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Knowledge and use of ephedrine among high school athletes

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KNOWLEDGE AND USE OF EPHEDRINE AMONG HIGH SCHOOL ATHLETES

A Research Project

Presented to

The Faculty of the Department of Human Performance

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

By

Jayne R. Hatcher, ATC

May 2005

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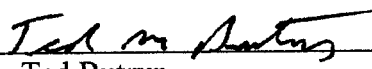
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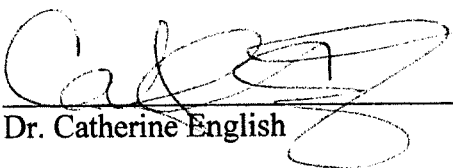
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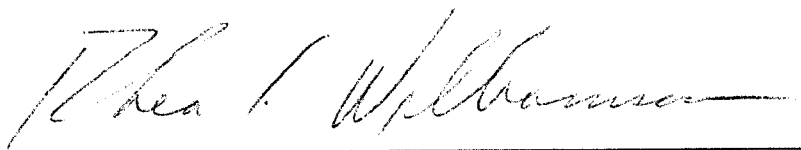


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ABSTRACT

KNOWLEDGE AND USE OF EPHEDRINE AMONG HIGH SCHOOL ATHLETES

by Jayme R. Hatcher

This thesis assesses high school athlete's knowledge and use of Ephedrine products. Fifty-eight subjects from two different Bay-Area high schools in California participated in the investigation. Consent was granted from the Institutional Review Board (IRB) at San Jose State University, the athletic directors at each school, and the parents of each subject. Data were analyzed and reported descriptively (e.g., means and percentages) for demographical information. Cross tabulations were used to assess associations between multiple questions. Subjects indicated that the media was their main source of information on Ephedrine products. More than half of the subjects reported that they did not know the effects of Ephedrine products on the body. Moreover, most subjects indicated they would use Ephedrine to obtain an athletic college scholarship. The implementation of an educational system, formal class work, drug awareness, counseling, and lectures is recommended to benefit subjects like those who participated in the study.

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TABLE OF CONTENTS

	Page
List of Tables.....	ix
Introduction.....	1
Methods.....	3
Subjects.....	3
Instrumentation.....	3
Procedures.....	4
Statistical Procedures.....	4
Results.....	5
Prevalence of Ephedrine Use.....	5
Related Factors to Ephedrine Use.....	5
Ephedrine use in Athletics.....	6
Associations Between Variables.....	7
Discussion.....	9
Recommendations for Further Study.....	14
EXTENDED SUPPORT MATERIAL.....	23
CHAPTER 1 – Introduction.....	24
Purpose of the study.....	26
Delimitations.....	27
Limitations.....	27
Definition of Terms.....	27

Definition of Terms.....	27
Project Completion.....	28
Summary.....	28
 CHAPTER 2 – Review of Literature	
Ephedrine, Effects and Side Effects.....	30
History of Steroid and Ergogenic Aid Use by Athletes.....	32
History of Anabolic Steroid Use in Sport and Exercise.....	33
History of Anabolic Steroid Use in Professional Football.....	34
History of Anabolic Steroid Use in College.....	35
History of Anabolic Steroid Use in High School.....	36
Studies of Anabolic Steroid Use in College.....	37
Studies of Anabolic Steroid Use in High School.....	37
Dietary Supplement Use in Professional Basketball.....	41
Dietary Supplement Use in College.....	42
Dietary Supplement Use in High School.....	42
Research on Ephedrine.....	44
Summary.....	45
 CHAPTER 3 – Methods	
Subjects.....	47
Development of the Questionnaire.....	48
Content Validity and Reliability of the Questionnaire.....	49
Administration of the Survey.....	50

Statistical Procedures.....	52
Summary.....	52
REFERENCES.....	53
APPENDIX A. Authors notes for <i>The Physical Educator</i>	59
APPENDIX B. Ephedrine Knowledge and Use Questionnaire.....	61
APPENDIX C. Letter to Athletic Directors.....	65
APPENDIX D. Letter of Confirmation.....	67
APPENDIX E. Consent Form.....	69
APPENDIX F. Institutional Review Board Approval Letter.....	71

LIST OF TABLES

Table 1. High School Subjects' Demographics Related to Ephedrine Knowledge.....	16
Table 2. Ephedrine Substances Known to be Used by High School Subjects.....	17
Table 3. Source of Supplement Information for High School Subjects.....	18
Table 4. Source and Grade Level of High School Subjects Questioned for Ephedrine Use.....	19
Table 5. Use of Ephedrine to Obtain an Athletic College Scholarship.....	20
Table 6. Cross Tabulation of No-Source of Information on Ephedrine Products Among High School Subjects Surveyed For Ephedrine Use.....	21
Table 7. Cross Tabulation of Effects of Ephedrine on the Body.....	22

Introduction

In the past few years, the United States Food and Drug Association (FDA) has investigated more than 800 reports of adverse reactions associated with more than 100 different products that contained or were thought to contain Ephedra alkaloids. Reported adverse reactions have included insomnia, nervousness, tremor, headaches, hypertension, seizures, arrhythmias, heart attack, stroke, and death (Johns, 1999). Athletes at the professional, collegiate, and high school levels reportedly use Ephedrine (Krome & Tucker, 2003), yet research on Ephedrine product knowledge and use has been lacking, particularly in comparison to anabolic steroids.

Since the 1940s, countless elite athletes and bodybuilders have taken anabolic-androgenic steroids (AS) to increase muscle mass and to intensify training regimens (Hobberman & Yesalis, 1995). Supplements, including legal and illegal drugs, have been used by high profile athletes such as Mark McGwire and Barry Bonds, which may be interpreted as a license for use by impressionable high school student-athletes (Perko, 1999). In the last decade, over-the-counter dietary supplement use has burgeoned in the general population as well as among athletes from high school to the professional level (Krome & Tucker, 2003). Perko (1999) indicates that adolescent athletes use supplements more than the national average for all adolescents. Due to the adverse effects of Ephedrine and a greater propensity for high school athletes to ingest supplements, this study intended to obtain the knowledge and use of Ephedrine products among high school athletes in two Bay-Area high schools in California.

Benowitz and Haller (2000) report the adverse side effects of Ephedrine products to include severe cerebrovascular and cardiovascular side effects such as seizures, heart attacks, kidney stones, and sudden death. Ephedrine, through its sympathomimetic properties, is also causally related to many adverse effects, including cardiac arrhythmias, myocardial infarction, hypertension, stroke, and death (Krome & Tucker, 2003).

The FDA announced a ban on the sale of products containing Ephedrine in December, 2003, stating that these products pose an unreasonable health risk (Mamula, 2004). The FDA's final rule became effective 60 days after the publication to allow time for the United States Congressional review. Even though there has been a ban placed on Ephedrine, this study was conducted prior to the ban and these subjects most likely had access to Ephedrine products, and may still have access. The announcement of a ban of Ephedrine products adds to the importance of the present study, to determine the knowledge and use of Ephedrine among high school athletes.

Blue Cross Blue Shield Association (BCBSA, 2001) research on sports supplements and performance-enhancing drugs (PEDs) indicate that the majority of adults and teens are aware of sports supplements (75% and 52% respectively) or PEDs (76% and 59% respectively). BCBSA suggests that Ephedrine products are consumed in relatively small numbers, and that knowledge related to Ephedrine products is limited. Therefore, the purpose of this research study was to assess high school athletes' knowledge and use of Ephedrine products.

Methods

Subjects

Fifty-eight high school scholastic athletes out of 136 (43% return rate) from two Bay-Area high schools in California volunteered to participate in the investigation. All subjects participated in an interscholastic sport during the 2003-2004 school year. The sports included Badminton, Swimming, Wrestling, Basketball, Cross Country, Golf, Track, Softball, Volleyball, Soccer, Baseball, Football, and Field Hockey.

Instrumentation

A previously used questionnaire (Brkirch, 1992) was modified for use in this research study. The purpose of the questionnaire was to assess the subjects' knowledge and use of Ephedrine products. Modification to the questionnaire included changing the words "performance-enhancing substances" to "Ephedrine products," as well as eliminating one question relating to multiple performance-enhancing substances. The modified questionnaire was reviewed by four certified athletic trainers (ATCs) for face validity given that this questionnaire had been previously used with minor modifications. No changes or recommendations were made.

The *Ephedrine Use Questionnaire* contained 17 items divided into four sections: (a) Three questions regarding demographic data (age, grade, and sport), (b) four questions designed to establish the subject's knowledge, products used, and frequency of use, (c) two questions asking the subject's main reason for use and source of information about Ephedrine products, and (d) eight questions to establish whether the subject thinks it is fair to use Ephedrine against non-users, the effects of Ephedrine products on the

body, if the products help an athlete's performance, the subject's participation in collegiate athletics, whether the subject hopes to obtain an athletic college scholarship and the subject's overall strength and health status.

Procedures

Approval to conduct the research was granted by the Institutional Review Board (IRB) on Human Subjects at San Jose State University. Prior to testing, the Athletic Director from two high schools granted the researcher permission to access the subjects for use in this study. Originally 16 high schools were approached but declined participation due to the nature of the subject matter. Subjects were requested to participate in the study when they entered their respective athletic training rooms. Every athlete that entered their respective training room was selected as a potential subject. Subjects who were willing to participate were mailed a consent form for the subject's parents/guardians to sign. On the day of administering the questionnaire, subjects who returned a signed parental/guardian consent form were allowed to participate. Each subject was then asked to anonymously complete the questionnaire. The subjects handed their completed questionnaire to the ATC who administered the questionnaire. The ATC placed the Completed questionnaires in a sealed envelope and returned them to the researcher during a scheduled meeting time.

