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Concordance Among Biological, Interview, and Self-Report Measures of Drug Use Among African American and Hispanic Adolescents Referred for Drug Abuse Treatment

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Abstract

This study examined the concordance among urine assays, interview measures, and self-report measures of marijuana and cocaine use among 190 drug-abusing/dependent African American and Hispanic adolescents and their families at 3 assessment points of an 18-month randomized clinical trial study. Results demonstrated concordance among urine assays, a calendar method self-report measure (Timeline Follow Back [TLFB]), and a noncalendar method self-report measure (Adolescent Drug Abuse Diagnosis Scale). Diagnostic criteria of marijuana and cocaine abuse/dependence from a clinical structured interview (Diagnostic Interview Schedule for Children [DISC]) also converged, albeit weakly, with self-report measures. Adolescent and parent reports on DISC marijuana abuse/dependence diagnostic criteria were related; however, collateral findings for DISC cocaine abuse/dependence diagnostic criteria were equivocal. Differences in concordance among biological and self-report cocaine use measures were found for baseline TLFB assessments among African American participants. Implications for future use and refinement of adolescent drug use assessments are discussed.

Keywords

drug use; assessment; adolescents; African American; Hispanic

Strong psychometric evidence for drug use measures is required to adequately evaluate outcomes of therapeutic programs aimed at reducing adolescent drug use (Flaherty, 2002; Leccese & Waldron, 1994). Recent studies suggest robust validity and reliability estimates among often-used measures of drug use by adults (Del Boca & Noll, 2000; Fals-Stewart, O'Farrell, Freitas, McFarlin, & Rutigliano, 2000; O'Farrell, Fals-Stewart, & Murphy, 2003). Similarly, studies have found generally valid estimates for adolescent drug use measures

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(Buchan, Dennis, Tims, & Diamond, 2002; Dennis, 2002; Godley, Godley, Dennis, Funk, & Passetti, 2002; Johnston & O'Malley, 1997; Maisto, Connors, & Allen, 1995; Vereby & Buchan, 1997; Winters, Anderson, Bengston, Stinchfield, & Latimer, 2000; Winters, Stinchfield, Henly, & Schwartz, 1990–1991). Although findings from recent studies have boosted the confidence of researchers and treatment providers assessing drug-using adolescents, the literature has been somewhat contentious about underreporting or overreporting of drug use (Morrall, McCafferey, & Iguchi, 2000; Schwarz, 1999). Also, the wide assortment of available instruments and methods with varying degrees of reliability has undermined confidence in findings (Babor, Stephens, & Marlatt, 1987; Harrison, 1995; Leccese & Waldron, 1994; Magura & Kang, 1997; Owen & Nyberg, 1983; Stinchfield, 1997; Winters, 1999). The purpose of the present study is to examine the concordance among multiple methods and measures of cocaine and marijuana use with a racial and ethnic minority adolescent clinical sample.

Epidemiological and treatment researchers often use different methods to assess drug use: biochemical measures, self-reports by the potential user, and/or reports from ancillary informants, such as parents. Biochemical measures provide relatively clear-cut information regarding whether an adolescent has recently used one or more psychoactive drugs. Because biochemical measures seem to provide the most valid means for drug use information, given their ability to detect use despite potential participant failures to report use because of social desirability, forgetfulness, or malingering, researchers have commonly portrayed them as the definitive gold standard (Buchan, Tims, & Dennis, 2000) and as the most objective assessment of drug use available (Burke, Ravi, Dhopes, Vandegrift, & Maany, 1990; Hawks & Chiang, 1986; Shaner et al., 1993; Vereby & Buchan, 1997). The first hypothesis of the present study examines this notion by predicting that the proportion of drug use detected by urine assays will be significantly higher than use detected on self-report measures of drug use.

Self-reports are a less invasive alternative to biochemical assays and permit the evaluation of drug use over longer time periods than do biochemical assessments. The benefits of the accuracy of biochemical measures are restricted by error rates, brief detection time periods for some drugs, high cost, and personal intrusiveness (Fals-Stewart et al., 2000; Hawks & Chiang, 1986; O'Farrell et al., 2003). Most results examining the reliability and validity of self-reports have been strong, yet findings have been variable at times among certain samples (Babor, Brown, & Del Boca, 1990; Brown, Kranzler, & Del Boca, 1992; Sherman & Bigelow, 1992; Sobell & Sobell, 1992). Variability has been attributed to differing characteristics across studies, such as assessment timing and data collection methods (Fals-Stewart et al., 2000; O'Farrell et al., 2003). Unfortunately, few studies have examined the psychometric properties and variability of performance of different drug use indices among racial and ethnic minority adolescents, despite the importance of assessing drug use in developmental and cultural contexts (Dana, 2001). As such, some questions remain regarding the validity of and concordance among scores obtained from drug use measures commonly used with racial and ethnic minority adolescents in clinical settings.

