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THE AVAILABILITY AND PORTRAYAL OF STIMULANTS OVER THE INTERNET

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Abstract

Purpose—To quantify the online availability and portrayal of amphetamine-class prescription stimulants with a focus on those medications commonly prescribed to and abused by adolescents.

Methods—The Google™ search engine was used in searches to assess the frequency of websites offering to sell controlled stimulants (retail sites) or websites that directly linked to retail sites (portal sites). Also, separate searches evaluated the portrayal of controlled prescription stimulants by the initial 20 websites returned by Google™. Retail and portal website frequency was collected for each search. For searches measuring the portrayal of stimulants, webpages were categorized as pro-abuse, anti-abuse, neutral or other, based on set criteria.

Results—Sites offering to sell stimulants without a prescription were found for nearly all search terms. Across all searches, the Schedule III stimulants indicated for the treatment of obesity returned more sites offering to sell stimulants without a prescription than Schedule II stimulants indicated for the treatment of ADHD. Internet site portrayal of each stimulant varied. However, sites that contained “methamphetamine” often included anti-abuse information.

Discussion—The apparent availability of stimulants over the Internet without a prescription indicates the potential for a significant public health problem. The extent to which teens are obtaining these drugs via the Internet remains unclear, but clinicians must be aware of the potential for abuse, concomitant prescription use issues, illicit sources, and diversion of these highly addictive medications. Education of consumers and physicians as well as further governmental interventions is needed to limit the potential scope of this problem.

Keywords

Internet; CNS stimulants; adolescent; drugs of abuse; drug source

INTRODUCTION

Central nervous system (CNS) stimulants are medications indicated for the treatment of Attention-Deficit Hyperactivity Disorder (ADHD), sleep disorders, and obesity [1,2]. CNS

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stimulants that are properly administered provide much needed relief to adolescents suffering from the effects of these disorders [3,4]. Despite their beneficial effects, many CNS stimulants carry a high-risk of misuse due to their acute effects, which include euphoria, increased energy and alertness, and decreased boredom and fatigue [2]. The high potential for misuse is reflected in the fact that all stimulants are regulated under the Controlled Substances Act (CSA) [5]. Text reflecting this from the medication information inserts is included in Table 1.

Concerns about the use of controlled stimulants have been increasing and have been particularly focused on diversion and misuse of these medications by adolescents and young adults [6,7]. The Monitoring the Future Studies [8] found that 8.6% of high school seniors and 6.7% of college students misused amphetamines in 2005, which were similar to previously established rates [9-11]. Also, many children, adolescents and young adults have been exposed to stimulant medication either directly or indirectly, often through peers. Stimulants are regularly prescribed in these age groups, with large increases in the number of prescriptions over the past two decades [12,13]. To illustrate, Thomas and collaborators [13] found that adolescent stimulant use increased 208% from 1994 to 2002. Regular exposure to stimulants and their relative availability may make these medications appear safe and beneficial for all individuals, potentially resulting in misuse [14]. Indeed, 40% of teens believe potentially addictive prescription medications are “much safer” than their illicit counterparts [15].

Prescription stimulants are available from a variety of sources, including friends, family [16] and Internet retailers [17,18]. The 2005 NSDUH found that 7.2% of stimulant misusers obtained stimulants most recently via the Internet, with both adolescents and young adults endorsing the Internet as a stimulant source [17]. Purchases of medication from online sources has had unfortunate consequences beyond the risk for fostering addiction, including the dangerous substitution of antipsychotic agents for controlled sedatives or hypnotics that were ordered online [19]. Thus, adolescents and young adults appear to be putting themselves at notable risk through ordering and consuming medication from Internet retailers.

The purpose of this study was to investigate aspects of the Internet related to controlled stimulant and methamphetamine use. One facet of this investigation was to establish which stimulants are offered over the Internet without a prescription and to quantify the frequency of websites offering to sell controlled stimulants. The methods were adapted from earlier studies [20,21] that examined whether controlled opioids are offered online. The stimulants examined here are on Schedule II or III of the CSA, and analyses were stratified by schedule to investigate potential differences in frequency of offers to sell. Schedule II stimulants tend to be used in the treatment of ADHD and are associated with stronger penalties, whereas Schedule III stimulants are primarily used in the short-term treatment of obesity and have lesser associated penalties. With significant coverage in the popular media in 2006 and 2007 on the misuse of Ritalin® and other ADHD stimulants among adolescents and young adults [e.g., 22,23], it might be expected that Schedule II stimulants would have a greater putative availability online.

