The Validity of Self-Reported Drug Use: Improving the Accuracy of Survey Estimates

Editors:

Lana Harrison, Ph.D.

Arthur Hughes, M.S.

NIDA Research Monograph 167
1997

ACKNOWLEDGMENT

This monograph is based on the papers from a technical review on "The Validity of Self-Reported Drug Use: Improving the Accuracy of Survey Estimates" held on September 8-9, 1994. The review meeting was sponsored by the National Institute on Drug Abuse.

COPYRIGHT STATUS

Table of Contents

Click on title or page number to go to section

The Validity of Self-Reports of Drug Use at Treatment Admission and at Followup: Comparisons With Urinalysis and Hair Assays

Eric D. Wish, Jeffrey A. Hoffman, and Susanna Nemes

ABSTRACT

Studies conducted in the 1970s and early 1980s concluded that people will provide valid information about their illicit drug use when research interviews are conducted under appropriate conditions. Recent studies of treated and untreated populations using improved urinalysis techniques as well as hair analysis techniques indicate that the validity of respondents' self-reports of recent drug use may be considerably less than previously reported and may differ according to a number of factors. Results are presented from a study of clients participating in the Washington, DC, Treatment Initiative study who were assessed for drug use by interview, urinalysis, and hair analysis. At intake, almost all clients who tested positive had reported their use of heroin but fewer clients had reported their cocaine use. At posttreatment followup, clients underreported both heroin and cocaine use. Findings from treatment outcome studies that fail to validate and adjust their estimates of self-reported recent drug use should be interpreted with considerable caution.

INTRODUCTION

The measurement of drug use by structured research interviews is an established technique in the social sciences. Numerous studies conducted in the 1970s and early 1980s concluded that respondents will provide valid information about their illicit drug use when the interviews are conducted by trained interviewers in a nonthreatening setting and when the respondents feel reasonably secure that their disclosures will not result in adverse consequences (Harrell 1985; Hubbard et al. 1989). Indeed, the Federal Government spends millions of dollars on surveys of household members and student populations that rely on respondents' willingness to report their illicit drug use accurately (General Accounting Office 1993).

There are three important reasons why conclusions from the early literature supporting the validity of self-reports must be reevaluated. First, most of the validity studies were based primarily on indirect measures of validity, usually assessments of internal consistency or the construct validity of responses. If a respondent's reports of drug use were internally consistent or correlated with other variables in theoretically expected ways (construct validity), the findings were interpreted as supporting the validity of the drug use self-reports. However, an important limitation of such indirect estimates of validity is that a respondent who lied consistently during the interview would have been judged to be providing valid responses. Thus, a person who underreported both drug use and other deviant behaviors would have exhibited the expected correlation between low drug use and low deviance. (See Magura et al. 1987 for an example of such a spurious relationship.) The same spurious association would be found if respondents were prone to overreporting deviance and drug use.

Even attempts to validate self-reported drug use by comparisons with official record information may lead to what at first glance appears to be evidence of the validity of self-reported drug use information. For example, Wish (1988) found the expected relationship between self-reported drug dependence and the number of previous drug arrests in respondents' criminal justice records; this was in an arrestee cohort in which there was considerable underreporting of recent drug use in comparison with the urine test results.

The second reason that conclusions of earlier validity studies should be reassessed involves the substantial improvements that have been made in the sensitivity of biological measures of recent drug use. The develop- ment of objective measures of recent drug use based on biological assays has provided researchers with tools to measure recent drug use directly and to avoid many of the problems described above. However, while urine test results have been used by researchers for almost 25 years to validate self-reports of drug use, the technology has improved so much that it casts doubt on the usefulness of early validity studies (Mieczkowski 1990).

The early urine tests used a process called thin layer chromatography (TLC), a very time-consuming and subjective laboratory test. As tests were perfected and became more sensitive and easier to interpret, it became clear that TLC had greatly underdetected the recent use of drugs, especially cocaine and opiates (Wish et al. 1983). Because TLC underdetected the use of these drugs, the concordance between self-reported use and the urine tests was inflated in a group of

people who were concealing their drug use. Drug users who reported that they had not used a drug appeared to be telling the truth because the TLC failed to detect the drug. The early urinalysis-based validity studies conducted before the advent of the more sensitive immunoassay screening tests were therefore likely to have overestimated the validity of the self-reports of drug use. Moreover, if hair analyses prove to be a more sensitive measure of drug use than current-day urine tests, the validity research using even today's sensitive urinalyses also may prove to have overestimated the validity of self-reported drug use.

A third reason for questioning the conclusions of earlier validity studies is the secular changes that have occurred with regard to attitudes toward illicit drug use. Since the beginning of the cocaine and crack epidemic and related street violence in the early 1980s and the emerging acquired immunodeficiency syndrome (AIDS) epidemic among injecting drug users (IDUs), the public has become more intolerant of drug use (Musto 1991). Earlier studies of the validity of self-reports of drug use were conducted at times when individuals may have been more likely to reveal their drug use in a research interview, which could have led to greater accuracy in self-report measures than is achieved today.

Researchers have begun to reassess the limitations and determinants of self-report measures of drug use with the more sensitive urinalysis and hair analysis (Magura and Kang 1995). The weight of the evidence suggests that the relationship between a respondent's self-reports of drug use and actual drug use behavior is more complex and variable than had been understood. For example, the evidence is overwhelming that people under the supervision of the criminal justice system greatly underreport their recent use of illicit drugs even when they are interviewed by researchers under conditions of anonymity and confidentiality (Dembo et al. 1990; Mieczkowski et al. 1991; Wish and Gropper 1990). Even arrested youth interviewed 6 months after their release in the community by experienced research interviewers, under conditions of confidentiality, have been found to conceal their recent drug use (Magura et al. 1995).

It may be expected that individuals who are interviewed while they are under the supervision of the criminal justice system or after release may never feel secure enough to disclose their illicit drug use in research interviews. However, studies of noncriminal populations have also found underreporting of recent drug use. Of the patients seeking treatment in a medical clinic who tested positive for cocaine

by urinalysis, only 28 percent reported recent use of the drug in the nurse-administered medical intake interview (McNagy and Parker 1992). Marques and colleagues (1993) studied a sample of infants and their postpartum mothers using interviews and urine and hair analyses. They found that while the cocaine levels in infant hair were correlated with analyses of maternal urine (r = 0.28) and hair (r = 0.43), the maternal self-reports of cocaine use did not correlate (r = 0.06) with the infant hair results. The authors concluded that self-reported drug use information routinely collected by interviewers should be interpreted cautiously.

