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Dr. Heather Erwin, Director of Graduate Studies

BEHAVIORAL INTENTIONS AND NONMEDICAL ANABOLIC STEROID USE
AMONG NON-INTERCOLLEGIATE ATHLETE MALES AGES 18-30

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Education in the
College of Education
at the University of Kentucky

By

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and

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Dr. Mark Dignan, Professor of Internal Medicine

Lexington, Kentucky

2013

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ABSTRACT OF DISSERTATION

BEHAVIORAL INTENTIONS AND NONMEDICAL ANABOLIC STEROID USE AMONG NON-INTERCOLLEGIATE ATHLETE MALES AGES 18-30

The purpose of this study was to increase understanding of factors associated with nonmedical anabolic steroid use among males ages 18-30 who do not participate in intercollegiate athletics. The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey instrument was developed, reviewed for content validity by a jury of experts, and pilot tested. The pilot testing results (n=25) demonstrated acceptable reliability (Cronbach's alpha= 0.74). The final version of the Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey instrument was administered at two distribution sites which included Ford's Fitness Center in Lexington, Kentucky and the Johnson Center on the University of Kentucky's campus to non-intercollegiate athlete men between the ages of 18-30 (n=121). The final version of the survey instrument was also found to be reliable (Cronbach's alpha= 0.86).

Of the 121 respondents, 7 (5.9%) reported using nonmedical anabolic steroids at least 1-2 days a week or more. A total of 9 (7.4%) men reported intending to use nonmedical anabolic steroids within the next year. Age was found to have a statistically significant association with intention to use nonmedical anabolic steroids ($p=.037$).

Perceived behavioral control ($p=.029$) was found to be the strongest predictor variable of study participants' intention to use nonmedical anabolic steroids. Muscle mass builder use ($p=.011$) and muscle mass builder use in combination with multivitamin use ($p=.000$) were found to be significant predictors of actual nonmedical anabolic steroid use. Study participants were more likely to use nonmedical anabolic steroids if they were currently using a muscle mass builder or using a muscle mass builder in combination with a multivitamin. No decision about the effectiveness of the components of perceived behavioral control (self-efficacy and control) as a one or two part construct was possible because of the small number of study participants. Two additional demographic predictor variables were found to be statistically significant with predicting the intention to use nonmedical anabolic steroids. Being a competitive bodybuilder ($p=.001$) was positively correlated and being satisfied with body image ($p=.025$) was negatively correlated with the intention to use nonmedical anabolic steroids.

KEYWORDS: Nonmedical Anabolic Steroids, Theory of Planned Behavior, Performance Enhancers, Multivitamin, Muscle Mass Builders

Vitesh "Victor" Enaker
Student's Signature

October 27, 2013
Date

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Date

This dissertation is dedicated to my parents and to the Bluegrass of Kentucky, especially Montgomery County. You made me everything that I am today. Thank you.

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Chapter One

Statement of the Problem

Introduction

Nonmedical anabolic steroid use has been a hot topic among the sports world over the last decade. Scandals involving major league baseball, the Olympics, and the tour de France have all recently received headlines. Deaths involving teenagers as a symptom of withdrawal from abruptly stopping nonmedical steroid use have also gained national attention (Weaver, 2005). In 2004, then president of the United States George W. Bush condemned nonmedical steroid use in his state of the union address (Berning, Adams, Debeliso, Stanford, & Newman, 2008). Nonmedical steroid use has maintained a presence in the media during the years involved with the new millennium causing a well known medical ethicist to proclaim that we live in a time of “steroid hysteria” (Kanayama, Hudson, & Pope, 2008). New information reveals that most nonmedical anabolic steroids users do not participate in sports and many have not participated in sport in the past (Cohen, 2009).

In 2005 a story in *USA Today* estimated that one in eight boys reported using hormones and/or supplements to improve his appearance, muscle mass, or strength. Five percent of the adolescent male population used products such as protein powders, growth hormones, and injectable steroids at least weekly (Weise, 2005). The teenagers who were most likely to use muscle building products admitted to researchers that they frequently thought about wanting greater muscular definition (Weise, 2005). A study by Hoffman et al. (2007) indicated that high school students were willing to have a decreased lifespan if they were able to have increased strength, muscle size, and/or a better physical appearance.

The Centers for Disease Control and Prevention report estimates that as many as 1 million students have taken nonmedical steroids for at least 8-12 weeks or for what is commonly referred to as a “cycle” (Weaver, 2005). The Government Accountability Office estimates that nonmedical anabolic steroid use among American high school seniors is at an all-time high

(GAO, 2006). Experts estimate that in the United States as many as 3 million Americans are abusing nonmedical anabolic androgenic steroids (Cohen, 2009). Canada, Sweden, South Africa, Britain, and Australia have all reported similar prevalence rates concerning nonmedical anabolic steroid use among high school students. This indicates that nonmedical anabolic steroid use has a worldwide impact showing that there is a cross cultural desire to increase athletic performance and physical appearance (Bahrke, Yesalis, Kopstein, & Stephens, 2000).

Typical weekly dosage among steroid users has possibly doubled over the last 15 years (Parkinson & Evans, 2006). One reason for this increase could be because many users practice a system called “stacking” or using multiple steroids at one time to increase their anabolic effects (NIDA, n.d.). A second reason for this increase could be the integrity of the drugs. Since these drugs are banned without a doctor’s prescription, users obtain them from less than creditable sources. The increase in average dosage is likely the result of the use of illegal “bootleg” drugs developed from underground laboratories in the United States and/or the use of steroids originally developed for veterinary use from foreign countries. Drug concentrations may not be accurately labeled on these products and the products themselves may not contain the drug concentration listed on the labeling (Parkinson & Evans, 2006). Using larger average dosages of steroids tends to increase risk for the manic behavior known as “roid rage.” When this occurs, individuals exhibit violent mood swings leading them to perform unpredictable and possibly dangerous actions (Parkinson & Evans, 2006; Stocker 2000).

Nonmedical anabolic steroids are not only harmful when they are actively being used these substances are also harmful when use has stopped. Evidence from previous research shows an effect of withdrawal that consists of suicidal thoughts and behavior, especially among adolescents. Suicide is already the third leading cause of death among people ages 15-24 based on U.S. government studies (Miniño, 2010). Some experts claim that the highest risk period for suicidal depression is three months after stopping use of nonmedical anabolic steroids, which

equals the same amount of time spent off the normal nonmedical anabolic steroid cycle (Weaver, 2005) or “drug holiday” (Parkinson & Evans, 2006).

Background

The risky health behaviors involved with nonmedical steroid use are often accompanied by other risky health behaviors. A study by McCabe, Brower, West, Nelson, and Wechsler (2007) found that lifetime nonmedical users of anabolic steroids were more than six times more likely to have operated a motor vehicle after binge drinking in the last 30 days compared to non-users of nonmedical anabolic steroids. This study also revealed that 77% of nonmedical anabolic steroid users reported using at least one illicit drug in the past year including use of prescription drugs for recreational purposes.

A study by Stephens and Olsen (2001) regarding ergogenic (also known as performance-enhancing) supplements and health risk behaviors found that supplement use is associated with certain risky health behaviors. This study found that ergogenic supplement use was common among young individuals. Results indicated that users of ergogenic supplements were more likely to believe in the effectiveness of nonmedical anabolic steroids. The risky behaviors observed with the use of ergogenic supplements (physically fighting, heavy drinking, and driving while under the influence of alcohol) are similar to risky behaviors observed by nonmedical anabolic steroid users. This trend indicates that there is a behavioral link between users of ergogenic aids and nonmedical steroids. Health promoters may find that identifying ergogenic supplement use and/or performance of other risky behaviors may provide valuable information of when to administer preventative strategies discouraging nonmedical anabolic steroid use.

A study by Hoffman et al. (2007) acknowledged that more research needs to be conducted on the use of dietary supplements and whether their use is a gateway to future nonmedical anabolic steroid use. This study found that almost 60% of the students surveyed in their study used a multivitamin. This study also found that as boys progressed through high school so did their likelihood of taking dietary supplements. Males in their senior year of high

school were the most likely to take a variety of supplements. Males who did use a greater amount of nutritional supplements were also more apt to use anabolic steroids than those taking fewer supplements. A similar study by Fernandez and Hosey (2008) found that some adolescents claimed that by using a variety of products such as multivitamins, energy drinks, and nonmedical anabolic steroids that they were experiencing a muscle building regimen. The National Institute of Health estimated that in 2006 the amount of money spent on dietary supplements by the American public was \$23 billion (NIH, 2006). Even after a financial recession that began in 2007, sales of supplements have increased because of increased insurance deductibles and the lack of health care among the unemployed (Williams, 2009). The lack of access to formal health care has led many Americans to try to compensate with the use of over the counter supplements (Williams, 2009).

The Hoffman et al. (2007) study also revealed that use of a specific dietary supplement mainly body mass gainers (protein powders, amino acids, weight-gain powders, and creatine) were a better indicator of anabolic steroid use compared to total amount of supplements used. Dietary supplement users were more likely to use nonmedical anabolic steroids, but directionality could not be implied. Whether users of dietary supplements progressed to using nonmedical anabolic steroids or if steroid users tended to use dietary supplements after they began using steroids is unclear.

The Theory of Planned Behavior (TPB) will be the behavioral theory used for understanding the effect of attitude, subjective norms, and perceived behavioral control on behavioral intention. Behavioral intention is considered the most direct forecaster of actual behavior (Ajzen, 2002). This study includes the results of an application of the Theory Planned Behavior to determine intentions to use nonmedical anabolic steroids among non-intercollegiate athlete males. The Theory of Planned Behavior contains the components of subjective norms, attitudes, intentions, and perceived behavioral control (Ajzen, 2002). Perceived behavioral control (PBC) is defined as a person's belief in the perceived ease or difficulty in performing a

behavior. In this study perceived behavioral control will be used as a one dimensional construct called global perceived behavioral control (global PBC) and a two dimensional construct consisting of self-efficacy and control. Self-efficacy can be defined as the ease or difficulty of performing a behavior, with people's confidence that they can perform it if they want to. Control can be defined as people's beliefs that they have control over the behavior that performance or non-performance of the behavior is up to them (Ajzen, 2002). Both constructs of PBC were reviewed and it was determined if PBC was a better predictor of intention to use nonmedical anabolic steroids as a single or two part construct.

Significance of the Study

There are a number of reasons why nonmedical anabolic-androgenic steroid use needs more study: First, data are lacking for non-intercollegiate athlete males and their nonmedical anabolic androgenic steroid use as compared to intercollegiate athletes (Berning et al., 2008). Second, there is evidence of adverse physical and behavioral effects related to nonmedical anabolic androgenic steroids such as testicular atrophy, acne, edema, insomnia, injection site pain, striae, mood alterations, sexual dysfunction, gynecomastia, hypertension, and high cholesterol levels (Parkinson & Evans, 2006). Steroid users have been known to use as many as five accessory drugs to relieve symptoms caused by nonmedical steroid abuse. Polypharmacy has been reported by many users to relieve themselves of the side-effects caused by the use of nonmedical anabolic androgenic steroids. Various drug interactions have the possibility of being more harmful than the initial use of nonmedical anabolic androgenic steroids alone (Parkinson & Evans, 2006). Third, a study by Berning et al. (2008) reported that among college students who used nonmedical anabolic steroids, 80% indicated they would use nonmedical anabolic steroids again. This study also indicated that as a male progressed through his college career his risk of nonmedical anabolic steroid abuse increased. This could indicate that prevention strategies to decrease nonmedical steroid use among college men may need to be altered. Fourth, previous studies have shown that males have a relative risk two to three times greater for abuse of

nonmedical anabolic androgenic steroid use than women (Bahrke et al., 2000) and chronic nonmedical anabolic androgenic steroid users have a mortality rate 4.6 higher than people who do not use nonmedical steroids (Parkinson & Evans, 2006). Fifth, college curriculums often include credits for activity courses and many colleges offer a weight lifting course than can fulfill a curriculum requirement. Two previous studies have indicated that when a person is introduced to weight training, nonmedical steroid abuse occurs within 2 to 5 years if it does occur (Peters, Copeland, & Dillion, 1999; Cohen, 2009). Sixth, the use of nonmedical anabolic androgenic steroids can lead to hazardous injection practices including reusing needles, sharing multi-dose vials, and sharing injection needles with another person. This could lead to an increased risk of developing HIV or hepatitis (Parkinson & Evans, 2006). For all of these reasons, there is a need for increased data on the nonmedical anabolic androgenic steroid use of non-intercollegiate athlete males. By gaining insight into nonmedical anabolic androgenic steroid use among non-intercollegiate athlete males, researchers and health promoters can gain a description of nonmedical steroid abuse rates and beliefs of the effects of nonmedical steroid among non-intercollegiate athlete males. Health promoters will also be better informed with how to design preventative strategy programs to prevent the initial use of nonmedical anabolic steroids specifically targeting non-intercollegiate athlete males based on the components of the Theory of Planned Behavior. Health promoters will also be more informed about when to apply preventative strategies. Evidence now reveals that most males start using nonmedical anabolic steroids in their twenties. The majority of nonmedical anabolic steroid users are most likely in college or at least of traditional college age. Efforts used to prevent nonmedical anabolic steroid use may be more effective immediately before or during college (Cohen, 2009).

Purpose of the Study

The purpose of this study was to increase understanding of factors associated with nonmedical anabolic steroid use among a specific segment of the population; males age 18-30 who do not participate in intercollegiate athletics.

Research Questions

1. Which variable of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control) is the strongest predictor of the intentions of non-intercollegiate athlete males' use of nonmedical anabolic steroids?
2. Are non-intercollegiate athlete males more likely to use nonmedical anabolic steroids if they are already using a multivitamin and/or a muscle mass builder?
3. Is the variable of perceived behavioral control a more effective predictor of non-intercollegiate athlete males' intentions to use nonmedical anabolic steroids as a single construct (perceived behavioral control) or two part construct (self-efficacy and control)?
4. Are the following factors predictors of nonmedical anabolic steroid use:
 - a. Considering oneself to be a competitive athlete
 - b. Considering oneself to be a competitive bodybuilder
 - c. Having a physically demanding job
 - d. Satisfaction with body image

Definition of Terms

For the purposes of this study, the following terms were identified and defined:

Dietary supplement: A dietary supplement is defined as:

“a product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following ingredients: a vitamin, mineral, herb, or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by increasing the total dietary intake, or a concentrate, metabolite, constituent, extract or combination of these ingredients”

- Is intended for ingestion in pill, capsule, tablet, or liquid form.
- Is not represented for use as a conventional food or as the sole item of a meal or diet.
- Is labeled as a “dietary supplement.”
- Includes products such as an approved new drug, certified antibiotic, or licensed biologic that was marketed as a dietary supplement or food before approval, certification, or license (unless the Secretary of Health and Human Services waives this provision) (FDA, 1995).

Ergogenic: Enhancing physical performance (<http://www.merriam-webster.com/ergogenic>)

Multivitamin: Containing several vitamins and especially all known to be essential to health (<http://www.merriam-webster.com/medical/multivitamin>)

Muscle mass builder: Any legal ingestible substance that increases the physical size of a muscle or muscle group (Operational definition)

Nonmedical anabolic steroids: A group of synthetic compounds similar in chemical structure to the natural anabolic steroid testosterone. These compounds are used in a non-therapeutic manner (Graham, Davies, Grace, Kicman, & Baker, 2008)

Chapter Two

Review of the Literature

Introduction

The purpose of this study was to increase understanding of factors associated with nonmedical anabolic steroid use among a specific segment of the population; males age 18-30 who do not participate in intercollegiate athletics. This chapter will begin with a brief explanation of what steroids are and about current nonmedical anabolic steroid use. Next socio-cultural influences associated with males and their physiques will be discussed. Dietary supplements, performance-enhancing supplements, ergogenic aids, and natural muscle hypertrophy will also be discussed. Steroid topics including muscle hypertrophy with the use of anabolic steroids, side effects related to nonmedical anabolic androgenic steroid use, steroids and the medical community, how steroids affect the brain, addiction to nonmedical anabolic steroids and other drugs, and how nonmedical anabolic steroids are acquired will all be reviewed. An assessment of peer-reviewed studies regarding dietary supplement and ergogenic aid use will assess the research that has been conducted, along with the lack of research concerning non-intercollegiate athlete males and their use of nonmedical anabolic steroids. Lastly, the Theory of Planned Behavior and its applications to predict behavioral intentions of non-intercollegiate athlete males and their use of nonmedical anabolic steroids will be discussed.

“Steroid” Defined

A “steroid” consists of 17 carbon atoms arranged in four rings. Steroids are naturally occurring compounds and can be classified into three groups. The first group consists of estrogens and would technically list birth control pills as steroids. These hormones are primarily responsible for female sex characteristics. Second are corticosteroids which break down tissue. Corticosteroids are catabolic hormones associated with the adrenal cortex and can be found in many ointments and creams. Anabolic steroids or androgens are usually synthetic versions of the hormone testosterone and produce primary male characteristics. These are the steroids referred to

when “steroids” are mentioned regarding increasing muscle size and strength in most cases (<http://steroid-abuse.org>; <http://www.drugpolicy.org/>).

Steroid Use

A study by Cohen (2009) has revealed that a new trend is arising in research concerning nonmedical steroid research and previous trends are not as concrete as researchers once thought. Data from Cohen’s study reveal that the average nonmedical steroid user is now believed to be a Caucasian man in the mid-twenties to early thirties and participation in any form of sport is not apparent. Many of the individuals who purchase nonmedical steroids over the internet, the most popular source to acquire nonmedical anabolic steroids, do not currently participate in sports and never played sports in high school or college. This demographic consists of men who have white-collar jobs, are highly educated, and who make higher than average incomes. These men are not regarded as typical substance abusers. The amount of preparation for administration of steroid use is thoughtful and intelligent. They also purchased the cycles of nonmedical steroids that they needed in a year’s abundance at one time, and would have blood work done periodically to indicate if any chemical imbalances were observable. Injection was the most common mode of use as many of these men were aware that oral ingestion would be more likely to cause kidney damage. Many of these men were taking nonmedical steroids for cosmetic reasons as they wanted to appear more muscular and strong and the older men in the study were very concerned with losing body fat. The use of nonmedical steroids was found not to be for perseverance of current physical state, but for enhancement of muscularity and to improve strength. This may indicate that these men are not really dissatisfied with their current physical state, but would like to reap the rewards that Western society gives to muscular men who make efforts to “better” themselves in an aggressive manner. Many users felt that the medical community’s and society’s views on steroid use were outdated and that if the medical technology exists, they should be allowed to partake in it (Cohen, Collins, Darkes, & Gwartney, 2007). Although nonmedical steroids were banned in 1990 their popularity has not decreased. In July 2009, federal agents

executed search warrants to investigate American Cellular Labs in California and found that the company was manufacturing supplements contaminated with anabolic steroids (Cohen, 2009).

History of Steroids

The cold war between the former Soviet Union and the United States (1945-1991) could have influenced a few generations of Americans to desire overly muscular bodies. This all began in 1889 during a scientific meeting in Paris, France. Dr. Brown-Sequard announced that he could reverse the ailments that affected his 72 year old body. His cure-all was an injection of an extraction taken from dog and guinea pig testicles. Later in 1905 the discovery of hormones was made (Calfee & Fadale, 2006) with testosterone being isolated in 1935 by Dutch pharmacologist Ernst Laqueur allowing synthetic versions to be produced (www.drugpolicy.org). In the 1940s a publication entitled *The Male Hormone* by Paul de Kruif claimed testosterone was the next “wonder drug” for aging men (De Kruif, 1945). Shortly thereafter, reports surfaced of steroids being able to speed up recovery times and increase muscle size (www.drugpolicy.org).

Then in the 1950s Russian weight lifters with the use of steroids drastically improved their performance competing in the Olympics. Almost immediately American physicians teamed with chemists to produce Dianabol, an anabolic steroid, in order to compete with the Russian athletes. The United States’ passion in defeating the Russians lead to steroids being used in a vast array of sports to improve performance and steroid use in sports still spans to today. This use of steroids could have influenced many Americans during an almost 50 year span of the cold war to win at all costs as a matter of dedication to their country (Calfee et al., 2006). The athletic world’s obsession with ergogenic aids began with the discovery and use of anabolic steroids (Juhn, 2003).

In the 1970s bodybuilding had started to gain popularity. Media portrayals of men with increased muscular definition began to be commonplace. Males started to learn how they could enhance their body image with the use of nonmedical anabolic steroids (Kanayama et al., 2008). By 1975 nonmedical anabolic steroids were added to the International Olympic Committee’s list

of banned substances. Many college and professional sports followed this action by banning nonmedical anabolic steroids (<http://www.drugpolicy.org/>). The first book on nonmedical steroid use became popular in 1981 entitled the *Underground Steroid Handbook* written by Daniel Duchaine. Detailed information was included in this publication revealing how to obtain nonmedical steroids and how to administer injections (Duchaine, 1981). Revisions to this work were made over the next ten years along with other similar publications following the new trend (Kanayama et al., 2008).

In the 1980s studies began to surface about the effect of nonmedical anabolic steroids on boys and young men. In 1988, a study by Buckley and colleagues (1988) found that many 12th grade boys had used nonmedical anabolic steroids and that for the first time they were using nonmedical anabolic steroids for reasons unrelated to sports or athletics. In 1990 the United States Congress passed the Steroid Trafficking Act acknowledging that nonmedical steroid use was a substance abuse problem (Kanayama et al., 2008). This act was passed although the action was against the advice of the American Medical Association, the Drug Enforcement Agency, the Department of Health and Human Services, and the Food and Drug Administration (<http://www.drugpolicy.org/>). In 1991 the National Household Survey of drug use included the use of nonmedical anabolic steroids and it was estimated that at least one million men had used nonmedical anabolic steroids (Kanayama et al., 2008).

Socio-cultural Influence

This study is important because research has revealed that men are feeling more pressure than ever to have more muscular physiques. A study conducted in France, Austria, and the United States in 2000 indicated that the average man wanted 28 lbs of pure muscle added to his physique (Choi, Pope, & Olivardia, 2002). Internet access has increased over recent years and has added to the already plentiful bombardment of media images showcasing the ideal male physique. Over the last 25 years calculations have shown that the average male centerfold showcased in *Playgirl* magazine has gained 27 pounds of muscle and lost an average of 12 pounds of fat (Pickett, Lewis,

& Cash, 2005). The constant barrage of these images has increased the anxiety in men to take control of their muscularity in order to become the ideal physical specimen (Clark, 2004). Men may find this task overwhelming when diet and exercise do not provide the desired superficial outcome (Pickett et al., 2005). A parallel has been created where society has started to view men more as sexual objects as compared to women in traditional society (Leit, Gray, & Pope, 2002). Men and women both may find it undesirable to be overweight in society, but for males it is undesirable to be considered too lean or insufficiently muscular. Boys who made significant efforts to look like male media figures were three times as likely to use products known to build muscle mass. Boys who read men's, health, and/or teen magazines were twice as likely to use products perceived to enhance appearance (Field et al., 2005).

An increasing number of men have been suffering from disorders related to becoming a media perfect icon (Leit et al., 2002). The effect of the media on men has been documented (Leit et al., 2002). When men are exposed to images of other men with rippling biceps and well defined abdominal muscles they realize they do not conform to the ideal images portrayed in the media. Even just a brief viewing of ideal male physiques caused most regular males to feel physically inadequate (Leit et al., 2002). Stout has documented that women are often satisfied with the attractiveness of their partner while men in these relationships are not satisfied with their own appearance because they value attractiveness more than women. This often leaves men unable to accept their own looks and can lead to abnormal behaviors (Stout, 2004). Marriage in regard to most unhealthy behaviors would be considered a protective factor for men against performing these behaviors. Cohen's study in 2009 on nonmedical anabolic steroid use showed that men who used nonmedical anabolic steroids were more likely to be married than previously thought. Married men could be using nonmedical anabolic steroids because they are unsatisfied with their own physical appearance.

Many people would argue that the onset of the perception to become hyper-masculine is brought about by socio-cultural factors and that the media brings out the obsession to become

unrealistically muscular in these men. An example would pertain to the toy industry. Most people are very familiar with the line of Barbie toys aimed at girls. Many think that the physical ideals Barbie set for girls are unattainable and that she is a bad role model for kids. Her figure has ridiculous proportions that are unattainable by any non-fictitious woman. It is estimated that if Barbie were an actual woman she would have a sixteen inch waist (Pope, Olivardia, Gruber, & Borowiecki, 1999).

Measures have been taken by the Mattel toy company to improve Barbie's perception. In 1998 she was given more proportionate hips, a decreased bust, and a thicker waist. Interestingly, Barbie's boyfriend Ken has always remained with the same dimensions and, compared to other action figures aimed at boys, his dimensions are of a much more realistic manner. With the Barbie line being aimed at girls it is interesting that the toy company acknowledges that women prefer a man that is of normal musculature (Stout, 2004).