Statistical Procedures

Data were collected from the questionnaires, tabulated, and analyzed for descriptive purposes using means and percentages. In addition, cross tabulations were conducted to assess associations between multiple questions. The Statistical Package for

the Social Sciences (SPSS 2003, version 11.0) computer program was used to calculate and analyze the data.

Results

There were a total of 58 subjects who participated in the study. Mean age of the subjects was 15.75 years of age. The majority of participants were in the 11th-grade, (n=21) (see Table 1). Thirteen sports were represented by the subjects involved in this study. The majority of subjects represented football, (63.8%) followed by track (32.8%), baseball (17.2%), volleyball (8.6%), wrestling (6.9%), basketball (6.9%), soccer (5.2%), softball (3.4%), and badminton (1.7%), swimming (1.7%), cross country (1.7%), golf (1.7%), and field hockey (1.7%)(see Table 1).

Prevalence of Ephedrine Use

Subjects were asked whether they knew athletes who used Ephedrine and 87.9% (n=51) of subjects responded no, while 12.1% (n=7) of subjects responded yes. Of the 12.1% (n=7) of the subjects that responded yes to knowing an athlete who used Ephedrine products, the substances used included Ripped Fuel, Xenadrine, and Yellow Jackets (see Table 2). One subject out of 58 responded to using Ephedrine products through self reporting.

Related Factors to Ephedrine Use

Subjects were asked where they obtained information pertaining to Ephedrine products, and overall, 29.3% (n=17) of the subjects reported no specific source was used to receive their information. Source sites for information about Ephedrine products included: Television was 22.4% (n=13), and the newspaper was 15.5% (n=9) of the

subjects' main source of information about Ephedrine products (see Table 3). Cross tabulations regarding the source of information and the subjects' grade level revealed mostly freshmen (12%, n=7 of subjects) reported having no source of information about Ephedrine products, followed by sophomores (8.6%, n=5 of subjects). The majority of juniors revealed their source of information for Ephedrine products to be television (13.7%, n=8 of subjects), while seniors revealed that their source of information for Ephedrine products was equally distributed between teacher, ATC, and no particular source. Subjects that viewed television as their main source of information about Ephedrine products (22.4%, n=13 of subjects) indicated that they would also use Ephedrine to obtain an athletic college scholarship. Finally, (29.3%, n=17 of subjects) that had no source of information on Ephedrine products would use Ephedrine products to obtain an athletic college scholarship (see Table 4).

Ephedrine Use in Athletics

When the subjects were asked if they believed it was fair for athletes using Ephedrine to participate with substance-free athletes, (69%, n=40 of subjects) stated it was not fair, and (19%, n=11 of subjects) stated it was fair. Fifty-one percent (n=30) of subjects indicated they did not know if the effects of Ephedrine on the body were positive or negative. Thirty-six percent (n=21) of subjects said the effects of Ephedrine on the body were negative and (9%, n=5 of subjects) said the effects of Ephedrine on the body were positive. Despite the possible effects of Ephedrine on the body, (58.6%, n=34 of subjects) believed that Ephedrine products help an athlete's performance, and 31% of the subjects believed Ephedrine products did not help an athlete's performance.

Subjects who plan on participating in collegiate athletics accounted for (72.4%, n=42 of subjects). Fifty-seven percent (n=33) of the subjects hope to obtain an athletic college scholarship. Sixty-nine percent (n=40) of subjects who indicated they would not use Ephedrine products to obtain an athletic college scholarship, while (29.3%, n=17 of subjects) responded they would use Ephedrine products to obtain an athletic college scholarship. When the subjects that plan on participating in collegiate athletics (72.4%) were cross tabulated with subjects who would use Ephedrine products to obtain a college scholarship (29.3%) the percentage of potential users increased to 98.3%.

Associations between Variables

The following associations were uncovered: (a) Approximately 98% (n=57) of the subjects that plan on becoming collegiate athletes stated they would use Ephedrine to obtain an athletic college scholarship; (b) approximately 89% (n=52) of the subjects that believed Ephedrine products help an athlete's performance noted they would use Ephedrine products to obtain an athletic college scholarship; (c) approximately 87% (n=51) of subjects who believed it is fair for athletes to use Ephedrine products against those who are Ephedrine-free noted they would use Ephedrine to obtain an athletic college scholarship; and (d) approximately 75% (n=44) of the subjects who hoped to obtain an athletic college scholarship indicated they would use Ephedrine to obtain an athletic college scholarship (see Table 5).

Findings related to the subjects having no source of information regarding Ephedrine knowledge (29.3%) when cross tabulated with: (a) the use of Ephedrine to obtain an athletic college scholarship; (b) fair to use Ephedrine products against

Ephedrine-free athletes; (c) the effects of Ephedrine on the body; (d) whether Ephedrine products help an athlete's performance; (e) becoming a collegiate athlete; and (f) obtaining an athletic college scholarship, produced similar numbers. Subjects that answered yes (29.3%), they would use Ephedrine to obtain a scholarship reported having no source of information regarding Ephedrine knowledge. Subjects that answered yes (27.6%), they believe it is fair to use Ephedrine among Ephedrine-free athletes reported having no source of information regarding Ephedrine knowledge. Subjects that answered yes (29.3%), they think the effects of Ephedrine on the body are positive reported having no source of information regarding Ephedrine knowledge. Subjects that believe Ephedrine helps an athlete's performance reported having no source of information (27.6%) regarding Ephedrine knowledge. Subjects that desire to become college athletes and have no source of information (29.3%) regarding Ephedrine knowledge. The subjects that desire to obtain an athletic college scholarship and have no source (25.9%) regarding Ephedrine knowledge. Of the subjects that revealed having no particular source of information for Ephedrine products, 29.3% (n=17) of them indicated they did not know the effects of Ephedrine on the body, they wanted to become collegiate athletes, and they would use Ephedrine to obtain an athletic college scholarship (see Table 6).

Subjects' knowledge of Ephedrine products appears limited in this study.

Subjects that wanted to compete in collegiate athletics (n=22) did not know the effects of Ephedrine on the body. Subjects that hoped to obtain an athletic college scholarship (n=17) did not know the effects of Ephedrine on the body. Subjects that indicated they

would not use Ephedrine to obtain an athletic college scholarship (n=21) did not know the effects of Ephedrine on the body (see Table 7).

Discussion

The purpose of this study was to assess high school athletes' knowledge and use of Ephedrine products. A major finding in this study was that a large percentage (98.3%) of subjects who plan on participating in collegiate athletics (72.4%) would use Ephedrine products to obtain an athletic college scholarship. This outcome may be a result of subjects' willingness to do whatever is necessary to progress to the next level, regardless of the potential health risks (Hainline & Wadler, 1989). Researchers Hainline and Wadler (1989) have suggested that athletes may be more likely to experiment with PEDs than individuals not participating in athletics. In addition, this information may indicate actual use from subjects who were unwilling to identify themselves as current users in the questionnaire since they reported they would use Ephedrine to obtain an athletic college scholarship.

Hainline and Wadler (1989) have outline five instances that might lead athletes to utilize PEDs: (a) athletes who are at risk for not making a team or achieving the level of performance they desire; (b) athletes who are approaching the end of their career and are striving to continue to compete in their sport; (c) athletes who have weight problems and are seeking a means to increase or decrease weight; (d) athletes who are battling injuries and are trying to find ways to heal faster; and (e) athletes who feel external pressure, such as from teammates, coaches, and parents, to use PEDs.

Most freshmen (12.1%) and sophomore subjects (8.7%) questioned in this study reported having no source of information for Ephedrine products. The majority of junior subjects reported their main source of information on Ephedrine products came from television (13.8%). Teachers provided most senior subjects information on Ephedrine products. Most subjects in this study used the media for information on Ephedrine or reported having no source of information regarding Ephedrine; therefore, they may not receive any information on Ephedrine products. The number of freshman and sophomore subjects in this study that reported having no source of information on Ephedrine products prompts the need for teachers, ATCs, coaches, and administrators to educate the subjects on Ephedrine products. Teenage years are an impressionable time for young athletes who are learning to make decisions (BCBSA, 2001). As subjects reach their junior and senior years, they may have already decided where they will obtain their information or what they believe to be true or false based on information they have received in previous years. Making appropriate decisions on supplement use is based on the accuracy of information obtained and outside influences such as the coach, professional athletes, and parents (Perko, 1999) making sure these subjects receive the correct information.

A large number of subjects (44.8%) obtained information regarding Ephedrine from the media. This high percentage may be due to the fact that drug use by athletes has received a great deal of media attention (Gardner, Naylor, & Zaichkowsky, 2001). Popular professional athletes, such as Mark McGwire, have come to wide public attention for the use of PEDs (Gardner, Naylor, & Zaichkowsky). The information available in the

media about professional athletes and drug use may be what subjects in this study have used as their main source of information. This may be a contributor to why these young athletes use products like Ephedrine. Among athletes, adolescents are a key target market of the dietary supplement industry, claims of increased energy, improved performance, and gains in muscular strength appeal to this population (Perko, 1999). Other reasons may include, athletes who are at risk for not making a team or achieving the level of performance they desire, athletes who are approaching the end of their career and are striving to continue to compete in their sport, athletes who have weight problems and are seeking a means to increase or decrease weight, athletes who are battling injuries and are trying to find ways to heal faster, and athletes who feel external pressure, such as from teammates, coaches, and parents, to use PEDs (Hainline & Wadler, 1989).

Based on the subjects' reported sources of information, knowledgeable professionals regarding Ephedrine products were rarely sought for information. Thus, incorrect information or no information may be reaching the subjects, which may create a misperception that performance-enhancing drugs are safe to take. Principals, teachers, administrators, coaches, and ATCs should become knowledgeable about Ephedrine products so they may provide athletes with proper knowledge on a regular basis or direct them to other sources of information. The high school teachers and administrators who are in contact with athletes on a daily basis can become very influential in their decision making. Not only is it important for these individuals to provide knowledge to the athletes, but for them to be aware of signs and symptoms of drug use. The suggestions for the present study are supported by the suggestions from multiple studies conducted on

AS. For example, Stilger & Yesalis (1999) suggest that ATCs can play a vital role in disseminating accurate information about AS abuse. Such information can include long term adverse health risks. High school student supervisors should begin educating students and athletes as early as the fourth and fifth grades (Stilger & Yesalis). These suggestions are important to prevent abuse of Ephedrine products.

