

Using Internet-based Surveys to Reach Hidden Populations: Case of Nonabusive Illicit Drug Users

David F. Duncan, DrPH, FAAHB; John B. White, PhD; Thomas Nicholson, PhD

Objective: To examine the potential of surveys delivered via the World Wide Web (WWW) as a method for reaching hidden populations such as that of nonabusive users of illicit drugs. **Methods:** Past and current approaches to collecting data from hidden populations were reviewed. **Results:** A number of approaches have been used in the past efforts to reach

drug users but the use of the WWW has produced the largest sample of successful illicit drug users ever surveyed. **Conclusion:** Further application of this approach (WWW) is recommended when hidden populations are surveyed.

Key words: drug use, Internet, survey, hidden population

Am J Health Behav 2003;27(3):208-218

A great deal of research on health behavior is concerned with the behavior of "hidden populations" such as sexually active teens, gays and lesbians, or persons with eating disorders. These populations are said to be hidden because they are difficult to find for study and often actively seek to conceal their group identity. The purpose of this paper is to describe an approach using Internet-based survey research to reach the "hidden population" of nonabusive drug users. We define nonabusive drug use as the consumption of a drug in a controlled manner, in terms of frequency and quantity, where the desired effects are experi-

enced without significant toxic, adverse physical or psychological consequences.¹ Lambert and Wiebel have described hidden populations as follows:

"Hidden populations" euphemistically refers to those who are disadvantaged and disenfranchised: the homeless and transient, chronically mentally ill, high school dropouts, criminal offenders, prostitutes, juvenile delinquents, gang members, runaways, and other "street people" - those we are all aware of to one degree or another, yet know so little about. These populations are often omitted from nationally representative surveys, largely because they have no fixed address or because they are less likely to be found at home or to agree to an interview. Ironically, those who belong to hidden populations are often at greater risk of drug abuse and drug-related morbidity than the general population. That is, the very individuals who might benefit the most from drug abuse treatment and prevention efforts are the least studied, the least understood, and the most elusive

David F. Duncan, Clinical Associate Professor, Medical Science, Brown University, Providence, RI. John B. White, Associate Professor; Thomas Nicholson, Professor, Department of Public Health, Western Kentucky University, Bowling Green, KY.

Address correspondence to Dr. Nicholson, Department of Public Health, Western Kentucky University, 1 Big Red Way, Bowling Green, KY 42101. E-mail: thomas.Nicholson@wku.edu

*to epidemiologists, clinicians, researchers, and others concerned with understanding and improving the public health of these populations.*²

Not only are hidden populations, such as the homeless, at high risk for illicit drug use and abuse, but as Anglin et al have noted, illicit drug users are themselves a hidden population.³ Expressing the concerns of HIV/AIDS prevention workers, Cunningham-Williams et al noted that "because of the illegal nature of their drug use activity, these populations are considered 'hidden' and therefore hard to recruit into prevention studies."⁴

Most of what we do know about the hidden population of illicit drug users is actually based on the study of 2 subgroups of users, which are essentially convenience samples of the larger population. One subgroup becomes accessible for study when they present for clinical treatment of drug dependence or drug-related health problems. A second subgroup becomes accessible to researchers as a result of their arrest for drug or drug-related offenses. These subgroups have been so extensively described that many Americans, including clinicians and researchers, incorrectly believe that they adequately represent not only all drug abusers but also all illicit drug users.

The other major source of information about drug users in our society is the population-based or school-based survey such as the National Household Survey on Drug Abuse (NHSDA) or the Monitoring The Future Survey (MFS). These surveys, however, reveal that there are millions of Americans who consume illicit drugs without ever presenting themselves for treatment or becoming entangled in the criminal justice system.⁵ This clearly indicates that the more detailed study of attributes of persons in either the clinical or criminal justice subgroups cannot be generalized to all illicit drug users.

Furthermore, when the Epidemiologic Catchment Area Study applied the formal diagnostic criteria for substance abuse disorders set by the American Psychiatric Association⁶ to representative samples of the populations of 5 metropolitan areas, they found that only 1 out of every 5 users of illicit drugs met, or had ever met, the criteria for a diagnosis of substance abuse or dependence.⁷ Unfortunately, the na-

tional surveys sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA) and National Institute on Drug Abuse (NIDA) have generally made no clear distinction between use and abuse of illicit drugs. SAMHSA's household survey, which offers no statistics on numbers of persons meeting DSM-IV criteria for substance abuse disorders, nevertheless reports its wealth of data on use under the title, *National Household Survey on Drug Abuse*. Although the text of government reports increasingly employs the correct term "use" for these data, they are commonly cited in the news media, political speeches, and much of the scientific/medical literature as reflecting abuse. Recent fluctuations in the usage rates for marijuana, for instance, were widely reported as trends in marijuana abuse.⁸