Cook and associates (1995, this volume) found that less than one-half of the employees of a steel manufacturing plant who tested positive by urine or hair analysis reported their drug use in anonymous research interviews or group-administered questionnaires. The largest amount of under-reporting was found for cocaine/crack use. A study of occupants of shelters and residents of single-occupancy hotels in New York City and State found that only one-third of those who tested positive for cocaine by hair analysis reported ever using the drug in the telephone research interview, even though all had been informed that they would be tested (Appel 1995). Underreporting of recent drug use in comparison with urinalysis results was also reported by another study of the homeless in New York City (New York City Commission on the Homeless 1992).

While the evidence suggests that traditional interview studies in which a researcher conducts a one-time interview or periodic interviews with a research subject may be open to underreporting, it has been suggested that more sustained, ethnographic, community-based interview proce- dures may obtain more valid self-reports of drug use. Weatherby and associates (1994) found that when community outreach workers recruited admitted drug injectors to participate in an AIDS risk-assessment study, the urine test results confirmed their self-reported drug use. However, Wish and Mieczkowski (1994) pointed out that because the study's findings came from people recruited and interviewed because they had previously reported their drug use to the recruiter and had been informed of the impending urine test, the likelihood that the urine tests would detect underreporting in the research interview was diminished. More- over, Falck and colleagues (1992) found considerable underreporting of cocaine and opiate use in their study of a similar sample of not-in-treatment, nonincarcerated IDUs who were not given advance notice of the urine test.

It could be argued that people in contact with the criminal justice system, the homeless, and employees may have significant reasons for under-reporting their drug use, even in confidential research interviews. One might expect, however, that drug abuse treatment clients would find little reason to conceal their drug use, especially at admission to treatment. Assessment and diagnostic tools generally rely upon the person's accurate reporting of recent drug use and associated problems. Moreover, treatment evaluation studies often depend on self-report measures of drug use at intake and at followup to assess treatment outcomes. Systematic under-reporting of drug use would greatly bias the results of such studies.

The evidence suggests that even drug abuse treatment clients may systematically underreport their drug use. Magura and associates (1987) found that only 35 percent of those receiving treatment at methadone programs who tested positive for opiates by enzyme-multiplied immuno-assay technique (EMIT) reported using the drug in the previous 30 days. Reporting was higher for cocaine (85 percent) and benzodiazepines (61 percent). These results underestimated the level of potential under-reporting, however, because clients were classified as having used a drug if they reported current use or use in the past 30 days, rather than use in the past 2 or 3 days, the period to which the urine tests were sensitive.

A comparison of the urinalysis results and self-reported drug use for clients in the Treatment Outcome Prospective Study (TOPS) 24 months after treatment found that only 33 percent of those positive for opiates reported using heroin in the previous 3 days (Research Triangle Institute (RTI) 1994). That study also found that only 40 percent of the cocaine-positive clients reported using the drug in the previous 3 days.

More recently, the Early Retrospective Study of Treatment Outcomes (RTI 1994), a study of clients receiving treatment for cocaine as a subset of Drug Abuse Treatment Outcome Study (DATOS) programs, found that only 26 percent of the 109 clients who tested positive for cocaine by urinalysis at followup 12 months after treatment reported using the drug in the previous 72 hours. Less than one-half (43 percent) of the cocaine-positive clients admitted using the drug in the past 2 weeks. Even when the researchers expanded their measure to compare the concordance between any drug-positive urine test and a self-report of the use of any drug in the past 72 hours, they reported that "... still two-thirds of those who

tested positive for any drug did not report use of any drug in the past 72 hours" (RTI 1994, p. 4).

Magura and associates (1992) obtained interview, urine, and hair test information to investigate the validity of hair analysis among clients receiving methadone treatment. They found that 81 percent of clients positive for cocaine by urinalysis and 73 percent positive by hair analysis reported using the drug in the confidential research interview. The numbers were smaller for heroin, however—57 percent and 64 percent, respectively.

Hinden and colleagues (1994) found that most of those who tested positive by hair analysis for heroin (96 percent) or cocaine (89 percent) at the inception of residential treatment had reported their use of these drugs during the admission interview. However, at the posttreatment interview, only 67 percent of those positive for heroin and 51 percent of those positive for cocaine reported using the drugs. The authors speculated that people may be less likely to report drug use after treatment or when not in the protected treatment environment.

An experiment to assess the benefit of giving interim methadone maintenance to individuals on a waiting list at three methadone treatment programs provided additional information about client underreporting of recent drug use (Sowder et al. 1993). Each of these clients had been randomly assigned to an experimental or control condition. Experimental subjects were provided low doses of methadone and some support services while waiting for admission to the full program; control subjects remained on the waiting list without receiving methadone. A baseline interview was conducted with each subject at entry to the research, and a followup interview was conducted about 4 months later, but before entry to formal treatment. Urine specimens were obtained at the baseline and followup interviews.

The study found that at baseline virtually all of the experimental (97 percent) and control subjects (99 percent) who tested positive for opiates reported using an opiate during the previous 48 hours. However, slightly more than half of those testing positive for cocaine (53 percent and 62 percent, respectively) reported use of the drug in the past 48 hours. Most of the cocaine positives (over 80 percent) did report using cocaine in the past 30 days. The authors speculated that at baseline those who wanted to obtain methadone had an incentive for reporting their recent heroin use. No such incentive was

present for reporting cocaine, and to some persons there may have been a disincentive to report use of drugs other than heroin.

While the experimental and control group subjects had similar rates of underreporting at baseline, marked differences were found at followup. Eighty percent of the control clients who tested positive for opiates at followup reported using the drug in the past 48 hours, but only 56 percent of the opiate-positive experimental clients reported such use ($p < 0.05$). The results for cocaine were even more disparate: 63 percent versus 33 percent ($p < 0.05$). Thus, while all subjects tended to underreport use of each drug at followup, the experimental subjects were more likely to conceal their drug use. The researchers suggested that experimental subjects may have had an incentive (e.g., social desirability) to show that the treatment they had participated in had some benefit. Although these findings need to be replicated, they suggest that treatment followup studies that rely solely on self-reported drug use to assess outcome run the risk of reporting reductions in drug use among treated versus untreated clients that may largely reflect systematic differences in underreporting. Similar concerns have been raised by Magura and Kang (1995) in their review of studies of the validity of respondent self-reports in drug treatment research studies.