Educational programs need to be established in the school system to teach the athletes the effects of Ephedrine containing products on the body. Blue Cross Blue Shield Association (2001) created a not-for-profit organization developed to educate youth and their families about the potential health effects of PEDs and eliminate their use from all levels of sports. Identification of substance use patterns during the high school years is important for preventing and curbing at-risk behaviors that might arise later in an individual's life (Gardner, Naylor, & Zaichkowsky, 2001). Sport organizations have made it their mission to deter substance use by athletes. In 1986 the National Collegiate Athletic Association (NCAA) implemented a national drug education and drug-testing program for its member institutions (Anderson, Bennell, Buckley, Wright, & Yesalis, 1990). Other organizations at various levels of sport have also adopted programs to monitor and police drug use behaviors in athletes (Shields, 1995). With a combination of testing and educating athletes on the effects of PEDs such as Ephedrine, the amount of use may decrease among high school athletes (BCBSA).

Based upon the findings of this study the following conclusions were made: Ephedrine product use was surprisingly low, almost non-existent. This finding was not anticipated, based on previous research that suggested drug use is present among the high

school athletic population (Brenner, & Wilson, 2001; Corbin, Feyrer-Melk, Lewis, & Phelps, 1994; Irving, L.M., Neumark-Sztainer, Story, & Wall, 2002; Perko, 1999; Zickler, 2001). This conflicting finding may be due to the low number of subjects, the low number of school participants, or unwillingness for the subjects and/or non-subjects to disclose potentially damaging Ephedrine abuse information on a questionnaire. Most subjects reported no source of information on Ephedrine, other main sources of information about Ephedrine products were from the media, television, newspapers, and magazines, thus education on the subject should be initiated by ATCs and coaches.

Over half of the subjects did not know the effects of Ephedrine products on the body, yet more than half of the subjects believe Ephedrine products aided or improved an athlete's performance. Interestingly, 96.6% of subjects that noted they would use Ephedrine to obtain an athletic college scholarship do not know the effects of Ephedrine on the body. Furthermore, while the majority of subjects hope to become collegiate scholarship athletes, surprisingly most would use Ephedrine products to increase their chance of success. The willingness to use Ephedrine products to obtain an athletic college scholarship may be indicative of the subjects' and non-subjects' unwillingness to divulge information they may deem damaging.

This study provides important data on the knowledge of Ephedrine products among high school athletes. However, data are not representative of the entire United States population of high school athletes. Non-subjects may have been hesitant to participate in the study, thus impacting the total number of subjects. Furthermore, subjects may be more representative of a population that does not use Ephedrine products

than one that does since subjects may have been hesitant to return the questionnaire if using Ephedrine. The possibility exists that some subjects may have under- or over-reported their Ephedrine product use. Coaches, ATCs, doctors, teachers, and administrators should be informed of the results from this study. This will help them provide knowledge on Ephedrine products through formal class work, counseling, and lectures to high school athletes. It is important for these professionals to be aware of the knowledge and use of Ephedrine products at the high school level.

The last area of discussion addresses drug testing and controls or sanctions against Ephedrine use. The NCAA, United States Olympic Committee (USOC), and the National Football League (NFL) have already established a ban of Ephedrine products. Possibly the high school system should look into some type of regulatory system as well. A regulatory system may be beneficial for high schools since studies have found an increase in the use of drugs such as ecstasy, alcohol, marijuana, and steroids (Brener & Wilson, 2001; Zickler, 2001). Use of steroids during the year prior to the 26th-Annual Monitoring the Future Survey rose from 1.7 percent in 1999 to 2.2 percent in 2000 among 10th-graders (Zickler).

Recommendations for Further Study

Drug use in sports appears to be an accepted concept in past societies (Perko, 1999). Coaches, teachers, and ATCs should become more available to educate students on Ephedrine products. An area for further study would be to determine what coaches, teachers, and ATCs know about Ephedrine in order to provide appropriate information to high school student-athletes.

In addition, a larger, more representative sample of high school athletes could be obtained from different areas of the country. A larger sample size would increase the chance of the generalizability of the findings. Future research could also examine differences in Ephedrine use across gender. Further, research is needed on the prevalence of Ephedrine and other performance enhancing drug use among different sociocultural populations. For instance, it is not known whether different racial and ethnic groups use Ephedrine for the same reasons, or in the same manner. The last recommendation for future studies includes questioning individual sports teams to determine which substances are prevalent among different sports. Also, a group meeting with parents prior to a study might establish a better relationship between the researcher and parents, which could increase the number of study subjects.

Table 1.

High School Subjects' Demographics Related to Ephedrine Knowledge: (N=58)

<u>Demographics</u>	<u>FREQUENCY (n=)</u>	<u>PERCENT (%)</u>
<u>AGE</u>		
14	4	6.9
15	21	36.2
16	18	31
17	13	22.4
18	1	1.7
<u>GRADE</u>		
Freshman	18	31
Sophomore	15	25.9
Junior	21	36.2
Senior	3	5.2
<u>SPORT</u>		
Badminton	1	1.7
Swimming	1	1.7
Wrestling	4	6.9
Basketball	4	6.9
Cross Country	1	1.7
Golf	1	1.7
Track	19	
Softball	2	32.8
Volleyball	5	8.6
Soccer	3	5.2
Baseball	10	17.2
Football	37	63.8
Other Sport (Field Hockey)	1	1.7

Table 2.

Ephedrine Substances Known to be Used by High School Subjects (N=58)

Ephedrine Substance	Never	1x or 2x	1x/month	1x/week	2-3x/week	1x/day	3x/day
Metabolife	n=58 100%						
Ripped Fuel	n=57 98.3%				n=1 1.7%		
Diet Fuel	n=58 100%						
Stacker 3	n=58 100%						
NaturalTRIM	n=58 100%						
Hydroxycut	n=58 100%						
Xenadrine RFA1	n=57 98.3%				n=1 1.7%		
Metab-O-Lite	N=58 100%						
Metabolift	N=58 100%						
Up Your Gas	N=58 100%						
Truckers Luv IT	N=58 100%						
Yellow Jackets	n=57 98.3%	n=1 1.7%					
Other	n=58 100%						

Table 3.

Source of Supplement Information for High School Subjects (N=58)

<u>SOURCE</u>	<u>FREQUENCY(N=58)</u>	<u>PERCENTAGE (%)</u>
Coach	6	10.3
Newspaper	9	15.5
Teacher	6	10.3
TV	13	22.4
Other Athlete	3	5.2
Magazine	4	6.9
ATC	8	13.8
Doctor	4	6.9
Family Member	3	5.2
No Source	17	29.3
Other Source	1	1.7

Table 4.

Source and Grade Level of High School Subjects Questioned for Ephedrine Use (N=58)

<u>Source</u>	<u>Grade</u>	Freshman	Sophomore	Junior	Senior
Coach		3	2	1	0
Newspaper		1	2	6	0
Teacher		1	2	1	2
Television		3	2	8	0
Other athlete		1	1	1	0
Magazine		1	1	1	0
ATC		1	2	4	1
Doctor		1	2	1	0
Family Member		1	1	1	0
Other Source		0	1	0	0
No source		7	5	3	1

Table 5.

Use of Ephedrine to Obtain an Athletic College Scholarship (N=58)

<u>CROSS TABULATION</u>	<u>FREQUENCY (n=)</u>	<u>PERCENTAGES (%)</u>
Obtain a scholarship and willing to use Ephedrine to obtain a scholarship	44	75.9%
Hopes to become a college athlete and would use Ephedrine to obtain a scholarship	57	98.3%
Thinks Ephedrine will help performance and would use Ephedrine to obtain a scholarship	52	89.7%
Thinks it is fair for athletes to use Ephedrine against substance-free athletes and would use Ephedrine to obtain a scholarship	51	87.9%

Table 6.

Cross Tabulation of No-Source of Information on Ephedrine Products Among High School Subjects Questioned for Ephedrine Use (N=58)

<u>Questions Answered Yes</u>	<u>No Source</u>
Use Ephedrine to obtain a scholarship	N=17 29.3%
Fair to use among Ephedrine-free athletes	N=16 27.6%
Effects of Ephedrine on the body	N=17 29.3%
Helps athletes performance	N=16 27.6%
Hopes to become college athlete	N=17 29.3%
Hopes to obtain a college scholarship	N=15 25.9%

Table 7.

Cross Tabulation of Effects of Ephedrine on the Body

Effects of Ephedrine on the Body

	<u>Good</u>	<u>Bad</u>	<u>Don't Know</u>
<u>Hopes to become a College Athlete</u>	5	13	22
<u>Hopes to Obtain a Scholarship</u>	3	11	17
<u>Use Ephedrine to Obtain a Scholarship</u>	2	16	21

EXTENDED SUPPORT MATERIAL

CHAPTER 1

Introduction

In recent years drug use by athletes has made newspaper headlines, sport governing body rulebooks, and doctors' waiting rooms on a regular basis (Gardner, Naylor & Zaichkowsky, 2001). A poll conducted by the National Collegiate Athletic Association (NCAA) revealed that almost 60% of United States (US) college athletes used nutritional supplements that are unregulated by the NCAA and may contain banned substances such as Ephedrine (Associated Press, 2001). Specifically, Ephedrine has been used to lose weight, increase energy during workouts, and obtain six-pack abs (Krome & Tucker, 2003). Athletes at the professional, collegiate, and high school levels reportedly use Ephedrine (Krome & Tucker). Studies involving Ephedrine use and high school athletes are limited, therefore investigation is warranted.

