

Psychometric Evaluation of Self- and Collateral Timeline Follow-Back Reports of Drug and Alcohol Use in a Sample of Drug-Abusing and Conduct-Disordered Adolescents and Their Parents

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One hundred eighty-eight drug-abusing and conduct-disordered adolescents and their parents provided retrospective reports of the youths' frequency of alcohol and illicit drug use for each of the 6 months preceding their initial session in an outpatient treatment program. Youths' and parent reports of youths' drug and alcohol use for each month were similar. For marijuana and alcohol, frequency reports were related for each month, whereas hard drug reports were related only for the 4 months preceding intake. Relationships among alcohol and hard drug reports were strong during Months 1, 2, and 4 preceding intake, whereas strength of relationship among marijuana reports was similar throughout the 6 months.

As Searles, Helzer, and Walter (2000) reported,

One of the central issues in human alcohol research is the ascertainment of reliable and valid quantity and frequency measures of consumption across time. Because much epidemiological research and almost all clinical interventions are based on these data, their importance is fundamental. Currently the only practical way to gather such data is through retrospective self-report. (p. 277)

Others have made the same claim in the assessment of drug use disorders, particularly in the evaluation of treatment outcome (Hersh, Mulgrew, Van Kirk, & Kranzler, 1999).

Of course, self-reports of substance use offer distinct advantages over more costly procedures (e.g., urinalysis, blood tests, hair

follicle analysis), including assessment of substance use behavior for extended retrospective periods of time, lack of invasiveness, and ease with which assessment procedures may be initiated. For instance, drug urinalysis testing is an objective biological indicator of drug use (Kaminer, Burleson, Blitz, Sussman, & Rounsaville, 1998) that is accurate in determining the presence or absence of substance use in a particular specimen (Cook, Bernstein, Arrington, Andrews, & Marshal, 1995). However, urinalysis testing is limited in that most substances cannot be detected 2 to 4 days after the substance is used (Howard, Bell, & Christie, 1995), and these tests are costly and invasive (Hersh et al., 1999). However, in using self-report measures, poor memory or deliberate under- or overreporting of substance use may influence the results (see Ehrman & Robbins, 1994). Indeed, the reliability and validity of self-reports of substance use frequency depend on the patient sample, setting, substances used, and method of inquiry (Hersh et al., 1999; Sherman & Bigelow, 1992), suggesting that these factors should be examined, and specified, in studies of drug use frequency methods. For instance, although evaluation of substance use self-report procedures in treatment programs that focus on specific drugs of abuse (e.g., methadone clinics for heroin abusers) are warranted, they may influence how particular drugs are reported (see Wish, Hoffman, & Nemes, 1997).

The timeline follow-back (TLFB) method is a standardized assessment of substance use frequency that is increasingly gaining support (for a review, see L. C. Sobell & Sobell, in press). In this method, the frequency of substance use is assessed on a day-by-day basis over a specified period of time, typically 30 days to 1 year (Hersh et al., 1999). Standard holidays and dates of personal

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interest to the participant (e.g., birthdays) are recorded on a calendar to improve memory by orienting the patient to substance-associated events and time periods (Ehrman & Robbins, 1994). The TLFB method was originally developed as a research tool for use with alcohol abusers but has since been used to measure drug and cigarette use (e.g., Azrin et al., 2001; L. C. Sobell & Sobell, in press; Waldron, Slesnick, Brody, Turner, & Peterson, 2001). The TLFB has been found to be a reliable and valid measure, demonstrating high correlations with biological markers and collateral reports in the assessment of adults who have been identified as using various substances (i.e., alcohol, tobacco, cannabis, heroin, cocaine; Hersh et al., 1999), and test-retest reliability is good (Searles et al., 2000; M. B. Sobell, Sobell, Klajner, Pavan, & Basian, 1986). However, its psychometric examination in adolescent substance abuse samples is limited.

Another method of verifying self-reports of substance use is to obtain similar information from others who have had frequent contact with the individual who is being assessed, that is, collateral informants. Corroboration between these individuals would suggest that the reports are reliable and valid (Maisto, Sobell, & Sobell, 1979). However, despite the tendency of investigators to concurrently use both methods of assessment in treatment outcome studies, their concordance has rarely been substantiated in published studies involving adolescent substance abusers (see Ciesla, Spear, & Skala, 1999). Moreover, reports by collateral informants are presumed to be based on personal observation of the individual's drug use behavior, which is often not the case, or is biased because of discussion of substance use behavior between the substance abuser and the collateral informant prior to assessment (see Ehrman & Robbins, 1994). Despite these limitations, collateral reports of drug use frequency do offer promise (Hersh et al., 1999; Winters, Anderson, Bengston, Stinchfield, & Latimer, 2000), particularly when these reports are assessed independently of reports obtained from the substance abuser (Platt, 1980).

