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Measurements, Instruments, Scales, and Tests

Effects of Interview Mode on Bias in Survey Measurements of Drug Use: Do Respondent Characteristics Make a Difference?

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ABSTRACT

Three recent empirical studies have provided strong evidence that self-administered questionnaires (SAQs), compared with interviewer questioning, substantially improve the reporting of drug use in population surveys. Specifically, SAQs appear to diminish underreporting bias. Two of these studies previously reported that this effect of interview mode varied significantly across gender, race/ethnicity, and age. Data from a randomized experiment embedded in the 1990 National Household Survey of Drug Abuse (NHSDA) field test were reanalyzed to test for those interaction effects. To better replicate prior studies, the NHSDA field test sample was restricted to people ages 18 to 45 ($N = 1,877$). The results of our statistical analyses generally replicated the finding of a main effect of SAQs on the reporting of drug use. However, only weak evidence was found to support the hypothesis that the advantage of SAQs varies substantially by the gender, race/ethnicity, or age of the respondent.

Key words. Survey measurement; Interview mode; Self-administered questionnaires (SAQ); Interviewer-administered questionnaires (IAQ); Sensitive behaviors

INTRODUCTION

Population-based estimates of drug use rely on accurate reporting by respondents in surveys, yet a growing body of methodological research suggests that the quality of responses is influenced by the mode of interview. In particular, interview modes that afford greater privacy and anonymity, such as self-administered questionnaires (SAQs), elicit increased reports of drug use when compared with interviewer-administered questioning (IAQ; see Miller et al., 1990:Ch. 6; Turner et al., 1992; Aquilino, 1994). That effect is most pronounced for reports of recent drug use and reports of the use of drugs that would carry heavier criminal sanctions (Turner et al., 1992). The observed increases in the reported prevalence of drug use obtained using SAQs are widely believed to reflect a decrease in measurement bias; the reduction of bias is attributed to the greater privacy of the survey context. However, it is not clear whether the strength of that mode effect is influenced by other factors, such as the characteristics of the respondents.

Data from a recent study of self-reported marijuana, cocaine, and alcohol use support the hypothesis that mode effect can vary by race and ethnicity (Aquilino, 1994). That study recruited a probability sample of 2,417 adults between the ages of 18 and 45 in 1991 from households in the 37 largest United States standard metropolitan statistical areas. Questions about drug use were adapted from the 1990 National Household Survey on Drug Abuse (NHSDA). Subjects were randomly assigned to one of three interview modes: 1) in-person interview with an SAQ for drug and alcohol questions, 2) in-person interview with an IAQ, or 3) telephone interview. Question wording, order, and response categories were identical across survey modes. When comparing data collected from SAQs with data from IAQs, Aquilino found that Black respondents reported significantly more lifetime use of cocaine and crack on SAQs and that Hispanics were significantly more likely to report having used marijuana or been drunk. No significant differences between the two modes (SAQ versus IAQ) were observed among White respondents for any drug (Aquilino, 1994:Table 4). The results suggest that the response anonymity of the SAQ mode has a greater potential impact on Black and Hispanic respondents than on Whites.

In another study of mode effects in a younger sample, Schober and colleagues (1992) reanalyzed data on drug use from the youth cohort of the 1988 National Longitudinal Survey of Labor Market Experience (NLS-Y). That study reported on an experiment embedded in the 1988 survey examining the effect of interview mode on reports of illicit drug use. The study by Schober and coworkers also reported mode differences by race or ethnicity of the respondent, but the pattern was somewhat different from that found by Aquilino. The Schober team's analyses were restricted to 9,308 NLS-Y respondents between the ages of 23 and 30 who completed questions on illicit drug use (marijuana and cocaine). Respon-

dents were randomized to either the SAQ or the IAQ interview mode (that is, an interview in private or in the presence of others). As Aquilino found, Hispanic respondents in the NLS-Y reported more marijuana use in the SAQ mode than in the private IAQ mode. However, unlike the Aquilino study, Schober and colleagues found no differences by mode in reports of cocaine use by Black respondents. Hispanic and White respondents who completed an SAQ reported more frequent recent use of marijuana and cocaine compared with IAQ respondents who were interviewed in private.

In the light of these somewhat contradictory findings, we undertook analyses of demographic differences in the effects of mode of survey administration on the reported use of marijuana, cocaine, and alcohol. Data for the studies came from the 1990 field test of the National Household Survey on Drug Abuse. This paper elaborates on earlier NHSDA analyses that examined variations in the rates of reported drug use by survey mode (Turner et al., 1992). Those results indicated that the SAQ yielded higher estimated prevalence rates of cocaine, marijuana, and alcohol use than the interviewer-administered format (Fig. 1). Examining the ratios for reported use of those drugs in self- versus interviewer-administered questionnaires suggests that the advantage of the SAQ increases with the sensitivity of the drug in question and that it is greatest for drug use in the past 30 days. (The SAQ yielded estimates of the prevalence of recent cocaine use that were 2.4

