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# The Internet and Psychoactive Substance Use Among Innovative Drug Users

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**ABSTRACT.** *Objective.* The Internet contains an extraordinary amount of information on the recreational use of psychoactive substances. We investigated the effect of the Internet on the drug-use knowledge, attitudes, and behaviors of adolescents.

*Methods.* Cross-sectional survey of adolescents being managed for substance abuse.

*Results.* Of 12 patients (9 male, 3 female) who had used the Internet to learn about psychoactive substances, 100% reported that Internet-based information had affected the ways in which they had used psychoactive substances. Of the 12 respondents, 8 described adopting behaviors intended to minimize the risks associated with psychoactive substance use. Respondents also reported changes in the use of a wide variety of illicit substances as well as over-the-counter and prescription pharmaceuticals. Examiners assessed whether quotations demonstrated that respondents' knowledge, attitudes, and behaviors toward psychoactive substance use were affected by Internet information. Despite the subjective nature of the research question, there was a highly significant agreement between coders.

*Conclusions.* Web-based data on psychoactive substances seem to influence a broad range of drug-use behaviors in adolescents. Information on the ways that the Internet is being used by this vulnerable population should be considered in the design of Web sites to prevent the initiation and use of psychoactive substances. *Pediatrics* 2005;115:302–305; *Internet, adolescent, drug abuse, substance abuse.*

Newly developed theories of drug use emphasize highly experienced drug users who possess a significant grasp of psychoactive substance use.<sup>1,2</sup> These individuals may function as vectors through whom drug knowledge is disseminated to peers.<sup>1,2</sup> The pivotal role that these adept drug users may play in the spread of emerging drug trends have made them an important prevention target.<sup>1,2</sup> Unfortunately, the response of this population to Internet-based drug information (with which innovative drug users can obtain an extraordinary volume of data on practical aspects of drug use) is

poorly understood. The purpose of our study was to examine the relationship between Internet drug-use knowledge, attitudes, and behaviors in a group of innovative adolescent drug users.

## METHODS

This study was conducted in the Adolescent Substance Abuse Program at Children's Hospital (Boston, MA) and the Emergency Department at the UMass-Memorial Medical Center (Worcester, MA) between April 2002 and May 2003. Inclusion criteria were: (1) age between 13 and 25 years; (2) had used the Internet to obtain information about psychoactive substances; (3) medically stable; (4) able to speak, read, or understand English or Spanish, and (5) able to consent to the study. Respondents >18 years old provided informed consent; those 13 to 17 years old assented to the study if caretakers provided consent. Patients were excluded if they were unable to provide informed consent; intoxicated with sedative-hypnotic agents; or intoxicated from intentional overdose. Exclusion of individuals using sedative hypnotic drugs allowed a more focused assessment of psychoactive substance use by excluding those persons abusing ethanol and pharmacologically similar compounds. The study protocol was approved by the institutional review boards of participating institutions.

Using a 48-item open-ended instrument, we performed a cross-sectional interview of adolescents who were receiving care for substance abuse. Domains of the instrument included gender/ethnicity, frequency of Internet use, types of information obtained online, drugs about which information had been sought online, effects of Internet drug information on respondents' opinions of drugs, the initiation or modification of drug use after online research, Web sites accessed for drug information, other sources of information used by respondents, and respondents' perceived validity of online information.

The sample size for this study was empiric and intended to provide preliminary data on the use of the Internet in adolescent decision-making about illicit substance use in a high-risk population. We analyzed the study variables using  $\kappa$  and descriptive statistics. We used an abstraction form to collect information about the effect of Internet-based information on respondents' drug-use knowledge, attitudes, and behaviors. The abstraction form comprised 24 respondent quotations in random order. By means of simple, dichotomous answers ("agree/disagree"), examiners assessed whether quotations demonstrated that the respondents' knowledge, attitudes, and behaviors toward psychoactive substance use were affected by Internet information. Masked versions were coded independently by 2 examiners trained in the use of the form, working according to an instruction manual, and blinded to the results until all data collection was complete. We determined, using the  $\kappa$  statistic, the degree of interobserver agreement between coders.

## RESULTS

Twenty-two individuals were approached for recruitment; 12 met inclusion criteria and completed the interview. Table 1 describes demographic characteristics, sources of information, drugs about which information was sought, changes in behavior, and respondent comments.

