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TRACKING ECSTASY TRENDS IN THE UNITED STATES WITH DATA FROM THREE NATIONAL DRUG SURVEILLANCE SYSTEMS*

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ABSTRACT

Anecdotal reports have suggested that the use of 3,4-methylenedioxymethamphetamine (MDMA or "ecstasy") is a prodigious problem across the United States. Unfortunately, no longitudinal evidence exists to support this contention. In the current study, data from the Drug Abuse Warning Network (DAWN), Monitoring the Future (MTF), and National Household Survey on Drug Abuse (NHSDA) are used to explore ecstasy use trends in the United States during the 1990s. While the use of ecstasy has increased over time, its prevalence is significantly less than other drugs of abuse. These findings suggest that anecdotal reports of an ecstasy epidemic is premature and that a less frenzied approach to ecstasy control and education may be warranted.

INTRODUCTION

A patent was issued in 1914 to the E. Merck Pharmaceutical Company in Darmstadt, Germany, to produce 3,4-methylenedioxymethamphetamine (MDMA or "ecstasy") as an appetite suppressant for soldiers in the First World War [1]. With the exception of several isolated animal studies during the 1950s, the compound was ignored until the early 1980s, at which point it gained popularity as both an adjunct to psychotherapy [2] and as a recreational drug [3]. For

*The opinions reflected in this article are those of the author and do not necessarily reflect those of McFarland & Associates, Inc.

psychotherapy, MDMA increased self-esteem and self-insight and enhanced empathy, communication, and interpersonal relations [2]. MDMA became popular recreationally because it increased self-confidence, lowered defenses and inhibitions, and induced feelings of empathy and love [1].

The first administrative acknowledgment of MDMA was a request from the World Health Organization (WHO) to the Food and Drug Administration (FDA) for specific information about MDMA [4]. Immediately thereafter, the Drug Enforcement Administration (DEA) filed a request for specific comments about MDMA, with the hope that it would eventually be classified as Schedule I under the Controlled Substances Act [5]. Although the DEA first learned of MDMA in the early 1970s, it was ignored for close to a decade. In July 1985, however, reports of potential neurotoxicity in laboratory animals [6] led the DEA to propose MDMA's criminalization. This proposal was met with strong opposition from therapists who continued to assert that MDMA's properties made it extremely valuable for therapy [7].

Federal hearings were held during the summer and fall of 1985 to determine the final scheduling of MDMA [8]. The DEA had several options. Schedule I substances are reserved for drugs that are deemed to have high abuse potential, no accepted medical value, *and* no accepted safety for use under medical supervision [9]. Schedules II-V are used for drugs that have some accepted medical uses and safety and have varying potential for abuse. During the course of these hearings, excessive marketing and distribution of ecstasy in bars and nightclubs, in addition to the findings of Ricaurte and colleagues [6], led the DEA to invoke emergency scheduling powers granted by the Comprehensive Control Act (CCA) of 1984 [9]. The CCA allowed the attorney general to place any substance posing "an imminent hazard to public safety" into Schedule I for a period of one year (plus an additional six months if necessary) while the final scheduling process was underway [9]. On July 1, 1985, MDMA was temporarily placed in Schedule I [9].

During the suspension, hearings were convened to decide what permanent measures should be taken. From the beginning of the hearings, the administrative judge expressed serious doubt regarding the lawful placement of MDMA into any of the available schedules [8]. Ultimately, the judge recommended that MDMA be placed into the less restrictive Schedule III. He concluded that MDMA did not appear to possess a high potential for abuse and that it did have a currently accepted medical use, as well as accepted safety of use under medical supervision [10]. The DEA rejected the court's ruling and permanently placed MDMA in Schedule I on March 23, 1988 [10]. A final appeal to the DEA was rejected during the spring of 1988.

