

EFFECTS OF INTERVIEW MODE ON SELF-REPORTED DRUG USE

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Abstract The effects of interview mode on 18- to 34-year-olds' self-reported tobacco, alcohol, marijuana, and cocaine use were investigated. RDD telephone and personal drug use surveys of the state of New Jersey were conducted in 1986-87. In the personal interview, respondents recorded their drug use on self-administered answer sheets. Compared to the area probability sample in the personal interview, RDD yielded a sample of blacks higher in income and education, and more likely to be married and currently employed; white SES was also higher in the telephone sample, but to a lesser degree than for blacks. Controlling for demographic characteristics and RDD's exclusion of non-telephone households, the telephone survey yielded significantly lower estimates of blacks' alcohol consumption, and lifetime and recent marijuana use. Whites' alcohol consumption was slightly lower by telephone; otherwise, estimates of whites' use of the four substances were nearly identical in the two modes. Sample coverage, respondent demographic characteristics, and racial matching of interviewer and respondent did not account for the significant mode differences. Characteristics of the interview situation itself, such as provision of privacy in the self-administered format, may have influenced tendencies toward socially desirable responding to a threatening topic such as drug use.

Telephone interviewing has increased in popularity relative to personal interviewing due to cost savings, efficiency, and the availability of com-

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puter-assisted methods to speed data collection and processing (Groves, 1983; Klecka and Tuchfarber, 1978). Compared to face-to-face interviewing, telephone surveys are cheaper, have shorter data collection periods, and lend themselves to closer monitoring of interviewer performance, thus enhancing quality control during data collection.

The utility of the telephone survey has been demonstrated in marketing, political polling, health, and numerous forms of attitudinal research. Herzog and Rodgers (1988), for example, found almost no differences in response distributions obtained from telephone and personal interviews in a survey of older Americans' political attitudes, health, well-being, and life satisfaction. Telephone approaches have been shown to produce reliable and valid results for relatively non-threatening interview topics. Much less is known, however, about the efficacy of telephone surveys for highly threatening interview topics, such as sexual behavior, criminality, and the use of illicit drugs. Surveys on these topics have relied almost exclusively on costly and time-consuming face-to-face interviewing. This research addressed the question: To what extent does the validity of sensitive surveys differ by mode of interview? Specifically, is there a difference between face-to-face surveys using self-administered questionnaires (SAQs) and telephone surveys in their estimates of lifetime and current use of tobacco, alcohol, marijuana, and cocaine? Our research questions centered on comparing telephone and personal survey modes in terms of nonresponse, demographic characteristics of the respondents, and validity of drug use estimates: (1) what differences in sample demographic characteristics are produced by multistage area probability sampling versus Random Digit Dial (RDD) methods; and (2) do personal surveys using SAQs and telephone surveys provide different estimates of drug use for the same population? If so, to what extent are mode differences attributable to sample coverage, nonresponse bias, or to the interview situation itself?

Literature Review

RESPONSE RATES

Response rates typically vary between telephone and face-to-face interview modes. Experimental comparison of interview modes for the National Health Interview Survey (NHIS) yielded overall response rates of 80% for the telephone, and 96% for the personal survey (Groves, Miller, and Cannell, 1987). Groves and Kahn (1979) reported an RDD response rate of 59% in their national survey (including all unanswered telephone numbers in the denominator of the response

rate equation), compared to 75% in the personal interview. Exclusion of the unanswered numbers raised the telephone rate to 70%.

Telephone surveys tend to have higher break-off rates (Groves and Kahn, 1979) and higher refusal rates (Jordan, Marcus, and Reeder, 1980) than personal surveys. The collection of household composition data early in the call, to determine eligibility and respondent selection, may increase refusals (Hauck and Cox, 1974). Telephone nonresponse occurs disproportionately among minorities, the less affluent, less educated, and among older respondents (Freeman et al., 1982; Groves, Miller, and Cannell, 1987; O'Neil, 1979). Nonresponse may vary by race and ethnicity. Blacks tend to be disproportionately inaccessible in telephone surveys (Weaver, Holmes, and Glenn, 1975); this is especially true for younger, lower income, and male black respondents.

SAMPLE COVERAGE

The survey literature is clear in suggesting that RDD sampling produces a different demographic profile of respondents than multistage area probability sampling. The sampling frame for RDD excludes households without telephones, which account for approximately 7% of households in the United States (Thornberry and Massey, 1988). The demographic correlates of nontelephone status make this a potentially serious bias for drug use surveys. Respondents from nontelephone households are more likely than those with telephones to be nonwhite, of lower income and education, and to be never married, divorced, or separated (Thornberry and Massey, 1988; Tull and Albaum, 1977). RDD's exclusion of nontelephone households also underrepresents rural nonfarm areas, single heads of household, persons under age 35, divorcees, and renters (Freeman et al., 1982). Income is the strongest correlate of nontelephone status; nearly 30% of families with incomes below \$5,000 in 1986 were without telephone service (Thornberry and Massey, 1988). Klecka and Tuchfarber (1978) compared RDD and face-to-face samples in a Cincinnati survey of crime victimization. The RDD sample captured fewer poor households and had a significantly higher education level than the personal survey. This literature suggests that, compared to the area probability sample in the personal survey, the RDD sample will have significantly higher income and educational attainment, and will have proportionately fewer nonwhite, fewer divorced, and fewer separated respondents.

BIAS IN DRUG USE ESTIMATES

Drug use surveys are subject to response set bias, most notably socially desirable responding in the face of threatening survey items

(Mensch and Kandel, 1988). Use of illicit drugs, such as marijuana and cocaine, and heavy versus social drinking, are assumed to be socially undesirable behaviors for the majority of respondents. To the extent that social desirability affects responses, and respondents feel threatened by such interview questions, one would expect *under-reporting* of drug use to be the largest threat to the validity of drug use surveys (Bradburn et al., 1978). The more socially unacceptable the substance the greater the underreporting should be. Sudman and Bradburn (1974) maintained that the higher the threat, the more influential the interview milieu on respondents. There is reason to suspect, then, that the more threatening the topic, the more potential there is for survey characteristics, such as interview mode, to affect tendencies toward socially desirable responding. The central question of this paper, then, is: Will a switch from face-to-face to telephone survey modes affect the validity of population estimates of drug use, i.e., result in lower estimates of drug use?

A recent study by Mensch and Kandel (1988) demonstrated the susceptibility of drug use reports to socially desirable responding. Under-reporting of lifetime marijuana use in the National Longitudinal Survey of Youth (NLSY) was related to familiarity with the interviewer, who may have conducted up to three interviews with the same respondent. Panel members reinterviewed by the same person were more likely than those with different interviewers to deny marijuana and cocaine use on subsequent interviews, even after admitting use at the initial interview. Familiarity with the interviewer increased respondents' propensity toward socially desirable responding.