Another famous toy line is the G.I. Joe line produced by Hasbro. G.I. Joe is an action figure assortment aimed at boys. These soldiers were first developed in 1964 with the dimensions of being 5'10" tall, with a 32" waist, a 44" chest, and 12" biceps. These dimensions can be attainable by a man who has a fairly rigorous workout scheme. In 1991, GI Joe was reissued and this time he had a 29" waist and 16" biceps along with the "six-pack" look. Images like this are causing more boys to become conscious of how they look, regardless of the shape they are in (Stout, 2004). The United Kingdom hosted a Body Image Summit resulting in reduced amounts of unhealthy images of women being published in periodicals throughout the country. No such summit has been compiled for the images presented of men in the media in the United Kingdom (Morgan, 2000).

Some people turn to nonmedical anabolic steroids because they live a highly appearance-sensitive lifestyle. These users are most concerned with an improvement in physical appearance and are labeled as "aesthetes." Some nonmedical anabolic steroid use occurs for a strictly vocational reason. This group feels that using nonmedical anabolic steroids assists them in

performing their jobs. This group includes body guards, police, firefighters, gang members, and armed forces personnel. Members of this group may feel that they lack a physical edge and nonmedical anabolic steroids provide this necessary piece of their employment puzzle. This group could feel that their survival depends on their own physical capabilities (Peters et al., 1999).

Previous research has tried to label nonmedical anabolic steroids users into four categories:

(A) Competitive athletes

(B) Competitive bodybuilders

(C) Occupational needs to use nonmedical anabolic steroids

(D) People who are dissatisfied with their body image

Findings have also indicated that men who are most likely to use nonmedical anabolic steroids experience muscle dissatisfaction and desire to conform to traditional masculine norms. The desire to become more masculine is often linked to exhibiting risky health behaviors with the possible use of dangerous substances (nonmedical anabolic steroids) to obtain an ideal male body type (Fillault & Drummond, 2010).

Throughout history certain societies have valued a certain form of masculinity for that specific time period. Whatever form of masculinity that was valued proved that those who exhibited the sought after traits would be considered superior to other males. The current “orthodox masculinity” values homophobia, misogyny, stoicism, physical strength, and being able to control one’s self and others. The ability to portray these values may be a way for men to attain power and dominance. The ideal male body alone might be a tool in attaining these values. Men who possess the body type that is idealized for their time period are often given more respect compared to men not portraying that image. Currently the body type that is thought to consist of natural superiority consists of having a body that is muscular and at the same time lean and toned (Fillault & Drummond, 2010).

Does all of this propaganda actually affect males in our society? In previous studies, boys are often asked what body-type females are most attracted to. These boys are usually asked to use a computerized tool called the somatomorphic matrix developed by Dr. Harrison Pope that allows a person to add or decrease the amount of muscular bulk to a picture, usually of a male (Morgan, 2000). They often pick males who are at least 30 pounds larger (consisting of muscle mass) than the reference male. Often males cannot find a bulky enough figure that they think is large enough when asked this question. They have a distortion that the male figure can be larger than physically possible regarding actual anatomical structure. This is very dangerous because they come to the realization that in order to reach this pinnacle of manliness that supplementation with illegal substances is necessary. Often, these boys are trying to achieve a male figure that is biologically impossible and their chase for the perfect male body will never be accomplished. Conversely, when women are asked which male figure they prefer the most they consistently pick a male who has an average build and nowhere near the very muscular build most men think women prefer (Clark, 2004).

Current vernacular can also contribute to males' feelings of inadequacy. Think about the language used to describe a thin woman, they are said to be slender, delicate, and fragile. Men who are labeled as skinny are thought to be pencil-necked, scrawny, and lanky. There is definite language bias when talking about a thin man and a thin woman. A large man is described as being a hulk, a hulk, or as big daddy. It can be derived that as a man it is much better to be described as large than to be described as thin or small (Stout, 2004).

As the trend continues in this society concerning body obsession in men a new kind of strategy will have to be developed regarding a variety of dysmorphic disorders. Male empowerment, no matter how ridiculous it may sound, may need to be implemented. It is often true that men do not talk about their feelings and that they often keep things to themselves. In the future, men will need to be able to express their feelings and communicate their feelings better in order to ward off body disorders. Men will have to recognize that male bodies come in variety of

forms and that just because a man does not resemble a male icon he is not less of a man himself (Stout, 2004). This is going to be a simple strategy for combating socio-cultural influence, male empowerment for the average man (Leone, Sedory, & Gray, 2005).

Normally, in the United States and the Western world, individuals are accustomed to perform to the best of their own ability. An individualistic approach is often favored over a collectivist approach when dealing with attributes such as wealth and status. It is possible that being in good health (mainly looking healthy) could be viewed as having a high status and with men a muscular physique could emphasize this quality even greater. This could involve weight lifting or some other form of exercise to improve a man's physical prowess. In some cases, a collectivist approach could be taken, such as competition in team sports where everyone wants to use his own ability to its fullest, but at the same time have his team succeed as much as possible. Lifting weights could be considered an activity that is performed with a team since, for safety reasons, a spotter will be used in case of the need to assist the actual weight lifter at that time. Members of a certain fitness center or weight lifters who work out at the same common times could also be considered to be like a team. Using nonmedical anabolic steroids could show dedication to the team and also that the individual is serious about becoming more bulky and is dedicated to weight lifting. Outside of the fitness center or away from the other weight lifters it is possible that these men have never considered taking nonmedical anabolic steroids. These men may consider taking nonmedical anabolic steroids to be a social norm especially while around a group of weight lifters or in the gym. These men's normal attitudes about lifting weights or taking nonmedical anabolic steroids could be overridden at this time (Triandis, 2001). In some cases where it would have been initially thought that men were lifting weights and taking nonmedical anabolic steroids to increase muscle mass for individualistic reasons, the real reason for performing these behaviors may have initially been to develop a social network. Men who perform such network-building tasks, especially in Western culture, are often viewed more positively by society. This could be a major reason for impressionable men to want to perform

these behaviors (Shephard, 1989). A study by Buckworth and Nigg (2004) indicated that a correlate for males with exercise was social support. They acknowledged that vigorous activity might be fostered by men's participation in group activities.

Perceived Steroid Use

A study by Berning et al. (2008) regarding perceived nonmedical anabolic steroid use among college students found that among non-users 62% did not know anyone who was using nonmedical anabolic steroids. 34% of students who did not use nonmedical anabolic steroids knew between 1 to 5 nonmedical anabolic steroid users. Among students who did use nonmedical anabolic steroids 7% reported not knowing anyone else who used nonmedical anabolic steroids, but 40% knew between 1 and 5 other nonmedical anabolic steroid users. 33% of nonmedical anabolic steroid users and 27% of non-users of nonmedical anabolic steroids perceived less than 5% of non-student athletes to be taking nonmedical anabolic steroids. 36% of nonmedical anabolic steroid users and 37% of non-users perceived non-athlete student rates of nonmedical anabolic steroid usage to range from 5% to 10%.

Of non-users of nonmedical anabolic steroids 24% claimed they could obtain nonmedical anabolic steroids within 1 to 2 weeks with 15% of this group claiming they could procure nonmedical anabolic steroids within a few hours. 36% of nonmedical anabolic steroid users stated they could obtain nonmedical anabolic steroids within 1 to 2 weeks with 40% claiming they could procure nonmedical anabolic steroids within a few hours. Some users indicated that they did not know how to obtain nonmedical anabolic steroids (Berning et al., 2008).

Reasons for using nonmedical anabolic steroids were 48% wanted to increase physical performance, 45% wanted to enhance their appearance, and 7% used nonmedical anabolic steroids because their friends were taking nonmedical anabolic steroids. Among nonmedical anabolic steroid users 76% claimed that they were very likely to continue using nonmedical anabolic steroids. College students most likely to take nonmedical anabolic steroids were seniors and the chance of taking nonmedical anabolic steroids in college increased as students progressed

through school (Berning et al., 2008). A study conducted by the University of Michigan in 2005 indicated that 42% of twelfth graders found nonmedical anabolic steroids to be easy or fairly easy to obtain without a doctor's written prescription (Weaver, 2005).

A study by Fernandez and Hosey (2009) found that 40% of teenagers claimed that obtaining nonmedical anabolic steroids was relatively easy. The teenagers mentioned slang terms for nonmedical anabolic steroids including "pumpers", "gym candy", and "juice." Observations to watch for when suspecting someone is using nonmedical anabolic steroid include:

- a. rapid weight gain
- b. change in attitude (usually negative)
- c. yellowing of the skin
- d. swelling in the feet and legs
- e. shakes and tremors
- f. body odor
- g. increased acne (<http://steroid-abuse.org/>).

Risky Health Behaviors and Steroids

Previous studies have shown that increased frequency of risky behaviors has been reported by nonmedical anabolic androgenic steroid users. Risky behaviors such as carrying a firearm, increased amount of sexual partners, injuries requiring medical attention from being in a physical fight, not wearing a helmet while riding a motorcycle, not wearing a seatbelt, and suicide attempts have all been reported by nonmedical anabolic androgenic steroid users (Bahrke et al., 2000).

A study by Middlemen et al. (1995) in Massachusetts examined nonmedical anabolic steroid use and other high risk behaviors. Middleman, Faulkner, Woods, Emans, and Durant examined Problem Behavior Theory and proposed that the use of nonmedical anabolic steroids would not be an isolated behavior. Problem behaviors were suggested to cluster together and form a risk behavior syndrome. These behaviors include high risk sexual behaviors, suicidal

behaviors, drinking while driving and driving in a vehicle with an inebriated driver, not wearing safety belts, riding a motorcycle, not wearing a helmet while riding a motorcycle, fighting, and carrying a weapon. These behaviors are thought to cluster together because they can provide necessary psychological and/or social achievements in an adolescent's life. These behaviors can affirm adult status, the ability to function without parents' approval, and to gain acceptance from their peers. Results indicated that nonmedical anabolic steroid use is often not an isolated behavior and suggests that when other high risk behaviors are examined that counseling regarding nonmedical anabolic steroid use may need to be performed.

When using nonmedical anabolic steroids in liquid or serum form the substances used must be injected intramuscularly. A variety of hazardous injections practices can take place by someone who is not a medical professional. Reasons for injections-related complications stem from informal training in administering injections, use of bootleg or veterinary products, and large volume injections used with high doses of nonmedical anabolic steroids. Nonmedical anabolic steroid users have been known to reuse needles, share multidose vials, and even share needles with another person. Nonmedical anabolic steroid users commonly experience pain at the injection site (Parkinson & Evans, 2006).

Vitamins and Dietary Supplements

The discovery of the first vitamins and minerals in the early 1900s was preceded by almost 150 years by the first random controlled trial experiment conducted by British Navy physician James Lind. Dr. Lind compared the nutritional intakes of sailors and recognized that the sailors who ingested citrus juices were free from scurvy. Later the compound known as vitamin C was recognized to prevent this affliction (NIH, 2006).

Soon after the discovery of essential vitamins and minerals, fortification of foods became a very common practice with iodine being added to salt in 1924 to prevent goiter and then vitamin D being added to milk in 1933 to help prevent rickets. Soon flour became enriched with iron and other minerals (NIH, 2006). Grain products now supply almost half of all dietary iron

with meat, fish, and poultry providing about 18%. In 1998 the FDA required that manufacturers fortify enriched grain products with folic acid (Briefel & Johnson, 2004). By the 1940s the first multivitamin and mineral tablets could be purchased at local pharmacies (NIH, 2006).

In 1994 the Dietary Supplement Health and Education Act was established and this enabled many dietary supplements to become available on the market.

DSHEA Dietary Supplement Health and Education Act 1994

Passage of DSHEA in 1994 created a new “liminal” regulatory for the FDA: dietary supplements are neither food nor drugs. The intention behind the legislation was the “rational regulation of dietary supplements, freedom of choice for consumers, access to truthful information, and protection and enhancement of public health.” Ultimately, the legislation defines dietary supplements as a broad set of products “intended to supplement the diet” and labeled to use to affect the “structure and function” of the body or for “general well-being” (United States FDA, 2002).

Dietary supplements are now neither food nor drugs (United States FDA, 2002). Congress’ reasoning for passage of the DSHEA was to enable consumers to purchase supplements that they feel may have beneficial effects on health by making them more accessible. In 1994 Congress also established the Food and Drug Administration as the body that regulates the dietary supplement industry and protects the interests of consumers by making sure that they are using truthful claims and are not misleading in their descriptions (United States FDA, 2002). The DSHEA states that dietary supplements cannot be removed from the marketplace unless they are a proven health hazard. Before supplements are placed on the market no clearance is required and no testing of the product has to occur (Dodge, Ford, & Perko, 2003). It is required that notification be given to the FDA if ingredients in the supplements have not been grandfathered in by the DSHEA prior to 1994, after 75 days the manufacturer is free to market their product, so it is vital for the FDA to conduct research during this 75 day window (Crawford, 2002). According to the United States Food and Drug Administration deaths have occurred because of this lack of stringent testing standards and this has resulted from hypertoxicity, allergic reactions, abuse, and disability including hospitalization (Perko, Bartee, Dunn, Wang, & Eddy, 2000).

Dietary supplements are not subject to standardized quality, purity, and manufacturing practices and no post market surveillance is required. The FDA is stressing good manufacturing practices and hopes that the dietary supplement industry will conform. These practices are intended to keep high quality control requirements of dietary supplement manufacturers (United States FDA, 2002). No formal surveillance system for tracking adverse events pertaining to dietary supplements currently exists (Haller, Meier, & Olson, 2005). A system was developed by the FDA called CAERS to report adverse effects but was removed from the FDA's web site because it was considered far too confusing (United States FDA, 2002).

Many foreign countries do not regulate their manufacturing of nutritional supplements very well. In many cases the ingredients listed on the nutritional supplement bottle do not match the actual ingredients used. Possible contamination of nutritional supplements with prohormones, which are anabolic agents or substances that cause muscle building can occur. The use of prohormones is prohibited by many sports and is banned by the International Olympic Committee. Very low amounts of prohormones can provide a positive test for illegal substances if ingested by an athlete competing in a world class event. There is no guarantee that using even legitimate nutritional supplements will not cause a person to fail a drug test (Van der Merwe & Grobelaar, 2005). The FDA has coordinated efforts with other countries because of ease of acquisition of acquiring dietary supplements regarding internet sales. Canadian and Mexican authorities are being cooperative along with the Federal trade commission and new programs specifically targeting surveillance with internet sales are being revamped (United States FDA, 2002). China however, is a major supplier of raw ingredients used to make supplements. Recently, there has been increasing awareness over greater amounts of contaminated products arriving to the United States. The FDA has not inspected any factory located in China known to supply dietary supplement ingredients (Consumer Reports, 2010).

A study by Hoffman et al. (2007) found that almost 60% of the students surveyed in their study used a multivitamin. This study also found that as boys progressed through high school so

did their likelihood of taking dietary supplements. Males in their senior year of high school were the most likely to take a variety of supplements. This study also revealed that use of a specific dietary supplement; mainly body mass gainers (protein powders, amino acids, weight-gain powders, and creatine) were a better indicator of anabolic steroid use compared to total amount of supplements used. Males who did use a greater amount of nutritional supplements were also more apt to use nonmedical anabolic steroids than those taking fewer supplements. Males in general, were found to use more fat burning supplements (high-energy drinks, ephedra, caffeine pills) than females and use of these specific supplements were indicators of nonmedical anabolic steroid use. The influence of teachers on the use of dietary supplements decreased as males progressed through high school. Males felt less compelled to seek advice from teachers about supplements after their 8th grade year. Nonmedical anabolic steroid users reported using multiple sources of information to obtain knowledge about nonmedical anabolic steroids with the internet and drug dealers being the most popular sources. It may be possible that students interested in using nonmedical anabolic steroids search for information until they find sources more inclined towards their previous notions regarding nonmedical anabolic steroids.

Students indicated that they were willing to have a decreased lifespan if they were able to have increased strength, muscle size, and or a better physical appearance. Nonmedical anabolic steroid users were found to exercise for more hours in a single day and to also exercise at significantly higher levels than non-steroid users. Users of dietary supplements were more likely to use nonmedical anabolic steroids, but directionality could not be implied. Whether students started using nonmedical anabolic steroids and then used dietary supplements to relieve side effects caused by steroids or if students used dietary supplements and then progressed to using nonmedical anabolic steroids is not apparent. The authors of the study emphasized that further study needs to be conducted on the use of dietary supplements and whether their use is a gateway to future nonmedical anabolic steroid use (Hoffman et al., 2007).

A study by Petroczi, Naughton, Mazanov, Holloway and Bingham (2007) showed that many athletes were confused about which supplements to take in order to attain certain physical goals. An example would be taking whey protein to decrease body weight when the most common use of whey protein is to increase muscle bulk. These athletes did not consult with a doctor and it was apparent that they had a poor understanding of why they were taking some of their supplements.

In 2001 *Prevention* magazine conducted a survey concerning consumer confidence regarding dietary supplements and nearly 75% of respondents indicated that they thought herbal supplements were either "safe or completely safe." Many people think dietary supplements are safe because they are accessible to the public, especially if these products can be bought at warehouse stores where they can be purchased in bulk. Even more amazing was a study done by Nichter and Thompson (2006) in which they asked regular and sometime users of supplements if they would continue to take a supplement if the FDA claimed that the supplement was ineffective with two-thirds saying that they would continue to use the supplement regarded as ineffective. More disturbing is that even if a supplement is not harmful, it may prevent the use of conventional medicine which has been documented as being effective. Although the supplement itself may not be harmful, the opportunity to take a proven medicine is missed out on (United States FDA, 2002).

The greater amount of dietary supplements a person had taken indicated that the greater the media's effects were compared to that of his or her primary care physician (Peters, Shelton, & Sharma, 2003). A breakdown in the number of dietary supplements taken was presented at the American Dietetic Association's Food & Nutrition Conference & Expo in 2005. Information from this Expo revealed that the number of people taking supplements decreased until three or more supplements were consumed (Picciano, 2005). This shows that three supplements could be the threshold amount where, after three supplements have been taken, the media's influences are stronger than that compared to the consumer's doctor.

Table 2.1

Amount of supplements taken by supplement users (Picciano 2005)

1 supplement	47.3%
2 supplements	22.7%
3 supplements	13.2%
4 supplements	16.8%

This helps to indicate the media's possible influence as there are more users of four supplements than three, possibly indicating that after using 3 supplements, consumers are much more easily influenced to use more. Confusion then develops and many people become confused about what their proper daily dosage of vitamin(s) is/are, possibly causing them to take vitamins in excess. Some people purposely take higher than recommended allowances because they perceive that they may have increased health benefits. Many people feel as vitamins cannot be physically hurtful, but dosages of vitamins can vary by manufacturer and just because one pill may be recommended as a serving size it does not necessary indicate that it is of the daily recommended allowance. Some adults may view this possible higher than average amount in a daily allowance as an indicator that they should have no worries about consuming higher than recommended amounts of vitamin(s) (Peters et al., 2003). A common complaint about conventional medicine is that it is not very tailored to specific individuals. Many consumers would claim that their friends and family's experience with taking dietary supplements is what led to their use. Even when supplement use does not prove beneficial, secondary elaboration occurs. The consumer acknowledges that everyone is different and that supplements may not be equally effective for everyone because of differing body type along with other factors such as fitness and diet. Even though the supplement may not have worked, it is still labeled as creditable by the consumer (Nichter & Thompson, 2006).

To help men identify more closely with positive connotations supplement companies have been very aware of what label name they provide their products with. Names such as Ripped Fuel, Megaman Complex, Hydroxy Cut, and Muscle-Milk all help the consumer identify

with the product more closely. Western society often identifies individuals with their mode of consumption compared to that of production as is the case in the rest of the world. Identity is more closely related to how we spend money than by how we earn money. These health consumers can now display their own health identity through consumption of the supplements that they buy. This identity can be presented as health-conscious, as consumers can showcase how much they care for their health by how many supplements they take. Consumers can also show their distrust for science by choosing to purchase supplements that are more natural showing that they accept the alternative and that they reject conventional medicine. Either way the pharmaceutical industry capitalizes because it can focus on insecurity and hope as well as science and possibility (Nichter & Thompson, 2006).

The National Institute of Health estimated that in 2006 the amount of money spent on dietary supplements by the American public was \$23 billion (NIH, 2006). Even after a two year recession that began in 2007, sales of supplements have increased because of increased insurance deductibles and the lack of health care among the unemployed. The lack of access to formal health care has led many Americans to try to compensate with the use of over the counter supplements (Williams, 2009). Although nutrition is a very important aspect of health, the use of dietary supplements in the United States goes far beyond the scope of nutrition.

In 2002 a Harris Poll indicated that consumers believed that supplements included warning labels about potential harmful effects with many believing that supplements are approved by a government agency. Over 140 contaminated products have been identified with many other supplements also having undeclared pharmaceutical ingredients. Contaminates have included toxic plants, heavy metals, or bacteria. Others were contaminated with prescription medications, rejected drugs by the FDA, and controlled substances. Since 2007 known serious adverse events that occur from the use of dietary supplements have been required to be reported by manufactures to the FDA. An estimated 50,000 of these events occur annually with the majority of the events not being reported (Cohen, 2009).

Performance-enhancing Substances

Performance-enhancing substances have gained a lot of public attention in the last few years. An article in the *Journal of Pediatrics* by Gomez (2005) states that any substance used for improving sports performance taken in nonpharmacologic doses is considered a performance-enhancer. These substances lure vulnerable adolescents who are already prone to risk-taking behavior and experimentation, which they believe will lead to perceived personal rewards. Even when improved performance in a sport is not the objective, adolescents will often take performance enhancers to aid in their cosmetic body appearance. Characteristics of a performance-enhancing substance include altering body weight/body composition along with the ability to increase strength, power, speed, or endurance. Performance-enhancing substances are also known to change behavior, arousal level, and perception of pain in order to improve performance.

Performance-enhancing substances include the following:

- Pharmacologic agents (prescription or nonprescription) taken in doses that exceed the recommended therapeutic dose or taken when the therapeutic indication(s) are not present (e.g., using decongestants for stimulant effect, using bronchodilators when exercise-induced bronchospasm is not present, increasing baseline methylphenidate hydrochloride dose for athletic competition)
- Agents used for weight control, including stimulants, diet pills, diuretics, and laxatives, when the user is in a sport that has weight classifications or rewards leanness
- Agents used for weight gain, including over-the-counter products advertised as promoting increased muscle mass
- Physiologic agents or other strategies used to enhance oxygen-carrying capacity, including erythropoietin and red blood cell transfusions (blood doping)

- Any substance that is used for reasons other than to treat a documented disease state or deficiency
- Any substance that is known to mask adverse effects or detectability of another performance-enhancing substance
- Nutritional supplements taken at supraphysiologic doses or at levels greater than required to replace deficits created by a disease state, training, and/or participation in sports (Gomez, 2005).

People who are more likely to use performance-enhancers are males, participate in sports that demand power, size, and speed. These males may also use other substances that may be illegal at their age such as tobacco and alcohol. Also youths who are obsessed with body image and their own physique are more likely to take performance-enhancers (Gomez, 2005). In 2005 a story in *USA Today* estimated that one in eight boys reported using hormones and/or supplements to improve their appearance, muscle mass, or strength. Five percent of the adolescent male population used products such as protein powders, growth hormones, and injectable nonmedical steroids at least weekly. The teens who were most likely to use muscle building products admitted to researchers that they frequently thought about wanting greater muscular definition (Weise, 2005).

A study by Stephens and Olsen (2001) regarding ergogenic supplements and health risk behaviors found that supplement use is associated with certain health risk behaviors. This study found that ergogenic supplement use was common among individuals. Results indicated that users of ergogenic supplements were more likely to believe in the effectiveness of nonmedical anabolic steroids. Users of ergogenic supplements were more likely to drink alcohol heavily, ride in a motor vehicle with a driver who has been drinking, drive after drinking, and participate in a physical fight. The risk behavior syndrome observed with ergogenic supplement use is similar to risk behaviors observed by nonmedical anabolic steroid users. Ergogenic supplements are readily available to adolescents and use of these supplements may provide enough incentive for

preventative counseling regarding nonmedical anabolic steroid use. Some adolescents may claim that by using a variety of products such as multivitamins, energy drinks, and nonmedical anabolic steroids that they are experiencing a muscle building regimen (Fernandez & Hosey, 2009).

Muscle Hypertrophy

Muscle size increases by two types of hypertrophy. Transient hypertrophy occurs during a single exercise session. Edema or fluid accumulation occurs as blood plasma is moved inside and outside of muscle cells and gives the “pumped up” impression temporarily. The accumulated fluid returns to the blood within hours of when exercise took place. Long-term resistance training causes chronic hypertrophy which lasts much longer. Structural changes take place within the muscle by increasing the actual number of muscle fibers or by increasing the size of existing individual muscle fibers (Wilmore & Costill, 1994).