The investigation of substance use frequency assessment methods in adolescent samples is only in its nascent stages, particularly in regard to illicit drug use (Leccese & Waldron, 1994). For instance, almost all studies investigating the validity and reliability of self-reports of substance use have focused on adults (see Ciesla et al., 1999). In a review of drug use frequency studies in adolescents, Johnson and O'Malley (1997) found that studies of drug use frequency assessment methods were lacking in adolescent substance abuse samples. Of particular relevance to the present study, they argued that parental collateral reports are often used to corroborate adolescent self-reports of their substance use as well as to serve as a substitute source of information if the adolescent is unavailable or unwilling to provide his or her own reports of substance use. However, Johnson and O'Malley emphasized the need to examine the concordance between parental reports and adolescent self-reports of youth substance use, particularly within the context of treatment programs for adolescent chemical dependency.

Waldron et al. (2001) shed light on the concordance between parent and youth reports of youths' drug use during the 3 months before they were admitted into an outpatient drug treatment program. This study included 120 adolescents who predominately abused marijuana. These youth were administered the TLFB (Form 90 version) and urinalysis testing at the pretreatment as-

essment. Collateral reports of adolescent drug use were also obtained from the youths' parents. The TLFB forms were used to assess the 3 months preceding treatment. The results indicated that parent and youth reports were significantly related during the 3 months (i.e., $r = .37$). Similar relationships between self- and collateral drug reports have been found up to 9 months posttreatment for adolescents who have been diagnosed with a primary substance abuse disorder (Ciesla et al., 1999).

As the preceding review indicates, the psychometric evaluation of standardized assessment instruments of drug and alcohol use frequency in adolescent samples is needed (Ciesla et al., 1999), particularly in adolescent substance abusers as they enter treatment. Some evidence appears to indicate that it is better to use youth self-reports of their use and corroborate these reports with collateral reports of their substance use. However, we are aware of no studies that have specifically examined the relationship of these measures in adolescent samples for extended periods of time. Therefore, the purpose of the present study was twofold: (a) to examine adolescent alcohol, marijuana, and hard drug use frequency patterns of drug-abusing and conduct-disordered adolescents during the 6 months preceding their initial session in a treatment program and (b) to assess the psychometric properties of TLFB youth self-reports and parent collateral reports of youths' use of the aforementioned substances during each of the 6 months preceding the intake session.

Method

Participants

Youth characteristics. Youth were predominately recruited from local high schools, detention centers, judges, and probation officers to participate in a controlled treatment outcome study funded by the National Institute of Mental Health. One hundred eighty-eight youth met the following inclusionary criteria and were accepted into this study: (1) between 12 and 17 years of age; (2) according to a structured interview, the youth exhibited symptoms consistent with a *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994) diagnosis of conduct disorder plus either drug abuse or dependence or drug dependence and oppositional defiant disorder; (3) lived with the parent; (4) lived within a 30-min drive from the clinic; (5) had no diagnosis of mental retardation or a psychotic disorder; (6) was not currently receiving psychological intervention; (7) completed the timeline follow-back assessment measure of substance use, described below; (8) had at least one caregiver who could provide transportation to, and participate in, the youth's treatment. The mean age of the participants was 15.3 years ($SD = 1.2$), and 148 (79%) were male. One hundred twenty-four (66%) were Caucasian, 34 (18%) were Hispanic, 18 (10%) were African American, and 11 (6%) were of other ethnic-minority descent. One hundred eight (57%) were referred by their parent(s), 70 (37%) were referred by the court system, and 9 (5%) were referred by their school administration. Sixty-four (34%) were enrolled in special education (remedial classes at school). The median family income per year of these youth was \$37,500 (range = \$0-\$300,000).

Parent characteristics. All primary caretakers of these youth are hereafter referred to as *parents*. One hundred eighteen (63%) of the parents were married. One hundred fifty (80%) of the primary caretakers were biological mothers, and 26 (14%) were biological fathers. The parents' mean age was 42.2 ($SD = 6.1$).