In July 1992, federal government meetings reopened the door for investigating MDMA's potential as a therapeutic adjunct. In October 1992, the FDA approved the first human study of MDMA. While today MDMA remains a Schedule I substance in the United States—illegal to manufacture, use, buy, and sell—clinical studies exploring the potential neurotoxic effects of MDMA have been undertaken

in the United States [11, 12]. While proponents of MDMA still insist that it has therapeutic value, these studies have begun to identify negative long-term neurotoxic effects associated with its use.

Ecstasy Use in the United States

Media reports have suggested that the use of ecstasy is reaching epidemic proportions in the United States [13, 14]. Empirical support for this contention, however, is absent in scholarly literature. Since 1986, few ecstasy-related studies conducted in the United States have been published in peer-reviewed social science periodicals [3, 15-22].

Peroutka, for example, estimated the prevalence of recreational ecstasy use by surveying a sample of undergraduate students at Stanford University [3]. Of the 369 students interviewed, 39 percent reported using ecstasy at least once [3]. Cuomo and Dyment conducted a study of drug use among undergraduate students at Tulane University in 1990 and compared the results to data collected in 1986 [16]. The lifetime use of ecstasy increased from 16 percent in 1986 to 24 percent in 1990 [16]. Klitzman, Pope, and Hudson explored the relationship between MDMA abuse and high-risk sexual behaviors among a sample of 169 gay and bisexual men surveyed in New York City [17]. The odds ratio for high-risk sexual behavior was 37 percent greater among frequent versus non-frequent MDMA users [17]. Most recently, Yacoubian, Arria, Fost, and Wish collected self-report drug use data and urine specimens from a sample of 209 juvenile offenders surveyed through Maryland's Offender Population Urinalysis Screening (OPUS) Program between July and August 2000 [22]. While no two-day ecstasy use was reported and no ecstasy-positives were detected by urinalysis, 16 percent of the sample reported using ecstasy within the past 12 months and 8 percent reported use within the 30 days preceding the interview [22].

While these studies offer preliminary insight into the prevalence of ecstasy use among a variety of populations, no longitudinal evidence exists to support the contention that ecstasy use is a prodigious problem in the United States. To address this limitation, data from the Drug Abuse Warning Network (DAWN), Monitoring the Future (MTF), and National Household Survey on Drug Abuse (NHSDA) are used to explore ecstasy use trends in the United States during the 1990s. With this preliminary framework, research methods are described below.

METHODS

There are several major data collection efforts funded by the federal government to measure the prevalence of drug use within the United States. DAWN is an annual survey of drug-related problems treated in hospital emergency departments (ED) and drug-related death data collected from a sample of medical examiners and coroners' offices [23, 24]. The MTF project began in 1975 as a way to study

changes in the drug-using beliefs, attitudes, and behaviors of high school students across the United States. Today, the program surveys approximately 50,000 grade school, high school, and college students annually [25]. The NHSDA generates self-report survey estimates of drug use among household members ages 12 and older in the contiguous United States [26]. Finally, the Arrestee Drug Abuse Monitoring (ADAM) Program collects self-report survey data and urine specimens from adult and juvenile arrestees [27]. Data from 35 jurisdictions are collected nationwide.[1] The DAWN, MTF, and NHSDA systems are described below.

Drug Early Warning System (DAWN)

For the purposes of the current study, only data collected through hospital EDs are utilized. Since 1988, DAWN ED data have been collected from a representative sample of hospitals within the 48 contiguous states, with oversampling in 21 metropolitan areas[2] [23]. Within each hospital, a DAWN reporter is identified. This person is usually a member of the ED or medical records staff and is responsible for reviewing medical charts to identify drug abuse episodes eligible for inclusion. Because DAWN reports rely exclusively on information taken directly from medical charts, the accuracy of the reports is entirely dependent on the completeness of the information provided by the patient [23].