Discovering Heroin Users

Although most of the literature ignores the distinction between users and abusers—often implicitly assuming that all use is, or will lead to, abuse—there is a small but growing body of research that describes nonabusing illicit drug users. It is interesting that this literature seems to begin with the discovery of nondependent users of the drug that most Americans tend to regard as being the most addictive drug of all: heroin. Perhaps the earliest contribution to this literature was Lindesmith's description of what he called "joy poppers" as opposed to true heroin addicts. A "joy popper," he wrote, "is simply an individual who uses the drug intermittently and who has never been hooked." It seems clear, however, that he believed that most such "joy poppers" would eventually succumb to addiction.⁹

Chein et al likewise documented the existence of "long term nonaddicted users" of heroin, but concluded both that their numbers were insufficient to warrant study and that most would go on to become addicts eventually.¹⁰ The accepted view among drug researchers, as stated by Goode, came to be one that "the occasional (weekend) heroin user is probably a good deal more common than most of us realize, although an extraordinarily high percentage of those who 'chippy' (experiment) with heroin eventually become addicted."¹¹

Beneath the surface of this consensus,

a contrary view persisted and grew. Scher described heroin users with "what might be called a regulated or controlled habit."¹² Zinberg and Lewis described a spectrum of narcotic usage ranging from the nonaddicted user to the addict.¹³ Contradicting the view that heroin use was merely a temporary stage on the way to addiction, Alksne, Lieberman, and Brill reported that "although no research reports are available for this kind of user, our own observations indicate that some persist in occasional or limited use for an indefinite period of time without going on to more regular use."¹⁴

During the 1970s, the explosive growth of community-based treatment brought increasing numbers of clinicians and community researchers into contact with nonaddicted heroin users. Hughes et al for instance, documented the existence of nonaddicted users in a heroin copping community.¹⁵ Gay et al¹⁶ and Newmeyer¹⁷ applied Zinberg and Lewis' concept of the pseudo addict in discussing nonaddicted heroin users seen at the Haight-Ashbury Free Medical Clinic.

Erickson and Alexander have reported findings about cocaine use similar to those reviewed above for heroin use. They reviewed research that studied users in the community, outside of treatment and prison, and concluded:

Most social recreational [cocaine] users can maintain a fairly low use pattern and lengthy periods without escalation to addiction. Users appear to recognize the need to limit their use of cocaine, and most seem to be able to accomplish this without professional intervention.¹⁸

Sampling Users

All the literature cited in the section above depended on convenience samples of users who either presented at clinical settings or were encountered in the course of research aimed at abusers. A fuller understanding of nonabusive use required samples specifically of users. Unfortunately in sampling such a hidden population, as Wiebel points out, "representative sampling, irrespective of scientific merit, is quite simply not possible in relation to the numerous varieties of phenomena at issue."¹⁹

The first researchers to attempt to study samples specifically made up of nonabusive users relied on advertising solicitations to bring subjects to them.

Powell, for instance, recruited occasional heroin users through advertisements in a counterculture ("underground") newspaper. As a result of this solicitation, he was able to describe a dozen subjects who had used heroin for 3 years or more without becoming addicted.²⁰

Zinberg and colleagues recruited subjects through newspaper advertisements, community agency and professional contacts, and subject referral. Using these methods they were able to identify 90 opiate users who had between 3 and 23 years of experience using heroin without addiction. Follow-up interviews were conducted 6 months to a year later with 60 subjects and 2 years later with 25, thus confirming that they did not subsequently become addicted. This work clearly demonstrated that, contrary to popular opinion and clinician belief, a stable population of long-term nonaddicted heroin users did exist.^{21,22}

Once Zinberg and his associates had proven the existence of this population it was possible for Hunt and Chambers to combine data from a number of sources to estimate that the current heroin-using population of the United States numbered between 3 and 4 million, with only 10% being addicted.²³ These figures seem to be generally consistent with the results of epidemiologic surveys.^{5,7}

Cohen applied "snowball sampling" techniques (in which known subjects nominate new subjects, who in turn nominate others) to identify 160 cocaine users in the City of Amsterdam who were not involved in deviant lifestyles apart from their drug use. His data offered no evidence that any of the subjects had ever lost control of their cocaine use. Only 2% of the subjects currently used cocaine at what Cohen considered a heavy level (2.5 grams per week or more), and only 20% had ever done so.²⁴