All 12 adolescents reported a change in drug-using

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**TABLE 1.** Sources of Online Information on Drugs and the Effect on Drug Use of Internet Data

Patient Age, y	Gender	Source of Online Information	Drugs About Which Information Was Sought Online	Drugs for Which Use Was Modified by Internet Information	Manner in Which Drug Use Was Modified	Comments on Internet Data	
1	17	Male	Erowid, online vendors	5-MeO-DMT, DMT, 5-MeO-DIPT, MDMA, <i>S divinorum</i> , <i>S rue</i> , nutmeg, morning glory, dextromethorphan, LSD	5-MeO-DMT, <i>S rue</i> , MDMA	Use of drugs initiated	"If it hadn't been for Erowid, I wouldn't have used the drugs"; "They had recipes on how to make extracts of <i>Syrian rue</i> "; "I think the information is dangerous"; "There wasn't anything that told me [the drug combination] was dangerous"; "The Internet exposed me to drugs that nobody else knows about"; "The Internet expands the possibilities... for exploration of the consciousness"; "I don't think I got [the mushrooms] I wanted"; "[The information on the Web] is usually accurate"; "The Internet informs you of addiction"; "The info is more of a deterrent [to using drugs]"; "The Internet gives new ideas on what's possible"; "Now I only smoke weed through a filter, because, you know, there might be carcinogens in the smoke"; "I think it is good that the information is out there"; "Sometimes [I was] given sites through chat rooms"; "I found out that you can go into withdrawal from Prozac"; "I didn't want to be addicted to a substance like [Prozac or Adderal]"
2	23	Male	Erowid, Lycaeam, online vendors	MDMA, <i>S divinorum</i> , cacti	<i>S divinorum</i>	Use of drug initiated	
3	18	Female	Bouncing Bear Botanicals, Erowid	<i>A muscaria</i> , <i>S divinorum</i> , absinthe	<i>A muscaria</i>	Use of drug initiated	
4	16	Male	Erowid, cleartest.com, 420 palace	MDMA, ketamine, LSD, cocaine, heroin, marijuana, LSD, opium, barbiturates, phencyclidine	Various substances	Administers drugs using new modalities (eg, smoking)	
5	16	Male	cannabis.org, cannabis culture, cleartest.com, Freevibe, Bluelight	Marijuana, LSD, MDMA, mescaline, psilocybin, PCP	Marijuana	Smokes marijuana through a filter	
6	18	Male	clubdrugs.org, deadiversions, Erowid, Cleartest, Healthsquare, tofse.com, prozactruth, WebMD	Adderal, paroxetine, cocaine, MDMA, heroin, ketamine, methamphetamine, dextromethorphan	Adderal, paroxetine	Ceased abuse of drugs	
7	15	Female	DextroVerse, Erowid	Dextromethorphan, MDMA	Dextromethorphan	Increased use of drug	"I, like, couldn't find a reason not to use it"; "It seemed safe because it is a real drug"; "I determined the risks [of MDMA] were less than the personal gain [from its use]"; "I hope [Internet information] is accurate"; "[Internet information is] helpful—it's good to put it out there, to weigh the pros and cons for personal use"; "We learned everything about GHB on the Internet"; "The Internet made GHB sound safe if you were careful"
8	16	Male	WebMD, geocities Web sites, Erowid, Multidisciplinary Association for Psychedelic Studies	MDMA, mushrooms, mescaline, cocaine, Percocet, codeine, mescaline	MDMA	Use of drug initiated	"I learned that the high [from Oxycontin] was like heroin, but my friends told me that [Oxycontin] is purer. So I started snorting it. Then it got so expensive and heroin was so cheap, I started using [heroin]."
9	15	Male	Erowid	GHB, MDMA, LSD, marijuana	1,4-Butanediol	Use of drug initiated	"There are lots of phenethylamines that I want to try"
10	16	Male	Erowid	GHB, MDMA, LSD, marijuana	1,4-Butanediol	Use of drug initiated	
11	19	Female	Government Web sites, heroin Web sites	Oxycontin, heroin, cocaine, MDMA, GHB	Oxycontin (heroin)	Use of drug initiated	
12	22	Male	Erowid, Lycaeam	2-CT7, 2-CB, MDMA, ketamine, dextromethorphan, GHB, tryptamines, nitrous oxide	2-CT7	Use of drug initiated	

MDMA indicates methylenedioxymethamphetamine; DMT, dimethyltryptamine; 5-MeO-DMT, 5-methoxy-dimethyltryptamine; 5-MeO-DIPT, N,N-diisopropyl-5-methoxy; LSD, lysergic acid diethylamide; PCP, phencyclidine; GHB,  $\gamma$ -hydroxybutyrate; 2-CT7, 2,5-dimethoxy-4-(n)-propylthiophenethylamine; 2-CB, 4-bromo-2,5-dimethoxyphenethylamine.

behavior after reviewing information obtained from the Internet. Participants described changes in the use of a range of substances including common drugs (eg, marijuana and methylenedioxymethamphetamine [MDMA]) or lesser-known hallucinogens (eg, 5-methoxy-dimethyltryptamine), herbs (eg, *Salvia divinorum*, *Syrian rue*), mushrooms (eg, *Amanita muscaria*), and pharmaceuticals (eg, dextromethorphan, Oxycontin, Ritalin, and Paxil). Of the 12 participants, 8 described (1) using drugs that they believed to be "safe," (2) using substances believed to be purer than pharmacologically related street drugs, (3) smoking drugs through a filter to remove potential carcinogens, (4) avoiding addictive behaviors and drugs, and (5) ceasing psychoactive substance use. Despite the subjective nature of the research question, there was a highly significant agreement between coders ( $\kappa = .64$ ;  $P = .006$ ).

