Retrieved December 2, 2010, from Merriam-Webster Dictionary: http://www.merriam-webster.com/dictionary/multi-vitamin

Merriam-Webster, Inc. (2010). *Vitamin C.* Retrieved December 2, 2010, from Merriam Webster Dictionary: http://www.merriam-webster.com/dictionary/vitamin+c?show=0&t=1291309766

Miller, K. E., Hoffman, J. H., Barnes, G. M., Sabo, D., Melnick, M. J., & Farrell, M. P. (2005). Adolescent anabolic steroid use, gender, physical activity, and other problem behaviors. *Substance Use & Misuse*, *40*(11), 1637-1657.

Naylor, A.H., Gardner, D., & Zaichkowsky, L. (2001). Drug use patterns among high school athletes and nonathletes. *Adolescence*, *36*(144), 627-640.

Nilsson, S., Spak, F., Marklund, B., Baigi, A., & Allebeck, P. (2005). Attitudes and behaviors with regards to androgenic anabolic steroids among male adolescents in a county of Sweden. *Substance Use & Misuse*, *40*(1), 1–12.

O'Brien, K. S., Hunter, J. A., Halberstadt, J., & Anderson, J. (2007). Body image and explicit and implicit anti-fat attitudes: The mediating role of physical appearance comparisons. *Body Image*, *4*(3), 249-256.

Office of the Press Secretary. (2004, January 20). *The 2004 State of the Union Address: Complete Transcript of President Bush's Speech to Congress and the Nation.* Retrieved October 18, 2010, from The White House: Officious Website of President George W. Bush: http://whitehouse.georgewbush.org/news/2004/012004-SOTU.asp

Petróczi, A., & Aidman, E. (2009). Measuring explicit attitude toward doping: Review of the psychometric properties of the Performance Enhancement Attitude Scale. *Psychology of Sport and Science*, *10*(3), 390-396.

Petróczi, A., Aidman, E. V., & Nepusz, T. (2008). Capturing doping attitudes by self-report declarations and implicit assessment: A methodology study. *Substance Abuse Treatment, Prevention, and Policy*, *3*(1), 9.

Petróczi, A., Aidman, E. V., Hussain, I., Deshmukh, N., Nepusz, T., Uvacsek, M., Tóth, M., Barker, J., Naughton, D.P. (2010). Virtue or pretense? Looking behind self-declared innocence in doping. *PLoS ONE*, *5*(5), e10457.

Project Implicit. (2010). *Take a Demo Test*. Retrieved November 11, 2010, from Project Implicit: https://implicit.harvard.edu/implicit/demo/selectatest.html

Reiss, M. (2007). *NFL strengthens drug policy*. Retrieved November 13, 2010, from The Boston Globe: http://www.boston.com/sports/articles/2007/01/25/nfl_strengthens_drug_policy/

Rickert, V. I., Pawlak-Morello, C., Sheppard, V., & Jay, M. S. (1992). Human growth hormone: A new substance of abuse among adolescents? *Clinical Pediatrics*, *31*(12), 723 -726.

Robertson, N., & Vohora, R. (2008). Fitness vs. fatness: Implicit bias towards obesity among fitness professionals and regular exercisers. *Psychology of Sport & Exercise*, *9*(4), 547-557.

Robinson, B. E., Bacon, J. G., & O'Reilly, J. (1993). Fat phobia: Measuring, understanding, and changing anti-fat attitudes. *International Journal of Eating Disorders*, *14*(4), 467-480.

Rudman, L.A., & Kilianski, S.E. (2000). Implicit and explicit attitudes toward female authority. *Personality and Social Psychology Bulletin, 26(11),* 1315-1328.

Rudman, L. A., Greenwald, A. G., Mellott, D. S., & Schwartz, J. L. (1999). Measuring the automatic components of prejudice: Flexibility and generality of the Implicit Association Test. *Social Cognition*, *17*(4), 437–465.

Saugy, M., Robinson, N., Saudan, C., Baume, N., Avois, L., & Mangin, P. (2006). Human growth hormone doping in sport. *British Journal of Sports Medicine, 40*, i35-i39.

Strauss, R.H., Liggett, M.T., & Lanese, R.R. (1985). Anabolic steroid use and perceived effects in ten weight-trained women athletes. *Journal of the American Medical Association, 253*, 2871-2873.

Strelan, P., & Boeckmann, R. J. (2006). Why drug testing in elite sport does not work: Perceptual deterrence theory and the role of personal moral beliefs. *Journal of Applied Social Psychology, 36* (12), 2909-2934.

Teachman, B. A., Gapinski, K. D., Brownell, K. D., Rawlins, M., & Jeyaram, S. (2003). Demonstrations of implicit anti-fat bias: The impact of providing causal information and evoking empathy. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *22*(1), 68-78.

