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Nonprescription Steroids on the Internet

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Abstract

This study evaluated the degree to which anabolic-androgenic steroids are proffered for sale over the Internet and how they are characterized on popular websites. Searches for specific steroid product labels (e.g., Dianabol) between March and June, 2006 revealed that approximately half of the websites advocated their “safe” use, and roughly one-third offered to sell them without prescriptions. The websites frequently presented misinformation about steroids and minimized their dangers. Less than 5% of the websites presented accurate health risk information about steroids or provided information to abusers seeking to discontinue their steroid use. Implications for education, prevention, treatment and policy are discussed.

Keywords

anabolic-androgenic steroids; Internet; no prescription sales; non-prescription websites; steroids; steroid misuse

Anabolic-Androgenic Steroids (AAS)

Anabolic-androgenic steroids (AAS) are synthetic forms of the primary male sex hormone, testosterone. *Anabolic* refers to the tissue-building properties of these drugs whereas *androgenic* refers to their promotion of masculine characteristics, such as facial hair. Abusers of AAS typically seek the drugs’ anabolic properties while attempting to minimize the androgenic properties that are primarily responsible for many of the unwanted side effects (Hartgens and Knipers, 2004; Kuhn, 2002).

To date, hundreds of AAS have been developed and many of these are available by prescription within the United States. All AAS are defined as controlled dangerous substances under the *Controlled Substances Act* (21 U.S.C. § 802) and are classified as Schedule III by the U.S. Drug Enforcement Agency (DEA). Schedule III drugs are those that have a medically indicated use but also have a moderate liability for misuse and may precipitate physical or psychological dependence (21 U.S.C. § 812).

Like many commonly misused drugs, AAS have a variety of legitimate medical indications. They are used to promote weight gain for patients with HIV-related weight loss (Stawford et al., 1999) and to restore secondary sex characteristics in hypogonadal men (Bhasin et al.,

1996; Brodsky et al., 1996). In addition, they may be used for the treatment of a variety of anemias, angioedema (excess extracellular fluid) and pain secondary to osteoporosis (Physician's Desk Reference, 2006). Available evidence indicates that AAS can significantly enhance mood (Pope et al., 2003), physical strength, sexual functioning, libido and mood in normal, healthy subjects (Bhasin et al., 1996, 1997, 2001) as well as in the elderly (Brill et al., 2002; Bross et al., 1999) and medically ill patients (Bhasin et al., 2000; Grinspoon et al., 2000).

Side Effects

The DEA (2006a) reports that non-prescribed use of AAS (hereafter referred to as "misuse") greatly exceeds that of medically prescribed use. The primary consumers of illegally obtained AAS are body builders and athletes seeking the drugs' anabolic properties for athletic or aesthetic gains (DEA, 2004). Unfortunately, substantial health risks have been associated with the use of AAS, even when taken in accordance with prescription standards and at a fraction of the dosage typically ingested by those misusing AAS for increased strength and muscular enhancement. These adverse effects may include peliosis hepatitis (blood-filled cysts on the liver or spleen) (Nakao et al., 2000), hypogonadism (reduced testicle size), reduced sperm count and infertility (Jarow and Lipshultz, 1990; PDR, 2006), sudden cardiac death (Wight and Salem, 1995), toxic shock (Herr et al., 2002) and cancer (Martorana et al., 1999; Parssinen et al., 2000).

AAS also carry serious mental health risks, including aggressiveness and psychosis while using the substance, and depression upon cessation (Pope & Katz., 1994; Pope, Kouri, & Hudson, 2000; Yates, 2000). The psychological effects are unpredictable and can range from simple mood swings to unprovoked rage (Daly, 2001). Of particular concern is the severe withdrawal syndrome that can follow cessation of AAS after sustained high doses, which may include depression, lethargy, decreased libido and muscular atrophy (Brower, 1997, 2002; Sinha-Hakim et al., 2002).

Some of the physical side effects of AAS (especially those related to hepatic functioning) can be bypassed by using injectable preparations in lieu of pills. This avoids "first-pass" metabolism of the drug through the liver, thus potentially reducing hepatic damage and cancer that have been associated with high-dose oral AAS preparations. However, a variety of injection-specific risks can arise that mirror those of other drugs delivered by syringe (Evans, 1997). For instance, there are documented cases of HIV transmission among AAS users who shared needles (Rich et al, 1999). Moreover, because AAS are delivered primarily via deep muscle injections as opposed to intravenously, there is a risk of nerve damage if the syringe is not properly positioned (Evans, 1997).