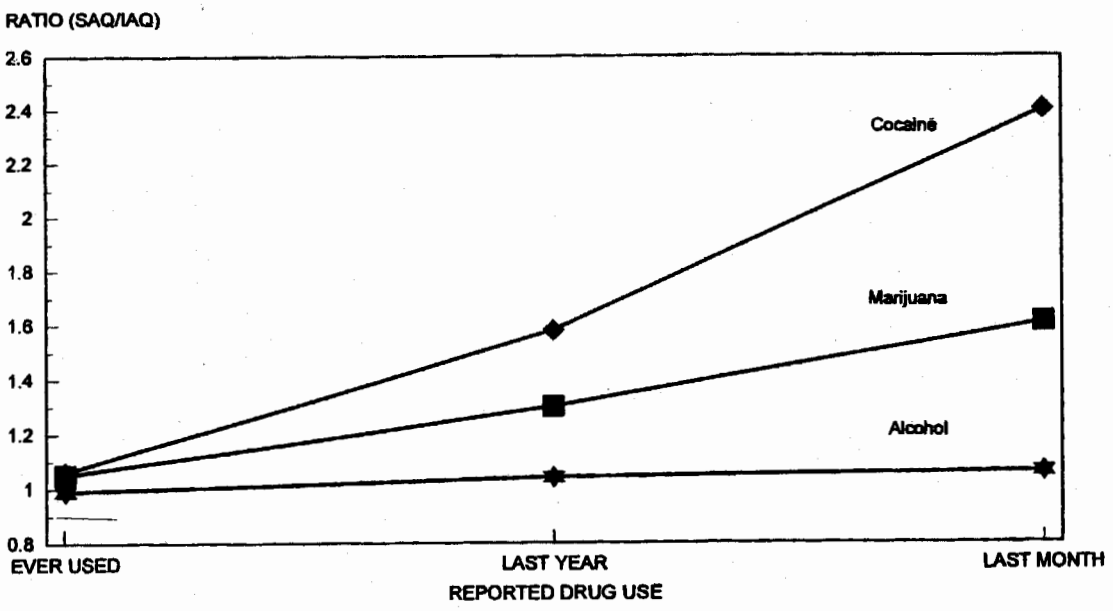

Fig. 1. Ratio of estimates of self-reported drug use, self-administered version divided by estimate from interviewer-administered version: 1990 National Household Survey on Drug Abuse field test.

times higher than estimates obtained with the IAQ.) That earlier study also investigated the interaction of survey mode with respondent characteristics such as age, education, race or ethnicity, and region of residence, and with characteristics of the interview (for example, the degree of privacy and the interviewer's previous experience). In general, the multivariate analyses were not indicative of any pervasive interaction effects (see Turner et al., 1992:Tables 7-7 through 7-10). However, the age range of respondents in those analyses (ages 12 and older) was quite different from the ranges reported by Aquilino (ages 18 to 45) and Schober and coworkers (ages 23 to 30).

Our analyses of the NHSDA field test, unlike those previously reported findings, are restricted to people between the ages of 18 and 45 in order to replicate Aquilino's studies. We also examined the effects of variation in mode of administration by respondent characteristic—specifically race/ethnicity, age, and gender—on self-reported alcohol, marijuana, and cocaine use. We then compared our findings with those of Aquilino (1994) and Schober and coworkers (1992).

METHODS

The 1990 NHSDA methodological field test was designed to assess the effects of two factors on estimates of drug use: interview mode (SAQ versus IAQ) and question wording (the 1990 NHSDA questionnaire compared with a modified questionnaire (see Note 1). The population-based sample comprised people 12 years of age and older living in households. A multistage probability sample was drawn from 33 purposively selected metropolitan areas in the United States. Interviews were completed with 3,325 respondents for a response rate of 76.4%. All interviews were conducted in person; the interviewer read aloud the questions on drug and alcohol use, and the respondent either recorded his or her answers on an SAQ or reported them directly to the interviewer.

The analyses presented here were limited to the 1,877 respondents in the NHSDA field test who were between the ages of 18 and 45; age categories were grouped to permit comparisons with the analyses of Aquilino and Schober and colleagues. Independent variables included mode of interview (SAQ versus IAQ), race/ethnicity (Black, White, or Hispanic), age, and gender. Consistent with the earlier analyses of the NHSDA data (Turner et al., 1992) and with Aquilino's study, dependent variables in our analysis focused on the reported use of three substances: cocaine, marijuana, and alcohol. Nine separate dependent variables were constructed to capture the reported use of each drug within three distinct periods: the respondent's lifetime, the past year, and the past 30 days. Aquilino's analyses focused on the use of those substances during the same three retrospective periods, but he constructed the dependent variables in his analysis as three ordered categorical measures (see Note 2). The analysis by the Schober team drew

on the illicit drug use supplement of the 1988 NLS-Y, which obtained information on lifetime history of use, use within the past month, and use within the past year for cocaine and marijuana only (see Note 3). Those authors compared differences in reports of illicit drug use by age, sex, and race/ethnicity between respondents who received SAQs and respondents who received IAQs in private.

The basic analyses reported in this paper began with cross-tabulations of categorical variables. Sampling weights were employed in deriving all estimates and analyses of drug use prevalence (see Note 4). As a first step, we reviewed the demographic composition of our sample and the samples of Aquilino and Schober and coworkers, demonstrating that they were substantially equivalent with the exception of the age range used in the Schober study (ages 23 to 30). We calculated variations in the rates of reported drug use (combining responses obtained in both versions of the NHSDA field test questionnaire) by mode of interview and selected demographic factors (race/ethnicity, gender, and age). We then compared those findings with weighted demographic and mode-specific estimates provided by Aquilino and Schober and colleagues.