There has been relatively little research on willingness to report highly threatening or undesirable behaviors in telephone versus face-to-face interviews. Several researchers have expressed skepticism about the ability of telephone surveys to secure honest reporting of sensitive or illicit behavior (Freeman et al., 1982; Johnston and O'Malley, 1985; Sudman, 1976). Groves (1979) found that respondents expressed greater uneasiness about discussing sensitive topics on the telephone than in face-to-face interviewing. Telephone interviewing may elicit higher refusal rates for sensitive questions than in-person interviewing (Groves and Kahn, 1979).

Studies comparing personal and telephone surveys for response set bias have produced mixed results (Orwin and Boruch, 1982). The validity of telephone results has been demonstrated with relatively non-threatening topics: the proportion of women admitting ever drinking alcohol (Hochstim, 1967); physicians' self-reported rates of reading medical journals (Colombotos, 1969); voting (Rogers, 1976); Catholics' attitudes toward abortion and birth control (Wiseman, 1972); and health-related surveys (Groves, Miller, and Cannell, 1987; Herzog et

al., 1983; Siemiatycki, 1979). Although these studies support the validity of telephone interviewing, their results are based on less threatening topics and may not be generalizable to highly threatening surveys concerned with self-reports of illicit or embarrassing behaviors.

Comparisons involving more threatening surveys suggest that telephone interviewing may be more susceptible than personal surveys to social desirability effects. Respondents (randomly assigned to interview mode) were more likely to report psychiatric symptoms and depression in face-to-face interviews than by telephone (Henson, Cannel, and Roth, 1978); face-to-face respondents in this study also had significantly lower social desirability scores on the Crowne-Marlowe scales than telephone respondents. Herman (1977), in a mixed-mode survey of employees' voting for unionization, found telephone respondents less willing than those personally interviewed to reveal sensitive information such as unlawful campaign practices and how they intended to vote. Respondents were more reluctant in telephone than in personal interviews to reveal financial information, especially their indebtedness, and current and projected income (Schmiedeskamp, 1962).

One of the best methods for reducing response set effects due to social desirability may be the use of self-administered questionnaires (SAQs) in the context of a personal interview (Sudman and Bradburn, 1974). Unfortunately, the SAQ has been all but ignored in studies comparing interview modes (apart from Hochstim's [1967] comparison of mail, telephone, and personal modes). With SAQs, interviewers read instructions, and possibly the questions, but do not see respondents' answers. The National Household Survey on Drug Abuse (NHSDA) and the personal New Jersey drug survey reported here, used SAQs to maximize respondents' privacy in reporting drug use in the personal interview. Use of SAQs should increase the likelihood of finding differences between face-to-face and telephone surveys in responses to sensitive questions.

To summarize, direct comparisons of survey modes have not provided unequivocal evidence concerning the ability of telephone versus personal surveys to elicit accurate reports of socially undesirable behavior. However, most comparisons of interview modes have relied on topics of relatively mild threat compared to drug use surveys. The survey literature suggests that characteristics of the interview situation become increasingly important in affecting responses as survey items become more threatening. To the extent that questions concerning heavy drinking, marijuana use, and cocaine use are highly threatening, telephone interviews can be expected to be more susceptible to social desirability bias than face-to-face interviews with SAQs for threatening questions. Thus telephone surveys should yield lower estimates of drug use than the personal surveys, and the degree of underreporting

should vary with the sensitivity of the question. Telephone estimates of heavy drinking, recent marijuana use, and recent cocaine use should be more susceptible to underreporting than estimates of social drinking or tobacco use.

Study Design

The objective of state and national drug use surveys is to estimate the incidence, prevalence, and correlates of the use and abuse of alcohol and other drugs in a representative sample of the household population. The NHSDA, for example, is conducted biannually to monitor national trends in drug use. Recently, several state governments have undertaken surveys to chart statewide drug use trends and to use as a resource for allocating drug abuse prevention funds. One such survey, conducted in 1986-87 for the state of New Jersey, provided the face-to-face interview data for this study.

DESIGN OF THE PERSONAL SURVEY

Questionnaire Design. The New Jersey face-to-face survey used the identical survey instruments developed for the 1985 NHSDA, and replicated the data collection procedures of the NHSDA exactly. Drug categories included: tobacco, alcohol, marijuana, cocaine (crack was added to the state survey), opiates, hallucinogens, and the nonmedical use of prescription drugs. Additional questions included health and behavioral consequences of drug use, and demographic characteristics of the respondent. The personal interview lasted 45 to 60 minutes, on the average.

Anonymity. For all but tobacco, answers to drug use questions were recorded by respondents on self-administered answer sheets; interviewers read the instructions at the start of each drug sequence, and, at the respondent's request, read the questions aloud, while the respondent completed the answer sheet. Respondents were told that interviewers would not see their answers on the self-administered sheets. Answer sheets were sealed in an envelope in the respondent's presence, upon completion of the interview. No names were recorded on the questionnaires, answer sheets, or envelopes containing the answer sheets. Respondents were offered the option of mailing the completed questionnaire directly upon completion of the interview (accompanying the interviewer to the nearest mailbox), although few exercised this option.

Data Collection. A sample of New Jersey's civilian, noninstitutionalized household population aged 18-34 years was developed. The

multistage area probability design yielded a total sample of 4,571 residential addresses.¹ Advance letters were sent to selected households in the sample. The letter explained the purpose of the survey, confidentiality procedures, and the voluntary nature of participation. All screening and interviewing was done in-person. During screening, household members were listed by age and first name, and one respondent per household was selected from the eligible 18- to 34-year-olds using tables developed by Kish (1965). When definite refusals were obtained, one refusal conversion attempt was made, with reassignment to another interviewer where possible. A screening rate of 90.5% was achieved, and interviews were completed in 79.1% of the households determined to include an eligible respondent aged 18 to 34 ($N = 1,042$ completed interviews). The field period extended from June, 1986, through January, 1987.

DESIGN OF THE TELEPHONE SURVEY

The overriding concern in designing the telephone survey was comparability to the personal survey. Thus, it was paramount that the telephone survey attempt to (1) achieve high screening and interview response rates, (2) minimize item nonresponse, (3) preserve question content and meaning, and (4) guarantee confidentiality to respondents.

In order to maximize response rates, we decided to conduct a telephone survey averaging no more than 25 minutes. It was clear that only a subset of the personal interview sequences could be used, since administering the entire NHSDA questionnaire over the phone would have required well over an hour. We decided to ask the complete sequence of items about a smaller number of drugs: tobacco, alcohol, marijuana, and cocaine (including crack). These drugs were selected because they are relatively prevalent in the population, they have potential for abuse, they represent both legal and illegal substances, and they form a continuum from relatively nonthreatening (smoking, social drinking) to threatening (heavy drinking, marijuana use, cocaine use) questions.

