

Athletic Trainers' Knowledge of Performance Enhancing Drugs

By

Clayton Faircloth

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Masters of Science in Leisure and Sport
Management

Murfreesboro, TN August 2016

Thesis Committee:

Dr. Brian Ragan, Chair

Dr. Helen J Gray

© 2016

Clayton Faircloth

All Rights Reserved

I dedicate this research to my family.

ACKNOWLEDGEMENTS

I would like to thank my family for their support throughout this research. I would also like to thank Dr. Brian Ragan, Dr. Joey Gray, and Jim Farnsworth for their guidance throughout the process of my thesis. They were there every step of the way and answered all my questions at every meeting. I would not have been able to complete my thesis without my committee and family pushing me the whole way. I am very thankful.

ABSTRACT

Performance enhancing drugs (PEDs) have been around for years and have recently become an issue in sports. They have effected all levels of sports from high school to professional. There has been 2.9-4.0 million Americans to use some sort of anabolic-androgenic steroid (AAS) (Pop et al., 2014). It is not only steroids that are used as PEDs; there is a long list that will be reviewed in this study. These PEDs have evolved over the years and new drugs are continuously changing. In organized sports, Athletic Trainers (ATs) are the primary resource for athletes when it comes to injuries, knowledge on nutrition, and supplements (Burns et al., 2004). It is important for ATs to be able to provide relevant information on PEDs. This study has developed a test to determine an ATs knowledge of PEDs. It will benefit the patients that ATs treat by encouraging better knowledge of PEDs.

TABLE OF CONTENTS

LIST OF TABLES.....	ix
LIST OF FIGURES	x
CHAPTER I: INTRODUCTION	1
Purpose statement.....	2
Hypothesis	2
Limitations.....	2
<i>Definitions of terms</i>	2
Study implications	5
CHAPTER II: LITERATURE REVIEW	6
Performance enhancing drugs	6
Prevalence	7
Issues	10
<i>New trends with unknown effects</i>	10
Safety and adverse effects.....	11
Media's effect on use of performance enhancers and professional idols	11
Legal & organizational complications.....	13
Alternative motives of use	14
Athletic training as a profession	14
<i>Continuing education units</i>	15
<i>State requirements</i>	16
<i>Need statement</i>	16

Psychometrics.....	16
<i>Specific aims</i>	17
CHAPTER III: METHODS	18
Design & setting.....	18
Participants	18
Instruments	18
Procedures.....	19
<i>Blueprint</i>	19
<i>Item development</i>	20
<i>Test construct</i>	21
<i>Recruitment</i>	21
<i>Test administration</i>	21
<i>Data cleaning</i>	21
Data analysis	22
<i>Item difficulty</i>	22
<i>Item discrimination</i>	22
<i>Item determination</i>	22
CHAPTER IV: RESULTS	23
Demographics of the participants.....	23
Overall performance	25
Items	26
CHAPTER V: DISCUSSION.....	28

Athletic trainers' knowledge of performance enhancing drugs	28
<i>Prevalence of PED communication in athletic training setting</i>	28
Poor performance	29
Continuing education units.....	30
Poorly created items	31
<i>Easy items</i>	31
<i>Acceptable difficulty & poor discrimination</i>	32
<i>Difficult items & poor discrimination</i>	32
<i>Revised Item</i>	33
Limitations.....	34
Future research.....	34
Conclusion	34
REFERENCES.....	36
APPENDICES	41
Appendix A: KT-PED	42
Appendix B: INFORMED CONSENT	54
Appendix C: RECRUITMENT SCRIPT	55
Appendix D: STUDY APPROVAL	56
Appendix E: FINAL KT-PED	60

LIST OF TABLES

Table 1: Prevalence of lifetime, high school, and past-year drug use in student athletes compared with non-athletes	9
Table 2: Percent of importance per section	20
Table 3: Item P, Pr, & determination	27

LIST OF FIGURES

Figure 1: Sex of participants	24
Figure 2: Distribution of years of experience	24
Figure 3: Distribution of scores	25

CHAPTER I

INTRODUCTION

With the rise of sports, athletes at all levels of competitions look to improve their performance. Many may turn to performance enhancing drugs (PED) to gain that competitive edge. A college study showed 88% of athletes surveyed used one or more supplements to help aid in performance (Burns et al., 2004). The athletic trainers for those athletes are perceived as a primary source of information of PEDs (Burns et al., 2004).

Many of the PEDs cause adverse effects that are detrimental to the athletes' long term and can lead to death. Some of the PEDs used today are new hormones that cause a release of HGH that will increase muscle strength and size (Ionescu & Frohman, 2006). The long-term use of those kinds of PEDs are unknown. It is important for athletic trainers (ATs) to stay up to date on those PEDs and should be able to inform their athletes on the dangers of using them.

Athletic trainers see and interact with athletes on a daily basis. They are in such an influential position among athletes, it is important that they are assisting in the decision making process. Based on position statements released by the National Athletic Trainers' Association (NATA), ATs should know the signs or symptoms in athletes that are abusing PEDs. Some PED use may be avoided altogether with proper education. It is important that ATs stay current in the world of PEDs as it is ever changing.

Purpose statement

The purpose of this study is to develop a test to assess AT's current knowledge of performance enhancing drugs.

Hypothesis

A psychometrically sound test will be created to assess AT's current knowledge of performance enhancing drugs.

Limitations

There are a few limitations to this study. There are many steps in the process of this test development. This project is in the initial steps of pilot testing. Another limitation is missing data or no response to some items. If there are any missing items from the test, the participant's test will not be scored. Having judges in this study instead of experts is also a limitation. This, however, is not a major concern based on the way the Board of Certification (BOC) develops items for the BOC exam for ATs.

Definition of terms

1. Athletic Trainer: a board certified healthcare professional who specializes in emergency care, injury prevention, diagnosis, treatment, and rehabilitation.
2. Demographics: statistical data pertaining to the study participants regarding information about sex, age, years of certification, employment

status (ie. full-time, part-time, outreach, etc), size of high school, number of ATs working at the high school, number of years working at the high school, and number of sports for which the athletic trainer is responsible.

3. National Athletic Trainers' Association (NATA): the professional membership association for ATs and others who support the profession.
4. Performance Enhancing drug (PED): an umbrella term for any drug or supplement used to enhance or improve athletic performance.
5. Adverse effects: undesired harmful effect after use of a drug.
6. National Collegiate Athletic Association (NCAA): Non-profit association that regulates student athletes in college.
7. Creatine Supplement: Form of PED used to increase high intensity athletic performance.
8. Caffeine: Common stimulant
9. Testosterone: Naturally secreted hormone found in humans that when injected in excess will increase muscle and bone mass.
10. Propranolol: A synthetic compound that acts as a beta-blocker.
11. Ritalin: A stimulant used to treat ADHD
12. Human growth hormone: Hormone secreted by the pituitary gland but can be injected in the body for increase in muscle and bone mass.
13. Adderall: A stimulant used to treat ADHD
14. Erythropoietin: Hormone secreted by the kidneys that increases the rate of production of red blood cells in response to falling levels of oxygen in the tissues.

15. ADHD: Condition where someone may act without thinking, are hyperactive and have trouble focusing.
16. Amphetamines: Synthetic, addictive, mood-altering drug, used illegally as a stimulant and legally as a prescription to treat ADD.
17. Androgenic anabolic steroids (AAS): A synthetic blend of male sex hormone or testosterone.
18. Dehydration: Condition occurs when someone loses more fluids than they take in.
19. Gastrointestinal distress: Bloating, cramping, or abdominal distention.
20. Myocardial infarction: Also known as a heart attack
21. Cardiovascular disease: Conditions that involve narrowed or blocked blood vessels leading to the heart.
22. Coronary heart disease: A disease in which a waxy substance called plaque builds up inside the coronary arteries and slows the flow of blood.
23. Sudden cardiac death: Sudden, unexpected death caused by loss of heart function.
24. Cardiomyopathy: Chronic disease of the heart muscle.
25. Pulmonary embolism: Blood clot that occurs in the lungs.
26. Psychiatric disorder: Any form of mental illness.
27. Mania: Mental illness marked by periods of great excitement, euphoria, delusions, and over activity.
28. Hypomania: A mild form of mania, marked by elation and hyperactivity.

29. CAATE: Agency that enforces standards to accredited athletic training programs.

Study implications

This study will develop a knowledge test that will show what practicing ATs know about PED. It will benefit the athletes in the end. Athletic trainers will realize how much they know or do not know about PEDs and will work on staying competent on current PEDs. This will make ATs more knowledgeable about PED, which will benefit athletes when they have questions.