In our analysis we used hierarchical log-linear modeling procedures (Goodman, 1971, 1978) to test the main effects of interview mode on self-reported drug use and the interaction of mode with race/ethnicity, gender, and age. Tests of model fit were performed for hierarchies of log-linear models according to the methods of Goodman (1978). Tests of main and interaction effects compared the fit of alternative models with the five-way cross-tabulation of reported drug use by mode of interview and by race/ethnicity, age, and gender. Likelihood ratio chi-square statistics were calculated for each model. The results of those modeling procedures were compared with the results of the ordered logit models (with race-by-interview-mode interaction terms) fit by Aquilino (see Note 5).

RESULTS

Composition of Samples

Table 1 presents the unweighted characteristics of our sample as well as those of the samples of Aquilino and Schober and colleagues. The random assignment of respondents to an interview mode (SAQ versus IAQ) in each of the surveys resulted in similar unweighted demographic characteristics for the two mode groups. In the 1990 NHSDA field test, the distribution of respondents by race/ethnicity, gender, and education was nearly identical for people who had completed the SAQ and people who had completed the IAQ. However, there were some variations across the three samples in their unweighted characteristics.

Table 1.

Comparison of Unweighted Sample Characteristics by Mode of Interview, SAQ versus IAQ[a]

Characteristic	1990 NHSDA field test[b] mode of administration		Aquilino (1994)[c] mode of administration		Schober et al. (1992)[d] mode of administration	
	SAQ (%)	IAQ (%)	SAQ (%)	IAQ (%)	SAQ (%)	IAQ (%)
Race:						
Non-White non-Hispanic	22	20	25	27	26	28
White non-Hispanic	65	67	59	57	59	55
Hispanic	13	13	16	17	16	16
Sex:						
Male	44	44	43	45	47	48
Female	56	56	57	55	53	51
Education:						
Less than high school	11	11	10	11	17	18
High school or beyond	89	89	90	89	83	82
Marital status:						
Married	39	44	43	47	49[e]	47
Widowed/divorced/separated	12	12	15	15	13	13
Never married	49	44	42	39	38	40
N	941	936	759	749	4,971	4,337

[a]Estimated percentages are unweighted.

[b]The 1990 National Household Survey on Drug Abuse (NHSDA) field test was a household survey of individuals 12 years of age and older. The multistage probability sample was drawn from 33 purposively selected metropolitan primary sampling units. All interviews were conducted in person; drug and alcohol questions were read aloud by the interviewer and responses were recorded either on a self-administered questionnaire (SAQ) or reported directly to the interviewer. The present analyses were restricted to the same population ages 18 to 45.

[c]The Aquilino (1994) sample included 2,417 adults ages 18 to 45 drawn as a multistage area probability sample of the 37 largest metropolitan statistical areas in the United States. Sampled respondents were randomly assigned within sample clusters to one of three experimental treatments: in-person survey with SAQ; in-person, interviewer-administered-questionnaire (IAQ) survey; or telephone survey. Sample sizes in the two treatment conditions (personal interview with SAQ vs no SAQ) reported in this table represent approximately two-thirds of the total *N* of 2,417.

[d]Schober et al. (1992) report on the 9,746 respondents who participated in the youth cohort of the 1988 round of the National Longitudinal Survey of Labor Market Experience (NLS-Y) and completed the illicit drug supplement, and for whom information on mode of survey administration was available. The NLS-Y is a panel survey of the cohort ages 14 to 21 as of January 1, 1979. Respondents were randomly assigned to either SAQ or IAQ; 561 respondents interviewed by telephone were excluded from the analyses. An additional 438 respondents who were interviewed in person with others present were excluded from this table (see text for details).

[e]Marriage categories were 1) married or widowed, 2) divorced or separated, or 3) never married.

Variation in Prevalence Estimates by Interview Mode

Table 2 presents weighted estimates of self-reported marijuana, cocaine, and alcohol use for each of the surveys for the three retrospective periods by mode of interview. All prevalence estimates used weights that were appropriate for projecting sample estimates to the respective populations: 1) NHSDA field test, adults 18 to 45 years of age from 33 purposively selected metropolitan areas in the United States; 2) Aquilino, adults ages 18 to 45 in the 37 largest metropolitan statistical areas in the United States; and 3) Schober and colleagues, a national sample of adults ages 23 to 30 at the time of interview in 1988 (see Note 6). As expected, for all nine measurements of the prevalence of drug use, estimates were higher among respondents assigned to an SAQ mode than among those assigned to an IAQ mode. Differences by mode in the NHSDA field test were statistically significant for reports of cocaine, marijuana, and alcohol use in the past 30 days; they were either statistically significant or approaching significance for use of the three drugs during the past year. No mode effect was observed for reports of lifetime use of any of the drugs.

