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Measuring AIDS-Related Behaviors in Older Populations: Methodological Issues

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Abstract

Because of a dearth of research on reporting biases in the measurement of HIV-related sexual and drug use behaviors in older populations, it is frequently assumed that methodological findings of research conducted with younger populations will generalize to older respondents. In this study, estimates of the effect of the experimental manipulation of interview mode (interviewer administered vs. self-administered) were derived separately for three age strata: 12 to 49, 50 to 64, and 65+. Results of these analyses indicate that there were a number of noteworthy reversals in which interviewer-administered questioning in the older age strata produced higher estimates of the prevalence of substance use or alcohol-related problem behaviors. These results suggest that caution should be exercised in making generalizations from studies of reporting bias for HIV-related behaviors to older populations.

INTRODUCTION¹

In the years since the development of simple tests for the presence of the human immunodeficiency virus (HIV) in blood products, transmission of HIV has been concentrated among younger age groups. As a result, acquired immunodeficiency syndrome, or AIDS, which is caused by HIV, has been characterized as a disease of the young, with relatively few direct consequences for older segments of the population.² That notion is bolstered by the concentration of 80 percent of AIDS cases among the under-45 year-old population and the fact that for several years, AIDS was the leading cause of death in the 25- to 44-year-old population (CDC, 1997). Because of high levels of rapid mortality previously associated with the onset of AIDS, large cohorts of HIV-infected persons simply have not survived into middle and old age.

Recently, though, hopes have emerged that the age profile of the HIV-infected population may change. New combination antiretroviral therapies are available to reduce viral loads and may result in greater longevity. If the promise of those therapies is borne out over the long term, we may begin to see a shift toward an older HIV-positive population, with survivors leading longer, healthier lives.

This emerging group of older people with HIV is likely to be different from the younger HIV-infected population. Differences in age, for example, affect decision-making processes. The two groups also have different health needs. A further difference is likely to be risk

¹In the introductory section of this article, we have drawn on the authors' contributions to other jointly prepared works including Turner, Danella, and Rogers (1995); Turner et al. (1996a,b,c; forthcoming); Turner, Miller, and Rogers (1997); Turner and Miller (forthcoming); and Miller et al. (forthcoming). Preparation of this paper was supported by grants from the National Institute of Child Health and Human Development and the National Institute on Aging (R01-HD/AG31067-04) and from the National Institute on Mental Health (R01-MH56318-01).

²At the outset of the epidemic, before the isolation of HIV and development of the HIV blood test, a notable spread of HIV occurred in the older population through the use of untreated blood products that carried the virus.

behaviors among the two groups. Before we can direct specific, effective outreach activities toward older HIV-positive people, we need to learn more about their needs and behaviors.

Survey methodological research, which previously was not possible because of the small number of older people who had survived HIV and opportunistic infections, can now be conducted and should provide a better understanding of how older people report a range of sensitive behaviors associated with HIV transmission.

Only in the past several years have the social sciences begun to focus substantial attention and resources on sexual behavior and drug use among older people. Most research dealing with the "over-fifty" population has focused on topics related to disabilities, health problems, or utilization of health services. Few studies have investigated sexual behavior in general and risk behaviors associated with HIV transmission among this age group. Understanding such behaviors is critical to address needs related to HIV and AIDS. Obtaining that information requires using what is already known about collecting data on sensitive behaviors.

Evidence has been building to indicate that the way questionnaires are administered during a survey can influence the quality of self-reported measures of sensitive behaviors, such as sexual behavior and drug use. Problems may arise for both an interviewer and an interviewee with the use of interviewer-administered questionnaires (IAQs) that contain items on sensitive or illegal behaviors. Questions, for example, about a respondent's recent history of sexually transmitted diseases (STDs) or unprotected intercourse with a new partner could conceivably generate anxiety for both individuals in the interview. The interviewer asking such questions might worry about losing the case, and the interviewee answering them may fear a "loss of face." Historically, surveys have attempted to deal with this potential discomfort by using paper-and-pencil self-administered questionnaires (paper SAQs) to increase the privacy of both parties.