Among athletes, adolescents are a key target market of the dietary supplement industry, claims of increased energy, improved performance, and gains in muscular strength appeal to this population (Perko, 1999). Media coverage of professional and college athletes' use of dietary supplements in the general population may exist and may be influential for burgeoning athletes (Perko). The mass media disseminates information regarding the use of dietary supplements to the general population, affecting the number of adolescent athlete users (Perko). Some researchers have suggested that drug use is inherent in sport and its culture (Dymant, 1987; Hainline & Wadler, 1989) even though participation in athletics is thought to lead to a healthier lifestyle and wiser decisions about substance use (Albrecht, Anderson, Hough, McGrew, & McKeag, 1991; Shephard, 2000; Shields, 1995). Despite the negative publicity, the relationship between Ephedrine

use and participation in athletics is not yet clear (Gardner, Naylor, & Zaichkowsky, 2001).

An article in *Ephedrine News* (2003) claims that Ephedra has been used for 2,000 years. Within the last ten years the stimulant has been put in drinks and supplements and has grown in popularity in the U.S. Drinks like “Ripped Fuel” claim to give athletes a quick jolt of energy and have gained substantial popularity in not just athletes, but those wanting to get a better workout at the health club. Ephedra has been banned by the National Football League (NFL), the NCAA, and the International Olympic Committee (IOC) (Shields, 1995). In the fall of 2001, the NFL was the first professional sports league to ban the use of Ephedrine (Krome & Tucker, 2003).

The use of over-the-counter dietary supplements has risen dramatically, causing a potential increase in adverse effects. Physicians should recognize the dangers that Ephedrine-containing supplements present and remain vigilant for sympathomimetic symptoms in young, otherwise healthy, patients (Krome & Tucker, 2003).

Prior to the NFL’s decision, Rashidi Wheeler, a cornerback for Northwestern University’s football team, collapsed and died during a workout (Krome & Tucker, 2003). His death was related to the use of Ephedrine-containing beverages (Krome & Tucker). This is an example of one of the many deaths that has led to the importance of banning Ephedrine from not only the sporting world, but from everyday activities. Studies pertaining to performance-enhancing drugs (PEDs) like Ephedrine are pertinent to the ultimate ban of the product and products alike.

The US Food and Drug Administration (FDA) on December 30, 2003 announced a ban on the sale of products containing Ephedrine, stating that these products pose an

unreasonable health risk. The final rule became effective 60 days after the publication to allow time for Congressional review (Mamula, 2004). “Tragically, this move comes too late for some, but perhaps we will finally see an end to the promotion and use of this potentially dangerous supplement” (Mamula, ¶3). This announcement was a continuation of a process that started in June, 1997 when the FDA first proposed to require a statement on dietary supplements with Ephedra warning that it is hazardous (U.S. Food and Drug Administration, 2003). This information emphasizes the importance of the present study concerning the knowledge and use of Ephedrine among high school athletes. The safety of these athletes is endangered if they use or continue to use Ephedrine products.

With limited focus on Ephedrine products and the high school athlete, most research has focused on anabolic steroids as a PED in high school athletes. With a lack of research available on Ephedrine use in athletics, it is important to: (a) understand what high school age athletes know, or think they know about Ephedrine; and (b) to better educate them as to the dangers of using Ephedrine products. Therefore, the researcher investigated the use of Ephedrine products by high school athletes.

Purpose of the Study

The purpose of this study was to assess high school athletes’ knowledge and use of Ephedrine products.

The rationale for the study was prompted by increased media attention on the negative effects of Ephedrine products and its use by professional athletes. There also is a lack of research available specifically on Ephedrine products and high school athletes.

Delimitations

1. One hundred and thirty six high school athletes in the San Francisco/San Jose Bay-Area, ages 14-18 years old were selected to participate in the study.
2. Ephedrine (knowledge and use) was the only product investigated.

Limitations

1. The accuracy of results was limited by the honesty in the subjects' responses.
2. The number of subjects available to complete questionnaire may have been affected by attendance on the particular day the questionnaire was distributed.
3. Thirteen athletic directors did not consent with the study, therefore, impacting the number of schools that participated.
4. Some subjects did not return their consent form which made them ineligible to participate in the study.
5. Subjects may not have understood the content of the questions in the questionnaire or may not have understood what was being asked of them, thus inaccurately answering or avoiding the question.
6. Parents/guardians may not have agreed to sign the consent form, making their child athlete ineligible to participate in the study.

Definition of Terms

Alkaloid: Any of various organic compounds normally with basic chemical properties and usually containing at least one nitrogen atom in a heterocyclic ring. These occur chiefly in many vascular plants and some fungi (Pickett, 2000).

Anabolic steroid: Chemical compound similar to testosterone that stimulates

Anabolism -the building of muscle tissue through nitrogen retention (Williams, 1974, Taber, 1985).

Dietary Supplement: A product added to one's diet to make complete or make up for a deficiency (Pickett, 2000).

Ephedra: Any of various gymnospermous, mostly shrubby plants of the genus Ephedra, some of which are used as a source of ephedrine. A stimulant often sold as pills or tablets, derived from a plant of this genus (Pickett).

Ephedrine: A white, odorless, powdered or crystalline alkaloid, $C_{10}H_{15}NO$, isolated from shrubs of the genus Ephedra or made synthetically (Pickett).

Ephedrine Product: Any substance that can be bought on the market that contains Ephedrine.

Gymnospermous: A plant whose seeds are not enclosed within an ovary (Pickett).

High School Athlete: A male or female high school student involved in any interscholastic sport during the 2003-2004 academic year.

Project Completion

Data from this study were completed and will be written for The Physical Educator, according to the Authors' Notes (see Appendix A).

Summary

In the last decade, over-the-counter dietary supplement use has burgeoned in the general population as well as among athletes from high school to the professional level (Krome & Tucker, 2003). Media and professional athlete influence may make an impact on high school athletes' use of Ephedrine, or some other type of dietary supplement.

Perko (1999) indicates that adolescent athletes use supplements more than the national

average for all adolescents. These young, healthy, and active individuals are seeking that natural edge to help shed several extra pounds, obtain six-pack abs, or gain some extra energy to get through a workout (Krome & Tucker). This study investigated the knowledge and use of Ephedrine products among high school athletes in the San Francisco/San Jose Bay-Area.

CHAPTER 2

Review of Literature

This chapter delineates information regarding Ephedrine and its use among high school athletes. Due to the lack of research conducted on Ephedrine use by high school athletes, the literature review will examine other types of ergogenic aids, as well as studies conducted to support the need for the present study.

This chapter will be presented in eight sections: a) an overview of Ephedrine; b) the effects and side effects; c) history of steroid and ergogenic aid use by athletes; d) history of anabolic steroid use in sport and exercise; and e) (i) a history of anabolic steroid use in professional football; (ii) college athletics; and (iii) high school athletics. Next, the review of literature will examine the research that has been conducted on: a) studies of anabolic steroid use on (i) college athletes; and (ii) high school athletes; as well as a brief overview of: b) dietary supplements and their use at the (i) professional, (ii) college, and (iii) high school levels of athletes. Finally, the research pertaining to the use of c) Ephedrine products will then be reviewed.

Ephedrine, Effects and Side Effects

According to the American Heritage Dictionary of the English language 2000, Ephedrine is a white, odorless, powdered or crystalline alkaloid, $C_{10}H_{15}NO$, isolated from shrubs of the genus *Ephedra* or made synthetically. *Ephedra* is any of various gymnospermous, mostly shrubby plants of the genus *Ephedra*, some of which are used as a source of Ephedrine. Ephedrine is also a stimulant often sold as pills or tablets, derived from a plant of this genus. Some of the popular Ephedrine products are: Metabolife,

Ripped Fuel, Diet Fuel, Stacker 3, Hydroxycut, Xenadrine RFA-1, Yellow Jackets, and Natural TRIM.

Ephedra's most powerful ingredient is the chemical Ephedrine (Duenwald, 2003). Like an amphetamine, Ephedrine stimulates the central nervous system, increasing blood pressure and heart rate, decreasing appetite and making the user feel energetic (Duenwald).

Ephedrine, through its sympathomimetic properties, is causally related to many adverse physiological effects, including cardiac arrhythmias, myocardial infarction, hypertension, stroke, and death (Krome & Tucker, 2003). There have been nearly 90 deaths and about 1500 reported cases of adverse effects related to the use of Ephedrine (Wolff, 2003). Bent, Odden, Shlipak, & Tiedt, (2003) found that Ephedra is by far the most dangerous herbal product on the market.

Ephedrine is one of a growing number of supplements that has the potential for abuse and serious adverse side effects (Krome & Tucker, 2003). Benowitz and Haller (2000) reviewed 140 reports of adverse events related to supplements containing ephedra alkaloids. These reports were submitted to the FDA between June 1, 1997, and March 31, 1999, and provide examples of severe cerebrovascular and cardiovascular side effects. Most of the cases described patients between the ages of 20 years old and 50 years old who were using Ephedrine-containing supplements as an adjunct to an exercise or fitness program (Benowitz & Haller). Given all the negative side effects associated with performance-enhancing drugs, it is questionable as to why these young adults would want to risk their health. Hainline and Wadler (1989) have pointed out five instances that

might lead athletes to utilize PEDs: (a) athletes who are at risk for not making a team or achieving the level of performance they desire; (b) athletes who are approaching the end of their career and are striving to continue to compete in their sport; (c) athletes who have weight problems and are seeking a means to increase or decrease weight; (d) athletes who are battling injuries and are trying to find ways to heal faster; and (e) athletes who feel external pressures from teammates, coaches, and parents, to use PEDs.

