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Joseph M. Berning

New Mexico State University'

Kent J. Adams

California State University-Monterey Bay

Mark DeBeliso

California State University-Monterey Bay

Bryant A. Stamford

Hanover College's Department of Exercise Science

Ian Newman

University of Nebraska-Lincoln, inewman1@unl.edu

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Anabolic Androgenic Steroids:

Use and Perceived Use in Non-Athlete College Students*

Joseph M. Berning¹, PhD, Kent J. Adams², PhD, Bryant A. Stamford³, PhD, Mark DeBeliso⁴, PhD, Ian M. Newman⁵, PhD

¹Exercise Physiology Lab, Physical Education, Recreation and Dance Department, New Mexico State University, Las Cruces, NM

²Exercise Physiology Lab, Human Performance and Wellness Department, California State University Monterey Bay, Seaside, CA

³Department of Exercise Science, Hanover College, Hanover, IN

⁴Center for Orthopaedic and Biomechanics Research, Department of Kinesiology, Boise State University, Boise, ID

⁵Nebraska Prevention Center for Alcohol and Drug Abuse, Educational Psychology Department, University of Nebraska-Lincoln, Lincoln, Nebraska

Contact Author:

Joseph M. Berning, PhD
Exercise Physiology Lab
New Mexico State University
Physical Education, Recreation and Dance Department
PO Box 30001, MSC 3M
Las Cruces, NM 88003-8001
Phone: 505-646-3660
Fax: 505-646-4065
e-mail: jberning@nmsu.edu

Abstract

Anabolic androgenic steroids (AAS) are used not only for the enhancement of athletic prowess, but also for promoting a muscular appearance - traits that may be appealing to many non-athlete college students. **Purpose:** This study investigated the use and perceived use of AAS among non-athlete college students. **Methods:** A survey on use and perceived use of AAS was administered to a cross section of non-athlete students at a major metropolitan university.

Results: Of the 485 non-athlete college students participating, 42 (9%) reported using AAS (37 males, 5 females), whereas 443 (91%) reported never using AAS. Seniors were the highest AAS users (36%) and freshman the least (7%); 76% of users were 20-22 yrs old; 34% of non-users and 41% of users knew between 1 and 5 AAS users; 33% of users and 27% of non-users perceived that less than 5% of non-athlete college students used AAS, and 36% of the total sample perceived that 5-10% of non-athlete college students used AAS. In users, 7% used AAS because their friends were using AAS, 45% wanted to enhance their physical appearance and 48% wanted to increase their physical performance. **Conclusion:** This study found that AAS is an occult behavior that affects non-athlete college students. College-freshman used AAS the least whereas an increase in use occurred with college sophomores, juniors and seniors. Alarming, 43% of the sample indicated they personally knew one or more non-athlete college students who used AAS and over one-third believed that between 5 and 10% of the college student population uses AAS. The reported purpose for AAS usage was almost split equally between enhancing physical appearance and improving athletic performance.

Key Words: ANABOLIC STEROIDS, APPEARANCE AND PERFORMANCE ENHANCING DRUGS

INTRODUCTION

Anabolic androgenic steroids (AAS) have been thrust into the national spotlight by revelations and federal indictments of AAS providers and high profile athletes (7). The seriousness of the matter, and the degree to which it has captured national attention and moved into the mainstream consciousness, was underscored when President George W. Bush, in his 2004 State of the Union address (25), condemned the use of anabolic steroids and called upon professional sports to rid their ranks of this poisonous influence.

Efforts by the American College of Sports Medicine (ACSM) are helping keep the spotlight focused. Recently (1), the ACSM issued a statement: “ACSM considers chemicals, such as the recently identified tetrahydrogestrinone, or THG, developed and cloaked to avoid detection by doping tests, as serious threats to the health and safety of athletes, as well as detriments to the principles of fair play in sports. Any effort to veil or disguise steroid usage in sports through stealth, designer, or precursor means, puts elite, amateur and even recreational athletes at risk.”

This attention has stirred increased interest in the true extent of AAS usage. It is suspected that usage by athletes varying in status from high school to Olympic caliber is on the rise and gaining momentum, at least according to reliable word of mouth sources closest to the issues (7). In contrast, a 2004 review of scientific studies on this topic revealed that usage is no higher than about 6% among athletes (7). While most studies of AAS usage have concentrated on college athletes (5, 6, 10, 15, 17, 20), there is limited information regarding usage among non-athlete college students (16, 18, 23) – the vast majority of the student population. Non-athlete college students are often involved in recreational sports (e.g., intramurals, city leagues) and are typically pre-occupied - like many in society – with their appearance and sexual attraction.