Muscle protein synthesis increases after exercise or during down time when the muscles are not being used as heavily. Protein levels are constantly fluctuating in the body and during exercise these levels are often broken down and depleted. The body later adjusts to this fluctuation and, after a consistent exercise pattern becomes established, protein synthesis increases to a higher level than protein depletion causing an increase in muscle size or bulk (Wilmore & Costill, 1994).

Resistance training should be as sport-specific as possible. At least part of the training should involve movements that closely mimic those needed for the athlete’s sport or activity, including movement patterns and speed (Wilmore & Costill, 1994). A new trend is arising among youths who are obsessed with body image and their own physique (Gomez, 2005).

Muscle Hypertrophy and Steroids

Healthy males produce 2-10 milligrams of testosterone per day. Testosterone is responsible for muscle development, facial hair growth, and voice deepening (Moitra, 1999). Most of the steroids used to increase muscle size are referred to as “anabolic-androgenic steroids.” These muscle building steroids are basically different variations of the male sex

hormone testosterone, which are produced synthetically. The term “anabolic” usually indicates muscle building and the term “androgenic” refers to increased male sexual characteristics. Steroid use is legal in some circumstances especially when involved with muscular wasting occurring from HIV-AIDS and cancer or when a person, usually a male is naturally deficient in testosterone and has delayed puberty (Moitra, 1999).

Anabolic steroids are effective in increasing muscle size and strength. Commonly two forms of anabolic steroids are available consisting of tablets and injectable serums (Moitra, 1999). The practice of “stacking” involves taking two or more steroids at one time usually consisting of a “cycle” or time period in which steroids are taken lasting anywhere from 4-12 weeks. Steroids can be “stacked” using either tablet or serum forms or mixed using both tablet and serum or liquid forms (Parkinson & Evans, 2006). Injectable steroids can also be divided into two categories consisting of oils and waters. Waters which are much like the tablet form of anabolic steroids do not last quite as long as the oil injection. Oil based steroids can be retained in the body for longer periods of time because they are slowly released, which is often favorable to users because this lessens the need for multiple injections usually occurring in the buttocks (Moitra, 1999).

Even when nonmedical anabolic steroid use has ceased there are lingering effects on the body. The body eventually becomes so accustomed to receiving outside sources of artificial hormones that it stops producing testosterone naturally. The human body can take at least 2-4 weeks to start producing natural testosterone after stopping use of nonmedical anabolic-androgenic steroids (Weaver, 2005). Typical nonmedical anabolic steroid use behavior consists of a practice called cycling. A typical cycle can last anywhere from 4-12 weeks and this is the amount of time spent while using nonmedical steroids. Common practice indicates that among most nonmedical steroid users (time on = time off), so in other words if someone used 12 week cycles, in one year he would spend 6 total months using nonmedical anabolic steroids, consisting

of (two) 3 month nonconsecutive cycles. Basically, there are two three-month intervals a person using nonmedical steroids would be on hiatus (Parkinson & Evans, 2006).

Two biochemical reactions are responsible for the effectiveness of anabolic steroids. First by causing RNA polymerase enzymes to promote phosphate synthesis production training can occur for longer periods of time. An average person would be fatigued after a strenuous workout due to the absence of sufficient oxygen, but increased amounts of creatine phosphate can be metabolized in oxygen's absence so a person on steroids should be able to train for longer periods of time. Second, protein synthesis occurs at an increased rate because receptor steroid complexes within a cell encourage transcription within a muscle cell's nucleus (Moitra, 1999).

Anabolic steroids also increase muscle size by aiding the body in efficiently utilizing the nitrogen content from ingested protein. To gain muscle mass a person must be in a state of positive nitrogen balance. An imbalance of nitrogen can occur after a strenuous work-out session due to the release of glucocorticosteroids by the body. In order to increase muscle mass the body must be in a state of positive nitrogen balance. Steroids increase the rate at which a positive nitrogen balance can be achieved, leading to faster gains in muscle mass compared to normal body functioning (Moitra, 1999).

To increase muscle size it was once thought that exercise must be used in conjunction with anabolic steroids. Research now shows that when anabolic steroids are taken in high dosages of at least 300 mg/week over 10-20 weeks that muscle size will increase even without performing exercise. Amounts of steroids in this dosage or larger can increase mean testosterone levels to over 1000mg. This increase in testosterone helps to increase the cross sectional area of muscle fibers and also increases the number of muscle fibers. Anabolic steroids have also been shown to influence the musculoskeletal system by increasing lean body mass, muscle size, strength, bone metabolism, and collagen synthesis (Parkinson and Evans, 2006).

Side Effects of Steroid Use

Immediate side effects of nonmedical anabolic androgenic steroids include acne, baldness, gynecomastia, testicular atrophy, sexual dysfunction, and psychological disturbances otherwise known as "roid rage." Increases in liver enzymes can occur with the use of orally taken anabolic steroids. Long term users who also take high doses of nonmedical anabolic androgenic steroids have been known to experience cardiomyopathy and sudden death. In some cases atherosclerosis has been accelerated causing hypertension, coronary artery disease and small heart attacks or myocardial infarctions. Long term use has also been associated with an increased amount of LDL cholesterol and a decreased amount of HDL cholesterol also known as dyslipidemia (Fernandez & Hosey, 2009).

A study by Parkinson and Evans (2006) on 500 nonmedical steroid users found that almost all subjects in their study experienced at least one side effect. Seventy percent of their subjects experienced at least three or more complications originating from nonmedical anabolic steroid use. Common adverse symptoms from their study included insomnia and other sleep disturbances, edema, stretch marks, and injection site pain. This study found that the number of side effects experienced increased with higher dosages of nonmedical anabolic steroids taken and with greater amounts of stacking or increases in taking different varieties of nonmedical anabolic steroids. Greater numbers of side effects often did not deter nonmedical anabolic steroid users from nonmedical anabolic steroid use. Nonmedical anabolic steroid users simply increased the amount of ancillary drugs they used in order to alleviate side effects. Nonmedical anabolic steroid users from this study also experienced hypertension and increased amounts of LDL cholesterol, but were more unlikely to take medications for these side effects compared to other side effects caused by nonmedical anabolic steroid use. This is a harmful practice because this form of polypharmacy can be more dangerous than taking nonmedical anabolic steroids alone and it also allows for nonmedical anabolic steroid users to use these drugs on a more long term basis without enabling the body to return to homeostasis.

Side effects of taking nonmedical anabolic steroids did not only occur while taking nonmedical anabolic steroids. Side effects from nonmedical anabolic steroid use can occur when someone has suddenly stopped taking nonmedical anabolic steroids and when they are in-between nonmedical anabolic steroid cycles. Withdrawal has been commonly reported by nonmedical anabolic steroid users along with depressed mood, fatigue, restlessness, anorexia, insomnia, decreased libido, headaches, and suicidal thoughts. A higher amount of nonmedical anabolic steroid cycles completed could indicate a greater amount of withdrawal effects experienced (Brower, Frederic, Young, & Hill, 1991).

The Medical Community and Steroids

Studies of nonmedical anabolic steroid users are rare possibly because most users of nonmedical anabolic steroids are untrusting of primary care physicians and other healthcare providers. Some nonmedical anabolic steroids users could be afraid of disclosing their nonmedical anabolic steroid use because it is against the law to use such substances, but many nonmedical anabolic steroid users feel that physicians are not informed of the abilities of nonmedical anabolic steroids and many feel that doctors are biased against nonmedical steroid use (Kanayama et al., 2008). A study by Pope, Kanayama, Ionescu-Pioggia, and Hudson (2004) found that when compared to other topics such as smoking, illicit drug use, alcohol, and general fitness nonmedical anabolic steroid users rated physicians as being knowledgeable about such matters. This study also revealed that the active weightlifting controls felt the same way about physicians' knowledge regarding nonmedical anabolic steroids and their use. Nonmedical anabolic steroid users were more likely to reveal their nonmedical anabolic steroid use to other male friends, girlfriends or spouses, and members of the same gym before physicians. Mistrust for the medical community may stem from previous claims that nonmedical anabolic steroid use has been ineffective. As recently as 2003, in the *Physician's Desk Reference* statements were made about nonmedical anabolic steroids being ineffective in increasing muscle strength and size. Many users of nonmedical anabolic steroids may view their lifestyle as being "underground"

without acknowledging views of the scientific community. They may feel more rebellious by using nonmedical anabolic steroids and often read publications like the infamous *Underground Steroid Handbook* which lists many “lies” provided by the medical and scientific community. Many of the subjects of this study referred to physicians as “geeks” or “pencil necks” that could not comprehend the body building lifestyle. In the future it will be necessary for physicians to try to break through this barrier presented by users of nonmedical anabolic steroids (Pope et al., 2004). That time will be soon as the first generation of nonmedical anabolic steroid users are now reaching the ages of 45 and older. Their previous nonmedical anabolic steroid use and their increasing age will lead to a variety of medical problems from possible long term use that doctors cannot combat without the disclosure of previous nonmedical anabolic steroid abuse (Kanayama et al., 2008).

The Brain and Steroids

The effects of steroids on the brain are usually different than the effects of other drugs. Anabolic-androgenic steroids bind to receptors on the surface of cells. This binding creates an anabolic-androgenic receptor complex that can influence gene expression. This expression is mediated by its previous merger with either androgen or estrogen that formed the anabolic-androgenic receptor complex. The most noticeable difference between steroids and other drugs affecting the brain is the lack of a “high” feeling because no dopamine is released when steroids are used. Long term use of anabolic-androgenic steroids can impact brain pathways and affect mood and behavior of an individual. Long term use of anabolic-androgenic steroids can also affect chemicals in the brain such as dopamine, serotonin, and opioids (Moitra, 1999).

Addiction and Other Drugs

Animal studies have shown the anabolic androgenic steroid use is reinforcing. This means that if animals are given the ability administer anabolic androgenic steroids to themselves they will use steroids like they do other addictive drugs (NIDA Info Facts, n.d.). A study by Cohen (2009) indicated that 99% of his sample steroid population did not experience a “high”

after the use of anabolic steroids. The participants of the study admitted that they did not have any feelings of intoxication, arousal, or euphoria after injecting or orally ingesting anabolic steroids.

In humans, the addictive potential of steroids is apparent in the consistent use of steroids despite the numerous side-effects. Many users of steroids spend a vast amount of time and money attaining steroids. Withdrawal symptoms have been known to occur after steroid use has ceased. These symptoms include mood swings, fatigue, restlessness, loss of appetite, insomnia, reduced sex drive, and steroid cravings. Depression has been the most publicized symptom as heavy depression has led to suicides especially in the teenage or adolescent populations. Suicide has been known to occur with suddenly quitting use of steroids but withdrawal symptoms could occur within the timeframe of being between “cycles”, which could be as long as 3 months. In order to relieve themselves of withdrawal symptoms with stopping the use of steroids some people may turn to other drugs (NIDA Info Facts, n.d.).

Another class of drugs used in conjunction with anabolic-androgenic steroids is ancillary drugs. Ancillary drugs make anabolic-androgenic steroids more effective or can be used to treat or prevent side effects occurring with the use of anabolic androgenic steroids. Common ancillary drugs used by anabolic androgenic steroids users often block the conversion of testosterone into estrogen. When a steroid abuser uses a high level of anabolic androgenic steroids the excess testosterone produced is converted by the body into estrogen in order to reach a state of homeostasis. The conversion to estrogen is unwanted by most steroid abusers because they desire male physical characteristics and increased estrogen will decrease male physical traits. These ancillary drugs consist of SERMs or selective estrogen receptor modulators and aromatase inhibitors (Cohen, 2009).

Peptides are also used as ancillary drugs by steroid abusers. A peptide is a shorter version of protein composed of amino acids and linked by peptide bonds. Peptides have always been used as ancillary drugs by steroid abusers, but are now more available in recumbent forms.

These recumbent forms may possibly be more effective in building muscle because of their modification. They are modified by placing a strand or more of a peptide into another peptide creating an artificial peptide. HGH, or human growth hormone has received a lot of attention recently. Insulin, which is used commonly to treat diabetes is often used by steroid abusers. The use of insulin helps to transport nutrients throughout the body and can be considered anabolic, or muscle building. HGH, use often increases insulin resistance in the body so many steroid abusers take HGH and insulin at the same time to combat this effect before it happens. Thyroid hormones are often taken because of their ability to increase the amount of fat burned by the body and when thyroid hormones and HGH are taken together they produce growth factors when synthesized in the liver (Cohen, 2009).

A study by Parkinson and Evans (2006) consisting of 500 steroid users found that 96% used other drugs in addition to anabolic androgenic steroids. Some users were found to use as many as 5 additional drugs while using anabolic steroids. Using many drugs at one time as some anabolic androgenic steroid users do has made it very difficult to link side effects to specific drugs. The use of these ancillary drugs is very dangerous to steroid abusers because instead of decreasing the amount of steroids they are using they simply increase the amount of ancillary drugs they are taking to lessen the side effects occurring. This enables steroid abusers to take larger amounts of steroids because ancillary drugs help to mask the warning signs and symptoms their bodies are naturally producing. The study by Parkinson and Evans also indicated that the use of HGH and insulin by steroid abusers may have nearly doubled over the last ten years to nearly 25%.

Many steroid abusers use insulin after a post workout meal and commonly use a glucometer to monitor the blood glucose level. HCG or human chorionic gonadotropin is sometimes taken to restart a male's natural testosterone production. Natural testosterone production is often inhibited when taking high amounts of anabolic androgenic steroids because the body feels no need to produce natural testosterone due to excess amount taken externally.

HCG is often taken at the end of a steroid cycle to lessen withdrawal effects and because of its ability to reverse testicular atrophy caused by anabolic androgenic steroid use. The use of ancillary drugs can be more dangerous than the actual use of anabolic androgenic steroids. Unsupervised administration of these drugs and the ability of these drugs to interact with each other in unknown ways causes the abuse of anabolic androgenic steroids to become even more hazardous (Parkinson & Evans, 2006).

The polydrug use of steroid abusers does not only consist of ancillary drugs used to increase the effectiveness of steroids. A study by McCabe et al. (2007) found that 7 out of every 10 anabolic steroid users met the criteria in the past year for a DSM-IV alcohol use disorder. The study also found that lifetime nonmedical anabolic steroid users were more than six times more likely to have driven while under the influence of alcohol within the past month. The study estimated that 77% of nonmedical anabolic steroid users consumed at least one illicit drug (including use of prescription drugs nonmedically) within the last year, compared to 32% of non-steroid users. Nonmedical anabolic steroid users were 12 times more likely to have used cocaine in the previous month. Previous studies have also shown that nonmedical anabolic androgenic steroid use was associated with the use of several other drugs including marijuana, cocaine, stimulants, relaxants, heroin, caffeine, alcohol, cigarettes, and smokeless tobacco. Also, a strong link has been discovered between anabolic androgenic steroid use and injectable drugs. The use of shared needles has also been observed with the use of these drugs (Bahrke et al., 2000).

Dr. Harrison Pope conducted research involving anabolic androgenic steroid users and found that many steroid abusers begin to abuse heroin and other opioid drugs including prescription pain relievers. Reviews of patient histories at a private drug-abuse treatment center in New Jersey found that almost 10% of men admitted for treatment of opioid addiction had used anabolic steroids. All of the men claimed to have not used any illicit drugs before their use of steroids. Most men said they were introduced to opioids by their steroid supplier. Most men said that they used opioid drugs to counteract insomnia and irritability caused by steroid use and many

explained that they used opioids to counteract withdrawal effects after the completion of a steroid cycle especially concerning depression (NIDA Notes, 2001).

In the U.S., men who abused opioids are more commonly using anabolic steroids to mask the signs of their drug use. Using opioids has an anorexic effect and steroids are used to build back lost muscle from drug abuse. In some cases steroid use has led to opioid use, making steroids a gateway drug. In the United Kingdom anabolic steroids are now the third most frequent drug offered to children behind marijuana and amphetamines. The Kaleidoscope project in Wales and the U.K. found a major increase in the amount of anabolic steroid use by drug users (Graham et al., 2008).

Nonmedical anabolic steroid use could be similar to dietary supplement consumption. Dietary supplementation itself is often not physically addictive meaning that there is no narcotic property present in most supplements. People who take dietary supplements become addicted to the behavior of taking dietary supplements; they are not physically addicted to a certain supplement. This behavior can also translate from other forms of addictive behavior. Former smokers have a higher prevalence of taking dietary supplements than nonsmokers (Brifel and Johnson, 2004). Alcoholism, workaholism, and eating disorders can all be behaviors that when halted could lead to abuse of dietary supplements (Hatcher, 1989). When performed at the same time, dependence on exercise and taking dietary supplements can be masked by society's favorable view of these activities, especially when compared to heavy drinking or smoking. A similar pattern could be observed with taking nonmedical anabolic steroids and exercising. These men could also view taking nonmedical anabolic steroids as a societal norm leading them to believe that all other men are also taking them, possibly leaving them with a disadvantage concerning any physical gain missed. These activities might be less taboo, or possibly even encouraged, but they are still addictive behaviors that indicate an underlying problem (Hatcher, 1989).

Acquisition of Steroids

The United States Government Accountability Office has reported that the most common way of obtaining anabolic steroids is from use of the Internet to place orders from foreign countries. Many countries worldwide do not consider anabolic steroids to be illegal and these drugs can be purchased without a medical prescription. United States law enforcement agencies often have no assistance from foreign officials to stop the import of anabolic steroids because distributors are not breaking any laws in their own country because steroids are not illegal. Two types of drug smuggling usually occur pertaining to anabolic steroids. First, a smuggler in the United States will take an order from a customer in person, over the phone, or by email. Email may be preferred method of placing an order for anabolic steroids because free email services are offered by offshore providers. Services like Hushmail in Ireland and Operamail in the Netherlands are almost untraceable because they can ignore nondisclosure requests with impunity and could possibly tip off users of their service if an inquiry has been made.

After the payment is made a smuggler will go to the source country, often Mexico, and purchase steroids. Some smugglers may purchase steroids directly from a pharmacy. The smuggler will then bring the steroids over the border and deliver them to their client. In the second case a foreign source may buy the steroids and then ship the steroids to the United States. A smuggler may have a partner in the United States who is known as a remailer and will provide them with addresses of customers in the United States. After the promise of free steroids or money the remailer will repackage the steroids and send them to customers. The steroids attained are either used for personal use or used for distribution in places like local gyms (GAO, 2006).

A new perspective has been revealed from the distribution of steroids pertaining to other illicit drugs. Recently, it was thought that the only reason illicit drugs were used at the same time as anabolic steroids was to lessen the side effects of steroid use. New information shows that this might not be the only reason why many steroid users now also use illicit drugs. Some drug dealers initially begin drug sales with a client by selling steroids due to the lack of penalties

associated with steroid use compared to other drugs. The drug dealer will then gauge the legitimacy of the buyer to make sure they are not an undercover agent. If the client clears the initial tests imposed by the drug dealer they are often offered other drugs like cocaine or heroin (GAO, 2006).

The federal sentencing guidelines are not thought to be proportionate for the crime of steroid possession. The lack of penalties associated with anabolic steroid possession has been viewed as not providing a high level of deterrence for would be offenders. The principle guideline for sentencing of drug possession is mainly based on drug quantity. Anabolic steroids are categorized as a Schedule III controlled substance and the sentencing for these substances is based on a “unit” system. A unit of almost any other Schedule III controlled substance consists of one pill or 0.5 grams of the substance. One unit of anabolic steroids is 50 pills, tablets, or capsules and in liquid form one unit equals 10cc of injectable steroids. An offender who was caught selling a Schedule III substance such as 40,000 pills of ketamine (an often abused anesthetic) would face a sentence of 33 to 41 months due to drug quantity. An offender caught with 40,000 pills of anabolic steroids would face a sentence of 0 to 6 months based on quantity. The Drug Enforcement Agency’s largest anabolic steroid bust was in 2003 with 44,000 tablets of anabolic steroids being seized. The maximum sentencing for this crime is 0 to 6 months based on current sentencing guidelines (GAO, 2006).

In 1990, the Anabolic Steroid Control Act was passed and caused the possession of anabolic androgenic steroids to be a felony. These drugs are also now classified as schedule III controlled substances (Department of Justice, 2007; Kersey, 1996). In 2004, the Anabolic Steroid Control Act added additional anabolic steroids to the original list of 27 anabolic steroids composed in 1990. The maximum imprisonment term for possession of a Schedule III controlled substance is 5 years and can be increased to 10 years if the person accused has a prior drug offense conviction (GAO, 2006).

Due to the high amount of international mail processed by the United States Postal Service and private carriers many shipments of anabolic steroids enter the country illegally. Inspections are made for controlled substances and contraband but the sheer volume of mail and the measures taken by smugglers to conceal these drugs causes the screening process to become so labor intensive that some illegal items are missed by inspectors. Visual examinations, x-rays, and opening of suspicious packages all occur in international mail facilities. Anabolic steroids are often concealed in other items such as small electronic equipment and hollowed out sections of books. On line tracking systems have made smuggling illegal steroids into the United States easier for drug dealers. Law enforcement officers will often perform a “controlled delivery” when they have found illegal substance while they were in the process of being shipped. A law enforcement officer will pose as a postal employee and deliver the package of illegal substances. This enables law enforcement to gather more information related to drug trafficking or to make an arrest. On line tracking now enables smugglers to realize that their package has been delayed and that law enforcement may be involved and these smugglers then take the necessary action in order not to be found in possession of these illegal substances (GAO, 2006).

The Theory of Planned Behavior and Its Basis in the Theory of Reasoned Action

In order for health promoters to better understand health behaviors they examine the environment in which a behavior takes place. For ultimate success in designing health promotion programs a strong theoretical framework is essential. This provides a systematic plan of understanding situations in which the behavior occurs or does not occur. Without theory health promoters are operating blindly and have no sense of how a sequence of events may be occurring. Relationships between variables are revealed and concepts, definitions, and propositions are used to explain the health behavior. Theory also provides a means to use an evaluative component to further tweak their programs while also helping to reach more of their target audience (Rimer & Glanz, 2005).

Cognitive behavioral theory-three constructs:

1. Behavior is mediated by cognitions; that is, what people know and think affects how they act
2. Knowledge is necessary for, but not sufficient to produce, most behavior changes.
3. Perceptions, motivations, skills, and the social environment are key influences on behavior (Rimer & Glanz, 2005).

An activity like using nonmedical anabolic steroids is not a trait that is set when someone is born. This action is a behavior that is learned and not explained by what a person "is." All of the consequences that occur with the use of nonmedical anabolic steroids are due to performing a risky health behavior. This is why theory will be used in this study, in order to explain the behavior of taking nonmedical anabolic steroids (Fishbein, 2000). The theory of reasoned action was introduced by Martin Fishbein in 1967 and later with Icek Ajzen they refined the psychological theory. The ultimate goal of the TRA is to predict and understand human behavior (Dodge et al., 2003). Later Ajzen added the additional construct of perceived behavioral control to the theory of reasoned action reforming the previous theory into the theory of planned behavior. The theory of planned behavior explores the relationship between behavior and four components being subjective norms, attitudes, perceived behavioral control, and behavioral intention. The theory of reasoned action contains three components being subjective norms, attitudes, and behavioral intention. Behavioral intention is assumed to be the most important determinant of behavior (Rimer & Glanz, 2005). Behavioral intention is thought to be a predictor of actual behaviors. This is where the theory of reasoned action and the theory of planned behavior differ. The theory of reasoned action believes that behavioral intention will lead into actual behavior and theory of planned behavior believes that behavioral intention and the additional component of perceived behavioral control lead into actual behavior.

The theory of reasoned action and the theory of planned behavior also assume that all other factors operate through the models' constructs all of these factors working in conjunction with

each other explain a person's behavior. No single factor could independently forecast the behavior that will take place in the future. Attitudes toward behavior are shaped by beliefs about performing the behavior and outcomes of the behavior. Beliefs about social standards and motivation to comply with those norms affect subjective norms. Perceived behavioral control (the theory of planned behavior only) is associated with a person's beliefs that they control a certain behavior. A causal chain is observed in the theory of reasoned action with beliefs, attitudes, and intentions and in the theory of planned behavior with beliefs, attitudes, perceived behavioral control, and intentions which then drive behavior (Rimer & Glanz, 2005).

A summary of TRA research studies presented by Ajzen shows that the influence of attitude toward the behavior and subjective norm varies across behaviors and populations with correlations ranging from 0.40 and 0.73. Most behaviors occur with the attitudinal component outweighing that of the subjective component. Previous research indicates that most individuals will intend to perform a behavior when they evaluate its consequences positively and they believe that significant others believe they should perform the behavior (Dodge et al., 2003).