CHAPTER II

LITERATURE REVIEW

For generations, athletes have been trying to stay “ahead of the curve” by any means necessary. Performance enhancing drugs (PEDs) have become a major issue in athletics, where the abuser is susceptible to a variety of adverse side effects. This issue has been brought into focus in recent years and healthcare professionals should familiarize themselves with adverse effects. More specifically, it is pertinent to athletic trainers (ATs), due to their unique position. They interact with athletes on a daily basis, many times more so than a coach or parent. It is important for them to maintain a proper understanding of PEDs. Doing so will allow them to remain competent in the most up to date evidence based practices. This will lead to better prophylactic (i.e. preventative) measures and education for athletes at risk. This review of literature has been organized in the following sections: PEDs, prevalence, issues, safety and adverse effect, legal complications, and athletic training as a profession.

Performance enhancing drugs

Performance enhancing drugs are substances that are used to enhance or improve performance. Performance enhancing drugs that are commonly used by athletes and non-athletes today include Creatine, Caffeine, Testosterone, Ephedrine, Propranolol, Ritalin, Human Growth Hormone (HGH), Adderall, and Erythropoietin (Smith, 2006). Human Growth Hormone, Testosterone, Creatine,

and Ephedrine are drugs that result in the athletic performance enhancement, predominantly in muscle mass and strength (DeSantis, 2008).

A few PEDs (i.e. Ritalin and Adderall), are not only used to enhance athletic performance; they are also common among college campuses to enhance academic performance. These drugs are prescribed to people with attention deficit hyperactivity disorder (ADHD), but many students illicitly use them as a tool for studying and staying focused (DeSantis, Webb & Noar, 2008).

Prevalence

Performance enhancing drugs have been around for years and have been seen in almost every sport all the way to the professional level (Pope et al., 2014). It is estimated that 2.9-4.0 million Americans, aged 13-50 years old have used anabolic-androgenic steroids (AAS) (Pope et al., 2014). Millions of users were found to have a dependence on performance enhancing drugs (Pope et al., 2014). Physicians have reported monthly that 62% of their patients have requested to receive prescriptions for PED's (Drabiak-Syed, 2011) and that 12% of patients ask for PED's daily (Drabiak-Syed, 2011).

The use of illicit drugs and PEDs on college campuses is a serious problem (Yusko, Buckman, White & Pandina, 2008). On a college campus, using a convenience sample, 35% of students admitted to illicitly using amphetamines (Low & Gendaszek, 2002). Illicit use of drugs has increased from 5.7% in 2008 to 9.3% in 2011 (Ghaffari, 2009; Johnson, O'Malley, Bachman, & Schulenberg, 2011). There is a difference between male (17%) and female (11%) drug use (Yusko, Buckman, White & Pandina, 2008).

In the high school setting, PED use has been seen in both male and female athletes, as well as male and female students. High school anabolic steroid use varies from 4% to 11% in boys and up to 3% in girls (Hua, 2008). Table 1 shows the prevalence of lifetime, high school and past drug use in students. Note that overall male student athletes had higher use of drugs.

Table 1

Prevalence of lifetime, high school, and past-year drug use in student athletes compared with non-athletes

	Students		Athletes	
	Male	Female	Male	Female
<i>Lifetime use (%)</i>				
Methamphetamines	21.0	16.6	28.8	16.6
Ephedrine	5.1	6.7	6.1	4.5
Banned performance-enhancers	7.8	0.3	17.8	3.2
Weight loss products	19.0	25.9	12.1	12.7
Nutritional supplements	41.1	14.0	57.1	22.3
<i>High school use (%)</i>				
Methamphetamines	8.9	5.5	11.4	3.2
Ephedrine	3.9	5.1	4.8	4.5
Banned performance-enhancers	6.2	0.3	11.0	2.6
Weight loss products	10.2	17.9	9.6	8.9
Nutritional supplements	25.4	9.0	42.3	15.4
<i>Last year use (%)</i>				
Methamphetamines	16.6	12.9	22.9	14.7
Ephedrine	2.2	3.2	2.2	1.3
Banned performance-enhancers	3.9	0.3	9.7	-
Weight loss products	11.3	13.9	7.0	5.1
Nutritional supplements	29.9	10.5	45.7	15.3

Note. Adapted from Yusko et al., 2008.

Issues

The fast pace world of today is ever changing. Along with technology and advances in medicine, the science of drug development is also improving. There is a need for continuous research investigating PEDs and their effects.

New trends with unknown effects

Performance enhancing drugs such as AAS have been a way for people to increase muscle mass and performance for years. The new era of PEDs are more complex than just oral or injectable versions of AAS (Ionescu & Frohman, 2006). Synthetic peptide hormones are a new trend in PED use. The supplements cause a release of HGH from the anterior pituitary gland (Ionescu & Frohman, 2006). There is little to no research on these growth hormone releasers. The adverse effects to the consumption of these growth hormone releasers are unknown.

The way these drugs are distributed should raise a brow to its use. Customs officers in Denmark found a package shipped from China that was suspected of illegal drugs. FedEx, a common shipping company, shipped the package (Ionescu & Frohman, 2006). Inside the box was ten clear glass vials, with no labeling other than different color lids. After further examination, the substance found was growth hormone releaser. Similar packages have been reportedly found in Europe and Australia (Ionescu & Frohman, 2006). These packages show a trend that the use of new PEDs has started to evolve.

Safety and adverse effects

The prolonged use of PEDs can cause many long term and adverse effects (DeSantis, 2008). The side effects for Ritalin and Adderall can range from insomnia to high blood pressure to seizures (DeSantis, 2008). With the use of HGH, Testosterone, Creatine, and Ephedrine the adverse effects can range from dehydration, muscle cramps, and gastrointestinal distress to myocardial infarction, cardiovascular diseases, cardiomyopathy, and death (Calfee & Fadale, 2006).

Anabolic androgenic steroids are a synthetic blend of male sex hormone or testosterone. With the prolonged use of AAS, major health complications have been reported. Lethal physical complications have occurred, including coronary heart disease, sudden cardiac death, cardiomyopathy, pulmonary embolism or stroke (Thiblin & Petersson, 2004). The use of this drug has also been known to cause psychiatric disorders. It has been reported that 23% of athletes using AAS have been diagnosed with having psychiatric disorders; such as mania, hypomania, and depression (Pope & Katz, 1994). During a treatment period of drug addiction, involving a cohort of 248 steroid users, 12 died of cardiac issues before completing the program (Petersson, Garle, Granath, & Thiblin, 2006).

Media's effect on use of performance enhancers and professional idols

The media today rarely reports on good news. In the realm of sports, a news team will expose any professional athlete or team if it will increase viewers. Young athletes watch these professional athletes and see them at the top of their game. Young people are often easy to persuade and may be peer pressured into

certain activities (Beatty, A., 2006). Today there are many other factors that could be influencing the use of PED's including the media, sports idols, and economic factors.

Olympic cycling changed the way blood doping and testing was done. The US 1984 Olympic cycling team won its first medal since 1912 (Gleaves, 2015). Seven of the members were found to have blood transfusions, also known as doping. At that time, the international Olympic committee did not prohibit doping, however, after that instance it cause a revision to the rules on doping (Gleaves, 2015). This case was exposed on the media and everyone in the world knew what happened.

Over the years, numerous cases of athletes have been in the media for using banned substances. In 1988 track star, Ben Johnson, was stripped of his gold medal after a positive drug test (Historical Timeline, 2013). In 1991, major league baseball banned AAS (Historical Timeline, 2013). An NFL player died of brain cancer after using AAS and HGH for 20 years (Historical Timeline, 2013). The US Anti-Doping agency (USADA) begun their operations in 2000, to educate, research, and lead testing in the US (Historical Timeline, 2013). World wrestling entertainment (WWE) wrestler commits murder then suicide after injecting AAS (Historical Timeline, 2013). Six national football league (NFL) players were suspended for taking a steroid-masking agent in 2008 (Historical Timeline, 2013). In 2009, National basketball association (NBA) player Rashard Lewis received a 10-game suspension after testing positive for banned substances (Historical Timeline, 2013). Floyd Landis, cyclist, admits to doping for

most of his career in 2010 (Historical Timeline, 2013). In 2012, Tour de France winners, Alberto Contador and Lance Armstrong were stripped of their titles (Historical Timeline, 2013).

Another factor that plays into younger athletic abuse of PEDs is economic stability. Athletes are doing whatever they can to gain an edge on their competitors (Calfee & Fadale, 2006). Even now, when the repercussions of abuse are at the forefront in the media, athletes are still taking the risk and pursuing money and fame.

