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VALIDITY OF ADOLESCENT SELF-REPORT OF SUBSTANCE USE

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ABSTRACT

The validity of self-report of substance use was examined in 367 adolescents referred for a substance use assessment between 1996 and 2000. Referrals came from a wide variety of sources, including pediatricians, the courts, social services, as well as self-referred by their parents. Average age of the sample was 15, 52% were male, and 82% were Caucasian. Adolescents were first asked about the details of their substance use by a clinician using a structured interview with established reliability and validity (Adolescent Drug and Alcohol Diagnosis). They were subsequently asked to provide a urine sample, a requirement they were unaware of when being interviewed about their substance use. If the urine sample was deemed valid by the laboratory technician it was analyzed by means of fluorescence polarization immunoassay and paper chromatography. If positive screens were obtained for any substance, the sample was subjected to gas chromatography/mass spectrometry for confirmation and quantification. Biochemical test results were compared to self-report. Overall, 28% (96/338) of the self-reports were not corroborated by urinalysis. Twenty-six percent (56/219) of adolescents who reported nonuse of a substance had a positive urinalysis. More surprisingly, 34% (40/119) of adolescents reporting substance use in the urinalysis detection window had a negative urinalysis. The present study found self-report of substance use in adolescents to only have fair validity. It is recommended that biochemical corroboration be routinely used for this population.

KEY WORDS: urinalysis, adolescent, substance use, self-report, validity

RÉSUMÉ

La validité de l'auto-évaluation a été étudiée chez 367 adolescents qui se sont soumis à une évaluation au regard de l'utilisation de substance entre 1996 et 2000. Les références émanaient d'une grande variété de spécialistes, notamment les pédiatres, des décisions judiciaires, des données obtenues auprès de services sociaux et d'individus se présentant spontanément sous les conseils de leurs parents. L'âge moyen des participants était de 15 ans; parmi les participants, 52% étaient des hommes et 82% d'origine européenne. Un clinicien a d'abord interrogé les adolescents sur leurs habitudes d'utilisation de substance à l'aide d'un questionnaire détaillé reconnu (*Adolescent Drug and Alcohol Diagnosis*). On les a ensuite invités à fournir un échantillon d'urine, ce à quoi les adolescents n'avaient pas été informé au départ. Lorsque l'analyse, faite par un technicien de laboratoire, donnait un résultat positif, l'urine faisait ensuite l'objet d'examens plus poussés : polarisation de fluorescence, immunoessai et chromatographie sur papier. Si des résultats positifs étaient obtenus à l'égard de n'importe quelle substance, l'échantillon était alors soumis à la chromatographie en phase gazeuse et à la spectrométrie de masse afin de confirmer les résultats initiaux, de même qu'à une évaluation quantitative. Les résultats des tests biochimiques étaient ensuite comparés aux informations obtenues lors de l'auto-évaluation. De façon générale, 28% des auto-évaluations (soit 96/338) ne correspondaient pas aux analyses d'urine. De plus, 29% des adolescents (69/235) qui avaient déclarés ne pas utiliser de substances ont eu un test d'urine positif. Plus surprenant encore, 34% des adolescents (40/119) ayant déclaré utiliser des substances pendant la période ciblée ont eu des tests d'urine négatifs. En somme, la présente étude montre que les informations obtenues par auto-évaluation en ce qui a trait à l'utilisation de substance chez les adolescents, a une validité relative. Il est recommandé d'obtenir une confirmation biochimique des déclarations faites par cette population.

MOTS CLÉS : analyse d'urine, adolescent, utilisation de substance, auto-évaluation, validité

RESUMEN

La validez del auto-informe sobre el uso de las sustancias fue examinada en 367 adolescentes referidos para una evaluación del uso de las sustancias entre 1996 y 2000. Las referencias vinieron de una variedad amplia de fuentes, incluyendo pediatras, las cortes, los servicios sociales, así como los auto-referidos por sus padres. La edad media de la muestra era 15, los 52% eran masculinos, y los 82% eran caucásicos. Primero, los adolescentes fueron preguntados por un clínico acerca de los detalles de su uso de sustancias usando una entrevista estructurada con confiabilidad y validez establecidas (diagnosis adolescente de las drogas y del alcohol). Posteriormente, les pidieron proporcionar una muestra de orina, un requisito del cual eran inconsciente al ser entrevistado en cuanto a su uso de las sustancias. Si la muestra de la orina era juzgada válida por el técnico de laboratorio, era analizada por medio de inmuno-diagnóstico de polarización fluorescencia y por cromatografía de papel. Si resultados positivos fueron obtenidos para cualquier sustancia, la muestra fue sujetada a cromatografía de gas/espectrometría en masas para confirmación y cuantificación. Los resultados de la prueba bioquímica fueron comparados al auto-informe. En total, los 28% (96/338) de los auto-informes no fueron corroborados por el urinalysis. El veintiseis por ciento (56/219) de los adolescentes que divulgaron el no uso de una sustancia tenían un urinalysis positivo. Más asombrosamente, el 34% (40/119) de adolescentes que divulgaron el uso de la sustancia en la ventana de la detección del urinalysis tenían un urinalysis negativo. El estudio actual encontró que el auto-informe sobre el uso de sustancias en adolescentes solamente tiene validez mediana. Se recomienda que la corroboración bioquímica sea utilizada rutinariamente para esta población.