Questionnaire Revision and Pretesting. This phase of the research involved reformatting and pretesting the NHSDA drug use and demographic items for telephone administration. Four waves of pretests (a total of 75 interviews) were conducted in August and September, 1987. The telephone numbers for the pretest interviewing were randomly selected from the telephone directory. Between each wave, the questionnaire was revised based on interviewer comments and the results

1. A technical report with detailed descriptions of sampling procedures and response rate calculations is available upon request from the first author.

of the interviews. Two types of changes were necessary to ensure the success of the telephone survey: reformatting items with many pre-coded response categories and the introduction of branching patterns within the drug sequences.

In the personal interview, items asking frequency of drug use presented respondents with up to 8 response categories, while income had 12 categories presented in a show card. Remembering the distinctions among 8 to 12 categories represents a far greater burden for the telephone than the personal respondent (Miller, 1984). To reduce respondent burden, these items were broken into subitems that recreated the original NHSDA precoded scales. Research has shown that the two-step (Miller, 1984) and bracketing (Locander and Burton, 1976) procedures for asking questions with many response categories produce results comparable to the single item format. In the revision for telephone, stem question wording and all original response categories were preserved.

In the face-to-face survey, respondents answered all questions within a drug sequence, regardless of whether or not they had used the drug, or how recently they used it. Thus, respondents were asked how often they had used marijuana in the last 30 days, even if previously they had indicated no use of marijuana in their life. This was done to prevent respondents from denying drug use merely to shorten interview time. This structure was impossible to administer over the telephone. Early rounds of pretests clearly indicated that redundancy in item sequences was unacceptable to respondents, and generated high degrees of irritation and interview break-offs. For the telephone interview to succeed, then, it was essential to introduce branching patterns in the telephone drug sequences.

It is important to note that all changes to the NHSDA were essential to minimize the telephone survey's interview and item nonresponse rates, respondent irritation, and interview break-offs. Failure to make these changes would have increased nonresponse in the telephone survey and, thus, jeopardized the comparison to the personal mode.

Data Collection. The Waksberg procedure (Waksberg, 1978) of Random Digit Dialing (RDD) was used to draw the telephone sample. The Waksberg procedure was adopted to maximize the proportion of residential households contacted during screening, thus reducing survey costs and field period length. Our goal was the completion of at least 2,000 interviews with respondents 18- to 65-years-old. (This paper reports substantive results for 18- to 34-year-olds only, the same age group available in the face-to-face survey.)

All residential households with at least one member 18- to 65-years-old were eligible for the telephone sample. Interviewers verified the number dialed, asked the screening informant if the number was resi-

dential, and, if so, obtained a listing by first name and age of all eligible household members. One respondent was randomly chosen for the interview using selection tables developed by Kish (1965). Screening informants were told that the interview concerned health-related issues; selected respondents were informed that the survey concerned tobacco, alcohol, and drug use. All initial refusers were recontacted by a different interviewer for refusal conversion. The data collection period for the telephone survey was October through December, 1987.

The Waksberg procedure produced a sample of 6,932 telephone numbers; 2,075 interviews were completed with adults 18- to 65-years-old, of which 864 were with 18- to 34-year-old respondents. The screening response rate was 71.5%. The interview response rate, the proportion of all selected respondents who completed the entire interview, was 82.5% for 18- to 34-year-old respondents. The difference in completion rates between the telephone and personal surveys was entirely due to differential screening nonresponse; the interview completion rate with selected respondents was slightly higher by telephone (82.5%) than face-to-face (79.1%, difference not statistically significant).

Results

MODE DIFFERENCES IN SAMPLE CHARACTERISTICS

One source of demographic differences between RDD and area probability sampling is RDD's exclusion of nontelephone households. Table 1 shows household telephone status by demographic characteristics for the face-to-face sample (the number of telephone lines in the household was asked in the personal as well as telephone interview). Blacks and other minorities were much more likely than whites not to have telephones. Respondents without telephones were also much more likely to be unemployed, have less than a high school education, and have lower incomes. Telephone status is correlated with respondents' race and economic status, both important predictors of drug use.

To estimate mode differences in demographic profiles, all non-telephone households were dropped from the face-to-face sample. Over 13% (21 cases) of black respondents, and 17% of the Hispanic cases were dropped from the face-to-face sample. For whites, very few households were without phone service (13 cases, or 1.7% of the total).

Demographic characteristics of the telephone and face-to-face samples are presented in Table 2. The percentage distributions show substantial differences for blacks and fewer differences for whites and Hispanics. For blacks, the RDD sample resulted in significantly differ-

Table 1. Telephone Status by Sample Characteristics, Personal Survey

	N of Cases	Percentage with No Phone
Total sample	1,041	5
Age		
18-21	222	5
22-25	223	5
26-29	249	6
30-34	339	4
Sex		
Male	433	4
Female	608	6
Race/ethnicity*		
Black	160	13
White	752	2
Hispanic	129	15
Marital status		
Married	430	4
Sep./div./wid.	89	9
Never married	521	5
Education*		
Less than high school	113	20
High school graduate	395	4
Some college	286	3
College graduate	247	2
Work situation*		
Employed full-time	675	4
Employed part-time	120	2
Unemployed	71	16
Not in labor force	175	7
Student status		
Full-time student	128	4
Part-time student	85	1
Nonstudent	824	6
Income*		
Under \$7,000	358	8
\$7,000 to \$14,999	219	6
\$15,000 to \$29,999	304	2
\$30,000 or more	137	2

NOTE: Ns sum to less than 1,042 due to missing values.

* $p < .01$ for contingency table chi-square test of statistical independence (presence of telephone $\times$ sample characteristic).

Table 2. Respondent Characteristics by Race and Interview Mode, Nontelephone Households Excluded from Personal Sample (Percentage Distributions)

	Black		White		Hispanic	
	Telephone	Personal	Telephone	Personal	Telephone	Personal
N of cases	104	137	636	734	60	82
Age						
18-21	19	23	18	22	25	21
22-25	18	21	22	21	20	21
26-29	26	26	24	24	25	19
30-34	37	29	37	33	30	40
Sex						
Male	34	34	45	44	33	36
Female	66	66	55	56	67	64
Marital status						
Married	27	17*	42	43	39	49
Widowed	2	1	—	—	—	1
Divorced/separated	5	15	7	6	15	8
Cohabiting	7	6	5	2	3	1
Never married	60	62	46	48	40	41

Education						
Less than high school	10	14	5	7	18	25*
High school graduate	42	45	37	38	43	40
Some college	36	27	26	29	15	27
College graduate	12	14	32	26	23	9
Work situation						
Employed full-time	78	59*	72	67	57	57
Employed part-time	10	9	13	13	17	10
Unemployed	4	12	4	5	5	10
Not in labor force	9	19	11	15	22	24
Student status						
Full-time student	11	10	10	13	17	12
Part-time student	10	7	11	10	10	4
Nonstudent	80	84	79	77	73	84
Income						
Under \$7,000	16	40*	20	32*	30	47
\$7,000 to \$14,999	24	21	16	21	33	21
\$15,000 to \$29,999	50	32	40	32	23	24
\$30,000 or more	11	7	24	15	13	8

* p < .05 for contingency table chi-square test of statistical independence (sample characteristic x mode of interview).

ent distributions for marital status, employment, and income. The RDD sample yielded greater proportions of married (27% to 17%) and lower proportions of divorced or separated respondents (5% to 15%) than the personal interview sample. There were significantly lower numbers of unemployed blacks (4% to 12%), and higher numbers of full-time employed (78% to 59%), in the telephone sample. The largest difference for blacks was in income: by telephone, only 16% of blacks reported personal incomes below \$7,000, compared to 40% for the in-person survey. By telephone, 61% of blacks reported incomes of \$15,000 or more, compared to only 39% in the face-to-face interview. For the 18- to 34-year-old population, then, the switch from area probability to RDD sampling shifted the SES profile of black respondents substantially upward.