This study was also designed to categorize the portrayal of stimulants and their use by the first 20 websites returned by Google™ in searches. This was believed to be important because of evidence that Internet searches by adolescents and young adults for information on club drugs (including methamphetamine and prescription stimulants) may increase the likelihood of their use [24,25]. Methamphetamine, a potent “street” stimulant, was included in all searches, and whether instructions for methamphetamine synthesis were available on websites was recorded. Given that the chemicals required to synthesize methamphetamine have been purchased from online retailers [26], the presence of online instructions for its manufacture could be a public health risk.

To the best of our knowledge, this is the first study to systematically evaluate whether controlled stimulants are offered for sale online and, if so, which are available. For this study, we had two main hypotheses. First, we expected that all searched stimulants except for methamphetamine would be offered online, with a greater frequency of offers of Schedule II stimulants. Since methamphetamine is almost always a “homemade” drug [27] that is distributed through networks similar to those for other illicit substances (e.g., marijuana), we did not expect to find it offered online. Second, we expected that the portrayals of the searched medications would be predominantly negative, particularly for methamphetamine.

METHODS

The investigators conducted two examinations using the Google™ (www.Google.com) search engine: (1) the frequency of websites offering to sell stimulants without a prescription, and (2) the portrayal of controlled stimulants by websites. Since the primary goal was to obtain a broad picture of the websites offering to sell controlled stimulants, the first investigation was given priority. Thus, these searches used the first 100 links, which provided a broad sample from which to form conclusions. Also, adolescents searching for stimulants to purchase over the Internet might need to explore more links to find stimulants offered for sale, and 100 links was expected to allow for this possibility. The searches examining the portrayal of stimulants captured only the first 20 links, which are ranked by Google™ based on an algorithm that includes the number and importance of webpages that link to the webpage in question [please see 28]. Previous research indicated that nearly 80% of individuals do not go beyond the first 20 links in searches [29,30], so the portrayal searches were structured to account for that tendency.

Nine terms were used in Google™ searches including six DEA Schedule II preparations: Adderall®, amphetamine, Concerta®, methamphetamine (placed on Schedule II as Desoxyn®; Desoxyn® was not included in the searches), methylphenidate, and Ritalin®; and three Schedule III preparations: Bontril®, Didrex® and phendimetrazine. Terms were chosen only if they were on Schedule II or III of the CSA [31] and were classified as CNS stimulants using either the Physician’s Desk Reference [1] or the MD Consult (www.mdconsult.com) website. We concentrated on Schedule II or III stimulants because of the significant penalties (up to 20 years and 5 years, respectively) levied for offenses related to the illegal distribution of these substances [5]. In addition, medications placed on Schedule II or III carry a high (II) or moderate risk (III) for abuse with a concomitant risk for physical and/or psychological dependence. These aspects were believed to increase the impact of online sales of these medications. The methods for the searches were adapted from earlier studies [20,21] examining whether controlled opioids are offered online.

Websites Offering to Sell Controlled Stimulants Without a Prescription: “No Prescription” Searches

The purpose of this study was to examine the frequency of websites that offered to sell the stimulants under investigation without a prescription or sites that directly connected to such websites. Searches captured the first 100 links and occurred on a quarterly basis from January through June of 2006 as follows: no prescription Bontril®, Didrex® and phendimetrazine (January and April); no prescription methamphetamine, amphetamine and methylphenidate (February and May); no prescription Adderall®, Concerta® and Ritalin® (March and June). The “no prescription” term was used to maximize the likelihood of returning websites that offered to sell stimulants without a prescription. Generally, this type of search would be conducted by an individual specifically seeking stimulants without a prescription from an online retailer.