PALABRAS CLAVES: urinalysis, adolescente, uso de sustancias, auto-informe, validez

INTRODUCTION

For many years there was a consensus that the self-report of substance users was reliable and valid based on their concordance with collateral reports, agency/official records and biochemical testing with thin layer chromatography of urine (1,2,3,4,5,6,7). Indeed, the major conclusions about the effectiveness of substance abuse treatment (e.g., 8,9,10) have been based largely on studies employing self-report of substance use.

However, in recent years the validity of self-report of substance use has come under question. Using the new technique of hair assay, as well as improved urinalysis by means of immunoassay, studies since the mid 1990s have found consistent evidence that recent arrestees significantly underreport their recent use, especially when it involves cocaine (11,12,13,14,15). Other studies have found underreporting of cocaine use during the course of drug treatment (16) and at post-treatment follow-up (17,18,19). Stinchfield (20) found evidence of a significant increase in reported pre-treatment substance use when this question was asked at discharge (1 month after beginning treatment) compared to when it was asked at intake. Whether this represents minimization at intake or exaggeration at discharge is unknown, but it speaks to the need for more objective validation of self-report.

The purpose of the present study is to further investigate this issue as it applies to adolescents who have been referred for a substance use assessment at a substance abuse clinic. This is an understudied population, as the majority of the above studies have been with criminal justice populations, adults, and cocaine abusers. Only a very small minority of substance abuse treatment facilities for adolescents currently provide biochemical verification of substance use. Adolescents entering substance abuse treatment may be a population with higher rates of underreporting, as most enter treatment because of parental, school or legal pressure rather than because they want to themselves (21).

METHOD

Sample

The sample consisted of 367 adolescents assessed at the Addiction Centre, Foothills Medical Centre, Calgary, Alberta between 1996 and 2000. The Addiction specializes in the assessment and treatment of substance-abusing adolescents with comorbid psychiatric conditions. It is primarily an outpatient program, but a small percentage of patients are admitted to an affiliated inpatient unit. The average age of the adolescents was 15.4 (12-17 range). Fifty-two percent were male, and 82% were Caucasian. These and other demographic characteristics of the sample are summarized in Table 1.

Adolescents were referred for a substance-abuse assessment from a wide variety of sources, including pediatricians, the courts, social services, as well as self-referred by their parents. The only requirements for the referral to be accepted was that there also be a referral from their family physician (for the purposes of follow-up care), that there be some suspicion of drug or alcohol use, and that at least one of his/her parents/guardians must also attend. Over 95% of referrals were accepted. The average length of time between the referral being accepted and the actual appointment was four to eight weeks.

Procedure

Upon arrival at the Addiction Centre, the adolescent was interviewed alone by a trained clinician (either a psychologist, nurse or social worker) while a family physician and an adolescent psychiatrist observed behind a 2-way mirror. The clinician used the Adolescent Drug and Alcohol Diagnosis (ADAD), a structured questionnaire with established reliability and validity (22,23). This structured interview asks about physical health, delinquent behaviour, school status, family issues, psychological problems,

employment, and substance use. For substance use, the adolescent is first asked about whether he/she has ever used each of 18 commonly used licit and illicit substances. If yes, they are asked to provide details about their history of use up to the past month. They are then asked about how often they have used this substance in the past month. Finally, they are asked about their very last use of the substance.