Combine this with a recent survey of 500 AAS users that showed that almost 80% used AAS for cosmetic reasons (22), and it suggests a strong trend that AAS are being used not only for the enhancement of athletic prowess, but also for promoting a lean, muscular appearance in non-athletes (12, 13, 22). Athletic prowess and a lean, muscular appearance are two traits that may be appealing to many non-athlete college students. Quantification of the degree of usage in non-athlete college students is open to question, however, as the few published studies addressing this specific issue are now several years old, and they were published well before the eruption of public attention on AAS (16, 18, 23). Therefore, the purpose of this study was to investigate the use and perceived use of AAS among male and female non-athlete college students.

METHODS

Experimental Design

In order to address the research question a survey questionnaire was developed and administered to a cross section of students at a major metropolitan based university in the United States. The survey questionnaire was designed to assess the use and perceived use of AAS while documenting the demographics of the respondent. Analysis of the questionnaire responses with descriptive statistics allowed the investigators to answer the research question.

Subjects

This study was approved by an Institutional Review Board and all participants signed an informed consent document explaining the purpose and voluntary nature of the study prior to survey completion. Emphasis was placed on assuring anonymity and confidentiality. A total of 485 (219 male and 266 female) non-athlete (i.e., not participating in collegiate or professional sports) college students 19-26 years of age were surveyed (Table 1).

Survey Procedure

Classroom. The written survey questionnaire was distributed to 13 randomly chosen classes in a variety of disciplines including physical education, exercise science, criminal justice, athletic training and health. In order to ensure confidentiality and anonymity, recommendations established by the American Statistical Association Committee on Privacy and Confidentiality were followed (3).

Prior to administering the questionnaire, a brief explanation was provided about the purpose of the study, its importance, requirements and procedures. The instructor of each class was asked to leave the room during completion of the questionnaires in an effort to minimize any external influences on student responses, and to emphasize and demonstrate the degree of effort dedicated toward preserving confidentiality. Students were instructed not to write their names or any identifying marks on the questionnaire or optical scantron answer sheet. Upon completion of the questionnaire, the answer sheet was folded in half and sealed in the provided envelope. Students were then asked to place the sealed envelope in a large closed box located at the front of the classroom. The investigator remained at the front of the room, but out of direct sight while students completed the survey.

University Recreation Center. In addition to the classroom responses, several days were spent at the university recreation center weight room. Students were asked at random as they entered and left the weight room if they would be willing to voluntarily complete a questionnaire. Students who agreed to complete the survey were provided a clipboard and allowed to complete the questionnaire outside the weight room in the hallway away from other students. Students sealed the completed surveys in a provided envelope and placed the results in a sealed box in the same procedure as used in the classroom. Procedures to ensure confidentiality and anonymity were followed faithfully in all data collection settings.

Survey Instrument

Survey development was based on recommendations established by the American Statistical Association Section on Survey Research Methods (2). The instrument was designed to elicit single answer responses and consisted of three demographic questions and six usage questions. The demographic questions followed suggestions by Dillman (11) and queried age, gender, and year in school. Use and perceived use questions were based on previous studies (20, 27, 28) as well as from personal communication with several collegiate strength and conditioning coaches and exercise physiologists from various universities in the United States. The usage questions appear in the headings of Table 2.

The accuracy of reporting on a self-administered survey is always a concern. Anabolic-androgenic steroids are considered a controlled substance and because of the threat of legal or social consequences, despite guaranteed anonymity, may affect how an individual would respond to the survey. For example, Yesalis (28) points out that drug use varies among different populations and so might accurate self-reporting. As such, suggestions established by the American Statistical Association (2) and Yesalis (28) were followed in order to maximize the validity of the questionnaire results. Further, a recent study (22) reported the results from an internet based self-selected, self-administered questionnaire of AAS usage patterns of "Users". The authors acknowledged their study was vulnerable to selection bias but considered their results as valid. The control and random selection of participants in the current study should yield results with at least comparable validity to the aforementioned study (22).

Statistical Analysis

The questionnaire responses were analyzed using Statistical Package for the Social Sciences (SPSS), release 11.0.