Although not statistically significant, the education distribution for blacks also is consistent with RDD's higher SES profile for blacks. The telephone sample produced fewer black respondents with less than a high school education and more who had completed at least some college.

The higher SES profile in the RDD sample was also evident for Hispanics, although not to the same degree as for blacks. The RDD sample yielded significantly more high school and college graduates than did the face-to-face sample, fewer Hispanic respondents with incomes below \$7,000 (30% to 47%), and fewer unemployed respondents (5% to 10%).

The demographic profiles of the two survey modes were most similar for whites. Although RDD also furnished significantly fewer low income respondents than the area probability sample, the magnitude of the difference for whites was smaller than for blacks or Hispanics. The RDD sample identified slightly more cohabiting respondents than did face-to-face. Otherwise, the demographic profiles for whites in the two surveys were nearly identical.

Controlling for telephone status did not equalize the demographic profiles of the RDD and area probability samples. It is very likely, then, that the differences are attributable to differential nonresponse by race/ethnicity in RDD versus area probability samples. That is, after correcting for bias introduced by sampling frame differences, the racial/ethnic patterns of screening and interview nonresponse may differ between the two survey modes. Even if proportional numbers of lower SES minority households were drawn into the RDD and area probability samples, telephone screening and interviewing appear to have produced higher levels of nonresponse (refusals, noncompleted interviews) for low SES households than did face-to-face methods.

It should be noted that the black and Hispanic samples were two-thirds female in both surveys. The low proportion of minority males in

the surveys may reduce the descriptive accuracy of the black and Hispanic demographic profiles in both modes.

MODE DIFFERENCES IN SELF-REPORTED DRUG USE

Four substances of high use-prevalence were chosen for these analyses: tobacco (cigarette smoking), alcohol, marijuana, and cocaine. Verbatim questions and response categories for drug use items are listed in the Appendix. In analyzing drug data, responses from both surveys were pooled into one data set, with mode of interview added to the pooled data set as a categorical variable. Demographic characteristics were entered as control variables in the analyses. Race-of-interviewer effects were also explored, but were found to be unrelated to the interview mode and respondent race effects described below. Results concerning the racial matching of interviewer and respondent (Tables 5 and 6) are presented later in this section, after findings for interview mode and respondent racial differentials have been described.

Comparisons of drug use estimates will be reported for black and white respondents only. The telephone survey obtained only 60 interviews with Hispanics in the 18- to 34-year-old age range, a sample size too small to allow for adequate demographic controls and tests for interactions in the multiple classification analyses. The results described below are based on telephone interviews with 104 blacks and 636 whites, and personal interviews with 160 blacks and 747 whites.

Dependent Variables. Our original intent in selecting dependent variables was to include, for each drug category, measures of lifetime prevalence, recent use (within the past 12 months), and current use (within the past 30 days). This was done for marijuana and cocaine only. For tobacco, lifetime prevalence (having tried a cigarette even once) seemed fairly trivial, and was replaced with the proportion who had smoked five packs or more in their lives. For alcohol, both the lifetime and past year prevalence had to be dropped due to lack of variance; 98% of whites, for example, had used alcohol at least once in their lifetimes.

In addition to prevalence and incidence estimates, variables were selected to show the amount of drug use, both current (e.g., the number of cigarettes smoked per day, the number of days a person had a drink, smoked marijuana, or used cocaine over the last 30 days), and lifetime (total number of times respondents used marijuana or cocaine in their lives). Variables were selected to furnish a representative picture of lifetime and current usage of the four drugs selected for the study.

Data Analyses. To control for sample coverage, respondents from

nontelephone households were dropped from the personal survey. Analyses are based on weighted drug use estimates. Case weights reflected adjustments for household selection probabilities (including number of telephone lines for the telephone sample), for differential nonresponse, and for Census profiles of New Jersey's age, race, and sex composition. Analysis of unweighted data yielded no important differences from the weighted results reported below.

Multiple classification analysis was used to estimate net differences by interview mode and by race, and the significance of the mode and race effects. Sample demographic characteristics were entered as control variables in the models. The *net differences* reported in Table 3 (telephone minus personal mode estimates) and Table 4 (black minus white estimates) control for sex, age, employment status, income, education, student status, and marital status. Preliminary analyses indicated significant race by mode of interview interactions for both alcohol and marijuana. Therefore the decision was made to analyze mode effects for blacks and whites separately. It should be noted that the term "mode effects" in this study refers (for all drugs but tobacco) to the comparison of telephone with a *self-administered format* in the personal mode. The results are not generalizable to personal surveys with interviewer-administered drug sequences.

Tobacco. Mode effects by race of respondent are presented in Table 3. Cigarette smoking is the least sensitive or threatening survey topic of the four substances, and, following Sudman and Bradburn (1974), should have been the least susceptible to interview mode effects. This prediction is borne out by the data. There were no significant mode effects for blacks or whites on the five measures of smoking. Overall, then, the results suggest that telephone estimates of smoking, when corrected for demographic characteristics of the sample, are comparable to face-to-face estimates for both black and white populations.

Alcohol. Questions concerning recent drinking and heavy drinking are more sensitive than smoking, given the negative social reactions to drunkenness and alcoholism. These questions should be more reactive to interview mode effects. Consistent with this prediction, there were substantial mode effects for alcohol use, after controlling for demographic characteristics of the samples (see Table 3). For blacks, the telephone survey yielded lower estimates for all five drinking measures. The results are particularly striking for blacks' drinking over the 30 days prior to the interview. The telephone interview estimates for the number of drinking days, total drinks for the month, and the number of days respondents had five or more drinks were significantly lower than in the personal interview.

For whites, the proportion of respondents who drank in the last 30 days and the proportion who admitted getting drunk at least once in the

past 12 months were significantly lower in the telephone interview, although the magnitude of the differences was small (about 6 percentage points in each case). The difference for blacks who drank in the last month was slightly larger (8 percentage points), but was not significant due to the smaller sample size. On the whole, the mode differences were much stronger for blacks' than for whites' drinking.