Another measure that is believed to ward off side effects is the use of "cycles" (Peters et al., 1997). This involves alternating active periods of AAS use of roughly 4 to 18 weeks' duration with respite intervals of roughly 1 to 12 months. The goal of cycling is to promote recuperation of the hypothalamic-pituitary-testicular-axis (HPTA), restore endogenous testosterone production and reverse AAS induced hypogonadism. Additionally, off-cycles are used to avoid detection during competition in drug-free athletic events. During on-cycles, a pyramid-dosing or titration regimen might be followed, in which the user gradually works up to the highest dosage and then back down to a low dose prior to the conclusion of the cycle (National Institute on Drug Abuse [NIDA], 2000; Peters et al., 1997). Anecdotal evidence suggests that tapering off of high levels of AAS, as with many other medications, can reduce withdrawal symptoms or rebound effects; however, this has not been established scientifically (NIDA, 2000).

Finally, some people misusing steroids may adhere to intricate multi-drug regimens using a combination of oral, intramuscular and transdermal preparations (NIDA, 2000; Peters et al., 1997). This practice is referred to as “stacking.” Users may take as many as six different AAS with the goal of maximizing androgen receptor (AR) binding and activating multiple steroidal receptor sites (Peters et al., 1997). There is, however, limited scientific evidence that stacking accomplishes these goals. Androgen receptor saturation occurs on a “first come, first served” basis. Non-AR mediated anabolism, such as increases in endogenous growth hormone production, has been proposed but is poorly understood and may be more dependent on the particular AAS employed rather than the use of supraphysiologic dosages. Despite popular beliefs, the addition of excessive dosages and multiple types of AAS have not been shown to elicit a summative effect (NIDA, 2000).

Initiation of AAS Use

Maycock and Howat (2005) describe the self-reported barriers as well as how AAS users overcome these barriers before initiating steroid use. According to users, barriers to AAS use include: finding reliable information about AAS and the potential side effects, learning how to use AAS, obtaining the necessary tools (i.e., syringes) for administering AAS, and actually acquiring the AAS (Maycock & Howat, 2005). Users report that their primary source of information about AAS is the dealers who also act as a driving force in their decision to use (Maycock & Howat, 2005). Wichstrom (2006) discusses predictors of AAS use and notes that those who are offered AAS are at a higher risk of initiating use.

The Internet

The National Institute on Drug Abuse (NIDA, 2000), DEA (2006a) and Government Accountability Office (GAO, 2005) have all concluded that the Internet is the most widely used venue for obtaining AAS without a valid prescription. Prior to the advent of the Internet, AAS were commonly smuggled into the United States from Mexico and European countries (DEA, 2004) and sold in clandestine ways at gyms and through direct, person-to-person sales. Now, purchasers can place orders from their homes to online pharmacies, many of which ignore legal prescription regulations or operate out of countries like Mexico and Thailand in which AAS are available without a prescription (GAO, 2005). A recent study conducted by the GAO (2005) found that 45% (10 out of 22) of the orders it placed for AAS with online pharmacies were received despite the absence of a valid prescription. All of those shipments contained actual AAS and were delivered from foreign countries.

The DEA prescription guidelines for online pharmacies require patients to have a validly diagnosed medical problem from a physician with whom they have a legitimate doctor/patient relationship (DEA, 2006b). The physician must take the patient’s medical history and perform a physical examination, and there must be a medically defensible connection between the presenting problem, history, examination findings and prescribed medication. Although many legitimate online pharmacies do follow these guidelines, others purport to offer an online consultation in the form of a medical questionnaire (see Appendix A1 for a sample online medical questionnaire), perhaps followed by a phone call. This practice does *not* establish a legally sufficient doctor/patient relationship (DEA, 2006b).

Use of the Internet by Youths

According to the Centers for Disease Control and Prevention (CDC), 6% of high school students in 2003 reported using non-prescribed AAS orally or by intra-muscular injection (Grunbaum et al., 2004). The NIDA reported in 2003 that only 55% of adolescents believed that use of AAS was risky and the perceived availability of AAS was high and increased progressively by grade level (Johnston et al., 2006).

The Internet may be contributing to youths' increasing awareness of the availability of AAS and positive attitudes towards their use. In a 2005 telephone survey, approximately 87% of 1,100 adolescents reported having access to the Internet, representing a 12% increase from 2000 (Lenhart et al., 2005). Approximately 50% of the adolescents with online access reported using the Internet nearly every day and about 50% had high-speed broadband access. Relevant to the present study, 31% of these adolescents reported going online to seek information about health and physical fitness and 22% reported searching the Internet for information about things they felt were hard to talk about such as drugs (Lenhart et al., 2005). In light of the findings of Maycock and Howat (2005), the information sought out by youth online may aid in the breakdown of barriers to AAS use. The social stigma of AAS use is one of the barriers Maycock and Howat (2005) discuss and could be a contributing factor to the feeling that these drugs are hard to talk about. Searching for information and purchasing drugs online could be a convenient avenue for users to overcome the barrier of social stigma. According to [Wichstrom \(2006\)](#), even when searching the Internet for informational purposes only, the large number of offers to sell the drug may increase the likelihood that AAS use will be initiated.