RESULTS

Table 1 contains the demographic characteristics of the sample (N=485). Forty-two (8.7%) students reported using AAS whereas 443 (91.3%) reported never using AAS. Of the AAS users, 37 (88.0%) were males and 5 (12.0%) were females. The largest amount of AAS use occurred among students who were 20 (23.8%), 21 (38.0%) and 22 (14.3%) years of age whereas students who were 19 (9.5%), 23 (4.8%), 24 (7.1%), 25 (0%), and 26 (2.3%) years of age reported the least amount of AAS use. Class standings indicated that seniors (35.7%) were the highest AAS users and freshman (7.1%) used AAS the least.

Table 2 contains the results of three questions which addressed the perceptions held by both AAS users and non-users regarding AAS use among students. Additionally, Table 2 reports the results of one question exploring the likelihood that non-user students may consider using AAS sometime in their future.

Sixty-two percent (276) of non-users said they did not know anyone who used AAS whereas 34% (148) knew between one and five AAS users. Of the 42 AAS users, 7.1% (3) reported not knowing anyone else who used AAS and 40.5% (17) knew between one and five other AAS users. Both AAS users and non-users perceived the amount of AAS use among students to be very similar; 33% of AAS users and 27% of non-users reported they perceived that less than 5% of non-athlete students used AAS, whereas 36% of AAS users and 37% of non-users perceived 5% to 10% of non-athlete students used AAS.

Users, of course, perceived that gaining access to AAS would be easy compared to non-users. Experience and familiarity with the process of obtaining AAS likely were primary factors. Some of the users indicated that they would not know how to obtain AAS. The only reasonable

explanation for this is that the AAS they used must have been provided to them by another user, and they never were challenged with the procurement process.

The results of the question asking non-users how likely they would be to use AAS in the future indicated that 91% would be very unlikely to ever use AAS. However, 4% of non-users stated they would be somewhat unlikely, 3% were unsure, 2% felt they were somewhat likely to use AAS and less than 1% said they were likely to use AAS in the future. In contrast, 76% of AAS users reported they were somewhat likely or very likely to continue to use AAS in the future.

Table 2 also shows that 21% of AAS users consumed AAS only once, 26% had used AAS between two to four times, 17% used between five and seven times, 12% used between eight and 10 times and 24% used AAS more than 10 times in their lifetime. One time usage was defined as using AAS for a cycle. Cycles among users usually ranges from 6-12 weeks (29). Of significant interest was that 7% used AAS because their friends were using them, 45% wanted to enhance their physical appearance and 48% wanted to increase their physical performance, even though respondents were non-athletes.

DISCUSSION

The present study investigated the use and perceived use of AAS among non-athlete college students. A number of studies have investigated the use of AAS among college students; however most have focused on college athletes rather than the non-athlete college student population (5, 6, 10, 15, 17, 20). Other studies have investigated AAS user attitudes and the reasons for using AAS (19, 21), but again, few have focused on the non-athlete college student population (16, 18, 23).

Use of anabolic androgenic steroids. The percentage of AAS users (8.7%) among this sample was similar to studies conducted prior to 1990 (4, 5, 10) and much higher than studies conducted after 1990 (6, 15, 17, 20). However, these earlier studies focused only on college athletes. One study not focusing on college athletes found only 2% of their sample used AAS (23). Some have suggested that AAS use has always been high, but since the enactment of the 1990 Anabolic Steroids Control Act, AAS users have hesitated to discuss or report their use of the drugs for fear of criminal prosecution (17).

In the present study, the higher reported use rates may reflect two quite different scenarios. On the one hand, potentially there is an alarming trend toward a substantial increase in AAS usage among non-athletes. On the other hand, the higher incidence reported could have been a result of data collection procedures which highly emphasized anonymity and confidentiality. This included personal interactions between the investigator and all potential subjects in which the investigator pledged that every effort would be made to ensure anonymity and confidentiality. And this, perhaps, increased the level of trust among respondents, allowing them to be more forthcoming in their responses. Because it is impossible at the present time to determine which of the scenarios is accurate, it is recommended that in future studies, efforts designed to guarantee anonymity be manipulated in order to determine whether they may impact results. The greater the effort applied, in other words, perhaps the greater the AAS usage revealed.

Of the 42 AAS users, 37 (88%) were males and 5 (12%) were females. The higher reported use among males is consistent with previous research (20). College freshman represented the lowest percentage (7%) of AAS users among all classes. These results were

similar to others (17, 20) and indicate that as students move from freshman to seniors, their chance of using AAS increases.

Of the AAS users, 21% indicated that they had used AAS only once. The remaining 79% indicated that they had used AAS two or more times. Twenty four percent of the users reported using AAS 10 or more times in their life. This suggested that once someone started using AAS, 80% would use AAS a second time at least. Additionally, this may suggest that experimental (infrequent) use of AAS may not be the normal course of AAS use.