Following administration of the ADAD, the adolescent is asked to provide a urine sample for analysis "as a routine part of the assessment that is asked of everyone". This is the first time he/she is made aware of this requirement. (It is unlikely that adolescents would have been aware of this requirement from other substance-using peers, as Addiction Centre patients are drawn from a widely dispersed population of approximately 1 million people). If the adolescent could not be persuaded to provide a sample, we did not insist. If the adolescent agreed, and if the urine sample was deemed valid by the laboratory technician (temperature in correct range, appropriate specific gravity, no evidence of doping), it was sent to the toxicology department. Toxicology conducted a fluorescence polarization immunoassay (AxSYM™ manufactured by Abbott Laboratories) for alcohol, cannabis, phencyclidine, amphetamines, benzodiazepines, barbiturates, opiates, and cocaine metabolites, as well as a paper chromatography screen (ToxiLab™) that detects most other substances of abuse (i.e., psilocybin, MDMA, Gravol, steroids). If cut-off levels for any of these substances was exceeded (e.g., 50 ng/mL for cannabinoids), the sample was subjected to gas chromatography/mass spectrometry for confirmation and quantification. Gas chromatography/mass spectrometry is highly accurate and considered the "gold standard" in urinalysis methodologies (24).

Validity of self-report was established by its correspondence with urinalysis test results. Specifically, a comparison was made between self-reported substance use within a substance's detection window and the urinalysis test results. Urinalysis detection windows vary for each substance. It depends on amount consumed, chronicity of use, and the substance's normal rate of excretion. Alcohol has a detection window of a few hours to several hours depending on the amount consumed (1oz/hr excretion), psilocybin and LSD of 1-3 days, cocaine of 0.5-3.0 days, amphetamines of 2-4 days, opiates of 2-4 days, and cannabis of 2-30 days (18,25). The detection window was adjusted on an individual basis by the first author (RW) depending on self-reported amount consumed and chronicity of use. These adjustments were made without awareness of the urinalysis test result.

RESULTS

Three percent (11/367) of adolescents refused to provide a urine sample. In addition, 5% (18/367) of the urine samples were not sent for analysis as they were judged to have been tampered with. The remaining 338 samples were sent for analysis. In 28% (96/338) of the cases self-report of substance use/nonuse was not corroborated by urinalysis test results. Twenty-six percent (56/219) of adolescents who reported nonuse of a substance had a positive urinalysis, and 34% (40/119) of adolescents reporting substance use in the urinalysis detection window had a negative urinalysis. Sensitivity, specificity, positive predictive power, and negative predictive power of self-report were calculated for each substance. The results are summarized in Table 2.

Most Common Substances Reported and Detected

Cannabis and alcohol were by far the most commonly reported substances. In the week prior to the assessment, 35% of the adolescents reported using cannabis, 26% reported alcohol, 6% reported hallucinogens (psilocybin, LSD), 2% reported stimulants (cocaine, amphetamines), 2% reported opiates (heroin, morphine, codeine), and 49% reported use of any mind-altering substance (includes ecstasy, phencyclidine, Gravol, benzodiazepines, organic solvents).

Cannabis was the most commonly detected substance in urinalysis. Thirty-four percent of the adolescents tested positive for cannabis. Only 5% tested positive for alcohol, 3% for opiates, 1% for stimulants, 0% for hallucinogens, and 40% for any mind-altering substance.

Positive Predictive Power of Self-Report

Positive predictive power of self-report varied depending on the substance reported. None of the three adolescents who reported using psilocybin within the psilocybin detection window had a positive urinalysis. Only 25% (2/8) of adolescents who reported using alcohol within the alcohol detection window had positive urine samples. Two out of four (50%) who reported opiate use had opiates detected in their urine. Positive predictive power was better for cannabis, where 66% (73/111) of individuals reporting cannabis use within its detection window had positive urinalysis. Similarly, 66% (79/119) of people reporting use of any mind-altering substance (mostly cannabis) within that substance's detection window had a positive urinalysis for that substance. There was no reported use of stimulants within its detection window.

Negative Predictive Power of Self-Report

Negative predictive power of self-report was fairly good. Ninety-three percent (315/340) of adolescents who reported no alcohol use within the alcohol detection window were negative for alcohol, 100% (335/335) for hallucinogens, 99% (333/338) for stimulants, and 97% (327/334) for opiates. The negative predictive power of cannabis nonuse was slightly lower at 82% (184/225). The overall negative predictive power for nonuse of any mind-altering substance was 74% (163/219).

Sensitivity of Self-Report

Sensitivity of self-report was low to moderate. Only 12% (2/17) of adolescents with positive urinalysis for alcohol reported alcohol use in the detection period, 0% (0/5) for stimulants, 22% (2/9) for opiates, 64% (73/114) for cannabis, and 59% (79/135) for any mind-altering substance. There was no self-reported use nor detection of hallucinogen use within the detection window.

Specificity of Self-Report

Specificity of self-report was uniformly good. Ninety-eight percent (315/321) of adolescents with negative alcohol urinalysis reported no alcohol use in the detection period, 83% (184/222) for cannabis, 99% (327/329) for opiates, 99% (335/338) for hallucinogens, 100% (333/333) for stimulants, and 80% (163/203) for any mind-altering substance.