These results are not fully consistent with Aquilino's findings. Using ordered logit models to test the significance of mode effects, Aquilino (1994) found that SAQs yielded marginally higher ($p < .10$) estimates of cocaine and alcohol use; effects for the use of marijuana were not significant. Results reported by Schober and colleagues (1992) were similar to our findings for marijuana and cocaine use, with the exception that their study found a significant mode difference in reporting of lifetime use of cocaine. The prevalence estimates of cocaine and marijuana use obtained by the Schober team were higher than those reported in the NHSDA, which may reflect the age differences between the samples. Schober and colleagues reported on respondents 23 to 30 years of age, whereas our sample and the Aquilino sample comprised respondents between the ages of 18 and 45. In addition, the results presented in Table 2 from Schober and colleagues (1992) are restricted to those respondents who were interviewed in private (separate tabulations were reported for personal interviews conducted in the presence of others).

Variation in Prevalence by Race/Ethnicity, Age, and Gender

Table 3 contains the weighted NHSDA estimates of reported past-month, past-year, and lifetime use of cocaine, marijuana, and alcohol by interview mode and by three demographic characteristics of respondents: race/ethnicity, age, and gender. Those data show remarkable consistency in increased reporting of drug use with an SAQ compared with an IAQ. Nonetheless, there is considerable variation in the magnitude of the mode effect for the different demographic subgroups and for different retrospective periods of reporting. Those observations give rise

Table 2.

Prevalence Estimates for Alcohol and Drug Use Derived from Surveys Comparing Self-Administered Questionnaires (SAQ) in Personal Interview Visits and Interviewer-Administered Questionnaires (IAQ)[a]

Measurement	1990 NHSDA field test estimated prevalence (per100)			Aquilino (1994) stimated prevalence (per 100			Schober et al. (1992))estimated prevalence (per 100)		
	SAQ	IAQ	*p*	SAQ	IAQ	*p*[b]	SAQ	IAQ	*p*[c]
Cocaine:									
Use within past 30 days	2.2	0.9	0.02	1	1		4	2	<.001
Use within past year	5.1	3.2	0.05	3	2		11	8	<.001
Ever used	22.2	21.3	0.66	25	22	<.10	29	26	<.001
Marijuana:									
Use within past 30 days	8.0	5.1	0.01	6	5		14	10	<.001
Use within past year	12.9	10.3	0.08	13	10		24	19	<.001
Ever used	53.4	52.6	0.74	58	57	ns	65	63	ns
Alcohol:									
Use within past 30 days	64.2	59.4	0.04	65	61		na	na	
Use within past year	82.2	77.3	0.01	81	77		na	na	
Ever used	91.8	89.8	0.14	92	91	<.10	na	na	
N (unweighted)	941	936		759	749		4,971	4,337	
Sample	33 MSAs, ages 18–45			37 largest SMSAs, ages 18–45			NLS-Y cohort, ages 23–30		

[a]Weighted prevalence estimates: na = not available; ns = not significant, $p > .10$; MSA = metropolitan statistical area; SMSA = standard metropolitan statistical area; NLS-Y = National Longitudinal Survey of Labor Market Experience, Youth Cohort.

[b]Aquilino (1994) fit ordered logit models in which drug use was coded as follows: 0 = never used; 1 = used more than a year ago; 2 = used within the past year; and 3 = used within the past 30 days. Compared with the SAQ mode, the personal mode without SAQs yielded marginally lower ($p < .10$) estimates of cocaine and alcohol use ($p < .10$). Results of mode comparisons were not significant for marijuana use.

[c]IAQ respondents are restricted to those who were interviewed in private (4,337 of 4,775). *p* values are based on chi-square tests for differences in reported drug use by mode of interview (see Schober et al., 1992).

Table 3.

Weighted Prevalence of Self-Reported Drug and Alcohol Use by Mode of Survey Administration, Race/Ethnicity, Age, and Gender among Respondents 18 to 45 Years of Age: 1990 National Household Survey of Drug Abuse Field Test (unweighted Ns shown in parentheses)

Drug and reported period of last use		Respondent characteristic	SAQ		IAQ	
			Estimate	(Base *N*)	Estimate	(Base *N*)
Cocaine:						
Past month	Race	Black	3.9	(208)	1.2	(186)
		White	1.8	(596)	0.6	(623)
		Hispanic	0.0	(117)	1.0	(120)
	Age	18–25	2.7	(340)	1.8	(332)
		26–34	1.6	(415)	1.3	(411)
		35–45	2.4	(171)	0.0	(190)
	Gender	Female	1.6	(525)	0.6	(525)
		Male	2.8	(401)	1.3	(408)
Past year	Race	Black	5.9	(203)	3.0	(185)
		White	4.7	(595)	3.3	(623)
		Hispanic	4.5	(115)	2.1	(120)
	Age	18–25	7.1	(338)	5.4	(331)
		26–34	5.5	(412)	5.9	(411)
		35–45	3.4	(168)	0.0	(190)
	Gender	Female	3.8	(522)	2.1	(524)
		Male	6.5	(396)	4.8	(408)
Ever	Race	Black	18.0	(207)	14.4	(186)
		White	24.3	(603)	24.3	(623)
		Hispanic	13.6	(117)	12.4	(120)
	Age	18–25	23.9	(341)	17.4	(332)
		26–34	24.1	(417)	28.4	(411)
		35–45	19.4	(174)	17.9	(190)
	Gender	Female	19.6	(527)	17.5	(525)
		Male	25.3	(405)	26.3	(408)
Marijuana:						
Past month	Race	Black	7.4	(205)	6.6	(186)
		White	8.8	(596)	5.0	(622)
		Hispanic	3.4	(116)	2.1	(119)
	Age	18–25	14.2	(341)	7.7	(330)
		26–34	8.0	(411)	6.3	(410)
		35–45	3.9	(170)	2.6	(190)
	Gender	Female	5.8	(521)	3.1	(524)
		Male	11.1	(401)	7.7	(406)
Past year	Race	Black	10.9	(204)	10.8	(186)
		White	13.6	(596)	10.8	(621)
		Hispanic	10.2	(117)	5.2	(119)
	Age	18–25	23.6	(340)	16.2	(330)
		26–34	12.5	(411)	13.6	(409)
		35–45	6.0	(171)	3.9	(190)