The reporter submits an episode report to the DAWN system for each substance abuse patient who visits an ED. Five criteria, however, must be met [23]. First, the person must be between 6 and 97 years old. Second, the patient must have been treated in the hospital ED. Third, the patient's problem must be directly related to substance abuse. Fourth, the problem must involve the use of an illegal drug or the illegal use of a licit drug. Fifth, the patient's reason for ingestion must be related to abuse/dependence, suicide, and/or psychological or physiological effects. Thus, DAWN cases do not include accidental ingestion, the use of a substance with no intent of abuse/dependence, and adverse reactions to over-the-counter (OTC) prescription medication [23].

Within each drug episode, up to four specific drugs (mentions) can be identified [23]. As such, not every mention is, in and of itself, necessarily a cause of the medical emergency [23]. Inversely, however, because only four specific drugs can

[1] Albuquerque, Anchorage, Atlanta, Birmingham, Chicago, Cleveland, Dallas, Denver, Des Moines, Detroit, Fort Lauderdale, Houston, Indianapolis, Laredo, Las Vegas, Los Angeles, Manhattan, Miami, Minneapolis, New Orleans, Oklahoma City, Omaha, Philadelphia, Phoenix, Portland, Sacramento, Salt Lake City, San Antonio, San Diego, San Jose, Seattle, Spokane, St. Louis, Tucson, and Washington, D.C.

[2] Atlanta, Baltimore, Boston, Buffalo, Chicago, Dallas, Denver, Detroit, Los Angeles, Miami, Minneapolis, New Orleans, New York, Newark, Philadelphia, Phoenix, San Diego, San Francisco, Seattle, St. Louis, and Washington, D.C.

be identified by the reporter, a drug abuse mention may go unreported. Alcohol use is recorded by the DAWN reporter *only* when ingested with an illicit drug [23].

In addition to the specific information on the drugs ingested, the DAWN reporter collects demographic information (e.g., sex, race, and age) about the patient and information related to the circumstances of the episode (e.g., the date and time of the visit). Data are also collected on the form of the drugs ingested (e.g., liquid or powder), route of administration (e.g., injection or snorting), and its source (e.g., street buy) [23].

There are potentially three major limitations to the DAWN data. First, DAWN data do not measure drug use prevalence, but ". . . health consequences of drug use that are reflected in visits to hospital EDs" [23, p. 7]. Second, the number of ED episodes reported to DAWN is not equivalent to the number of individual patients [23]. That is, the estimates reflect total ED episodes, not the number of patients involved. Third, DAWN data may be affected by varying collection procedures across the United States [23]. As with all surveillance systems, the data are only as good as the reporters collecting them.

Monitoring the Future (MTF)

The MTF study began in 1975 as a way to study the drug-using beliefs, attitudes, and behaviors of high school students across the United States. Today, the program surveys approximately 50,000 grade school and high school students annually [25]. Each data collection takes places in approximately 130 public and private schools, which provides an accurate cross-section of high school students throughout the United States [25].

A multi-stage sampling design is utilized [25]. Stage 1 is the selection of a specific geographic area. Stage 2 is the selection of the high school(s) within that particular area. The third stage is the selection of individual students within each high school. During the fall of each academic year, a MTF representative makes an initial contact with each sampled school. After securing consent from the high school principal or other administrator, arrangements are made for administering the survey [25]. Two weeks prior to its scheduled administration, MTF staff members visit the teachers and provide a brief overview of the study. Teachers are then asked to announce the study to their students.

MTF staff members follow standardized data collection procedures delineated in an instruction manual [25]. While parental/guardian permission is not required, youths are informed that their participation is voluntary and confidential. Questionnaires are administered during normal class periods. Most respondents complete the questionnaire within 45 minutes, although additional time is permitted for those who require it.

In addition to basic demographic information, the questionnaire covers areas on criminal behavior, alcohol, and other drug (AOD) use, education, health, politics, religion, social change, and social problems [25]. The AOD-use questions

are fairly specific. Respondents are first to report whether they have *ever* used alcohol, amphetamines, barbiturates, cigarettes, crack cocaine, ecstasy, heroin, inhalants, LSD, marijuana, powder cocaine, other psychedelic drugs (e.g., phencyclidine (PCP) and mushrooms), and tranquilizers. For those drugs respondents report having *ever* tried, they are asked to indicate grade at first use, whether they have used the drug within the past 12 months, and the number of times used within the past 30 days. They are also asked about their perceived ability to reduce or stop using drugs and the personal, familial, and occupational consequences of their drug use.