Legal & organizational complications

The National Collegiate Athletic Association (NCAA) has labeled eight drug classes as banned for use by athletes; there are many drugs listed within the individual classes. The NFL has a similar list of illegal drugs, banned from use during play. Olympic athletes have similar regulations when it comes to PEDs. Legal ramifications can occur with the use or possession of illegal substances.

In the NFL, there have been many cases related to drugs. In 2016, the Cleveland Browns made a defensive lineman inactive for two games on felony drug possession charges (McManamon, 2016). The drugs were Oxycodone and Adderall (McManamon, 2016). In 2002, Olympic officials revoked gold metals from two cross-country skiers for using a doping drug that avoid anemia by producing red blood cells (Associated Press, 2002). In 2015, the Florida Gators suspended their quarterback for one year after testing positive for PEDs (Aschoff, 2015). When Lance Armstrong, a noted cyclist, admitted to using PEDs he was

stripped of seven Tour de France titles and a bronze medal in the Olympics (Botelho & Levs, 2013).

Alternative motives of use

College students outside of just athletes have abused PEDs. Many high-school and college-aged students take PEDs for nonmedical reasons, such as cosmetic appearances (Hua, 2008). Steroids can build muscle for males or females seeking muscular appearance (Smith, 2006). Amphetamines can suppress appetite for females or males who want to look thinner (Gallucci, Usdan, Martin, Bolland, 2014). The number of people taking someone else's medication, for reasons other than the drugs purpose, has been on the raise since 2008 (Gallucci et al., 2014). College users are taking stimulants like Adderall and are using them to receive a cheap and easy high (DeSantis et al., 2008). Adderall capsules are usually time released, so the illicit users are crushing it and snorting it like cocaine to receive a quicker rush of the drug (DeSantis et al., 2008).

Athletic training as a profession

The NATA defines ATs as an American Medical Association recognized healthcare profession that collaborates with physicians to optimize activity and participation of patients and clients. The profession encompasses the prevention, diagnosis, and the interventions of emergency, acute and chronic medical conditions involving impairment, functional limitations and disabilities (BOC, 2013).

Athletic training has an agency that holds the responsibility for accrediting both bachelors and masters' level athletic training programs. This agency is the Commission on Accreditation of Athletic Training Education (CAATE). The mission of the CAATE is to provide comprehensive accreditation services to institutions that offer athletic training degree programs and verify that all the CAATE accredited programs meet acceptable educational standards for professional (entry-level) athletic training education. This agency enforces those standards to ensure the same information is being taught to the athletic training students across the country (BOC, 2013). This is an important characteristic of the athletic training programs because all of the athletic training students take the same national certification exam, no matter where they graduated.

All ATs should have the same basic knowledge base when in their first few years of practice. Once they become experienced and are in the field for a longer amount of time, certain ATs will develop better knowledge on different aspects of the field.

Continuing education units

In order to stay certified and current with changing practices ATs must complete continuing education units (CEUs). Every two years ATs must obtain and document a minimum of 50 CEUs. Ten of the 50 CEUs must be evidence-based medicine. There is a wide range of topics and ways to obtain CEUs. CEUs are obtained by attending conferences and workshops. All workshops online or at a conference must be BOC approved in order to count towards an ATs required CEUs.

Based on the position statements released by the NATA, ATs are required to be competent with educating athletes on nutrition and PEDs (Burns et al., 2004). They are expected to be able to educate, counsel, and make referrals about these supplements and drugs when appropriate (NATA, 2004). Since PEDs are ever changing and developing they are among the many different areas of study that ATs can acquire their CEUs.

State requirements

Each state requires ATs to have a state licensure on top of their BOC certification. Each state has a little bit different method of obtaining this license but it is mainly to protect the public from someone practicing who is not actually licensed. It is illegal to practice as an AT without a state license.

Need statement

There is no test to determine ATs current knowledge of PEDs. It is important that ATs stay current in the world of PEDs as it is ever changing.

Psychometrics

This section describes how psychometrically sound test are created. Item analysis is used determine if an item is useful in the test. For this to occur a pilot test is conducted before the real test to determine the effectiveness of each part of test. Item difficulty determines how hard or how easy an item is (Ginther & Shohamy, 2002, 2001). The equation used to calculate this statistic is by dividing the number of correct answers by the total number of people who took the test (Ginther & Shohamy, 2002, 2001). A test creator does not want an item to be too easy or too hard. Item discrimination lets the creator know if an item

has been created well (Ginther & Shohamy, 2002, 2001). If the performance of high scorers is better than low scorers for a particular item, it is said to have good discrimination. If the reverse is true or if both groups get the item equally correct, then the item has poor discrimination. Item determination means an item needs to fall into acceptable ranges for both item difficulty as well as item discrimination (Ginther & Shohamy, 2002, 2001).

A well-developed test for a study includes an intensive review and steps by the creator and a panel of judges or content experts, whichever are preferred. A blueprint should be created and components could be selected based on the judge's opinion. One way to determine questions per sections is to have the judges weight each section. The developed items could then be given to the judges for verification to ensure the items belong in each component.

Specific aims

There are two specific aims for this study. One is to establish a psychometrically sound knowledge test on PED. The other is to assess ATs knowledge of PEDs using that test. Scoring the test assesses the knowledge. The percentage correct will determine the score.

CHAPTER III

METHODS

The purpose of this study was to determine the current knowledge of current certified athletic trainers (ATs) on performance enhancing drugs (PEDs). The following sections in this chapter will discuss the design of the study, instruments used, procedures, and data analysis.

Design & setting

This study was an iterative test construction design.

Participants

Approximately 180 licensed ATs who are working clinically, were asked to volunteer for this study. It is assumed a licensed AT is also certified. Based on industry standards only 60 participants were needed to volunteer for the study. The reason that 180 ATs were ask to participant was to ensure that at least 60 data entries were completed.

Instruments

The instrument used for this study was named the knowledge test-performance enhancing drugs (KT-PED) (see appendix). The KT-PED will determine current knowledge of ATs. The test covers basic knowledge of PEDs including administration, effects, and adverse reactions of certain drugs. The KT-PED will also test ATs ability to recognize different drug classes, whether or not specific drugs are banned, and the effects drugs have on performance. The test includes a demographic section, a true and false section, recognition of drug

class section, and a multiple-choice section of the test. A group of judges in the field of sports medicine was used to validate the content of this instrument.

Procedures

Prior to developing questions, five judges that are ATs were recruited to determine content. The panel of judges included two ATs, each with more than 12 years of experience, one of which is a professor of sports medicine at a university. The other two judges have at least six years of experience in the field. Another judge, was a university professor of athletic training courses and researcher of PEDs. Judges were selected, as opposed to content experts, based on the new standards the BOC uses for creating items for the certification exam.

Blueprint

In the early stages of development there were initial sections created and emailed to the judges. They were asked to evaluate the sections and determine if they were appropriate for the aims of this study. They were encouraged to add sections, delete sections, and provide comments, as necessary. After all the sections were determined, we send the judges a new email asking them to rank the different sections in order of importance with a weight. The weight would be a percentage out of 100. The weight was used to determine how many items would be used per section. One section was dropped from the list based on how difficult it would be in gathering data. The percentage of the final sections can be seen in table 2.

Table 2

Percent of importance per section

Section	Average %
Ability to recognize different drug classes	18.0
Whether a drug is banned	23.2
Effect of drug on performance	61.0

Item development

The test consisted of 72 items, with the expectation that approximately 60% of the items would be usable. This was done to ensure at the end, a 43-item test would be constructed. The industry standard is that 60% of a 60-item test will be left with 36 items. So in the end our test will be based on at least 36 sound items. Each section will have its corresponding percent determining the number of items per section. Next the judges were asked to review each item, to ensure it belongs in that section. An example of this would be; does the follow question belong in the common knowledge section? "When an athlete is simultaneously using multiple types of steroids in high doses, the athlete is said to be:" The judges would circle yes or no and then indicate what section the question should be put into. No items were switched into the appropriate sections, while some irrelevant items were removed.

Test construct

The test was reviewed by four ATs different from the judges to test readability. They were reminded the items should be at an 8th grade reading level. The AT's were instructed to not answer any items but to highlight any questions that are awkward or difficult to understand. Those items were then modified or removed.

Recruitment

Participants were recruited from the personal emails and social media. The ATs were asked to forward the link to other ATs to gain more data. Approval for the current study was obtained from the universities IRB prior to the recruitment of participants.