Table 3. *Continued.*

Drug and reported period of last use		Respondent characteristic	SAQ		IAQ	
			Estimate	(Base *N*)	Estimate	(Base *N*)
	Gender	Female	10.1	(522)	6.0	(523)
		Male	16.2	(400)	15.9	(406)
Ever	Race	Black	39.3	(208)	39.2	(185)
		White	58.4	(601)	60.1	(623)
		Hispanic	46.1	(118)	26.0	(119)
	Age	18–25	57.3	(343)	49.8	(331)
		26–34	62.4	(417)	58.4	(410)
		35–45	42.6	(172)	49.6	(189)
	Gender	Female	54.1	(528)	49.6	(524)
		Male	52.4	(404)	56.7	(406)
Alcohol:						
Past month	Race	Black	44.9	(208)	42.8	(184)
		White	72.1	(603)	65.9	(624)
		Hispanic	47.7	(116)	42.3	(120)
	Age	18–25	61.9	(343)	62.9	(332)
		26–34	65.9	(418)	61.3	(409)
		35–45	64.1	(171)	55.6	(192)
	Gender	Female	58.0	(525)	53.7	(526)
		Male	71.9	(407)	66.8	(407)
Past year	Race	Black	68.0	(208)	58.2	(184)
		White	89.2	(603)	83.6	(624)
		Hispanic	61.4	(116)	67.0	(120)
	Age	18–25	78.4	(343)	79.4	(332)
		26–34	84.4	(418)	74.5	(409)
		35–45	82.8	(171)	78.3	(192)
	Gender	Female	78.0	(525)	73.7	(526)
		Male	87.3	(407)	82.1	(407)
Ever	Race	Black	82.2	(210)	75.0	(186)
		White	96.7	(605)	95.3	(623)
		Hispanic	77.5	(119)	77.6	(121)
	Age	18–25	88.2	(345)	87.9	(332)
		26–34	93.4	(420)	90.8	(411)
		35–45	92.7	(175)	90.1	(192)
	Gender	Female	90.5	(532)	88.6	(528)
		Male	93.4	(408)	91.3	(407)

to questions concerning the possible interaction of respondent characteristics with the interview mode. For example, are females more sensitive than males to the increased anonymity afforded by the self-administered questionnaire? To explore such issues, we undertook a series of multivariate analyses of the interactions between interview mode and demographic characteristics and their effects on

estimates of drug use in the 1990 NHSDA methodological field test. In the next set of analyses, we fit models to test for the main effects of interview mode on the reported prevalence of drug use and for the interaction effects of age, gender, and race/ethnicity with mode.

Models of Main Effects and Interaction

Hierarchical log-linear models (see Goodman, 1971, 1978) were fit to estimate the reported use of cocaine, marijuana, and alcohol in the three retrospective periods as a function of the interview mode as well as the interaction of mode with each of the three respondent characteristics (race/ethnicity, gender, and age). That technique allowed us to simultaneously examine the effect of mode and respondent characteristics on each of the nine outcome variables—that is, use of each of the three drugs reported for three retrospective periods. For example, models were fit to determine whether the difference between the SAQ and IAQ interview modes for reports of marijuana use in the past month was larger among males than among female respondents.

The results of tests of both main effects (i.e., interview mode on drug use) and interaction effects (i.e., mode and demographic subgroup on drug use) are presented in Table 4. The table shows main and interaction effects that are estimated to be different from zero, with p equaling less than .10. Tests of main (mode) effects were statistically significant for use of cocaine ($p < .05$) and marijuana ($p < .025$) only within the past month). The mode of questionnaire administration did not affect reporting of marijuana or cocaine use for the past year or over the respondent's lifetime. However, the main effect of interview mode was significant for reports of alcohol use during both the past month ($p < .025$) and the past year ($p < .005$) (see Note 7).

Race/ethnicity showed a significant interaction with interview mode for reporting of lifetime use of marijuana. The data in Table 3 suggest that this interaction reflects the greater sensitivity of Hispanics to the mode of survey administration. The estimated prevalence of lifetime use of marijuana among Hispanics was 46% in the SAQ mode compared with only 26% in the IAQ mode. In contrast, reporting of lifetime use of marijuana among Black and White respondents appeared to be unrelated to the interview mode.

Age also showed a significant interaction with interview mode for reporting of cocaine use within the past year ($p < .025$). The prevalence estimates for past-year cocaine use indicated a weak or null mode effect for 18-to-25-year olds (7.1% in the SAQ mode vs 5.4% in the IAQ mode) and for 26-to-34-year olds (1.6 vs 1.3%). However, for respondents 35 to 45 years of age, estimates of the prevalence of cocaine use in the past year increased from zero in the IAQ mode to 3.4% in the SAQ mode. Results suggestive ($p < .10$) of a different pattern of

Table 4.