In sum, the recent research literature raises important questions regarding the validity of self-report measures of drug use in studies of drug abuse treatment. At treatment admission, the validity of self-reports of drug use may depend upon the type of drug and the treatment modality. Cocaine use frequently goes unreported; people seeking methadone treatment may report the recent use of heroin even as they underreport cocaine use. Moreover, those who have completed some treatment may have special motivation to underreport all recent drug use in the posttreatment period. The remainder of this chapter presents findings relevant to some of these issues using information from research interviews, urinalyses, and hair analyses for a subsample of people participating in the Washington, DC, Treatment Initiative (DCI) study. The next section provides an overview of the DCI study and the validity substudy. The third section presents the results of the validity substudy, following which the implications of the findings and the literature for studies of treatment outcome are discussed.

THE DCI STUDY AND VALIDITY SUBSTUDY

The DCI is an experiment designed to test the efficacy of providing enhanced inpatient or outpatient treatment to clients seeking treatment in the District of Columbia. People who sought treatment at the Central Intake Division (CID) run by the DC Alcohol and Drug Abuse Administration (ADASA) or who were ordered by the court to obtain treatment were eligible to volunteer to participate in the DCI. Volunteers were sent to the DCI Diagnostic Unit, where research staff administered a battery of interviews and psychological measures. The Individual Assessment Profile (IAP), developed for the DCI by researchers at RTI (Flynn et al. 1992), was administered to all participants before they were assigned to treatment. The IAP is a structured interview based on the longer DATOS protocol; it asks about many aspects of the client's life, including demographic information, drug use, treatment history, and criminal history. Based on the results of a clinical assessment, clients were assigned to the appropriate residential therapeutic community or outpatient treatment modality. The research staff then randomly assigned clients to either the enhanced or standard treatment program for their modality. Clients were interviewed periodically after admission and a small subsample was interviewed over the telephone or in person as part of a 3-month postdischarge followup study. More extensive followup interviews are currently being conducted with all persons assigned to one of the two residential therapeutic community programs. (A more complete description of the DCI appears in Hoffman et al. 1995.)

Intake Data Collection

To assess the validity of self-reports of drug use obtained in the IAP interview, a validity study was undertaken with all clients appearing at the diagnostic unit between September 29, 1991, and February 18, 1993. The intent was to compare the self-reports of opiate and cocaine use with the analysis results of a urine specimen and a hair sample collected by staff. Each measure is described below.

Self-Reports of Drug Use. This information was obtained from the IAP questions regarding lifetime use, frequency of use, and past month use of heroin, opiates, and cocaine. The IAP was administered by trained research interviewers at the initial in-person interview. All research participants were asked for their informed consent and told that all study data were protected by a Federal Certificate of Confidentiality.

Urine Tests. Specimens were obtained by CID staff as part of the routine medical screening at intake and analyzed by the ADASA laboratory for the presence of opiates and cocaine using standard immunoassay screening tests (e.g., EMIT). Standard National Institute on Drug Abuse (NIDA) laboratory cutoff levels were used. Confirmation of positive results was not attempted. Both the urine and hair tests are sensitive to the class of opiate drugs or to a metabolite of cocaine, rather than cocaine itself, but for simplicity, throughout this chapter reference is made to cocaine or opiate test results. The minority of persons who self-reported use of opiates also reported using heroin. Opiate test results are therefore compared with self-reports of heroin in the remainder of this chapter.

Hair Tests. At the initial assessment, each client was asked to provide a hair sample for analysis after completion of the IAP. Clients who provided the hair specimen were given a food voucher for $10. Research staff cut a sample of hairs as close to the scalp as possible near the crown of the head, using the standard procedures established by the Psychemedics Corporation. The hair samples were sent to Psychemedics for testing for cocaine and opiates using their standard radioimmunoassay of hair (RIAH) test procedures (Psychemedics Corporation 1991). The length of the hair was cut to a maximum of 3.9 centimeters (cm), representing about 3 months of growth (Saitoh et al. 1967). Confirmation of positive RIAH results was not conducted.

Postdischarge Followup

Toward the end of the project, an attempt was made to reinterview clients who had been discharged from treatment for at least 3 months; a comprehensive followup study was not possible at the time. Clients were interviewed over the telephone or in person using a modified followup version of the IAP. All respondents were asked to provide a hair specimen for analysis, for which they were paid $10. All those who had been interviewed over the telephone were asked to go to the research office to provide the hair specimen. No urine specimens were collected. While a larger number completed the posttreatment interview, this chapter focuses on the 39 clients who also went to the research office to provide a hair specimen. Questions about drug use in the past 90 days were added to the IAP followup interview so the self-report period would correspond to the period to which the hair analysis results were sensitive.

Limitations

A number of limitations should be noted in reviewing the results. First, none of the positive urine or hair test results was confirmed. Research has found that the greatest threat to the validity of these tests is the presence of false negatives. That is, the tests are more likely to fail to detect recent drug use than to erroneously detect drug use in a nonuser (Visher and McFadden 1991). Once the drug is extracted from the hair, the RIAH test used with the resulting solution is equivalent to that used in urinalysis. Thus, the limitations to the validity of urinalysis apply to RIAH. In other research using hair analysis (with confirmation) for high-risk populations, the current authors have found that in virtually every instance an initial positive result for cocaine or opiates by hair analysis was confirmed by gas chromatography/mass spectrometry (GC/MS), the ultimate standard for identifying drugs.

There is some controversy with regard to the possibility that clients who are exposed to external drug contamination (e.g., drugs smoked by others) may test positive by hair analysis (Mieczkowski 1992). There has also been some controversy about the impact of melanin concentrations in the hair on drug absorption and the possibility that drug metabolites in sweat may be deposited along the hair and thus complicate estimates of time of use (Harkey and Henderson 1988; Mieczkowski 1993). The laboratory used for the RIAH test analyzes wash kinetics to ensure that external drugs are removed from the hair before drugs are extracted from inside the hair. While some disagree about whether these laboratory techniques completely eliminate external contamination, the concentrations of drugs detected in the hair specimens of the research subjects in this study tend to be much higher than those detected from external contamination.[1] Further, the overwhelming majority of clients in this study who tested positive for cocaine also tested positive for opiates, which increases the likelihood that they had actually used the drugs.

Given the acknowledged high rates of false negative urine (and hair) test results, these types of toxicologic tests tend to underestimate recent drug use. This does not represent a large limitation, however, because the analyses are principally concerned with whether persons who did test positive also reported using the drugs detected.