Test administration

The test was given online through the website survey monkey. The entire test was strictly online. An informed consent form was electronically signed before the beginning of the test. The KT-PED was completed by ATs through survey monkey. The online website allows surveys to be distributed and returned electronically. ATs who volunteered to participate were given the items one at a time and asked to answer them. Once all the items were answered, the KT-PED was submitted.

Data cleaning

In order for the test to be considered 100% of it must have been completed. Any data that has been determined as missing was omitted.

Data analysis

Based on scores from the survey the knowledge of ATs on PEDs total scores were determined. Descriptive statistics were calculated using SPSS. Iteman version 3.6 was used to analyze the items, which provides information on the effectiveness of each item.

Item difficulty

Item difficulty (P) lets the creator know if an item is too easy or too hard and the range of acceptance is $P = .32 > .92$ (Ginther & Shohamy, 2002, 2001).

Item discrimination

Item discrimination was determined using point bi-serial correlation, where $r_{pbis} \geq .1$ was desired (Ginther & Shohamy, 2002, 2001). If the performance of high scorers is better than low scorers for a particular item, it is said to have good discrimination. If the reverse is true or if both groups get the item equally correct, then the item has poor discrimination.

Item determination

The decision to keep, revise, or drop an item is known as item determination. This decision is based upon the item discrimination and item difficulty of each item.

CHAPTER IV

RESULTS

The knowledge test-performance enhancing drugs (KT-PED) was developed to create an instrument that is psychometrically sound and used to assess athletic trainers (ATs) knowledge of performance enhancing drugs (PEDs). The instrument was based on three content areas: knowledge, recognition, and determining whether a drug is banned. It was sent to approximately 180 practicing ATs. This chapter discusses demographics of participants and the results of the KT-PED. The results will be presented in a table and descriptive statistics were calculated.

Demographics of the participants

The demographic characteristics that were collected from the participants included sex, years of experience, and education. Of the approximately 180 emails sent to ATs, 79 started the KT-PED and 61 completed it. There was a 33.9% response rate. Figure 1 shows the sex of participants, while figure 2 shows the distribution of experience among participants. The majority of participants held a master's degree 49 (80%) while there were only ten (16%) with bachelor's degrees, and two (4%) with doctoral degrees.

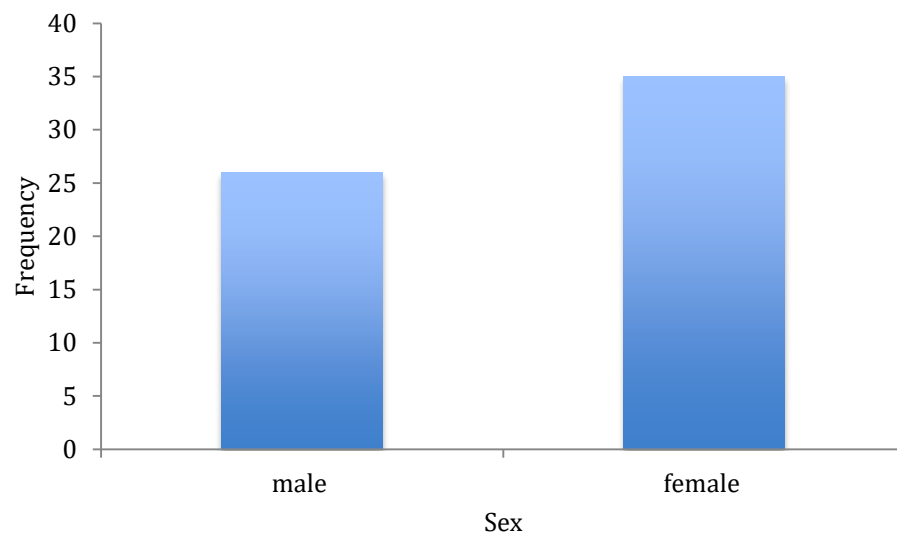


Figure 1. *Sex of participants*

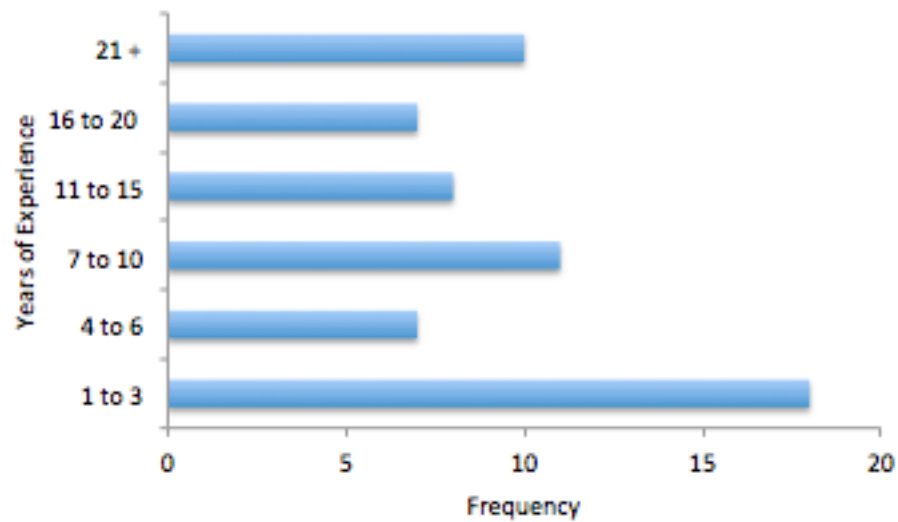


Figure 2. *Distribution of years of experience*

Overall performance

Overall, performance of ATs on the KT-PED was low. The distribution of scores, which follows a normal bell shape curve, is provided in figure 3. The number of correct responses ranged from 32 to 53 out of 72 possible questions, which corresponds to 44.4% and 73.7%, respectively.



Figure 3. *Distribution of scores*

Items

Item determination (keep, revise, or drop) for each item (see Table 3) was based upon item difficulty (P) and point-biserial correlations (Pr). After removing or modifying poor items, 37 items remained in the test. Note that the final test has been renumbered. (See appendix E) The knowledge section had 16 items removed from the 41 items, leaving 25. The recognition of drug class section began with 13 items and 5 were removed, retaining 8 items. In the banned and effect a drug has on performance section there were 18 items with 14 removed and one revised, leaving 4 items.

Table 3

Item P, Pr, & determination

Item	P	Pr	Determination	Item	P	Pr	Determination
1*	0.05	0.05	Drop	37*	0.92	0.15	Keep
2*	0.56	0.12	Keep	38*	0.92	0.15	Keep
3*	0.92	0.26	Keep	39*	0.15	0.27	Drop
4***	0.61	0.08	Revise	40*	0.15	0.09	Drop
5*	0.98	0.22	Drop	41***	0.08	0.17	Drop
6***	0.95	0.25	Drop	42***	0.13	0.06	Drop
7*	0.62	0.19	Keep	43***	0.54	0.02	Drop
8*	0.87	0.08	Drop	44***	0.48	0.01	Drop
9*	0.62	0.15	Keep	45*	0.90	0.18	Keep
10*	0.56	0.22	Keep	46*	0.25	0.18	Drop
11*	0.67	0.13	Keep	47*	0.59	0.01	Drop
12***	0.75	0.03	Drop	48*	0.38	0.07	Drop
13*	0.98	0.10	Drop	49*	0.43	0.24	Keep
14***	0.64	-0.07	Drop	50*	0.85	0.12	Keep
15*	0.80	0.50	Keep	51*	0.95	-0.02	Drop
16*	0.85	0.16	Keep	52*	0.48	0.03	Drop
17*	0.77	0.15	Keep	53*	0.18	0.15	Drop
18*	0.84	0.21	Keep	54*	0.03	0.26	Drop
19***	0.87	0.32	Keep	55*	0.84	0.43	Keep
20***	0.20	0.03	Drop	56*	0.39	0.12	Keep
21***	0.95	-0.03	Drop	57*	0.18	0.03	Drop
22*	0.80	0.24	Keep	58*	0.43	0.14	Keep
23*	0.90	0.12	Keep	59*	0.33	0.10	Keep
24***	0.82	0.10	Keep	60*	0.38	0.20	Keep
25***	1.00	0.00	Drop	61**	0.48	0.41	Keep
26***	0.98	0.16	Drop	62**	0.33	0.20	Keep
27***	1.00	0.00	Drop	63**	0.80	0.40	Keep
28***	0.85	0.13	Keep	64**	0.51	0.43	Keep
29***	0.97	0.13	Drop	65**	0.51	0.44	Keep
30*	0.97	0.33	Drop	66**	0.28	0.18	Drop
31*	0.84	0.21	Keep	67**	0.61	0.40	Keep
32*	0.54	0.12	Keep	68**	0.34	0.31	Keep
33*	0.97	0.11	Drop	69**	0.28	0.19	Drop
34*	0.64	0.08	Drop	70**	0.36	0.33	Keep
35*	0.34	0.22	Keep	71**	0.15	0.16	Drop
36*	0.82	-0.01	Drop	72**	0.18	0.17	Drop