Although they were not specifically seeking nonabusive users of cocaine, Waldorf et al found a good many in their study of 267 current or former heavy users of cocaine in California. Heavy use was defined as using at least 2 grams per week for at least 6 months or having used some cocaine every day for a minimum of one year. Subjects were sampled using the snowball technique.²⁵

Although Waldorf et al describe their subject's rate of cocaine consumption as falling in the top 5% of all of the millions

of Americans who have tried cocaine, only about half of them had serious clinical problems. The remaining half reported few, if any, such problems. Many of these heavy cocaine users had used cocaine for years in a controlled manner without serious negative effects. Having found the use of paraprofessional outreach workers to be ineffective in reaching injecting drug users (IDUs), Broadhead et al adopted a snowball-type approach. They found that they could reach IDUs more effectively when they paid cash incentives to users to bring in a member of their user network for HIV prevention. Even this approach would not reach any previously undetected user networks.²⁶

Difficulties With Sampling Procedures

At first glance the snowball technique (also known as chain referral) seems to be a major improvement over earlier efforts that solicited volunteers through advertisements. The snowball process, however, must begin with some initial sample of subjects who form the core of the growing snowball. With hidden populations it may be difficult to obtain subject referrals to new subjects. Coomber,²⁷ for instance, found in his attempt to use snowball technique in a survey of drug dealers that none of his respondents was willing to nominate another subject.

In the majority of the extant research, this core or seed has been a solicited sample or a sample of convenience drawn from a clinical or criminal justice population with all the attendant biases resulting from such samples. As a result it is possible to acquire a sample that is entirely composed of one or several social networks whereas other networks that do not intersect with those networks are excluded. The nature of the original core thus largely determines the nature of the final sample.

The use of "street" contacts and chain referral (snowball) techniques by HIV/AIDS prevention outreach to injecting drug users has been found to result in the projects reaching a biased sample of drug users.^{4,28} It is a common finding that this technique results in an underrepresentation of white drug users. Suggesting the cause of this phenomenon, Cunningham-Williams et al state that:

The outreach process needs to be modified to adequately reach white drug

users for HIV prevention. In both San Antonio and St. Louis for example, only a small segment of the white drug users 'hang out' on the streets in the usual recruitment areas, thus few will be identified or recruited using 'street' outreach. Recruitment of employed, middle-class drug users from any racial/ethnic group will be difficult for projects which restrict their activities to normal working hours during weekdays...⁴

Data-collection procedures that rely on face-to-face interviews confront serious problems when inquiring about socially disapproved behavior, and these problems are likely to be even greater when inquiring about illegal behavior such as illicit drug use. The most successful drug users may well be those who succeed best at concealing their drug use. Such persons would be unlikely to be reached through a snowball sample because they would minimize their contact with readily identified social networks of drug users. They would also be less likely to admit to drug use in any face-to-face situation.

Based on NIDA's experience with drug surveys, Turner et al conclude, that utilization of self-administered questionnaires (SAQs) and/or computer-assisted self-interviewing (CASI) technology can lead to increased reporting of drug use by respondents.²⁹ An important advantage to the use of such methods is the anonymity a respondent can have while completing a survey of socially deviant and very often illegal behavior. A recent comparison of a computer-administered version of the Primary Care Evaluation of Mental Disorders (PRIME-MD) to clinician administration of the same instrument or a DSM interview, for example, revealed that twice as many patients admitted symptoms of alcohol abuse on the computer-administered version.³⁰

More recently, the ability to distribute SAQs across the Internet using a variety of technologies has made this approach particularly attractive and timely. The use of E-mail, for instance, is the electronic version of the survey mailed via post. For example, it is possible to compose a survey, mail it to hundreds or thousands of individuals, and receive replies, all relatively inexpensively.

Table 1 (adapted from Fitzgerald³¹) presents a summary of 4 different means of

Table 1
Comparison of Survey Methods via the Internet

	Hard-copyMail	Distribution/Collection Method		
		E-mail	Telnet	HTML
Access	High	Low - High	Low	Low - High
Cost	High	Very Low	Moderate	Low - High
Labor	High	Low - High	High	Low - High
Randomized Sample	High	Low - High	Low - High	Low - High
Security/Confidentiality	High	Low	Low - High	Low - High
Targetability	High	Low - High	Low - High	Low - High

Note.
This table was adapted from Fitzgerald.³¹

delivering a survey to a respondent. For comparison, hard-copy surveys delivered via postal mail are included. It should be noted that these categorizations are based upon the experience of authors and others and are intended as guidelines for other researchers. The lowest cost alternatives for delivering surveys are via E-mail. This results from the relatively easy interface most people enjoy today (software such as Microsoft's Outlook, Netscape's Mail Interface, or other programs such as Eudora) in comparison to that of a few years ago. Further, it is the ability to simply "reply" to E-mail that makes participating in this type of survey relatively easy.