History of Steroid and Ergogenic Aid Use by Athletes

Some of the first recorded uses of ergogenic aids were when ancient Greeks ate sesame seeds and the legendary Berserkers (Norse warriors who were believed to be invulnerable in battle) used bufotien, a hallucinogen (Williams, 1974). Also, the Andean Indians chewed coca leaves, while the Australian Aborigines chose the pituri plant for stimulation and anti-fatiguing effects (Williams). Williams noted that the ancient Greeks and the Berserkers used these substances to enhance their natural bodies in some form, similar to how PED's are used today, and that these examples may be early forms of what we know today as PEDs.

During the 1940s, scientists discovered that testosterone could facilitate the growth of muscle tissue. Charles D. Kochakian, a pioneer in synthetic hormone research, reported as early as 1935 that androgens stimulated the protein anabolic processes, offering the possibility that androgen therapy might restore protein tissue and stimulate growth in patients (Hobberman & Yesalis, 1995). The clinical literature of the early 1940s often discussed the correlation between androgens and heightened muscularity, including speculations about the use of these drugs to boost athletic performance

(Hobberman & Yesalis). Since the 1940s countless elite athletes and bodybuilders have taken AS to increase muscle mass and to intensify training regimens (Hobberman & Yesalis). The Russians first admitted to using anabolic substitutes as ergogenic aids in the 1960s (Stokes, 1979). However, it is only in recent years that drug use in athletics has received considerable attention, probably because of the national and international drug problem as a whole (William, 1974). PEDs have been used for many years in different forms, which formulate the present study's significance. The issue of PEDs at the professional, collegiate, and now even high school levels is immediate concern.

History of Anabolic Steroid Use in Sport and Exercise

Behavior alteration was present in World War II and has continued into physical performance enhancement. Wade (1972) alleged that during World War II, German soldiers took steroids prior to battle to enhance aggressiveness.

AS have been noted to enhance physical performance. Boje (1939), wrote in the *Bulletin of the Health Organization of the League of Nations*, appeared to have been the first to suggest that sex hormones, based on their physiological actions, and might enhance physical performance. At the same time, the anabolic effects of AS were being confirmed in eunuchs and in normal men and women (Kenyon, Knowlton, Koch, Lotwin, & Sandiford, 1940). The next level of use of AS was sought after by athletes to enhance their physical performance in their respective sport.

The initiation of systematic use of AS in sports has been attributed to reports of their use by successful Soviet weight-lifting teams in the early 1950s. Statistical analysis of the performance of the Soviet lifters during this period is consistent with this assertion

(Fair, 1988). Dr. John Ziegler, a U.S. team physician, was reportedly told by his Soviet counterpart that the Soviets were taking testosterone (Starr, 1981). Ziegler returned to the U. S. and experimented with testosterone on himself and a few weight lifters in the York Barbell Club. When the Ciba Pharmaceutical Company released Dianabol (methandrostenolone) in 1958, Dr. Ziegler began experimentation with this new drug. Dr. Ziegler described some of his results in several popular physical training periodicals of the time, leading to news of the efficacy of these drugs. By the early 1960s, usage began more heavily in other strength-intensive sports. From field events to football, the number of AS users was based on information from past AS users who achieved championship status.

History of Anabolic Steroid Use in Professional Football

In the early 1960s, shortly after the word of the effectiveness of AS disseminated among weight lifters and throwers, football players began to incorporate these drugs into their training regimens. In 1963 the San Diego Chargers hired Alvin Roy, a Baton Rouge, Louisiana gym owner, as the first strength coach in professional football. Roy, previously an assistant coach for the U.S. Olympic weight-lifting team was speculated to have already been familiar with AS, and it is therefore alleged that he introduced the San Diego players to dianabol (Gilbert, 1969a, 1969b, 1969c).

From the mid-1970s to the early 1980s the Pittsburgh Steelers were said to possess one of the most sophisticated strength programs in pro football as well as one of the most physical styles of play (Courson, 1988). Interestingly, the Steelers were also a dominant force in the NFL during this period as well as in the NFL's Strongest Man

competitions (1980 to 1982). Courson (1991) also alleged that some of the athletes who contributed to this success used AS (Courson, 1991).

In 1991, prior to his death, NFL All-Pro lineman Lyle Alzado charged that NFL officials have known but ignored the extensive use of AS by the players (Alzado, 1991). Alzado stated that he used drugs during his entire career in the NFL, which spanned nearly two decades. Alzado also believed that the teams' coaches knew that he and others were taking drugs, but they just coached and looked the other way (Alzado). One of Alzado's coaches admitted that he knew about Alzado's drug use, "When I was coaching him, I was aware that he was using steroids," former Oakland Raiders coach Tom Flores told Steve Kelley of the *Seattle Times* (Alzado). Alzado's (1991) case demonstrates that even though his coaches knew he was taking the drugs, they were not inclined to stop his usage or intervene because the dangers and effects of the drugs were not widely understood or studied. This is why it is imperative to find out what athletes know about Ephedrine.

History of Anabolic Steroid Use in College

The NCAA outlawed, in principle, the use of AS in 1973. It was not until 1986 that a drug testing program was initiated (Albrecht et al., 1991). Jim Calkins, the co-captain of the 1969 University of California football team, claimed that he was given AS by the team physician in order to gain weight to play tight end (Scott, 1971). Based on the results of an anonymous survey of NCAA Division I-III athletes, one would expect that on a team with 100 football players, on average 10 would have used steroids in the prior 12 months (Albrecht et al.). In addition to football, other collegiate men's sports

have been connected with AS use; these include track and field, baseball, basketball, gymnastics, lacrosse, swimming, volleyball, wrestling, and tennis (Albrecht et al.; Anderson, Buckley, Wright, & Yesalis, 1990). The high number of collegiate users necessitates a need to determine if the usage began in high school or college. If AS usage started at the high school level, we must find out if other PEDs, especially Ephedrine, are being accepted and used as well.

History of Anabolic Steroid Use in High School

Hobberman et al. (1995) noted that AS use by high school athletes may have begun as early as 1959 when a physician in Texas allegedly administered Dianabol to a high school football team for an entire season. In 1965 a physician in Bloomington, California, oversaw a study in which three different commercial brands of AS were administered to 10th and 11th-grade football players (Gilbert, 1969b). By the late 1980s AS use had been reported in high school baseball, basketball, track and field, and wrestling (Anderson, Buckley, Wright, & Yesalis, 1988). The spread of steroid use to adolescents has likely involved a variety of paths over the past 4 decades, including interactions with older athletes, coaches, physicians, and even parents (Anderson et al.). There has been an influx of AS use at the high school level dating back to the 1950s. While there is history supporting the use of anabolic drugs, there needs to be follow up studies which support the use, knowledge, and effects of AS as well as other performance enhancing drugs, like Ephedrine.

and steroid use, behavior of others and steroid use, and availability of AS. Corbin et al. found that the usage rate for females was 1.1% and the usage rate for males was 2.4%. Steroids were most readily available to males, and the males reported knowing more steroid users than did females. Older athletes were more likely to consider steroid use, but differences in use rate were not significant from grade 8 to grade 12 (Corbin et al.). This study provided results that athletes at the high school level are using AS. Based on these findings the present study was developed.

The use of AS is perceived by the media, segments of the sports medicine and athletic communities, and by the public to have grown to epidemic proportions. Unfortunately, the incidence and prevalence to AS use among elite, amateur, and recreational athletes is poorly documented (Anderson, et al., 1988). Anderson et al. (1988) conducted the first nationwide survey of AS use among the general adolescent male population. This assessed 12th-grade male students in private and public high schools. Samples were drawn from a pool of 150 schools across the nation that employed certified athletic trainers (ATCs) who had participated in a sports epidemiology survey within the prior two years. A questionnaire which consisted of 11 questions on AS use was employed to collect data. The last question established current or previous use of AS. Those who answered yes to this question were instructed to proceed to a series of 12 questions that further explored steroid usage. Those who responded no were directed to 12 questions related to basic health behavior. This strategy likely resulted in equal survey completion times for steroid users and nonusers, helping to assure anonymity during the administration of the instrument. Pilot surveys established that the instrument

Studies of Anabolic Steroid Use in College

To determine the substance-use patterns of college student-athletes, the NCAA studied the abuse habits for alcohol, amphetamines, anabolic steroids, cocaine/crack, Ephedrine, marijuana/hashish, psychedelics/hallucinogens, and smokeless tobacco (Bray, Green, Petr, & Uryasz, 2001). A self-report survey was handed out to athletes who were asked to anonymously complete the study. The researchers examined male and female student-athletes from 30 sports competing at 991 NCAA Division I, II, and III institutions (Bray et al.). The respondents were queried about their use of eight categories of substances in the previous 12-month period. Bray et al identified of the eight categories of substance use, alcohol was the most widely used drug in the past year at 80.5% of athletes surveyed. AS use was reported at 1.1% of athletes overall, some sports demonstrated higher use, and 32.1% of athletes obtained their AS from a physician other than the institution's team physician.

Future studies like the 2001 NCAA study would be beneficial at the high school level. Most studies have either been performed at the professional or collegiate level. As the number of high school athletes using some type of PED increases, so will the number of incidences and the greater need for regulation of the drugs.

Studies of Anabolic Steroid Use in High School

With the growing number of high school athletes using some type of PED, there is a need for studies dealing specifically with the high school student-athlete. A group of 1,680 high school athletes were studied to determine factors associated with AS use (Corbin, Feyrer-Melk, Lewis, & Phelps, 1994). A questionnaire assessed personal factors

could be used with this population without difficulty and required similar amounts of time for both users and nonusers of steroids to complete (Anderson et al.).

The mean rate of AS use for all schools studied was 6.34% \pm 5.61%. The mean rate of AS use for all students studied was 6.64% (Anderson et al., 1988). The results indicated a variation among the participating institutions, with seven schools (15%) reporting no steroid use (Anderson et al.). The evidence indicates that educational intervention strategies should begin as early as junior high school; the intervention strategies should not be directed only towards those individuals who participate in school-based athletics. The present study determined if there is Ephedrine use by high school athletes. The previous studies, like the Anderson et al.'s study, have focused on AS, where the present study used Ephedrine as the substance of choice.