Measures

We obtained reports of the youth's frequency of illicit drug and alcohol use from the youth and his or her parent, in separate interviews, using a slightly modified version of the TLFB (Babor, Stephens, & Marlatt, 1987; Ehrman & Robbins, 1994; M. B. Sobell et al., 1986). In this method, a month-by-month calendar of the 6 months preceding the intake session was shown to the youth and parent, separately, during the intake session (i.e., first physical contact with clinic). Significant events (e.g., birthdays, vacation days, holidays) were marked on the calendars to facilitate recall of the days on which alcohol and illicit drugs were used. The youth and parent were separately instructed to indicate, on their calendars, which days the youth had used marijuana, hard drugs (i.e., any illicit drug other than marijuana), and alcohol. The TLFB method has been found to correspond closely with official records and reports by substance abusers, and its test-retest reliability is good (Ehrman & Robbins, 1994; M. B. Sobell et al., 1986).

Procedure

A brief screening interview was conducted with parents during their initial telephone call to an outpatient clinic specializing in the treatment of drug-abusing and conduct-disordered youth. All youth who were assessed to meet study inclusionary criteria (see *Participants* section) were invited to participate in a controlled treatment outcome study. All parents of qualifying youth in this study accepted the invitation and were immediately scheduled to participate in an intake session and three assessment sessions (approximately 1 month of assessment). Assessment measures were administered by trained doctoral students who were enrolled in a clinical psychology program. During the intake session, informed consent to participate in the treatment outcome study was obtained from the parent of each youth participant, and informed assent was obtained from each youth. The TLFB method was administered to the parent and youth during this initial session.

Results

Statistical Comparison of Youth and Parent Reports of Youths' Alcohol and Drug Use Frequency

The means and standard deviations of the youths' number of days using marijuana, hard drugs, and alcohol during each of the 6 months prior to the intake session, as reported by the parent and youth separately, are presented in Table 1. We conducted a 2 (family member: parent or child) × 6 (months before intake)

mixed-subjects analysis of variance (ANOVA) to statistically determine the extent to which: (a) youth and parent reports of youths' alcohol use were different during each of the 6 months, (b) the frequency of youths' alcohol use was different among the months of assessment, and (c) youth and parent reporting of alcohol use varied as function of time. The results revealed neither statistically significant main effects nor statistically significant interactions (all *ps* > .05). Thus, the mean numbers of reported days using alcohol as assessed by youth, and separately by their parents, were similar for each month. The mean frequency of days using alcohol was also similar among the 6 months, and youth and parent reports did not differ across time.

We performed similar 2 × 6 mixed-subjects ANOVAs for marijuana and hard drug use. Both ANOVAs revealed no significant main or interaction effects (all *ps* >.05), indicating similar findings as alcohol use (see above).

Relationship of Youth and Parent Reports of Youths' Alcohol and Drug Use Frequency

Table 2 shows the intraclass correlation coefficients of parent and youth reports of youths' use of alcohol, marijuana, and hard drugs for each of the 6 months prior to intake, as well as their respective probabilities. Using a Bonferroni correction to protect against familywise error, we found that most correlations were statistically significant (*ps* < .001), indicating positive linear relationships between youth and their parents in their reports of the youths' drug and alcohol use.

For alcohol and hard drugs, there were generally stronger positive linear relationships during each of the 4 months preceding intake. Specifically, for hard drugs, pairwise tests of dependent intraclass correlations (Feldt, 1980; Kraemer, 1981) with a Bonferroni correction indicated that there were significantly higher positive linear relationships for parent-child frequencies of use for 1, 2, and 4 months before intake than for 5 and 6 months before intake (*ps* < .01). Similarly, for alcohol, there were significantly higher positive linear relationships for parent and youth reports for 1, 2, and 4 months before intake than for 6 months before intake (*ps* < .05). Regarding marijuana use, there were no statistically significant differences among correlations (all *ps* >.05). The latter result indicates consistency between youth and parents in their

Table 1
Youth Self-Reports and Parent Collateral Reports of Youths' Mean Days Using Hard Drugs, Marijuana, and Alcohol During the 6 Months Before Intake (Days of Use Per Month)

Drug type and self-reports of youths' drug use	1 month before			2 months before			3 months before			4 months before			5 months before			6 months before		
	<i>M</i>	Range	<i>SD</i>	<i>M</i>	Range	<i>SD</i>	<i>M</i>	Range	<i>SD</i>	<i>M</i>	Range	<i>SD</i>	<i>M</i>	Range	<i>SD</i>	<i>M</i>	Range	<i>SD</i>
Hard drugs																		
Parent report	0.9	0-30	3.7	0.7	0-30	3.7	0.6	0-30	2.8	0.6	0-30	3.0	0.4	0-30	2.5	0.4	0-30	2.5
Youth report	0.9	0-30	3.2	1.2	0-27	3.9	0.7	0-30	3.0	0.5	0-20	2.3	0.5	0-16	2.0	0.4	0-15	1.6
Marijuana																		
Parent report	7.8	0-30	9.5	7.8	0-30	9.5	7.2	0-30	9.1	6.8	0-30	8.7	7.2	0-30	8.9	6.9	0-30	9.2
Youth report	7.9	0-30	9.6	8.5	0-30	10.1	8.6	0-30	9.9	8.0	0-30	10.1	8.1	0-30	10.1	7.8	0-30	10.2
Alcohol																		
Parent report	2.1	0-28	4.7	2.1	0-30	4.7	1.9	0-30	4.3	2.0	0-30	4.8	1.8	0-30	4.3	1.9	2-30	4.8
Youth report	1.7	0-29	3.4	1.8	0-29	3.9	1.8	0-30	4.3	1.8	0-30	4.6	1.7	0-30	4.2	1.7	0-30	4.1