Experience in the use of E-mail to collect survey results has shown that a majority of subjects respond within 3 days after receiving the survey.³² Response rates using E-mail to survey on sensitive topics, however, may suffer due to the fact that E-mail is not anonymous.³³

There are significant obstacles to this low-cost technology (both to the researcher and the potential respondent). Unlike traditional postal mail, the selection of a random sample from the population is problematic. Similar to phones, E-mail has generally been available among the more affluent or educated in the United States. Further, in the prior decade, the majority of E-mail originated within universities or other research institutions, hardly a representative population. This lack of representation continues to be a hurdle for any type of research conducted via the Internet.

Two further problems with E-mail sur-

veys remain. Straight text is relatively easy to format, but today's surveys with machine coding have provided for checkboxes and other similar means of limiting respondent choices. This is extremely difficult to mimic via E-mail documents. Most are simple text (ASCII and ANSI character set), and there is no easy means of recording responses. This has been addressed somewhat with the advent of HTML-compliant E-mail software.

Using these newer software packages, E-mail can be formatted with different fonts, color, highlighting, or other design changes. The researchers can frequently use their favorite word-processing program to compose their survey with all the formatting options normally available. However, unless the survey includes the capability to interact with a Common Gateway Interface (CGI) program, someone must still encode the data from a respondent's answers. An alternative to this is the attaching of an actual survey document (perhaps in an Adobe Acrobat Reader© format preserving the original look and feel of the survey), which the respondent could then print out, complete, and return to the researcher. In addition to adding another step to the survey process, this particular solution is not satisfactory because many individuals have difficulty handling attached files, either because of incompatible file formats or a lack of working knowledge with regard to their E-mail software.

The personnel costs for preparation of these responses for analysis when returned can range from relatively inexpensive to exorbitant. As with paper-and-

pe
Hc
di
m:
m

m
th
su
la
be
ar
U
er
er
u
e:

e:
c
tl
e
s
f
d
p
u
s
v
f
r
e
s
c
s
i
c

pencil surveys, the data must be coded. However, with E-mail surveys, it is very difficult to receive the data back in a machine-readable format; thus coding must be done by hand.

The security and confidentiality of E-mail are also questionable. Depending on the rules of the institution where the survey originated, as well as the rules/laws governing the respondent, there may be no privacy. Many public institutions are covered by open records laws in the United States, and there have been several legal precedents establishing that employees have no right to privacy when using the E-mail systems of their employers.

Rather than sending the survey to users, it is possible to invite users to a centralized space on the Internet and then respond to a survey. It is possible, for example, to send E-mail soliciting responses providing an address or URL (Uniform Resource Locator) that the respondent could then access. Nicholson et al³⁴ presented the results of a study in which users were solicited via the Internet, specifically USENET newsgroups, who would then telnet into a mainframe computer to complete the survey. Unlike E-mail, this had the distinct advantage of electronically coding respondents' answers, as well as providing for branching of questions, controlling out-of-range responses, and ensuring that the data were readily available for analysis. This means of survey delivery was more expensive than E-mail as it was necessary to hire programmers to write the software required to run the survey and code responses. Access was even more of a concern for this technology. Even today, software for telnetting from one's personal computer to a remote host is delivered with every copy of Microsoft's operating system (the most popular in the world); however, few people are required to use it. As of this writing, neither of the major Web browsers has a default setting that would enable users to follow a link to a telnet-ready host, and further, not all software is compatible with all machines. In short, as with E-mail, individuals may see different formatting, colors, and even character sets when using telnet.

The third alternative, use of hyper-text markup language (HTML), is a very attractive means of delivering a survey to the user. Access to a document is very

high, depending on how the document is formatted. HTML is currently in its fourth incarnation, with additional coding languages proposed. However, surveys that are HTML 2.0 compliant can reach a broad number of respondents, regardless of the operating system residing upon their computer. Further, with a few design considerations (eg, choice of colors and fonts), the survey will look the same on an IBM, Mac, or Unix system. Creating an HTML document is almost as easy as composing E-mail. Most major word processors have the capability of saving documents in their native or HTML formats. Microsoft Word, Corel WordPerfect, and Lotus AmiPro all have this capability. It is then possible to place this document on a server that can handle forms and begin collecting data. Costs from this approach are relatively low, with an important exception. Although it is possible to have an HTML document use the respondent's E-mail software to send the data back to the researcher, this particular methodology is not always successful. Not all E-mail packages complete the required steps. Therefore, the more certain means of collecting data from an HTML document involves accessing another program whose purpose is to handle such data. These common gateway interface (CGI) programs are generally written in higher level languages (eg, C++, Perl, or Java) and often require specialized technical support, which can be expensive. However, once a CGI program has been developed, the ease of responding to a HTML document makes it particularly attractive as a means of data collection. Studies of the use of the Internet in conducting marketing and business surveys have shown that "web capabilities can boost response rates by an average of 10-15%."³⁵