Two commonly used methods to collect adolescent self-report drug use data are quantity–frequency assessments and calendar methods (Leccese & Waldron, 1994; Waldron, Slesnick, Brody, Turner, & Peterson, 2001). In the quantity–frequency method, participants report the frequency and quantity with which they consumed over a specified time period (Calahan, 1973; Fals-Stewart et al., 2000). The range of levels of quantity–frequency can differ depending on type of inventory used. For example, a scale may broadly assess use or abstinence over a specified time point or may more specifically inquire about the number of times drugs were used and the actual amount of drug used during specified time periods. Other measures target problem behaviors associated with drug use and identify diagnostic thresholds for drug use, such as abuse or dependence. Calendar methods also ask participants to report drug use over

a specified time interval but use specific cues to months, days of the week, holidays, and other reminders to enhance recall of use on specific days.

The Timeline Followback interview (TLFB; Sobell & Sobell, 1996) is an example of a frequently used calendar self-report assessment method. The TLFB collects past estimates of daily drug use over a designated time period with an actual calendar during assessment. Studies of the psychometric properties of the TLFB have shown high test–retest correlations, indicating strong temporal stability among adult populations (Fals-Stewart et al., 2000; Tonigan, Miller, & Brown, 1997). As part of a recent randomized clinical trial study, Waldron et al. (2001) examined the concordance of the TLFB with other measures of marijuana use with Anglo American and primarily English-speaking Hispanic adolescents (Waldron et al., 2001). Results yielded strong convergence among the TLFB, urine assays, self-report, and collateral parent and sibling reports. In another adolescent treatment effectiveness study, the TLFB demonstrated predictive validity with a small sample of Anglo American and Hispanic adolescents and their families (Bry & Krinsley, 1993). These studies help provide initial evidence of adequate levels of concordance among measures of illicit drug use.

Although recent years have seen an increase in the number of studies reporting the consistency and validity of multiple assessment methods for adolescent drug use (e.g., Buchan et al., 2002), no study has focused on the performance of these measures with a racial and ethnic minority adolescent sample. There is a need to establish the generalizability of these assessments with racial and ethnic minority adolescent populations (American Psychiatric Association, 1995; Hanson, 1985; National Institute of Health Office of Extramural Research, 1994; Pena, Bland, Shrevington, Rice, & Foulks, 2000; Pena & Koss-Chiokino, 1992; Trimble, 1990; Tucker, 1985). An initial step toward addressing this need is to establish concordance between and within racially and ethnically diverse samples of adolescents, their families, and the drug use measures used in clinical settings.

The present study attempts to address the above-mentioned gaps in the drug use assessment literature. Data were collected during a treatment effectiveness study in which drug use was an outcome variable. Multiple sources of concordance among measures of drug use information were examined, including urine assays, collateral reporter data, and self-report measures. Drug use at multiple time periods was analyzed for concordance, including assessments at baseline, 6 months postrandomization, and 18 months postrandomization.

Research Objectives

The first research objective was to assess the extent to which urine assays and adolescent self-report measures provided comparable indicators for the presence or absence of any marijuana and cocaine use across multiple assessment points. Within this objective, the following hypotheses were posited.

Hypothesis 1: The proportion of use detected by urine assays will be significantly higher than use detected on self-report measures of (a) marijuana and (b) cocaine at each assessment point. The level of agreement for measures of urine assays and self-report measures of (c) marijuana and (d) cocaine use will be significant at each assessment point.

The second research objective was to examine the level of agreement between adolescent self-report frequency measures of marijuana and cocaine use and adolescent reports about problems associated with their drug use. Problems associated with drug use were represented by the endorsement of diagnostic criteria for abuse and dependence, as determined by adolescent reports on an established diagnostic measure of drug abuse and dependence. The following hypothesis was posited:

Hypothesis 2: The levels of agreement among a continuous measure of diagnostic criteria (Diagnostic Interview Schedule for Children [DISC]; Lucas et al., 2001), a continuous non-calendar self-report assessment (Adolescent Drug Abuse Diagnosis Scale [ADAD]; Friedman & Utada, 1989) of frequency of (a) marijuana and (b) cocaine use, and a continuous calendar self-report method (TLFB) of frequency of (c) marijuana and (d) cocaine use will be significant at each assessment point (baseline, 18 months).

We determined strength of agreement levels using the following guidelines: Cohen's $\kappa < .00$ indicated poor agreement, $.00$ to $.20$ indicated slight agreement, $.21$ to $.40$ indicated fair agreement, $.41$ to $.60$ indicated moderate agreement, $.61$ to $.80$ indicated substantial agreement, and $.81$ to 1.00 indicated near perfect agreement (Fleiss, 1981).