Until recently, few studies have investigated the effect of the mode of interview in surveys of self-reported sexual behavior (Catania, McDermott, and Pollack, 1986; Turner et al., 1992, 1995, 1996a, 1996b, 1996c, 1997, 1998 in press). Most of those studies report a mode effect for some but not all sexual behaviors. For example, Millstein and Irwin (1983), in a study conducted in university hospital clinics, recruited 108 adolescent girls to provide data on their sexual histories. They assigned the girls to one of three interview modes: IAQ, paper SAQ, or computer-assisted SAQ. For girls who were assigned to the IAQ mode, Millstein and Irwin found significantly lower levels of masturbation and vaginal intercourse (25 percent and 63 percent, respectively) compared with girls assigned to either one of the SAQ formats (38 percent and 74 percent, respectively).

Paper SAQs constitute a reasonable technology for surveying sexual, contraceptive, and other sensitive behavior, but they have several major drawbacks. In many cases, it is difficult to make extensive use of contingent questioning--that is, branching or skip patterns--in SAQs because some respondents find such complex instructions hard to follow (Lessler and Holt, 1987). That limitation creates problems in matching the questions that are asked of a respondent with the particular behavior they report--for example, by asking detailed follow-up questions.

What may be an even more important factor, based on findings by the National Center for Education Statistics (1993), is the limited reading skills of a sizable segment of the U.S. population. Literacy problems are particularly severe among some of the populations of special interest in studies of sexual behavior related to HIV infection, that is, people with a history of STDs or drug use.³ Because of the reading problems in such populations, IAQs must be used with a substantial proportion of the respondents in national surveys and other

kinds of research. That requirement introduces potential bias into the resulting measurements of stigmatized sexual, drug use, and related behavior.

Methodological research to improve the quality of data on sensitive behaviors has been conducted, but much of it has been directed at younger target populations. Surveys of sexual behavior, which have been the context of several recent methodological studies, focus on reproductive behavior and thus logically have been targeted for the most part toward the population of reproductive age. By design, the older segments of the population have tended to be categorically excluded from many such methodological studies.

However, the 1990 National Household Survey on Drug Abuse (NHSDA) field test, which included an embedded methodological test comparing SAQs and IAQs, was not limited to the age ranges of most surveys of sexual behavior. Respondents ranged in age from 12 to 92; consequently, the NHSDA field test gathered information on drug and alcohol use and their associated behaviors from a sample that was representative of virtually the entire adolescent and adult population of the 33 metropolitan areas in which the survey was conducted. Although the use of alcohol and most drugs is not a direct source of HIV transmission, data from the NHSDA provide prevalence estimates of such behaviors, which have been shown to be associated with sexual risk taking (Stall et al., 1986; Stall, 1988). In addition, such data illustrate the effect of using IAQs and SAQs to collect information in surveys of sensitive behaviors. In the present article, we examine data from the NHSDA field test as a starting point for understanding the impact of survey methodology on the measurement of sensitive behaviors among the rapidly growing older segment of the U.S. population.

DATA AND METHODS

The 1990 NHSDA field test was conducted to address a number of methodological issues that had arisen in association with the main survey, which first went into the field in 1971. The field test used a multistage area probability sample of the household population aged 12 and older, drawn from 33 preselected metropolitan areas. The 1990 NHSDA field test completed 3,284 interviews with an overall response rate of 76.4 percent.

The field test used four versions of the questionnaire. Two versions were administered entirely by interviewers, and two used a combination of self-administered and interviewer-administered components.⁴ Topics covered in the NHSDA were use of alcohol, sedatives, tranquilizers, stimulants, analgesics, marijuana and hashish, inhalants, cocaine, hallucinogens, and heroin; drug dependencies during the past 12 months; drinking experiences; drug problems; perceived risks of using drugs; and a few special topics. All interviews were conducted in person; the interviewer read aloud questions on drug and alcohol use, and the respondent provided answers either in a SAQ or directly to the interviewer. (For detailed descriptions of survey content and procedures, see Turner, Lessler, and Devore [1992].)