The prevalence of AS use among adolescent males and females was revealed in a study conducted by Irving, Neumark-Sztainer, Story, & Wall, (2002). Four thousand seven hundred forty-six middle school and high school students from thirty-one St.Paul/Minneapolis public schools completed surveys and anthropometric measurements, as part of a population-based study of eating patterns and weight concerns among teenagers. The data were collected from students within Health, Physical Education, and Science classrooms in one 90-minute period or two 50-minute periods. Trained research staff administered the surveys within school classes.

The results identified that AS use was more common in males (5.4% of males, versus 2.9% of females), non-Caucasians, and in middle school students. AS use in adolescence was found to be associated with poorer health-related attitudes and behaviors

and exposure to socio-environmental influences encouraging weight preoccupation. Attention needs to be directed toward youth who may be at increased risk for AS use within clinical and community-based settings (Irving et al., 2002). The results from this study indicate that the use of AS is present among adolescents. With this information provided, the present study will examine the usage of Ephedrine by athletes at the high school level.

Athletes and non-athletes use AS to improve their strength and enhance their appearance (Alongi, Miller, & Tanner, 1995). A study was conducted to determine the prevalence of AS use by high school students in Denver, Colorado (Alongi, et al.). The prevalence of AS use was 2.7% (4.0% for males and 1.3% for females); prevalence was slightly higher in sport participants than non-participants. The mean age of starting AS was 14 years old with a range between 8 and 17 years old. Alongi et al.'s study was the first documented detailed assessment of high school students' knowledge of the risks of AS. The Alongi et al.'s study revealed knowledge deficits regarding the potential side effects of AS. Users of AS were less likely than nonusers to acknowledge the risks of AS. Alongi et al. suggested that health care providers should provide more information to adolescents about AS. Teaching efforts regarding AS should start in junior high school or sooner and continue through high school (Alongi, et al.). Studies on AS, like the Alongi et al. study, can be used as a template for future studies on Ephedrine product use and can be used in comparison to Ephedrine product use.

The last study researched on AS use by Stilger and Yesalis (1999) provided the present study with suggestions for disseminating accurate information about AS abuse,

which can be implied for the present study on Ephedrine. Out of the 1,325 subjects, 873 Indiana high school football players participated in the study on AS use. The results indicated that 6.3% of the 873 Indiana high school football players were current or former AS users. The average age at the time of first use of AS was 14 years old and 15% of the 6.3% began taking before the age of ten (Stilger & Yesalis). Stilger and Yesalis (1999) suggested that ATCs can play a vital role in disseminating accurate information about AS abuse, including long term adverse health risks. The suggestions from this study can be implemented in the present study on Ephedrine use.

Dietary Supplement Use in Professional Basketball

Mora, Navarro, Schroeder, Seco, Torregrosa, & Tramullas, (2002) focused on the use of dietary supplements in a professional Spanish Basketball League. Mora et al. researched the type, amount, frequency and timing of dietary supplement use by elite players in the first Spanish Basketball League. The type, amount, and specific timing of supplement use were recorded by 55 professional basketball players from seven different teams of the first Spanish Basketball League.

Mora et al. (2002) identified that most elite players (58%, n=31) consumed dietary supplements. Multivitamins and vitamins were the most frequently used supplements among the elite players (50.9%, n=27), followed by sports drinks (21.8%, n=11), miscellaneous supplements (21.8%, n=11), amino acids (14.5%, n=7), proteins (12.7%, n=6) and carbohydrates (12.7%, n=6). Although the proportion of elite players who consumed dietary supplements before, during, and immediately after exercise was 25.4%, 16.3% and 7.3% respectively, only a few consumed potentially ergogenic

supplements at these times. Mora et al. suggested that the type or amount of dietary supplements consumed had a beneficial effect on the physical performance of these professional basketball players, with the possible exception of antioxidant vitamins and the commercial sports drink. At the professional level, it seems almost obsolete for an athlete not to consume any type of performance enhancing drug or supplement.

Dietary Supplement Use in College.

Gillentine and Hunt (2001), conducted a study on dietary supplement knowledge and information sources among college student athletes. Ninety-two students from a health education survey class responded to a 13 item assessment of dietary supplement knowledge. Responses indicated 81% of these students used some form of dietary supplements. No significant differences in knowledge levels were noted between female and male students, or between users and nonusers of dietary supplement products. The increase in use of supplements at the college level leads one to believe that there is an increase at the high school level as well. Gillentine and Hunt's study also confirms the need for the present study.

Dietary Supplement Use in High School.

Influences on the use/non-use of dietary supplements among adolescent athletes were studied by Perko (1999) to determine the use of dietary supplements by adolescent athletes and who or what influences the adolescent athletes. Dietary supplement use is a well documented practice among adult and adolescent athletes (Perko). Perko's purpose was to provide preliminary results of the theory-based Survey to Predict Adolescent Athletes Dietary Supplement Use (SPADDSU) to assess influences of behavioral

intentions, attitudes, and beliefs of 1,737 adolescent athletes regarding dietary supplements. The SPADDSU is based on the Theory of Reasoned Action (TRA). The ultimate goal of the TRA is to predict and understand human behavior. Perko's study was the first of this kind to use theory to determine the underlying determinates of the dietary supplement use by adolescent athletes.

Data were collected during the winter and spring of 1999. Parental consent forms were sent to parent/guardians one week prior to the scheduled questionnaire date. Students who returned the completed consent forms before the questionnaire date were allowed to complete the questionnaire. The students anonymously completed the questionnaire and handed them in to the teacher after completion.

The results regarding student attitudes of dietary supplements were; 17.7% agreed/strongly agreed that most athletes their age need dietary supplements to improve sport performance (Perko, 1999). Twenty-seven point four percent of students agreed/strongly agreed that taking dietary supplements would help all athletes do better in sports (Perko). Nearly one-third of the students, 32.7% agreed or strongly agreed that taking dietary supplements is a safe way to improve strength (Perko, 1999).

The purpose of Perko's (1999) study was to assess intentions, attitudes, and beliefs about adolescent athletes and dietary supplement use. Perko (1999) wanted to determine what adolescent athletes are taking and more importantly, to find out why. It was also noted that a valid and reliable instrument such as the SPAADSU will greatly benefit those groups of individuals who are responsible for the well being of adolescent athletes; most specifically, but not limited to, coaches, ATCs, physicians, health

educators, and parents/guardians (Perko). Perko's study is similar to the present study. The goals of the present study were to determine what adolescents in the San Francisco/San Jose Bay-Area know about Ephedrine and if they are taking Ephedrine. The goals were also to provide the groups of individuals who are responsible for the well being of the adolescent athletes with the proper knowledge on Ephedrine use to prevent future use.

Research on Ephedrine

Most literature and studies available on Ephedrine pertain to the effects of Ephedrine, Ephedrine related deaths, and the side effects of Ephedrine. However, the literature and studies cited have mainly been found in the media. In peer reviewed literature research specifically on Ephedrine use by athletes and the effects of Ephedrine when the body is stressed by exercise is lacking. Bray et al. (2002), was one of a few researchers who focused on Ephedrine and athletes; He identified the substance use and abuse habits of college student-athletes. Eight categories of substance use were found in the survey, including Ephedrine. Bray et al. found that the probability of Ephedrine use is highest in both NCAA Division II and III schools.

The Blue Cross Blue Shield Association (BCBSA), (2001) was developed to educate youth and their families about the potential health effects of PEDs and eliminate their use from all levels of sport. The BCBSA study was conducted in August of 2001. The specific objectives of this study were to determine attitudes and behaviors surrounding PEDs and sports supplements.

The BCBSA (2001) study found the majority of adults and teens to be aware of sports supplements (75% and 52% respectively) or PEDs (76% and 59% respectively). Among adults, Creatine and Ephedra were found to be equally popular. Among youths, awareness of creatine was more than double that of ephedra. Use of ephedra was found to be more common among adults than among youths. BCBSA also found that only a handful of teenagers know of someone who has used Ephedra. Of the adults and teenagers combined, Ripped Fuel and Diet Fuel were found to be the most popular Ephedra-containing supplements. Virtually all young people associated with this study realized there were risks associated with PEDs, but most were unaware of the side effects. Seventy-six percent of youths did not know of potential side effects of PEDs (BCBSA).

There have been limited studies dealing with the use of Ephedrine products and the high school athlete. Therefore, the lack of knowledge and the increasing use of Ephedrine in high school athletes prompted the need for this particular study.

Summary

In conclusion, it is evident that research in the area of usage of Ephedrine by athletes, specifically high school athletes, is needed. With the ban of Ephedrine products in place, it is imperative to determine whether high school athletes are using Ephedrine products and if they are knowledgeable regarding the products. The adverse side effects related to the use of Ephedrine being detrimental to one's health, prompted the present study to find out if high school athletes are using Ephedrine products or if they are knowledgeable on the effects of Ephedrine on the body. Before a program can be

implemented to educate and stop the use of Ephedrine, a study needs to be conducted to determine the extent of use and knowledge of Ephedrine use.

Performance enhancing products have been around since the 1930s and possibly earlier. AS as a performance enhancing product has also been around for many years. Many examples of how AS have been used to enhance performance and the extent of AS use has increased to the level currently used today.

During the 1960s professional football players began using anabolic steroids in their training regimens. Steroids became more popular throughout the professional league of football. The death of Lyle Alzado prompted the league, coaches, and players to take a step back and look at anabolic steroids in a different perspective.

In 1973 the NCAA outlawed the use of anabolic steroids. In 1986 a testing program was initiated (Anderson et al., 1990). This also prompted officials to look at performance enhancing substances in a different perspective. Not only were these drugs having great outcomes, but these drugs were causing dangerous side effects, even death.

