



# National Institute of Justice

## Research Preview

Jeremy Travis, Director

April 1997

### Hair Assays and Urinalysis Results For Juvenile Drug Offenders

*A Summary of Research Conducted by Tom Mieczkowski, Ph.D.*

Estimates of the incidence and prevalence of drug use among juveniles have been derived, historically, from self reports obtained during interviews. However, comparison of survey responses with urinalysis results has shown that self-reported drug behavior does not accurately reflect the extent of drug use. Urine-based testing consistently detects more drug use than is revealed by self reports, suggesting that estimates based on surveys alone underreport drug use. But for several major drugs of abuse, urinalysis affords too narrow a detection “window.” For example, the maximum retrospective period allowed by urinalysis for detecting cocaine or most opiates at currently accepted cutoff values is approximately 48 to 72 hours, as determined by the rate at which these drugs clear the body. This limited detection capability, as well as problems associated with implementing a urine monitoring program (i.e., the need to refrigerate samples and to observe the voiding of specimens), makes validation of new drug-testing methodologies a priority.

Hair analysis is one such methodology. Hair entraps drugs or their metabolites for much longer periods than urine and represents an alternative medium for estimating the use of rapidly excreted drugs. In 1993, the National Institute of Justice (NIJ) funded a project designed to replicate the findings of an earlier study<sup>1</sup> that had examined drug use among juvenile offenders using self reports, urinalysis, and hair assays. The original study showed that hair analysis revealed seven times as much cocaine use as was detected by urinalysis. The findings from the replicated study confirmed those made earlier, although only a fourfold difference was found between hair and urine assay results for cocaine. In addition, the drug assessment instrument used in the study, COMPASS<sup>2</sup>, was able to identify sample members at risk for substance abuse independently from the bioassay or self report.

#### Study methodology

The target population consisted of 426 juvenile detainees, between 14 and 18 years old, at two sites: Cleveland (Cuyahoga County), Ohio (185 male detainees, of whom

nearly 72 percent were black) and St. Petersburg (Pinellas County), Florida (241 male and female detainees, of whom approximately 6 percent were black). Participation in the study was voluntary. At the Cleveland site, a juvenile detention facility, eligibility was restricted to youths arrested or apprehended less than 48 hours prior to interviewing; the Florida site, also a juvenile detention facility, included referrals from schools, parents, and similar sources. All juveniles were approached, recruited, and interviewed according to NIJ’s Drug Use Forecast (DUF) system protocol. Following the interview and collection of a urine specimen, hair specimens were gathered, and the COMPASS assessment was administered to all subjects.

Urinalysis was performed using EMIT™ (enzyme multiplied immune test), an objective, machine-readable method. Specimens were analyzed for the 10 drugs standard to DUF: cannabinoids, cocaine, opiates, PCP, methadone, amphetamine, diazepam, methaqualone, barbiturates, and phenylpropanolamine. Hair specimens were analyzed for evidence of cocaine, marijuana, methadone, PCP, and opiates, using radioimmunoassay screening and gas chromatography/mass spectroscopy confirmation analyses.

#### Study findings

- **Self reports.** Juveniles were reluctant to report using drugs in the arrest or detention setting, even when they had been assured that an admission would not be held against them. If they reported anything, it was likely to be having used marijuana “at some point in their lives.” The more recent the timeframe queried, the more likely the juvenile was to deny use.
- **Cocaine and marijuana detection.** Hair analysis identified higher drug prevalence for cocaine than did urinalysis—a finding consistent with the data reported in the original study. However, the findings for marijuana were inconsistent. In the Cleveland group, marijuana was detected in urine nearly four times as frequently as in hair. The opposite was true in St. Petersburg, where

approximately 60 percent more marijuana use was detected by hair assays than by urinalysis. Few other drugs were detected in subjects at either site.

In many cases, cocaine was detected in an offender's hair but not his or her urine. Rarely was the reverse true, i.e., in almost no instance was a cocaine-positive urine test contradicted by a cocaine-negative hair assay. High levels of cocaine in hair indicate more chronic and high-dose cocaine use, which is more readily detected by urine testing. Persons who use cocaine infrequently or in very low doses (and who ought, therefore, to have low hair assay values) are likely to pass a periodic urine screen.

- **COMPASS assessment.** Virtually all subjects had high COMPASS scores relative to the general population norms for the instrument, showing clearly that youths at both sites were at risk for substance abuse. In this regard, the assessment instrument was successful. High risk was indicated without reference to either the bioassay or self-report outcomes. However, COMPASS did not finely differentiate among the juveniles in the sample.

### Implications

Samples in both jurisdictions were small, quite different from one another, and perhaps not representative of the juvenile justice population. However, study findings generally affirm those reported in the earlier research. Both hair and urine assays detected more drug use than was reported in interviews. Cocaine use was substantially underreported—and substantially undercounted by urine assays; at both sites, hair analysis revealed much more cocaine use than did urine testing. This study suggests that a drug monitoring program using hair assays can be

implemented in field settings, but very short hair styles may be a stumbling block. Although other body hair can be used, collecting specimens could prove awkward. Further research is needed to determine the accuracy and timeliness of hair testing methodology and the costs and benefits of hair testing relative to other technologies.

### Notes

1. Feucht, T., R. Stevens, and M. Walker, "Drug Use Among Juvenile Arrestees: A Comparison of Self-Report, Urinalysis, and Hair Assays," *Journal of Drug Issues* 24 (1 and 2):99-116, 1994.
2. The COMPASS is a 98-page self-report questionnaire on substance abuse designed for use with any adolescent or adult, regardless of sex, marital status, or ethnic background. Since October 1995, COMPASS has been known as MAPP (Multidimensional Addictions and Personality Profile).

The summary is based on a study conducted by Tom Mieczkowski, Ph.D., Associate Professor of Criminology at the University of South Florida, under NIJ grant 94-IJ-CX-0036. The full project report, *Hair Testing a Juvenile Offender Population*, is available through the National Criminal Justice Reference Service on interlibrary loan or for a photocopying fee. Call 800-851-3420 and ask for NCJ 163925.

Points of view in this document do not necessarily represent the official position of the U.S. Department of Justice.

FS 000171

**U.S. Department of Justice**  
Office of Justice Programs  
*National Institute of Justice*

Washington, D.C. 20531

BULK RATE  
POSTAGE & FEES PAID  
DOJ/NIJ  
Permit No. G-91

Official Business  
Penalty for Private Use \$300