The NHSDA field test measured a range of sensitive behaviors related to drugs, alcohol, and tobacco use. In our analyses, we began with reported use of four substances: alcohol, marijuana, cigarettes, and cocaine. Consistent with previous studies (e.g., Turner et al., 1992; Aquilino, 1994; Rogers, Miller, and Turner, forthcoming), use of those substances

³David Celentano, from the School of Public Health, Johns Hopkins University, noted that in studies of intravenous drug users in Baltimore, for instance, researchers estimated that between 30 percent and 50 percent of study participants could not reliably complete a self-administered survey form. His statement was made during discussions with the steering committee for the Multisite Trial of Behavior Interventions to Halt the Spread of HIV, sponsored by the National Institute of Mental Health, February 1991.

⁴Wording of questions, which was the second variable manipulated in the experiment (other than interview mode) was not included in the analyses reported here because earlier work indicated it did not have substantial effects on reporting of drug use (Turner, Lessler, and Devore, 1992).

was examined within three distinct time periods: the past 30 days, the past year, and the respondent's lifetime. In addition, we considered a number of alcohol- and drug-related experiences during the past year that were more specific than the use or non-use of a substance during a given reference period. Those experiences included feeling aggressive or cross while drinking, taking specific drugs for nonmedical reasons, drug use inhibiting clear thinking, tossing down several drinks quickly to feel their effect, and feeling irritable and upset because of drugs.

The analyses presented here draw on reports from all 3,284 respondents. We divided the sample into three age groups: 12 to 49 years, 50 to 64 years, and 65 years and older. All analyses focus on the impact of the survey mode (interviewer- or self-administered) on reports of sensitive drug-use behaviors. Comparing the impact of the survey mode among older age groups with its impact in the 12- to 49-year-old group--the age group that has been the focus of most methodological research on sensitive behaviors to date--tests whether methodological findings from the more studied younger population can be generalized to the older segments of the U.S. population.

STATISTICAL PROCEDURES

The analyses reported in this paper began with 2-way and 3-way cross-tabulations of drug and alcohol behavior by age group and by mode. Thus, we calculated variations in the prevalence of those behaviors by mode of interview and age group, and chi-square statistics testing the significance of the variations in prevalence. Using the cross-tabulations, we then estimated odds ratios and their 95-percent confidence intervals for each behavior for the entire sample and within each of the three age groups.

The next step in the analysis was to use hierarchical log-linear modeling procedures to test for an interaction between age group, mode, and behavior. Tests of model fit were performed for hierarchies of log-linear models using methods developed by Goodman (1978). Likelihood ratio chi-square statistics were calculated for each model. To test for the homogeneity of mode effects across age groups, we compared the likelihood ratio chi-square statistics of a saturated model (which comprised main effects and all 2-way and 3-way interactions) with the model that comprised all main effects and 2-way interactions. Odds ratios and their 95-percent confidence intervals, based on parameter estimates from the log-linear models, are presented for selected alcohol- and drug-related variables.⁵ (Normed sample weights⁶ were used in all statistical analyses reported in this paper.)

RESULTS

Impact of Survey Mode on Prevalence Estimates

Table 1 presents estimates of the reported prevalence of use of alcohol, marijuana, cigarettes, and cocaine across age groups during three time periods: past 30 days, past year, and lifetime. Use of alcohol and cigarettes is generally not considered a sensitive behavior. However, use of marijuana and cocaine, because they are illegal substances, is considered to be much more sensitive.

Aggregating the variables related to substance use across age groups produces a consistent pattern of higher prevalences among respondents assigned to the SAQ mode compared with

⁵The odds ratios for main effects and interactions in the saturated log-linear models correspond to the tau parameters of Goodman's general model for the analysis of survey data.

⁶Normed weights were constructed so that the weighted sample *N* equaled the unweighted *N*. The statistical analyses in this article treat the survey sample as a closed population that has been randomly assigned to one of two experimental conditions (IAQ or SAQ).

respondents in the IAQ mode. Although the differences in prevalence between modes were not significant for most of the alcohol- and cigarette-use variables, reports of recent use of marijuana and cocaine did indicate that mode was an important factor. (Those findings replicate the previous analysis of this dataset by Turner et al. [1992].)