Established psychological measures need to be validated for use with diverse samples to ensure that they accurately assess intended constructs across various cultural backgrounds (Suzuki & Ponterotto, 2001). The third research objective explored the concordance among the drug use measures within a clinical sample of drug-abusing/dependent African American and Hispanic adolescents across assessment points. Differences across drug use assessments as well as an array of cultural factors may influence the ways drug-abusing/dependent African American and Hispanic youth differentially respond to drug use assessment procedures (Rogler, Malgady, Costantino, & Blumenthal, 1998). These factors include negative attitudes about treatment and research, cultural mistrust, social desirability, and deference to perceived authority figures. The third objective addressed potential group differences by examining the extent to which urine assays and self-report measures provide comparable indicators for the presence or absence of any marijuana and cocaine use at each assessment point within each racial/ethnic clinical sample. Results from this exploratory objective may aid researchers and clinicians to adapt existing measures and techniques to maximize accurate assessment of drug use within these populations.

Method

Participants

Participants were 190 drug-abusing/dependent adolescents and their parents. Participants were referred from the juvenile justice system (80%), mental health agencies (16%), and school and family community institutions (4%). Approximately 25% of the adolescents from the juvenile justice system were referred from a 15–28-day residential drug addiction receiving facility, and the remaining adolescents were referred from legal agencies, including the Office of the Public Defender, the Department of Juvenile Justice, Treatment Alternatives and Safe Communities, and Juvenile Alternatives to Street Crime. Adolescents were not court ordered to participate in treatment. Significant differences were observed in racial/ethnic and gender distribution of participants across referral sources. A greater proportion of African American participants (74%) were referred from the juvenile justice system than Hispanic participants (48%), and a greater proportion of Hispanic participants (52%) were referred from the drug addiction receiving facility and the school system than African American participants (26%), $\chi^2(1, N = 190) = 12.98, p < .001$. No statistically significant differences were found among referral sources on the basis of participants' age or gender.

Data for this study were collected as part of a larger treatment efficacy study. Participants in the larger study were obtained according to the following criteria: They (a) were between the ages of 12 and 17 years, inclusive; (b) met *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994) criteria for either drug abuse or dependence; (c) were African American or Hispanic; and (d) lived with a formal or informal parent caregiver. For the purpose of data collection, *parent caregiver* was defined as the primary adult who provided instrumental and/or emotional leadership.

Participants were either Hispanic ($n = 113$) or African American ($n = 77$). The majority of adolescents were male (163 boys and 27 girls). Parent caregiver–reported ethnicities were as follows: 40% African American, 21% Cuban, 17% other Hispanic, 10% Nicaraguan, 5% Puerto Rican, 4% Columbian, and 3% Dominican. The mean adolescent age was 15.57 ($SD = 1.15$), with a range of 12 to 17 years. The sample reported annual household income level as less than \$15,000 (41%), between \$15,000 and \$35,000 (42%), or above \$35,000 (17%). Parent caregivers reported an educational level of high school (35%) or less (38%), technical training (7%), 2 years of college (11%), or 4 years of college or more (6%). The differences between the African American and Hispanic samples in adolescent age, parent caregivers' education, and household income were not statistically significant.

Measures

The measures are presented in the order they were administered to participants.

Demographics—A client information form gathered information on basic demographic variables, family composition, and presenting issues at the time of referral to the study.

Urine assays—Urine specimens were taken from participants during each assessment point. They were analyzed according to the analyte immunoassay technique for cannabis (THC) and cocaine (benzoylecgonine) and/or their metabolites (OnTrak TesTcup Pro 5 [Varian Inc., Lake Forest, CA]; Jones et al., 2001). The urine detection time for each substance is as follows: 2–3 days for cocaine, 10–30 days for cannabis.

TLFB—The TLFB calendar self-report method (Sobell & Sobell, 1996) was administered as an interview to adolescent participants at each assessment point. This measure obtains retrospective reports of daily drug use by using a calendar to stimulate recall of frequency and severity of use. Participants were given a calendar to review the past 90 days before their respective assessment point date. We modified the interview to facilitate recall by asking participants to identify dates of important events that occurred in their life. Next, we asked participants to identify specific drugs used each day and the level of intoxication they experienced during and after use. We examined the frequencies of participants' marijuana and cocaine use with both continuous (number of days used in past 30 days) and dichotomous (use or nonuse in the past 30 days) use scores. Although it was originally developed to assess alcohol abuse by adults, the TLFB method has been psychometrically supported for use with adolescents (Bry & Krinsley, 1993; Hogue, Liddle, Dauber, & Samuolis, 2004) and has been found to accurately assess use of drugs such as marijuana (Stephens, Babor, Kadden, & Miller, 2002), cocaine (Hersh, Mulgrew, Van Kirk, & Kranzler, 1999), and cocaine and heroin (Ehrman & Robbins, 1994). Researchers have demonstrated criterion validity for this measure by comparing self- and collateral reports and records of verifiable events, such as hospitalizations and imprisonment (Fals-Stewart et al., 2000; Sobell & Sobell, 1996).