While the students sampled in MTF are designed to be representative of high school students within the 48 contiguous states, there are four methodological limitations to the data. First, some schools may decline participation [25]. Second, survey data may not be obtained from all of the students sampled [25]. Both of these limitations could introduce bias to the sample. Third, questions on sensitive issues, such as sexuality and drug use, could lead to distortions and thus reduce validity [25]. Finally, limitations in sample size could place limits on the accuracy of the estimates [25]. These caveats aside, the MTF data provide enlightening information about a variety of behaviors of grade school and high school students in the United States.

National Household Survey on Drug Abuse (NHSDA)

The NHSDA is designed to estimate the prevalence of drug use in the United States. All civilian, non-institutionalized residents in the United States aged 12 and over are eligible for inclusion, including individuals living in college dormitories, group homes, shelters, rooming houses, and military personnel [26]. A multi-stage probability sampling design is utilized [26]. Stage 1 is the selection of counties within the United States. Stage 2 is the selection of blocks or block groups within a particular area. The third stage is the selection of listing units within the sub-areas. Stage 4 involves the selection of age domains within sampled listing units. Finally, stage 5 involves interviewing individuals within the sampled age domains.

Respondents are first asked if they have *ever* used drugs in the following classes: alcohol, cocaine, hallucinogens, heroin, inhalants, marijuana, tobacco, and non-medical prescription drugs. If respondents report having used any drugs within these classes, questions are posed about specific drugs of abuse. For example, if respondents report having ever used any hallucinogens, questions are asked for specific types of this class, including mescaline, peyote, and ecstasy. For those drug *classes* respondents report having ever tried, they are asked to indicate age of first use and whether they have used the class within the past 12 months and the past 30 days.[3] Respondents are also asked about criminal history, AOD

[3] As such, the only data available for ecstasy are lifetime use.

treatment history, problems resulting from the use of AOD, need for AOD treatment, and needle sharing. Finally, demographic data, including gender, race, age, marital status, and educational levels, are collected.

While the NHSDA sample is designed to be representative of household members aged 12 and older in the United States, the data have two major limitations. First, the information is based exclusively on self-report [26]. As such, underreporting and overreporting may occur. Second, the data are cross-sectional in nature [26]. An exploration over time for specific individuals is therefore not possible. These caveats aside, the NHSDA is the only study that regularly produces estimates of drug use among civilian members of the non-institutionalized population of the United States. With this preliminary summary, data analysis and findings are presented below.

DATA ANALYSIS AND FINDINGS

Data analysis was accomplished in three phases. First, emergency room mentions were calculated for ecstasy, cocaine, and marijuana between 1994 and 2000. Second, self-reported ecstasy, cocaine, and marijuana use data were generated for 10th grade students and high school seniors surveyed through MTF between 1996 and 2000. Third, self-reported ecstasy, cocaine, and marijuana use data were generated from the NHSDA between 1990 and 1998. Because only lifetime ecstasy use data were available from the NHSDA, lifetime use ecstasy data were used from MTF.

Drug Early Warning System (DAWN)

The number of mentions and percent increases is shown for ecstasy, cocaine, and marijuana in Table 1. As indicated, the number of ecstasy mentions rose from 56 in 1994 to 4,511 in 2000, an increase of close to 8000 percent. Cocaine and marijuana mentions also increased during this time frame. Cocaine mentions increased 22 percent between 1994 and 2000, while marijuana mentions increased 140 percent during this time frame. While the cumulative percent increase is most dramatic for ecstasy, the total number of specific mentions in 2000 indicates that ecstasy use is considerably less prevalent than cocaine and marijuana use. The 174,896 cocaine mentions and the 96,446 marijuana mentions in 2000 are respectively 3,777 percent and 2,038 percent greater than the ecstasy mentions in 2000, suggesting that, relative to other drugs of abuse, ecstasy use is not a significant problem within hospital ED.