Present Study

The present study was undertaken to quantify the degree to which AAS are being proffered for sale over the Internet, how these drugs are being characterized on popular websites, and the accuracy of the information being presented. Research methods were employed to determine what an individual with a moderate understanding of the Internet would be likely to encounter if s/he conducted a search using the most popular search engines.

Methods

Search Terms

There are literally hundreds of AAS substance-related terms, including both generic and brand labels. It was thus necessary to reduce this exhaustive list to a manageable set of search terms that are most likely to be used by individuals seeking to obtain AAS without a valid prescription. In addition to the broad generic term of "steroids", drug-specific terms were selected according to the following steps:

1. First, we reviewed government publications by the DEA, NIDA (2000), and GAO (2005) reporting on the most commonly misused AAS drugs and compiled a list of 16 specific drug terms.
2. Next, we entered those 16 drug terms into the most popular online search engine, Google™, to determine the number of "hits" or "mentions" that were returned for each substance. This figure, which is reported at the upper right-hand corner of the Google Results page, indicates the number of websites containing the search term. This does not reveal whether the websites actually focus on that content, but rather whether the search term appeared somewhere on the sites. This provides a rough indicator of the prevalence or dominance of the search term in the literature and in popular online usage ([Forman et al., 2006](#)).
3. Finally, because AAS are typically sought out for their anabolic muscle-building properties as opposed to their androgenic properties, we elected to search for those substances that have the greatest ratio of anabolic to androgenic effects. From this process, we settled on five out of the original 16 AAS mentioned by the DEA, NIDA and GAO as the most commonly abused AAS drugs in the U.S.: Winstrol, Dianabol, Durabolin, Anadrol, and Oxandrolone (see Resource Table 1).

In prior studies, it was found that adding a “no prescription” prefix to opiate and opioid drug names (e.g., “no prescription oxycodone”) increased the number of relevant web mentions (Forman et al., 2006). We conducted preliminary searches prior to initiating the current study to determine whether this was also true for AAS, and found that adding a “no prescription” prefix elicited fewer Google™ mentions as compared to searching for the drug names alone. For example, “Winstrol” elicited 2,140,000 mentions whereas “no prescription Winstrol” elicited only 565,000 mentions. We elected, therefore, not to include “no prescription” prefixes in the current study; again under the effort to capture information that might be seen by simply inquisitive teens, not just those with the intent to purchase.

Coding Procedures

Two types of online searches were conducted in Google™ (www.google.com) on a monthly basis between March and June of 2006 for the five drug-specific search terms listed above, plus the generic term of “steroids”. The first search examined the top 20 links to determine whether the most popular websites were advocating use of these drugs, discouraging their use, or providing objective information about their use. This search was limited to the first 20 links because most Internet users do not venture appreciably beyond 20 websites if they are simply gathering information on a topic (Brin & Page, 1998). The second search examined the top 100 links to determine what proportion of the websites offered to sell AAS without a valid prescription or linked to other websites purporting to do so (i.e., were “portal” sites). This search was extended to 100 links because individuals seeking to purchase drugs illegally would be more likely to delve farther in pursuit of their objectives.

Two highly trained research technicians independently coded the websites according to *a priori* scoring criteria described below. The two raters coded the sites within the same one-week window and subsequently reviewed together any scoring discrepancies and reached a consensus on 100% of the ratings. In inter-rater reliability scoring trials, the consensus on independent ratings virtually always exceeded 90% and no rater was included in the study until he or she achieved $\geq 90\%$ reliability with the other raters during practice exercises.

Duplicate websites (i.e., those with identical content but a different URL address) were noted as such but were included in the tallies. Including duplicate sites best represented what online users would be likely to encounter during a routine search. Although duplicate sites were encountered from time to time, they were not common and did not appear to unduly influence the tallies.

In a Google™ search, “sponsored links” often appear on the right-hand side of the page in their own column or at the top of the results list. These are links to websites that paid Google™ to place them at the top of the list; therefore, they did not earn their position according to their popularity or the number of visits they received. Although sponsored links are apt to be viewed by online users, their prominence can fluctuate considerably depending upon the length of sponsorship. Moreover, they are not included in Google’s™ page-rank methodology, which calculates a quality-ranking based upon objective indices of citation importance or frequency of viewing (Brin & Page, 1998). For this reason, they were not included in the tabulations for this study. All of these methods were purposely taken to produce a conservative estimate (best case scenario) of the issues examined.