Note: * = Knowledge section, ** = Recognition of drug class section,

*** = Banned/ effect drug has on performance section

CHAPTER V

DISCUSSION

The purpose of this study was to develop a psychometrically sound test for assessing knowledge of performance enhancing drugs (PEDs). The KT-PED was developed using an extensive literature review and judges to evaluate the quality of the items. Also the psychometric properties of the items were analyzed to ensure the quality of the items in the test. The KT-PED, which was developed for this study, was used to assess practicing ATs current knowledge of PEDs. This research is important for the safety of all athletes. It has been estimated that 2.9-4.0 million Americans have used some sort of anabolic-androgenic steroid (AAS) (Pop et al., 2014). Steroids are not the only drugs used by athletes to try and gain a competitive edge. Athletes perceive ATs as primary resource for athletes when it comes to injuries, knowledge on nutrition, and supplements for performance (Burns et al., 2004). In order for ATs to benefit their athletes they must be knowledgeable on this topic. This chapter discusses the major findings in the study. The limitations and future research will also be discussed.

Athletic trainers' knowledge of performance enhancing drugs

The results of this study suggest that ATs do not possess adequate knowledge of PEDs. Because of the daily interactions between ATs and their athletes this is a major concern.

Prevalence of PED communication in athletic training setting

Subjects reported that approximately 63% (39/61) of ATs discussed PEDs with their athletes. This is problematic because ATs may be discussing PEDs

with athletes without sufficient knowledge on the topic. One AT reported that this type of discussion has happened “every year for 37 years”. Others reported similar circumstances and would discuss effects and benefits of using PEDs with their athletes. Of the 61 ATs that volunteered for the study 18 reported they suspected an athlete of using PEDs. Most ATs reported their athletes as “bulking up” in a short period of time.

Poor performance

All sections of the test had poor performance, however, one section in particular had exceptionally low scores. The section with the lowest scores was knowledge related to the effects of PEDs on performance and drug classification. The low score on this section could be for a few different reasons, one being poorly created items the other being a lack of knowledge. There were 14/18 items dropped from this section. There were seven items that were too easy so they were dropped. The easy and poorly related items will be discussed later in this chapter. The other seven items the ATs just did not get the item correct. This shows that there is a lack of knowledge in this area of PEDs.

The lack of knowledge could also be from the way the ATs educational program is set up. Most athletic training programs curriculums require only a single course in pharmacology. It may not be possible to cover all material during this single course, which means that ATs may not be receiving adequate training in this area. Including additional pharmacology courses, or extending the time of the class may be beneficial for improving ATs knowledge of PEDs. Other way this could be broken up is into different sections of pharmacology. The additional

course could be designed specifically to education future ATs on PEDs. The professor that are teaching the material could only have basic knowledge of PEDs. This would let to the ATs with having only basic knowledge of PEDs. Most institutions require minimal knowledge to teach these courses to ATs. This area is specialty topic and should require an expert or someone with more than basic knowledge to teach it.

Based on the low scores from the KT-PED how are ATs supposed to effectively provide information to athletes without the proper knowledge? The standards for this knowledge base are in the curriculum for ATs. But somewhere there is a disconnect from learning the material at the undergraduate or graduate level program to applying it in the field. What could be done to fix this issue?

Continuing education units

Continuing education units (CEUs) are one-way ATs stay up to date on the latest evidence based practices. CEUs on PEDs are in limited access and that makes it a challenge. If there is not a CEU workshop at a conference for ATs to attend, then ATs will have to go online and pay extra money for their CEUs. When ATs have to pay for their own CEUs they will partake in material that is of most interest them. ATs may not take a course involving PEDs simply from lack of interest in the topic. ATs need to know PEDs to better benefit their athletes. Requiring more material or teaching strategies at the entry-level programs could be another way to increase this knowledge.

Poorly created Items

Easy items

There were 72 items created at the beginning of this study. Not all items performed well and some were dropped for the final test. Many of the items dropped were based on item difficulty. Items were dropped if they were too easy or too difficult. For example, item 15 read: “Albuterol, a common inhalant, is used as a bronchodilator. A. True b. False.” This item was easy probably because asthma is very common and most people know what an albuterol inhalator does. Removing the words “a common inhalant” could make this item more challenging. Item 16 involved Adderall and again this is a very common drug used to help people stay focus and this is most likely why it was an easy item. These items could be revised to be more challenging by changing the format. True and false type questions are usually the easiest form of questions. There is a high chance that test takers could guess the correct answer (Chandratilake, Davis, & Ponnampereuma 2011). True or false questions are weak in discriminating between high and low performers (Chandratilake, Davis, & Ponnampereuma 2011). Changing these items into a multiple choice type question could make these questions more difficult (Chandratilake, Davis, & Ponnampereuma 2011). There are other items that fall under the similar circumstances where the items seem to be common knowledge and were really easy for the ATs. Those items included 23, 35, 36, 37, 38, 40, and 43.

Acceptable difficulty & poor discrimination

Some of the items were dropped based on an item's discrimination. This means are the top performers getting the item correct and are the low performers getting the item incorrect. An item is not discriminating well if the low performers are getting the item correct more than the top performers. For example, item 18 read "Ritalin has some of the same effects on the body as does amphetamines a) true b) false." Item difficulty for this item fell into accepted range but did not discriminate very well. This item is straight forward with no tricky or miss leading words. There could be two possible reasons for this to happen. One the ATs simply did not know this material well enough to get these items correct. Secondly, the item could not have discriminated well because true/false questions are known to have poor discrimination (Chandratilake, Davis, & Ponnampereuma 2011). The ATs probably guessed on these items which is why the low performers outscored the top performers. For this item ATs would have to know that Ritalin is a type of amphetamine so some the effect would be the same on the body. Other items that fell into the accepted item difficulty range but did not discriminate well and were dropped included items 22,44,46,53,54,58,61, and 62.

Difficult items & poor discrimination

Other items that were dropped included items after analysis were found to be too hard and did not discriminate very well. Item 50 read: "Which caffeine theory is the original argument for how it works to provide an ergogenic benefit to athletes? A) Muscular b) Neurologic c) Metabolic d) Stimulatory." Caffeine is a

common drug but knowing what benefits it has for athletes is not common knowledge. This question seemed to be too hard and did not discriminate well for the ATs. Whether this item was too hard for ATs or was not developed well it was one that most ATs did not get correct. Other items that were similar to this one included; 11, 30, 49,50,51,52,46,63,64,67,76,79,81, and 81.

Changing the wording of some items and having some volunteers review the items could maybe help fix some items but many are not tricky or worded poorly there is just a lack of knowledge among ATs. There is little to no research to help support why there is a lack of knowledge in PEDs. This is why this study is important to show there is a deficiency in ATs knowledge. The KT-PED has shown that there is a lack of knowledge.

Revised item

The one item that was revised was questions 4 from the banned/effect drugs have on performance section; it read, "Amphetamines were once perceived as ideal ergogenic drugs for training and competition. "Ergogenic" refers to muscle producing. A) True or B) False." We thought this was a tricky item because ergogenic means to enhance physical performance not necessarily producing muscle. So we decided to remove the "muscle producing" and replacing it with "enhancing physical performance" hopefully making it less tricky. The question will now read; "Amphetamines were once perceived as ideal ergogenic drugs for training and competition. "Ergogenic" refers to enhancing physical performance. A) True or B) False." This answer would be "true".

Limitations

The limitations for this study include mostly sampling. The small sample size in this study and the fact that it was a convenience sample is a limitation. Based on this type of sampling it may not be reliable to generalize about the normal population.

Future research

This study was a preliminary step in what could be part of a larger more in depth study. The pilot test that was conducted started with 72 items and ended with 38. In the end our study was left with a psychometrically sound test that could be tested with a larger randomized sample size. Any future testing would need to investigate the reliability and validity of the test. This would best be done by a larger sample size.

Judges were used instead of content experts in this study. The use of content experts would add more validity to the test. The experts would need to be persons that teach a pharmacology course, researchers in the field, or perhaps others.