Marijuana. The race by mode interaction is most evident in reports of marijuana use. For blacks, the marijuana results were very much the same as for alcohol. The telephone survey furnished consistently lower estimates of blacks' lifetime and recent marijuana use than the face-to-face survey. The number of current users was over 50% lower in the telephone than in the personal interview, while the number of lifetime users was about 25% lower in the telephone survey. For blacks, the telephone mode also furnished significantly lower estimates of both the days and the amount of marijuana use over the last 30 days.

For whites, the remarkable feature of these data is the extent of similarity between the two modes. The net differences between modes were zero or near zero in all six measures of marijuana use. For the state of New Jersey, then, there would be no change in marijuana use estimates for whites associated with a shift from face-to-face to telephone interviewing. The prediction of greater social desirability effects for the telephone versus personal interviewing was supported only by the data for black, but not for white, marijuana use.

Cocaine. The direction of mode effects for cocaine was similar to that found for alcohol and marijuana, although mode effects were not significant. The telephone survey provided lower estimates than the face-to-face survey of blacks' lifetime, last year, and current cocaine use. For whites, lifetime use estimates were higher by telephone, while last year and current use estimates were lower by telephone. The lone significant main effect was for whites: the number admitting cocaine use more than 10 times in their life was higher in the telephone survey (17% to 10%). Overall, then, the telephone mode produced generally, but not significantly, lower cocaine use estimates for blacks, and similar or higher estimates for whites.

Racial Differences by Interview Mode. Given the mode effects described above, it is important to ask whether interview mode might affect findings concerning racial differences in drug use. Net differences between races (black minus white estimates) are presented by interview mode in Table 4.

Although no significant mode effects for smoking were found, the smoking estimates for blacks were slightly higher by telephone, while for whites the smoking estimates were slightly lower. The effect of these trends can be seen in the net racial differences for tobacco. In the personal survey, smoking estimates were significantly higher for

Table 3. Weighted Drug Use Estimates, by Respondent Race and Interview Mode

	Black			White		
	Telephone	Personal	Net Difference ^a	Telephone	Personal	Net Difference ^b
Tobacco (cigarette smoking)						
Smoked 5 packs or more lifetime (%)	42	43	- 2	51	49	+ 2
Smoked in last 12 months (%)	42	37	+ 4	41	42	- 2
Smoked in last 30 days (%)	39	33	+ 4	35	37	- 3
No. of cigarettes smoked per day	4.4	3.6	+ .3	5.5	6.2	- .7
No. of years smoked daily	3.5	3.2	- .1	3.7	3.6	0
Alcohol						
Drank in last 30 days (%)	52	60	- 8	77	84	- 6**
No. of drinking days/last 30 days	1.8	4.0	- 2.3**	5.3	5.5	- .2
Total drinks/last 30 days	4	16	- 12**	18	18	0
No. of days had 5 or more drinks	0.3	1.6	- 1.4*	1.3	1.5	- .3
Drunk once or more last year (%)	26	28	- 2	53	59	- 6*

	Marijuana					
Used once or more lifetime (%)	51	64	-16*	66	66	0
Used last 12 months (%)	16	22	- 6	25	26	0
Used last 30 days (%)	7	17	-12*	13	13	0
Used 10 or more times in life (%)	17	31	-16**	39	39	0
No. of days used/last 30 days	0.6	1.4	-1.1*	1.0	1.1	-.1
No. of joints a day/last 30 days	0.1	0.5	-.6*	0.3	0.2	+.1
	Cocaine					
Used once or more lifetime (%)	19	23	- 4	33	30	+ 4
Used last 12 months	9	11				
Used last 30 days (%) (%)	3	5	-2 -2	125	146	-2 -2
Used 10 or more times in life (%)	6	9	- 4	17	11	+ 5**
No. of days used/last 30 days	0.4	0.2	+.1	0.3	0.2	+.1

^a Net differences (telephone - personal) controlling for sex, age, employment, income, education, student status, and marital status. Non-telephone households excluded from the personal survey.

** $p < .01$, * $p < .05$.

Table 4. Race Differences in Weighted Drug Use Estimates, by Interview Mode

	Telephone			Personal		
	Black	White	Net Difference ^a	Black	White	Net Difference ^a
Tobacco (cigarette smoking)						
Smoked 5 packs or more lifetime (%)	42	51	-13**	43	49	-10*
Smoked in last 12 months (%)	42	41	-4	37	42	-10*
Smoked in last 30 days (%)	39	35	+1	33	37	-9*
No. of cigarettes smoked per day	4.4	5.5	-1.7#	3.6	6.2	-2.3***
No. of years smoked daily	3.5	3.7	-.5	3.2	3.6	-.7
Alcohol						
Drank in last 30 days (%)	52	77	-23***	60	84	-24***
No. of drinking days/last 30 days	1.8	5.3	-3.2***	4.0	5.5	-1.3*
Total drinks/last 30 days	4	18	-13***	16	18	-3
No. of days had 5 or more drinks	0.3	1.3	-.9**	1.6	1.5	+.2
Drunk once or more last year (%)	26	53	-27***	28	59	-31***

Marijuana

Used once or more lifetime (%)	51	66	- 17***	64	66	- 1
Used last 12 months (%)	16	25	- 10*	22	26	- 4
Used last 30 days (%)	7	13	- 8*	17	13	+ 5
Used 10 or more times in life (%)	17	39	- 24***	31	39	- 5
No. of days used/last 30 days	0.6	1.1	- .5	1.4	1.1	+ .2
No. of joints a day/last 30 days	0.1	0.3	- .3#	0.5	0.2	+ .3*

Cocaine

Used once or more lifetime (%)	19	33	- 15***	23	30	- 7
Used last 12 months (%)	9	12	- 5	11	14	- 4
Used last 30 days (%)	3	5	- 2	5	6	- 1
Used 10 or more times in life (%)	6	17	- 12**	9	11	- 5
No. of days used/last 30 days	0.4	0.3	+ .1	0.2	0.2	- .1

^a Net differences (Black - White) controlling for sex, age, employment, income, education, student status, and marital status. Nontelephone households excluded from the personal survey.

*** $p < .001$. ** $p < .01$. * $p < .05$. # $p = .06$.

whites on four of the five indicators. The racial differences were attenuated in the telephone survey, with only two estimates suggesting higher levels of smoking for whites.

For alcohol, marijuana, and cocaine, the number and size of race differentials were larger in the telephone than in the personal survey, with black estimates lower than white estimates in nearly all cases. The telephone survey furnished large and significant race differences for all five measures of alcohol consumption, compared to three of five measures in the personal survey. The race findings are most striking for marijuana use. The personal survey indicated significant race differences for only one of the six indicators, with blacks smoking a slightly higher number of joints per day than whites. The telephone estimates show black marijuana use significantly lower than whites' on five of the six indicators, including the use of significantly fewer joints per day than whites. Finally, the personal survey indicated no significant race differentials in cocaine use; by telephone, however, blacks appeared significantly less likely than whites to have ever used cocaine, or to have used it 10 times or more in their lifetimes. It is clear that the two interview modes compared in this study provide very different pictures of black-white differences in all four drug use categories.