Characterization of AAS on the Internet

The first 20 non-sponsored links returned for each search term were categorized according to the following criteria:

- Websites were categorized as *Pro-use* if they:

- a. emphasized benefits associated with using AAS such as increased strength and muscle mass; or
 - b. offered to sell AAS without a valid prescription; or
 - c. linked to at least one other website that offered to sell AAS without a valid prescription; or
 - d. described how to use AAS “responsibly”(i.e., harm reduction); or
 - e. reported news stories primarily emphasizing the benefits of using AAS.
- Websites were categorized as *Anti-misuse* if they:
 - a. had a mission to reduce substance misuse; or
 - b. emphasized potentially harmful consequences of non-medical use of AAS; or
 - c. linked to addiction treatment programs; or
 - d. reported news stories emphasizing the dangers of using AAS; and
 - e. did not meet criteria for being a Pro-use website.
 - Websites were categorized as *Neutral* if they:
 - a. did not meet criteria for being a Pro-use or Anti-misuse website; and
 - b. were legitimate online pharmacies; or
 - c. were academic journal sites presenting unbiased research results about AAS.
 - Finally, websites were categorized as *Other* if they:
 - a. were unrelated to drug use; or
 - b. were broken or defunct links.

Offers to Sell AAS on the Internet

The first 100 links were coded according to whether the websites offered to sell AAS without a valid prescription or linked to other websites offering to do so. Payment options were recorded for retail non-prescription websites, as was the country of registration using domain registration look-up services including godaddy.com, allwhois.com, and register.com. The websites were categorized as:

- *Retail Non-Prescription* if they offered to sell AAS without a prescription or provided an online consultation via a medical questionnaire in lieu of an office visit with a medical doctor;
- *Portal Non-Prescription* if they did not offer to sell AAS directly, but linked to at least one Retail Non-Prescription website;
- *Addiction Health Information* if they provided information about addiction, health promotion, recovery or addiction treatment, or linked to websites providing such information, and did not meet criteria for a Retail Non-Prescription or Portal Non-Prescription website;
- *Legitimate Online Pharmacies* if they offered to sell AAS and required a valid prescription in accordance with the standards of the National Association of Boards of Pharmacy Verified Internet Pharmacy Practice Sites (VIPPS) (<http://www.nabt.net/vipps/consumer/listall.asp>);

- *Harm Reduction* if they promoted the safe, non-prescribed use of AAS; or
- *Other* if they were academic journal sites, presented unrelated content or were broken or defunct links.

Comparison Between Google™ and Yahoo™

In May of 2006, the identical procedures used for the Google™ searches were employed for a 20-link search conducted in Yahoo™ (www.yahoo.com) on the same day.

Results

Characterization of AAS

Table 2 presents the average percentages of the top 20 websites that were classified as Pro-use, Anti-misuse, Neutral or Other during the four-month study. Entering the generic search term, “steroids”, was considerably more likely to return websites from scientific or law-enforcement organizations such as the American Academy of Endocrinology and NIDA offering information about steroids or discouraging non-prescribed use of these drugs. The “steroids” search term elicited an average of approximately two-thirds (65%) websites that were classified as Anti-misuse and an additional 18% that were classified as Neutral. Only 16% of the websites were classified as Pro-use.

In contrast, drug-specific terms elicited a greater percentage of websites advocating for use of the drugs. Most of the product labels elicited roughly one-half or more websites that were classified as Pro-use and almost *no* site that was classified as Anti-misuse. “Dianabol” elicited the greatest percentage of Pro-use websites (75%). In contrast, “oxandrolone” elicited the smallest percentage of Pro-Use websites (29%) and the greatest percentage of Neutral websites (69%). This is likely attributable to the fact that Oxandrolone is used more readily for legitimate medical indications such as severe tissue wasting due to injury, illness, infection, or trauma (e.g., Medline Plus, 2007).

A standardized content analysis was beyond the scope of this research study. It is noteworthy, however, that the large majority of pro-use websites were geared towards people seeking strength, physical attractiveness and popularity. Among adolescents, AAS are often used to enhance performance, however, the most prominent reason for use is to improve appearance (Bahrke et al. 2000; Wichstrom, 2006) and self esteem (Leone and Fetro, 2007). The pro-use websites often provided testimonials from satisfied customers that would impress most adolescents (e.g., “They [AAS] have done a lot for me- personal satisfaction, self esteem, great body, chicks, popularity” [sic]).