Conclusion

The results of this study show that ATs have a low knowledge of PEDs based on the instrument developed. The KT-PED was comprised of 72 items that was pilot tested to ATs who were currently practicing in the field. There was 79 ATs that submitted a test but only 61 was complete and used for data. No one

made lower than 44.44% and the highest score was 73.7%. Each item of the test was analyzed for quality. After the analysis the KT-PED was left with 38 sound items. This initial step of creating a test that will examine ATs knowledge of PEDs could be part of another study to test more ATs. Hopefully this study will benefit athletes by ensuring ATs are up to date on their knowledge of PEDs.

REFERENCES

- Aschoff, E. (2015). Florida's Will Grier suspended for one year after positive PED test. <http://espn.go.com/college-football/story//id/13871336/will-grier-florida-gators-quarterback-suspended-season>
- Associated Press. (2002) Muehlegg, Lazutina test positive, stripped of golds. ESPN. <http://espn.go.com/oly/winter02/gen/news?id=1340028>
- Beatty, A., Program committee for a workshop on improving research on interactive media and children's, H., & national research, C. (2006). Studying media effects on children and youth: Improving methods and measures: Workshop Summary. Washington, D.C.: National Academies Press.
- Board of Certification. (2013). For the Athletic Trainer. "CAATE" Retrieved from <http://www.bocatc.org/boc-partners/caate>.
- Botelho, G. Levs, J. (2013). 'Deeply flawed' Lance Armstrong admits using performance enhancing drugs. <http://www.cnn.com/2013/01/17/sport/armstrong-doping/index.html>
- Burns R., Schiller M., Merrick M., & Wolf K. (2004). Intercollegiate student athlete use of nutritional supplements and the role of athletic trainers and dietitians in nutrition counseling. J Am Diet Assoc. 104(2):246–249.

- Calfee, R., & Fadale, P. (2006). Popular ergogenic drugs and supplements in young athletes. *Pediatrics*, 3, 915.
- Chandratilake, M., Davis, M., & Ponnampereuma, G. (2011). Assessment of medical knowledge: the pros and cons of using true/false multiple choice questions. *The National Medical Journal Of India*, 24(4), 225-228.
- DeSantis, A., Webb, E., & Noar, S. (2008). Illicit use of prescription ADHD medications on a college campus: a multimethodological approach. *Journal Of American College Health*, 57(3), 1-23.
- Drabiak-Syed, K. (2011). Physicians prescribing 'medicine' for enhancement: why we should not and cannot overlook safety concerns. *American Journal Of Bioethics*, 11(1), 17-19.
- Gallucci, A. R., Usdan, S. L., Martin, R. J., & Bolland, K. A. (2014). Pill popping problems: The non-medical use of stimulant medications in an undergraduate sample. *Drugs: Education, Prevention & Policy*, 21(3), 181-188.
- Ghaffari, M. (2009). The abuse potential of medications for attention deficit/hyperactivity disorder: Recent advances in our understanding. *Current Attention Disorders Reports*, 1, 29–34.
- Ginther, A (2002). Shohamy E. (2001). The power of tests. A Critical Perspective on the Uses of Language Tests. *Studies In Second Language Acquisition*, 24, 644-646.

Gleaves, J. (2015). Manufactured dope: How the 1984 US olympic cycling team rewrote the rules on drugs in sports. *International Journal Of The History Of Sport*, 32(1), 89-107.

Historical Timeline; History of Performance Enhancing Drugs in Sports. (2013). ProCon.org.
<http://sportsanddrugs.procon.org/view.timeline.php?timelineID=000017>

Hua, L. (2008). School sports and adolescent steroid use: national trends and race-ethnic variations. *Challenge*, 14(2), 29-49.

Ionescu M. & Frohman L. (2006). Pulsatile secretion of growth hormone (GH) persists during continuous stimulation by CJC-1295, a long-acting GH-releasing hormone analog. *The Journal Of Clinical Endocrinology And Metabolism*, 91(12), 4792-4797.

Johnston, L.D., O'Malley, P.M., Bachman, J.G., & Schulenberg, J.E. (2011). *Monitoring the future national survey results on drug use, 1975–2010. Volume II, college students & adults ages 19–50*. Michigan: Institute for Social Research, University of Michigan.

Low, K. G., & Gendaszek, A. E. (2002). Illicit use of psychostimulants among college students: a preliminary study. *Psychology, Health & Medicine*, 7(3), 283.

McManamon, P. (2016). Browns' Armonty Bryant indicted on drug charges.

ESPN. <http://espn.go.com/nfl/story//id/14754426/cleveland-browns-armonty-bryant-former-player-deante-saunders-indicted>

Petersson, A., Garle, M., Granath, F., & Thiblin, I. (2006). Morbidity and mortality in patients testing positively for the presence of anabolic androgenic steroids in connection with receiving medical care. A controlled retrospective cohort study. *Drug And Alcohol Dependence*, 81, 215-220.

Pope, H., Kanayama, G., Athey, A., Ryan, E., Hudson, J., & Baggish, A. (2014). The lifetime prevalence of anabolic-androgenic steroid use and dependence in Americans: Current best estimates. *The American Journal On Addictions*, 4, 371.

Pope, H., Katz, D., (1994). Psychiatric and medical effects of anabolic-androgenic steroid use. A controlled study of 160 athletes. *JAMA, The Journal Of The American Medical Association*, 8.

Smith, R. L. (2006). Pharmacology application in athletic training. *Physical Therapy*, 86(3), 460-461.

The National Athletic Trainers' Association Board of Certification. (2004). *Role of delineation Study: For the entry- level certified athletic trainer. 5th ed.* Omaha, NE: Board of Certification, 3-24.

Thiblin, I., Petersson, A. (2004). Pharmacoepidemiology of anabolic androgenic steroids: a review. *Fundamental & Clinical Pharmacology*, 19, 27–44.

Yusko, D. A., Buckman, J. F., White, H. R., & Pandina, R. J. (2008). Alcohol, tobacco, illicit drugs, and performance enhancers, a comparison of use by college student athletes and nonathletes. *Journal Of American College Health*, 57(3), 281-290

APPENDICES

APPENDIX A: KT-PED

The following questions deal with demographics; please answer the questions as they apply to you.

1. Please indicate your sex...

- a. male
- b. female

2. Are you a Certified Athletic Trainer?

- a. yes
- b. no

3. How many years of athletic training experience do you have?

4. Please check the athletic team(s) you are currently working with as an athletic trainer, the current level you're at and the position that fits you best. (Check all that apply)

Basketball
Cross country
Golf
Lacrosse
Softball
Soccer
Swimming/Diving
Tennis
Track
Volleyball
Cheerleading
Gymnastics
Ultimate Frisbee
Equestrian

High School
College
Professional
Olympic
Recreation
AAU
Educator
Administrator
Other ()

5. What is the highest level of education completed?

- a. high school
- b. associates degree
- c. bachelors degree
- d. masters degree
- e. doctoral degree

6. Has there been a time where you talked with an athlete about a PED (Performance Enhancing Drug)?

- a. yes
- b. no

If so, how many times has this occurred?

1-5 6-10 11-15 16+

If yes, explain.

7. Has there been a time when you referred an athlete because of an addiction to a PED?

- a. yes
- b. no

If so how many times has this occurred?

1-5 6-10 11-15 16+

If yes, explain.

8. Has there been a time when an athlete came to you about PED issue?

- a. yes
- b. no

If so, how many times has this occurred?

1-5 6-10 11-15 16+

If yes, how did you handle it? Explain.

9. Has there been a time when you suspected that an athlete had used PEDs, but they did not come to you personally about it?

- a. yes
- b. no

If so, how many times has this occurred?

1-5 6-10 11-15 16+

If yes, how did you handle it? Explain

10. At your current job is there someone else that could help you with an athlete that has a PED addiction. Mark all that apply

- ☐ Nurse
- ☐ Counselor
- ☐ Team physician
- ☐ School resource officer
- ☐ Administrator

This section deals with common PED questions. Please identify if they are true or false.

11. Pharmacokinetics refers to how a drug affects the body, the site in which drugs act and the mechanism in which the action occurs.

- a. True
- b. False

12. When it comes to absorption, the three major classes of administration are enteral, respiratory, and topical.

- a. True
- b. False

13. Oral administration is the fastest way for the body to absorb a drug.

- a. True
- b. False

14. Amphetamines were once perceived as ideal ergogenic drugs for training and competition. "Ergogenic" refers to muscle producing.