Table 2
Intraclass Correlation Coefficients Between Parent and Youth Reports of Youths' Days Using Hard Drugs, Marijuana, and Alcohol During the 6 Months Before Intake (Days of Use Per Month)

Drug type	1 month before	2 months before	3 months before	4 months before	5 months before	6 months before
Hard drugs	.53*	.54*	.39*	.45*	.19	.17
Marijuana	.48*	.39*	.48*	.38*	.40*	.40*
Alcohol	.43*	.45*	.42*	.45*	.34*	.25*

* $p < .001$.

reporting of the youths' frequency of marijuana use throughout the 6 months of assessment.

Under- and Overreporting of Youths' Substance Use Frequency by Parents, in Relation to Youth

The percentages of parents who under- and overreported youths' use of marijuana, hard drugs, and alcohol for each of the 6 months of assessment are shown in Table 3. Also shown are the percentages of parents who reported the same frequency of marijuana, hard drug, and alcohol use as their youth for each of the 6 months of assessment. To determine if under- and overreporting bias by the parents was consistent over time, we conducted separate repeated measures ANOVAs for marijuana, hard drug, and alcohol use, with months before intake as the independent variable and the dichotomous variable of over- and underreporting as the dependent variable (Seeger & Gabrielson, 1968). All three ANOVAs were nonsignificant (all $ps > .05$). Thus, parents were consistent in their over- and underreporting of days that youth used marijuana, hard drugs, and alcohol throughout the 6 months of assessment. Examination of the percentages in Table 3 reveals that a higher percentage of parent and youth dyads reported the same frequency of hard drug use (i.e., hard drug identical reports average 82.3% for the 6

months) as compared with marijuana use (22.5%) and, to a lesser extent, alcohol use (i.e., 51.8%).

Discussion

The present study offers several strengths that complement existing studies, including a focus on a relatively large number of adolescents who are seeking outpatient treatment for drug abuse; concurrent assessment of adolescent alcohol, marijuana, and hard drug use frequency; substance use assessment across an extended period of time (i.e., 6 months); use of a standardized method of drug use frequency assessment (i.e., TLFB); and parent collateral reports of youth substance use frequency assessment to complement youth self-reports.

The overall results of this study support the psychometric properties of the TLFB method and can guide future research and practice involving the assessment of drug use among adolescent substance abusers. In an examination of the frequency of reported alcohol, marijuana, and hard drug use for each of the 6 months preceding the initial assessment session, marijuana use was reported to occur most often, with alcohol and hard drugs being reported much less frequently. For each substance classification (i.e., alcohol, marijuana, and hard drugs) the mean numbers of

Table 3
Percentage of Under- and Overreporting of Youths' Days Using Marijuana, Hard Drugs, and Alcohol During Each of the 6 Months Before Intake by Parent in Relation to Youth Reports

Drug type	1 month before		2 months before		3 months before		4 months before		5 months before		6 months before	
	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>
Marijuana												
Overreporting	38.3	72	35.3	66	33	62	37.8	71	34	64	36.3	66
Underreporting	42.6	80	42.2	79	48.4	91	38.8	73	43.1	81	35.2	64
Identical Report	19.1	36	22.5	42	18.6	35	23.4	44	22.9	43	28.6	52
Hard drugs												
Overreporting	7.4	14	5.9	11	8	15	5.3	10	4.3	8	3.8	7
Underreporting	14.4	27	16	30	12.2	23	10.1	19	9	17	9.8	18
Identical Report	78.2	147	78.1	146	79.8	150	84.6	159	86.7	163	86.3	158
Alcohol												
Overreporting	25.7	48	25	47	22.9	43	21.4	40	19.3	36	21.3	39
Underreporting	27.8	52	25.5	48	26.1	49	24.6	46	26.7	50	23	42
Identical Report	46.5	87	49.5	93	51.1	96	54	101	54	101	55.7	102