Overall Classification Accuracy

Overall classification accuracy was assessed using a Kappa coefficient, which takes chance agreement into account. Kappa coefficients were low to moderate: .13 for alcohol, 38 for opiates, .48 for cannabis, and .40 for any mind-altering substance. Kappa statistics could not be calculated for stimulants or hallucinogens.

An examination of subgroup differences as a function of age and gender was undertaken. There was a greater tendency for older adolescents to deny use of a mind-altering substance in the presence of a positive urinalysis (16.0 average age compared to 15.3 for the rest of the sample). There were no gender differences for specificity or sensitivity. However, positive predictive power tended to be higher for males compared to females (70% versus 60%), and negative predictive power tended to be higher for females compared to males (81% versus 67%).

DISCUSSION

The results suggest that adolescent self-report of substance use has some degree of validity, but is far from perfect. In 28% of the cases self-report of substance use/nonuse was not corroborated by urinalysis test results. This figure is 34% if it is assumed that self-report was also invalid for individuals who refused to provide a urine sample or who had tampered with their urine sample.

A common source of inconsistency was the adolescent reporting nonuse of a substance when urinalysis found otherwise. Twenty-six percent of adolescents who reported nonuse of a substance had a positive urinalysis (36% when including individuals who did not provide urine samples or who tampered). Consistent with prior research (e.g.,13,17,19), underreporting occurred more frequently with less socially acceptable drugs (e.g., cocaine, opiates) than it did for cannabis. In the present study, only a very small percentage of adolescents with positive urinalysis for stimulants or opiates reported using these substances in the detection period.

A more surprisingly source of inconsistency was the adolescent reporting use of a substance in the absence of a positive urinalysis, occurring in 34% of cases. A few of these cases may have been due to fast metabolism of drug metabolites or consumption of a very small amount of drug. When the reporting window is significantly narrowed (e.g., just examining regular cannabis users reporting reported cannabis use in 3 or fewer days prior to assessment), the false positive rate decreases to 26%.

For this remaining 26% it would seem likely that the urinalysis was valid and the self-report invalid. Some adolescents may have been misled about what substance he/she had taken. In other cases, the adolescent may have had poor memory concerning their recent substance use. Deliberate fabrication is another possibility. Most individuals reporting recent substance use (despite negative urinalysis) were accepted into treatment and followed for several weeks. In several cases subsequent reports of substance use continued not to be corroborated by urinalysis. When confronted, many of these individuals eventually acknowledged that their report of substance use at the assessment (and subsequently) had either been exaggerated or fabricated, either as a ‘cry for help’ or as a way of boasting. Thus, although Downey, Helmus & Schuster (26) and Yacoubian (27) advocate no urinalysis when a person reports they have actually used, our data do not support this conclusion, at least for an adolescent population.

It is difficult to compare our results to other studies, as no other study has used these exact same procedures with the exact same population. Three studies of juvenile arrestees (11,12,15) also found underreporting of substance use, but to a much greater degree than obtained in our clinical sample. Buchan et al. (28) studied cannabis-abusing adolescents entering outpatient treatment and obtained a kappa statistic (.42) comparable to ours (.40). However, sensitivity was much higher in Buchan et al.’s study (91% versus 59%), and specificity was much lower (47% versus 80%). The higher sensitivity may have been because adolescents were aware they would be required to provide a urine sample prior to the interview (unlike the present study). The lower specificity is likely due to their use of a much wider detection window (i.e., urinalysis results were compared to any self-reported use in the past 30 days).

In general, our results support the contention that the validity of self-report is a complex social-psychological process influenced by characteristics of the respondent, characteristics of the interviewer, characteristics of the question being asked, and the situational context. Kahneman et al.’s (29) work concerning the irrational underpinnings of human judgment is relevant here. Essentially, a self-report is a judgment call in which there is some type of decision to trust or not to trust someone, in some way. The factors influencing this are time and situation specific. Del Boca & Noll (30) have stated these considerations more specifically as they apply to self-report of addictive behaviour. Demand characteristics of the situation are very important determinants of validity. Realistically, it is unclear how

much honesty should be expected for an adolescent who is brought for an assessment against his or her will and asked to divulge their substance use to a stranger. Similarly, it should come as no surprise that there is underreporting of substance use in recent arrestees (e.g.,11,15) for less socially acceptable drugs; when parents are present (31); and when answers are given verbally (31,32,33,34,35,36). There is also evidence that individuals tend to be less honest about substance use after treatment than before treatment (19), with repeated assessments being associated with progressively less honest reporting (37). Although not evaluated in the present study, it is to be expected that the reliability and validity of other sensitive issues/areas that were investigated (e.g., sexual behaviour, delinquent activities) will also be very much dependent on these factors.