Monitoring the Future

As shown in Figure 1, the prevalence of lifetime ecstasy use among 10th grade students increased only marginally between 1996 and 2000. In 2000, approximately 7 percent of 10th grade students reported lifetime ecstasy use, as compared

Table 1. DAWN Emergency Room Mentions and Percent Increases, by Drug and Year[a]

	1994	1995	1996	1997	1998	1999	2000
Ecstasy							
Number of mentions	56	145	638	762	1,282	3,178	4,511
Annual percent change	—	+158%	+340%	+19%	+68%	+148%	+42%
Cumulative change	—	—	—	—	—	—	+7,955%
Cocaine							
Number of mentions	142,878	135,801	152,433	161,087	172,506	168,764	174,896
Annual percent change	—	–5%	+12%	+6%	+7%	–2%	+4%
Cumulative change	—	—	—	—	—	—	+22%
Marijuana							
Number of mentions	40,183	45,271	53,789	64,745	76,870	87,150	96,446
Annual percent change	—	+13%	+19%	+20%	14%	+13%	+11%
Cumulative change	—	—	—	—	—		+140%

[a]No ecstasy-specific data were collected before 1994.

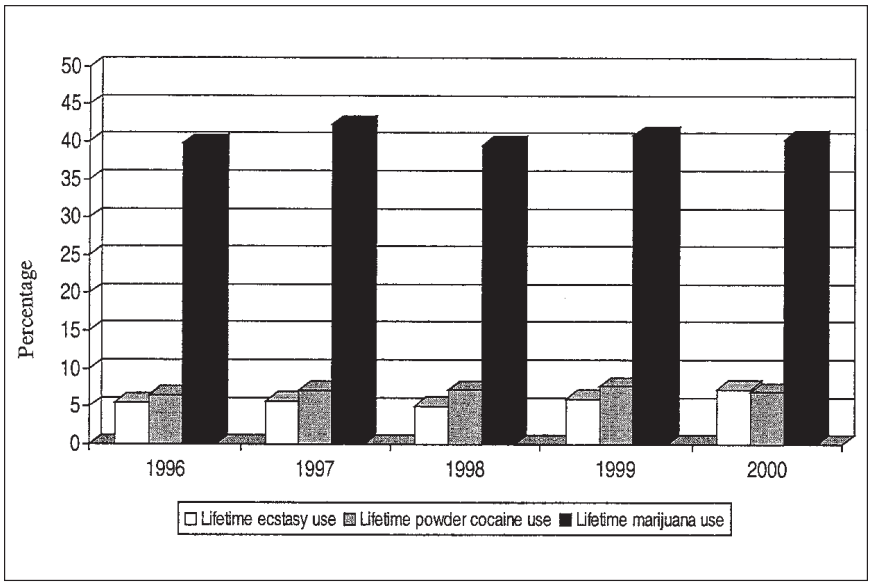

Figure 1. Lifetime ecstasy use among MTF 10th graders, 1996-2000.

to 6 percent in 1996. The prevalence of lifetime ecstasy use among this population is virtually identical to the prevalence of lifetime powder cocaine use, but considerably lower than the prevalence of lifetime marijuana use. In 2000, the prevalence of lifetime marijuana use (40 percent) was almost six times greater than the prevalence of lifetime ecstasy use. These data indicate that while lifetime ecstasy use has increased slightly among 10th grade students during the second half of the 1990s, it is considerably less prevalent relative to marijuana.

As shown in Figure 2, the prevalence of lifetime ecstasy use among high school seniors increased approximately five percentage points between 1996 and 2000. In 2000, approximately 11 percent of high school seniors reported lifetime ecstasy use, as compared to 6 percent in 1996. The prevalence of lifetime ecstasy use among this population is slightly greater than the prevalence of lifetime powder cocaine use, but considerably lower than the prevalence of lifetime marijuana use. In 2000, the prevalence of lifetime marijuana use (49 percent) was more than four times greater than the prevalence of lifetime ecstasy use. These data indicate that while lifetime ecstasy use has increased slightly among high school seniors since 1996, it is considerably less prevalent relative to marijuana.