The DRUGNET Study

The purpose of DRUGNET was twofold: (a) to explore the potential of using the World Wide Web (WWW) of the Internet to sample hidden populations (such as drug users) and (b) to collect exploratory data documenting the existence and some of the characteristics of a hidden population of nonabusive, recreational users of illicit drugs. Respondents would be described in terms of demographics, past legal history, health/behavioral indices, general mental health status, and a drug-taking profile.

Given the widespread denial of the existence of healthy, successful, nonabusive drug users that has greeted the studies cited above and our own presentations of this study in progress, we felt justified in proposing our study as a test of the implicit and widely held hypothesis that there are no long-term, nonabusive users of illicit drugs. The discovery of any substantial number of cases of such users justifies rejection of the null hypothesis, much as the discovery of the first breeding colony of black swans disproved the hypothesis that all swans are white.

Procedures

In 3 annual waves of data collection in 1996, 1997, and 1998, Internet users were solicited to participate in an anonymous on-line survey. The survey was located on the WWW, and the home page for the DRUGNET survey was registered with the major search engines such as Lycos and Alta Vista. Respondents were also actively solicited through electronic mailing lists and announcements posted on USENET News Groups. Announcements were posted to groups, which were not drug related, as well as those which were, but objections to this practice of "spamming" led to minimization of postings to nonrelated groups.

Respondents would point their browsers to the Web address (<http://wkuwebl.wku.edu/drugnet> - now <http://www.illicit-drugs.org>) to view the DRUGNET homepage. This initial page included a short tutorial on how to complete the survey, a link to a service that would increase the anonymity of their responses (<http://www.anonymizer.com>), and a statement of informed consent. Respondents had to at least view the contents of the page before actually completing the survey. Only if they indicated their agreement with the purpose and procedures of the survey would they be able to move on to the pages where they would be asked any questions with regard to their past history of drug usage.

A major advantage of conducting surveys on the WWW is the ease with which data can be collected and coded. For the research reported here, a program was written in C computing language to both administer the various surveys and code and store the data for analysis. This CGI and its actions are invisible to the re-

spondent. Furthermore, because the CGI program runs continuously in the background, the data are coded as each response is submitted and available for analysis by the researcher as soon as subjects complete each section of the survey.

Alternatively, the researcher can make use of products such as Cold Fusion (<http://www.macromedia.com>) or MicroSoft's ASP (<http://microsoft.com/asp>) technology to deliver dynamic surveys. These products have the advantage of being able to run multiple surveys without the significant investment of programming time that many CGI solutions require.

Instrument

The survey actually consisted of a set of smaller questionnaires. Following a screening item asking what drugs the respondent had used in the past, each respondent was asked only about those drugs indicated. The drug use history for each drug included questions based on the DSM-III-R criteria for substance abuse disorders in order to identify and select out any drug abusers who might complete the survey. In addition, all respondents completed 3 more questionnaires dealing with: past legal experiences and opinions, mental health status, and demographic and lifestyle indices.

The measure of mental health status used in this survey was the General Well-Being Schedule (GWBS). The GWBS was developed for the National Center for Health Statistics to fill the need for a brief, reliable, and valid self-report measure of mental health for use in general population surveys and was initially used in the US Health and Nutrition Examination Survey (HANES I). Scores can range from 0 to 110, with higher scores indicative of better well-being. There is good evidence of validity of the measure, and test-retest reliability has been reported as .85.³⁰

RESULTS

Nearly 2000 persons have completed the DRUGNET survey during its first 3 rounds of data collection making it the largest sample of nonabusing illicit drug users ever collected. The purpose of this paper is to examine the need for study of the hidden population of nonabusive illicit drug users and to present Web-based surveys as a technique of value in sur-

veying this population. We will not, therefore, present our findings in detail in this report. They can be found elsewhere.^{1,34,37,38,39} The following summary of some of our main findings, however, may be of interest to the reader.