ADAD—The items adapted from the ADAD (Friedman & Utada, 1989) assessed the total number of times adolescent participants reported using marijuana and/or cocaine during the past 30 days. The ADAD was administered as a noncalendar self-report measure. Adolescent participants' marijuana and cocaine use frequencies were examined via continuous (number of times used in past 30 days) and dichotomous (use or nonuse in the past 30 days) scores. In a previous study, test–retest reliability scores ranged from .71 to .98 (Friedman & Utada, 1989). The ADAD scores have been reported to demonstrate adequate concurrent and divergent validity (Leccese & Waldron, 1994).

DISC—We administered both DISC marijuana and cocaine abuse and dependence scales (Lucas et al., 2001) via structured interview to adolescents and their parent caregivers at

baseline and 18-month assessment points. We obtained a continuous composite score, indicating the number of abuse and dependence diagnostic criteria met, by summing the total number of endorsed abuse and dependency items on the DISC and used this score as an indicator of problems caused by marijuana and cocaine use. On average, continuous composite scores yielded adequate internal consistency within both parent and adolescent reports, ranging from .51 to .99 in the current study. Past studies have reported adequate interrater reliability estimates, ranging from .70 to 1.00 (Fals-Stewart et al., 2000). We also determined the presence or absence (dichotomous score) of a diagnosis using the DISC cut-offs for marijuana and cocaine abuse/dependence disorders (Lahey, Flagg, Bird, & Schwab-Stone, 1996). The results of the DISC clinical interview have demonstrated adequate convergent validity estimates in past studies (Lucas et al., 2001).

Procedure

All measures were administered as part of a baseline assessment battery conducted after participant assent and consent to the parent study. Eight trained assessors (one African Bahamian man, four Hispanic women, one African American woman, and two Hispanic men) administered the measures. Assessors were matched to participants on the basis of race/ethnicity. Measures were administered in Spanish when appropriate. Assessors were trained and supervised by a clinical psychologist throughout the study to ensure fidelity to administration guidelines. They were trained in weekly meetings over a period of 5 months. Training consisted of didactic instruction by a clinical psychologist and discussion of the coding manual, in-group coding and review of practice tapes, and exercises designed to enhance accurate scoring of the measures. Assessors also received weekly supervision by a clinical psychologist to ensure fidelity to assessment protocol and prevent rater drift.

Participants were randomized into one of three conditions, two of which were family-based treatment interventions and one of which was a treatment as usual condition. The treatment as usual condition provided referral to community treatment facilities. Participants received treatment services for approximately 6 months following randomization into the study. Data were gathered at baseline and at 3, 6, 12, and 18 months postrandomization. The analyses for the present study only use data from the baseline and 6- and 18-months postrandomization assessments. The 6-month assessment point was selected for analysis because it marked the approximate end of treatment for the majority of participants. The 18-month assessment was selected to represent an approximate 1-year posttreatment follow-up. Data were gathered from adolescents and their parent caregivers.

Analytic Plan

To test Hypotheses 1a–1d, we calculated a dichotomous summary score for the TLFB and the ADAD to assess the adolescent's report of any use of marijuana or cocaine over the past 30 days. We chose a 30-day window of assessment as a standard time interval to compare the sensitivity of the measures in a manner that would be generalizable to practical time frames that could be used in future treatment efficacy studies and epidemiological studies. Next, we estimated the concordance among TLFB and ADAD measures of drug use and the urine assays by using these dichotomous scores. To test Hypotheses 1a and 1b, we compared the proportion of positive test results for the urine assays, the dichotomized TLFB, and the dichotomized ADAD using a Cochran's Q statistic within each assessment point. To test Hypotheses 1c and 1d, we used Cohen's kappa statistic to assess the level of agreement among categorical variables of drug use (Siegel & Castellan, 1986).

We used continuous versions of the TLFB and ADAD to test Hypotheses 2a–2d. We summed the total number of adolescent-endorsed abuse and dependency items on the DISC to create a continuous composite measure of drug abuse and dependency criteria. We computed a bivariate

correlation between marijuana use and cocaine use on the ADAD with the DISC abuse/dependence composite to test Hypotheses 2a–2b. We also computed a bivariate correlation between marijuana use and cocaine use on the TLFB with the DISC abuse/dependence composite to test Hypotheses 2c–2d. We also performed secondary analyses to determine whether the adolescent DISC abuse/dependence continuous composite scores were significantly correlated with the parent DISC abuse/dependence continuous composite scores.

We calculated the proportions of positive test results for each assessment measure at each assessment point to explore the concordance among measures of drug use separately for African American and Hispanic adolescents referred for drug treatment. To determine whether these proportions were significantly different, we computed Cochran's Q statistic for dependent samples to compare the three assessment instruments within each group. We computed separate Q statistics within each ethnic group for each assessment point for marijuana and cocaine to detect differences across assessment methods. We used a Bonferroni adjusted alpha of .025 to test Hypotheses 1 and 2 and to explore the concordance among measures of drug use separately, because of the number of nonindependent tests of significance performed within each subhypothesis.