Offers to Sell AAS

Table 3 reports the average percentages of top-100 websites that were classified as Retail, Portal, Addiction Health Information, Legitimate Online Pharmacies or Harm Reduction. Across all five drug-specific search terms, an average of 6% of the websites were categorized as Retail sites, with a range of 1% to 22% over the course of the 4 months of the study. There was relatively little variability between specific drugs, with most search terms eliciting roughly 5% to 10% Retail sites. In total, 32 distinct Retail websites offering to sell AAS without a valid prescription were identified during the course of this 4-month study. Many of these websites also offered to sell human growth hormone, harm-reduction products, syringes, and cycling and stacking regimens. They also frequently provided consumer testimonials as well as information on how to “beat” drug tests during athletic events and perform safe and painless intra-muscular injections.

Portal sites accounted for an average of 29% of the websites, with a range of 10% to 48% over the 4 months of the study. Again, there was relatively little variability between specific AAS drugs, with most searches eliciting roughly one-quarter to one-third Portal sites. In total, 173 distinct Portal websites were identified. Summing the Retail and Portal sites together, over one-third (35%) of the sites were classified as “Commercial”, meaning they either offered to sell AAS without a valid prescription or directly linked to other sites offering to do so.

As previously stated, a standardized content analysis was beyond the scope of this study. It was noted, however, that the Portal sites generally fell into one of three categories. Many of the Portal sites were “intentional” portals, meaning their specific mission was to advertise large lists of retail sites that could be accessed for a membership fee or registration fee. A second category of “permissive” portals were constructed around the theme of AAS use or drug use, and contained message boards for patrons to post their own correspondence including links to retail sites. For example, bodybuilding websites often contained message boards that were used by patrons to post links to retail sites selling AAS and related paraphernalia. A third category of “unintentional” portals were not specifically related to AAS, but permitted messages to be posted on a wide range of topics including links to retail sites. For example, certain online texts and encyclopedias permit entries to be posted by patrons. The AAS-related entries in many of these online texts included pro-use statements or links to retail sites posted by visitors.

Importantly, only a negligible proportion of the websites (< 2%) were legitimate online pharmacies and less than 5% offered unbiased information about the dangers of misusing AAS or information on how to obtain treatment. Approximately 5% to 10% of the sites were designed to provide information on harm reduction or “safe” use of these drugs.

Information regarding acceptable payment methods was collected for all Retail websites. Among the 32 distinctly identified Retail sites, Visa™ and MasterCard™ credit cards were the most commonly accepted method of payment (50%), followed by Western Union™ (41%), bank or money transfers (34%), American Express™ (25%), Discover Card™ (16%), money orders (9%), cash (6%) and/or personal checks (3%).

Finally, data were collected on the country of registration for each Retail and Portal website. To establish a website, it is necessary to purchase a website name from one of various domain registration services such as register.com, godaddy.com, or allwhois.com. Contact information must be provided including the registrant’s address and the country from which the website will be operated. Unfortunately, there appears to be little in the way of a check on the veracity of the information provided; however, these are the best data currently available on the country of registration for websites. Only 11% of the Retail websites were registered within the United States where this practice is clearly illegal. Most of the Retail websites were registered in an un-concentrated number of Eurasian, Central Asian or Middle Eastern countries that have far more lenient laws regulating drugs and/or Internet sales. The largest proportions of Retail sites were registered in Slovenia or Austria (both at 15%). In contrast, the largest proportions of Portal websites were registered in the United States (57%) and Canada (7%) where it is generally permissible to provide information about the practices of other websites or simply to link to those sites.

Comparison of Google™ and Yahoo™

After Google™, Yahoo™ is the second most commonly used Internet search engine in the U.S. Identical 20-link searches were conducted in Google™ and Yahoo™ as a measure of reliability on the same day in May of 2006 and those data are presented in Table 4. This comparison search was conducted to ensure that the positive characterization of AAS and

availability without prescription was not unique to results elicited in Google™ searches. The results revealed that Yahoo™ returned substantially greater proportions of websites advocating for the use of AAS, offering to sell AAS without a valid prescription, or linking to websites offering to sell them without a valid prescription. For instance, whereas Google™ returned an average of only 1% Retail websites across the various search terms, Yahoo™ returned an average of 18% Retail sites. Similarly, Google™ returned an average of 44% Pro-use websites, whereas Yahoo™ returned an average of 76% Pro-use sites. This suggests that searches in Google™ may underestimate the degree to which online websites are being used to promote the illicit use of AAS.

Discussion

The results of this study suggest that the Internet may be serving as a substantial repository of illegal advertising and misinformation about AAS; as well as a resource for acquiring these drugs without a valid prescription and for non-medically indicated uses. This may be of particular concern for parents of minors and young adults, because many of the sites are directing their messages towards those seeking rapid improvements in strength, physical attractiveness and popularity. The Internet acts as a source of information about AAS, their side effects and how to minimize them, as well as a resource for obtaining AAS and for the tools necessary to use AAS. Therefore it may also serve as an important avenue through which the natural barriers to AAS use may be overcome (Maycock & Howat, 2005). The large proportion of online offers for AAS may increase the risk of AAS use by individuals who initially search the Internet just for information and come in contact with these websites (Wichstrom, 2006).