Two of our questions help demonstrate the erroneous stereotype of inevitable slide to addiction. First, when asked if they had "ever used" a drug, lifetime percentages ranged from 97% for alcohol to 27.2% for opiates.³⁷ However, these percentages drop rapidly when users are asked about their usage in the past year—94.0% and 9.6% respectively.³⁷

Second, alcohol and marijuana appear to be the most commonly used drugs throughout the lifetime of respondents.^{1,34,37} These 2 drugs are associated with earlier use, but instead of serving as a "gateway" to increasing use of other drugs, they seem for most of our respondents to have remained the drugs of choice. The mean age for first trying alcohol was reported as 13.2 years and 16.7 years for marijuana.³⁷ Use of hallucinogens, cocaine, stimulants, depressants, and opiates were all more likely to be reported as having occurred during our respondents' college years.^{34,37}

When asked about current use, alcohol and marijuana were again the most common drugs of choice for respondents.^{1,34,37,39} Over 50% of the respondents reported taking one of these drugs at least once a month or more often.³⁷ When asked about their typical level of intoxication, respondents reported the lowest levels when using alcohol, reaching a mild level of intoxication.³⁷ Respondents reported becoming moderately intoxicated with the other drugs they reported using, with the exception of hallucinogen users, who reported becoming "Very" or "Extremely" intoxicated.^{1,36,37}

Last, we have found no evidence suggesting that drug use is related to the current mental status of our respondents. As a group our respondents' observed GWBS scores were almost identical to those reported for the general population.³⁶⁻³⁸ We have found no relationship between GWBS scores and use, except for alcohol and cocaine.³⁸ Frequency of use of alcohol was associated with lower level of mental well-being as was level of intoxication for both alcohol and cocaine. None of the other drugs (marijuana, stimulants, cocaine, opiates, depressants, or

hallucinogens) was correlated with GWBS scores. In short, illicit drug use does not appear to be either negatively or positively related to mental status for these respondents.³⁸

A subsample of parents (n=325) reported that their drugs of choice were alcohol and marijuana with opiates and depressants the least frequently used.³⁹ The majority (64.2%) of these users also reported that their children were unaware of their drug consumption.³⁹

DISCUSSION

The experience of planning and conducting the DRUGNET Study over the past 5 years has convinced us that Web-based surveys have a role to play in studying illicit drug users. They may not be the solution to all of our problems, but they are a means to reach a substantial number of respondents who are willing to complete part or all of a fairly lengthy on-line survey of recreational drug use. A majority of individuals responding to the survey felt secure enough to answer questions of a very personal nature, many of which were related to illegal activity. Most respondents were willing to write what were often quite lengthy essay responses to open-ended questions included in the survey. These responses were often powerfully emotional, indicating this population's strong needs to be heard. If given enough safety and security, they appear more than willing to tell their stories.

Numerous respondents followed up their survey responses by sending us both mail and E-mail that often included information of a sensitive nature despite the loss of anonymity this involved. We believe that this bodes well for future research efforts of this type. Analysis of the range of responses to questions and response patterns also seems to suggest that the responses provided were honest and possibly more frank than what people will say face-to-face with an interviewer. We are not the first to suggest that the use of computer to collect data may be a solution to some forms of subject-response bias.^{27,40,41}

These results also provide a larger and more diverse database from which to develop a profile of nonabusive illicit drug users than did any of the previous studies. Overall, our respondents appear to be a normal, healthy group of individuals

who occasionally or socially use illicit drugs. Generally, they are well educated, employed, active in social activities, comfortable with their physical health, and possessed of normal mental well-being. Their recreational drug use does not appear to be the central focus of their lives, clearly distinguishing them from drug addicts. Their drug consumption is generally low to medium in frequency and appears to be well-controlled (ie, consumed within nonharmful, self-defined parameters). These findings are an important counter to the widely held view that drug abuse is the inevitable outcome of any illicit drug usage that proceeds at all beyond experimentation — a view that is foundational to our nation's current zero tolerance policies.

Any generalization of these findings to the entire population of nonabusive illicit drug users must be tempered by an awareness of the characteristics of the population that uses the Internet. Although an ever increasing proportion of Americans in all walks of life seems to be going online, marketing surveys indicate that Internet users are more likely than the general population to be college graduates and to earn median household incomes of \$60,000 compared to the \$42,000 median for all US households.⁴² Naturally, a population of drug users identified via the Internet is likely to share many of these characteristics, particularly if it is true that their drug use has not impaired their educational or career progress. The Internet has changed demographically since these data were collected. For example, our samples were overwhelmingly white male, reflecting the nature of the Internet population at the time, as well as the population of drug users. According to the UCLA report "Surveying the Digital Future," women are now going online as often as males.⁴³ Individuals with higher incomes and levels of education still use the Internet more than other persons do.⁴³ Another survey of the Internet indicates that the majority of users on the Internet earn \$30,000 (US\$) or more.⁴⁴

We believe that the DRUGNET experiences provide encouragement for the development and refinement of further online surveys of the general population who have access to these technologies. In the years to come, this should be a steadily increasing proportion of the population similar to the increase in home phone

ownership in the latter part of the 20th century. For studying so-called hidden populations such as recreational, illicit drug users, this medium appears to be potentially very valuable.