Other determinants of validity and reliability include the ability to verify data through collateral informants (e.g., 38), and the order of self-report and urinalysis. Conducting urine tests before an interview may increase the accuracy of self-reports (39). The memory demand of the task is an obvious determinant of validity (13). Less obvious is the current substance use status of the individual. It appears that higher reports of retrospective use are associated with higher current use and vice versa (40,41).

Interviewer-client characteristics may also affect the accuracy of self-report. Johnson et al. (42) found that increased social distance between respondent and interviewer (i.e. decreased respondent-interview similarity) decreased the probability of respondents reporting lifetime and recent substance use behaviour in a telephone survey. Fendrich et al. (43) concluded that interviewer characteristics such as race, gender, and age impacted rates of disclosure of cocaine and marijuana use among male juvenile arrestees, providing support for Social Attribution and Conditional Social Attribution models of interviewer effects.

The primary implication of the present study is that it is preferable to seek multiple sources of information in coming to a determination about the presence or absence of substance use (43,44). Our findings indicate that relying exclusively on self-report has its shortcomings. Reliance on parental report is also problematic because of evidence that parental awareness of adolescent substance use tends to be quite poor (45,46). Establishing that substance use is occurring by means of a positive report by either the adolescent or parent may improve validity, but procedures that require a positive report by both the adolescent and parent likely decrease validity.

Relying exclusively or primarily on biochemical drug testing does not necessarily improve validity because of problems with false negatives. Some substances are present in such minute quantities (e.g., LSD) they are virtually impossible to detect. Unless done frequently, urinalysis is also poor at detecting substances that are quickly metabolized (e.g., alcohol, cocaine). For example, in the present study 26% of adolescents reported using alcohol in the week prior to the assessment, yet urinalysis was positive for alcohol in only 5% of cases. Other biochemical methods with longer detection windows (e.g., hair assays) do not screen for all substances, and are unable to detect drug use for the 3 days prior to the test (47).

These results also have important implications for treatment. The primary importance of a good assessment is that it leads to the formulation of an appropriate treatment plan. If adolescent self-report only has fair validity at intake then limited weight should be given to it in formulation of the treatment plan and/or formulation must proceed more slowly, as self-report improves. Secondly, therapeutic engagement is thought to be one of the more important factors in treatment success with adolescents (48). To the clinician, invalid self-report may serve as a useful indicator of the need for improved engagement.

Limitations

One of the limitations of this study is that the sample is not representative of substance-abusing adolescents generally, as it contains a greater proportion of dually-diagnosed individuals. Roughly 90% of individuals in the present study had a co-occurring psychiatric disorder, compared to approximately 50%

in the general population of substance-abusing adolescents (49). However, in all other respects the heterogeneous demographics and situational characteristics (e.g., school attendance, % on probation, etc.) of our sample is very similar to what is found in the general adolescent treatment population (10,21) and in the general adolescent substance-abusing population (50).

A second limitation concerns the generalizability of the findings for all substances. Cannabis and alcohol were by far the most commonly reported substances, and cannabis was by was the most commonly detected substance. Our findings must be seen as tentative for other substances.

A final consideration is that our results are somewhat dependent on the situational context. Adolescents in this study typically had several weeks notification that they were going to attend a substance use assessment, which may have caused them to curtail their use. Furthermore, all of the adolescents had at least one parent attend the assessment. Even though the parent was not present during the actual interview, it may have caused the adolescent to be less honest about his/her substance use. The fact that much of the assessment was done verbally (as opposed to a self-administered questionnaire) probably decreased accurate self-report. Finally, adolescents were unaware they would be asked to provide a urine sample for analysis. It is reasonable to assume that accuracy of self-report would have been higher if they had been aware. All of the above factors likely had some influence on our results. Nonetheless, it is also important to realize that the above conditions are also the typical conditions of most adolescent assessments.

Conclusions

Adolescent self-report of substance use appears to have fair validity for adolescents being assessed for substance abuse. However, it is strongly influenced by the demand characteristics and memory requirements of the situation. In the present study, roughly one-third of individuals who deny substance use had a positive urinalysis and one-third of individuals who claim to be using a substance had a negative urinalysis. The optimal assessment approach is to utilize conditions that promote accurate self-report, but also to use a variety of methods including both self-report and urinalysis in order to attain the most accurate clinical picture.