A second limitation stems from the availability of hair and urine specimens for only 22 percent of the clients assessed during the time of the validity study. Analyses presented later in this chapter show that those who provided both specimens were likely to be older heroin users, while the remaining respondents tended to be young crack users. Had specimens been obtained from these crack-using youth, the level of underreporting might have exceeded that found among the older heroin users. Thus, the levels of underreporting of drug use presented here could be considerably below what would be expected in a more representative sample of all persons seeking treatment.

A third limitation involves the comparability of the postdischarge followup results and those from the intake validity sample. Some of the 39 clients in the followup sample were interviewed postdischarge by telephone and some in person. Given the finding that household surveys conducted by telephone produce somewhat lower estimates of recent drug use than in-person interviews (Gfroerer and Hughes 1992), one might expect more underreporting in the followup sample than in the intake sample. However, clients interviewed on the telephone had to make a special trip to the research office to provide a hair specimen. Such compliance with the research procedures may have been related to more accurate disclosure of drug use. Another limitation of the followup component is that only eight clients in the discharge followup sample were included in the intake validity sample. Analyses presented below show that the 39 clients interviewed posttreatment differed from those interviewed at intake primarily with regard to age and heroin use. Clients in the followup sample were less likely to report daily heroin use at intake and were younger. Both factors could have been associated with greater underreporting of drug use in the followup sample. For these reasons, differences in the level of reporting of drug use between the intake validity sample and the discharge sample can only be considered as suggestive pending further replication. The ongoing, larger followup study of all inpatient DCI clients will permit a more systematic comparison of the validity of self-reports of drug use at intake and postdischarge.

RESULTS

Intake Validity Sample

During the period of the validity study, 487 people were processed by the diagnostic unit. Table 1 shows that 56 percent provided a urine specimen and 33 percent provided a hair specimen. A hair or urine specimen was obtained from 67 percent of the sample, and both specimens were obtained from 106 persons, or 22 percent of the sample. It was not clear why urine and hair specimens were not obtained for more sample members. However, if a person came to the diagnostic unit without going to the CID, a urine specimen would not have been collected. Also, hair specimens could not be obtained from the many persons who had

TABLE 1. *Percentage of interviewed clients who provided urine or hair specimen.*

Provided	N		%		
No hair or urine specimen	161		33		
Urine specimen only	165		34		
					56%
Hair specimen only	55	33%	11		
Urine and hair specimen	<u>106</u> 487		<u>22</u> 100%		

hair styles so short that a sufficient specimen could not be obtained with scissors. An estimate of the percentage of respondents from whom a hair specimen could not be obtained is not available. However, other research indicating that people are more likely to provide hair than urine samples leads the authors to believe that many of the missing hair specimens were due to short hair rather than refusal to provide a sample.

Because the analyses of the intake validity sample focus exclusively on the minority of individuals who provided both urine and hair specimens, potential differences between these individuals and the rest of the target sample were examined. Table 2 presents comparisons of the four groups formed according to whether they provided urine or hair specimens (provided neither specimen, hair only, urine only, or both). Three characteristics differentiated the groups. Clients who provided urine only or hair and urine specimens were 4 to 5 years older (mean age 38.1 to 39.2 years) and most likely to have reported heroin use in the past year (75 to 79 percent). Clients who provided both specimens were least likely to have reported daily use of crack cocaine. Ethnicity, gender, education, previous arrest, previous alcohol or drug treatment, and use of powder cocaine did not differ in the four groups. These findings suggest that the clients who provided both hair and urine specimens were older heroin users, perhaps those seeking methadone treatment. This conclusion is consistent with the fact that the CID is much more likely to obtain urine specimens to verify heroin use from individuals seeking methadone treatment.

TABLE 2. *Client characteristics by specimens provided (N = 487 clients).*

	(N)	No hair/ urine (161)	Hair only (55)	Urine only (165)	Hair and urine (106)
		Subjects who provided			
Male		73%	43%	75%	59%
Mean age		34.3*	33.5*	38.1*	39.2*
African American		95%	95%	93%	94%
Less than 12 years education		64%	57%	58%	59%
High school diploma/GED		60%	57%	52%	53%
Ever arrested		75%	71%	84%	85%
Used daily in past year					
Cocaine		28%	27%	26%	33%
Crack		32%**	36%**	27%**	15%**
Heroin		61%*	23%*	75%*	79%*
Previous alcohol/drug treatment		73%	64%	75%	84%

NOTE: Numbers (Ns) vary slightly because of missing information.
KEY: * = p < 0.05; ** = p < 0.01.

Hair Versus Urine Tests Results at Intake

The length of the hair specimens varied from 0.5 cm to 3.9 cm. This means that the window of detection for drug use by RIAH extended from 1 to 3 weeks before the interview to as long as 3 months before the interview. (Hair takes about 7 days to grow out to the scalp level (Harkey and Henderson 1988)). Thus, a cutting at the scalp represents drug use that occurred about 1 week earlier. For most drugs, therefore, the sensitivity period of hair analysis does not overlap with that of urinalysis.) Given that the urine specimens detect use of opiates and cocaine in the 24 to 72 hours before the specimen is provided, one would expect that even in a group of chronic users, the hair would detect more users. Ninety-one percent of the clients in the intake validity sample tested positive for opiates by hair and 83 percent by urinalysis, a nonsignificant difference (table 3). The hair tests did detect much more cocaine use, however—93 percent versus 69 percent (p < 0.01).[1]

Both the urine and hair test results indicated considerable multiple drug use by the sample clients. Seventy percent of clients whose urine tested positive for opiates also had a positive urine test for cocaine. Eighty-five percent of those with a positive urine test for cocaine had a urine test positive for opiates. The numbers were even higher for the hair tests. Almost all clients (97 percent) who tested positive for opiates by RIAH had a cocaine-positive test and 94 percent with a hair test positive for cocaine tested positive for opiates.

TABLE 3. *Estimates of drug use by self-report, urinalysis, and hair analysis at intake interview (N = 106 clients who provided urine and hair specimens).*

	Self-report		Urinalysis	Hair
	Ever used Æ 5 times	Used past 30 days		
Opiates/heroin	93%	91%	83%	91%
Cocaine	90%	71%	69%*	93%*

KEY: * = p < 0.01.

Estimates of Cocaine and Heroin Use at Intake

Because the IAP did not include questions regarding drug use in the past 24 to 72 hours or past 90 days, direct comparisons of self-reported use and urinalysis and RIAH results during their exact detection periods were not possible. Comparisons were therefore made with respect to self-reported use in the past 30 days or lifetime use of the drug on five or more occasions. The results in table 3 show fairly similar estimates for heroin/opiate use based on all four measures.