The results we present here suggest that drug education in the United States is fundamentally flawed. A harm-reduction approach would suggest that individuals can be taught to manage their use of any illicit drug. This contradicts the "Just Say No" campaigns and abstinence-based approach emphasized in "D.A.R.E." and similar educational programs. Future research should include references to individuals who are able to consume illicit drugs in a safe, and in some cases, healthy manner.

It would certainly seem that an untapped population of users is available for study, if we, as researchers, can assure them of anonymity and safety of their responses. Given that past research has concentrated on either persons who have encountered the judicial system, entered treatment, or are youth targeted by the federal government, we cannot help but wonder what this different perspective on drug use might reveal.

Along with implications for primary prevention, the numbers and nature of nonabusive users can have important consequences for policy regarding secondary and tertiary prevention. Early intervention programs need to be able to distinguish between abusers at an early stage of their disorder and nonabusive users of the same drugs. Compulsory treatment of drug abuse or dependence may be justifiable, but compulsory treatment for nonabusive users is not. Only through further study of this hidden population can such decisions be made on a rational basis. ■

REFERENCES

1. White JB, Nicholson T, Minors P, et al. A demographic profile of employed users of illicit drugs. In Rahim MA, Golembiewski T, Mackenzie KD, (Eds). *Current Topics in Management* 2001;6:353-370.
2. Lambert EY, Wiebel WW. Introduction. In Lambert EY (Ed). *The Collection and Interpretation of Data from Hidden Populations*. NIDA Research Monograph 89. (DHHS Publication No. (ADM) 90-1678) Washington, DC: U. S. Government Printing Office;1990:1-3.
3. Anglin MD, Caulkins JP, Hser YL. Prevalence estimation: policy needs, current status, and future potential. *Journal of Drug Issues*.