Since its inception, the TRA has been successfully applied in explaining and predicting a variety of behaviors such as voting choice in a presidential election, contraception use, drug use, seat belt use, and alcohol use by adults. In the early 1990s it was realized that a social science theory should be incorporated into dietary supplement research in order to understand decisions to use or not use supplements. The reasons for use of dietary supplements are complex and often involve social, psychological, and economic factors. These factors often interact with each other further indicating their complexity (Dodge et al., 2003). Perko has previously used the theory of reasoned action to determine factors that influence dietary supplement use among adolescent athletes. A TRA based survey was used for assessing influences of dietary supplement use among adolescent athletes by Perko et al. (2000). The study identified influences of supplement use or nonuse for 1737 student athletes' ages 14-19 years old. Survey questions addressed the three components of the TRA. Survey results exhibited a relationship with the athletes' intention

of use or non-use of supplements and their attitude toward the behavior and their subjective norms (Dodge et al., 2003).

For a behavior such as student athletes' use of dietary supplements to be adequately explained by the TRA, two basic assumptions must be met. First, it should be assumed that humans are rational beings who possess the ability to use information available to them to arrive at a behavioral decision in a reasonable manner. The TRA also assumes that the behavior of interest is under the volitional control of the individual. In other words, the individual has the ability to easily perform or to refrain from performing the behavior if they are so inclined. Ajzen and Fishbein also recognized that many behaviors (smoking cessation) have incomplete volitional control. Glanz et al. (1997) reported that the TRA components might not be sufficient for predicting behaviors in which volitional control is reduced. A person who has a high motivation to perform the behavior may not actually perform the behavior due to intervening environmental conditions. Environmental conditions may have an impact on the use of supplements. Access and economic factors may interrupt actually attaining supplements (Dodge et al., 2003).

Dr. Michael Perko developed a questionnaire titled the SPAADSU survey predicting adolescent athletes dietary supplement use based on the theory of reasoned action. In 1999 he published a research article describing the development process of the SPAADSU. The final version of the SPAADSU consisted of 36 items and had a Cronbach's alpha value of .9409 making the instrument very reliable. Dr. Perko described the development of the SPAADSU in nine stages. Before beginning the nine stages of development Perko had to take into account the previous work of Ajzen and Fishbein and their suggestions for constructing a questionnaire based within the theory of reasoned action (Perko, 1999). Ajzen and Fishbein listed three steps in the construction of a standardized TRA questionnaire that would permit prediction and explanation of behavior at a general level:

1. The behavior of interest should be defined in terms of action, target, context, and time element.

2. The corresponding behavioral intention should be defined and a format developed for measuring the behavioral intention
3. The corresponding attitude and subjective norm should be defined and a format developed for measuring the attitude and subjective norm (Perko, 1999).

Fishbein and Ajzen believe any standard measurement scale can be used adequately with the TRA. Perko decided to use a 5 point Likert scale and both positive and negatively worded questions in composing the SPAADSU because of its simplicity and the dissemination of the survey to adolescents. Construction of the SPAADSU was a nine step process.

1. Identify the attitudinal component
2. Collect a pool of opinion items
3. Pool of items reviewed by panel of experts
4. Pilot test draft of the SPAADSU
5. Administer the item pool to a group of respondents
6. Score each item for each respondent
7. Sum respondents' item scores
8. Correlation item scores with total scale scores for all respondents
9. Apply statistical criteria for elimination of test items

In stage one in order to determine the parameters of content related to adolescent athletes dietary supplement use, a review of previous literature, focus group interviews with adolescent athletes, and expert panel submissions of related materials were all used. Stage two saw the collection of 73 items into the question pool divided into the three constructs of the theory of reasoned action. Questions 1-29 were based on behavioral intention, questions 30-46 were based on attitude toward the use of dietary supplements, and questions 47-73 were based on subjective norms. Stage three involved the identification a 16 member panel of experts who were each sent the initial draft of the SPAADSU. The panel of experts consulted for stage three consisted of the three professionals fields of adolescent athletics, test construction, and sports nutrition. Eighteen

items were omitted because of duplication of similar items, poor wording, being too broad in scope, item not representative of construct being measured, and lack of operationalization of terms used in items. The panel of experts did not recommend any new items for the questionnaire, but did encourage rewording of some items. Stage four involved the pilot test draft of the SPAADSU with the omission of the questions recommended by the panel of experts. Stage five of the questionnaire development involved the use of a convenience sample of adolescent students located in Alabama after permission was granted from a regional medical center. Before the beginning of stage five an additional six members of the panel of experts returned their evaluations of the previous 73 SPAADSU questions. After acknowledging the new evaluations 6 items were omitted from this pilot testing of the SPAADSU leaving 68 questions. After completion of the pilot study a total of 9 of the 16 members of the panel of experts had completed their review of the SPAADSU questions. In stage six each respondent's score was tabulated. Each response was scaled for being positive or negative and a score of "5" was given for responses that stated "strongly agree" or "strongly disagree" and score of "4" was given for responses that stated "agree" or "disagree" and so on. Stage seven involved summing up the respondent's item scores. Average mean, standard deviation, and range of scores was calculated for the pilot study population of 232 adolescents. Stage eight involved correlating item scores with total scale scores of all respondents. Discrimination analyses indicated if respondents who scored positively throughout the entire survey scored similarly on individual items. Items that did not receive a .3 value were eliminated. This eliminated a total of 12 questions from the SPAADSU. Stage nine involved eliminating test items due to results of test criteria. Data analysis consisted of factor analysis, item response discrimination, frequency distributions, and Cronbach's alpha. Factor analysis resulted in the elimination of four questions. Questions involving attitudes, subjective norms, and behavioral intention were found to measure their respective constructs, but questions that did not obtain a value of at least .3 were omitted. Item response discrimination was used to distinguish between more positive and negative athletes.

Questions that scored over 80% or lower than 20% in response categories were omitted leaving out two questions. Cronbach's alpha was used to determine the interpretability of each construct. The final questionnaire consisted of 36 items, 13 items in the behavioral intention construct, 10 items in the attitude toward the behavior construct, and 13 items in the subjective norm construct. Dr. Michael Perko concluded that after the completion of these processes that the SPAADSU was a reliable instrument that could be used to measure adolescent athletes behavioral intentions, attitudes, and subjective norms concerning use of dietary supplements. He also declared that since the SPAADSU could be labeled as reliable that a longitudinal database could be established (Perko, 1999).

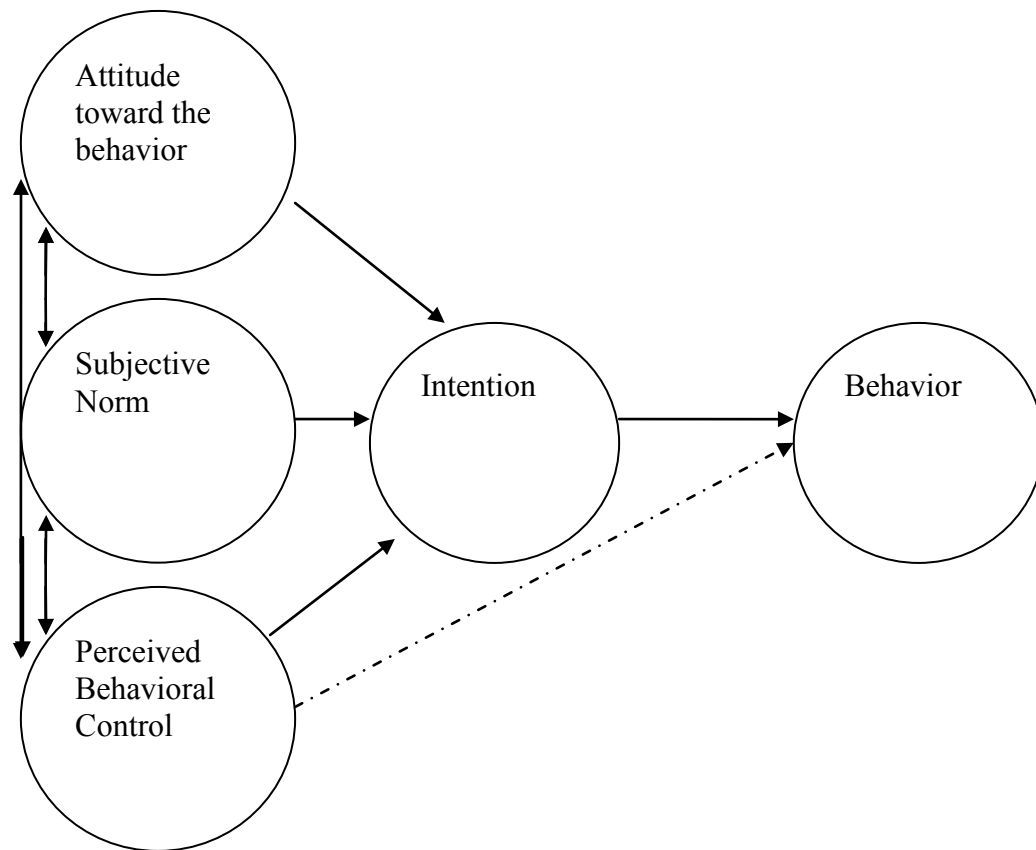
For a behavior such as men's use of nonmedical anabolic steroids to be adequately explained by the TRA, two basic assumptions must be met. First, it should be assumed that humans are rational beings who possess the ability to use information available to them to arrive at a behavioral decision in a reasonable manner. The TRA also assumes that the behavior of interest is under the volitional control of the individual. A person who has a high motivation to perform the behavior may not actually perform the behavior due to intervening environmental conditions. Environmental conditions may have an impact on nonmedical anabolic steroid use. Access and economic factors may interrupt actually attaining nonmedical anabolic steroids as based on previous dietary supplement studies (Dodge et al., 2003). Nonmedical anabolic steroid use is most likely a behavior that occurs without complete volitional control in the United States for healthy individuals. Nonmedical anabolic steroids are now a class III controlled substance and access to nonmedical anabolic steroids is most likely limited (GAO 2006). This study will use the theory of planned behavior to predict the behavioral intentions of non-intercollegiate athlete males to use nonmedical anabolic steroids due to the lack of volitional control when trying to acquire anabolic steroids in the United States.

The Theory of Planned Behavior

The Theory of Planned Behavior with the additional component of perceived behavioral control can be a better predictor of behavior than the Theory of Reasoned Action. Perceived behavioral control is defined as a person's belief in the perceived ease or difficulty in performing a behavior. Using both perceived behavioral control and intentions as predictors of performing a behavior can explain an extra amount of variance from the intention to actual behavior continuum as compared to the theory of reasoned action's basis in intention alone. In this study perceived behavioral control will be used as a one dimensional construct (global PBC) and a two dimensional construct consisting of self-efficacy and control. Self-efficacy can be defined as the ease or difficulty of performing a behavior, with people's confidence that they can perform it if they want to and control can be defined as people's beliefs that they have control over the behavior, that performance or non-performance of the behavior is up to them (Ajzen, 2002). Both constructs of PBC will be reviewed and it will be determined if PBC is a better predictor of intention to use nonmedical anabolic steroids as a single or two part construct.

Figure 2.1

The Theory of Planned Behavior (McKenzie & Smeltzer, 2001).



In this study nonmedical anabolic steroid use is found to be a behavior not fully under volitional control, TPB predicts that a person will use these substances if he:

1. Has a positive attitude toward using nonmedical anabolic steroids
2. Thinks others whom he values believe it would be good for him to use nonmedical anabolic steroids
3. Perceives that he has control over whether he uses nonmedical anabolic steroids

(McKenzie & Smeltzer, 2001).

A previous study by Munoz-Silva, Sanchez-Garcia, Nunes and Martins (2007) examined the prediction of condom use between the Theory of Reasoned Action and the Theory of Planned Behavior. This study divided the perceived behavioral control variable of the Theory of Planned

Behavior into two components: self-efficacy and control. The reason for the division of perceived behavioral control was to more accurately find which variable determined risk or prevention behavior in regard to HIV transmission. Previous work by Ajzen indicates that the closer the individual's perception is to reality in regard to conducting a behavior the more accurate the prediction of the behavior will be by the Theory of Planned Behavior. In this study perceived behavioral control was measured in the dimensions of communication skills and control. A single measure of perceived behavioral control called Global-PBC was measured as a mean score consisted of all the questions asked covering communication skills and control. This study found the theory of planned behavior to significantly increase the amount of variance explained concerning intention as compared to the theory of reasoned action. The authors' results indicate that self-efficacy was found to be a better predictor of behavioral intention than the control dimension. Overall no percentage difference could be found between global pbc (single construct) and pbc divided into the variables of communication skills and control. Women in this study often perceived themselves as in control of condom use behavior, but did not possess this control when the actual behavior was to occur although the women in this study had high intentions to use condoms.

A study by Kraft, Rise, Sutton, & Røysamb (2005) from the British Journal of Social Psychology examined the Theory of Planned Behavior and the predictors of affective attitude and perceived behavioral control. They discussed the Theory of Reasoned Action and the Theory of Planned Behavior and concluded that the two theories are identical in their predictive capabilities when the degree of control for both internal and external factors reaches the maximum values. Most real world scenarios are far from perfect and this is where the concept of perceived behavioral control becomes relevant. The authors also mention that when perceived behavioral control is measured in terms of perceived difficulty that it does not differ from measuring attitude. When perceived behavioral control is measured as confidence it does not differ from intentions. The authors discussed the perceived behavior control variable being perceived as a

unidimensional construct measured as an average of at least two items. Chronologic and theoretical reasoning however, support the notion the perceived behavioral control is a multidimensional construct consisting of two separate, but related components. Icek Ajzen acknowledges that perceived behavioral control is a unitary higher order concept that consists of the two interrelated components of self-efficacy and controllability. Ajzen also acknowledges that he prefers to include the aspects of possible/impossible when phrasing questions dealing with the construct of self-efficacy as compared to the previous easy/difficult contrast. This may be more accurate when measuring the internal cognitions of an individual. The authors analyzed data from a study on Norwegian graduate students concerning measuring intention to exercise regularly and to recycle. Previous use of confirmatory factor analysis suggested that perceived behavioral control could be separated into perceived control, perceived difficulty, and perceived confidence. Perceived difficulty items were found to severely overlap with affective attitude. Affective attitudes were found to be the best predictors of intentions. The authors concluded that in some circumstances it may be inadequate to measure perceived behavioral control by means of perceived difficulty. Perceived confidence was a strong predictor of exercise intention but not recycling intention. Perceived control was a strong predictor of recycling intention but not exercise intention.

A previous study by Pawlak et al (2005) was reviewed because of its use of the Theory of Planned Behavior to predict multivitamin use by female African American college students. This study was conducted because of the lack of folic acid ingested by women of child bearing age and folic acid's ability to reduce neural tube defects in newborns. Multivitamin supplementation was examined because the essential amount of daily folic acid required for women of child bearing age is contained in most women's multivitamins. During this study two survey instruments titled the Survey of the Theory of Planned Behavior and the Survey of the use of MVS were developed. The Survey of the Theory of Planned Behavior measured the variables of behavioral intention, attitude, subjective norms, perceived behavioral control, and behavioral, normative, and control

beliefs. Demographic and socioeconomic information was also collected. An open ended survey was used to gather information about behavioral, normative, and control beliefs concerning the use of multivitamins in order to construct the survey of the theory of planned behavior. The survey of the Theory of Planned Behavior was distributed twice to the same participants during a one week time frame. Pearson correlation was utilized to assess linear correlation between responses. Items adopted from previous literature related to behavioral intention, attitude, subjective norms, and perceived behavioral control were included in the study of the Theory of Planned Behavior survey. Survey statements with the highest internal consistency as shown by Cronbach's alpha scoring related to behavioral intention, attitude, subjective norms, and perceived behavioral control were included in the survey of the Theory Planned Behavior survey. Sixty-five percent of the variance in behavioral intention was explained by attitude, subjective norms, and perceived behavioral control. Behavioral intention was also found to significantly predict the use of multivitamins. When asked about why many of the participants did not use multivitamins the most common answer was lack of interest concerning multivitamin use (by physicians) when they previously visited their physicians during routine check-ups.

Ajzen states that human behavior is guided by three kinds of considerations behavioral beliefs, normative beliefs, and control beliefs. These beliefs are based on likely outcomes of the behavior being performed, beliefs about the expectations of others and complying with these beliefs, and beliefs about factors that may inhibit or facilitate performing a behavior along with the perceived power of these factors. Ajzen believes that the behavior of interest should be defined in the terms of TACT elements. These terms represent Target, Action, Context, and Time. Once the behavior of interest is defined at this theoretical level it can be measured either through direct observation or by self-reports. Ajzen also acknowledges that depending on the behavior being examined that these categories can become somewhat ambiguous (Ajzen, 2002). In this study the main target is nonmedical anabolic steroids, the action is the use of this substance, the context is ambiguous as non-intercollegiate athlete males (ages 18-30) could use

this substance in different ways, and time is indicated in a one year time frame. In regard to standard direct measure Ajzen explains that an investigator cannot ask a few arbitrarily selected questions or adapt items used in previous studies. The results obtained can produce low reliabilities and underestimate the theory's constructs and the theory's predictive ability. Appropriate items must be selected during the formative stages of a study by the investigator. Ajzen also explains that the final questionnaire should be presented in a nonsystematic order and be interspersed with the study's constructs. When measuring attitude it is necessary to include two separable components within the evaluation. Previous empirical research recommends the use of both affective and instrumental variables when measuring attitude. The mix of these variables can lead to a more accurate evaluation of how the individual feels about performing the given behavior. Ajzen warns of the injunctive quality associated when measuring subjective norm. This is apparent when important others approve of desirable behaviors and disapprove of undesirable behaviors. In order to alleviate this problem it is recommended to also include questions that measure descriptive norms or whether people important to the individual perform the behavior in question. Measurement of perceived behavioral control must capture the perceived capability of performing the behavior as indicated by the individual being questioned. Perceived behavioral control questions should also have a high level of internal consistency. Internal consistency of beliefs can be ambivalent if performing the behavior can produce both positive and negative outcomes. Along with internal consistency temporal stability can also estimate reliability. In order to predict behavior at a later point in time temporal stability or test-retest reliability must be present. In order to identify behavioral, normative, and control beliefs pilot work is required. These responses can identify personal salient beliefs or modal salient beliefs. The modal salient beliefs can be used as the basis for constructing a standard questionnaire. In order to access these beliefs pilot study participants are given a few minutes to respond to a series of questions. Responses to the questions are thought to offer a glimpse into the specific beliefs of that certain population. With each referent two questions are asked in

regard to belief strengths and outcome evaluations. This provides information about attitudinal considerations that during people's decision making process when deciding to perform or not perform a certain behavior. Finally, Ajzen acknowledges that depending on the purpose of the investigation that it is the investigator's decision whether to aggregate the items of perceived behavioral control into a unitary factor or to distinguish between self-efficacy and control (Ajzen, 2002).

Lack of research concerning non-intercollegiate athlete males and their reasons for use or nonuse of nonmedical anabolic steroids is apparent. The Theory of Planned Behavior provided valuable information because it provides a strong theoretical foundation for this study. The Theory of Planned Behavior works on an individual level and this is the best fit for indicating factors that influence actual behavior. The Theory of Planned Behavior is also suitable for this study because it examines social norms and attitudes which can change every few years in a society. What was a social norm 10 years ago may not be the norm in the present, also attitudes about certain behaviors can change over time. Even in certain geographic areas there could be a wide variation in social norms and attitudes simply within the United States. This model can provide valuable information in designing programs to help combat the negative behaviors examined. The Theory of Planned Behavior examines the decision making process as a whole. By being able to identify factors that influence the decision making process health promoters will be able update strategies to increase health whenever new ergogenic aids become available. Use of the Theory of Planned Behavior could provide a template regarding strategy to decrease the amount of men who use and abuse nonmedical anabolic steroids. The Theory of Planned Behavior can later provide information to design awareness programs, preventative strategies, education programs, treatments, and even public service advertisements if needed (Rimer & Glanz, 2005).

This study intended to conduct a survey to learn what beliefs, attitudes, and intentions in this population are associated with using nonmedical anabolic steroids. The survey was designed

to gauge: if non-intercollegiate athlete males have previously consumed multivitamins, muscle mass builders and/or nonmedical anabolic steroids (behavior); how likely they are to take nonmedical anabolic steroids in the future (intention); attitudes about taking these substances (attitude); whether or not “most people who are important to me” would want them to take any or all of these substances (subjective norm); and whether or not using nonmedical anabolic steroids is “under my control” (perceived behavioral control). Survey results were compared to data about who have used multivitamins, muscle mass builders, and/or nonmedical anabolic steroids to identify beliefs, attitudes, perceived behavioral control, and intentions that predict nonmedical anabolic steroid use (Rimer & Glanz, 2005).

Table 2.2

The Theory of Planned Behavior (Rimer & Glanz, 2005).

Theory of Planned Behavior	Definition	Measurement Approach
Concept		
Behavioral Intention	Perceived likelihood of performing behavior	Are you likely or unlikely to perform the behavior?
Attitude	Personal evaluation of the behavior	Do you see (the behavior) as good, neutral, or both?
Subjective Norm	Beliefs about whether key people approve or disapprove of the behavior; motivation to behave in a way that gains their approval	Do you agree or disagree that most people approve or disapprove of the behavior?
Perceived Behavioral Control	Belief that one has, and can exercise, control over performing the behavior	Do you believe (performing the behavior) is up to you, or not up to you?

Chapter Two Summary

In order to reach the goal of examining the vitamin supplementation, muscle mass builder, and nonmedical anabolic steroid habits in non-intercollegiate athlete males a literature review was conducted to provide background data. This chapter began with a brief description of steroids and then described new trends associated with the use of nonmedical anabolic steroids. New trends indicated that the average nonmedical anabolic steroid user is not a typical drug

addict and it is possible that the activity of using nonmedical anabolic steroids could be considered a planned behavior with a one year supply often being purchased at one time. College students could be particularly susceptible to nonmedical anabolic steroid use because of their higher socio economic status and level of intelligence. Socio-cultural influences associated with males and their physiques have concluded that males may be as prone to societal pressures to possess an ideal physique equal to the pressure society places on women. This high amount of societal pressure to be “attractive” and the bombardment of ideal male specimens by the social media may make many men turn to nonmedical anabolic steroids to enhance their physique in order to be more accepted in society. Risky health behaviors associated with nonmedical anabolic steroid use have shown that the activity of using nonmedical anabolic steroids is not inclusive and that many people who use nonmedical anabolic steroids may also be performing other risky behaviors or that the performance of other risky behaviors could be an indicator of future nonmedical anabolic steroid use. Dietary supplements and performance-enhancing supplements were examined and their mainstream use in society could indicate that the use of nonmedical anabolic steroids might be more acceptable socially than initially thought. Those who use these substances may also be more prone to believe in the effectiveness of nonmedical anabolic steroids compared to non-users. Previous research involving muscle hypertrophy both natural and with the use of anabolic steroids was compared to show how anabolic steroid mechanisms differ from the natural muscle building process the human body enforces. Previous research by Parkinson and Evans (2006) showed that many people use more than one nonmedical anabolic steroid at a time. The practice of “stacking” is usually performed in order to increase muscle mass gains. Use of more than one nonmedical anabolic steroid at a time could manifest to side effects that have yet to be observed with unknown consequences. Side effects related to nonmedical anabolic androgenic steroid use have shown that the use of ancillary drugs to treat side effects might be more harmful than the actual use of nonmedical anabolic steroids alone. Research has shown that instead of discontinuing the use of nonmedical anabolic steroids many

people simply increase the amount of other drugs to compensate for the body's natural warnings against nonmedical anabolic steroid use. Steroids and the medical community were discussed and it is evident that those who consume nonmedical anabolic steroids are distrustful of the medical community in general and may consider themselves to be rebellious against traditional medicine. These individuals in many cases think that the medical community is hiding the true nature of steroids effectiveness from the general public. The theory of planned behavior will be especially important to distinguish if these users are against the typical sentiments of traditional society (subjective norms). How steroids affect the brain along with addiction to steroids and other drugs indicated that many of the effects of steroids have not been determined. These results indicate that preventative strategies may be more effective when dealing with nonmedical anabolic steroid use because programs aimed at healing individuals after heavy nonmedical anabolic steroid use are most likely incomplete due to lack of knowledge about brain functioning. How nonmedical anabolic steroids are acquired was also reviewed and evidence now shows that the traditional means of acquisition has changed. People who want nonmedical anabolic steroids do not have to frequent small gymnasiums with a prominent weight lifting or bodybuilding population. The internet has provided a new means of acquiring nonmedical anabolic steroids without even having to make face to face contact with another person. Those who may have social phobias or who thought they were too socially awkward may have not had access to nonmedical anabolic steroids in the past, but with the use of the internet they now have a portal into nonmedical anabolic steroid use. This review of peer-reviewed studies regarding nonmedical anabolic androgenic steroid use demonstrated that research needs to be further specified. The Theory of Planned Behavior was presented as the theoretical background of choice because of its individual level application to predict behavioral intentions of non-intercollegiate athlete males to use nonmedical anabolic steroids. A review of literature involving the use of the Theory of Planned Behavior was presented. The review of literature indicated that the Theory of Planned Behavior is useful in a variety of behaviors, but to ultimately determine its effectiveness with a

behavior, research must be conducted specifically. The Theory of Planned Behavior is also applicable because of its ability to adapt to societal change and its effectiveness for later developing preventive programs to discourage any negative behaviors.