Race-of-Interviewer Effects. Survey literature concerning racially sensitive questions has consistently demonstrated race-of-interviewer effects (Schuman and Kalton, 1985). When interviewed by someone of a different race, respondents tend to answer racially sensitive questions in ways considered favorable to the interviewer (Campbell, 1981). Blacks interviewed by whites display less hostility toward whites, less militant civil rights attitudes (Schaeffer, 1980; Schuman and Converse, 1971), and less closeness to blacks (Anderson et al., 1988b), than those interviewed by blacks. Similarly, whites interviewed by blacks respond more liberally on racial issues than those interviewed by whites (Cotter et al., 1982; Hatchett and Schuman, 1975).

These studies suggest that lack of racial matching between interviewer and respondent increases the likelihood of socially desirable responding. Although drug use items do not concern race per se, they may be "racially sensitive." If respondents consider drug use to be socially undesirable, having an interviewer of another race may increase respondents' tendencies to conceal undesirable behavior. Thus, it was important to determine the extent to which the interview mode and race findings in this research were attributable to race-of-interviewer effects.

The number of respondents interviewed by black and white interviewers is shown in Table 5. In the personal survey, nearly all whites, and slightly more than half of blacks, were interviewed by whites.

Table 5. Race of Respondent and Interviewer, by Mode of Interview

	Mode of Interview			
	Telephone		Personal	
	Race of Respondent			
Race of Interviewer	Black	White	Black	White
Black	76 (73%)	427 (67%)	58 (36%)	26 (4%)
White	28 (27%)	206 (32%)	89 (56%)	686 (91%)
Missing	—	3 (.5%)	13 (8%)	40 (5%)
Total	104 (100%)	636 (100%)	160 (100%)	752 (100%)

By telephone, a clear majority of both blacks (73%) and whites (67%) were interviewed by black interviewers. Thus, black respondents were more likely to be interviewed by someone of the same race in the telephone survey. White respondents were much more likely to have a same race interviewer in the personal survey. If racial matching (Schaeffer, 1980) of interviewer and respondent is assumed to elicit more accurate responses to sensitive questions, the telephone mode should have favored blacks in this study and the personal mode should have favored whites. The results reported in Table 3, however, do not support this assumption. Telephone estimates of drug use for whites, the majority of whom were interviewed by blacks, were nearly identical to estimates from the personal survey, where nearly all whites were interviewed by whites. Further, the increased racial matching of respondent and interviewer for blacks by telephone did not result in higher reporting of drug use than in the personal survey, where proportionately fewer blacks were interviewed by black interviewers.

The ability of racial matching to reduce socially desirable responses is controversial. Anderson, Silver, and Abramson (1988a) found blacks *more likely* to overreport voting when interviewed by a black rather than white interviewer, that is, racial matching produced less valid results for blacks. To verify that the patterns of drug self-reporting described in this paper are independent of interviewer race, we calculated drug use estimates for respondents interviewed by same race interviewers only. These estimates are displayed in Table 6. The mode

Table 6. Drug Use Estimates by Interview Mode for Respondents with Same Race Interviewers

	Black Respondent/ Black Interviewer			White Respondent/ White Interviewer		
	Telephone	Personal	<i>p</i> ^a	Telephone	Personal	<i>p</i> ^a
N of cases	76	58		206	686	
Tobacco (cigarette smoking)						
Smoked 5 packs or more lifetime (%)	43	52	n.s.	57	51	n.s.
Smoked in last 12 months (%)	39	56	.06	44	41	n.s.
Smoked in last 30 days (%)	36	52	.08	37	36	n.s.
No. of cigarettes smoked per day	3.3	4.9	n.s.	5.9	6.1	n.s.
No. of years smoked daily	3.4	3.9	n.s.	4.9	3.9	.02
Alcohol						
Drank in last 30 days (%)	51	69	.06	75	84	.01
No. of drinking days/last 30 days	1.6	3.2	.05	5.0	5.4	n.s.
Total drinks/last 30 days	4	14	.09	16	17	n.s.
No. of days had 5 or more drinks	0.2	1.0	.03	1.1	1.4	n.s.
Drunk once or more last year (%)	25	33	n.s.	50	57	.08

	Marijuana					
Used once or more lifetime (%)	46	65	.04	68	67	n.s.
Used last 12 months (%)	17	33	.04	21	25	n.s.
Used last 30 days (%)	8	25	.01	10	13	n.s.
Used 10 or more times in life (%)	17	31	.07	38	38	n.s.
No. of days used/last 30 days	0.6	2.2	.05	0.8	1.1	n.s.
No. of joints a day/last 30 days	0.1	1.3	.03	0.4	0.2	n.s.
	Cocaine					
Used once or more lifetime (%)	21	21	n.s.	33	29	n.s.
Used last 12 months	12	13	n.s.	11	13	n.s.
Used last 30 days (%)	5	6	n.s.	4	6	n.s.
Used 10 or more times in life (%)	8	2	n.s.	15	11	n.s.
No. of days used/last 30 days	0.6	0.2	n.s.	0.2	0.2	n.s.

^a F-test used to determine significance of mode effects; n.s. = **nonsignificant**.

effects on self-reports of drug use for respondents with same-race interviewers were nearly identical to those found for the full sample. For blacks, there were significantly lower alcohol and marijuana estimates by telephone, and some evidence of lower tobacco use estimates as well. For whites, the sole discrepancy between the full sample and those interviewed by whites was for years of daily smoking (a significantly higher estimate by telephone). The lower telephone estimates of drug use for blacks and the increased racial differences in drug use in the telephone versus personal survey do not appear to be attributable to differences between modes in the proportion of black and white interviewers, or to the racial matching of respondents and interviewers.

We should note, however, that interviewers were not randomly assigned to respondents. In the personal survey, black interviewers were assigned to black areas wherever possible and white interviewers to white areas. Respondents interviewed by same-race interviewers have different characteristics than respondents interviewed by someone of a different race. The results in Table 6 cannot be generalized beyond the samples included in this study.

Discussion

Looking down the column of results in Table 3, a justifiable conclusion for whites is that the telephone survey yielded results comparable to face-to-face estimates across all drug groups. Where telephone estimates for whites were significantly lower-for the current use of alcohol and drunkenness-the percentage differences between modes were small. The RDD sample also reproduced the demographic profile for whites found in the personal mode. The dearth of mode effects for whites is especially noteworthy given the large sample sizes (over 1,300 cases) and therefore relatively high power to detect differences.

The conclusions for blacks are very different. The telephone survey introduced a significantly higher SES profile for blacks. After controlling for SES and other demographic characteristics, the telephone survey resulted in substantially lower estimates of blacks' current alcohol consumption and marijuana use, compared to the face-to-face results. The telephone interviews also suggested more and larger racial differences in drug use than the personal survey (Table 4). By telephone, black alcohol and marijuana use was significantly lower than whites' in nearly all categories. The personal survey indicated almost no racial differences in marijuana use, and fewer racial differences in the amount of recent alcohol consumption. The personal survey indicated no significant racial differences in cocaine use; the telephone estimates sug-

gested that blacks were significantly less likely than whites to have ever used cocaine, or to have used it more than ten times. We recognize that neither provides a fully accurate description of black drug use or demographic characteristics. Minority men were substantially underrepresented in the surveys, accounting for only one-third of the respondents in both modes.