Results

Proportion of use detected and other descriptive statistics for each measure are listed in Table 1. Differences in sample size across assessment points and measures are due to the following factors: (a) participant attrition, (b) adolescent or parent absence at assessments, and (c) participant refusal to complete follow-up assessment. Attrition rates were 26% from baseline to 6 months and 42% from baseline to 18 months. Logistical regression analyses revealed no observed pattern of attrition, $\chi^2(3, N = 190) = 6.04, p > .05$, on the basis of ethnicity ($\beta = .21, p > .05$), level of marijuana use ($\beta = .02, p > .05$), or level of cocaine use ($\beta = -.12, p > .05$) from baseline to 6 months. Similarly, there was no observed pattern of attrition, $\chi^2(3, N = 190) = 4.02, p > .05$, on the basis of ethnicity ($\beta = .18, p > .05$), level of marijuana use ($\beta = -.03, p > .05$), or level of cocaine use ($\beta = .01, p > .05$) from baseline to 18 months. No gender differences were found in attrition rates for baseline to 6 months and for baseline to 18 months.

Hypotheses 1a and 1b

The first research objective was to determine whether the urine assay results and dichotomous adolescent self-reports detected different proportions of users for marijuana and cocaine. The results for the measures of marijuana use indicated that the baseline proportions, $Q(2) = 4.51, p < .10$, and the 6-month assessment point proportions, $Q(2) = 2.74, p < .25$, were not significantly different among measures. Eighteen-month proportions were marginally significantly different, $Q(2) = 7.75, p < .02$. The proportion of positive results for the urine assays ($p = .63$) was statistically significantly higher than for the ADAD ($p = .52$), $Q(1) = 7.75, p < .005$, and marginally significantly higher than for the TLFB ($p = .54$), $Q(1) = 4.17, p < .04$, at the 18-month assessment point. These analyses provide tentative support for Hypothesis 1a (that the urine assays would detect a higher rate of marijuana use), but only at the 18-month follow-up.

Comparisons among the cocaine measures indicated that the estimated proportions of users by the three assessment procedures were not significantly different at baseline, $Q(2) = 4.87, p < .09$, 6 months, $Q(2) = 3.25, p < .20$, or 18 months, $Q(2) = 1.60, p < .45$. The findings do not support Hypothesis 1b.

Hypotheses 1c and 1d

The concordance among the three assessment points of marijuana and cocaine were statistically significant ($p < .017$) at each assessment point (see Table 2). The concordance kappa statistic for marijuana ranged from .32 to .58, whereas the concordance for cocaine ranged from .38 at baseline to .56 at the 18-month assessment.

We performed further exploratory analyses to examine the kappa statistics computed separately for the TLFB and the ADAD with the urine assay. The two adolescent self-report measures had comparable levels of agreement with the urine assay. For example, the differences in kappa statistics between TLFB and ADAD with urine results were .04 at baseline, .03 at 6 months, and .00 at the 18-month assessment. The differences in the kappa statistic for cocaine use were .05 at baseline, .01 at 6 months, and .15 at 18 months. The findings provide support for Hypotheses 1c and 1d, suggesting that self-report measures and urine assays were concordant measures for the presence or absence of marijuana or cocaine use in the past 30 days. The strength of agreement level ranged from fair (.32) to moderate (.58) across the three assessment periods.

Hypotheses 2a–2d

Prior to examining Hypotheses 2a–2d, we performed preliminary analyses to assess the association of the TLFB and ADAD measures of marijuana and cocaine use at the baseline, 6-month, and 18-month assessment points. The results of these preliminary analyses are presented in Table 3. The results for the continuous measure of marijuana use indicated that the bivariate correlations of the TLFB and the ADAD were marked and significant at all three assessment points, ranging from .57 to .76 at the 18-month assessment. The results for cocaine use ranged from .81 at baseline to .68 at the 18-month assessment. Thus, the TLFB and ADAD measures of marijuana and cocaine were strongly correlated at each of the assessment points.

Findings from the tests of Hypotheses 2a–2d revealed significant correlations between the continuous DISC abuse/dependence composite measure and the ADAD self-report frequency of use measure on marijuana and cocaine both at the baseline and at the 18-month assessment (see Table 4). Similarly, significant correlations were obtained between the continuous DISC abuse/dependence composite measure and the TLFB continuous measure of marijuana and cocaine both at the baseline and at the 18-month assessment point. Thus, the findings provide support for Hypotheses 2a–2d both at the baseline and at the 18-month assessment point.

Concordance Between Self-Report and Collateral Parent Reports

Additional analyses indicated that the parent DISC abuse/dependence continuous composite score was moderately and significantly correlated with the adolescent DISC abuse/dependence continuous composite for marijuana at baseline, $r(181) = .32, p < .01$, and 18-month follow-up, $r(102) = .23, p < .05$, and for cocaine at baseline, $r(181) = .21, p < .05$, but not for cocaine at 18-month follow-up, $r(102) = .13$.