However, the reporting pattern observed in the aggregate data was not consistently found when the analysis was repeated within the three age groups. As an example of the alcohol and tobacco use variables, alcohol use in the past 30 days was estimated to be more prevalent (with borderline significance, $p = 0.09$) when SAQs were used in the entire sample. Overall, the odds of SAQ respondents reporting alcohol use in the past 30 days were 1.13 times those of IAQ respondents. If we disaggregate the findings for the three age groups, two different patterns emerge. Data for the 12- to 49-year-old and 50- to 64-year-old groups yielded roughly similar prevalence ranging from 54 percent to 62 percent. For both younger age groups, the use of SAQs resulted in higher estimates of prevalence, although that result was not statistically reliable (odds ratio = 1.13, not significant, for the population aged 12 to 49; and 1.36, with $p = 0.08$, for the population aged 50 to 64). The estimated prevalence of alcohol use during the past 30 days was lower among the population aged 65 and older; that population evinced a different but statistically insignificant mode effect (odds ratio = 0.82). Among respondents aged 65 and older, we estimated the prevalence of reported alcohol use in the past 30 days to be 39.5 percent when questioning was conducted by an interviewer versus 34.9 percent when respondents used a self-administered form.

In most instances in Table 1, we cannot reject the null hypothesis that the estimated mode effects *within the three age groups* differ from 1.0, although *in the aggregate*, there are significant mode effects for 5 of the 12 measurements shown in Table 1 (and borderline effects in 3 other instances). To push the analysis further, we make two observations:

1. All but one of the measurements in Table 1 for which a mode effect can be calculated yielded the same pattern of results. Of the odds ratios for the estimated mode effects, 18 of 19 exceeded 1.0 for the groups under age 65, whereas none of the 7 estimates for the population aged 65 and older exceeded 1.0. In substantive terms, SAQs yielded higher estimates of the prevalence of substance use for the population under age 65, whereas interviewer questioning yielded higher estimates for the population age 65 and older. (Of the 19 variations in the prevalence estimates for the groups under age 65, seven were significant at the 0.05 level, and four were significant at the 0.10 level. None of the variations for the 65-year and older group were significant.)
2. Casual analysis by inspection of mode effects estimated separately for the three age groups does not provide an adequate statistical test of the question of interest. That is, does the available evidence warrant rejection of the hypotheses that the impact of survey mode is homogeneous across the three age groups?

Below we present evidence that provides a more rigorous test of the generalizability of conclusions about the impact of survey mode to the older population.

Variation in Impact of Survey Mode by Age

Analysis Strategy—In this section, we seek to provide a more appropriate answer to the following question: Is the impact of survey mode on the reporting of sensitive behaviors equivalent across the three groups: ages 12 to 49, ages 50 to 64, and age 65 and older? To answer that question, we fit a hierarchical series of log-linear models⁷ to the 3-way tables of

⁷See Goodman (1968, 1978), Haberman (1978), and Bishop, Feinberg, and Holland (1975) for descriptions of the statistical theory underlying these modeling techniques.

reports of substance use {S} by mode of interview {M} by age {A}. The categories of these variables were {S}--reported use of the substance or not; {M}--measurement made using the IAQ or SAQ mode; and {A}--three age categories (12 to 49, 50 to 64, and 65 and older). Models were fit for each of the 12 measurements shown in Table 1 (e.g., marijuana use in lifetime, alcohol use in the past 30 days, etc.). In four cases (marijuana and cocaine use in the past 30 days and in the past year), the presence of zero marginals precluded estimation of a full set of hierarchical log-linear models.

A well-formed answer to our question can be obtained by estimating a model that includes terms to fit all of the 2-way interactions {SA} {SM} {MA}, as well as the univariate marginals. If the estimates from this model do not provide an acceptable fit to the interior cells of the 3-way table, then one may conclude that one (or more) 3-way interaction {SMA} terms are needed. The 3-way interaction terms can be interpreted as a variation across age categories in the estimated mode effect parameter. Examination of the parameter estimates for this 3-way interaction term can help identify which age group or groups are showing noteworthy variations.