The greater reporting of opiate use is clearly shown in table 4. Between 96 percent and 100 percent of the clients who tested positive for opiates by hair or urinalysis reported use of the drug on at least one of the three self-report measures at intake. The numbers were lower for cocaine.

TABLE 4. *Percentage of clients positive for opiates or cocaine by urine or hair at intake who reported using the detected drug.*

	(N) positive for opiates by		(N) positive for cocaine by	
	Hair (97)	Urine (88)	Hair (99)	Urine (73)
Reported using detected drug five or more times in life	97%	100%	91%	95%
In past year	97%	100%	79%	87%
In past 30 days	96%	99%	75%	82%

NOTE: Ns may vary slightly because of missing information.

While there was some underreporting of cocaine use, there was an association between the self-reported frequency of cocaine or heroin use in the previous month and the likelihood that the person tested positive (table 5). Most clients (87 to 100 percent) who reported using opiates or cocaine on 26 to 30 days in the past month tested positive for the reported drug by hair analysis or urinalysis. The hair tests were much more likely than the urine tests to detect drug use in clients who reported using the drugs less frequently. For example, three times as many people who reported no opiate use in the past 30 days tested positive by RIAH as by urinalysis (30 percent versus 10 percent). The differences were smaller (83 percent versus 49 percent) but in the same direction for those who reported no cocaine use in the past month.

A strong association was also found between the self-reported frequency of drug use and the concentration of drugs found in the hair.[1] The median concentration of opiates in the positive hair specimens was 45 nanograms (ng) per 10 milligrams (mg). However, the average concentration detected varied from 4.4 ng/10 mg for people who reported no use of heroin in the past 30 days to 59.8 ng/10 mg for people who reported daily use (figure 1). The standard deviations were quite large relative to the means, indicating considerable variation within each group. However, these computations include people who had concentration levels in their hair that were below the detection thresholds routinely used by the laboratory to designate the presence of drugs. If these negative results had been removed, the standard deviations would have been smaller. The median concentration of cocaine metabolite in positive hair

specimens was 115 ng/10 mg. Again, the concentration was greatest (404.4 ng/ 10 mg) among self-reported daily users (figure 2).

TABLE 5. *Percentage of clients who tested positive by hair analysis or urinalysis, by self-reported number of days used during the past month.*

	Self-reported number of days used in past month		
	0	1-25	26-30
Tested positive for opiates (N)	(10)	(11)	(85)
Urine	10%	73%	93%
Hair	30%	82%	99%
Tested positive for cocaine (N)	(35)	(48)	(23)
Urine	49%	75%	87%
Hair	83%	98%	100%

Self-Reports and Hair Tests at the Postdischarge Interview

The postdischarge followup study yielded 39 clients who completed the telephone or in-person interview and provided a hair specimen. Eight of these clients had also been included in the intake validity sample. (The remaining 31 clients had been interviewed at intake but not in the same time period as the validity sample.) Table 6 presents characteristics at intake for the intake validity sample and the postdischarge followup sample. The followup sample differed from the intake validity sample with regard to age and past-year use of heroin. They tended to be
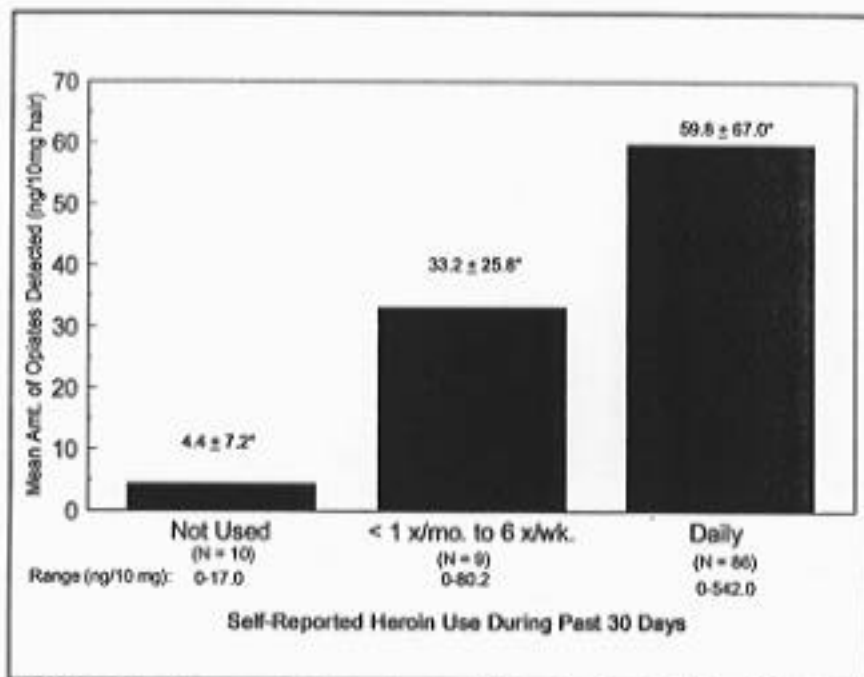
FIGURE 1. *Amount of opiates detected in hair at intake, by self-reported use in the past 30 days (N = 105 clients).*

NOTE: Information was missing for 1 of the 106 clients.
KEY: ± = standard deviation.

younger and less likely to have used heroin daily in the year before intake. However, the two samples were similar in terms of education, ethnicity, previous arrest, use of crack/cocaine, and previous drug or alcohol treatment. In view of the similarity of the two groups, differences between them in self-reports and hair tests may reflect differences in how people self-report at intake compared with followup, rather than differences in the composition of the samples.