An online search using any of the common AAS product labels, slang references, or generics yield many results. Roughly one-half of these results are websites that advocate the “safe” use of AAS for non-medical purposes. Roughly one-third of the websites offer to sell AAS without a valid prescription or provide direct links to retail websites that offer to sell them, again without a valid prescription (see Tables 2 and 3). Of perhaps greatest concern, less than 5% of the websites offered objective health information about AAS, warned against the dangers of AAS use or provided information to AAS users who are seeking to discontinue their use.

Given such statistics, it would be ill advised for parents or teachers to encourage children, especially adolescents, to learn about AAS using the Internet – or for example in an un-monitored library research project. Misinformation an adolescent might encounter on these websites will promote positive, incorrect views and could play a significant role in AAS initiation. In the absence of effective governmental regulation of Internet websites, parents and educators need to educate their children about the inherent dangers of the Internet and assure they are exposed to objective websites that offer accurate health information. The largely misleading information presented on the Internet regarding AAS could lead one to believe that the misuse of these drugs is both safe and beneficial. Because objective websites appear to be outnumbered on the order of ten- to twenty-fold, youths might be unlikely to encounter them unless properly guided by an informed, trusted adult. It is also essential to caution naïve Internet users that many official-looking websites, including some online encyclopedias, actually contain unsubstantiated opinions (i.e. using pyramid dosing regimens and cycles to ward off side effects; stacking AAS doses to produce summative results) masquerading as scientific evidence. In light of the findings of this research, the positive messages and misinformation on the Internet regarding AAS could lead to a false belief of the safety of these drugs and therefore may impair reasoned judgment of a person considering AAS use.

When searches were conducted on the generic term, “steroids”, they elicited a greater proportion of objective scientific websites (American Academy of Endocrinology, journal articles, University-hosted PowerPoint presentations) or government-sponsored websites (e.g., NIDA and DEA) offering anti-misuse messages and treatment-related referral sources. In contrast, the names of specific AAS drugs (e.g., “Dianabol”) were unlikely to elicit these websites. This suggests that anti-misuse websites need to do a better job of including relevant search terms in the text of their websites to ensure they are accessed during a broader range of online searches. These websites also need to insert themselves as sponsored links into the most popular search engines to ensure they are accessed during a broader array of AAS-related search terms. Due to the fact that Internet-based drug dealers have become proficient at ensuring that Internet users repeatedly encounter their messages, educators, scientists and treatment providers need to become equally proficient at spreading their own messages. Sources of legitimate information, such as NIDA, also need to be cautious to put forward scientific and objective information that has been checked for validity as the presentation of false or misleading information could result in a lack of trust in people seeking reliable drug information.

The Internet appears to be a very active marketplace for AAS and thus represents a significant public health threat based on the serious side effects known to be associated with these drugs. Advertising for AAS occurs on a daily basis through the media reporting on high profile athletes who are known or suspected to use them and whose performance has been enhanced. Furthermore, public awareness of the Internet availability of these drugs is crucial given the current lack of government or Internet service providers’ ability or willingness to confront this matter.

Limitations

An obvious limitation of this study is that we did not order the drugs to determine whether they would, in fact, be delivered. It is possible that some of the purported Retail sites are actually scams and do not ship AAS or other illicit drugs. As was noted earlier, however, a recent study by the GAO (2005) found that 45% (10 out of 22) of the orders it placed for AAS with online pharmacies were received without a valid prescription. It is likely that a significant proportion of the retail sites identified in the current study do ship these drugs without a valid prescription and in violation of U.S. law.

As was discussed previously, we did not include a “no prescription” prefix in our searches because this practice was shown to elicit a smaller number of web hits or mentions. Based on our prior work (Forman, 2006) it is likely that using a “no prescription” prefix might have elicited a greater proportion of Retail or Portal sites. Individuals who are intent on making illicit drug purchases are likely to refine their search strategies quickly to obtain a purer and longer list of Retail and Portal sites.

Finally, it should be noted that websites with different URL addresses and distinct homepages and content, may still be owned by the same party or parties. Some online sellers may create multiple websites in hopes of attracting a larger number of customers. Moreover, websites may be continuously erected and taken down on an ongoing basis to elude law enforcement officials. It is not possible, therefore, to determine how many distinct entities are actually involved in online drug sales. All that can be determined from the current data is what a typical Internet user would be likely to encounter in an online search.