Chapter Three

Methodology

Introduction

The purpose of this study was to increase understanding of factors associated with nonmedical anabolic steroid use among a specific segment of the population; males age 18-30 who do not participate in intercollegiate athletics. The study included three phases: (1) develop a survey instrument based within the Theory of Planned Behavior; (2) utilize the survey instrument to collect data to identify self-reported use and behavioral intention; and (3) conduct data analyses to investigate perceived benefits and identify demographic predictors of nonmedical anabolic steroid use. The study's research questions were the following:

1. Which variable of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control) is the strongest predictor of the intentions of non-intercollegiate athlete males' use of nonmedical anabolic steroids?
2. Are non-intercollegiate athlete males more likely to use nonmedical anabolic steroids if they are already using a multivitamin and/or a muscle mass builder?
3. Is the variable of perceived behavioral control a more effective predictor of non-intercollegiate athlete males' intentions to use nonmedical anabolic steroids as a single construct (perceived behavioral control) or two part construct (self-efficacy and control)?
4. Are the following factors predictors of nonmedical anabolic steroid use:
 - a. Considering oneself to be a competitive athlete
 - b. Considering oneself to be a competitive bodybuilder
 - c. Having a physically demanding job
 - d. Satisfaction with body image

This chapter describes the methodology by which this study was conducted. Components of the methodology section include a discussion of the participants, the survey instrument, the jury of experts, the pilot study & revision, data collection (sample selection & procedures), data analysis and the data analysis plan.

Participant Characteristics

The participants for this study consisted of a convenience sample of male non-intercollegiate athlete males (ages 18-30). Participants were recruited from two sites: Ford's Fitness Center, Lexington, KY and the University of Kentucky Recreation Center, Lexington, KY.

Survey Instrument Development

No previous survey instrument based within the Theory of Planned Behavior regarding nonmedical anabolic steroid use was available. A confidential survey instrument (a draft of the instrument is included in Appendix A) was designed by the investigator based within the Theory of Planned Behavior. The survey was used to determine (1) Which variable of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control) was the strongest predictor of the intentions of male non-intercollegiate athletes' use of nonmedical anabolic steroids, (2) whether using a multivitamin and/or a muscle mass builder increased the likelihood of using nonmedical anabolic steroids, (3) if the variable of perceived behavioral control was a more effective predictor of non-intercollegiate athlete males' intentions to use nonmedical anabolic steroids as a single construct (perceived behavioral control) or two part construct (self-efficacy and control), and (4) if any of the following factors were predictors of nonmedical anabolic steroid use:

- a. Considering oneself to be a competitive athlete
- b. Considering oneself to be a competitive bodybuilder
- c. Having a physically demanding job
- d. Satisfaction with body image

The instrument consisted of two basic sections and a total of 44 items. Section I consisted of items derived from the components of the Theory of Planned Behavior, including intentions, attitudes, perceived subjective norms, behavioral control and self-efficacy related to use of nonmedical anabolic steroids. Questions included in section I of the survey instrument (questions 1-31) were based on results identified by previous research published in peer reviewed journals. Previous work by Ajzen about how to construct a survey instrument based within the Theory of Planned Behavior was also used (Ajzen, 2002). Data from previous research was applied to the components of the Theory of Planned Behavior in order to construct the topics used in conjunction with the Likert scale scoring system. Section II (questions 32-44) was designed to collect demographic characteristics. The final four questions (41-44) consisted of the four most likely groups of men to use nonmedical anabolic steroids based on the research by Fillault and Drummond (Fillault & Drummond, 2010). All questions regarding attitudes, subjective norms, behavioral intent, and perceived behavioral control consisted of a five point Likert scale response system (See Appendix A).

Jury of Experts

The survey instrument was reviewed by a jury of three experts familiar with concepts and components of Health Promotion. These experts were chosen because of their training, experience and background in the areas of kinesiology & health promotion, exercise physiology, and nutrition. The role of the jury was to individually review the health concepts included in the instrument and to either agree, disagree, or modify items. Jury members centered their responses on the professional judgment based upon educational training and occupational experiences. A similar method of confirming content validity was used by Smith, Hicks, and Heyward (1991) in their development of a written tool to assess knowledge about coronary heart disease including risk factors involved with the disease. The members of the jury of experts reviewed the instrument after the survey instrument was sent to them via electronic mail. Suggestions from jury members were used to revise the instrument after all of the jury of experts' responses were

received. Changes requested by the jury of experts mainly dealt with syntax and grammar. All requested changes were made to the survey instrument. The changes requested by the jury of experts enhanced the face and content validity of the survey instrument.

Pilot Testing & Revision

The University of Kentucky Institutional Review Board (IRB) gave approval prior to the distribution of the survey instrument along with permission from the owner of Ford's Fitness Center to distribute the survey instrument within the facility. Pilot testing occurred in order to determine if the survey instrument was understood by men between the ages of 18-30 years. A convenience sample of 25 non-intercollegiate athlete males was utilized when they entered the sign-in area of Ford's Fitness Center and viewed a written prompt to participate in a pen and paper survey involving ergogenic aids and performance enhancing substances. Potential participants were told that they would have an opportunity to win a \$25 debit card as compensation for their time in completing the pilot test component of the study. The investigator was located in an area used for contract signing at the fitness center next to a table and three stools. When males walked by the contract signing area they were asked to participate in a study regarding intentions to use ergogenic aids/performance enhancers.

The investigator distributed the pilot surveys for two separate, three hour intervals during the day of the Saturday, August 18, 2012 until responses from 25 participants were obtained. Respondents were allowed to complete the surveys in the contract signing section of the fitness center partially secluded from other people who were exercising or were given a clipboard and writing utensil to complete the survey while exercising. After completion, each subject placed his survey into an envelope, sealed the envelope, and placed the envelope in a box labeled "completed surveys." After the completion of each survey, subjects who wished to be entered into an optional drawing for a \$25 debit card were asked to write their first name and a valid email address or phone number on an index card. Participants of the pilot study were informed that they were not be eligible to participate in the actual study involving the use of the final

survey instrument and separate debit card drawings. They were also told that the winner would be contacted after the data collection period was over. A fishbowl drawing was used to select the winner and the winner of the drawing was given one week to respond with an address to mail the debit card via U. S. mail or another drawing(s) was to take place until a valid mailing address could be provided. The debit card drawing was held during the last week of December 2012, and the winner was sent his incentive by mail.

Respondents took an average of 8 minutes to complete the survey. Changes made before the final administration of the survey included eliminating one question because it was found confusing to respondents. This question asked if these men intended to use multivitamins, muscle mass builders, and nonmedical anabolic steroids within the next year. The previous three questions asked if these men had intended to use these substances individually. Respondents may have felt that they could not respond to both categories if all substances had been used.

Responses from the completed surveys were entered into a SPSS for Windows version 18 database for analysis. Cronbach's alpha was used to estimate internal reliability with a goal of achieving an alpha value of 0.70. If a Cronbach's alpha value of 0.70 was not reached after the pilot test the survey was to be fully reviewed by the investigator and the jury of experts was to be consulted once again and asked for more suggestions. A total Cronbach's alpha value of 0.74 was calculated and there was no need to re-administer the survey to additional participants. After all changes were made, the survey was finalized.

Data Collection (Sample Selection & Procedures)

The same procedures used to recruit participants for the pilot study were also used in the actual study. The actual study involved 121 final participants compared to only 25 participants used in the pilot study. To gain the additional number of participants for the actual study, recruitment also occurred at the University of Kentucky's Johnson Center in addition to Ford's Fitness Center after approval was granted by the recreational facility's manager. Participants involved in the pilot study were not eligible to participate in the actual study. Two separate \$25

debit card drawings occurred for the participants of the actual study with the same drawing guidelines as the pilot study. Before administration of the survey instrument all participants were informed briefly about the purpose of the study, the requirements to participate, and procedures. Participants were told not to write their names on the survey and not to make any identifiable marks. Participants completed the survey in an area consisting of a table and chairs partially secluded from the weight training equipment and other people using the facility available in both locations. Participants were given a copy of the Behavioral Intentions of Non-intercollegiate Athlete College Males to Use Ergogenic Aids/Performance Enhancers Survey complete with cover letter and a pencil if one was needed. When completed, each participant placed his survey into an unmarked envelope, sealed it, and placed it into a cardboard box labeled "completed surveys." The return box was located on the table used by the survey administrator in the free weight area of Ford's Fitness Center and the Johnson Center on the University of Kentucky's campus. After the completion of each survey, subjects who wished to be entered into the optional drawings for two \$25 debit cards were asked to write their first name and a valid email or phone number on an index card. Subjects were told that the winners would be contacted after the data collection period was over. A fishbowl drawing was used to select the winners and the winners of the drawings were given one week to respond with an address to mail the debit card via U. S. mail or another drawing(s) were to take place until valid mailing addresses can be provided. The fishbowl drawings took place at the end of December 2012 and both debit cards were mailed to the winners. The survey administrator was on hand to answer any questions. Data collection occurred on December 3rd from 5PM until 9PM at Ford's Fitness Center. Data collection also occurred on December 5th and 6th of 2012 from the times of 5PM until 9PM at the University of Kentucky.

Data Analysis Plan

Data analysis for this study was performed by examining the relationships among non-intercollegiate athlete males' behavioral intent, attitudes, subjective norms, and perceived behavioral control. All analyses were completed using SPSS (Statistical Package for the Social Sciences) for Microsoft Windows software version 18.0. A general section including multivitamins, muscle mass builders, and nonmedical anabolic steroids was used to measure non-intercollegiate athlete males' behavior. All other sections specifically measured nonmedical anabolic steroid use.

The following section illustrates the general approach that was taken for analysis of the survey responses. For the section of the instrument assessing behavior, a three item scale was used to assess self-reported taking of multivitamins, muscle mass builders, and nonmedical anabolic steroids (see figure below). The respondents were asked to choose values from 1-5 on a positive Likert scale. Means and standard deviations were computed for each of the three items. The Likert scale scores were totaled as (everyday = 1, most days = 2, on about half the days = 3, a number of times but less than half = 4, and never = 5) to give each response a numeric value. These three questions were based on how often the substances mentioned were used within the last year. The scores ranged from 3 (lowest possible score) to 15 (highest possible score). The lower the total score, the stronger the participation of the behavior by the respondent was determined. Means and standard deviations were computed for each of the three items of the behavior scale. A variable called "Behavior" was tabulated by adding together the scores of each of the individual items of the three item behavior scale. In addition to the descriptive statistics, Cronbach's alpha was calculated to derive an estimate of reliability.

Answer the following questions based on how often you have used the substance(s) mentioned within the last year. 1 = Every day, 2 = Most days, 3 = On about half the days, 4 = A number of times, but less than half, and 5 = Never. (circle your response)

	Every day	Most days	On about half the days	A number of times, but less than half	Never
Multivitamins (Centrum, One-a-Day, GNC Megaman Complex etc.)	1	2	3	4	5
Muscle mass builders (Whey protein, or similar item(s) including high protein drinks and protein bars)	1	2	3	4	5
Nonmedical anabolic steroids	1	2	3	4	5

Similar tables were used during the survey to measure behavioral intentions, subjective norms, normative belief strength, motivation to comply, control beliefs, control belief strength, control belief power, attitudes, behavioral belief strength, and outcome evaluations. Each of these components is necessary to accurately incorporate the Theory of Planned Behavior for identification of predictive factors associated with a certain behavior (Ajzen, 2002). Likert scales with values ranging from 1 (greatest value) through 5 (lowest value) were used in each table. For each section descriptive statistics were calculated including mean, median, and standard deviation along with Cronbach's alpha in order to derive an estimate of reliability. The complete survey instrument is located in Appendix A.

Analysis of Demographic Characteristics of Survey Respondents

The data from the following questions were collected to identify additional predictors of nonmedical anabolic steroid use. Accessibility to a large scale university setting and sampling of an exclusively non-intercollegiate athlete male population may provide additional insights into

nonmedical anabolic steroid use as compared to previous studies not conducted in a college setting.

Demographic Questions

The first question asked if the men have had any formalized weight training during their high school careers. The men were to check either “yes” or “no” as a response. The results indicated which percentage had previously participated in formalized weight training during high school.

Have you had any formalized weight training in high school from either being on a sports team or through a physical education (P.E.) class?

_____ Yes

_____ No

The next question asked men if they had been part of a sports team during their high school careers. The men were to check either “yes” or “no” as a response. The results indicated which percentage had previously been part of a high school sports team. If “yes” was the response chosen then the men were to list which sport team(s) they were a part of. This will better inform the investigator of which sports men who use nonmedical anabolic steroids have participated in while in high school.

Were you on a junior varsity team or varsity sports team in high school?

_____ Yes

_____ No

If **yes**, which sport(s) did you play? (please list below) If not please move to next question.

The next question asked if participants had taken or are currently taking a weight lifting/strength and conditioning course. Participants were to check either “yes” or “no” as a response. The results indicated which percentage had previously taken a weight lifting/strength and conditioning course at a college/university.

Have you taken a weight lifting/strength and conditioning course at a college/university?

_____ Yes

_____ No

The next question asked for the participant's academic classification. Participants were to check their answer as either not in college, freshman, sophomore, junior, senior, graduate student or other professional school, college graduate, or post college graduate. The sections of the academic classifications are listed below:

What is your academic classification?

_____ Post College Graduate (MBA, MPH, Ph.D., Ed.D., DMD etc)

_____ College Graduate (not currently earning post graduate degree)

_____ Graduate Student or other professional program (Business, Dentistry, Law etc)

_____ Senior

_____ Junior

_____ Sophomore

_____ Freshman

_____ Not in college

The next question asked each respondent to indicate their cumulative grade point average. Each participant was to place a check in one of the following categories 4.00-3.50, 3.50-3.00, 3.00-2.50, 2.50-2.00, under 2.00, or have not attended college. The results of the response to identify cumulative grade point average will be listed in Chapter Four.

What is your cumulative college grade point average (G.P.A.)? Please average total G.P.A. for all college degrees earned.

___4.00-3.50

___3.49-3.00

___2.99-2.50

___2.49-2.00

___Under 2.00

_____Have not attended college

The next question asked each respondent his age. Each respondent was instructed to simply write his age in the space provided. The average age of the respondents was 22 years with a standard of deviation of 4.6.

What is your age today? (Please write below)

The next question will asked each respondent his height. Each respondent was instructed to write in his height as measured by feet and inches. The average height of the respondents was 71.3'' with a standard deviation of 2.8.

How tall are you? (Please write below)

_____Feet_____Inches

The next question asked each respondent his weight. Each respondent was instructed to write in his weight as measured by pounds. The average weight of the respondents was 181.6 pounds with a standard deviation of 31.5.

How much do you weigh? (Please write below)

_____Pounds/Lbs

The next question asked if participants consider themselves to be a competitive athlete. Participants were to check either "yes" or "no" as a response. The results indicated which percentage of males considered themselves to be competitive athletes.

Do you consider yourself to be a competitive athlete?

_____ Yes

_____ No

The next question asked if participants consider themselves to be a competitive bodybuilder. Participants were to check either “yes” or “no” as a response. The results indicated which percentage of males considered themselves to be competitive bodybuilders.

Do you consider yourself to be a competitive bodybuilder?

_____ Yes

_____ No

The next question asked if the participants had a physically demanding job. Participants are to check either “yes” or “no” as a response. The results indicated which percentage of males consider themselves to have physically demanding jobs.

Do you have a physically demanding job?

_____ Yes

_____ No

The next question asked if participants were satisfied with their own body image. Participants were to check either “yes” or “no” as a response. The results indicated which percentage of males were satisfied or dissatisfied with their own body image.

Do you feel satisfied with your own body image?

_____ Yes

_____ No

To identify predictors of nonmedical anabolic steroid use, a multiple regression analysis was performed. Behavioral intention to use nonmedical anabolic steroids was the dependent variable with participation in a weight lifting/strength and conditioning course (college/university), participation in formalized weight training (from a physical education course or organized team), participation in a nutrition course, participation in high school sports,

academic classification, grade point average, age, height, and weight being the independent variables (Questions 33-40) in the survey. The linear combination of these variables was evaluated by their correlational significance in regard to behavioral intention. An ANOVA test was conducted to evaluate which independent variable of the Theory of Planned Behavior (attitude “questions 23-32”, subjective norms “questions 7-12”, and perceived behavioral control “questions 13-22”) had the greatest effect on the behavioral intentions of non-intercollegiate athlete males to use nonmedical anabolic steroids (dependent variable). Eta squared analyses was also used to indicate how much variance could be attributed to each component of the Theory of Planned Behavior. A cross tabulation was completed to indicate overlap concerning the self-reported use of multivitamins, muscle mass builders, and nonmedical anabolic steroids. These figures helped to indicate if non-intercollegiate athlete males were more/less likely to use nonmedical anabolic steroids if they were already using a multivitamin and/or a muscle mass builder. Pearson chi square analysis was calculated to indicate if users of the multivitamins and/or muscle mass builders had a significantly greater likelihood of nonmedical anabolic steroid use. Perceived behavioral control was examined by running a stepwise multiple logistic regression analysis. Perceived behavioral control was separated into a one dimensional construct (global PBC) and a two dimensional construct consisting of self-efficacy and control. The comparison of these constructs confirmed whether the perceived behavioral control variable was a more effective predictor of non-intercollegiate athlete males’ nonmedical anabolic steroid use as a one or two part construct. The first section consisted of the independent variables of perceived behavioral control (questions 14, 15, 16, 19, 20, 21) were labeled as “PCT selfeff” and (questions 13, 17, 18, 22) were labeled as “PCT ctl”, and Global perceived behavioral control “questions 13-22” were labeled as “PCT global.” This comparison indicated which model was more determinate. To identify additional predictors of nonmedical anabolic steroid use, a multiple logistic regression analysis was performed. Behavioral intention to use nonmedical anabolic steroids was the dependent variable with having a physically demanding job, body image

satisfaction, and considering one's self to be a competitive athlete, and considering one's self to be a body builder being the independent variables (Questions 41-44 in survey). The linear combination of these variables was evaluated by their correlational significance in regard to behavioral intention.

Summary

This chapter presented the methods and procedures that were implemented in this study. The study design and sample selection procedures were discussed in detail. A description of the survey instrument developed demonstrated the usefulness of the survey instrument from its basis in the Theory of Planned Behavior and pending approval from a jury of experts. The methods of data collection and data analysis were presented. The results of the study are presented in Chapter Four.

Chapter Four

Results and Discussion

The purpose of this study was to increase understanding of factors associated with nonmedical anabolic steroid use among a specific segment of the population; males age 18-30 who do not participate in intercollegiate athletics. The study included three phases: (1) develop a survey instrument based within the Theory of Planned Behavior; (2) utilize the survey instrument to collect data to identify self-reported use and behavioral intention; and (3) conduct data analyses to investigate perceived benefits and identify demographic predictors of nonmedical anabolic steroid use. The study's research questions were the following:

1. Which variable of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control) is the strongest predictor of the intentions of non-intercollegiate athlete males' use of nonmedical anabolic steroids?
2. Are non-intercollegiate athlete males more likely to use nonmedical anabolic steroids if they are already using a multivitamin and/or a muscle mass builder?
3. Is the variable of perceived behavioral control a more effective predictor of non-intercollegiate athlete males' intentions to use nonmedical anabolic steroids as a single construct (perceived behavioral control) or two part construct (self-efficacy and control)?
4. Are the following factors predictors of nonmedical anabolic steroid use:
 - a. Considering oneself to be a competitive athlete
 - b. Considering oneself to be a competitive bodybuilder
 - c. Having a physically demanding job
 - d. Satisfaction with body image

Results

Completed surveys were obtained from 128 male participants. Of the 128 completed surveys, 7 were excluded from analyses because they were from individuals not meeting the age criteria for the study; age 18-30. Of the 121 usable surveys, the participants were 21 years of age

on average (sd=3.7), with an average weight of 181 pounds (sd=31.7), and an average height of 71 inches (sd=2.8).

Nine questions were included to collect demographic characteristics, including age, height, weight, academic classification, grade point average, experience with formal weight training in high school, training in nutrition, sports participation in high school (with a follow up section asking which sports were played if the answer was yes), and formalized weight training in college. Four questions were included to search for additional predictors of nonmedical anabolic steroid use. These questions asked if the men participating in the survey were a competitive athlete, if they were a competitive bodybuilder, if they had a physically demanding job, and if they felt satisfied with their own body image. Frequencies for these survey items are listed in tables 4.1-4.5.

Table 4.1

Questions 1-4 Demographic question frequencies

	YES	NO
Q1. Formalized weight training (high school)?	102 (84.3%)	19 (15.7%)
Q2. Formalized training in nutrition? *Missing one response (0.8%)	83(68.6%)	37 (30.6%)
Q3. Junior varsity sports team or varsity sports team in high school?	101(83.5%)	20 (16.5%)
If yes, which sport(s) did you play? (please list below) If not please move to the next question	Football 40 Baseball 27 Soccer 27 Basketball 26 Track 23 Wrestling 13 Cross Country 07 Lacrosse 07	
Q4. Weight lifting/strength and conditioning course at a college/university?	31(25.6%)	90 (74.4%)

Table 4.2

Question 5 Academic classification

Q5. What is your academic classification?	n(%)
College Graduate (not currently earning post graduate degree)	8 (06.7%)
Graduate Student or other professional program	9 (07.5%)
Senior	21 (17.5%)
Junior	14 (11.6%)
Sophomore	17 (14.2%)
Freshman	34 (28.3%)
Attended college, but did not graduate	12 (10.0%)
Never attended college	5 (04.2%)
One response missing	1 (0.8%)

Table 4.3

Question 6 Cumulative undergraduate grade point average

Q6. Cumulative undergraduate college grade point average	n(%)
4.00-3.50	32 (26.7%)
3.49-3.00	51 (42.5%)
2.99-2.50	25 (20.8%)
2.49-2.00	9 (07.5%)
Have not attended college	3 (2.5%)
One response missing	1 (0.8%)

Table 4.4

Questions 7-9 Average age, height, and weight of study participants

Q7. What is your age today (in years)?	Mean Age 21	Standard Deviation 3.7
Q8. How tall are you? (result in inches)	Mean Height 71	Standard Deviation 2.8
Q9. How much do you weigh (in pounds)?	Mean Weight 181	Standard Deviation 31.7

Table 4.5

Questions 10-14 Additional predictors of nonmedical anabolic steroid use

	n(%)
Q10. Considered a competitive athlete?	91(75.2%)
Q11. Considered a competitive bodybuilder?	08(6.6%)
Q12. Physically demanding job?	42(35.0%)
Q13. Satisfied with your own body image?	89(73.6%)

The survey results of questions based within the Theory of Planned Behavior are provided below. These questions were based within the sections of behavior, intention, subjective norms, perceived behavioral control, and attitudes. The first three questions specifically asked about the behavior being performed and provided choices concerning how many days a week the behavior had been performed within the last year. Table 4.6 shows the distribution of responses.

Table 4.6

Respondents' behavior scores

	7 days a week	5-6 days a week	3-4 days a week	1-2 days a week	Never
Multivitamins/ Multiminerals	24 (19.8%)	16 (13.2%)	10 (8.3%)	14 (11.6%)	57 (47.1%)
Muscle mass builders	16 (13.2%)	23 (19.0%)	31 (25.6%)	20 (16.5%)	31 (25.6%)
Nonmedical anabolic steroids *Missing two responses (1.7%)	4 (3.3%)	0 (0.0%)	1 (0.8%)	2 (1.7%)	112 (92.6%)

A three item scale was used to combine the responses to the behavior items shown in Table 4.6. The Likert scale scores were totaled as: 7 days a week = 1, 5-6 days a week = 2, 3-4 days a week = 3, 1-2 days a week = 4, and never = 5 to give a numeric value. The range of scores was 3 (lowest possible score) to 15 (highest possible score). The lower the total score, the more frequent the behavior of the respondent. Medians and interquartile ranges were computed for each of the three items of the behavior scale (see Table 4.7). A variable called "Behavior" was tabulated by adding together the scores of each of the individual items of the three item behavior scale. A Cronbach's alpha value was calculated for these scores indicating inter-item reliability (See table 4.19).