- 1993;23(2):345-360.
4. Cunningham-Williams RM, Cottler LB, Compton WM, et al. Reaching and enrolling drug users for HIV prevention: a multi-site analysis. *Drug Alcohol Depend.* 1999;54:1-10.
 5. Substance Abuse and Mental Health Services Administration. Office of Applied Studies. 1995 National Household Survey on Drug Abuse: Main findings. (DHHS Publication No. (SMA) 97-3127) Rockville, MD: Author 1997:17-34.
 6. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Washington, DC: Author 1987:165-185.
 7. Anthony JC, Helzer JE. Syndromes of drug abuse and dependence. In Robins LN, Regier DA (Eds). *Psychiatric Disorders in America: The Epidemiologic Catchment Area Study.* New York: Free Press;1991:116-154.
 8. Schultz S. Teenagers' drug abuse is leveling off, annual study finds. *Orange County Register.* Dec 18, 1999.
 9. Lindesmith AR. Opiate Addiction. Evanston, IL: Principia 1957:103.
 10. Chein I, Gerard DL, Lee RS, et al. *The Road to H.* New York: Basic Books 1964:103.
 11. Goode, E. *Drugs in American Society.* New York: Knopf 1972:281.
 12. Scher JM. Group structure and narcotics addiction: Notes for a natural history. *Int J Group Psychother.* 1961;11:81-93.
 13. Zinberg NE, Lewis DC. Narcotic usage I. A spectrum of a difficult medical problem. *N Engl J Med.* 1964;270:989-993.
 14. Alksne H, Lieberman L, Brill L. A conceptual model of the life cycle of addiction. *International Journal of the Addictions.* 1967;2:221-240.
 15. Hughes PH, Crawford GA, Barker NW, et al. The social structure of a heroin copping community. *Am J Psychiatry.* 1971;128:43-50.
 16. Gay GR, Senay EC, Newmeyer JA. The pseudo junkie: evolution of the heroin lifestyle in the non-addicted individual. *Anesthesia and Analgesia.* 1974;53:241-247.
 17. Newmeyer J. Five years after: drug use and exposure to heroin among the Haight Ashbury free medical clinic clientele. *J Psychoactive Drugs.* 1974;6:61-65.
 18. Erikson PG, Alexander BK. Cocaine and addictive liability. *Social Pharmacology.* 1989;3(3):249-270.
 19. Wiebel WW. Identifying and gaining access to hidden populations. In Lambert EY (Ed). *The Collection and Interpretation of Data From Hidden Populations* NIDA Research Monograph 89. DHHS Publication No. (ADM) 90-1678. Washington, DC: U. S. Government Printing Office 1990:4-11.
 20. Powell DH. A pilot study of occasional heroic users. *Arch Gen Psychiatry.* 1973;28:586-594.
 21. Zinberg NE, Jacobson RC. The natural history of 'chipping.' *Am J Psychiatry.* 1976;33:37-40.
 22. Zinberg NE, Harding WM, Winkeller N. A study of social regulatory mechanisms in controlled drug users. *Journal of Drug Issues.* 1977;7:117-133.
 23. Hunt LG, Chambers CD. The heroin epidemics: a study of heroin use in the United States, 1965-1975. New York: Spectrum 1976:112,120.
 24. Cohen, P. *Cocaine Use in Amsterdam.* Amsterdam: University of Amsterdam 1989:1-195.
 25. Waldorf D, Reinerman C, Murphy S. Cocaine Changes: The Experience of Using and Quitting. Philadelphia: Temple University Press 1991:255-257,285.
 26. Broadhead RS, Heckathorn DD, Grund JPC, et al. Drug users versus drug workers in combating AIDS: part II: preliminary results of a peer-driven intervention. *Journal of Drug Issues.* 1995;25(3):531-564.
 27. Coomber R. Using the Internet for survey research. *Sociological Research Online* 1997;2(2). Available: <http://www.socresonline.org.uk/socresonline/2/2/2.html>. Accessed March 3, 2001.
 28. Cunningham RM, Cottler LB, Compton WM. Are we reaching and enrolling out-of-treatment drug users for prevention studies? *Journal of Drug Issues.* 1996;26(3):541-560.
 29. Turner CF, Lesser JT, Gfroerer JC. Future directions for research and practice. In Turner CF, Lesser JT, Gfroerer JC (Eds). *Survey measurement of drug use: methodological issues.* DHHS Publication No. (ADM) 92-1929. Washington, DC: U. S. Government Printing Office 1992:299-306.
 30. Kobak KA, Taylor LH, Dotti SL, et al. A computer administered telephone interview to identify mental disorders. *JAMA.* 1997;278(11):905-910.
 31. Fitzgerald SP. Data collection on the Internet. In P. Minors (Ed.), *Proceedings of the 6th Annual International Conference on Advances in Management* 1999;(16):92-93.
 32. Kittleson MJ. Comparison of the response rate between E-mail and postcards. *Health Values.* 1995;19(2):27-29.
 33. Kittleson MJ. Determining effective follow-up of E-mail surveys. *Am J Health Behav.* 1997;21:193-196.
 34. Nicholson T, White J, Duncan DF. Drugnet: a pilot study of adult recreational drug users via the WWW. *Substance Abuse.* 1998;19(3):109-121.
 35. "Web Surveys Boost Response Rates." *CAI Quarterly.* Winter 1998;99:2.
 36. Fazio AF. A Concurrent Validation Study of the NCHS General Well-being Schedule. DHEW Publication No. (HRA) 78-1347. Washington, DC: U. S. Government Printing Office 1978:10.
 37. Nicholson T, White J, Duncan DF. A survey of adult recreational drug use via the world Wide Web: The DRUGNET study. *J Psychoactive Drugs.* 1999;31:415-422.
 38. Reneau J, Nicholson T, White JB, et al. The general well-being of recreational drug users:

Hidden Populations

- a survey on the WWW. *International Journal of Drug Policy*. 2000;11:315-323.
39. Nicholson T, White J, Cline R, et al. Parents who report using illicit drugs: findings and implications from the DRUGNET study. *Psychol Rep*. 2001;88:245-251.
40. Gold RS, Duncan DF. Potential uses of micro-processors for home health education. *Health Values*. 1980;4(2):69-70.
41. Klein K, Duncan DF, Voss HW. Dental health education and data collection using computer games. *Education*. 1991;112:141-143.
42. Tedesco R. Nielson sees 50% jump in 'Net users. *Broadcasting and Cable*. August 19;1996:72.
43. The UCLA Internet report 2001 - "Surveying the digital future." Los Angeles, CA: UCLA Center for Communication Policy. Available: <http://www.ccp.ucla.edu>. Accessed December 10, 2001.
44. Hourrigan JB. Online Communities: Networks that nurture long-distance relationships and local ties. Washington, DC: Pew Internet & American Life Project. Available: <http://www.pewinternet.org>. Accessed on December 10, 2001.