Note. $N = 188$. Because of missing data, $N = 187$ for 2-month reports of marijuana and hard drug use and for 1-, 4-, and 5-month reports of alcohol use; $N = 183$ for 6-month reports of hard drug and alcohol use; and $N = 182$ for 6-month reports of marijuana use.

reported days of use as assessed by youth, and separately their parents, were similar for each month. Moreover, no significant differences were found regarding the frequency of reported drug and alcohol use among the 6 months that were assessed in this study. However, there does appear to be a nonsignificant trend of increasing hard drug use as these youth approach treatment, supporting the contention that increasing hard drug use may influence referrals of these youth to treatment services. On a related note, the present results suggest that parents were clearly aware of the youths' use of marijuana for an extended period of time but were unwilling, or unable, to seek treatment for them at an earlier time. Anecdotal reports of parents participating in our clinical trials of youth drug abuse (e.g., Azrin et al., 1996; Azrin, Donohue, Besalel, Kogan, & Acierno, 1994; Azrin et al., 2001) suggest that the latter assumption is more likely (i.e., the court fails to support their requests to mandate the youth to treatment programs or to make such treatment possible).

The relationship between parent and youth substance use reports was generally strong. For instance, in regard to marijuana and alcohol use, a significant relationship between youth and parent frequency reports was indicated for every month that was assessed. For hard drugs, the relationship between parent and youth reports was significant for each of the 4 months preceding the intake session.

The strength of the aforementioned relationships depended on the reported substance used and the month assessed. For marijuana use, there were no significant differences among the months regarding the strength of the relationship between parent and youth reports. However, for hard drugs, relationships between the parent and youth reports were strongest for Months 1, 2, and 4 before the intake session, as compared with the 5th and 6th months. Similarly, for alcohol use the relationship was strongest for Months 1, 2, and 4 as compared with the 6th month. It is possible that problems due to memory may have negatively influenced the relationship of parent and youth reports of youths' hard drug use (and, to a lesser extent, alcohol use) during the 5th and 6th months.

The results indicated that, in relation to youth substance use reports, parents had a general tendency to underreport the substance use of their children, particularly for hard drugs. However, these differences were not statistically significant. Furthermore, the percentage of parental under- and overreporting of their youths' substance use was consistent over time. The latter findings suggest that both collateral and self-reports of youths' days using substances are important to assess, as each may provide additional, albeit related, information. For instance, 82% of parent and youth reports of youths' days using hard drugs were identical across the 6 months. At first consideration, this finding might suggest that substance-abusing youth can be relied on as sole informants of their hard drug use, because the agreement between youth and parent reports of youths' hard drug use is relatively good (which is not surprising given that the frequency of hard drug use reported by the majority of parents and youth was "0") and because 11% of the parents underreported the hard drug use of their youth. However, in this study, 7% of the parents reported a higher frequency of youths' hard drug use during the 6 months under consideration than their children reported. This information becomes particularly valuable when youth deny hard drug use.

Drug-abusing youth and their parents did not appear to evidence tendencies to deny recent drug use on admittance to the clinic. This finding is consistent with the results of Winters et al. (2000). In an intake session at a drug abuse clinic, the majority of 205 drug-abusing youth agreed with their mothers that they "often" used alcohol and drugs. Thus, the present study builds on existing research by establishing that youth and their parents entering drug abuse clinics appear to be generally open in their reporting of substance use.

Given that parent and youth TLFB reports were obtained independently (i.e., informants did not know they would be asked to provide substance use information, and informants were assessed separately), the significant correspondence between parent and youth reports provides support for the validity of this method (Maisto et al., 1979; Platt, 1980). These results also suggest parents may be reliably used in the retrospective TLFB assessment of youth drug and alcohol use when youth are unavailable, or unwilling, to provide this information (Ciesla et al., 1999).

Although the results of the present study support the validity of the TLFB method in the assessment of adolescent substance use, future studies will need to examine different aspects of substance use frequency methods in adolescent samples. For instance, the present sample included a select group of substance abusers, that is, those who concurrently evidenced conduct disorders. Although this diagnosis is common among adolescent drug abusers (see Azrin et al., 2001), the results of this study will need to be replicated in other adolescent substance-abusing samples. In a different vein, future studies will need to include concurrent objective biological indicators of substance use frequency (i.e., urinalysis). Although these biological methods of substance frequency assessment are limited when used individually, in adult samples, the validity and reliability of self-reports of substance use have been shown to increase when used in conjunction with urine-based drug tests (Harrison, 1997).

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