REFERENCES

(1) Amsel, Z.; Mandell, W.; Matthias, L.; Mason, C.; Hocherman, I. Reliability and Validity of Self-reported Illegal Activities and Drug Use Collected from Narcotic Addicts. Int. J. Addict. **1976**, *11*, 325-336.
(2) Bale, R.N.; Van Stone, W.W.; Engelsing, T.M.J.; Zarcone, V.P.; Kuldau, J.M. The Validity of Self-reported Heroin Use. Int. J. Addict. **1981**, *16*, 1387-1398.
(3) Ball, J.C. The Reliability and Validity of Interview Data Obtained from 59 Narcotic Drug Addicts. Am. J. Sociol. **1967**, *72*, 650-654.
(4) Ben-Yehuda, N. Are Addicts' Self-reports to be Trusted? Int. J. Addict. **1980**, *15*, 1265-1270.
(5) Bonito, A.J.; Nurco, D.N.; Shaffer, J.W. The Veridicality of Addicts' Self-reports in Social Research. Int. J. Addict. **1976**, *11*, 719-724.
(6) Cox, T.J.; Longwell, B. Reliability of Interview Data Concerning Current Heroin Use from Heroin Addicts on Methadone. Int. J. Addict. **1974**, *9*, 161-165.
(7) Maddux, J.F.; Desmond, D.P. Reliability and Validity of Information from Chronic Heroin Users. J. Psychiatr. Res. **1975**, *12*, 87-95.
(8) Agosti, V. The Efficacy of Treatments in Reducing Alcohol Consumption: A Meta-analysis. Int. J. Addict. **1995**, *30*, 1067-1077.
(9) Miller, W.R.; Brown, J.M.; Simpson, T.L.; Handmaker, N.S.; Bien, T.H.; Luckie, L.F.; Montgomery, H.A.; Hester, R.K.; Tonigan, J.S. (1995). What Works? A Methodological Analysis of the Alcohol Treatment Outcome Literature. In *Handbook of Alcoholism Treatment Approaches*, 2nd Ed; Hester, R.K., Miller, W.R., Eds.; Allyn & Bacon: Needham Heights, MA, 1995; 12-44.
(10) U.S. Department of Health and Human Services. *Effectiveness of Substance Abuse Treatment, September 1995*, DHHS Publication no. (SMA) 95-3067; Substance Abuse and Mental Health Services Administration: Washington, 1995.
(11) Fendrich, M.; Xu, Y. The Validity of Drug Use Reports from Juvenile Arrestees. Int. J. Addict. **1994**, *29*, 971-985.
(12) Feucht, T.E.; Stephens, R.C.; Walker, M.L. Drug Use among Juvenile Arrestees: A Comparison of Self-report, Urinalysis and Hair Assay. J. Drug Issues **1994**, *24*, 99-116.
(13) Harrison, L.D. The Validity of Self-reported Data on Drug Use. J. Drug Issues **1995**, *25*, 91-111.
(14) Magura, S.; Kang, S.Y. The Validity of Self-reported Cocaine Use in Two High-risk Populations. NIDA Res. Monogr. **1997**, *167*, 227-246.
(15) Mieczkowski, T.; Newel, R.; & Wraight, B. Using Hair Analysis, Urinalysis, and Self-reports to Estimate Drug Use in a Sample of Detained Juveniles. Subs. Use Misuse **1998**, *33*, 1547-1567.
(16) Ehrman, R.N.; Robbins, S.J.; Cornish, J.W. Comparing Self-reported Cocaine Use with Repeated Urine Tests in Outpatient Cocaine Abusers. Exp. Clin. Psychopharmacol. **1997**, *5,* 150-156.
(17) Lundy, A.; Gottheil, E.; McLellan, A.T.; Weinstein, S.P.; Sterling, R.C.; Serota, R.D. Under-reporting of Cocaine Use at Post-treatment Follow-up and the Measurement of Treatment Effectiveness. J. Nerv. Ment. Dis. **1997**, *185*, 459-62.
(18) U.S. Department of Health and Human Services. *Screening and Assessing Adolescents for Substance Use Disorders,* DHHS Publication No. (SMA) 99-3282; Substance Abuse and Mental Health Services Administration: Washington, 1999.
(19) Wish, E.D.; Hoffman, J.A.; Nemes, S. The Validity of Self-reports of Drug Use at Treatment Admission and at Follow-up: Comparisons with Urinalysis and Hair Assays. NIDA Res. Monogr. **1997**, *167,* 200-226.
(20) Stinchfield, R. Reliability of Adolescent Self-reported Pretreatment Alcohol and other Drug Use. Subs. Use Misuse **1997**, *32*, 425-34.
(21) Williams, R.J.; Chang, S. Comprehensive & Comparative Review of Adolescent Drug Abuse Treatment Outcome. Clinical Psychology: Science & Practice **2000**, *7*, 138-166.
(22) Friedman, A.S.; Utada, A. A Method for Diagnosing and Planning the Treatment of Adolescent Drug Abusers: The Adolescent Drug Abuse Diagnosis (ADAD) instrument. J. Drug Educ. **1989**, *19*, 285-312.