Table 4.7

Behavior Item Descriptives

	Median	Interquartile range
Use multivitamins/multiminerals	4	2-5
Use muscle mass builders	3	2-5
Use nonmedical anabolic steroids	5	5-5
	Mean	Standard Deviation
Total of Items 1-3.Behavior	11.75	2.79

The next component of the Theory of Planned Behavior included within the survey was intention. A three item scale was used to combine the responses to the intention items shown in Table 4.8.

Table 4.8

Respondents' Intention scores

	Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
Multivitamins/ Multiminerals	60(49.6%)	19(15.7%)	12(9.9%)	10 (8.3%)	20 (16.5%)
Muscle mass builders	64(52.9%)	22(18.2%)	4(3.3%)	8(6.6%)	23 (19.0%)
Nonmedical anabolic steroids	8(6.6%)	1(0.8%)	4(3.1%)	11 (8.7%)	97 (80.3%)

The Likert scale scores were totaled as: very likely = 1, likely = 2, neither likely or unlikely = 3, unlikely = 4, and very unlikely = 5 to give a numeric value. The range of scores was 3 (lowest possible score) to 15 (highest possible score). Medians and interquartile ranges were computed for each of the three items of the intention scale (see Table 4.9). A variable called "Intention" was tabulated by adding together the scores of each of the individual items of the three item behavior scale. A Cronbach's alpha value was calculated for these scores indicating inter-item reliability (See table 4.19).

Table 4.9

Intention Item Descriptives

	Median	Interquartile Range
Intend to use multivitamins/multiminerals	2	1-4
Intend to use muscle mass builders	1	1-4
Intend to use nonmedical anabolic steroids	5	5-5
	Mean	Standard Deviation
Items 4-6. Intention	9.13	3.18

The next component of the Theory of Planned Behavior covered by the survey was subjective norms. A six item scale was used to measure the subjective norms associated with nonmedical anabolic steroids. Belief strength and motivation to comply are the two components of the subjective norm component in the Theory of Planned Behavior. The groups the respondents' were to consider for their subjective norms consisted of family, friends, and doctors.

Table 4.10

Respondents' Subjective Norm scores; Normative belief strength

	Should Use	Probably should use	Neutral or No opinion	Probably should not use	Should not use
Family	3(2.5%)	2(1.7%)	12(9.9%)	13(10.7%)	91(75.2%)
Friends	3(2.5%)	10(8.3%)	23(19.0%)	22(18.2%)	63(52.1%)
Doctors	3(2.5%)	3(2.5%)	13(10.7%)	15(12.4%)	87(71.9%)

Table 4.11

Respondents' Subjective Norm scores; Motivation to comply

	Very much	Somewhat	Neutral	Not much	Not at all
Family	49(40.5%)	15(12.4%)	17(14.0%)	8(6.6%)	32(26.4%)
Friends	33(27.3%)	27(22.3%)	21(17.4%)	13(10.7%)	27(22.3%)
Doctors	60(49.6%)	11(9.1%)	20(16.5%)	6(5.0%)	24(19.8%)

The Likert scale scores for normative belief strength were totaled as: should use = 1, probably should use = 2, neutral = 3, probably should not use = 4, and should not use = 5 to give a numeric value. The Likert scale scores for motivation to comply were totaled as: very much = 1, somewhat = 2, neutral = 3, not much = 4, and not at all = 5 to give a numerical value. The range of scores was 6 (lowest possible score) to 30 (highest possible score). The lower the total score,

the stronger the subjective norms of the respondent. Medians and interquartile ranges were computed for each of the six items of the subjective norms scale (see Table 4.12). A variable called “Subjective Norm” was tabulated by adding together the scores of each of the individual items of the six item subjective norm scale. A Cronbach’s alpha value was calculated for these scores indicating inter-item reliability (See table 4.19).

Table 4.12

Subjective Norm Descriptives

	Median	Interquartile Range
Family (Normative belief strength)	5.0	4.75-5
Friends (Normative belief strength)	5.0	3-5
Doctor (Normative belief strength)	5.0	4-5
Family (Motivation to comply)	2.0	1-5
Friends (Motivation to comply)	2.5	1-4
Doctor (Motivation to comply)	2.0	1-3.25
	Mean	Standard Deviation
Items 7-12. Subjective Norms	20.9	4.83

The next component of the Theory of Planned Behavior covered by the survey was perceived behavioral control. A ten item scale was used to measure the perceived behavioral controls associated with nonmedical anabolic steroids. Control belief strength and control belief power are the two components of the perceived behavioral control component in the Theory of Planned Behavior. The factors the respondents’ were to consider for their perceived behavioral controls consisted of cost/affordability, availability, ability to use/administer, having enough time to use the product regularly, and accessibility of the product. These factors were chosen because they composed a mix of intrinsic and extrinsic factors associated with perceived behavioral control.

Table 4.13

Respondents' perceived behavioral control scores; control belief strength

	Very Much	Somewhat	Neutral	Not much	Not at all
Cost/Affordability *Missing 31 responses (25.6%)	22(24.7%)	17(18.3%)	7(8.6%)	5(6.5%)	39 (41.9%)
Availability	13(10.7%)	25(20.7%)	18(14.9%)	21(17.4%)	44(36.4%)
Administer	20(16.5%)	21(17.4%)	15(12.4%)	24(19.8%)	41(33.9%)
Time	17(14.0%)	22(18.2%)	15(12.4%)	18(14.9%)	49(40.5%)
Accessibility *Missing one response (0.8%)	21(17.4%)	21(17.4%)	19(15.7%)	14(11.6%)	45(37.2%)

Table 4.14

Respondents' perceived behavioral control scores; control belief power

	Very Easy	Easy	Neither easy or difficult	Difficult	Very difficult
Cost/Affordability *Missing 28 responses (23.1%)	9(9.3%)	8(8.2%)	35(38.1%)	15(15.5%)	26(28.9%)
Availability *Missing three responses (2.5%)	15(12.4%)	17(14.0%)	43(35.5%)	17(14.0%)	26(22.0%)
Administer *Missing two responses (1.7%)	14(11.6%)	23(19.0%)	41(33.9%)	17(14.0%)	24(19.8%)
Time *Missing two responses (1.7%)	23(19.0%)	19(15.7%)	47(38.8%)	12(9.9%)	18(14.9%)
Accessibility *Missing three responses (2.5%)	19(15.7%)	21(17.4%)	38(31.4%)	15(12.4%)	25(20.7%)

The Likert scale scores for control belief strength were totaled as: very much = 1, somewhat = 2, neutral = 3, not much = 4, and not at all = 5 to give a numeric value. The Likert scale scores for control belief power were totaled as: very easy = 1, easy = 2, neither easy or difficult = 3, difficult = 4, and very difficult = 5 to give a numerical value. The range of scores was 10 (lowest possible score) to 50 (highest possible score). The lower the total score, the stronger the perceived behavioral control of the respondent. Medians and interquartile ranges were computed for each of the ten items of the intention scale (see Table 4.15). A variable called "Perceived Behavioral

Control” was tabulated by adding together the scores of each of the individual items of the ten item perceived behavioral control scale. A Cronbach’s alpha value was calculated for these scores indicating inter-item reliability (See table 4.19).

Table 4.15

Perceived behavioral control descriptives

	Median	Interquartile Range
Cost/Affordability (Control belief strength)	3.0	1-5
Availability (Control belief strength)	4.0	2-5
Administer (Control belief strength)	4.0	2-5
Time (Control belief strength)	4.0	2-5
Accessibility (Control belief strength)	3.0	2-5
Cost/Affordability (Control belief power)	3.0	3-5
Availability (Control belief power)	3.0	2-4
Administer (Control belief power)	3.0	2-4
Time (Control belief power)	3.0	2-3
Accessibility (Control belief power)	3.0	2-4
	Mean	Standard Deviation
Items 13-22. Perceived Behavioral Control	32.96	9.35

The last section of the Theory of Planned Behavior covered by the survey was attitudes. A ten item scale was used to measure the attitudes of respondents associated with nonmedical anabolic steroids. Behavioral belief strength and outcome evaluation power are the two components of the attitudes component in the Theory of Planned Behavior. The factors the respondents’ were to consider for their attitude component were increased athletic performance, weight loss, increased muscle mass, increased energy, and increased strength. These factors were included because they were the most common desired outcomes from nonmedical anabolic steroid use as indicated from previous literature (Cohen, 2009; Berning et al., 2008; Parkinson and Evans, 2006; Weise, 2005; Choi et al., 2002; Perko et al.,2000).

Table 4.16

Respondents' attitudes scores; Behavioral belief strength

	Very Likely	Likely	Neither likely or unlikely	Unlikely	Very unlikely
Athletic Performance *Missing one response (.08%)	54(44.6%)	42(34.7%)	11(9.1%)	6(5.0%)	7(5.8%)
Weight loss	25(20.7%)	16(13.2%)	37(30.6%)	30 (24.8%)	13(10.7%)
Muscle mass	74(61.2%)	41(33.9%)	2(1.7%)	1(0.8%)	3(2.5%)
Energy	42(34.7%)	40(33.1%)	29(24.0%)	6(5.0%)	4(3.3%)
Strength	72(59.5%)	40(33.1%)	5(4.1%)	0(0.0%)	4(3.3%)

Table 4.17

Respondents' attitudes scores; Outcome evaluation

	Very Important	Important	Neutral	Somewhat Unimportant	Unimportant
Athletic performance	52(43.0%)	22(18.2%)	14(11.6%)	7(5.8%)	26(21.5%)
Weight loss	14(11.6%)	16(13.2%)	27(22.3%)	14(11.6%)	50(41.3%)
Muscle mass	50(41.3%)	26(21.5%)	15(12.4%)	5(4.1%)	25(20.7%)
Energy	36(29.8%)	29(24.0%)	28(23.1%)	8(6.6%)	20(16.5%)
Strength	57(47.1%)	23(19.0%)	17(14.0%)	2(1.7%)	22(18.2%)

The Likert scale scores for behavioral belief strength were totaled as: very likely = 1, likely = 2, neither likely or unlikely = 3, unlikely = 4, and very unlikely = 5 to give a numeric value. The Likert scale scores for outcome evaluation were totaled as: very important = 1, important = 2, neutral = 3, somewhat unimportant = 4, and unimportant = 5 to give a numerical value. The range of scores was 10 (lowest possible score) to 50 (highest possible score). The lower the total score, the stronger the attitudes of the respondents. Medians and interquartile ranges were computed for each of the ten items of the intention scale (see Table 4.18). A variable called "Attitudes" was tabulated by adding together the scores of each of the individual items of the ten item attitudes scale. A Cronbach's alpha value was calculated for these scores indicating inter-item reliability (See table 4.19).

Table 4.18

Attitude scale descriptives

	Median	Interquartile Range
Athletic performance (Behavioral belief strength)	2.0	1-2
Weight loss (Behavioral belief strength)	3.0	2-4
Muscle mass (Behavioral belief strength)	1.0	1-2
Energy (Behavioral belief strength)	2.0	1-3
Strength (Behavioral belief strength)	1.0	1-2
Athletic performance (Outcome evaluation)	2.0	1-4
Weight loss (Outcome evaluation)	4.0	3-5
Muscle mass (Outcome evaluation)	2.0	1-4
Energy (Outcome evaluation)	2.0	1-3
Strength (Outcome evaluation)	2.0	1-3
	Mean	Standard Deviation
Items 23-32. Attitudes	23.61	8.9

Cronbach’s alpha was calculated for each section of the survey and the overall survey. This measure was used to indicate the amount of inter-item reliability present. An overall value of 0.86 was found indicating that the survey instrument could be classified as reliable.

Table 4.19

Cronbach’s Alpha values of survey

Theory of Planned Behavior Component	Cronbach’s Alpha value
Behavior	0.59
Intention	0.63
Subjective Norms	0.62
Perceived Behavioral Control	0.74
Attitudes	0.80
Overall	0.86

To look for predictors of nonmedical anabolic steroid use, linear regression analysis was performed. Questions 34-40 of the Behavioral intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey constructed a scale known as demographic predictors. The items included in the demographic predictors section were taken from data acquired from peer reviewed journals as well as from suggestions given by the principal investigator’s advisory committee. These items were weight lifting/strength conditioning (college), formalized nutrition, weight lifting/strength conditioning (high school),

participation in high school sports, academic classification, undergraduate overall academic G.P.A, age, and questions 39 (height) and 40 (weight) were combined to form an overall body mass index calculation (Cohen, 2009; Fernandez & Hosey, 2009; Berning et al.,2008; Kanayama et al., 2008; Cohen, 2009; Parkinson & Evans, 2006; Gomez, 2005; Rimer & Glanz, 2005; Dodge et al., 2003; Ajzen, 2002; McKenzie & Smeltzer, 2001; Perko, 1999; Peters et al., 1999). Results from the regression analysis are shown in table 4.20. When the regression analysis was computed, age was the only item found to be statistically significant. Age was related to intentions to use nonmedical anabolic steroids B=.187, S.E=.089, sig=.037.

Table 4.20

Regression analysis to indicate predictor variables of intention to use steroids

	B	SE B	Sig
Q1. Weight training (high school)	.263	1.074	.807
Q2. Training in nutrition	-.125	.853	.884
Q3. Sports team	-1.349	.888	.129
Q4. Weight training (college)	.996	.882	.226
Q5. Academic classification	.110	.159	.487
Q6. Grade point average	-.102	.315	.746
Q7. Age	.187	.089	.037*
Q8 & Q9 Body mass index	.123	.069	.076
* p < .05 ** p < .01 *** p < .001			

To indicate which variable of the Theory of Planned Behavior was the greatest predictor of the intentions of non-intercollegiate athlete males' use of nonmedical anabolic steroids, an ANOVA analysis was completed. Results from the ANOVA analysis are shown in table 4.21. When the ANOVA analysis was computed, the independent variable of perceived behavioral control was found to be the strongest predictor of non-intercollegiate athlete males' intention to use nonmedical anabolic steroids p=.029. Attitude was second strongest predictor p=.060 and subjective norm had the lowest correlation in regard to the intentions to use nonmedical anabolic steroids p=.349. Perceived behavior control was the only predictor variable found to be statistically significant. An eta-squared value was also calculated to indicate the amount of

variability concerning intention to use nonmedical anabolic steroids that can be explained by attitudes, subjective norms, and perceived behavioral control. Results from the eta squared analysis are shown in table 4.22. The eta-squared results indicate that 4.9% of the variance concerning intention could be explained by attitude, 10.1% could be explained by perceived behavioral control, and 0% could be explained by subjective norms.

Table 4.21

ANOVA table indicating greatest predictors of Theory of Planned Behavior

Intention	df	F	p
Subjective Norm	4	1.124	.349
Perceived Behavioral Control	3	3.169	.029*
Attitude	4	2.326	.060
* p < .05 ** p < .01 *** p < .001			

Table 4.22

Eta-squared values for components of the Theory of Planned Behavior

	Eta	Eta-squared
Attitude	.222	.049
Perceived behavioral control	.318	.101
Subjective norms	.006	.000

To indicate if non-intercollegiate athlete males were more likely to use nonmedical anabolic steroids if they were already using a multivitamin and/or a muscle mass builder, cross tabulation with chi square analysis was performed. These tests were performed to indicate if there were any overlapping interactions between the data and if the data were significant. Muscle mass builders and use of nonmedical anabolic steroids, multivitamins and use of nonmedical anabolic steroids, and muscle mass builder use in combination with multivitamin use and use of nonmedical anabolic steroids were all compared. Of the participants surveyed, 7 men used nonmedical anabolic steroids while taking a muscle mass builder which indicated that every survey

participant who used steroids also used muscle mass builders. The Pearson Chi-square value was 2.6 with $df=1$ and a sig of .011. The results show that there is a statistically significant association between using muscle mass builders and using nonmedical anabolic steroids. However, due to the low number of nonmedical anabolic steroid users these results cannot be counted as significant. Of the participants surveyed, 5 used multivitamins while using nonmedical anabolic steroids. The Pearson Chi-square value was 1.03 with $df=1$ and a significance of 0.31. These results indicate that there is no statistically significant association with using multivitamins and using nonmedical anabolic steroids. Of the participants surveyed, 5 used both multivitamins and muscle mass builders while using nonmedical anabolic steroids. Pearson Chi-square value was 15.4 with $df=1$ and a significance of .000. These results indicate that there is a statistically significant association with using multivitamins and muscle mass builders and using nonmedical anabolic steroids. However, due to the low number of nonmedical anabolic steroid users these results cannot be counted as significant. Of the three predictor variables (multivitamin use, muscle mass builder use, and multivitamin and muscle mass builder use) associated with the use of nonmedical anabolic steroids only muscle mass builder use and use of muscle mass builders and multivitamins (together) were found to be statistically significant concerning association with nonmedical anabolic steroid use. However, these results cannot be classified as significant due to the low number of responses indicating nonmedical anabolic steroid use.

Table 4.23

Pearson Chi-Square analysis predicting steroid use from previous supplement usage

Pearson Chi Square	Value	df	Sig
Muscle mass builders	2.6	1	.011*
Multivitamins	1.03	1	0.31
Muscle mass builders and Multivitamins	15.4	1	.000***
*No values were significant due to low rate of steroid use			

To indicate which component of the perceived behavioral control was a more effective predictor of the intentions of non-intercollegiate athlete males' use of nonmedical anabolic steroids, a stepwise multiple logistic regression was completed. Results from the stepwise multiple logistic regression are shown in table 4.23. None of the components of perceived behavioral control were found to be statistically significant. From these data a decision about whether the variable of perceived behavioral control is a more effective predictor of non-intercollegiate athlete males' intentions to use nonmedical anabolic steroids as a single construct (global perceived behavioral control) or two part construct (self-efficacy and control) cannot be made because none of the components of perceived behavioral control were found to be statistically significant. Self-efficacy did have a greater amount of significance compared to control.

Table 4.24

Stepwise multiple logistic regression analysis of perceived behavioral control components

	B	S.E.	Sig
Self-efficacy	-.056	.036	.115
Control	-.048	.050	.338
Global perceived behavioral control (dropped from stepwise regression due to low amount of variability)			
* p < .05 ** p < .01 *** p < .001			

To look for additional predictors of nonmedical anabolic steroid use, logistic regression analysis was performed. Questions 41-44 of the Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey constructed a scale known as additional demographic predictors. These items consisted of the four groups of men most likely to use nonmedical anabolic steroids. These questions asked if the participants surveyed were satisfied with their body image, had a physically demanding job, if they were a competitive bodybuilder, and if they were a competitive athlete (Fillault & Drummond, 2010). Results from the regression analysis are shown in Table 4.25. When the regression analysis was computed two items were found to be statistically significant, being a competitive bodybuilder

(positive correlation) and being satisfied with body image (negative correlation) were related to intentions to use nonmedical anabolic steroids. Being a competitive bodybuilder was significantly related to intending to use nonmedical anabolic steroids $B=3.374$, $S.E.=1.01$, $sig=.001$. Being satisfied with body image had a negative correlation and was significantly related to intending to use nonmedical anabolic steroids $B=-2.054$, $S.E. =.913$, $sig=.025$.

Table 4.25

Multiple logistic regression analysis of additional demographic variables

	B	S.E.	Sig
Satisfied with body image	-2.054	.913	.025*
Physically demanding job	0.980	.844	.246
Competitive bodybuilder	3.374	1.01	.001** *
Competitive athlete	1.059	1.20	.377
* p < .05 ** p < .01 *** p < .001			

Discussion

The first objective of this study was to develop a survey instrument based within the Theory of Planned Behavior. No previous survey based within the Theory of Planned Behavior was directly applicable to nonmedical anabolic steroid use. A 44-item survey was constructed based within the Theory of Planned Behavior in order to identify predictors of non-intercollegiate athlete males' nonmedical steroid use and other ergogenic aids. The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey was found to have an overall Cronbach's Alpha value of 0.86. The instrument consisted of two basic sections. Section I consisted of items derived from the components of the Theory of Planned Behavior, including intentions, attitudes, subjective norms, and perceived behavioral control related to the use of nonmedical anabolic steroids. Questions included in section I of the survey instrument (questions 1-32) were based on results identified by previous research published in peer reviewed journals (Fillault & Drummond, 2010; Cohen, 2009; Fernandez & Hosey, 2009; Berning et al., 2008; Kanayama et al., 2008; Cohen, 2009; Hoffman et al., 2007; Munoz-Silva et al., 2007; Parkinson & Evans, 2006; Gomez, 2005; Rimer & Glanz, 2005; Dodge et al., 2003;

McKenzie & Smeltzer, 2001; Perko, 1999; Peters et al., 1999). Previous work by Ajzen about how to construct a survey instrument based within the Theory of Planned Behavior was also used (Ajzen, 2002). Data from previous research were applied to the components of the Theory of Planned Behavior in order to construct the topics used in conjunction with the Likert scale scoring system. Section II (questions 33-44) was designed to collect demographic characteristics (Fillault & Drummond, 2010; Cohen, 2009; Fernandez & Hosey, 2009; Berning et al., 2008; Kanayama et al., 2008; Cohen, 2009; Hoffman et al., 2007; Munoz-Silva et al., 2007; Parkinson & Evans, 2006; Gomez, 2005; Rimer & Glanz, 2005; Dodge et al., 2003; Ajzen, 2002; McKenzie & Smeltzer, 2001; Perko, 1999; Peters et al., 1999). The final four questions (41-44) were designed to indicate if the men responding to the survey were included in any of the categories of men designated as most likely to use nonmedical anabolic steroids as mentioned by Fillault and Drummond (Fillault & Drummond, 2010). These four questions asked if the participants had physically demanding jobs, were bodybuilders, competitive athletes, and if they were satisfied with their own body image (Fillault & Drummond, 2010). All questions regarding attitudes, subjective norms, behavioral intent, and perceived behavioral control consisted of a five point Likert scale response system (See Appendix A). A detailed version of the Cronbach's alpha values for The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey can be seen in table 4.26.

Table 4.26

Detailed Cronbach's Alpha values of survey

Theory of Planned Behavior Component	Cronbach's Alpha value
Behavior	0.59
Intention	0.63
Normative beliefs	0.79
Motivation to comply	0.92
Subjective Norms	0.62
Control belief strength	0.94
Control belief power	0.87
Perceived Behavioral Control	0.74
Behavioral beliefs	0.82
Outcome expectancy	0.91
Attitudes	0.80
Overall	0.86

The second objective of the study was to utilize the survey instrument to identify actual use and behavioral intentions of non-intercollegiate athlete males concerning nonmedical anabolic steroids. Of the respondents to The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey, 7 participants were found to use nonmedical anabolic steroids at least 1-2 days a week or more. This indicated that 5.9% of the respondents were using nonmedical anabolic steroids. A Berning et al. (2008) study indicated that 9% of nonathletic college students had used anabolic steroids. This Berning et al. study (2008) also indicated that 80% of the previous users of steroids planned to use steroids again. Previous work by McCabe et al. (2007) indicated that less than 1% of his U.S. college student respondents had used nonmedical anabolic steroids. In the research by McCabe et al. four surveys were administered to the same 119 nationally representative colleges in 1993, 1997, 1999, and 2001. Past year nonmedical anabolic steroid users were found to be positively associated with risky behaviors such as illicit drug use, drinking and driving, and many met the DSM-IV criteria for alcohol use disorder. The NCAA conducted a survey of student athletes'

substance use and abuse habits and found that less than 1.1% were steroid users with varying prevalence depending on the sport being played (Green, Uryasz, Petr, & Bray, 2001).

Of the respondents to The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey, 9 (7.4%) participants were found to have intentions to use nonmedical anabolic steroids within the next year. Although, 7.4% of respondents intended to use nonmedical anabolic steroids within the next year, this does not always translate into actual use or actual behavior. Ajzen states that the closer the reality is to the perception subjects have about the performance of the behavior, the closer will be the perception of real control, thus increasing the prediction to perform or not perform the given behavior (Ajzen 2002). These men may plan on using nonmedical anabolic steroids within the next year but they may find themselves unable to actually obtain these products or they may not be able to actually use these products if they do obtain them because they do not know how to use the products effectively. Ajzen states that a person who has a high motivation to perform the behavior may not actually perform the behavior due to intervening environmental conditions (Ajzen 2002). A previous study by Munoz-Silva et al. (2007) examined the prediction of condom use. Women in this study often perceived themselves as in control of condom use behavior, but did not possess this control when the actual behavior was to occur although the women in this study had high intentions to use condoms. These women realized that when it was time to discuss the use of a condom with their partner that they did not always know how to approach the topic although they felt they had good communication skills.

The third objective of the study was to investigate perceived benefits resulting from nonmedical anabolic steroid use. There were five items included in the attitudes scale/behavioral belief strength section of the Theory of Planned Behavior in regard to this study. Study participants believed using nonmedical anabolic steroids over the course of the next year would provide the following results; increased athletic performance (79.3%), weight loss (33.9%), increased muscle mass (95.1%), increased energy (67.8%), and increased strength (92.6%).