Although the reported use in this sample was 9%, actual AAS use may be much greater. When students were asked about how many fellow students they knew who used AAS, 34% of all students reported knowing between one and five non-athlete AAS users. In addition 4% of non-users and 53% of AAS users indicated they knew six or more students who used AAS.

Results suggest that the perceived prevalence of AAS use is much higher than the self-reported use of AAS. When students were asked what percentage of students they believed used AAS, 0.4% stated they didn't know anyone who used AAS. In contrast, 28% believed less than 5% of college students used AAS, 37% believed between 5% and 10% of college students used AAS, 24% believed 10-20% of college students used AAS, 9% believed 20-30% used AAS and 2% believed greater than 30% used AAS.

Reasons for use: A growing concern. To prevent AAS use, a clear understanding of why people use the drugs in the first place is necessary. Most research conducted over the past 50 years reinforces the notion that AAS were used to improve athletic performance (4, 5, 6, 8, 9, 10, 20). However, recent evidence has suggested that increasing numbers of athletes and non-athletes may be using AAS to enhance physical appearance (12, 13, 14, 20, 22, 24). In 2001, the NCAA indicated that 20% of collegiate athletes who used AAS reportedly did so for the purpose

of enhancing appearance, not for improving performance (20). The present study showed that in non-athlete college students, 48% of AAS users reported using AAS primarily to improve recreational athletic performance and 45% reported using AAS to enhance their physical appearance. The high percentage of users who desire to enhance physical appearance is additional strong evidence that AAS use is no longer limited to athletes for the purpose of improving athletic performance. It also signals the potential inauguration of an alarming trend, given our nation's preoccupation with youth and beauty.

The increased desire to enhance physical appearance by using AAS suggests that non-athlete college students who previously would not consider using AAS, may consider using the drugs in the future. This study showed that 2% of the non-users indicated that they were likely or very likely to use AAS in the future. Additionally, another 2% of non-users indicated that they were unsure whether they might use AAS. In contrast, 76% of AAS users reported they were somewhat likely or very likely to continue to use AAS in the future. These results indicate the need for strong preventive education programs aimed at dissuading students from starting to use AAS, and convincing AAS users to discontinue AAS use.

A major enabling factor for AAS use lies in how easy they are to obtain. This study showed that 24% of non-users reported they could get AAS within 1 to 2 weeks. In addition, 15% of the non-users believed they could obtain AAS within a few hours to a day. In contrast, 36% of AAS users indicated they could obtain AAS in 1 to 2 weeks and 40% stated they could get AAS within a few hours to a day. This suggests that AAS are readily available despite the fact they are classified as a federally controlled substance.

Reports document that the black market in AAS has blossomed into a huge profitable business (7, 22, 26). Illegal AAS from Mexico and European countries, especially Russia and

Romania, are flowing into this country in bulk and are easily obtained with little or no risk involved (26). In addition, clandestine laboratories are springing up and cashing in on the demand. The Internet has become a conduit for mail-order AAS (22), and it is not difficult to find someone at large commercial gyms and competitions with an automobile trunk full of drugs (7). Anabolic androgenic steroids procured from the black market also raise important issues about drug purity, potency, and lack of medical supervision that are particularly frightening, because the casual, uneducated, naïve users, who are already breaking the law and risking everything to look and perform better are not likely to worry about such matters (7, 22).

CONCLUSIONS

This study investigated AAS use among males and females and found that AAS is an occult behavior that affects non-athlete college students. College-freshman used AAS the least whereas an increase in use occurred with college sophomores, juniors and seniors. This finding may have significant implications in planning preventive educational programs, as health educators should target incoming college freshman classes with the intent of dissuading AAS experimentation and use. Alarming, 43% of the sample indicated they personally knew one or more non-athlete college students who used AAS and 36% believed that between 5% and 10% of the college student population uses AAS. Furthermore, 76% of AAS users and 4.5% of non-users suggested they might use AAS in the future. An alarming trend, but one that might be expected in a non-athlete college student population and may be reflected in the fact that the reported purpose for AAS usage was nearly as strongly related to enhancing appearance (45%) as to the improvement of athletic performance (48%).