(23) Leccese, M.; Waldron, H. Assessing Adolescent Substance Use: A Critique of Current Measurement Instruments. J. Subs. Abuse Treat. **1994**, *11*, 553-563.
(24) Foltz, R.L.; Fentiman, A.F.; Foltz, R.B. *GC/MS Assays for Abused Drugs in Body Fluids.* NIDA Res. Monogr. 32; U.S. Department of Health and Human Services: Rockville, MD, 1980.
(25) Abbott Laboratories. *Manufacturer's Data on the AxSYM™ Fluorescence Polarization Immunoassay*. Abbott Laboratories: 1998.
(26) Downey, K.K.; Helmus, T.C.; Schuster, C.R. Contingency Management for Accurate Predictions of Urinalysis Test Results and Lack of Correspondence with Self-reported Drug Use Among Polydrug Abusers. Psychol. Addict. Behav. **2000**, *14*, 69-72.
(27) Yacoubian, George S. Jr. Reassessing the Need for Urinalysis as a Validation Technique. J. Drug Issues **2000**, *30*, 3223-334.
(28) Buchan, B.J.; Dennis, M.L.; Tims, F.M.; & Diamond, G.S. Cannabis Use: Consistency and Validity of Self-report, On-site Urine Testing and Laboratory Testing. Addiction **2002**, *97*, 98-108.
(29) Kahneman, D., Slovic, P., & Tversky, A. *Judgment under Uncertainty: Heuristics and Biases*. Cambridge University Press: England, 1982.
(30) Del Boca, F.K.; Noll, J.A. Truth or Consequences: The Validity of Self-report Data in Health Services Research on Addictions. Addiction **2000**, *95*, S347-S360.
(31) Aquilino, W.S. Privacy Effects on Self-reported Drug use: Interactions with Survey Mode and Respondent Characteristics. NIDA Res. Monogr. **1997**, *167*, 383-415.
(32) McAllister, I.; Makkai, T. Correcting for the Underreporting of Drug Use in Opinion Surveys. Int. J. Addict. **1991**, *26*, 945-961.
(33) Supple, A. J.; Aquilino, W. S.; and Wright, D. L. Collecting Sensitive Self-report Data with Laptop Computers: Impact on the Response Tendencies of Adolescents in a Home Interview. Journal of Research on Adolescence **1999**, *9*, 467-488.
(34) Tourangeau, R.; Smith, T. W. Asking Sensitive Questions: The Impact of Data Collection Mode, Question Format, and Question Context. Public Opinion Quarterly **1996**, *60*, 275-304.
(35) Turner, C.F.; Lessler, J.T.; Gfroerer, J.C. *Survey Measurement of Drug Use: Methodological Studies*. National Institute on Drug Abuse: Rockville, MD, 1992.
(36) van der Zouwen, J. and De Leeuw, E. D. The Relationship between Mode of Administration and Quality of Data in Survey Research. Bull. Meth. Sociolog. **1990**, *29*, 3-14
(37) Fendrich, M.; Mackesy-Amiti, M.E.; Wislar, J.S.; Goldstein, P. (1997). The Reliability and Consistency of Drug Reporting in Ethnographic Samples. In *The Validity of Self-Reported Drug Use: Improving the Accuracy of Survey Estimates* (NIDA Res. Monogr. 167); Harrison, L., Hughes, A., Eds. U.S. Department of Health and Human Services: Rockville, MD, 1997.
(38) Babor, T.F.; Stephens, R.S.; Marlatt, G.A. Verbal Report Methods in Clinical Research on Alcoholism: Response Bias and its Minimization. J. Stud. Alcohol **1987**, *48*, 410-424.
(39) Hamid, R.; Deren, S.; Beardsley, M.; Tortu, S. Agreement between Urinalysis and Self-reported Drug Use. Subs. Use Misuse **1999**, *34*, 1585-1592.
(40) Collins, L.M.; Graham, J.W.; Hansen, W.B.; & Johnson, C.A. Agreement between Retrospective Accounts of Substance Use and Earlier Reported Substance Use. Appl. Psycholog. Meas. **1985**, *9*, 301-309.
(41) Czarnecki, D.; Russell, M.; Cooper, M.L & Salter, D. Five-year Reliability of Self-reported Alcohol Consumption. J. Stud. Alcohol **1990**, *51*, 68-76.
(42) Johnson, T.P.; Fendrich, M.; Shaligram, C.; Garcy, A.; & Gillespie, S. An Evaluation of the Effects of Interviewer Characteristics in an RDD Telephone Survey of Drug Use. J. Drug Issues **2000**, *30*, 77-102.
(43) Fendrich, M.; Johnson, T.; Shaligram, C.; Wislar, J. The Impact of Interview Characteristics on Drug Use Reporting by Male Juvenile Arrestees. J. Drug Issues **1999**, *29*, 37-58.
(44) Cook, R.F.; Bernstein, A.D.; Andrews, C.M. Assessing Drug Use in the Workplace: A Comparison of Self-report, Urinalysis, and Hair Analysis. NIDA Res. Monogr. **1997**, *167*, 247-272.