Summary

The results of this study indicate that much of what an inquisitive individual would encounter on the Internet about AAS is systematically skewed towards increasing drug use

at the expense of accurate health information. Online drug sellers and drug-use advocates are becoming increasingly sophisticated at spreading their messages, infiltrating legitimate websites and marketing their products and services. Parents, educators and scientists need to become equally proficient at spreading their own messages on the “information superhighway.”

Future Implications

Armed with the information collected through this research, and previous studies ([Forman, 2003, 2006](#); [Forman et al., 2006a, 2006b](#); [Hoover et al., 2008](#); [Schepis et al., 2008](#)) of the availability of drugs without a prescription through Internet pharmacies and with funding from the Pennsylvania Department of Health a parent-training intervention was developed. This parent workshop was designed to inform parents about the availability of drugs and drug misinformation on the Internet, to provide parents with concrete prevention and monitoring strategies to protect their children from the various online threats and to provide parents with specific strategies for recognizing and addressing problematic Internet use. Preliminary findings demonstrated that the parent workshop led to significant increases in parents’ knowledge and awareness of Internet-based drug sales and to the implementation of specific Internet monitoring and prevention strategies. The need for workshops for parents and caregivers is evident through our research and we intend to procure additional funding to continue to develop this prevention strategy and disseminate information regarding drugs on the Internet.

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Glossary

Anabolic-androgenic steroids	synthetic forms of testosterone
Anabolic	responsible for the tissue-building properties of steroids
Androgenic	responsible for steroids ability to promote masculine characteristics
Anadrol	the strongest androgenic steroid available; the generic name is oxymetholone
Controlled Substances Act	regulates the manufacture, importation, possession and distribution of drugs
Cycles	slang term used to describe a period in time in which an individual uses anabolic steroids; most commonly last between 6–12 weeks; often involve the use of two or more steroids
Dianabol	an anabolic steroid; the generic name is methandrostenolone
Durabolin	an anabolic steroid; the generic name is nandrolone; most commonly sold commercially as Deca-Durabolin
Hypogonadism/Hypogonadal	inadequate functioning of the testes or ovaries due to hormone deficiencies
Oxandrolone	an anabolic steroid designed to be taken orally

Peliosis hepatitis	an abnormal condition in which blood-filled cysts develop on the liver or spleen
Schedule III drug	has a current accepted medical use in the United States; has less potential for abuse than drugs in schedules I and II; abuse may lead to only moderate or low physical dependence or high psychological dependence
Stacking	slang term used to describe the use of two or more anabolic steroids at the same time
Winstrol	an anabolic steroid; generic term is stanozolol

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General Medical History

All questions must be answered

Date of Birth:
 Month: Day: Year: 19

Height (inches): Weight: Sex: Male Female

Do you smoke cigarettes? Yes No
 Do you smoke more than 1 pack per day? Yes No
 Do you consume more than 2 alcoholic beverages per day? Yes No
 (Women) Are you currently pregnant? Yes No
 Do you plan to become pregnant within the next 6 months? Yes No
 Have you had a complete physical, including blood tests within the last year? Yes No

1. List all medications you are currently taking.

2. List all known allergies and medications that you are allergic to.

3. List all medical conditions you are currently being treated for.

4. List all medical conditions you have had in the past.

5. List all past surgeries detailing the conditions you were treated for.

6. Name of your primary care physician (If Applicable)

7. Physician's phone number (If Applicable)

8. Date of last doctor visit
 Month Day Year

9. City, State where Doctor is located (If Applicable)
, State

10. Physician Phone Consultation:
 Our physicians provide consultations Monday-Friday from 11:00am-8:00pm EST. To schedule your medical consultation over the phone, please select a time period below.
 Select a time period:
 For best scheduling results, select "Any Time"

11. Drivers License Information:
 Number: State:

12. Have you been previously prescribed this medication by a doctor that you have physically seen?

- Yes, I am requesting a refill of a medication that was prescribed to me.
 No, this is a new prescription and I have never been prescribed this medication by any doctor that I have physically seen.

Acetaminophen / Codeine #3

13. Do you suffer from depression?

- Yes No

14. Have you ever had an adverse reaction to sulfa-containing compounds?

- Yes No

15. Have you previously been treated for any type of immune deficiency?

- Yes No

16. Do you have a history of heart problems, fluid retention, or uncontrolled hypertension?

- Yes No

17. Have you ever had a seizure?

- Yes No

18. Have you ever had an allergic reaction to this medication?

- Yes No

19. Do you take or have you taken antidepressants?

- Yes No

20. Do you have a history of narcotic or opiate usage?

- Yes No

21. Do you have high blood pressure?

- Yes No

22. Your level of pain:

On a scale of 1 - 10 with 1 being 'mild pain' and 10 being 'severe pain', please indicate how you would rate your level of pain.