Internet address (URL), the presence of retail or portal characteristics (described below), and any relevant comments about the site were captured in these searches. Following data capture, a second rater coded the websites independently; in cases of discrepancy, a consensus was achieved between raters following joint viewing of the site. Websites could be coded as *retail* or *portal* websites for quarterly 100-link searches. *Retail* websites offered to directly sell a Schedule II or III controlled stimulant to consumers. In addition, retail websites explicitly stated that medication was sold without a prescription (e.g., “No prior prescription necessary”) or offered an online consultation. Such consultations (i.e., those not performed in-person) are not a valid or legal basis for making a medical diagnosis and/or prescribing medications [32]. Finally, retail websites could not claim to need the approval of the patient’s treating physician or a valid prescription. Thus, retail sites offered to sell controlled stimulants without a valid prescription, which is an illegal activity. *Portal* sites contained website links that directly connected the consumer with retail websites.

Portrayal of Stimulants on the Internet: Drug Term Only Searches

This study investigated the portrayal of controlled stimulant use over the Internet. Nine stimulant names alone (i.e., without the “no prescription” prefix) were entered in the Google™ search engine on a monthly basis from January to July of 2006. The drug name alone was used to provide information on the portrayal of the drug and its use, not to capture offers to sell the medication. Such searches were expected to be conducted by adolescents who already use stimulants or by individuals interested in learning about stimulants. The information captured in these searches included Internet address (URL), portrayal of stimulants (described below), whether portal or retail characteristics were present, and whether instructions for methamphetamine synthesis were present. Corating and consensus occurred as described above for the “no prescription” searches.

Websites could be placed in one of four portrayal categories: *pro-use*, *anti-misuse*, *neutral* or *other*. *Pro-use* websites emphasized the benefits and/or minimized the risks associated with stimulant use. An example of a pro-use portrayal would be, “Adderall® helped out a lot on my ACT exam” [33]. Sites with portal or retail characteristics were coded as pro-use. *Anti-misuse* websites contained information on risks of non-medical stimulant use or had information about addiction treatment. An anti-misuse statement could be, “Taking high doses of a stimulant may result in a dangerously high body temperature” [34]. If a site contained both pro-use and anti-misuse portrayals, the site was classified as pro-use. This decision was made because the pro-use portrayals were believed to be more damaging. *Neutral* websites contained information about the medication but were neutral about use of the drug. Neutral sites included academic abstracts or unbiased news stories. Finally, websites were classified as *other* if they were unrelated to stimulant use (e.g., “Amphetamine Reptile Records,” a record company) or were non-operational links.

Data Analysis

Analysis of each data set began by calculating the interrater agreement (kappa) for the type of site ratings. For the both searches, frequencies and percentages of retail or portal website appearance were calculated for each individual drug. A one-way ANOVA was used to analyze the differences in retail or portal site appearance between the Schedule II and III stimulants. For the drug term only searches, frequencies and percentages of both portrayal rating were calculated for each search, with chi-square analyses used to evaluate the deviation from chance appearance of each portrayal rating. Finally, ANOVA analysis was employed to compare drug terms for the incidence of portal or retail websites.

RESULTS

Kappa (inter-rater agreement) values for the six months of data collection were between .81 and .96 for all searches and all evidenced significant agreement between raters ($p < .001$).

“No Prescription” Searches

The mean portal and retail frequencies and percentages for each “no prescription” drug term are summarized in Table 2. Analysis showed that the Schedule III controlled stimulants used to treat obesity (i.e., Bontril®, Didrex® and phendimetrazine) were more likely than the Schedule II stimulants used to treat ADHD (i.e., Adderall®, amphetamine, Concerta®, methamphetamine, methylphenidate, and Ritalin®) to return retail or portal sites in these searches ($F(1, 16) = 4.512, p = .050$). Since data for each medication was collected at only 2 time points, sufficient power did not exist to investigate differences between specific drugs. Also, it was noted that the vast majority of retail sites used medically-oriented images (e.g., individuals in lab coats) and written claims of legality for the sale of medications over the Internet. Due to the pilot nature of this investigation, a standardized content analysis was beyond the scope of this study.

Drug Term Only Searches

Portrayal Rating—The online portrayal of each medication is summarized in Table 3. Each drug fell into one of three groups based on the most common portrayal of each medication ($p < .001$). The most common portrayal of Ritalin®, amphetamine and methamphetamine was negative or anti-misuse; the most common portrayal of methylphenidate, Adderall® and Concerta® was neutral; and the most common portrayal of phendimetrazine, Bontril® and Didrex® was pro-use (due to a high incidence of portal sites). Methamphetamine was significantly more likely to have anti-misuse portrayals than any other searched drug, but it did have eight incidences of pro-use websites through the seven months of data collection. Of those eight, seven were from a single website: Erowid (www.erowid.com). Also, Erowid was the only website in this sample to contain detailed information on methamphetamine synthesis.