The followup interview included questions about drug use in the past 90 days that would permit direct comparison with the window of sensitivity of the hair analyses. (Hair specimens had again been cut to a maximum of 3.9 cm, and 72 percent of the sample had hair specimens of this length, representing drug use in the previous 7 to 90 days. The findings indicated considerable differences in estimates of drug use from self-reports and the hair tests. While 62 percent of the followup sample tested positive for opiates by RIAH, only 36 percent reported using
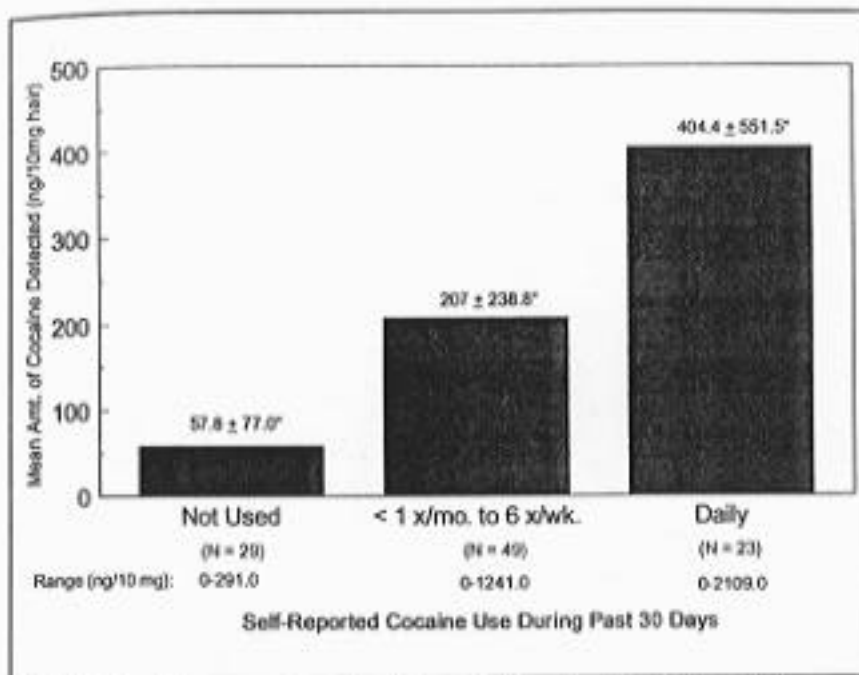
FIGURE 2.   *Amount of cocaine detected in hair at intake, by self-reported use in the past 30 days (N = 101 clients).*

NOTE: Information was missing for 5 of the 106 clients.
KEY: * = standard deviation.

opiates in the past 90 days. Similar differences were found with respect to cocaine—80 percent positive by RIAH, 41 percent by self-report. Only about half of the clients who tested positive by hair analysis for opiates (46 percent) or cocaine (52 percent) reported using the drug in the past 90 days. While not exactly comparable, these numbers are considerably below similar analyses of self-reports and hair tests at intake, reported in table 4. At intake, 96 percent of those with a hair test positive for opiates and 75 percent of those positive for cocaine reported using the drug in the past month.

To determine whether the degree of self-reporting at followup was related to the level of use, the followup sample was divided into high or low levels of drug detected in the hair. Clients above the median concentration (31.2 ng/10 mg for opiates and 105.0 ng/10 mg for cocaine) were classified as heavier users of that drug.[1]

TABLE 6. *Characteristics of intake validity sample and followup sample at intake.*

Characteristic (from intake interview)	Intake validity sample[a] (N = 106)	Followup sample[b] (N = 39)
Male	59%	51%
Mean age	39.2*	36.4*
African American	94%	90%
Less than 12-year education	59%	58%
High school diploma/GED	53%	66%
Ever arrested	85%	90%
Used daily in past year		
Cocaine	33%	26%
Crack	15%	21%
Heroin	79%**	57%**
Prior alcohol/drug treatment	84%	71%

KEY: a = Clients who provided hair and urine specimens; b = eight followup clients were also among the 106 clients in the intake validity study sample; * = $p < 0.05$; ** = $p < 0.01$.

While the sample sizes were small, the results show that clients who had the larger concentrations of a drug in their hair were significantly more likely to have reported use of the drug in the past 90 days (figure 3). Approximately three-quarters of clients with the higher concentration of drugs in their hair reported using the detected drug in the past 90 days, compared with one-third or fewer of the persons with less of the drug in their hair.
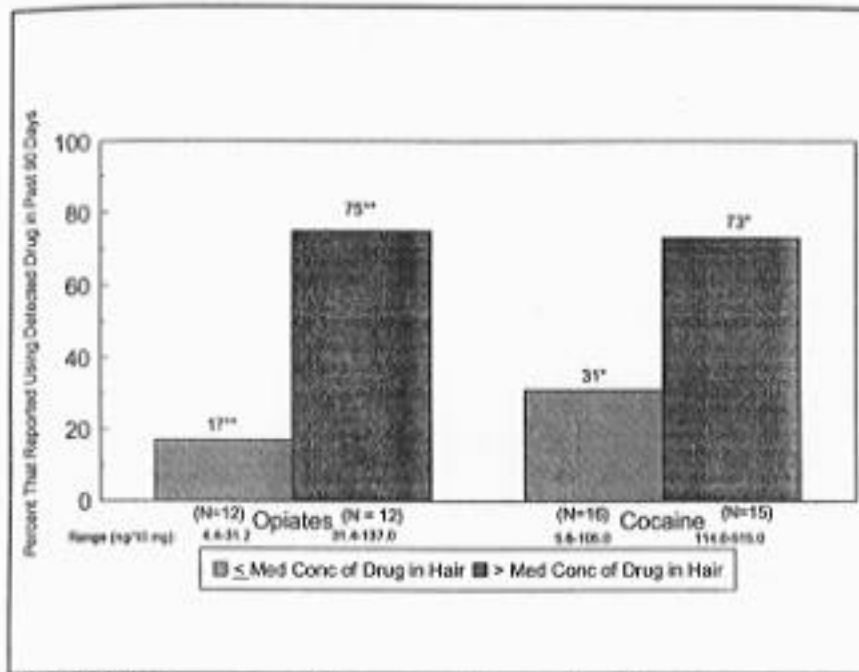
FIGURE 3. *Percentage of persons testing positive for opiates or cocaine at followup who reported using the detected drug in the past 90 days, by amount of drug detected in hair.*

NOTE: Clients were grouped according to whether they fell above or below the median concentration of drug detected among all tested followup clients. Median concentrations were 31.2 ng/10 mg for opiates and 105.0 ng/10 mg for cocaine.

KEY: $* = p < 0.05;$ $** p < 0.01$.

DISCUSSION AND IMPLICATIONS

The results of this study have considerable implications for drug abuse treatment research and for clinical practice. Each of the main themes is discussed below.

> •*The validity of client self-reports of drug use may differ by drug*. The overwhelming majority of clients tested positive for opiates by urinalysis or hair analysis at intake, and virtually all reported use of heroin in the previous 30 days. Clients' readiness to report recent heroin use is perhaps not surprising in view of the analyses suggesting that the sample who provided urine and hair specimens included many who

were seeking methadone treatment. The finding that clients who tested positive for cocaine at intake were less likely to report recent use of cocaine is consistent with the findings of Sowder and associates (1993) and with the possibility that heroin users seeking methadone treatment may perceive a disincentive for reporting cocaine use. These findings suggest that discussions of the validity of drug use among drug treatment clients must be framed in the context of the specific drug used.