Differences in Detection Rates

Findings suggest that the detected rates of marijuana use were not significantly different for the African American or Hispanic samples at any of the three measurement points (see Table 5). The findings for the cocaine measure suggest that urine assays detected higher rates of use than did self-reports at baseline for the African American sample, $Q(2) = 9.50, p < .01$. In particular, the difference between urine assay and TLFB was statistically significant, $Q(1) = 8.33, p < .001$, but the difference between urine assay and ADAD was not, $Q(1) = 2.25, p < .13$. Differences among cocaine measures were not significant at other assessment points for

the African American sample. The cocaine assessment measures were not significantly different for the Hispanic sample at any of the assessment points.

Discussion

The current investigation presents a comprehensive evaluation of multiple methods for assessing adolescent drug abuse/dependent behavior with African American and Hispanic adolescent clinical samples. This study extends previous investigations of drug abuse/dependence instruments (e.g., Ehrman & Robbins, 1994; Fals-Stewart et al., 2000; Hersh et al., 1999; O'Farrell et al., 2003; Sobell & Sobell, 1996; Winters, 1999) to African American and Hispanic adolescents referred to drug abuse treatment and their collateral parent reports.

Our findings indicate that, for the use of marijuana and cocaine, dichotomous adolescent calendar and noncalendar self-report and diagnostic interview methods were associated with urine assay results in (a) levels of agreement and (b) proportion of use at three assessment points of an 18-month randomized clinical trial study. However, urine assays were more sensitive in detecting marijuana use than was a noncalendar self-report method at the 18-month assessment. The strength of the concordant relations observed lends support to the use of self-report calendar and diagnostic interview methods for assessing presence of drug use among clinical samples of African American and Hispanic adolescents. These findings are particularly important for researchers to be aware of when considering the strengths, costs, and other factors that are associated with biological measures.

Our findings also provide support for the use of calendar and noncalendar self-reports and diagnostic interview measures to yield valid data about frequency or rate of adolescent drug use and problems associated with use within African American and Hispanic clinical samples. Similar to existing research (e.g., Clark & Winters, 2002; Pollock & Martin, 1999), the relations observed between frequency measures and diagnostic abuse and dependence criteria were weak, which highlights the challenges to linking adolescent drug abuse and dependence criteria, as they are currently diagnosed, with frequency of drug use. Scant insight among adolescents regarding the problems in their life due to drugs and low motivation to stop abusing drugs are potential reasons for the weak relations (Buchan et al., 2002). Further research is needed to refine the assessments used and to establish an accurate link between frequency of drug use and abuse/dependence criteria unique to the adolescent developmental period (Martin & Winters, 1998).

Results of the present study are comparable to those of recent studies with Anglo American adolescent participants (e.g., Buchan et al., 2002; Godley et al., 2002), suggesting no evident ethnic/racial differences in concordant reports across assessments. However, findings for African American adolescents in the present study do suggest a discrepancy between self-reported cocaine use and urine assays at baseline but not at follow-up assessments. African American adolescent participants with discrepant reports might have been experiencing mistrust of assessors' reactions to their honest disclosure of drug use because of fear of punitive results related to disclosing drug use and/or a regrettable history of cultural bias and insensitivity with racial and ethnic minority populations in the field of psychology (Buchan et al., 2002; Dana, 2001; Hall, 1997; Nagayama Hall, 2001). Discrepancies were not found at follow-up assessments because adolescents with discrepant self-reports and urine assays at baseline potentially did not return for subsequent assessment. In any case, it is critical for drug abuse researchers to be aware of cultural dynamics impacting the assessment process (e.g., cultural mistrust; Terrell, Mosley, Terrell, & Nickerson, 2004). Assessors need to reflect on their own competency to conduct culturally sensitive assessments and build rapport with participants to facilitate their accurate reports of drug use problems and enhance retention in treatment (Bradley, Gossop, Phillips, & Legarda, 1987).

Because of attrition over the course of the present study, the samples assessed at each assessment point were neither independent nor identical. Therefore, it is difficult to determine why we observed improvements in concordance among measures at each of the three assessment points of the study. One potential reason might have resulted from the increased range of use at each assessment point over time. Perhaps the lower levels of agreement among measures at baseline were influenced by (a) unreliability (approximately 15% false positives) of the urine assay (ONTRAK TesTcup Pro 5; Jones et al., 2001), (b) adolescent dishonesty during their first research interview, and/or (c) the fact that many adolescents might have been in restricted settings during some or all of the 30-day period before the baseline assessment. In any case, these findings have implications for longitudinal studies involving drug use measures with similar samples. That is, there may be variability in adolescent drug use over time that is associated with measurement and/or design issues in addition to actual use.