Tests of Significance for Main and Interaction Effects of Mode of Interview and Demographic Variables on Reported Prevalence of Drug Use among Respondents 18 to 45 Years of Age: 1990 National Household Survey on Drug Abuse Field Test[a]

Drug, mode, and interaction effects	Time period of reported drug use		
	Past month	Past year	Lifetime
Cocaine:			
Mode	$p < .05$	ns	ns
Mode by race/ethnicity	ns	ns	ns
Mode by age	ns	$p < .025$	$p < .10$
Mode by gender	ns	ns	ns
Marijuana:			
Mode	$p < .025$	ns	ns
Mode by race/ethnicity	ns	ns	$p < .01$
Mode by age	ns	ns	$p < .10$
Mode by gender	ns	$p < .10$	$p < .025$
Alcohol:			
Mode	$p < .025$	$p < .005$	$p < .10$
Mode by race/ethnicity	ns	ns	ns
Mode by age	ns	ns	ns
Mode by gender	ns	ns	ns

[a]ns = not significant. Tests were performed by fitting hierarchical log-linear models to the five-way distribution of reported drug use {D}, mode of administration {M}, race/ethnicity (R}, age {A}, and gender (G}. Tests for the main effect of interview mode on reporting of each category of drug use assessed the improvement in fit for a model that included a term for the main effect: (model {MRAG} {RAGD} {DM}) to a base model that did not fit (model: {MRAG} {RAGD}). Statistics tested the null hypothesis that the distribution of responses to drug use questions reflected only random variation in the assignment of respondents to different modes of questionnaire administration. Tests for interactive effects with mode compared the main effect model with models that included terms for each demographic characteristic. For example, to test for interaction of mode with age, the main effect model {MRAG} {RAGD} {DM} was compared with a model that included a term for age (model: {MRAG} {RAGD} {DMA}). Main and interaction effects estimated to be different from zero, with $p < .10$, are shown. Race is specified as non-White/non-Hispanic, White/non-Hispanic, and Hispanic; age is coded as 18–24, 25–34, and 35–45. Note that these analyses differ from those reported in Turner et al. (1992:Tables 7-4 and 7-7) in that the sample here is restricted to respondents aged 18–45.

interaction of mode with age were found for reporting of lifetime use of cocaine and marijuana. In both of those cases the results suggest a greater sensitivity of younger people (i.e., ages 18 to 25) to mode of administration.

The interaction of interview mode with gender was significant for reporting lifetime use of marijuana ($p < .025$), but the effects were borderline ($p < .10$) for reports of marijuana use within the past year. Female respondents in the self-administered mode were more likely to report lifetime use of marijuana compared

with females in the interviewer-administered mode (54.1% in the SAQ vs 49.6% in the IAQ mode) while the reverse pattern was found for male respondents (56.7% in the IAQ mode vs 52.4% in the SAQ mode).

None of the interactions between mode and demographic characteristics were significant for any reports of alcohol use. Nor were they significant for past-month use of any drug.

How do these results compare with the findings of Aquilino and Schober and colleagues? Table 5 summarizes the results of significant tests from the ordered logit regression models used in the Aquilino analyses. Aquilino fit models with and without race-by-interview-mode interaction terms; he also fit models separately for Blacks, Whites, and Hispanics for the cocaine- and marijuana-dependent variables. In Aquilino's models without interaction terms (column 1 of the table), the IAQ mode yielded lower estimates of cocaine and alcohol use than did the SAQ, but the results were only marginally significant ($p < .10$); results were not significant for use of marijuana. Mode-by-race interactions (column 2; SAQ vs IAQ) were significant for reports of marijuana use. More specifically, Aquilino found that the use of SAQS increased reports of marijuana use among Hispanics; however, no differences between the modes were seen for use by Whites or Blacks.

Column 3 of Table 5 presents Aquilino's results for models fit separately for Blacks, Whites, and Hispanics to examine the magnitude of the mode differences by race/ethnicity. The mode of interview had a significant effect on reports of cocaine use among Blacks and on reports of marijuana use among Hispanics. That is, the magnitude of the difference between the IAQ and the SAQ modes in reporting of cocaine use was greater for Blacks than for Whites or Hispanics in Aquilino's analyses. In particular, a significant negative effect on self-reported cocaine use was observed for the IAQ mode vs the SAQ mode for Black respondents but not for White or Hispanic respondents. Among Hispanic respondents, the SAQ mode also yielded higher estimated prevalences of reported marijuana use than did the IAQ mode, but no differences were observed for Whites or Blacks.

Schober and colleagues found no difference in reporting of illicit drug use by gender or age between respondents who completed an SAQ and IAQ respondents who were interviewed in private (see Note 8). However, reports of past-month and past-year use of cocaine varied by race/ethnicity for respondents in the self-administered vs those in private-interviewer-administered groups. Among people completing SAQs, past-year cocaine use was greater among Whites than among Blacks or Hispanics. In Schober and colleagues' analyses, the estimated prevalence of cocaine use during the past month was higher among Whites and Hispanics in the SAQ mode, whereas among respondents who completed the IAQ in private, Blacks reported the highest level of use of cocaine within the past

Table 5.