Incidence of Portal and Retail Sites—The mean frequency of retail or portal sites for the drug term only searches is summarized in Table 4. Analysis revealed significant differences in the frequency of retail and portal site appearance between drug terms ($F(1,6) = 210.633, p < .001$). Each of the Schedule III drugs indicated for the treatment of obesity were significantly more likely to return retail and portal sites than any of the Schedule II ADHD medications. As seen in the “no prescription” searches, many retail sites in the drug name only searches contained medical images and statements that their activities were allowed under US law.

DISCUSSION

This study offers substantial evidence that multiple websites offer to sell controlled stimulants without requiring a valid prescription. As predicted in the first hypothesis, eight of nine searched stimulants appeared to be offered online, with methamphetamine as the exception. Contrary to the prediction made in the first hypothesis, though, Schedule III stimulants indicated for the treatment of obesity were more likely to return retail or portal websites than the Schedule II ADHD stimulants. Also, instructions for the manufacture of methamphetamine are posted online. Finally, the portrayal of these stimulants varied depending on type: the Schedule III stimulants were associated with pro-use portrayals, while methamphetamine (in particular) was associated with a negative portrayal. The presence of mainly neutral or pro-use portrayals for some medications was not expected, and it contradicts the prediction made in the second hypothesis. While the predominately negative portrayals of Ritalin® and amphetamines might dissuade adolescents from misuse, other studies have found that Internet

searches actually increase likelihood of experimentation with certain “club drugs” [24,25]. These drugs, including MDMA (ecstasy) and Dextromethorphan, are also likely to have predominately negative portrayals by websites. Thus, negative information may not have the intended effect of discouraging adolescent stimulant misuse.

The apparent availability of controlled stimulants over the Internet is alarming for many reasons. First, the ease and anonymity of making purchases over the Internet could make it easier for adolescents and young adults to obtain these medications than similar drugs that are seen as comparatively unsafe, such as methamphetamine. In addition, using the Internet could facilitate purchases when other sources (e.g., peers) are unavailable. Second, even if the medication was legitimately prescribed, obtaining it via the Internet has resulted in dangerous substitutions [19]. Finally, retail websites (e.g., www.hateweight.com) appeared in the searches using the medication name only. This could lead to adolescents who simply searched for medication information finding stimulants offered online.

Here, and in a separate study [21], retail sites used images (e.g., individuals in lab coats) and written claims of legality for their activities. These images and claims may convince naïve consumers that Internet purchases of controlled stimulants are legal and safe, increasing the risk. Adolescents may be more vulnerable to such claims, based on their developing reasoning skills. Interestingly, though, it did not appear that the websites offering to sell controlled stimulants over the internet were specifically targeting adolescents through their appearance or content. Indeed, most websites returned in these searches targeting adolescents would be characterized as anti-misuse, using the criteria of this study.

Given the concern voiced in the popular media about the misuse of ADHD stimulants among youth and young adults, it is surprising that these medications appeared less likely to be offered online than stimulants indicated for the treatment of obesity. In the drug term only searches, retail or portal sites composed 52.4% of websites returned in searches of Schedule III stimulants but only 7.6% in searches for ADHD stimulants. Perhaps the less severe penalties associated with the illegal sale of Schedule III medications [5] are a factor in their greater availability. Alternatively, more frequent offers of Schedule III stimulants could indicate that these stimulants are more likely to be solicited online than ADHD stimulants. Regardless, over half of websites in Schedule III stimulant searches and 1 out of every 13 in Schedule II stimulant searches returned websites connected to offers to sell stimulants without a prescription. This was seen in the drug term only searches as well, where offers to sell medication were not specifically sought.