In addition to supporting dichotomous measures of drug use, our results indicate that continuous measures of problems associated with marijuana/cocaine use and frequency of marijuana/cocaine use were associated with one another, indicating convergent validity estimates among the measures and methods used with this African American and Hispanic adolescent clinical sample. Results also indicate that adolescent and collateral parent clinical interviews and self-report measures were somewhat congruent among continuous marijuana abuse and dependence criteria results at baseline and 18-month assessments. Continuous cocaine abuse and dependence criteria also showed a significant association between adolescent and parent reporters at baseline but not at the 18-month assessment. The most likely explanation for this inconclusive collateral agreement at the 18-month assessment is the inconsistent patterns of cocaine use and the exceptionally low rates of use reported by participants across measures at each assessment point.

Limitations

Although this study has several strengths (e.g., a large and traditionally underrepresented African American and Hispanic adolescent clinical sample, access to their caregivers, use of well-trained and diverse assessors, and multiple drug use measures and methods), several limitations should be noted. First, the level of attrition we observed limits the conclusions that can be drawn about concordance rates across assessments over time. We cannot assume that an identical sample was assessed at each assessment point. Therefore, conclusions regarding the mean concordance of the assessments over time could be misrepresented. Second, although our overall sample was large, the sample sizes for some analyses conducted were relatively smaller than the entire sample of 190 participants by the 18-month assessment ($n = 111$). Third, participants did not report the amount of cocaine and/or marijuana consumed on a given event of reported use. It is difficult to use a common scale to assess the quantity of a drug used because of different methods of consumption and underreporting or exaggerated reporting rates by adolescents (Buchan et al., 2002; Clark & Winters, 2002; Fals-Stewart, 2000). For example, some adolescents smoke cocaine mixed with marijuana, others use it in powder form intranasally, and others smoke it in the form of crack. Requesting participants to convert amounts into measurement equivalents is not likely to result in accurate reports. Future studies that reliably and validly measure quantity of drugs used per occasion may be able to predict whether drug use quantity improves association with other measures over and above that accounted for by frequency. Furthermore, future adolescent studies should follow the methods often used in adult sample studies (e.g., Ehrman & Robbins, 1994; Fals-Stewart et al., 2000; O'Farrell et al., 2003) by asking adolescent participants to estimate the cost of the drugs consumed to provide a common scale that could be used as an index of amounts consumed. Fourth, the findings of this study may apply only to similar drug-abusing/dependent adolescents. It remains unclear whether the values we found would be similar among drug-using adolescents who were not using drugs as frequently. Fifth, the measures were

administered to all participants in a uniform manner. Counterbalancing these measures would have diminished the likelihood of order, practice, and fatigue effects that might have impacted the level of agreement among measures. An order effect also might have manifested itself in that adolescents were aware that they had just completed a urine test when they were interviewed. Therefore, participants' self-reports might have been more honest than usual because of the order in which assessments were administered. Sixth, our study was based on a clinical sample of convenience, which may have implications for the generalizability of the results. It is possible that parents who perceived a benefit from the intervention were more likely to volunteer and participate in the intervention. Their willingness to participate may, in turn, be associated with their knowledge of their adolescent's drug use in ways that are unique to this sample.

Implications for Adolescent Drug Use Assessment

Adequate rates of concordance were found across indices and assessment points. Therefore, urine assay results may not need to be perceived as the definitive gold standard to determine most recent use in clinical trial research with drug-abusing/dependent African American and Hispanic adolescents, particularly given the variables influencing accurate detection (e.g., quantity consumed, time between the last use and the collection of urine specimen). Researchers should consider the intrusive nature of the urine-screening process, its related error rates and detection limitations, and its implications for participant retention when choosing between biological and other forms of drug use measures.

Each measurement method evaluated in the current study appears to have its own strengths and limitations in terms of specific use with drug-abusing/dependent African American and Hispanic adolescents and their families. Two observed differences among the DISC diagnostic interview, TLFB calendar self-report, and adapted ADAD noncalendar self-report methods are (a) the amount of time needed to complete them and (b) the fact that the latter is considerably shorter. Administration of the DISC, like the TLFB, takes a long time, but it appears to be a solid clinical interview method that features items developed for collateral report and clinical diagnoses that can be shared across studies and clinicians. The ADAD gives important information about the frequency of use over a specific time interval. The TLFB provides more salient information about the patterns and frequency of use over a targeted time interval. Thus, use of the TLFB as part of the assessment with drug-abusing adolescents can allow for an examination of the relation between specific drug use and other significant events that often occur in the lives of these youths. Future investigators should consider findings highlighted in the current study when choosing an instrument and viable method to measure drug use variables with drug-abusing/dependent African American and Hispanic adolescents and their families.