23. Indicate the location of the pain:

24. Indicate the duration of the pain:

0-6 months, 6 months - 1 year, greater than 1 year

25. Explain in detail the medical reason for continuing to need this pain medication. Please be specific. Include the cause and duration of the pain, doctor's diagnosis, test performed, and previous medical treatments.

Appendix A.
Sample Online Medical Questionnaire

Table 1

Composition, Approved Medical Use, and Adverse Effects of Anabolic-Androgenic Steroids (AAS)

AAS Trade Name (generic)	A:A Ratio *	Approved Medical Uses (US, Canada or Europe)	Adverse Effects	
			Reversible	Irreversible
Testosterone Esters (IM) Delatestryl (testosterone enanthate) testosterone cypionate; testosterone decanoate	1:1	hypogonadism, breast CA, stimulation of puberty,	acne; mood changes, enlarged prostate, peliosis hepatitis†, injection site complications	Gynecomastia; clitoral enlargement, hirsutism (females); epiphyseal closure (prepubescent); male pattern baldness
Dianabol (methandrostenolone) (oral)	5:1	None		
Anadrol-50 (oxymetholone) (oral)	9:1	angioedema; anemia		
Oxandrin (oxandrolone) (oral)	10:1	weight gain; osteoporosis analgesia		
Deca Durabolin (nandrolone) (IM)	10:1	antineoplastic		
Winstrol (stanozolol) (IM, oral)	30:1	angioedema; anemia		

* Note: A:A ratio indicates the anabolic to androgenic composition of each steroid (Kunh, 2002).

Characterization of Anabolic-Androgenic Steroids (AAS) on 20 Popularly Ranked Websites in Google™ between March of 2006 and June of 2006

Table 2

Search Term	Pro-Use (%)		Anti-Misuse (%)		Neutral (%)		Other (%)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Steroids	16	15 – 20	65	65 - 65	18	15 – 20	1	0 – 5
Anadrol	45	40 – 50	0	0	50	45 – 55	5	0 – 10
Dianabol	75	55 – 95	0	0	4	0 – 10	21	5 – 40
Durabolin	58	45 – 70	4	0 – 15	17	10 – 25	21	15 – 30
Oxandrolone	29	25 – 35	0	0	69	65 – 75	2	0 – 10
Winstrol	49	45 – 55	0	0	40	30 – 50	11	5 – 15
All 5 search terms	51	25 – 95	1	0 – 15	36	0 – 75	12	0 – 40

* Note: Pro-use = websites that endorsed the misuse of AAS; Anti-Misuse = websites that warned about the dangers of illicit AAS use; Neutral = websites that provided information on AAS that were deemed neither pro nor anti; Other = websites that were unrelated to AAS use or broken links.

Table 3

Percent of 100 Popularly Ranked Websites in Google™ Offering to Sell Anabolic-Androgenic Steroids (AAS): March through June 2006.

Search Term	Retail (%)		Portal (%)		Total* Commercial (%)		Addiction Health Information (%)		Legitimate Online Pharmacy (%)		Harm Reduction (%)		Other (%)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Anadrol	12	5 – 22	31	27 – 36	43	0 – 3	1	0 – 3	2	1 – 2	9	8 – 13	45	36 – 55
Dianabol	5	1 – 12	39	34 – 48	44	0	0	0	1	0 – 2	7	5 – 10	49	41 – 56
Durabolin	6	2 – 16	27	22 – 30	33	3 – 5	4	3 – 5	1	0 – 2	7	4 – 13	55	45 – 63
Oxandrolone	2	1 – 4	14	10 – 20	16	0	0	0	0	0 – 1	4	2 – 5	80	70 – 85
Winstrol	7	3 – 18	33	30 – 37	40	0 – 2	1	0 – 2	1	0 – 2	8	6 – 9	51	38 – 57
All 5 AAS search terms	6	1 – 22	29	10 – 48	35	0 – 5	1	0 – 5	1	0 – 2	7	2 – 13	56	36 – 85

*Total Commercial = sum of Retail and Portal.

Table 4

Comparison of Top 20 Websites Returned from Google™ and Yahoo™ During May of 2006.

	Google™ (%)		Yahoo™ (%)	
	Mean	Range	Mean	Range
Retail	1	0 – 5	18	5 – 35
Portal	25	10 – 35	41	25 – 65
Total Commercial *	26	10 – 40	59	30 – 75
Pro-use	44	25 – 55	76	50 – 85
Anti-misuse	0	0 – 0	1	0 – 5
Neutral	37	5 – 65	15	0 – 35
Other	19	3 – 4	8	0 – 2

* Total Commercial = sum of Retail and Portal.