The first 20 returned websites had a consistently negative portrayal of methamphetamine. Given the great popular concern about methamphetamine use, the high degree of anti-misuse portrayals is not surprising. Pro-use webpages did appear in these searches, though with a much smaller frequency. As mentioned above, the main pro-use webpage for methamphetamine was Erowid (www.erowid.com). Erowid includes information on the chemistry, effects, and legal issues related to the use of a wide variety of legal and illegal psychoactive substances. The best description of Erowid may be to call it a “harm reduction” website, if harm reduction is concerned with reducing the adverse consequences of drug use without reducing use itself [35]. Erowid is of particular concern because it contains instructions for methamphetamine use and synthesis. The vast majority of methamphetamine is manufactured in clandestine labs [27], unlike the other medications here, which are made commercially. Thus, online instructions for methamphetamine manufacture are a notable public health risk that could promote the illicit manufacture of the drug.

Two limitations of the study were identified: (1) the exclusive use of Google™ in searches; and (2) the exclusion of “slang” or “street” names in searches. Google™ was chosen due to its

dominance of the Internet search engine marketplace, but different search engines might have returned a different pattern of results. Indeed, an investigation of opioid availability online [20] found that Yahoo!™ (www.yahoo.com) is more likely to return retail or portal sites than Google™. Thus, these results may be a conservative estimate of the phenomenon. Also, slang names for stimulants (e.g., meth or ice for methamphetamine, Vitamin R for Ritalin®) were excluded from these searches. The inclusion of these terms might have increased the likelihood of finding retail sites or methamphetamine synthesis instructions. Future studies should investigate this further.

For future research directions, continued monitoring of this phenomenon is warranted, using search engines other than Google™. Also, attempts to buy controlled stimulants online and evaluations of whether the obtained drugs are authentic or adulterated should occur. Investigators from the US Government Accounting Office (GAO) obtained authentic controlled medications online, including OxyContin and hydrocodone [36]. Since controlled stimulants were not ordered, future investigations should include these medications.

Clinicians can help limit the impact of online medication availability in a number of ways. While federal agencies are taking important steps to limit the availability of addictive medications sold by illegitimate Internet sellers [37,38], consumer education can limit the dangers posed by addictive medications being offered online. Physicians, mental health professionals and those in allied fields are well placed to inform parents about the apparent online availability of stimulants and opioid analgesics [20,21] and other stimulant-related issues, including diversion and misuse [39,40]. Clinicians can suggest practical steps that parents can take to prevent Internet purchases and stimulant misuse. First, parents should be urged to carefully monitor the Internet activity of adolescents, whether through monitoring software, blocking certain searches and/or keeping the computer in a common household area (e.g., family room). Second, parents should monitor their credit card statements for unfamiliar charges, as use of a parent's credit card may be the major way that adolescents gain access to stimulants offered online. Third, parents should keep and monitor their adolescent's stimulant medications, and, if an adolescent ceases stimulant use or changes stimulants, parents should be instructed to safely destroy the medication. Perhaps most importantly, parents need to communicate that prescription stimulants are as dangerous as illicit stimulants when the prescription is used in a non-medical fashion.

In sum, this investigation has established that controlled stimulants are offered for sale over the Internet without prescription. These findings might signal a major public health risk that requires both further monitoring and measures to prevent individuals from obtaining controlled stimulants via the Internet. Clinicians can help prevent online purchases by adolescents through parental education both about this phenomenon and about practical steps parents can take to prevent online purchases, misuse and diversion of stimulant medication.

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Table 1**FDA Stimulant Medication Warnings****Schedule II amphetamines carry the following Black Box Warning:**

Amphetamines have a high potential for abuse. Administration of amphetamines for prolonged periods of time may lead to drug dependence. Particular attention should be paid to the possibility of subjects obtaining amphetamines for non-therapeutic use or distribution to others, and the drugs should be prescribed or dispensed sparingly.

Misuse of amphetamine may cause sudden death and serious cardiovascular adverse events.

In addition, Schedule II amphetamines, such as methylphenidate, carry the following statement:**Drug Dependence**

Methylphenidate should be given cautiously to patients with a history of drug dependence or alcoholism.

Chronic abusive use can lead to marked tolerance and psychological dependence with varying degrees of abnormal behavior. Frank psychotic episodes can occur, especially with parenteral abuse. Careful supervision is required during drug withdrawal from abusive use since severe depression may occur.

Withdrawal following chronic therapeutic use may unmask symptoms of the underlying disorder that may require follow-up.