MODE EFFECTS BY DRUG CATEGORY

Differences between telephone and personal survey estimates were not found for tobacco use, the least threatening of the four drug groups. This is consistent with the mode comparison literature on health surveys and other less threatening topics (Herzog et al., 1983; Herzog and Rodgers, 1988; Groves, Miller, and Cannell, 1987). Mode effects (for blacks) were more evident as the sensitivity of the questions increased, with the strongest differences for recent and heavy drinking and marijuana use. Contrary to expectation, however, the findings were not as clear for cocaine as for the other three drug groups.

Although the telephone survey furnished consistently lower cocaine use estimates for blacks than did the personal survey, the mode differences were not significant. This was somewhat surprising since questions on cocaine should be at least as sensitive as questions on marijuana use. Mensch and Kandel (1988), for example, found significant underreporting of both marijuana and cocaine in their study of social desirability effects on NLSY drug estimates. The mode differentials for black cocaine use in this study may have reached significance if the sample sizes were larger (as in the NLSY). Studies with larger samples of respondents and with additional drug categories may be needed to sort out the differences in interview mode effects among various drugs.

ORIGIN OF THE INTERVIEW MODE AND RACE EFFECTS

Why would blacks display more sensitivity to mode of interview effects than whites? It is not possible to answer this question definitively with data from this study, or through recourse to the survey literature. We do know, however, that minorities in general appear more prone than whites toward socially desirable responding in sensitive surveys, regardless of interview characteristics. Mensch and Kandel (1988) reported that blacks and Hispanics were twice as likely as whites in the NLSY to underreport drug use and that, in national drug use surveys, estimates of blacks' illicit drug use are consistently lower than estimates for whites. Blacks also appear less likely than whites to report their own criminal behaviors in surveys (Hindelang et al., 1981; Huizinga and Elliott, 1984). It is possible that minorities are more

suspicious than whites of surveys of illicit behavior, and may have less confidence than whites in guarantees of confidentiality. In turn, heightened suspicions may foster increased reactivity to variations in survey methodology among blacks (or other minorities), especially in surveys of illicit or socially sanctioned behavior.

Although this study cannot pinpoint the exact causes of the interview mode effects, a few tenable conclusions can be drawn. The notion that sample characteristics alone account for the mode effects is not supported by the data. We have focused on two sources of bias: RDD's exclusion of nontelephone households and differences in demographic profiles due to nonresponse. Exclusion of nontelephone households from the face-to-face sample and controls for respondent demographic characteristics did not reduce the interview mode and respondent race effects for alcohol, marijuana, or cocaine use. Although respondent characteristics differ in RDD and personal modes, they do not fully account for mode differences in self-reported drug use. Interviewer effects also appeared unrelated to the mode differences. Controlling for interviewer race did not alter the pattern of mode effects for either blacks or whites.

Apart from sampling issues and nonresponse, we suspect that characteristics of the interview situation itself play a role in altering responses to sensitive or threatening survey items. Mode differences in provision of privacy and anonymity are central issues in surveys concerning illegal or socially sanctioned behavior. The self-administered answer sheets for drug use reporting in the personal mode, where interviewers read the questions but do not see the answers, may have provided a greater degree of anonymity to respondents than the telephone interview, where the unseen interviewer hears the report directly. Although randomized response techniques (RRTs) have been developed for telephone surveys (Orwin and Boruch, 1982), it would be very difficult to use these to insure greater privacy in drug surveys. In order to branch to the appropriate follow-up question, the telephone interviewer must know the answer to the filter question; e.g., follow-up questions concerning recent marijuana use can be asked only if lifetime use of marijuana is admitted, and recorded by the interviewer.

Another aspect of questionnaire design that may be involved in the mode effects is redundancy. In the face-to-face interview, respondents recorded an answer to each question on the self-administered answer sheet, regardless of their history of using that particular drug. Persons who indicated that they never used marijuana, for example, were not branched out of the marijuana sequence at that point, but were asked to respond to each marijuana use question. In addition to standardizing the sequence of questions for all respondents, this technique gave respondents more time to reconsider their answers or to admit using a

drug after having initially denied it. The high degree of redundancy involved in this method is impossible in a telephone interview. Pretesting made it abundantly clear that, to avoid an extraordinarily high break-off rate, telephone respondents needed to be branched out of inappropriate question sequences.

Changes in question format for telephone administration (two-step and bracketing procedures) are most likely not related to the mode and race differences. Significant effects were obtained for revised items as well as for items with identical formats in both survey modes. Items with identical formats that yielded significant mode and race effects included: number of drinking days, total drinks, and number of days with five or more drinks; lifetime marijuana and cocaine use, number of days of marijuana use, and number of marijuana joints smoked.

APPLICABILITY TO OTHER SURVEYS

In surveys concerned with sensitive or embarrassing topics, such as sexual behavior, sexually transmitted diseases, drugs, or criminal behavior, the sample characteristics associated with RDD versus area probability sampling may be highly correlated with the behavior the survey is trying to estimate. It is imperative, in sensitive surveys, to correct for the nontelephone household exclusion and for the higher SES profile produced by RDD sampling. In addition, our findings suggest that the impact of social desirability on responses to sensitive questions may vary by mode of interview, and that mode of interview effects may themselves vary among racial and ethnic groups. The results of surveys whose purpose is to estimate racial and ethnic group differences in sensitive or illegal behavior may vary substantially by interview mode. If underreporting of illicit or embarrassing behavior is the biggest threat to validity, researchers interested in sensitive and threatening topics should not assume that all survey modes will furnish equivalent estimates.

Appendix: Verbatim Drug Use Questions

CIGARETTES-SAME WORDING IN TELEPHONE AND FACE-TO-FACE SURVEY

- C1.** The first question is about smoking tobacco. About how old were you when you first tried a cigarette? (Record age, or never tried a cigarette.)
- c2.** Have you smoked as many as five packs of cigarettes, that is, at least 100 cigarettes, in your life?
- c3.** When was the most recent time you had a cigarette? (In the past 30

days, within the past 6 months, within the past year, one to three years ago, more than three years ago, not sure.)

- C4. How many cigarettes have you smoked, on the average, during the past 30 days? Give me the average number per day. (Less than one cigarette a day, one to five cigarettes a day, about half a pack a day [6-15 cigarettes], about a pack a day [16-25 cigarettes], about 1½ packs a day [26-35 cigarettes], about two packs or more a day [over 35 cigarettes], not sure.)
- C5 For how many years did you smoke daily?