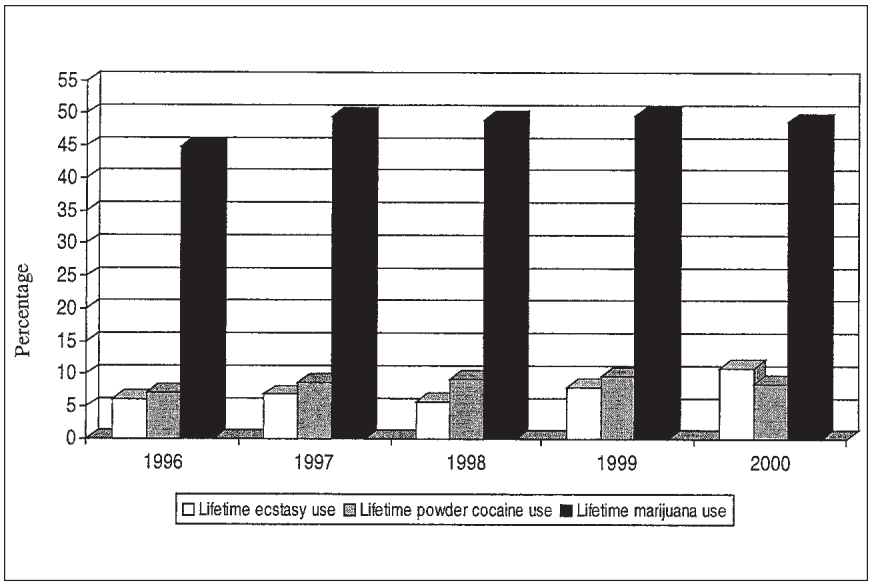

Figure 2. Lifetime ecstasy use among MTF high school seniors, 1996-2000.

National Household Survey on Drug Abuse

As shown in Figure 3, the prevalence of lifetime ecstasy use increased only marginally between 1990 and 1998. In 1998, 2 percent of the household respondents reported lifetime ecstasy use, as compared to .5 percent in 1990. The prevalence of lifetime ecstasy use is considerably lower than the prevalence of lifetime cocaine and marijuana use. In 1998, approximately 9 percent of respondents reported lifetime cocaine use, a rate four times greater than the prevalence of lifetime ecstasy use among this population. In 1998, the prevalence of lifetime marijuana use (32 percent) was 16 times greater than the prevalence of lifetime ecstasy use. These data indicate that while lifetime ecstasy use has increased during the 1990s, it is considerably less prevalent relative to other drugs of abuse.

DISCUSSION

In the current study, data from DAWN, MTF, and NHSDA were analyzed to explore ecstasy use trends in the United States during the 1990s. DAWN ED mentions were explored for ecstasy, cocaine, and marijuana between 1994 and 2000. MTF lifetime ecstasy, cocaine, and marijuana use data were examined for