- a. True
- b. False

15. Albuterol, a common inhalant, is used as a bronchodilator.

- a. True
- b. False

16. Adderall is not used as a drug to stay focused.

- a. True
- b. False

17. Tetrahydrogestrinone (THG) has a street name known as "The Clear".

- a. True

- b. False
18. Ritalin has some of the same effects on the body as does amphetamines.
- a. True
 - b. False
19. Human Growth Hormone (HGH) is available by prescription only.
- a. True
 - b. False
20. Ritalin gives the same effects to the body as Vyvanse.
- a. True
 - b. False
21. Androstenedione (Andro) blocks the body's production of testosterone.
- a. True
 - b. False
22. Ma Huang is banned in the US.
- a. True
 - b. False
23. Dietary supplements can be used as performance enhancers.
- a. True
 - b. False
24. Creatine is a synthetic substance used to gain muscle mass.
- a. True
 - b. False
25. Epoetin is commonly used by endurance athletes.
- a. True
 - b. False
26. Only males produce testosterone.
- a. True
 - b. False
27. Ephedra and pseudoephedrine can be found in "natural," over the counter, and prescription medications.
- a. True
 - b. False
28. The production and marketing of herbal supplements are regulated by the food and drug agency in the United States.

- a. True
 - b. False
29. Ephedra will NOT enhance the performance of a sprint athlete.
- a. True
 - b. False
30. Wrestlers who are trying to lose weight will lose more weight using Ma Huang.
- a. True
 - b. False
31. Caffeine has multiple effects on the physiology of the body.
- a. True
 - b. False
32. All drugs have an immediate effect on the user.
- a. True
 - b. False
33. An athlete can test positive for drugs when taking only nutritional supplements.
- a. True
 - b. False
34. An AT should be able to identify athletes using PEDs
- a. True
 - b. False

Please read the following multiple choice questions and choose the most appropriate answer.

35. An athlete has been identified as using harmful PEDs. The AT should....
- a. Do nothing
 - b. Wait until the athlete gets injured
 - c. Call 911
 - d. Discuss the use of the PED with the athlete
36. A college athlete has been using anabolic steroids and has lately had mood swings. Should the AT have a conversation with the athlete?
- a. Yes it's the AT's job
 - b. No the athlete can do whatever they want

- c. No an AT isn't a doctor
 - d. No anabolic steroids are legal and anyone can take them
37. Regarding the uses and effects of PEDs,
- a. An AT doesn't have to help their athletes
 - b. An AT doesn't have the knowledge to help athletes
 - c. AT's should be able to effectively offer valid information
 - d. AT's should be able to tell an athlete where to get illicit PEDs
38. An athlete asked an AT about the effects of legal PEDs. The AT should be able to:
- a. Provide relevant information
 - b. Nothing AT's aren't doctors
 - c. Tell the athlete to search the internet
 - d. Refer to a physician
39. An ergogenic substance is something that has:
- a. A genetic beginning
 - b. Eggs in the supplement
 - c. The ability to increase exercise output
 - d. To be injected into the body
40. Steroid use has been traced to which of the following athletic populations?
- a. High school
 - b. College
 - c. Professional
 - d. All of the above
41. The term endogenous means
- a. Originating within the organism
 - b. Contains eggs in the supplement
 - c. Will increase work output
 - d. Has a genetic ending
42. Irreversible adverse effects of steroids in females include:
- a. Increase foot size
 - b. Increase acne
 - c. Masculinizing effects
 - d. Sterility
43. When an athlete is simultaneously using multiple types of steroids in high dose, the athlete is said to be:
- a. Injecting
 - b. Stacking
 - c. Maximizing producing

44. By using high dose of androgenic anabolic steroid (AAS), an athlete will definitely experience:
- Adverse side effects
 - Faster running speeds
 - More wins in their sports
 - Stronger muscles
45. Which of the following AAS are least affected by first pass metabolism?
- Androgenic
 - Oral
 - Anabolic
 - Injected
46. HGH is now mainly available from what source?
- Human cadavers
 - Monkeys
 - Synthetic production
 - Pig pituitary glands
47. DHEA is a precursor to:
- androstenedione
 - HGH
 - HMB
 - Creatine
48. Creatine is reported to result in an increase in weight mainly because of an increase in:
- Calories consumed
 - Strength
 - Bone size
 - Water retention
49. The physiological argument for creatine use is that it provides an increase in
- Strength
 - Energy production
 - Anaerobic capacity
 - Aerobic capacity
50. To what group of drugs does caffeine belong to?
- Amphetamines
 - Xanthines
 - Decongestants
 - Appetite suppressants

51. Which of the following is NOT a theory of how caffeine works in the body
- Muscular
 - Neurologic
 - Metabolic
 - Stimulatory
52. Which caffeine theory is the original argument for how it works to provide an ergogenic benefit to athletes?
- Muscular
 - Neurologic
 - Metabolic
 - Stimulatory
53. What effect does caffeine have on an endurance type of activity?
- Increases reaction time
 - Increase total exercise time
 - Decrease reaction time
 - Decrease total exercise time
54. What effect does caffeine have on a short-term type of activity?
- No difference in exercise time
 - Increases total exercise time
 - Decreases reaction time
 - Decrease total exercise time
55. What is a “nutraceutical”?
- A nutrition store
 - Prescribed medication
 - Nutritional counseling
 - A nutritional supplement
56. The Dietary Supplement Health and Education Act (DHSEA) essentially provides for:
- Supplement purity
 - Supplements for underprivileged children in schools
 - Unrestricted access to food supplements
 - Athlete supplementation freedom
57. Supplement manufactures are not allowed to state which of the following?
- That a supplement will prevent cancer
 - That a supplement will decrease the chance of getting skin cancer
 - That a supplement will work as a “tanning pill”
 - That a supplement will cure depression

58. What nutraceutical was taken off the market because it was dangerous to human health and then put back on the market as a result of the passage of the DHSEA law in 1994?

- a. DHEA
- b. St. John's wort
- c. Echinacea
- d. Ginkgo biloba

59. General drug toxic levels are increased in which population when supplements are used?

- a. Women
- b. Men
- c. Children
- d. Athletes

60. What extra product is included in most energy drinks?

- a. Carbohydrate
- b. Caffeine
- c. Sodium
- d. Water

61. Carbohydrate loading is most beneficial to which type of athlete?

- a. Endurance
- b. Sprint
- c. Water sports
- d. Female

62. Whey is a derivative of what product?

- a. Corn
- b. Wheat
- c. Sugar
- d. Milk

63. What are the signs or personality characteristics that indicate an athlete could become a drug abuser?

- a. Ambitious
- b. Committed
- c. Deliberate
- d. Nonconformist

64. Most cocaine abusers prefer which method of use to get the most rapid effect from the drug?

- a. Snorting
- b. Smoking
- c. Injecting

- d. Oral
65. GHB is used by body builders to:
- a. Increase growth hormone release during sleep
 - b. Decrease serotonin release during exercise
 - c. Decrease beta endorphins released during sleep
66. The force that binds or unites drugs molecules is called:
- a. Agonist
 - b. Affinity
 - c. Endogenous
 - d. Receptor
67. The lock and key analogy represents
- a. The process of a drug binding to a receptor
 - b. The affinity of a drug for a receptor
 - c. The biological reaction produced by a drug receptor binding to a drug
 - d. The inability of a drug to bind successfully to its specific receptor
68. The potency of a drug refers to:
- a. The maximal perceivable response to a specific dose
 - b. The ability of a drug to exert its effects
 - c. The difference between the dose of the two drugs
 - d. The amount of a drug needed to produce a pharmacological effect
69. Which of the following is not an advantage of parenteral over enteral administration of a drug?
- a. Rapid onset of drug action
 - b. No direct gastrointestinal contact
 - c. Direct administration of the drug to the site
 - d. Safest method of drug delivery
70. The ability of a drug to cross a cell membrane depends on:
- a. The active transport system
 - b. Water solubility
 - c. The ionization of the drug receptor
 - d. The diameter of the receptor

[illegible]

Thank you for completing this survey.

APPENDIX B: INFORMED CONSENT

Middle Tennessee State University

Project Title: Athletic Trainers' Knowledge of Performance Enhancing drugs

Purpose of Project: Develop a test to assess AT's current knowledge of performance enhancing drugs.

Procedures: You are being asked to complete a test that will cover basic knowledge of PEDs including administration, effects, and adverse reactions of certain drugs. The test is called KT-PED it will also test your ability to recognize different drug classes, whether a drug is banned or not, and the effect a drug has on performance. The material will be broken up a demographic section, a true and false section, recognition of drug class section, and a multiple-choice section. The test will take approximately 20 minutes. Your data will be combined with other Athletic Trainer in the field.

Risks/Benefits: The risks from this research is minimal. There are no direct benefits from participating in this research. This research will benefit athletes by informing athletic trainers of their knowledge of PEDs, which inturn may create more knowledgeable athletic trainers to the topic.