Schedule III amphetamines, such as phendimetrazine, carry the following statement:

Drug Dependence: Phendimetrazine tartrate is related chemically and pharmacologically to the amphetamines. Amphetamines and related stimulant drugs have been extensively abused, and the possibility of abuse of phendimetrazine tartrate should be kept in mind when evaluating the desirability of including a drug as proof of a weight reduction program. Abuse of amphetamines and related drugs may be associated with intense psychological dependence and severe social dysfunction. There are reports of patients who have increased the dosage to many times that recommended. Abrupt cessation following prolonged high dosage administration results in extreme fatigue and mental depression; changes are also noted on the sleep EEG. Manifestations of chronic intoxication with anorectic drugs include severe dermatoses, marked insomnia, irritability, hyperactivity, and personality changes. The most severe manifestation of chronic intoxications is psychosis, often clinically indistinguishable from schizophrenia.

Table 2
Mean Portal and Retail Site Number from the “No Prescription” Drug Term searches (Study 1)

“No Prescription” Drug Term	Schedule	Primary Indication	Mean Portal Sites (per month)	Mean Retail Sites (per month)
phendimetrazine	III	obesity	58.5	2
Adderall®	II	ADHD	50.5	0.5
amphetamine	II	ADHD	49	1.5
Bontril®	III	obesity	47.5	0.5
Didrex®	III	obesity	46	1
Ritalin®	II	ADHD	41	0
methamphetamine	II	ADHD	39	0
methylphenidate	II	ADHD	33	0.5
Concerta®	II	ADHD	31	0
All Schedule III		(obesity)	50.67 (SD = 10.893)	1.17
All Schedule II		(ADHD)	40.58 (SD = 9.179)	0.42

Note: The mean number and percentage for each drug (for both portal and retail sites) is the same, as searches were conducted on 100 links.

Table 3

Mean Attitude Rating from the Drug Term Only searches (Study 2)

Search Term	Anti-misuse	Pro-Use	Neutral	Other	Chi-Square
methamphetamine	118 (84.3%)	8 (5.7%)	12 (8.6%)	2 (1.4%)	$\chi^2 = 263.89$ $p < .001$
Ritalin®	70 (50.0%)	21 (15.0%)	44 (31.4%)	5 (3.6%)	$\chi^2 = 68.63$ $p < .001$
amphetamine	66 (47.1%)	19 (13.6%)	33 (23.6%)	22 (15.7%)	$\chi^2 = 39.71$ $p < .001$
Didrex®	0 (0.0%)	78 (55.7%)	26 (18.6%)	36 (25.7%)	$\chi^2 = 32.63$ $p < .001$
Bontril®	7 (5.0%)	73 (52.1%)	31 (22.1%)	28 (20.0%)	$\chi^2 = 65.98$ $p < .001$
phendimetrazine	2 (1.4%)	71 (50.7%)	46 (32.9%)	21 (15.0%)	$\chi^2 = 77.20$ $p < .001$
Adderall®	39 (27.9%)	28 (20.0%)	70 (50.0%)	3 (2.1%)	$\chi^2 = 66.11$ $p < .001$
methylphenidate	33 (23.6%)	26 (18.6%)	72 (51.4%)	9 (6.4%)	$\chi^2 = 60.86$ $p < .001$
Concerta®	22 (15.7%)	38 (27.1%)	63 (45.0%)	17 (12.1%)	$\chi^2 = 36.74$ $p < .001$

Note: Bolded values denote the most common type of site for each medication

Table 4
Mean Portal and Retail Site Numbers from the Drug Term Only searches (Study 2)

Drug Term	Schedule	Mean Portal and Retail sites (per month)	Percentage
Didrex®	III	11.14 (SD = 3.761)	55.7%
Bontril®	III	10.43 (SD = 2.760)	52.2%
phendimetrazine	III	9.86 (SD = 2.116)	49.3%
methylphenidate	II	2.71 (SD = 0.756)	13.6%
Adderall®	II	2 (SD = 1.633)	10%
amphetamine	II	1.71 (SD = 0.488)	8.6%
Ritalin®	II	0.86 (SD = 1.215)	4.3%
Concerta®	II	0.29 (SD = 0.756)	1.5%
methamphetamine	II	0 (SD = 0)	0%
All Schedule III		10.48 (SD = 2.857)	52.4%
All Schedule II		1.26 (SD = 1.326)	6.3%