The final columns of Table 1 contain two tests for such 3-way interactions. The first test (labeled Homogeneity: 3 age groups) assessed the equivalence of mode effects across the three age categories. The second (labeled Homogeneity: 2 age groups) assessed the equivalence of estimated mode effects after collapsing the table to contrast estimates for the 65-and-older population with those for the population aged 12 to 64.

Illicit Drugs—After assessing the equivalence of mode effects across the *three* age groups, we found that our tests of homogeneity indicated weakly significant nonequivalence of survey mode effects for measurements of lifetime cocaine use ($\chi^2_2 = 6.33$; $p = 0.04$) and lifetime marijuana use ($\chi^2_2 = 5.71$; $p = 0.06$). Interpretation of the result for use of cocaine is complicated by the vanishingly low prevalence of this behavior among older age groups. That circumstance resulted in two interior cells of the 3-way table having zero observations.

It is worth noting, however, that some lifetime cocaine use was reported by over 18 percent of the youngest age group (12 to 49) and no mode effect was observed (odds ratio = 1.02). The finding may reflect low sensitivity among those respondents for their reports that they had "experimented" with cocaine at some point in their lives. Recent use of cocaine, however, showed strong mode effects (odds ratio = 1.53 for use in the past year and 2.57 for use in the past month), which suggests that respondents considered reports of such recent behaviors to be quite sensitive. For the population ages 50 to 64, the only reports of cocaine use were obtained in the SAQ condition (estimated prevalence of 1.4 percent for lifetime use and 0.4 percent for use in the past year). The emergence of possible mode effects, although not significant in that older segment of the population, suggests that they, unlike younger respondents, may find it sensitive to report some experimentation with cocaine. The infinitesimally low prevalences estimated for cocaine use (0.0 and 0.3 percent) in the population aged 65 and older make it pointless to consider the impact of survey mode on those measurements.

Some history of marijuana use was reported by a much larger segment of the older population (14 percent to 21 percent of 50- to 64-year-olds and 3 percent to 5 percent of those aged 65 and older). The estimated mode effects from this analysis cover the gamut of possibility: no effect for 12- to 49-year-olds (odds ratio = 1.03); a positive effect of SAQs for 50- to 64-year-olds (odds ratio = 1.58); and a negative effect of SAQs for people aged 65 and older (odds ratio = 0.47). The first two results follow the pattern for cocaine use and might also be interpreted as reflecting differences in the relative sensitivity for these two groups of reporting that they had tried marijuana. The results for those aged 65 and older,

however, do not fit that pattern; nevertheless, the negative mode effect observed here is consistent with the negative mode effects observed for all other measurements among this population. As Table 1 shows, interviewer questioning consistently yielded higher prevalence estimates than SAQs for the population aged 65 and older.

Licit Drugs—For the six measurements of licit drug use, we found no 3-way interaction effects that were significant at the 0.05 level using either the 3- or 2-age group homogeneity test. There were, however, three interaction effects of borderline significance ($p = 0.08$ to 0.14) for reporting of lifetime alcohol and cigarette use and for reporting of alcohol use in the past 30 days. In most of the cases, the interaction was characterized by odds ratios of less than 1.0 for the population aged 65 and older and odds ratios of more than 1.0 for age groups under age 65. As noted previously, this pattern suggests that in the older population, IAQs yielded higher estimates of prevalence than SAQs, whereas the reverse was true in the younger age groups.

One exception occurs to that pattern. For one of the six mode effects estimated for the younger group (50- to 64-year-olds), we found an odds ratio of 0.55 for reporting of lifetime alcohol use. Thus, in one instance out of six, a measurement in a younger group paralleled the measurement found universally in the population aged 65 and older.