ALCOHOL—FACE-TO-FACE SURVEY

- A1. The next questions are about alcohol, that is, beer, wine, and liquor, like whiskey, gin, or mixed alcoholic drinks like gin and tonic. About how old were you the first time you had a glass of beer or wine or a drink of liquor, such as whiskey, gin, scotch, or something else? Do not include childhood sips you may have had from an older person's drink. If you can't remember exactly how old you were, give your best guess. (Record age, or never had a drink.)
- A2 When was the most recent time that you had an alcohol drink, that is, of beer, wine, or liquor or mixed alcoholic drinks? (Within the past month [30 days], within the past six months but more than a month ago, six months to a year ago, more than a year to three years ago, more than three years ago, never had a drink.)
- A3. If you used alcohol during the past 30 days, on how many different days did you have one or more drinks?
- A4. On the days that you drank during the past 30 days, about how many drinks did you usually have a day? By a drink we mean the equivalent of a can of beer, a glass of wine, a shot glass of hard liquor, or a mixed drink.
- A5. During the past 30 days, about how many days did you have five or more drinks on the same occasion? By occasion we mean at the same time or within a couple of hours of each other.

ALCOHOL—TELEPHONE SURVEY

- A1. The next questions are about alcohol, that is, beer, wine, and liquor, like whiskey, gin, or mixed alcoholic drinks like gin and tonic. About how old were you the first time you had a glass of beer or wine or a drink of liquor, such as whiskey, gin, scotch, or something else? Do not include childhood sips you may have had from an older person's drink. If you can't remember exactly how old you were, give your best guess. (Record age, or never had a drink.)
- A2a Was the *most recent time* you had an alcohol drink, that is, of beer, wine, liquor, or mixed alcoholic drinks: within the past 30 days, within the past 6 months but more than 30 days ago, or more than 6 months ago? (If more than six months ago, go to A2b.)

- A2b. Was the most recent time you had an alcoholic drink: six months to a year ago, more than a year to 3 years ago, or more than three years ago?
- A3. During the past 30 days, on how many different days did you have one or more drinks?
- A4. On the days that you drank during the past 30 days, about how many drinks did you usually have a day? By a drink we mean the equivalent of a can of beer, a glass of wine, a shot glass of hard liquor, or a mixed drink.
- A5. During the past 30 days, about how many days did you have five or more drinks on the same occasion? By occasion we mean at the same time or within a couple of hours of each other.
- A6a. In the past 12 months, have you gotten very high or drunk on alcohol more than twice a month, that is, at least 25 days a year?
- A6b. (If yes to A6a): In the last 12 months, have you gotten very high or drunk on alcohol: daily, 3 to 6 days a week, about 1 or 2 days a week, or several times a month, but less than once a week?
- A6c. (If no to A6a): In the last 12 months, have you gotten very high or drunk on alcohol: 1 or 2 times a month, every other month or so, or 6 to 11 days a year, 3 to 5 days in the past 12 months, 1 or 2 days in the past 12 months, or not at all?

MARIJUANA—FACE-TO-FACE

- M1. About how old were you the first time you actually used marijuana or hash? (Record age, or never.)
- M2. Think of all the times you've actually used marijuana, from the first time up to the most recent time. About how many times in your life have you used marijuana or hash? (1 or 2 times, 3 to 5 times, 6 to 10 times, 11 to 49 times, 50 to 99 times, 100 to 199 times, 200 or more times, never.)
- M3. When was the most recent time you used marijuana or hash? (Within the past week, within the past month [30 days] but more than a week ago, within the past six months but more than a month ago, six months to a year ago, more than a year to three years ago, more than three years ago, never.)
- M4. The next few questions are about the last 30 days. On about how many different days did you use marijuana or hash during the past 30 days?
- M5. The rest of these questions are only about marijuana and not hash. About how many marijuana cigarettes, joints, or reefers did you smoke per day on the average during the past 30 days? If you shared them with other people, count only the amount you smoked.

MARIJUANA-TELEPHONE

- M1. About how old were you the first time you actually used marijuana or hash? (Record age, or never.)

- M2a. Next, think about all the times you've used marijuana, from the first time up to the most recent time. Have you used marijuana or hash 50 times or more in your life? (If no, skip to M2d.)
- M2b. In your life, have you used marijuana or hash 200 times or more? (If yes, skip to M3a.)
- M2c. In your life, have you used marijuana or hash 100 times or more? (Skip to M3a.)
- M2d. In your life, have you used marijuana or hashish: 1 or 2 times, 3 to 5 times, 6 to 10 times, or more than 10 times?
- M3a. Think about the *most recent time you* used marijuana or hashish. Was the most recent time within the last six months?
- M3b. (If yes to M3a): Was the most recent time you used marijuana or hashish: within the past week, within the past 30 days, but more than a week ago, or was it more than 30 days ago?
- M3b. (If no to M3a): Was the most recent time you used marijuana or hashish: six months to a year ago, more than a year to three years ago, or more than three years ago?
- M4. The next few questions are about the last 30 days. On about how many different days did you use marijuana or hash during the past 30 days?
- M5. The rest of these questions are only about marijuana and not hash. About how many marijuana cigarettes, joints, or reefers did you smoke per day on the average during the past 30 days? If you shared them with other people, count only the amount you smoked.

COCAINE - FACE-TO-FACE

- CN1. About how old were you the first time you actually used cocaine? (Record age, or never.)
- CN2. Think of all the times you've used cocaine, from the first time up to the most recent time. About how many times in your life have you used cocaine? (1 or 2 times, 3 to 5 times, 6 to 10 times, 11 to 49 times, 50 to 99 times, 100 to 199 times, 200 or more times, never.)
- CN3. When was the most recent time you used cocaine? (Within the past week, within the past month [30 days] but more than a week ago, within the past six months but more than a month ago, six months to a year ago, more than a year to three years ago, more than three years ago, never.)
- CN4. The next few questions are about the past 30 days. During the past 30 days, on about how many different days did you use cocaine?

COCAINE - TELEPHONE

- CN1. About how old were you the first time you actually used cocaine? (Record age, or never.)
- CN2a. Next, think about all the times you've used cocaine, from the first time up to the most recent time. Have you used cocaine 50 times or more in your life? (If no, skip to CN2d.)

- CN2b. In your life, have you used cocaine 200 times or more? (If yes, skip to CN3a.)
- CN2c. In your life, have you used cocaine 100 times or more? (If yes, skip to CN3a.)
- CN2d. In your life, have you used cocaine: 1 or 2 times, 3 to 5 times, 6 to 10 times, or more than 10 times?
- CN3a. Was the most recent time you used cocaine within the past 12 months?
- CN3b. (If yes to CN3a): Was the most recent time you used cocaine: within the past 30 days, within the past six months, but more than 30 days ago, or was it more than six months ago?
- CN3c. (If no to CN3a): Was the most recent time you used cocaine: six months to a year ago, more than a year to three years ago, or more than three years ago?
- CN4. The next few questions are about the past 30 days. During the past 30 days, on about how many different days did you use cocaine?

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