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Table 1
Means/Proportions, Standard Deviations, and Sample Sizes for Drug Use Measures Across Assessment Points

Substance use measure	Baseline (<i>n</i> = 190)		6 months (<i>n</i> = 141)		18 months (<i>n</i> = 111)	
	M	SD	M	SD	M	SD
	Marijuana use					
Urine assay result	0.78	0.41	0.64	0.48	0.63	0.48
TLFB (past 30 days)	0.84	0.37	0.58	0.49	0.54	0.50
ADAD (past 30 days)	0.84	0.37	0.44	0.50	0.52	0.50
Abuse parent DISC	0.05	0.22			0.04	0.19
Abuse youth DISC	0.14	0.34			0.03	0.18
Dependence parent DISC	0.38	0.49			0.21	0.40
Dependence youth DISC	0.49	0.50			0.21	0.40
	Cocaine use					
Urine assay result	0.20	0.40	0.17	0.38	0.13	0.34
TLFB (past 30 days)	0.13	0.33	0.11	0.32	0.10	0.31
ADAD (past 30 days)	0.18	0.38	0.10	0.30	0.08	0.27
Abuse parent DISC	0.04	0.20			0.07	0.25
Abuse youth DISC	0.11	0.31			0.05	0.22
Dependence parent DISC	0.02	0.12			0.02	0.12
Dependence youth DISC	0.01	0.10			0.01	0.07

Note. Each measure was scored as 1.00 for *use*, *abuse*, or *dependence* or as 0.00 for *no use*, *no abuse*, or *no dependence* to calculate the above statistics. Thus, cell means are also proportions of use. TLFB = Timeline Followback; ADAD = Adolescent Drug Abuse Diagnosis Scale; DISC = Diagnostic Interview Schedule for Children.

Table 2
Concordance Between Urine Assay Result and Dichotomized Adolescent Measures

Concordance relation	Baseline (κ)	6 months (κ)	18 months (κ)
Marijuana on TLFB, ADAD, and urine	0.32**	0.52**	0.58**
Cocaine on TLFB, ADAD, and urine	0.38**	0.49**	0.56**

Note. TLFB = Timeline Followback; ADAD = Adolescent Drug Abuse Diagnosis Scale.

**
 $p < .01$.

Table 3

Correlations Between Continuous Adolescent Self-Report Measures of ADAD and TLFB by Time for Marijuana and Cocaine

Assessment point	Substance reported by adolescent	
	Marijuana use	Cocaine use
Baseline	.57 ^{**}	.81 ^{**}
6-month assessment	.69 ^{**}	.85 ^{**}
18-month assessment	.76 ^{**}	.68 ^{**}

Note. Cell entries are the bivariate correlations between the Adolescent Drug Abuse Diagnosis Scale (ADAD) and Timeline Followback (TLFB) continuous measures of marijuana or cocaine use as reported by the adolescent.

**
 $p < .01$.

Table 4

Bivariate Correlations Between the DISC Continuous Measures of Problems Associated With Marijuana and Cocaine Abuse/Dependence and the TLFB and ADAD at Baseline and 18 Months Assessment

Assessment point and correlated assessments	Adolescent marijuana use	Adolescent cocaine use
Baseline		
ADAD and DISC	.24**	.18 [†]
TLFB and DISC	.17 [†]	.26**
18-month assessment		
ADAD and DISC	.32**	.50**
TLFB and DISC	.31**	.40**

Note. DISC = Diagnostic Interview Schedule for Children; TLFB = Timeline Followback; ADAD = Adolescent Drug Abuse Diagnosis Scale.

[†]
p < .025.

**
p < .01.

Table 5
Means/Proportions, Standard Deviations, and Sample Sizes for Drug Use Measures Across Assessment Points

Substance use measure	Baseline (<i>n</i> = 190)		6 months (<i>n</i> = 141)		18 months (<i>n</i> = 111)	
	M	SD	M	SD	M	SD
Marijuana use African American sample (<i>n</i> = 77)						
Urine assay result	0.84	0.37	0.69	0.47	0.69	0.47
TLFB (past 30 days)	0.85	0.36	0.75	0.44	0.75	0.49
ADAD (past 30 days)	0.84	0.37	0.69	0.47	0.67	0.48
Marijuana use Hispanic sample (<i>n</i> = 113)						
Urine assay result	0.74	0.44	0.62	0.49	0.60	0.49
TLFB (past 30 days)	0.84	0.37	0.51	0.50	0.48	0.50
ADAD (past 30 days)	0.83	0.37	0.51	0.50	0.44	0.54
Cocaine use African American sample (<i>n</i> = 77)						
Urine assay result	0.20	0.40	0.14	0.35	0.14	0.35
TLFB (past 30 days)	0.07	0.25*	0.08	0.27	0.11	0.32
ADAD (past 30 days)	0.12	0.33	0.10	0.30	0.17	0.38
Cocaine use Hispanic sample (<i>n</i> = 113)						
Urine assay result	0.18	0.39	0.20	0.39	0.13	0.32
TLFB (past 30 days)	0.17	0.37	0.13	0.34	0.10	0.31
ADAD (past 30 days)	0.20	0.40	0.15	0.36	0.13	0.34

Note. Each measure was scored as 1.00 for *use, abuse, or dependence* or as 0.00 for *no use, no abuse, or no dependence* to calculate the above statistics. Thus, cell means are also proportions of use. TLFB = Timeline Followback; ADAD = Adolescent Drug Abuse Diagnosis Scale.

* $p < .017$.