Use of performance enhancing substances at the professional and collegiate levels has trickled down to the high school level. The studies presented in this chapter have determined the use of anabolic steroids at the collegiate and high school levels. With these previous studies being conducted regarding anabolic steroids, this substantiated the need for the present study of Ephedrine use among high school athletes. Previous studies have been related to collegiate athletes, professional athletes, or other performance enhancing substances besides Ephedrine. The present study focused on Ephedrine use and the high school athlete.

CHAPTER 3

Methods

Drug use by athletes has definitely been on the rise (Irving et al., 2002). Drugs are consumed at all levels of athletics; professional, college, and high school (Wolff, 2003), yet not all substances have been investigated at the high school level with regards to the students' knowledge and use. Thus, the purpose of this study was to assess high school athletes' knowledge and use of Ephedrine products.

This chapter is divided into several sections: (a) Subjects; (b) Development of the questionnaire; (c) Content validity and reliability of the questionnaire; (d) Administration of the survey; (e) Statistical procedures; and (f) Summary.

Subjects

One hundred and thirty-six subjects were mailed consent forms. Out of the 136 consent forms that were mailed, 58 were returned, which provided a study wide return rate of 43%. The sample population included male and female high school interscholastic athletes from grades nine, ten, eleven, and twelve, ranging in age from fourteen to eighteen years old. The subjects questioned attended one of the two participating high schools in the San Francisco/San Jose Bay-Area during the 2003-2004 school year. The San Francisco/San Jose Bay-Area high schools were chosen as a convenience to the researcher. The ATCs who helped distribute the questionnaires at these schools were selected based on their participation in the San Jose State University Graduate Athletic Training Internship Program. The researcher believed that this sample would have a greater return of questionnaires due to the relationships with the athletic training staff at these two schools.

Development of the Questionnaire

A questionnaire originally intended for Mary Brkirch's thesis study in 1992 was modified for use to collect Ephedrine product knowledge and use information. Modification to the questionnaire included changing the words "performance enhancing substances" to "Ephedrine products," as well as eliminating one question relating to multiple performance enhancing substances.

The questionnaire for the current study consisted of four sections. The first section of the questionnaire consisted of demographic questions relating to the subjects' current age, grade, and the particular sport in which the subject participated during the 2003-2004 academic school year (see Appendix B).

The second section has four questions. This section of the questionnaire consisted of questions that determined if the subjects are knowledgeable of Ephedrine and which products contain Ephedrine. In addition, the subjects were questioned on their knowledge of others who use Ephedrine products. Subjects were then asked to identify known products from a provided list. Subjects who indicated using the Ephedrine products themselves were asked about their frequency of Ephedrine use. Choices included: never, once or twice, one time a month, one time a week, two-three times a week, one time a day and three times a day.

The third part of the questionnaire included two questions pertaining to why subjects use Ephedrine. The response choices included: to decrease weight, to increase strength, to increase speed, to reduce fatigue, to improve appearance, to increase performance, for pleasure, peer pressure, and other. Subjects were also requested within

this section to identify their main sources of information about Ephedrine containing agents.

The fourth part of the questionnaire had eight questions regarding fairness of athletes using Ephedrine, effects of using Ephedrine on your body, products that help an athlete's performance, participation in collegiate athletics, whether they hope to obtain an athletic college scholarship, and their overall strength and health status. Subjects were also requested to rate their overall health and strength status compared to their peers. The instrument and procedures were reviewed and approved by the Institutional Review Board (IRB at San Jose State University).

Content Validity and Reliability of the Questionnaire

Survey data collection is an interaction between a researcher and a respondent. The questionnaire is the protocol for one side of the interaction. In order to provide a consistent data collection experience for all respondents, a good questionnaire has the following properties: (a) The researcher's side of the question and answer process is fully scripted, so that the questions as written fully prepare a respondent to answer questions; (b) the question means the same thing to every respondent; and (c) the kinds of answers that constitute an appropriate response to the question are communicated consistently to all respondents (Fowler, 1988).

A measurement tool of any kind is valid to the degree it measures all of what it intends to measure and only that which it is supposed to measure. To be valid it must be free of extraneous factors that systematically push or pull the results in one particular direction. If something other than what is being measured affects the results by introducing a systematic bias, the results are less valid (Alreck & Settle, 1995).

Self-report studies have widespread application primarily because other satisfactory and practical measures of drug use are usually unavailable (Stacy, 1985) or financially difficult to obtain. Self-report methods have been shown to be valid for documenting drug use, especially for the age group of this study (Ausel, 1976; Bonito, 1976; Deaux, 1984; Edwards, 1977; Freedberg, 1980; Petzel, 1973; Polich, 1979; & Stacy, 1985). When the drug use rates from self-report studies have been compared with external methods of documenting drug use (reports by others, blood, urine samples), the self-report use rates have been similar or only slightly lower than rates from the other methods (Anderson et al., 1988).

The modified questionnaire was reviewed by four ATCs for face validity given that this questionnaire had been previously used with minor modifications. No changes or recommendations were made.

The reliability of a study is dependent upon the subjects being able to understand and interpret the questionnaire and the researcher's ability to give accurate directions. Therefore, to enhance the reliability of this study, a statement of the purpose was written on the top of each questionnaire, as well as a written protocol, for which each subject could refer to if needed beyond the verbal instructions they received from the ATCs who administered the questionnaires.

Administration of the Survey

After IRB approval, the researcher sought permission to conduct the study from the athletic director at each school via a written letter (see Appendix C). Once the researcher received permission from the athletic director, via written confirmation

regarding the letter in which they received, the research was able to begin (see Appendix D).

The researcher met with the ATCs at the participating schools (two high schools in the San Francisco/San Jose Bay-Area) to discuss the involvement of selected athletes. The ATC asked subjects that entered their athletic training room if they would be willing to participate in the current study. Subjects who agreed to participate in the study were asked to provide the ATC with their home address. The ATC then provided the researcher with the addresses of the subjects. The researcher then mailed a consent form (see Appendix E) to the parent or guardian to read and sign. Once the parent or guardian signed the consent form the subject returned it to the ATC. Subjects who returned the consent form signed from his/her parent/guardian before the date of the questionnaire administration were allowed to participate in the study. Subjects who failed to bring the consent form back before the date of the questionnaire administration, or whom brought the consent form back unsigned by the parent/guardian were not allowed to participate in the study.

On the day of the questionnaire administration, subjects who returned a signed consent form were allowed to participate. The ATC placed all of the consent forms in a sealed envelope and returned them to the researcher during a scheduled meeting time. The ATC at each school distributed the questionnaires to their subjects on the scheduled questionnaire day. The subjects were allotted 10 minutes to complete the questionnaire and hand it back to the ATC. The ATC then placed the completed questionnaires in a sealed envelope and returned the questionnaires to the researcher during the scheduled meeting time.

Statistical Procedures

Data were collected from the questionnaires, tabulated, and analyzed for descriptive purposes using means and percentages. In addition, cross tabulations were conducted to assess associations between multiple questions surveyed. The Statistical Package for the Social Sciences (SPSS 2003, version 11.0) computer program was used to calculate and analyze the data. Tables were also developed to assist the understanding of the findings.

Summary

Once permission was granted by the IRB at SJSU, and the athletic directors at the respective schools, the ATC started selecting subjects to participate in the study. Once the subjects agreed to participate they had to provide the ATC with their current mailing address. The ATC then provided the researcher with all of the addresses of subjects willing to participate in the study. The researcher then mailed a consent form home to be signed by the subjects' parent or guardian. Once the consent forms were returned to the ATC the questionnaires were distributed. This study was conducted using a questionnaire that was completed anonymously by 58 subjects from the San Francisco/San Jose Bay-Area. Fifty-eight subjects out of 136 (43% return rate) subjects volunteered to participate in the study. Data from this study were compiled into a journal article for *The Physical Educator*, according to the authors' notes (see Appendix A)

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Appendix A

Authors' Notes for The Physical Educator

INSTRUCTIONS FOR AUTHORS

The original manuscript and two clean copies should be sent directly to William F. Stier, Jr., #4 Trefoil Lane, Brockport, New York, 14420. Include a stamped self-addressed envelope for return of the manuscript should revisions be required. **APA format 5th edition** must be used consistently and throughout the entire paper. Manuscripts must be typed double-spaced with wide margins on 8.5 x 11-in. bond paper.

The first page of the manuscript must include the title of the article only. Do not include your name, affiliation, or other identifying information except on a cover sheet. The cover sheet must include the title of the manuscript, name of the author (s), and institutional affiliation (s). At the bottom of the cover sheet, include the mailing address and phone number of the author who is to receive the galley proofs. A one paragraph abstract must accompany each manuscript.

Label all graphs and tables and place them on separate pages. Number pages beginning with the title page followed by text, references, figure captions, tables, and figures. Tables should be double spaced and figures should be professional looking. Freehand art or lettering is not acceptable.

Carefully check references to assure they are correct and include only when they are cited in the text. Only include references which have been published or accepted for publication.

Authors will be sent a letter of receipt when manuscripts are received in the editorial office. Manuscripts are read by the editor and two reviewers using a blind review process which takes 60 to 90 days. Authors will be notified about the disposition of their manuscripts as soon as reviewers have returned their reviews. Depending on the outcome of the review, authors will receive one of the following notices:

1. Letter of acceptance certifying the article will be published in the near future.
2. Letter of rejection and copies of reviewers' comments.
3. Letter recommending revision and copies of reviewers' comments and suggested revisions. A due date will be listed for resubmission of the revised manuscript.

Galley proofs will be mailed to the identified author and must be returned within 72 hours of receipt. Only minor corrections can be made; new additions or major revisions are not allowed. Reprints of articles are not available at this time. Lead authors will receive six copies of *The Physical Educator* after the article has been published.