Overall, survey participants were confident that the use of nonmedical anabolic steroids would provide these results. These respondents especially believed that nonmedical steroid use would increase their muscle mass, increase strength, and would increase their athletic performance. There were also five items included in the attitudes scale/outcome evaluation section of the Theory of Planned Behavior in regard to this study. Study participants felt that the following outcomes that could occur with the use of nonmedical anabolic steroids were Very Important/Important; increased athletic performance (61.2%), weight loss (24.8%), increased muscle mass (62.8%), increased energy (53.8%), and increased strength (66.1%). These results are comparable to the results of a previous study by Berning et al. (2008) where reasons for using nonmedical anabolic steroids were 48% of college students wanted to increase physical performance and 45% wanted to enhance their appearance. A study by Cohen et al. (2007) found that among male adult nonmedical steroid users, the main motivations for use were increases in muscle mass, strength, and physical attractiveness.

In order to look for predictors of nonmedical anabolic steroid use, linear regression analysis was performed. Questions 33-40 of the Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey were used to construct a scale known as demographic predictors. When the regression analysis was computed, Age was the only item found to be statistically significant. These results indicated that as the age of the survey participants increased so did their intentions to use nonmedical anabolic steroids. A crosstabulation indicated that of the nine men who had intentions to use nonmedical anabolic steroids eight were age 21 or above.

Table 4.27

Crosstabulation of age of participants regarding intention to use steroids

Crosstabulation-Intention to use steroids	Age<21	Age 21+	Total
Very Likely	0	8	8
Likely	1	0	1
Neither	1	3	4
Unlikely	5	6	11
Very Unlikely	52	45	97
Total	59	62	121

The age range of the participants may have played a key role in this behavior. A Berning et al. (2008) found that as males progressed through college so did their chances of using steroids. Academic seniors were the group found most likely to use steroids. A previous study by Cohen et al. (2007) indicated that males who used steroids were usually around the age of 22. These men were established and many had a college degree and a white collar job. The previous study by Cohen et al. (2007) also indicated that men are usually not dissatisfied with their body image these men usually choose to use anabolic steroids because they believe that they will be perceived as people who can take charge and who are in control as shown by their muscularity. These men may believe that they will be able to do better in school, get a better job, and be more physically appealing. By having greater stature these men may feel that society will recognize them compared to being ignored previously. The Cohen et al. (2007) study also found that among male steroid users, men who were thirty years old or older specifically used steroids to decrease amounts of body fat compared to men under thirty years old who were primarily concerned with increasing muscle mass.

A study by Hoffman et al. (2007) indicated that as males progressed through high school so did their likelihood of taking dietary supplements. Males also increased their likelihood of taking body mass gainers as they progressed through high school. Males who took a variety of dietary supplements were more likely to use steroids and males who specifically used body mass

gainers were also more likely to use steroids. This could indicate that by the time males have finished high school that they ready to move on to using steroids in college. A progression could not be implied concerning causality due to a lack of longitudinal data.

A previous study by Peters et al. (2003) indicated that the greater amount of dietary supplements a person had taken indicated that the greater the media's effects were compared to that of his or her primary care physician. A breakdown in the number of dietary supplements taken was presented at the American Dietetic Association's Food & Nutrition Conference & Expo in 2005. Information from this Expo revealed that the number of people taking supplements decreased until three or more supplements were consumed (Picciano, 2005). This shows that three supplements could be the threshold amount where, after three supplements have been taken, the media's influences are stronger than that compared to the consumer's doctor. Many steroid users are already distrustful of the medical community and their views of steroid use (Pope et al., 2004). The percentage of participants in the current study regarding intention to use nonmedical anabolic steroids that had no motivation to comply with the subjective norms concerning doctors' advice were almost 20%. Participants of the current research study were only asked if they were using three substances in general. These respondents could be using a variety of dietary supplements beyond multivitamins, muscle mass builders, and nonmedical anabolic steroids.

The first research question asked, which variable of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control) was the strongest predictor of the intention of non-intercollegiate athlete males' use of nonmedical anabolic steroids. The only predictor variable found to be statistically significant was the perceived behavioral control component of the Theory of Planned Behavior and accounted for 10% of the variance. Perceived behavioral control is a person's belief in the perceived ease or difficulty in performing a behavior (Ajzen 2002). Measurement of perceived behavioral control may have not captured the perceived capability of using nonmedical anabolic steroids as indicated by the respondents. The behavior of using nonmedical anabolic steroids can produce both desired (increased muscle mass) and

undesired effects (hair loss). The participants of this survey may perceive greater ease concerning the external and internal control aspects of perceived behavioral control in regard to nonmedical anabolic steroid use than exist in reality.

Attitude was not considered statistically significant in regard to this study. Attitude was the second greatest predictor of nonmedical anabolic steroid use and accounted for 5% of the variance involving the Theory of Planned Behavior. Attitudes are shaped by beliefs about performing the behavior and outcomes of the behavior (Ajzen 2002). Based upon the results of this study concerning perceived benefits resulting from nonmedical anabolic steroid use, the participants involved in this study seemed to strongly believe that use of nonmedical anabolic steroids would provide them with their desired results. Most behaviors occur with the attitudinal component outweighing that of the subjective component (Ajzen, 2002).

These men could be exhibiting this behavior to use nonmedical anabolic steroids because they want to affirm their own adult status with the ability to make their own decisions. Many of the college students involved in this study may have believed that they could perform this behavior because they were no longer under parental supervision because they were now living away from home possibly for the first time (Middlemen et al., 1995).

Subjective norms accounted for none of the variance associated with the Theory of Planned Behavior. The majority of the survey respondents were aware that friends, family, and doctors would disapprove of their use of nonmedical anabolic steroids. Many of these participants may have exhibited the injunctive quality and felt like they should have agreed with the social norm. These respondents knew that friends, family, and doctors would most likely not approve of the use on nonmedical anabolic steroids, but some of these survey participants still had the intention to use nonmedical anabolic steroids. Some people are fully aware of the social norm and purposely try to perform the opposite behavior the Theory of Planned Behavior was designed to indicate this behavior. Results as indicated by the collected data from this study to identify self-reported use and behavioral intention to use nonmedical anabolic steroids indicate

that the stigma associated with nonmedical anabolic steroids could be decreasing. Nonmedical anabolic steroids are still illegal, but their presence is now much more commonplace than even a decade ago (GAO, 2006). Future studies could indicate that at least friends and family may be less disapproving of nonmedical anabolic steroid use. A study by Pawlak, Connell, Brown, Mayer, and Yadrick (2005) concerning use of multivitamins to increase folic acid intake of African American women found that the reason women in the study did not use multivitamins was because their doctors had never indicated the importance of folic acid to prevent neural tube disorders during pregnancy.

The second research question asked, if respondents were more likely to use nonmedical anabolic steroids if they were already using a multivitamin and/or a muscle mass builder. Of the three predictor variables (multivitamin use, muscle mass builder use, and multivitamin and muscle mass builder use) associated with intention to use nonmedical anabolic steroids muscle mass builder use and using both multivitamins and muscle mass builders were found to be statistically significant with associated nonmedical anabolic steroid use, but these results cannot be classified as significant due to the low amount of responses indicating nonmedical anabolic steroid use.

The responses indicated that survey participants using muscle mass builders were the most likely to intend to use nonmedical anabolic steroids followed by participants who used both multivitamins and muscle mass builders, and lastly respondents who used multivitamins. The result of muscle mass builder use being the greatest predictor of anabolic steroid use is consistent with a previous study by Hoffman et al. (2007). A previous study by Stephens and Olsen (2001) found that men who used muscle mass builders were more likely to believe in the effectiveness of nonmedical anabolic steroids.

The use of both multivitamins and muscle mass builders may indicate a progression to nonmedical anabolic steroids. Participants in the study may have felt as though their fitness results had steadied with the use of multivitamins and muscle mass builders. These respondents

may have felt that they needed to use nonmedical anabolic steroids in order to reach greater levels of their desired fitness goals. The previous Hoffman et al. (2007) study indicated that as males progressed through high school so did their likelihood of using multivitamins and/or body mass gainers. Using a variety of dietary supplements and specifically using body mass gainers were the two most direct forecasters of future steroid use. These survey participants may have progressed from using multivitamins in high school to body mass gainers, and then later in college using steroids. Directionality cannot be implied due to a lack of longitudinal data.

The third research question asked, if the variables of perceived behavioral control were a more effective predictor of non-intercollegiate athlete males' intentions to use nonmedical anabolic steroids as a single construct (perceived behavioral control) or two part construct (self-efficacy and control). None of the components of perceived behavioral control were found to be significant. Self-efficacy was found to be a better predictor than control. Overall, it seemed as participants of this study believed that they could actually obtain nonmedical anabolic steroids 64.5% of the respondents believed actually obtaining steroids would be very easy, easy, or neither easy or difficult. External control did not seem to be an obstacle for the study population. The local gym and university setting may provide outlets for those who sell nonmedical anabolic steroids to distribute these products. Steroids could have also been purchased via the Internet at websites well known to these respondents. The study results also indicated that financial cost was not a factor when acquiring nonmedical anabolic steroids. The respondents who used or planned to use nonmedical anabolic steroids may have deemed their purchase as necessary and possibly avoided other unnecessary expenses. Many men who choose to use steroids have thoughtfully saved their money for steroid related expenses and their purchase would not be considered an "impulse buy" as compared to the purchase of other illegal substances (Cohen et al 2007). Almost 25% of the study participants did not answer the question pertaining to cost/affordability which may indicate that they are not aware of the current monetary cost of nonmedical anabolic steroids.

Overall, it seemed that the participants in this study were able to obtain steroids and that the control aspect of perceived behavioral control was not an issue. The participants in this study did seem to have issue with their own self-efficacy. Almost half of all the respondents indicated that availability, administration, and time would affect their use possible use of steroids very much, somewhat, or neutrally. These intrinsic factors seemed to outweigh the extrinsic factors concerning the behavior of nonmedical anabolic steroid use. Self-efficacy may have been lower than initially thought due to the age of the study population. The participants in this study may live a more unscheduled lifestyle compared to older respondents. This population may have felt that if they did not have the desired time to perform exercise that they should not use steroids at the current time. This population may have not wanted to be in possession of nonmedical anabolic steroids especially if they were living in university housing due to steroids being illegal (GAO 2006). This population may have believed they knew where the product was available but they may have believed it would have been a waste of money if they could not accurately administer steroids or that they did not have the time to use steroids. This population may have previously tried using nonmedical anabolic steroids and were not able to have the desired affects because of inaccurate use. This may have lowered their sense of self-efficacy causing them to not perform the behavior (Ajzen 2002).

A decision cannot be made about the effectiveness of predictors concerning non-intercollegiate athlete males' intentions to use nonmedical anabolic steroids as a single construct (perceived behavioral control) or two part construct (self-efficacy and control). None of the components of perceived behavioral control were statistically significant as related to global perceived behavioral control and the two-part construct of self-efficacy and control. Ajzen concluded that the only way to indicate if a single or two-part construct is a more effective predictor of a certain behavior is to analyze these constructs through a variety of behaviors (Ajzen 2002). Future research will need to be conducted regarding perceived behavioral control and its predictive ability concerning nonmedical anabolic steroid use.

The last research question asked respondents about additional predictors of nonmedical anabolic steroid use. These questions asked if the participants surveyed were satisfied with their body image, had a physically demanding job, if they were a competitive bodybuilder, and if they were a competitive athlete. When the regression analysis was computed being a competitive bodybuilder (positive correlation) and being satisfied with body image (negative correlation) were the items found to be statistically significant.

A common saying heard by the respondents while administering the survey instrument at Ford's Fitness center was "There are two types of men, those who use steroids and those that wish they were using steroids." The participants involved with this study seemed satisfied with their body image with almost 74% indicating satisfaction. Almost 64.5% claimed to not have a physically demanding job. Almost 75% of respondents considered themselves to be competitive athletes, but the participants with significant intentions to use nonmedical anabolic steroids were those who considered themselves to be competitive bodybuilders 6.6%.

As indicated by the results of this study the majority of participants were not dissatisfied with their body image. A previous study by Cohen et al., (2007) indicated that men who use steroids are not dissatisfied with their body image. These men use steroids in order to reap the rewards society offers to men with increased musculature. These men feel that they will be able to accomplish goals such as getting a promotion at work and attracting a more appealing mate because of increased muscle mass. These men feel as though they have built social capital through their muscle mass which indicates that they are "a go getter" and "a man of action."

The reason for nonmedical anabolic steroid use among bodybuilders is likely due to their participation in bodybuilding competitions where they are judged strictly on the muscularity of their physiques. These men live a lifestyle that relies heavily on their physical appearance. These men may believe that the use of nonmedical anabolic steroids aids them in their performance. Some competitive bodybuilders may feel that without the use of nonmedical anabolic steroids they cannot reach their desired physical goals and this would endanger their ability to place well

in competitions (Peters et al., 1999). They may also believe that fellow bodybuilding competitors are already using steroids and by not using steroids would place them with a clear disadvantage. These men may feel that they need to use steroids in order to “level the playing field.”

Bodybuilding competitions are often organized either for the “natural” body builder for whom blood and/or urine tests are required and a second type organized for those participants for which there are no tests for any illegal substances.

These bodybuilders are most likely not dissatisfied with their body image, but they may feel the need to enhance their physical state in order to be a “serious” competitor (Cohen et al., 2007). The desire to become more masculine is often linked to exhibiting risky health behaviors with the possible use of dangerous substances (nonmedical anabolic steroids) to obtain an ideal male body type (Fillault & Drummond, 2010).

Those who had memberships to the Johnson Center and Ford’s Fitness Center could have joined these establishments in order to increase their physical health and to add social contacts. Many of the participants who were members of Ford’s Fitness Center may have been from other areas of Kentucky and moved to Lexington in order to find work. The population at Ford’s Fitness Center was more likely to have a job and not be attending college, so they may have had more time to participate in bodybuilding contests and to prepare for these contests. Ford’s Fitness Center is also well known in the Lexington, Kentucky area because of the amount of free-weights that it contains. This may attract more competitive bodybuilders to the facility because they like how the use of free-weights work naturally to build their physiques compared to other facilities that contain mostly machine equipment.

The physical structure of each facility can also be contrasted. Based upon the physical environment, it may be easier to buy, sell, and use nonmedical anabolic steroids at Ford’s Fitness Center as compared to the Johnson Center on the UK Campus. Ford’s Fitness Center is smaller and has divided areas that could conceal accessing these drugs.

Limitations

Limitations existed within this study. One limitation relates to the location where the study was conducted. Only men at the University of Kentucky, Johnson Center and members of Ford's Fitness Center in Lexington, Kentucky were used as participants thus limiting generalization. The University of Kentucky is a large-sized university with approximately 36,000 total students. Ford's Fitness Center is a small gym with less than 1000 total members. Students at the University of Kentucky have already paid for memberships to the Johnson Center with the cost of their tuition and many of the students are already located on the college campus. Members of Ford's Fitness Center pay for their memberships out of pocket with the majority of members paying their dues on a monthly basis. The members of Ford's Fitness Center must also drive or take public transportation to the facility because it is not located in a predominantly residential area. Members of Ford's Fitness Center who completed the survey also tended to be older (25 to 30 years).

Overall, there are a large amount of dietary supplements available within the United States. This study consisted of questions specifically asking about multivitamins/multiminerals, muscle mass builders, and nonmedical anabolic steroids. Respondents may have been taking other substances that they thought could be included in these categories. They could have also been taking multivitamins, muscle mass builders, and/or nonmedical anabolic steroids and not realized they were taking these substances due to the names of these products from their pharmaceutical marketing. A study by Petroczi et al (2007) indicated that many athletes are confused about why certain supplements are taken. Many athletes do not know which supplement to take for the desired effect they want. This could have affected respondents answering questions about their use of various substances.

According to Ajzen for maximum effectiveness a survey based within the Theory of Planned Behavior should present questions in a nonsystematic order. This did not occur within this survey because it was felt that presenting the information in a nonsystematic order would be

too confusing to the respondents and would increase the amount of time needed to complete the survey. Questions related to this study were presented in a pattern with sequential ordering to avoid confusion. Ajzen also recommends a more formative approach for creating survey items. This did not occur within this study due to time concerns and the need to have respondents present at more than one occasion. Initially, open ended questions would have been asked to respondents and the most frequent answers would have been used to construct the pilot survey. The results obtained may have underestimated the theory's constructs and the theory's predictive ability (Ajzen 2002).

Overall sample size (121 participants) was a limitation. The small sample size population reduced the power of the study in general. Future studies will want to include a larger sample size and a population with more steroid users. Studies may need to be completed entirely of steroid users in order to achieve a higher amount of power. This study found a significant percentage of steroid users, but many of the statistical tests could not be regarded a significant due to the low amount of steroid users overall.

Another limitation was that the data were self-reported, thus respondents may not have been truthful in responding. The survey inquired about nonmedical anabolic steroid use, which is illegal in the United States. Participants may have not accurately reported nonmedical anabolic steroid use or may have not chosen to participate in the study at all, thus affecting actual results. The survey was anonymous, but some individuals may have believed their responses could have been in some manner linked back to them. This study found actual use of steroids in the surveyed study population to be around 6% and intentions to use steroids at around 7.5%. Previous work by Frenrich, Mackesy-Amiti, & Johnson (2008) found that men in general answered truthfully about their drug use concerning marijuana but not cocaine. Underreporting was found to be a correlate of social class (education, income and employment). This could possible affect this study because in general steroid users are often of higher socio-economic status (Cohen, 2009).

The actual amount of steroid users and participants who intend to use steroids might be greater than the statistics indicate.

This study was carried out in two locations that were believed to be appropriate for finding steroid users. Research conducted in more locations might result in a different pattern of steroid use. Other locations not involving exercise could also be used such as a library, dining hall, or even open areas where students/men congregate. Other means to attract steroid users to the study could be used. The most frequent method of acquiring steroids is over the internet (Cohen, 2009), so future research could also use the internet for data collection.

Results from this study showed that approximately 74% of participants reported being satisfied with their overall body image. Previous research by Tucker (1982) indicated that almost 70% of college aged males were dissatisfied with their body image. The results from this study may have been affected because of the proximity of the survey research collection to fitness areas. Study participants from such areas may be more prone to be in better overall shape which may increase their overall body image satisfaction. During the pilot study and possibly during the actual study, a mixed martial arts event took place in Lexington, Kentucky. This event may have altered the normal populations frequenting the fitness venues with transient exercisers. Many of these men may have been practicing a mixed martial arts regimen possibly increasing their overall body image satisfaction.

Question #41 was a yes/no response question that asked if the participants considered themselves to be competitive athletes. Some participants may have misinterpreted the phrase "competitive athlete." This question was meant to differentiate between professional sporting events (professional power lifting competitions) compared to recreational activities. They may have considered themselves to be a "competitive athlete" when in fact they were not. Overall around 75% of the study population considered themselves to be competitive athletes. The United States Department of Labor estimates that only around 13% of people living in the Kentucky area exercise everyday (U.S. Department of Labor, 2008). The percent of males

considering themselves to be competitive athletes reported in this study is likely to be vastly overestimated. The most likely reason for this discrepancy is a misunderstanding of the term “competitive athlete.” Participants of this study may have interpreted this question to ask if they were competitive in general when involved in any sort of sport activity.

About 68% of the study population indicated that they had previously taken a nutrition course. This result was unexpectedly high and could have occurred because of a misunderstanding of the questionnaire item. The item pertaining to participation in a formalized nutrition course might have been better if it indicated that the course was a stand alone class not pertaining to part of a physical education course section. The respondents may have believed that previous participation in a high school health education class with a nutrition component was applicable to answer “yes.” It is most likely that the percentage of the study population that had taken a formal nutrition class was much lower than the reported 68%. At the University of Kentucky around 1100 of the 30,000 undergraduates have taken or are taking a nutrition course for a percentage of around 3.6% as indicated by Tammy Stephenson, PhD, Director of Undergraduate Studies for the Department of Dietetics and Human Nutrition (personal communication, September 22, 2013).

Chapter Five

Summary, Conclusions, and Implications

Summary

Steroid use has gained a multitude of publicity over the last decade especially in the sports world. Men are especially vulnerable to the lure of steroid use because they value physical attractiveness and are often influenced by the media outlets perception of what a male physique should look like. A greater amount of Americans are using steroids and using these substances in greater amounts. Harmful side effects from the use of steroids can occur ranging from fits of “roid rage” to suicidal tendencies.

The purpose of this study was to increase understanding of factors associated with nonmedical anabolic steroid use among a specific segment of the population; males age 18-30 who do not participate in intercollegiate athletics. The study included three phases: (1) develop a survey instrument based within the Theory of Planned Behavior; (2) utilize the survey instrument to collect data to identify self-reported use and behavioral intention; and (3) conduct data analyses to investigate perceived benefits and identify demographic predictors of nonmedical anabolic steroid use. These data will give health promotion professionals information which will be useful in planning interventions and possibly targeted prevention counseling.

Research Questions

1. Which variable of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control) is the strongest predictor of the intentions of non-intercollegiate athlete males' use of nonmedical anabolic steroids?
2. Are non-intercollegiate athlete males more likely to use nonmedical anabolic steroids if they are already using a multivitamin and/or a muscle mass builder?
3. Is the variable of perceived behavioral control a more effective predictor of non-intercollegiate athlete males' intentions to use nonmedical anabolic steroids as a single construct (perceived behavioral control) or two part construct (self-efficacy and control)?

4. Are the following factors predictors of nonmedical anabolic steroid use:
 - a. Considering oneself to be a competitive athlete
 - b. Considering oneself to be a competitive bodybuilder
 - c. Having a physically demanding job
 - d. Satisfaction with body image

New trends indicated that the average nonmedical anabolic steroid user is not a typical drug addict and it is possible that the activity of using nonmedical anabolic steroids could be considered a planned behavior with a one year supply often being purchased at one time. College students could be particularly susceptible to nonmedical anabolic steroid use because of their higher socio economic status and level of intelligence. Socio-cultural influences associated with males and their physiques have concluded that males may be as prone to societal pressures to possess an ideal physique equal to the pressure society places on women. This high amount of societal pressure to be “attractive” and the bombardment of ideal male specimens by the social media may make many men turn to nonmedical anabolic steroids to enhance their physique in order to be more accepted in society. Risky health behaviors associated with nonmedical anabolic steroid use have shown that the activity of using nonmedical anabolic steroids is not inclusive and that many people who use nonmedical anabolic steroids may also be performing other risky behaviors or that the performance of other risky behaviors could be an indicator of future nonmedical anabolic steroid use. Dietary supplements and performance-enhancing supplements were examined and their mainstream use in society could indicate that the use of nonmedical anabolic steroids might be more acceptable socially than initially thought. Those who use these substances may also be more prone to believe in the effectiveness of nonmedical anabolic steroids compared to non-users. Use of more than one nonmedical anabolic steroid at a time could manifest to side effects that have yet to be observed with unknown consequences. Side effects related to nonmedical anabolic androgenic steroid use have shown that the use of

ancillary drugs to treat side effects might be more harmful than the actual use of nonmedical anabolic steroids alone. Research has shown that instead of discontinuing the use of nonmedical anabolic steroids many people simply increase the amount of other drugs they take to compensate for the body's natural warnings against nonmedical anabolic steroid use. Steroids and the medical community were discussed and it is evident that those who consume nonmedical anabolic steroids are distrustful of the medical community in general and may consider themselves to be rebellious against traditional medicine. These individuals in many cases think that the medical community is hiding the true nature of steroids effectiveness from the general public. The theory of planned behavior will be especially important to distinguish if these users are against the typical sentiments of traditional society (subjective norms). How steroids affect the brain along with addiction to steroids and other drugs indicated that many of the effects of steroids have not been determined. These results indicate that preventative strategies may be more effective when dealing with nonmedical anabolic steroid use because programs aimed at healing individuals after heavy nonmedical anabolic steroid use are most likely incomplete due to lack of knowledge about brain functioning. How nonmedical anabolic steroids are acquired was also reviewed and evidence now shows that the traditional means of acquisition has changed. People who want nonmedical anabolic steroids do not have to frequent small gymnasiums with a prominent weight lifting or bodybuilding population. The internet has provided a new means of acquiring nonmedical anabolic steroids without even having to make face to face contact with another person. Those who may have social phobias or who thought they were too socially awkward may have not had access to nonmedical anabolic steroids in the past, but with the use of the internet they now have a portal into nonmedical anabolic steroid use.

A pilot study was conducted to refine the instrument. The survey was then administered to 121 non-intercollegiate athlete males between the ages of 18-30 at the independently owned Ford's Fitness Center and the University of Kentucky in Lexington, Kentucky in December of

2012. Descriptive statistics were computed. ANOVA analysis, cross tabulations, chi-square analysis, multiple logistic and linear regressions were used to answer the research questions.