Tests of Significance from Ordered Logit Models of Mode Effects on Reported Drug Use (Aquilino, 1994)[a]

		Mode-by-race interaction[c]		Model fit separately for[d]		
	Mode effect[b]	Black	Hispanic	Blacks	Whites	Hispanics
Cocaine	$p < .10$	ns	ns	$p < .05$	ns	ns
Marijuana	ns	ns	$p < .01$	ns	ns	$p < .01$
Alcohol	$p < .10$	ns	ns	[e]	[e]	[e]

[a]$N = 2,448$; significance tests one-tailed; ns = not significant. Ordered logit models with dependent variable coded 0 if never used the drug, 1 if used more than year ago, 2 if used within the past year, and 3 if used within the past month.
[b]Personal interview with no self-administered questionnaire (SAQ) versus (SAQ) (Aquilino, 1994:Table 3; Model 1 estimates for equations without mode-by-race interactions).
[c]Personal interview (no SAQ) versus SAQ (Aquilino, 1994:Table 3; Model 2 estimates with mode-by-race interactions).
[d]Mode effects models were fit separately for Blacks, Whites, and Hispanics for use of marijuana and cocaine only.
[e]Tests for alcohol were not calculated.

month. The weighted prevalence estimates of marijuana use in the past month and in the past year varied by mode of interview for White and Hispanic but not for Black respondents. No differences between the two modes were noted in reported lifetime use of marijuana or cocaine by race/ethnicity.

DISCUSSION

There is little doubt that the mode of interview has an impact on self-reports of illicit drug use. Overall, people appear to be more willing to reveal their history of drug use when completing a self-administered questionnaire than when answering questions posed by another person in a face-to-face interview. Results from our analyses of the 1990 NHSDA field test suggest that mode effects vary with item sensitivity and recency of drug use. That is, the strongest effects found in those studies were for the use of cocaine and marijuana within the past month. However, tests for interaction effects of mode with a respondent's age, gender, and race/ethnicity do not support the notion of *systematic* variation in the strength of the mode effect by those demographic characteristics. For the most part, in the 1990 NHSDA methodological field test, the effect of mode of survey administration on reports of drug and alcohol use for the three retrospective periods were similar for men and women, for Whites, Blacks, and Hispanics, and for respondents of all ages. We tested for 27 such interactions, and found that only 3 were significant with $p < .05$. Specifically, interview mode evidenced significant interaction effects with race/ethnicity and with gender for the reporting of lifetime use of marijuana, and with age for the reporting of cocaine use within the past year.

Our NHSDA analyses do lend weak support to Aquilino's and Schober and colleagues' findings of a differential mode effect by race/ethnicity. As those earlier studies found, reporting of the lifetime use of marijuana by Hispanic respondents was more strongly influenced by interview mode than were such reports by other race/ethnic groups. However, we were unable to replicate findings of a significant mode-by-race interaction in reporting of alcohol or cocaine use. The reason for that outcome is not clear. Randomized designs were employed in all of the studies, and we purposely restricted our study population to coincide with the age group that Aquilino studied. It may be that mode differences observed by others are related to factors that were not included in our analyses, such as socioeconomic status. Alternatively, differences may be related to factors other than demographic characteristics. For example, certain subpopulations may perceive the questions as more sensitive or may have different interpretations of the "risks" associated with the behaviors in question, and their responses might be more vulnerable to mode effect. The lack of a systematic interview mode effect for demographic subgroups in these analyses on illicit drug use does not rule out

the possibility of differential mode effects for other sensitive behaviors or for other subgroups (see Note 9).

In discussing his findings, Aquilino suggested that concerns about protection of anonymity and confidentiality of responses might account for some of the racial differences in the magnitude of mode effects. Minorities might have a disproportionately greater concern, compared with other groups, about responding in a face-to-face situation to questions on such sensitive behaviors as drug use. In his analysis, however, controlling for respondent mistrust could not explain the racial differences in the magnitude of mode effects. To investigate that possibility, Aquilino suggests that standardized measures of respondents' beliefs about confidentiality be incorporated into survey designs.

Other researchers have also questioned whether the perceived risk of revealing the use of illicit drugs may be of greater consequence if concerns about breaches of confidentiality vary considerably across subgroups. Some studies have suggested that minority groups may feel more threatened by or uncomfortable about self-reports of illicit behaviors and therefore more inclined to provide socially desirable responses in surveys (Mensch and Kandel, 1988). That tendency may be particularly pronounced when providing responses directly to an interviewer (see Note 10). Other features of the interview process itself, such as interviewer experience, the interaction between the respondent and the interviewer, or the cognitive demands on the respondent in answering questions, may directly or indirectly alter mode effects in survey measurements of sensitive behaviors.