NOTE: Now that we have changed the artwork on the cover of the Journal, we will continue to solicit photographs of physical facilities that house programs in physical education, health, recreation, and related areas. Each photograph will be reviewed to determine its appropriateness for use as a "cover." The cover will likely not change with each issue so a limited number of "final" selections will be made.

If you wish to submit a camera-ready photograph of such a facility to be used for the cover of *The Physical Educator*, please feel free to send them to Phi Epsilon Kappa, 901 West New York Street, Indianapolis, IN 46202.

Please include a letter or memorandum which clearly identifies the name of the facility (to be used in conjunction with the photograph) and language that will serve as a "release" from the photographer or from the appropriate administrator at the institution to which the facility belongs.

Appendix B

Ephedrine Knowledge and Use Questionnaire

Ephedrine Knowledge and Use Questionnaire

We are interested in determining the knowledge and use of Ephedrine products among high school athletes. In order to successfully carry out this project, we need as many people as possible to complete this questionnaire and everyone who does is helping the outcome of this study.

Participation is completely voluntary. The questionnaire is completely anonymous. **DO NOT PUT YOUR NAME ON IT.** The answers are confidential. The completed questionnaire will not be seen by any faculty or staff from your school. When you complete the questionnaire, hand it to the certified athletic trainer. Return of this survey implies consent to participate.
Thank you for your help.

KNOWLEDGE AND USE OF EPHEDRINE PRODUCTS QUESTIONNAIRE

1. What is your current grade level? Freshman Sophomore Junior Senior
2. What is your current age? 13 14 15 16 17 18 >18
3. Which school sports did you participate in this year (2003-2004)? badminton swimming wrestling
 basketball tennis fencing
 cross country track golf
 softball volleyball other (specify) _____
 soccer baseball football
4. Do you know any athletes who use Ephedrine products? yes no
5. If yes to Question #4, which Ephedrine product do they use? Metabolife Metab-O-Lite
 Ripped Fuel Metabolift Diet Fuel
 Up Your Gas Stacker 3 Truckers Luv It
 Natural TRIM Yellow Jackets Hydroxycut
 Xenadrine RFA-1 Other (specify) _____
6. Do you use Ephedrine products? yes no

7. If yes to Question # 6, which Ephedrine products do you use? How often? (Please Check)

	Never	1x or 2x	1x/month	1x/week	2-3x/week	1x/day	3x/day
a. Metabolife							
b. Ripped Fuel							
c. Diet Fuel							
d. Stacker 3							
e. NaturalTRIM							
f. Hydroxycut							
g. Xenadrine RFA1							
h. Metab-O-Lite							
i. Metabolift							
j. Up Your Gas							
k. Truckers Luv IT							
l. Yellow Jackets							
m. Other							

8. If you have ever used Ephedrine products, what is the main reason?

- to decrease weight
- to increase weight
- to improve appearance
- to reduce fatigue
- to increase strength
- to increase speed
- to cope with pressure
- to increase overall performance
- for pleasure
- peer pressure
- other (specify) _____

9. What is your source of information about Ephedrine products?
 coach newspaper teacher TV
 other athlete magazine athletic trainer
 doctor family member none
 other (specify)_____
10. Do you think it is fair for athletes using Ephedrine products to participate with substance-free athletes?
 yes no
11. Do you think the effects of using Ephedrine products on your body are:
 good bad don't know
12. Do you think Ephedrine products help an athlete's performance?
 yes no
13. Do you plan to participate in college athletics?
 yes no
14. If yes to Question #13, do you hope to obtain an athletic scholarship?
 yes no
15. Would you use Ephedrine products if you thought it would help you obtain a college scholarship?
 yes no
16. How would you rate your overall health status compared to your peers?
 excellent very good good fair
 poor
17. How would you rate your overall strength compared to your peers?
 greater than average average
 less than average

This ends the questionnaire. Please hand your survey to the certified athletic trainer. Double check to make sure your name is not on the survey. Again, thank you for your help in this survey.

Appendix C

Letter to Athletic Directors

Spring, 2004

Dear Athletic Director:

I am writing to ask for your help in obtaining data for my thesis pertaining to student-athlete Ephedrine knowledge and use. The grade levels I am studying are 9-12. I am asking your permission to conduct research at your school, as well as support in advising coaches about the importance of this study.

The study will consist of a questionnaire that will be distributed during the warm-up of their sport. Informed consent forms must be obtained by all students and signed by a parent or legal guardian. Participation of these student-athletes will not cause any harm to them. The questionnaires will all be confidential and anonymous and no service of any kind, to which the student-athlete are otherwise entitled, will be lost or jeopardized if they choose to "not participate" in the study. The student-athlete consent will be given voluntarily. They may refuse to participate in the entire study. If the student-athlete decides to participate in the study, they are free to withdraw at any time without any negative effect on their relations with San Jose State University.

Please let me know as soon as possible if you and your school are willing to participate in this study. If you are willing to participate, please send a letter of confirmation to the following address: 1401 Red Hawk Circle Apt. G310 Fremont, CA 94538. Enclosed you will find a sample questionnaire and consent form. If you would like additional information, including current information regarding the study, please do not hesitate to call me at (510) 557-3697 or my advisor at San Jose State University, Dr. Leamor Kahanov at (408) 924-3040 or Dr. Pam Stacks, interim Vice President of Graduate Studies and Research, San Jose State University at (408) 924-2427. Thank you.

Regards,



Jayme R. Hatcher, ATC
Head Athletic Trainer
Abraham Lincoln High School



**College of Applied
Sciences and Arts**
**Department of Human
Performance**

One Washington Square
San José, CA 95192-0054
Voice: 408-924-3010
Fax: 408-924-3053

Appendix D

Letter of Confirmation



San José State
UNIVERSITY

**College of Applied
Sciences and Arts**
**Department of Human
Performance**

One Washington Square
San José, CA 95192-0054
Voice: 408-924-3010
Fax: 408-924-3053

Spring, 2004

Graduate Studies and Research
San Jose State University
One Washington Square
San Jose, CA 95192-0025

Dear Human Subjects Institutional Review Board,

Please be advised that _____ High School is in full support of Jayme Hatcher's study on the use of Ephedrine products among High School athletes in the San Francisco/San Jose Bay-Area.

She has our permission to conduct this study at _____ . We expect her to exercise confidentiality in her study and that the results and answers to questions are unconnected to individual athletes. We understand that this study has been approved by the San Jose State University Human Subject Board.

Sincerely,

Director of Athletics

Appendix E
Consent Form

Agreement to Participate in Research

Responsible Investigator: Jayme R. Hatcher
Title of Protocol: Knowledge and Use of Ephedrine Among High School Athletes



College of Applied Sciences and Arts
Department of Human Performance
One Washington Square
San José, CA 95192-0054
Voice: 408-924-3010
Fax: 408-924-3053

Your child has been asked to participate in a research study investigating the knowledge and use of Ephedrine among high school athletes. Your child will be asked to complete a questionnaire. There are no risks anticipated to participants of this study. All of the questionnaires will be anonymous; therefore, researchers will not know whose information is used. Although the results of this study may be published, no information that could identify your child will be included. There is no compensation for participation in this study.

Questions about this research may be addressed to Jayme R. Hatcher (510) 557-3697. Dr. Leamor Kahanov, Director of Athletic Training, Department of Human Performance, also may be reached for questions at (408) 924-3040. Complaints about the research may be presented to Dr. Gregory Payne, Department Chair, Department of Human Performance, (408) 924-3010. Questions about research subjects' rights or research-related injury may be presented to Dr. Pam Stacks, interim Vice President of Graduate Studies and Research, San Jose State University, (408) 924-2427.

No service of any kind, to which your child is otherwise entitled, will be lost or jeopardized if you and your child choose to "not participate" in the study. Your child's consent is being given voluntarily. Your child may refuse to participate in the entire study or in any part of the study. If your child decides to participate in the study, he/she is free to withdraw at any time without any negative effect on their relations with San Jose State University or with any other participating institutions or agencies.

Name of Child or Ward

Parent or Guardian Signature

Date

Relationship to Child or Ward

Full Mailing Address

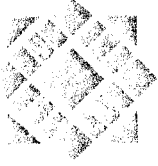
Investigator's Signature

Date

The California State University:
Chico, Fresno, Fullerton,
Hayward, Long Beach, Los Angeles,
Los Angeles Maritime Academy,
Merced, Monterey, Pomona,
San Bernardino, San Diego,
San Francisco State, Stanislaus,
and Ukiah

Appendix F

Institutional Review Board Approval Letter



San José State
UNIVERSITY

**Office of the Academic
Vice President**

**Academic Vice President
Graduate Studies and Research**

One Washington Square
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From: Pam Stacks,
Interim AVP, Graduate Studies & Research

Date: March 17, 2004

The Human Subjects-Institutional Review Board has approved your request to use human subjects in the study entitled:

“Knowledge and use of Ephedrine among High School Athletes.”

This approval is contingent upon the subjects participating in your research project being appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity when they participate in your research project, and with regard to all data that may be collected from the subjects. The approval includes continued monitoring of your research by the Board to assure that the subjects are being adequately and properly protected from such risks. If at any time a subject becomes injured or complains of injury, you must notify Pam Stacks, Ph.D. immediately. Injury includes but is not limited to bodily harm, psychological trauma, and release of potentially damaging personal information. This approval for the human subjects portion of your project is in effect for one year, and data collection beyond March 17, 2005 requires an extension request.

Please also be advised that all subjects need to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate, or withdrawal will not affect any services that the subject is receiving or will receive at the institution in which the research is being conducted.

If you have any questions, please contact me at (408) 924-2480.

cc: Dr. Keamor Kahanov

The California State University:
Chancellor's Office
Bakersfield, Channel Islands, Chico,
Dunsmuir Hills, Fresno, Fullerton,
Hayward, Humboldt, Long Beach,
Los Angeles, Maritime Academy,
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