The Associated Press. (2007, December 16). *Pettitte admits using HGH to recover from an elbow injury in 2002*. Retrieved November 12, 2010, from ESPN: http://sports.espn.go.com/mlb/news/story?id=3156305

The Henry J. Kaiser Family Foundation. (2000, October). *Children get mixed messages from famous athletes, on and off the field.* Retrieved December 5, 2010, from http://www.kff.org/kaiserpolls/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=13552

The NCAA News. (2010, June 7). *Latest testing shows minimal increase in steroid use*. Retrieved October 2, 2010, from NCAA.org: http://www.ncaa.org/wps/portal/ncaahome?WCM_GLOBAL_CONTEXT=/ncaa/ncaa/ncaa+news/ncaa+news+online/2010/association-wide/latest+testing+shows+minimal+increase+in+steroid+use_06_07_10_ncaa_news

The NCAA Research Staff. (1997). NCAA study of substance use and abuse habits of college student-athletes. *Presented to The National Collegiate Athletic Association Committee on Competitive Safeguards and Medical Aspects of Sports*. http://www.ncaa.org/wps/wcm/connect/291b91004e0b8a509a96fa1ad6fc8b24/NCAADrugUseStudy1997.pdf?MOD=AJPERES&CACHEID=291b91004e0b8a509a96fa1ad6fc8b24

USA Today. (2009, December 16). *Bucs' Earnest Graham: 30% of NFL players could be using HGH*. Retrieved November 12, 2010, from USA Today: http://content.usatoday.com/communities/thehuddle/post/2009/12/bucs-earnest-graham-30-of-nfl-players-could-be-using-hgh/1

Vecsey, G. (2010, May 11). *Cushing Made His Choice; Voters Have an Easy One*. Retrieved October 18, 2010, from The New York Times: http://www.nytimes.com/2010/05/12/sports/football/12vecsey.html?_r=1&scp=3&sq=brian%20cushing%20suspended&st=cse

Visek, A., & Watson, J. (2005). Ice hockey players' legitimacy of aggression and professionalization of attitudes. *Sport Psychologist, 19*(2), 178-192.

Wichstrom, L., & Pedersen, W. (2001). Use of anabolic-androgenic steroids in adolescence: Winning, looking good, or being bad?. *Journal of Studies on Alcohol*, *62,* 5-13.

White, M. J., Gordon, P., & Jackson, V. (2006). Implicit and explicit attitudes toward athletes with disabilities. *Journal of Rehabilitation*, *72*(3), 33-40.

Wittenbrink, B., & Schwarz, N. (2007). *Implicit measures of attitudes.* New York City: The Guilford Press.19.

Wright, S., Grogan, S., & Hunter, G. (2001). Body-builders' attitudes towards steroid use. *Drugs: Education, Prevention & Policy*, *8*(1), 91-95.

Wroble, R. R., Gray, M., & Rodrigo, J. A. (2002). Anabolic steroids and pre-adolescent athletes: Prevalence, knowledge, and attitudes. *The Sport Journal*, http://www.thesportjournal.org/article/anabolic-steroids-and-pre-adolescent-athletes-prevalence-knowledge-and-attitudes.

Yarasheski, K. E., Campbell, J. A., Smith, K., Rennie, M. J., Holloszy, J. O., & Bier, D. M. (1992). Effect of growth hormone and resistance exercise on muscle growth in young men. *American Journal of Physiology - Endocrinology and Metabolism*, *262*(3), E261-267.

Yarasheski, K. E., Zachweija, J. J., Angelopoulos, T. J., & Bier, D. M. (1993). Short-term growth hormone treatment does not increase muscle protein synthesis in experienced weight lifters. *Journal of Applied Physiology*, *74*(6), 3073-3076.

Yesalis, C. E., Kopstein, A. N., Bahrke, M. S., Wilson, W., & Derse, E. (2001). Difficulties in estimating the prevalence of drug use among athletes. *Doping in Elite Sport: The Politics of Drugs in the Olympic Movement*, 43–62.

Yesalis, C. E., Kennedy, N. J., Kopstein, A. N., & Bahrke, M. S. (1993). Anabolic-androgenic steroid use in the United States. *The Journal of the American Medical Association*, *270*(10), 1217-1221.

Youth Risk Behavior Surveillance System. (2009). *2009 National Youth Risk Behavior Survey Overview.* National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health. http://www.cdc.gov/HealthyYouth/yrbs/pdf/us_overview_yrbs.pdf

Yuker, H. E. (Ed.). (1988). *Attitudes toward persons with disabilities*. New York: Springer.

Yuker, H. E., & Block, J. R. (1986). Research with the Attitudes Toward Disabled Persons Scales: 1960-1985. Hempstead, NY: Hofstra University Center for the Study of Attitudes toward Persons with Disabilities.

Yusko, D.A., Buckman, J.F., White, H.R., & Pandina, R.J. (2008). Alcohol, tobacco, illicit drugs, and performance enhancers: A comparison of use by college student athletes and nonathletes. *Journal of American College Health, 57*(3), 281-289.

Zelli, A., Lucidi, F., & Mallia, L. (2010). The relationships among adolescents' drive for muscularity, drive for thinness, doping attitudes, and doping intentions. *Journal of Clinical Sport Psychology*, *4*(1), unpaginated.