•*Multiple drug use may go undiagnosed by self-report measures.* The fact that 97 percent of clients who tested positive for opiates by RIAH also tested positive for cocaine has important implications for research as well as clinical management. If clients are relatively less likely to report their recent cocaine use at treatment intake, clinical or research interviews that rely solely on self-reports might underdiagnose multiple drug use. In this study, more than 90 percent of the cocaine-positive clients (by either hair analysis or urinalysis) did report use of cocaine five or more times in their lifetime, even though they denied use in the past month or year. By asking less threatening questions about lifetime drug use, it might be possible to identify clients at risk for current multiple drug use who should receive additional testing or study.

•*Hair analysis detected more cocaine use than did urinalysis.*[1] This finding is consistent with extensive research showing that RIAH's greater window of sensitivity (up to 90 days in this study) leads to the identification of more cocaine users than does urinalysis. Hair analysis did not detect more heroin users in this sample, which contained 79 percent self-reported daily heroin users. With such frequent heroin use, most users can be identified by the 24 to 72 hour sensitivity period of urinalysis.

•*While some clients underreport drug use, their disclosures of extensive drug use may still have substantial validity.* Clients who reported daily use of heroin or cocaine were more likely to test positive for these drugs by urinalysis or RIAH. Self-reported daily users also had the highest concentrations of the reported drug in their hair. These findings suggest that when clients do report extensive drug use, the information is likely to be valid. These findings are consistent with those of Wish

(1988), who found that in a sample of people underreporting their recent drug use, those who did report drug dependence had higher rates of drug-related arrests and expected associations with other correlates of serious drug use.

•*Hair analysis may offer some diagnostic utility*. The finding that daily users of heroin and cocaine had the highest concentrations of drug detected in their hair raises the possibility that hair analysis may be useful in identifying people with the most serious drug abuse problems.[1] As hair analysis techniques are improved, research should be conducted to determine the relationship between quantitative hair test results and clinical and research diagnoses.

•*The validity of self-reports of recent drug use may be less at followup than at intake*. Clients who tested positive for cocaine or heroin were much less likely to self-report use of these drugs at postdischarge followup than at intake. These findings are consistent with those reported for treated (experimental) clients in a program designed to provide methadone to clients while they were waiting to enter the full treatment program (Sowder et al. 1993). The findings are also consistent with the underreporting at treatment followup reported by Hinden and associates (1994) and the RTI (1994). While it is possible that the underreporting found in this study at followup occurred because some followup interviews were conducted over the telephone and only a small number of clients were followed up, much of the underreporting may be the result of the respondents' intention to conceal their current drug use from the researchers. If this is the case, treatment evaluations that compare self-reports of drug use at intake and followup may show reductions in drug use largely as an artifact of the greater underreporting at followup. Until this issue is settled, treatment outcome evaluations that measure drug use solely by self-reports should be interpreted with caution.

•*Underreporting may be less of a problem among the most serious substance abusers*. The fact that about 70 percent of clients with higher concentrations of cocaine or opiates in their hair reported their recent drug use suggests that underreporting may present less of a problem when the goal is to identify the most severe users. Individuals with the greatest drug abuse problems may be most likely to admit their problem in a research or clinical interview. This finding warrants further study and replication by others.

CONCLUSION

The findings reported here contribute to those of other studies that have questioned the validity of self-reports of recent drug use among drug abuse treatment clients. For years researchers have discussed the more obvious determinants of a respondent's willingness to report drug use, including response style, interviewer characteristics, social desirability, and the nature of the interview setting. Researchers must now become sensitive to a host of other factors that may influence a respondent's willingness to report recent illicit drug use, such as: type of drug; whether the person is assigned to a treatment or comparison group; whether the interview occurred at intake, in treatment, or postdischarge; and the severity of the respondent's drug use. Researchers should consider these factors in designing and interpreting treatment outcome studies. Most important is to include toxicologic measures of drug use in all treatment outcome research to validate respondents' self-reports of recent drug use and adjust for underreporting. In the absence of such adjustments, estimates of treatment outcome based on self-reports should be interpreted with caution.

ENDNOTE

1. Refer to the Technical Note at the end of the Introduction (p. 13).

ACKNOWLEDGMENT

REFERENCES

Appel, P.W. "Substance Abuse Among Adults in Transient Housing in New York State: Validation of Self-Report by Use of Hair Analysis." Albany: New York State Office of Alcoholism and Substance Abuse Services and Research Institute on Addictions, 1995.

Cook, R.F.; Bernstein, A.D.; Arrington, T.L.; Andrews, C.M.; and
    Marshall, G.A. Methods for assessing drug use prevalence
    in the workplace: A comparison of self-report, urinalysis
    and hair analysis. *Int J Addict* 30(4):403-426, 1995.
Dembo, R.; Williams, L.; Wish, E.D.; and Schmeidler, J. *Urine Testing of
    Detained Juveniles to Identify High-Risk Youth.* National
    Institute of Justice Research in Brief. Washington, DC:
    National Institute of Justice, 1990.
Falck, R.; Siegel, H.A.; Forney, M.A.; Wang, J.; and Carlson, R.G. The
    validity of injection drug users' self-reported use of opiates
    and cocaine. *J Drug Issues* 22(4):823-832, 1992.
Flynn, P.M.; Hubbard, R.L.; Forsyth, B.H.; Fountain, D.L.; Smith, T.K.;
    and Hoffman, J.A. "The Individual Assessment Profile
    (IAP): Standardizing the Assessment of Substance
    Abusers." Paper presented at the 100th Annual Meeting
    of the American Psychological Association, Washington,
    DC, August 15, 1992.
General Accounting Office. *Drug Use Measurement*. Washington, DC:
    General Accounting Office, 1993.
Gfroerer, J.C., and Hughes, A. Collecting data on illicit drug use by phone.
    In: Turner, C.F.; Lessler, J.T.; and Gfroerer, J.C., eds.
    *Survey Measurement of Drug Use: Methodological
    Studies*. DHHS Pub. No. (ADM)92-1929. Washington,
    DC: Supt. of Docs., U.S. Govt. Print. Off., 1992. pp. 277-
    295.
Harkey, M.R., and Henderson, G.L. "Hair Analysis for Drugs of Abuse: A
    Critical Review of the Technology." Report submitted to
    California Department of Alcohol and Drug Programs.
    Winters, CA: Henderson-Harkey, Inc., 1988.
Harrell, A.V. Validation of self-report: The research record. In: Rouse,
    B.A.; Kozel, N.J.; and Richards, L.G., eds. *Self-Report
    Methods of Estimating Drug Use: Meeting Current
    Challenges to Validity*. National Institute on Drug Abuse
    Research Monograph 57. DHHS Pub. No. (ADM)85-
    1402. Washington, DC: Supt. of Docs., U.S. Govt. Print.
    Off., 1985. pp. 12-21.
Hinden, R.; McCusker, J.; Vickers-Lahti, M.; Bigelow, C.; Garfield, F.; and
    Lewis, B. Radioimmunoassay of hair for determination of
    cocaine, heroin and marijuana exposure: Comparison with
    self-report. *Int J Addict* 29(6):771-789, 1994.
Hoffman, J.A.; Schneider, S.J.; Koman J.J., III; Flynn, P.M.; Luckey, J.W.;
    Cooley, P.C.; Wish, E.D.; and Diesenhaus, H.I. The
    centralized intake model for drug abuse treatment: The

role of computerized data management. *Computers Hum Behav* II(2):215-222, 1995.