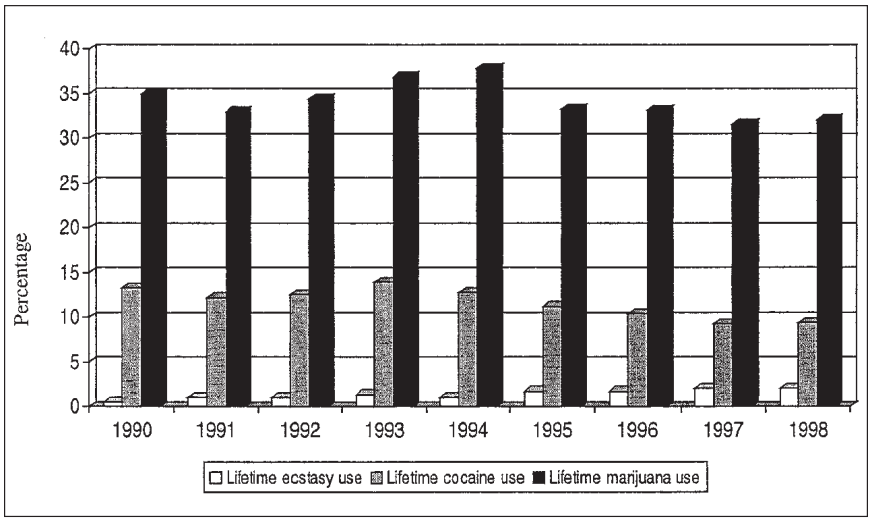

Figure 3. Lifetime ecstasy, cocaine, and marijuana use among NHSDA respondents, 1990-1998.

10th grade students and high school seniors between 1996 and 2000. NHSDA lifetime ecstasy, cocaine, and marijuana use data were analyzed between 1990 and 1998. The results indicate that while ecstasy use increased sharply across the four populations during the 1990s, it remains considerably less prevalent than cocaine and marijuana.

There is one unfortunate limitation to the current study. As discussed earlier, DAWN, MTF, and NHSDA are three of the four major drug surveillance systems in the United States. The fourth—the ADAM Program—did not collect ecstasy-specific data before 2001 for either its adult or juvenile arrestee populations. While ADAM is unquestionably an efficacious drug use reporting system, it has not kept pace with other data collections systems with respect to the surveillance of ecstasy [28]. While it may be argued that ecstasy is not a drug typically used by deviant populations—that its use is relegated to more mainstream youth—this is an empirical question that can only be addressed through future research. Indeed, Yacoubian et al.'s [22] study suggested that juvenile offenders may represent an important population for ecstasy-specific intervention.

ADAM has two major advantages. First, it has the ability to access a hidden population [29]. An underlying assumption of ADAM is that if a new drug emerges on the streets, it will take root in a criminal population before diffusing to the general population. This assumption is based on the work of Wish [30] and DuPont and Wish [31] who, after evaluating a urine screening program for arrestees arraigned in Washington, D.C., Superior Court, concluded that arrestee

urinalysis results detected an increase in heroin use in Washington, D.C., at least one year before other indicators of use in the community. It is reasonable to suspect, therefore, that ecstasy, as a newer drug, may take root in a juvenile offender population prior to diffusing to the general population of youth. Assuming this hypothesis is a reasonable one, the juvenile component of the ADAM Program is an ideal platform to test it.

Second, ADAM is the only major drug surveillance system in the United States to collect an objective measure of recent drug use. While the procedures for detecting ecstasy in urine are complicated [22], they can be accomplished. Given the plethora of research documenting low validity of self-reported drug-using behaviors [32, 33], a biological specimen would allow J-ADAM to estimate the prevalence of ecstasy use more accurately than those systems that rely exclusively on self-report.

The results of the current study suggest that media accounts of an ecstasy epidemic may be premature. This finding has major implications for how drug interdiction and education efforts are undertaken. Funds allocated for ecstasy-specific interventions may not be necessary. Rather, it may be more appropriate to divert these funds to address the unrelenting marijuana problem. Given that the prevalence of lifetime ecstasy use did not rise above 11 percent in any of the populations explored here, and that ecstasy mentions from DAWN are substantially fewer than those for cocaine and marijuana, a more sensible approach to interdiction and education efforts is warranted. In addition, drug education efforts should be tailored to younger populations, as the prevalence of ecstasy use was higher in the MTF samples than in the NHSDA sample.

The stability of ecstasy's prevalence, however, remains a matter for future scientific research. It is therefore important for national drug surveillance systems, like DAWN, MTF, and NHSDA, to continue to monitor ecstasy's prevalence. These systems provide the foundation for drug surveillance in the United States and are as important for drugs with high prevalence levels as they are for drugs whose popularity is minimal.

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