To obtain information about drugs, participants accessed a broad range of online drug information including government antidrug Web sites, electronic medical textbooks, online vendors of psychoactive agents, and online drug encyclopedias. Of the 12 adolescents, 10 preferred drug encyclopedias such as Erowid ([www.erowid.org](http://www.erowid.org)) to other sources. Of the 12 participants, 2 accessed mainstream Web sites (eg, WebMD or government antidrug Web sites). Only a single person verified Internet information by using medical textbooks.

## DISCUSSION

These data suggest that Internet-based information on psychoactive substances influences a broad range of drug-use behaviors in a cohort of innovative drug users. Previously, online drug encyclopedias had been theorized to promote the initiation of recreational drug use.<sup>3-6</sup> Study participants, however, adopted new behaviors such as modifications in the use of preferred drugs, the cessation of psychoactive substance abuse, and the use of new drugs and drug combinations. The striking finding from our study, therefore, is that all respondents in our cohort modified their drug use after reviewing online drug information. This observation suggests that the Internet has a profound ability to affect decisions related to psychoactive substance use in a cohort of innovative drug users. Interestingly, 8 of the 12 participants adopted behaviors intended to minimize the risks associated with drug use, a finding that suggests that attempts to reduce the harm associated with psychoactive substances are fostered by online information.

Respondents sought data from an unexpected breadth of online resources including federal government antidrug Web sites, electronic medical textbooks, online vendors of psychoactive agents, Web forums, and online drug encyclopedias. However, they seemed to prefer Web sites that may promote the use of drugs such as online drug encyclopedias. Our respondents' preference may reflect the belief that online encyclopedias purportedly contain information that is more truthful than that contained in government Web sites.<sup>7</sup> Alternatively, this preference may be due to the volume of information con-

tained within online encyclopedias. One encyclopedia, Erowid, contains 20 000 documents that detail the practical aspects of drug use, including dosage, modes of administration, and intended effects.<sup>8,9</sup> Its 250 000 daily page visits and 6 million annual unique visitors who seek information on >200 psychoactive substances attest to Erowid's popularity and the perceived reliability of its information.<sup>8,9</sup> In contrast, Web-based antidrug efforts by the US government do not compete effectively with online drug encyclopedias. Governmental products do not penetrate Internet search engine results effectively and therefore are unlikely to be accessed by viewers.<sup>3</sup>

Health-behavior-change models often emphasize the importance of individuals gaining knowledge about specific health issues and incorporating these data into daily activities.<sup>10</sup> Accurate information can assist adolescents in making sound health decisions such as identifying options and learning potential consequences of behaviors.<sup>11-13</sup> Adolescents readily accept information on topics ranging from smoking cessation to sexual health and may rely on Web-based information for a variety of reasons, including ease of access, confidentiality, and the ability to obtain "personalized" data.<sup>12,14-16</sup> Once incorporated into daily activities, Internet usage is believed to change the behavior of adolescents and young adults profoundly.<sup>17</sup> Whereas older adults, who are unused to new technologies, must consciously integrate the Internet into daily routines, younger users may unconsciously append the Internet into beliefs and behaviors that are being developed.<sup>18</sup> For populations raised on e-mail, instant messaging, and immediate information, seeking data on psychoactive substances from electronic sources (and spontaneous trust of those sources) may be normative.<sup>18</sup>

At present, Internet users must decide what information offered on the Internet is valuable and what is not.<sup>19</sup> The information available on online drug encyclopedias, which has been implicated in drug abuse in adolescents, represents a considerable danger to a population that still needs adult supervision and guidance.<sup>19,20</sup> Currently, national drug-control strategies have been unable to offer an effective alternative to online drug encyclopedias and related Web sites.

This is one of the first studies to obtain direct information on the ways in which "at risk" adolescents and young adults respond to Internet drug information. We recognize that our data are preliminary and our study population is selective. Nonetheless, understanding how innovative drug users respond to Internet data is important, particularly because this group may act as vectors to influence the drug-use behaviors of peers, thereby leading to broader drug trends.<sup>1</sup> These results demonstrate the dramatic affect that Internet-based information exerts on drug-use behaviors in a select cohort of adolescents. Drug information that is tailored to adolescents and delivered through the Web may offer a highly focused means of delivering drug-prevention messages to this vulnerable population. Additional research into the mechanism by which Internet drug



information disseminates into the general population, as well as the effect of Internet data on drug use, is urgently needed.

#### ACKNOWLEDGMENT

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Grady D. *New York Times*. November 24, 2004

Noted by JFL, MD

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