(45) Friedman, A.A.; Glickman, N.W.; Morrissey, M.R. What Mothers Know about Their Adolescents' Alcohol/Drug Use and Problems, and How Mothers React to Finding Out About It. In *FamilyTherapy for Adolescent Drug Abuse.* Friedman, A.S.; Granick, S., Eds.; Lexington Books: Lexington, Mass, 1990; 169-181.
(46) Williams, R.J.; McDermitt, D.R.; Bertrand, L.D.; & Davis, R.M. Parental Awareness of Adolescent Substance Use. Addict. Behav. **2003**, *28* (4), 803-809.
(47) Kintz, P. Drug Testing in Addicts: A Comparison between Urine, Sweat, and Hair. Ther. Drug Monit. **1996**, *18*, 450-455.
(48) Williams, R.J; Chang, S.Y. A Comprehensive and Comparative Review of Adolescent Substance Abuse Treatment Outcome. Clinical Psychology: Science and Practise **2000**, *7*, 138-166.
(49) Greenbaum, P.E.; Foster-Johnson, L.; Petrila, A. Co-occurring Addictive and Mental Disorders among Adolescents: Prevalence Research and Future Directions. Am. J. Orthopsychiatry **1996**, *66*, 52-60.
(50) U.S. Department of Health and Human Services. *The Prevalence and Correlates of Treatment for Drug Problems*. DHHS Publication No. (SMA) 97-3135; Substance Abuse and Mental Health Services Administration: Washington, 1997.

TABLE 1

Demographic Characteristics of the Sample

Average Age	15.4 (12-17 range)
Gender	52% male
Race/Ethnicity	82% Caucasian
Attending School	69%
Living at Home	78%
On Probation	18%
Conduct Disorder	26%
Major Depression	26%
Attention Deficit Hyperactivity	25%
Oppositional Defiant Disorder	18%
Post-Traumatic Stress Disorder	17%
Dysthymia	15%
Substance-Induced Mood Disorder	11%
Learning Disability	10%

TABLE 2

Reported Substance Use in Urinalysis Detection Period Compared to Urinalysis Results

ALCOHOL		Urinalysis +	Urinalysis –
Reported use in urinalysis detection period	yes	2	6
	no	15	315

Positive Predictive Power	25%
Negative Predictive Power	93%
Sensitivity	12%
Specificity	98%
Kappa	.13

CANNABIS		Urinalysis +	Urinalysis –
Reported use in urinalysis detection period	yes	73	38
	no	41	184

Positive Predictive Power	66%
Negative Predictive Power	82%
Sensitivity	64%
Specificity	83%
Kappa	.48

HALLUCINOGENS (psilocybin, LSD)		Urinalysis +	Urinalysis –
Reported use in urinalysis detection period	yes	0	3
	no	0	335

Positive Predictive Power	0%
Negative Predictive Power	100%
Sensitivity	N/A
Specificity	99%
Kappa	N/A

STIMULANTS (cocaine, amphetamine)		Urinalysis +	Urinalysis –
Reported use in urinalysis detection period	yes	0	0
	no	5	333

Positive Predictive Power	N/A
Negative Predictive Power	99%
Sensitivity	0%
Specificity	100%
Kappa	N/A

OPIATES		Urinalysis +	Urinalysis –
Reported use in urinalysis detection period	yes	2	2
	no	7	327

Positive Predictive Power	50%
Negative Predictive Power	97%
Sensitivity	22%
Specificity	99%
Kappa	.30

ANY MIND-ALTERING SUBSTANCE		Urinalysis +	Urinalysis –
Reported use in urinalysis detection period	yes	79	40
	no	56	163

Positive Predictive Power	66%
Negative Predictive Power	74%
Sensitivity	59%
Specificity	80%
Kappa	.40