Since no previous survey instrument was available concerning nonmedical anabolic steroid use and the Theory of Planned Behavior, a survey instrument was created specifically for this study. The survey instrument was found to have an overall Cronbach's value of 0.86. Of the respondents to The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey 7 participants were found to use nonmedical anabolic steroids at least 1-2 days a week or more. This indicated a 5.9% prevalence of nonmedical steroid use among this male population. Of the respondents to The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey 9 (7.4%) participants were found to have intentions to use nonmedical anabolic steroids within the next year.

There were five items included in the behavioral belief scale section of the Theory of Planned Behavior in regard to this study. Study participants believed using nonmedical anabolic steroids over the course of the next year would provide the following results; increased athletic performance (79.3%), weight loss (33.9%), increased muscle mass (95.1%), increased energy (67.8%), and increased strength (92.6%). Overall, respondents were confident that the use of nonmedical anabolic steroids would provide these results. These respondents especially believed that nonmedical steroid use would increase muscle mass, increase strength, and would increase athletic performance.

To look for predictors of nonmedical anabolic steroid use, linear regression analysis was performed. When the regression analysis was computed age was the only item found to be statistically significant. The results indicated that as participants of this study increased in age so did their intentions to nonmedical anabolic steroids. An ANOVA analysis was computed to predict which variable of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control) was the strongest predictor of the intentions of non-intercollegiate athlete

males' use of nonmedical anabolic steroids. Only the predictor variable of perceived behavioral control was found to be statistically significant. The behaviors of using multivitamins, muscle mass builders, and multivitamins and muscle mass builders were all examined for significance in regard to predicting intention to use nonmedical anabolic steroid use. Muscle mass builder use and use of both multivitamins and muscle mass builders (together) were found to be significant predictors of the intention to use nonmedical anabolic steroids. Every user of nonmedical anabolic steroids in this study was found to use muscle mass builders. The results could not be classified as significant overall, due to the low amount of responses indicating use of nonmedical anabolic steroids. No decision could be made about whether perceived behavioral control was a more effective predictor of nonmedical anabolic steroid use due to the lack of statistical significance involving all three components. Self-efficacy however, was found to be a more effective predictor of nonmedical anabolic steroid use compared to control indicating that the men involved in the study did not find it difficult to obtain nonmedical anabolic steroids. Two additional demographic predictor variables were found to be statistically significant with predicting the intention to use nonmedical anabolic steroids. Being a competitive bodybuilder was positively correlated with intention to use nonmedical anabolic steroids while being satisfied with body image was negatively correlated with the intention to use nonmedical anabolic steroids.

Conclusions

1. The actual use and intention to use nonmedical anabolic steroids among nonintercollegiate athlete college men was evident. This survey found that 5.9% of the study population was currently using nonmedical anabolic steroids and 7.4% intended to use nonmedical anabolic steroids. Results from a previous Berning et al. (2008) study that indicated that 9% of nonathlete college students had used anabolic steroids. Previous work by McCabe et al. (2007) indicated that less than 1% of his U.S. college student respondents had used nonmedical anabolic steroids.

2. Study participants believed using nonmedical anabolic steroids over the course of the next year would provide the following results; increased athletic performance (79.3%), weight loss (33.9%), increased muscle mass (95.1%), increased energy (67.8%), and increased strength (92.6%). Overall, study participants were confident that the use of nonmedical anabolic steroids would provide intended results. A significant number of respondents in this study believed that nonmedical steroid use would increase muscle mass, increase strength, and would increase athletic performance. These results are disturbing because there is no product quality guarantee with these substances. Most of these steroids are produced illegally and could be composed of almost any substance. There is no regulation concerning these products and there is no limit to the side effects that could occur with their use.
3. There were five predictors found to be statistically significant regarding intentions to use nonmedical anabolic steroids:
 - a. Current use of muscle mass builders and
 - b. Current use of both multivitamins and muscle mass builders (together) were found to be statistically significant predictors of future intention to use nonmedical anabolic steroid use. The overall significance cannot be established due to the low number of responses indicating intention to use nonmedical anabolic steroids. The use of muscle mass builders and/or multivitamins may “groom” these men for future nonmedical anabolic steroid use by providing them with partially desired results involving with an increase of muscle mass. A study by Clark (2004) indicates that because of exposure to muscular males in the media that many of these men may have had unrealistic goals concerning their body image and would have to progress to using nonmedical anabolic steroids to provide the desired results. Some of these males may be trying to accumulate more muscle mass than their body can physically support (Clark, 2004).

- c. Increasing age was correlated with the intention to use nonmedical anabolic steroids. This may indicate that men who are possibly dealing with an increased amount of fat mass are more likely to use nonmedical anabolic steroids. They may see the use of nonmedical anabolic steroids as a way of changing their body composition. Previous research indicates that as males progress through middle school, high school, and college so does their likelihood of using steroids.
 - d. Being satisfied with body image was negatively correlated to intention to use nonmedical anabolic steroids. The results indicated that respondents who were satisfied with their body image were less likely to have intentions to use nonmedical anabolic steroids.
 - e. The last significant predictor of nonmedical anabolic steroid use was being a competitive bodybuilder. These respondents were the most likely to use nonmedical anabolic steroids as ergogenic aids. Use of these substances can provide them with an edge over other competitors in their sport or could place them on equal ground if they perceive everyone else participating in body building to be using nonmedical anabolic steroids.
4. The variable of self-efficacy was found to be a more effective predictor of nonmedical anabolic steroid use as compared to control, although neither was statistically significant. Many of the participants involved with this study did not have any issues in regard to affording nonmedical anabolic steroids or knowing where to find nonmedical anabolic steroids.
5. The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey was found to have an overall Cronbach's Alpha value of 0.86. The Behavioral Intentions and Ergogenic Aid/Performance Enhancer use among non-intercollegiate athlete males survey was found to be a valid survey instrument based within the Theory of Planned Behavior.

Implications

Recommendations for action

Future research regarding nonmedical anabolic steroids needs to be collected in a longitudinal manner if possible. An entry and exit survey among male college students may provide data concerning factors of why they use or do not use these substances in college. There might be times in a man's life when he is more likely to have an increased intention to use nonmedical anabolic steroids. The use of nonmedical anabolic steroids most likely occurs between the ages of 18-30, but some men could be exposed to nonmedical anabolic steroids at earlier or later times. Exposure to muscular male images from the media could cause some males to desire more muscular definition at earlier ages than 18. A study by Field et al. (2005) indicated that boys were twice as likely to use substances to enhance their appearance when exposed to media images. High divorce rates in the United States could also cause some males to desire to become more muscular in order to attract a partner after the age of 30 to make them more appealing.

This study focused on a progressive chain of substance use beginning with multivitamins and then onto muscle mass builders and finally nonmedical anabolic steroids. This chain of use does not end with nonmedical anabolic steroids and most likely branches out to alcohol, illegal drugs such as opiates/cocaine, and recreational use of prescription medications (McCabe et al., 2007). Some drug dealers initially offer steroids to their clients in order to have them request other drugs due to the side effects caused by steroid use (NIDA Notes, 2001). Drug dealers may also initially offer steroids to their clients because the penalties for the possession of steroids are not as great as the penalties for possession of other drugs such as cocaine. When the client is thought of as legitimate, drug dealers will sell them other more illicit drugs (GAO, 2006). Some opioid users turn to steroids due to the anorexic effects of their drug use. The use of steroids helps to mask their drug abuse of opioids like heroin (Graham et al., 2008). The behavior

associated with the use of nonmedical anabolic steroids is necessary to understand in order to combat what substances will be desired in the future.

Specific populations should be studied along with their use of nonmedical anabolic steroids. Populations such as police officers, gymnasts, and military personnel all should be studied because their vocations place them at high risk to use steroids (Dao 2009; Fillault & Drummond, 2010). These populations are especially vulnerable to nonmedical anabolic steroid use because of their vocations demand them to be in top physical shape and/or their body musculature is highly visible (Fillault & Drummond, 2010). Being muscular and strong benefits all of their job performances. Some of these jobs also have an increased risk of suicide associated with performance and use/nonuse of nonmedical anabolic steroids could increase this risk.

Male high school and college students need to be informed about the risks of using nonmedical anabolic steroids. Many female students are informed about the dangers of anorexia, bulimia, and disordered eating, so it is logical that males should be informed about the use of nonmedical anabolic steroids and risk involved with their use. This should occur as early as first year orientation so students know that the use of nonmedical anabolic steroids has harmful consequences. Many of the participants in this study had previously participated in weight lifting activities in high school (84.3%). These activities and classes may be a “gateway” to future nonmedical anabolic steroid use. Steroid use usually occurs within 2-5 years of initial weight training (Peters et al., 1999; Cohen, 2009). A previous study by Hoffman et al. (2007) indicated that males are likely to search a variety of sources until they find information more inclined towards steroid abuse regardless of legitimacy. It is possible that males interested in using nonmedical anabolic steroids specifically get involved in these activities or classes. This indicates that high school coaches and other related personnel should be educated about steroids and the effects of steroids. Students may turn to coaches as a source of information regarding use or nonuse of steroids. If these personnel are not educated about this topic these men will most

likely look for other sources of information. Only (25.6%) of the study population participated in weight lifting/strength and conditioning courses in college.

Recommendations for practice

Health promotion can be used to effectively reduce the amount of men who use or intend to use nonmedical steroids. First awareness must be raised about the effects of steroid use. Health promotion is concerned with empowering people to take control of their health. Steroid users most likely believe that they are taking control of their especially in regard to their physical health. These men could be regarded as being in a state of “pseudo-health.” These men do not realize that although they may look “healthy” in regard to the physical musculature that they are not in a state of complete health. The physical aspect of health is only superficially changed in reality these men are at risk of strokes due to hypertension and heart attacks possibly due to dyslipidemia (Fernandez & Hosey, 2009). Mentally, these men are at risk of having “roid rage” caused by imbalances of serotonin levels in the brain, increased risk of suicide especially when in between steroid cycles, and other disorders caused by being unable to sleep normally (Weaver, 2005; Parkinson & Evans, 2006; Stocker 2000; Moitra, 1999). Socially these men are not at normal functional ability because of the chemical imbalances occurring in their brains many of the men who use steroids are extremely volatile, violent, and moody (Bahrke et al., 2000; <http://steroid-abuse.org/>). The use of steroids is often not isolated and involves other high risk behaviors such as fighting, driving while intoxicated, and carrying a weapon (Middlemen et al., 1995).

Men need to be better informed of how the media influences their views of themselves. Men could possibly now be on a level where they are judged by their physical attractiveness as much as women are. An increasing number of men have been suffering from disorders related to becoming a media perfect icon (Leit et al., 2002). The effect of the media on men has been documented (Leit et al., 2002). When men are exposed to images of other men with rippling biceps and well defined abdominal muscles they realize they do not conform to the ideal images

portrayed in the media. Even just a brief viewing of ideal male physiques caused most regular males to feel physically inadequate (Leit et al., 2002). Men need to be aware that when women choose between a variety of male physiques that they most often pick a male who has an average build and nowhere near the very muscular build most men think women prefer (Clark, 2004). Men will have to recognize that male bodies come in variety of forms and that just because a man does not resemble a male icon he is not less of a man himself (Stout, 2004). This is going to be a simple strategy for combating socio-cultural influence, male empowerment for the average man (Leone et al., 2005).

Fishbein would state that nonmedical anabolic steroid use is the consequence of behavior, it does not come from what one is, but from what one does and that the objective of the research is to prevent or change the risk behavior (Fishbein, 2000). Prevention is the ultimate strategy because treatment has not fully been developed due to a lack of knowledge concerning the chemical changes that occur in the brain with steroid use. Health promotion programs that are aimed at preventing the behavior of steroid use are still being developed. At this point these programs are not offered on an individual level. Programs like ATLAS (Athletes Training and Learning to Avoid Steroids) developed by Linn Goldberg, rely primarily on student athletes to share anti-steroid information in a highly scripted program. Coaches are facilitators and peers are instructors, student athletes work in small "squads" to learn about steroids. This program has been shown to be effective in reducing steroids use among high school populations in the Northwest United States (Clay, 2003). This program works within a group dynamic most likely due to the distrustful nature of steroid users because of the illegality of steroids and their distrustful nature of the medical community (GAO, 2006; Pope et al., 2004). This program is aimed at student athletes and a previous study by Cohen (2009) revealed that most nonmedical anabolic steroids users did not participate in sports and many have not participated in sport in the past.

Mandatory education during college orientation should address steroid use to incoming male first year students much like that of anorexia/bulimia concerning first year female students. Steroid education should be implemented possibly in high school and middle school health classes. Students should practice real world techniques involved in role play to help them refrain from steroid use when possibly being approached by drug dealers and peers. These men should be exposed to testimonials of steroid users and their families/friends hardships. They should also be made aware that being more muscular does not equal being more masculine. Pediatricians/doctors of general medicine should ask men if they have considered using nonmedical anabolic steroids and inform them of the risk associated with steroid use. When doctors do not address the topic of steroids, men may perceive the use of steroids as alright or as a minor, insignificant issue in regard to subjective norms. Parents and teachers need to be better informed about the dangers of steroid use and be able to function as a resource with information about steroids and dangers of steroid use. Men may also need to be reminded that nonmedical anabolic steroids are illegal substances to possess. Penalties for the possession of nonmedical anabolic steroids need to be increased at least to level of other similar illegal substances. The participants in this study did not seem to have any concerns about being able to acquire nonmedical anabolic steroid especially those in a university setting. The Ergogenic Aids/Performance Enhancers Use Survey designed for this study was found to be reliable with an overall Cronbach's value of 0.86. It is recommended that the use of this survey in future research should be done with dividing the nutrition question into multiple questions asking when the class was taken (college or high school). It is also recommended that the investigator explain that the nutrition course should be a stand-alone class and not a unit included in a typical health class. Questions pertaining to the cost of steroids should also have the option of (N/A or not applicable). There were a significant amount of blank responses (31 concerning control belief power and 28 concerning control belief strength) which may have occurred because participants did not know the actual monetary price of steroids. Questions regarding time may also need to split into time

spent acquiring steroids and the time spent pertaining to actually physically ingesting/injecting steroids.

Appendix A

Ergogenic Aids/Performance Enhancers Use Survey

This survey is designed to measure the behavioral intentions of non-intercollegiate athlete men and their use/nonuse of multivitamins/multiminerals, muscle mass builders, and nonmedical anabolic steroids.

You DO NOT have to be taking multivitamins/multiminerals, muscle mass builders, or nonmedical anabolic steroids to participate in this study.

All of your responses are **confidential**, please do not write your name or make any identifiable marks on the survey.

Please answer all questions to the best of your ability, and feel free to ask the survey administrator any questions you may have.

Key Terms

Multivitamin/Multimineral-Tablet or serum containing several vitamins and/or minerals known to be essential to health (Examples include Centrum, One-a-Day, GNC Megaman Complex)

Muscle mass builder-Any legal ingestible substance that is intended to increase the physical size of a muscle or muscle group (including high protein powder shakes and high protein bars)

Nonmedical anabolic steroid-Synthetic versions of the hormone testosterone (or other steroids/hormones) that produce primary male characteristics (Can be injected directly into muscle or taken orally)-**DOES NOT INCLUDE ASTHMA INHALERS** (Examples include Albuterol, Flovent, Advair Diskus, Symbicort, and Singulair)

Please answer the following questions based on **how often you have used** the substance(s) mentioned **within the last year**. *(Please circle your response)*

	7 days a week	5-6 days a week	3-4 days a week	1-2 days a week	Never
Multivitamins/Multiminerals (Centrum, One-a-Day, GNC Megaman Complex etc.)	1	2	3	4	5
Muscle mass builders (Whey protein, or similar item(s) including high protein powder drinks and protein bars)	1	2	3	4	5
Nonmedical anabolic steroids (Testosterone, Anadrol “ABomb” or “A50”, Deca-Durabolin “Deca”, Dianabol “D-Bol”, Anavar, Winstrol “Winnie D”, Equipoise “EQ” etc.)	1	2	3	4	5

Please answer the following questions based on how likely or unlikely **you are to use or not use** the substance(s) mentioned. 1 = Very Likely, 2 = Likely, 3 = Neither Likely or Unlikely, 4 = Unlikely, and 5 = Very Unlikely. *(Please circle your response)*

	Very Likely	Likely	Neither Likely or Unlikely	Unlikely	Very Unlikely
I intend to use multivitamins/multiminerals within the next year	1	2	3	4	5
I intend to use muscle mass builders within the next year	1	2	3	4	5
I intend to use nonmedical anabolic steroids within the next year	1	2	3	4	5

What do you think each of the following groups would think about your use of **nonmedical anabolic steroids**? 1 = Should Use, 2 = Probably Should Use, 3 = Neutral, 4 = Probably Should Not Use, and 5 = Should Not Use. *(Please circle your response)*

	Should Use	Probably should use	Neutral or No opinion	Probably should not use	Should not use
Family	1	2	3	4	5
Friends	1	2	3	4	5
Doctors	1	2	3	4	5

When it comes to the use of **nonmedical anabolic steroids**, how much do you want to follow the recommendations of the following groups? 1 = Very Much, 2 = Somewhat, 3 = Neutral, 4 = Not Much, and 5 = Not At All. *(Please circle your response)*

	Very much	Somewhat	Neutral	Not much	Not at all
Family	1	2	3	4	5
Friends	1	2	3	4	5
Doctors	1	2	3	4	5

How much **do you think** each of the following factors would affect your use of **nonmedical anabolic steroids**? 1 = Very Much, 2 = Somewhat, 3 = Neutral, 4 = Not Much, and 5 = Not At All. *(Please circle your response)*

	Very Much	Somewhat	Neutral	Not much	Not at all
Cost/Affordability	1	2	3	4	5
Availability (Knowing the product was obtainable)	1	2	3	4	5
Ability to use/administer (Knowing how to administer the product)	1	2	3	4	5
Having enough time to use the product regularly	1	2	3	4	5
Accessibility of the product (Knowing where to get the product)	1	2	3	4	5

How easy/difficult does each of the following factors make your use of **nonmedical anabolic steroids**? 1 = Very Easy, 2 = Easy, 3 = Neither Easy or Difficult, 4 = Difficult, and 5 = Very Difficult. *(Please circle your response)*

	Very Easy	Easy	Neither easy or difficult	Difficult	Very difficult
Cost/Affordability	1	2	3	4	5
Availability (Knowing the product was obtainable)	1	2	3	4	5
Ability to use/administer (Knowing how to administer the product)	1	2	3	4	5
Having enough time to use the product regularly	1	2	3	4	5
Accessibility of the product (Knowing where to get the product)	1	2	3	4	5

Do you believe that using **nonmedical anabolic steroids** over the course of the next year will provide the following results?

You do not have to be currently using nonmedical anabolic steroids.

1 = Very Likely, 2 = Likely, 3 = Neither Likely or Unlikely, 4 = Unlikely, and 5 = Very Unlikely. *(Please circle your response)*

	Very Likely	Likely	Neither likely or unlikely	Unlikely	Very unlikely
Increased athletic performance	1	2	3	4	5
Weight loss	1	2	3	4	5
Increased muscle mass	1	2	3	4	5
Increased energy	1	2	3	4	5
Increased strength	1	2	3	4	5

How important are each of the *following possible outcomes* from use of **nonmedical anabolic steroids** to you?

You do not have to be currently using nonmedical anabolic steroids.

1 = Very Important, 2 = Somewhat Important, 3 = Neutral, 4 = Somewhat Unimportant, and 5 = Unimportant. *(Please circle your response)*

	Very Important	Important	Neutral	Somewhat Unimportant	Unimportant
Increased athletic performance	1	2	3	4	5
Weight loss	1	2	3	4	5
Increased muscle mass	1	2	3	4	5
Increased energy	1	2	3	4	5
Increased strength	1	2	3	4	5

Have you had any formalized weight training in high school from either being on a sports team or through a physical education (P.E.) class?

_____ Yes

_____ No

Have you had any formalized training in nutrition, through a course in high school or college?

_____ Yes

_____ No

Were you on a junior varsity sports team or varsity sports team in high school?

Yes
 No

If yes, which sport(s) did you play? (please list below) If not please move to next question

Have you taken a weight lifting/strength and conditioning course at a college/university?

Yes
 No

What is your academic classification?

College Graduate (not currently earning post graduate degree)
 Graduate Student or other professional program (Business, Dentistry, Law etc)
 Senior
 Junior
 Sophomore
 Freshman
 Attended college, but did not graduate
 Never attended college

What is your cumulative undergraduate college grade point average (G.P.A.)?

4.00-3.50
 3.49-3.00
 2.99-2.50
 2.49-2.00
 Under 2.00
 Have not attended college

What is your age today? (Please write below)

_____ years of age

How tall are you? (Please write below)

_____ Feet _____ Inches

How much do you weigh? (Please write below)

_____ Pounds/Lbs

Do you consider yourself to be a competitive athlete?

Yes

No

Do you consider yourself to be a competitive bodybuilder?

Yes

No

Do you have a physically demanding job?

Yes

No

Do you feel satisfied with your own body image?

Yes

No

Thank you for participating in this study of non-intercollegiate athlete males and their use of ergogenic aids/performance enhancers. **Please return the completed survey to the administrator, if you have any questions do not hesitate to ask as your participation was appreciated.**

Appendix B

Consent to Participate in Research Study

BEHAVIORAL INTENTIONS AND ERGOGENIC AID/PERFORMANCE ENHANCER USE AMONG NON-INTERCOLLEGIATE ATHLETE MALES

You are being invited to take part in a research study about the behavioral intentions of non-intercollegiate athlete males to use ergogenic aids/performance enhancers. You are being invited to take part in this research study because you are a male between the ages of 18-30 years and do not participate in University of Kentucky or any other intercollegiate athletics. If you volunteer to take part in this study, you will be one of about 100-200 people to do so at the University of Kentucky/Ford's Fitness Center (Lexington, Kentucky).

The person in charge of this study is Vitesh "Victor" Enaker (PI) a doctoral student of the University of Kentucky. Victor is a doctoral student being guided by Dr. Richard Riggs (advisor). The purpose of this study is to develop a survey instrument based within the theory of planned behavior and utilize the survey instrument to identify behavioral intentions of non-intercollegiate athlete males concerning nonmedical anabolic steroid use.

By doing this study, we hope to identify predictors of nonmedical anabolic steroid use and acknowledge if the Theory of Planned Behavior is a valid predictor of the behavioral intention to use nonmedical anabolic steroids among non-intercollegiate athlete males.

You should NOT participate in this study if you are not a male and if you participate in intercollegiate athletics. You can NOT participate in the study if you are less than 18 years of age or over 30 years of age.

The research procedures will be conducted at the Johnson Center recreational facility at the University of Kentucky and Ford's Fitness Center located in Lexington, Kentucky. The total amount of time you will be asked to volunteer for this study is 10 minutes.

You, as a male, non-intercollegiate athlete at the University of Kentucky or any other NCAA institution, are being asked to complete a confidential survey that includes questions about behavior, intentions, subjective norms, attitudes, and control beliefs toward multivitamins, muscle mass builders, and nonmedical anabolic steroids and to complete non-identifying demographic data.

To the best of our knowledge, the things you will be doing have no more risk of harm than you would experience in everyday life.

You will not get any personal benefit from taking part in this study. If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. Participation or nonparticipation will not affect your use of the Johnson Center recreational center/Ford's Fitness Center facility in any way.

If you do not want to be in the study, there are no other choices except not to take part in the study.

There are no costs associated with taking part in the study.

We cannot and do not guarantee that you will receive any personal benefits from taking part in this study. There will be two random prize drawings for a \$25 gift card for those individuals who wish to participate in the study. Your willingness to take part, however, may, in the future, help society as a whole better understand this research topic.

We will make every effort to keep private all research records that identify you to the extent allowed by law. Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private. We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. All records of the study will be stored securely in a locked safe when not in use. All data entry performed will not be able to identify participants with their response. We will keep private all research records that identify you to the extent allowed by law. However, there are some circumstances in which we may have to show your information to other people. For example, we may be required to show information which identifies you to people who need to be sure we have done the research correctly; these would be people from such organizations as the University of Kentucky

If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you decide to stop taking part in the study. The individuals conducting the study may need to withdraw you from the study. This may occur if you are not able to follow the directions they give you, if they find that your being in the study is more risk than benefit to you.

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the principal investigator, Vitesh “Victor” Enaker at (859)-806-3647 or at vmenak0@uky.edu or his advisor, Dr. Richard Riggs at (859) 257-3645. If you have any questions about your rights as a volunteer, in this research, contact the staff in the Office of Research Integrity at the University of Kentucky at 859-257-9428 or toll free at 1-866-400-9428.

Signature of person agreeing to take part in the study

Date

Printed name of person agreeing to take part in the study

Name of [authorized] person obtaining informed consent

Date

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