Hubbard, R.; Marsden, M.E.; Rachal, J.V.; Harwood, H.J.; Cavanaugh, E.R.; and Ginzburg, H.M. *Drug Abuse Treatment: A National Study of Effectiveness.* Chapel Hill, NC: University of North Carolina Press, 1989.

Magura, S., and Kang, S.Y. *Validity of Self-Reported Drug Use in High Risk Populations: A Meta-Analytic Review.* New York: National Development and Research Institute, Inc., 1995.

Magura, S.; Goldsmith, D.; Casriel, C.; Goldstein, P.J.; and Lipton, D.S. The validity of methadone clients' self-reported drug use. *Int J Addict* 22(8):727-749, 1987.

Magura, S.; Freeman, R.; Siddiqi, Q.; and Lipton, D.S. The validity of hair analysis for detecting cocaine and heroin use among addicts. *Int J Addict* 27(1):54-69, 1992.

Magura, S.; Kang S.Y.; and Shapiro, J.L. Measuring cocaine use by hair analysis among criminally-involved youth. *J Drug Issues* 25(4):683-701, 1995.

Marques, P.R.; Tippetts, A.S.; and Branch, D.G. Cocaine in the hair of mother-infant pairs: Quantitative analysis and correlations with urine measures and self-report. *Am J Drug Alcohol Abuse* 19(2):159-175, 1993.

McNagy, S.E., and Parker, R.M. High prevalence of recent cocaine use and the unreliability of patient self-report in an inner-city walk-in clinic. *JAMA* 267(8):1106-1108, 1992.

Mieczkowski, T. The accuracy of self-reported drug use: An evaluation and analysis of new data. In: Weisheit, R., ed. *Drugs, Crime and the Criminal Justice System*. Cincinnati, OH: Anderson Publishing, 1990. pp. 275-302.

Mieczkowski, T. New approaches in drug testing: A review of hair analysis. *Ann Am Acad Polit Soc Sci* 521:132-150, 1992.

Mieczkowski, T. An evaluation of patterns of racial bias in hair assays for cocaine: Black and white arrestees compared. *Forensic Sci Int* 63:85-98, 1993.

Mieczkowski, T.; Barzelay, D.; Gropper, B.; and Wish, E.D. Concordance of three measures of cocaine use in an arrestee population: Hair, urine and self-report. *J Psychoactive Drugs* 23(3):241-246, 1991.

Musto, D. Opium, cocaine and marijuana in American history. *Scientific American,* July 1991. pp. 40-47.

New York City Commission on the Homeless. *The Way Home, A New Direction in Social Policy.* New York: New York City Commission on the Homeless, 1992.

Psychemedics Corporation. *Policies and Procedures Manual.* Santa
    Monica, CA: Psychemedics Corporation, 1991.
Research Triangle Institute. "Early Retrospective Study of Cocaine
    Treatment Outcomes, Overview and Findings." Draft
    technical report no. 1, vol. I, submitted to the National
    Institute on Drug Abuse. Research Triangle Park, NC:
    Research Triangle Institute, 1994.
Saitoh, M.; Uzuka, M.; and Sakamoto, M. Rate of hair growth. *Adv Biol
    Skin Hair Growth* 9:183-194, 1967.
Sowder, B.J.; Beschner, G.M.; Ergh, T.; Wish, A.; Wish, E.D.; Zhang, Y.;
    and Sowder, J. "Waiting List Community Intervention
    Project." Summary report submitted to the National
    Institute on Drug Abuse. Bethesda, MD: NOVA Research
    Corporation, 1993.
Visher, C., and McFadden, K. *A Comparison of Urinalysis Technologies for
    Drug Testing in Criminal Justice*. National Institute of
    Justice Research in Action. Washington, DC: National
    Institute of Justice, 1991.
Weatherby, N.L.; Needle, R.; Cesari, H.; Booth, R.; McCoy, C.B.; Watters,
    J.K.; Williams, M.; and Chitwood, D.D. Validity of self-
    reported drug use among injection drug users and crack
    cocaine users recruited through street outreach. *Eval
    Program Plan* 17(4):347-355, 1994.
Wish, E.D. Identifying drug-abusing criminals. In: Leukefeld, C.G., and
    Tims, F.M., eds. *Compulsory Treatment of Drug Abuse:
    Research and Clinical Practice*. National Institute on
    Drug Abuse Research Monograph 86. DHHS Pub. No.
    (ADM)88-1578. Washington, DC: Supt. of Docs., U.S.
    Govt. Print. Off., 1988. pp. 139-159.
Wish, E.D., and Mieczkowski, T. Comment on Weatherby et al. *Eval
    Program Plan* 17(4):356-357, 1994.
Wish, E.D., and Gropper, B.A. Drug testing by the criminal justice system:
    Method, research and applications. In: Wilson, J.Q., and
    Tonry, M., eds. *Drugs and Crime*. Chicago: University of
    Chicago Press, 1990. pp. 321-339.
Wish, E.D.; Johnson, B.; Strug, D.; Chedekel, M.; and Lipton, D.S. "Are
    Urine Tests Good Indicators of the Validity of Self-
    Reports of Drug Use? It Depends on the Test." New York:
    Narcotic and Drug Research, Inc., 1983.

AUTHORS

Eric D. Wish, Ph.D.
Director

Susanna Nemes, M.A.
Research Associate

Center for Substance Abuse Research
University of Maryland at College Park
4321 Hartwick Road, Suite 501
College Park, MD 20740

and

Jeffrey A. Hoffman, Ph.D.
Vice President for Operations
Koba Associates, Inc.
1156 15th Street, NW, Suite 200
Washington, DC 20005

Click here to go to page 227