The ability to enhance respondent's perceived anonymity and confidentiality in reporting sensitive information in survey questionnaires is critical for much behavioral research. Although SAQs are a reasonable technology for surveying sexual, contraceptive, and other sensitive behaviors, they are limited by the literacy of the surveyed population and by the ability of respondents to follow sometimes complex branching and skipping instructions on the self-administered form (Turner et al., 1997). Recently, researchers have developed an audio computer-assisted, self-interviewing (audio-CASI) technology to administer complex questionnaires in personal-interview surveys (O'Reilly and Turner, 1992; Turner et al., 1993; O'Reilly et al., 1994). Using portable laptop computers, respondents listen to questions through headphones and enter their answers by pressing labeled keys. Preliminary findings from a number of small trials of the technology and from large-scale field experiments suggest that respondents have no difficulty using it, that they prefer it to a paper-and-pencil SAQ, and that they are more likely to report some sensitive behaviors (Turner et al., 1998). Technologies such as this could advance investigations of the interaction between mode effects and demographic characteristics of respondents in additional populations as well as

across additional interview modes. Such studies are needed to explain the magnitude of differences in response between survey modes and to improve the quality of survey data.

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NOTES

1. See Turner et al. (1992) for a description of the modifications embedded in the 1990 NHSDA field test.
2. For each drug Aquilino analyzed, he constructed dependent variables so that 0 = never used, 1 = used more than 1 year ago, 2 = used in the past 12 months, and 3 = used in the past 30 days. In contrast, we used nine binary variables in our analyses.
3. Results are presented as weighted proportions (with 95% confidence intervals) of respondents who reported using marijuana and cocaine in the three periods by race/ethnicity and mode of interview (Schober et al., 1992).
4. Normed sample weights are employed in the analysis. (The normed weights were constructed so that weighted sample *N*'s approximately equaled the unweighted *N*.) Our statistical analyses treat the resultant data as a closed population that has been randomly assigned to one of two experimental conditions (SAQ or IAQ). The second variable manipulated in this experiment (question wording) was not included in these analyses because earlier work indicated that it did not have substantial effects on the reporting of drug use (Turner et al., 1992).
5. For Aquilino's 1994 analysis, dependent variables indicating use of marijuana, cocaine, and alcohol were constructed as ordered categorical variables. Ordered logit models were fit for each of the dependent variables (see Winship and Mare, 1984, for a discussion of logit models with ordinal variables). Models were fit both with and without race-by-interview-mode interactions; for those with significant race-by-mode interactions (use of marijuana and cocaine), models were fit separately by race/ethnicity (Blacks, Whites, and Hispanics).
6. In particular, the cohort aged 14 to 21 years as of January 1, 1979.
7. As noted previously, those results differed from findings reported earlier by Turner et al. (1992) in that they represent a subset of the sample population age 12 and older.
8. Schober and colleagues' (1992) analyses of variation in self-reported drug use by interview mode and demographic characteristics were restricted to two groups of respondents: those who received SAQs and IAQ respondents who were interviewed in private.
9. We conducted additional analyses (not shown here) to test for the effects of interactions between mode and marital status on the prevalence of reported drug use, but the results were not statistically noteworthy.

10. Wallace and Bachman (1993) maintain, however, that racial differences in reported drug use among young minority groups are not due to underreporting among minorities. They note that the patterns of race/ethnic differences have persisted over time and are consistent with differences in racial attitudes toward drug use.

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RESUMEN

Tres estudios empíricos recientes han proporcionado sólida evidencia de que los cuestionarios auto-administrados (QAA) mejoran sustancialmente el reporte de consumo de drogas en encuestas de población.

Comparado con las encuestas realizadas por encuestadores, los QAAs parecen disminuír el sesgo por ocultamineto de información. Dos de estos estudios han concluído que el efecto asociado con el modo de encuesta varía significativamente con el sexo, raza/etnia y edad. Datos aportados por un experimeneto aleatorio incluído en el test de campo de la Encuesta Nacional de Hogares sobre Consumo de Drogas de 1990 (ENHCD) están siendo re-analizados para determinar la existencia de estos efectos de interacción. Para reproducir mejor estudios anteriores, el test de campo de la ENHCD fue restringido a personas de 18 a 45 años de edad (N = 1877). Los resultados de neustros análisis estadísticos generalmente reproducen el hallazgo de un efecto general de los QAA's en el reporte de consumo de drogas, pero encuentra escasa evidencia en favor de la hipótesis de que la ventaja de los QAA's varía sustancialmente con el sexo, raza/etnia o edad del encuestado.

RÉSUMÉ

Trois étude empiriques récentes ont fournis les éprouves que les questionnaires données à soi-même (Self-Administered Questionnaires - SAQs) améliorent considérablement le reportage de l'usage des drogues dans les enquêtes de la population générale. Par rapport aux interogations faites par les enquêteurs, les SAQs donnent l'air de diminuer les penchants pour sous-reportage. Deux de ces études ont indiquées précédemment que cet effet de mode d'enquête vaire d'une façon significative à travers le genre, la race, le groupe ethnique et les groupes d'âges. Les données d'une expérience enchassée dans le 1990 National Household Survey of Drug Abuse (NHSDA) Field Test (Enquête Nationale des Ménages des Abus de Drogues) ont été utilisées pour refaire les analyses pour examiner ces effets d'interactions. Pour mieux reproduire les études précédentes, la section représentative de la population dans le NHSDA Field Test était restrictée aux gens âgés de 18 à 45 ans (N = 1.877). Les résultats de nos analyses statistiques reproduissent en général la conclusion de l'effet principal des SAQs sur le reportage de l'usage des drogues, mais il n'y a que de l'éprouve faible pour soutenir l'hypothese que l'avantage des SAQs varie considerablement par le genre, la race, le groupe ethnique ou l'âgé de la personne interrogée.