Confidentiality: All information will be confidential. Only the researchers will have access to the files.

Principle Investigator/ Contact information: Clayton Faircloth, Cell: 912-687-1080, Email: cf3q@mtmail.mtsu.edu

Participating in this project is voluntary, and refusal to participate or withdrawing from participation at any time during the project will involve no penalty or loss of benefits to which to you might otherwise be entitled. All efforts, within reason, will be made to keep the personal informaiton in your research record private but total privacy cannot be promised, for example, your information may be shared with the Middle Tennessee State University Institutional Review Board. In the event of question or difficulties of any kind during or following participation, you may contact the Principal Investigator as indicated above. For additional informaiton about giving consent or your rights as a participant in this study, please feel free to contact the MTSU Office of Compliance at (615) 494-8918

Consent

I have read the above information and my questions have been answered satisfactorily by project staff. I believe I understand the purpose, benefits, and risks of the study and give my informed and free consent to be a participant.

SIGNATURE

DATE

APPENDIX C: RECRUITMENT SCRIPT

To Athletic Trainers:

My name is Clayton Faircloth. I am a graduate student at MTSU and I am conducting a research study on athletic trainers knowledge of performance enhancing drugs. Would you be willing to take approximately 20 minutes to fill out the test that is in the link here. Your responses will be anonymous. Your participation is completely voluntary. If you have any questions about the survey, please feel free to email me at claytondfaircloth@gmail.com. If you choose to participate, please click the link below to begin the survey. Thank you in advance for your time.

Thank you,

Clayton Faircloth ATC, LAT

APPENDIX D: STUDY APPROVAL



IRB INSTITUTIONAL REVIEW BOARD Office of Research Compliance, 010A

Sam Ingram Building, 2269 Middle Tennessee Blvd Murfreesboro, TN 37129

IRBN007 – EXEMPTION DETERMINATION NOTICE

Thursday, June 09, 2016

Investigator(s): Investigator(s') Email(s): Department:

Study Title: Protocol ID:

Clayton Faircloth (PI), and Dr. Brian Ragan (FA)

cf3q@mtmail.mtsu.edu Health and Human Performance

Evaluation of the Measurement Properties of Athletic Training Knowledge

Tests

16-1289

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category (2) *Educational Tests* A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	EXEMPT from further IRB review***	
Date of expiration	NOT APPLICABLE	
Sample Size	180 Participants	
Participant Pool	Athletic Trainers	
Mandatory Requirements	Must collect informed consent	
Additional Restrictions	ATs recruited from the NATA member database	
Comments	N/A	
Amendments	Date	N/A
	N/A	Post-Approval Amendments

***This exemption determination only allows above defined protocol from further IRB review such as continuing review. However, the following post-approval requirements still apply:

- ☐ Addition/removal of subject population should not be implemented without IRB approval
- ☐ Change in investigators must be notified and approved
- ☐ Modifications to procedures must be clearly articulated in an addendum request and the proposed changes must not be incorporated without an approval
- ☐ Be advised that the proposed change must comply within the requirements for exemption
- ☐ Changes to the research location must be approved – appropriate permission letter(s) from external institutions must accompany the addendum request form

- ☐ Changes to funding source must be notified via email (irbsubmissions@mtsu.edu)
- ☐ The exemption does not expire as long as the protocol is in good standing
- ☐ Project completion must be reported via email (irbsubmissions@mtsu.edu)

IRBN007 Version 1.2 Revision Date 03.08.2016

Institutional Review Board Office of Compliance Middle Tennessee State University

- ☐ Research-related injuries to the participants and other events must be reported within 48 hours of such events to compliance@mtsu.edu

The current MTSU IRB policies allow the investigators to make the following types of changes to this protocol without the need to report to the Office of Compliance, as long as the proposed changes do not result in the cancellation of the protocols eligibility for exemption:

- ☐ Editorial and minor administrative revisions to the consent form or other study documents
- ☐ Increasing/decreasing the participant size The investigator(s) indicated in this notification should read and abide by all applicable post-approval conditions imposed with this approval. [Refer to the post-approval guidelines posted in the MTSU IRB's website](#). Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident. All of the research-related records, which include signed consent forms, current & past investigator information, training certificates, survey instruments and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter

without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed. Sincerely, Institutional Review Board Middle Tennessee State University Quick Links: [Click here](#) for a detailed list of the post-approval responsibilities. More information on exempt procedures can be found [here](#).

APPENDIX E: FINAL KT-PED

1. When it comes to absorption, the three major classes of administration are enteral, respiratory, and topical.
 - c. True
 - d. False
2. Oral administration is the fastest way for the body to absorb a drug.
 - c. True
 - d. False
3. Amphetamines were once perceived as ideal ergogenic drugs for training and competition. "Ergogenic" refers to enhancing physical performance.
 - c. True
 - d. False
4. Tetrahydrogestrinone (THG) has a street name known as "The Clear".
 - a. True
 - b. False
5. Human Growth Hormone (HGH) is available by prescription only.
 - a. True
 - b. False
6. Ritalin gives the same effects to the body as Vyvanse.
 - c. True
 - d. False
7. Androstenedione (Andro) blocks the body's production of testosterone.
 - a. True
 - b. False
8. Epoetin is commonly used by endurance athletes.
 - a. True
 - b. False
9. Only males produce testosterone.
 - c. True
 - d. False
10. Ephedra and pseudoephedrine can be found in "natural," over the counter, and prescription medications.
 - c. True
 - d. False

11. The production and marketing of herbal supplements are regulated by the food and drug agency in the United States.
- c. True
 - d. False
12. Ephedra will NOT enhance the performance of a sprint athlete.
- c. True
 - d. False
13. All drugs have an immediate effect on the user.
- c. True
 - d. False
14. An athlete can test positive for drugs when taking only nutritional supplements.
- c. True
 - d. False
15. An AT should be able to identify athletes using PEDs
- c. True
 - d. False

Please read the following multiple choice questions and choose the most appropriate answer.

16. An athlete asked an AT about the effects of legal PEDs. The AT should be able to:
- e. Provide relevant information
 - f. Nothing AT's aren't doctors
 - g. Tell the athlete to search the internet
 - h. Refer to a physician
17. The term endogenous means
- e. Originating within the organism
 - f. Contains eggs in the supplement
 - g. Will increase work output
 - h. Has a genetic ending
18. Irreversible adverse effects of steroids in females include:
- e. Increase foot size

- f. Increase acne
 - g. Masculinizing effects
 - h. Sterility
19. Which of the following AAS are least affected by first pass metabolism?
- e. Androgenic
 - f. Oral
 - g. Anabolic
 - h. Injected
20. DHEA is a precursor to:
- e. androstenedione
 - f. HGH
 - g. HMB
 - h. Creatine
21. Creatine is reported to result in an increase in weight mainly because of an increase in:
- e. Calories consumed
 - f. Strength
 - g. Bone size
 - h. Water retention
22. What is a “nutraceutical”?
- e. A nutrition store
 - f. Prescribed medication
 - g. Nutritional counseling
 - h. A nutritional supplement
23. General drug toxic levels are increased in which population when supplements are used?
- e. Women
 - f. Men
 - g. Children
 - h. Athletes
24. What extra product is included in most energy drinks?
- e. Carbohydrate
 - f. Caffeine
 - g. Sodium
 - h. Water

25. GHB is used by body builders to:
- d. Increase growth hormone release during sleep
 - e. Decrease serotonin release during exercise
 - f. Decrease beta endorphins released during sleep
26. The force that binds or unites drugs molecules is called:
- e. Agonist
 - f. Affinity
 - g. Endogenous
 - h. Receptor
27. The potency of a drug refers to:
- e. The maximal perceivable response to a specific dose
 - f. The ability of a drug to exert its effects
 - g. The difference between the dose of the two drugs
 - h. The amount of a drug needed to produced a pharmacological effect
28. Which of the following is not an advantage of parenteral over enteral administration of a drug?
- e. Rapid onset of drug action
 - f. No direct gastrointestinal contact
 - g. Direct administration of the drug to the site
 - h. Safest method of drug delivery
29. The ability of a drug to cross a cell membrane depends on:
- e. The active transport system
 - f. Water solubility
 - g. The ionization of the drug receptor
 - h. The diameter of the receptor

The NCAA defines different classes of drugs as those of concern for banning during performance (Performance Enhancing Drugs). Using the table below, please choose which category the specific drug falls under below by placing an "x" under the appropriate response and select whether or not you think the drug is banned or not banned by the NCAA.