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Table 1

Demographic Characteristics of the Sample

<u>Gender</u>	<u>Users (%)</u>		<u>Non-Users (%)</u>		<u>Total (%)</u>	
Males	37	(88.0)	182	(41.1)	219	(45.2)
Females	5	(12.0)	261	(58.9)	266	(54.8)
Total (%)	42	(8.7)	443	(91.3)	485	(100)
<u>Age</u>	<u>Users (%)</u>		<u>Non-Users (%)</u>		<u>Total (%)</u>	
19	4	(9.5)	116	(26.1)	120	(24.7)
20	10	(23.8)	128	(28.8)	138	(28.4)
21	16	(38.0)	95	(21.4)	111	(22.9)
22	6	(14.3)	61	(13.8)	67	(13.8)
23	2	(4.8)	15	(3.4)	17	(3.5)
24	3	(7.1)	9	(2.0)	12	(2.5)
25	0	(0.0)	4	(0.9)	4	(0.8)
>26	1	(2.3)	15	(3.4)	16	(3.3)
Total (%)	42	(8.7)	443	(91.3)	485	(100)
<u>Class Standing</u>	<u>Users (%)</u>		<u>Non-Users (%)</u>		<u>Total (%)</u>	
Freshman	3	(7.1)	2	(0.5)	5	(1.0)
Sophomore	13	(30.9)	28	(6.3)	41	(8.5)
Junior	11	(26.1)	147	(33.2)	158	(32.6)
Senior	15	(35.7)	132	(29.8)	147	(30.3)
Total (%)	42	(8.7)	443	(91.3)	485	(100)

Table 2

Perceptions of Users and Non-Users about Anabolic-Androgenic Steroids

1. How many non-athlete student Anabolic-Androgenic Steroids users do you know?

	Users (%)	Non-Users (%)	Total (%)
I don't know any users	3 (7.1)	276 (62.3)	279 (57.5)
1-5 users	17 (40.5)	148 (33.4)	165 (34.0)
6-10 users	8 (19.0)	15 (3.4)	23 (4.7)
11-20 users	10 (23.8)	3 (0.6)	13 (2.7)
Greater than 20 users	4 (9.5)	1 (0.2)	5 (1.0)
Total (%)	42 (8.7)	443 (91.3)	485 (100)

2. What percentage of non-athlete students do you believe use Anabolic-Androgenic Steroids?

	Users (%)	Non-Users (%)	Total (%)
I don't know any users	0 (0)	2 (0.5)	2 (0.4)
Less than 5%	14 (33.3)	120 (27.1)	134 (27.6)
5-10%	15 (35.7)	162 (36.6)	177 (36.5)
10-20%	10 (23.8)	108 (24.4)	118 (24.3)
20-30%	1 (2.4)	43 (9.7)	44 (9.0)
Greater than 30%	2 (4.8)	8 (1.8)	10 (2.0)
Total (%)	42 (8.7)	443 (91.3)	485 (100)

3. How easy would it be to obtain Anabolic-Androgenic Steroids?

	Users (%)	Non-Users (%)	Total (%)
Very Easy: Within a Few Hours	7 (16.7)	19 (4.3)	26 (5.4)
Somewhat Easy: Within a Day	10 (23.8)	47 (10.6)	57 (11.8)

Easy: Within 1-2 weeks	15	(35.7)	107	(24.2)	122	(25.1)
Somewhat Hard: Within a Month	6	(14.3)	72	(16.3)	78	(16.0)
Hard: I Cannot Get Them	4	(9.5)	198	(44.7)	202	(41.6)
Total (%)	42	(8.7)	443	(91.3)	485	(100)

4. How likely is it that you would ever use Anabolic-Androgenic Steroids?

	Users	(%)	Non-Users	(%)	Total	(%)
Very Likely	12	(28.6)	3	(0.7)	15	(3.0)
Somewhat Likely	20	(47.6)	7	(1.6)	27	(5.6)
Don't Know/Not Sure	6	(14.3)	10	(2.3)	16	(3.3)
Somewhat Unlikely	0	(0)	16	(3.6)	16	(3.3)
Very Unlikely	4	(9.5)	407	(91.9)	411	(84.7)
Total (%)	42	(8.7)	443	(91.3)	485	(100)

5. Number of times Anabolic-Androgenic Steroid users indicated they have used Anabolic-Androgenic Steroids in their lifetime.

Number of Times Used	Users	(%)
1 time	9	(21.4)
2-4 times	11	(26.2)
5-7 times	7	(16.7)
8-10 times	5	(11.9)
> 10 times	10	(23.8)
Total	42	(100)

6. Major reason users used Anabolic-Androgenic Steroids

Primary Reason	Users	(%)
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My friends were using them	3	(7.1)
I wanted to enhance my physical appearance	19	(45.2)
I wanted to increase my athletic performance	20	(47.6)
<hr/>		
Total	42	(100)