Parameter Estimates for {SMA} Interaction

To better understand the relationships between age, interview mode, and reported use of licit and illicit drugs, we fit saturated log-linear models that included parameters for the 3-way interaction {SMA}. Table 2 presents the parameter estimates for models of the reporting of alcohol consumption in the past month, lifetime cigarette use, and lifetime marijuana use.

The estimates in Table 2 use more formal controls for the subpopulation comparisons and confirm the inferences we have derived from visual inspection of Table 1. Thus, reporting of alcohol use in the past 30 days and some lifetime use of marijuana is less common in the population aged 65 and older. Further, we note that the saturated model incorporates a parameter representing a null overall mode effect (estimated odds ratios range from 0.96 to 1.13).

The interaction effects in each instance of these three formal analyses also replicate the previously noted pattern. Interviewer-administered questioning yielded higher levels of reporting of the three substance use behaviors for the population aged 65 and older (odds ratios = 0.52 to 0.73). The opposite effect was found for the population aged 50 to 64.

Drug- and Alcohol-Related Problem Behaviors

In addition to questions related to prevalence, the NHSDA field test also asked respondents about their experiences in using alcohol and drugs and the consequences of and reactions to such use. In this section of the paper, we examine a number of these drug- and alcohol-related consequences, which indicate how such substances may be disrupting people's lives. Questions about these topics provide a test bed for further study of the reporting of sensitive behaviors that may be more common in the older population than the use of marijuana or cocaine.

Table 3 presents estimates of the reported prevalence of six alcohol- and five drug-related problem behaviors, categorized by age group and mode.⁸ Overall, the differences in prevalence estimates derived from IAQs and SAQs for these behaviors were not significant, although for all 11 variables, higher estimates of prevalence were obtained by using SAQs. When we considered the three age groups, we noted wide ranges in the reported prevalences

of behaviors, larger odds ratios, and a few significant mode effects. Respondents in the 12- to 49-year-old group always reported higher levels of these behaviors when using SAQs. The two older groups did not display a consistent pattern. Respondents in the 50- to 64-year-old group who used SAQs tended to report lower levels of prevalence for the alcohol-related problem behaviors (five of six instances), and higher levels of prevalence for the drug-related behaviors (four of five instances). Prevalences for the group aged 65 and older showed an opposite pattern; however, no mode effect for that age group approached statistical significance.

Tests of the homogeneity of the mode effect were at least marginally significant for four of the six alcohol-related behaviors. The chi-squared test of homogeneity for the behavior "felt aggressive or cross while drinking," for example, indicated a variation across age groups in the effect of mode on reports of this behavior. The 12- to 49-year-old group reported the highest prevalence; in that group, the odds that SAQ respondents would report having felt aggressive or cross when drinking were 1.24 times those of IAQ respondents. The opposite occurred in the 50- to 64-year-old group, which reported a much lower prevalence of the behavior. The odds that SAQ respondents would report having felt aggressive or cross when drinking were 0.37 times those of IAQ respondents. The 65-and-older group, however, flipped back to the pattern of the 12- to 49-year-old group: the odds that SAQ respondents in the 65-and-older group would report feeling aggressive or cross were 2.84 times those of IAQ respondents.

Log-Linear Parameter Estimates Controlling for Age and Mode

As a way of further examining how this set of alcohol- and drug-related behaviors vary with age and survey mode, Table 4 presents estimates of selected parameters of a saturated log-linear model for four problem behaviors that had a significant 3-way interaction: getting into heated arguments while drinking; felt aggressive or cross when drinking; afraid of being or becoming an alcoholic; and got drunk or high while drinking alone.

The parameters for the association of age and behavior {AB} are all substantially lower than 1.0, indicating, as noted earlier, that alcohol- and drug-related problem behaviors are much less common in the two older age groups than among younger respondents. No general mode effects {BM} were detected, but four terms for the 3-way interaction {BMA} were statistically noteworthy (three with $p \leq 0.02$ and one with $p = 0.10$). In each of those instances, IAQs generated higher estimates of the prevalence of the problem behavior for *one* of the older age groups. In three instances, the higher estimates occurred for the 65-and-older population and in one instance for the population aged 50 to 64.

DISCUSSION

Studies of sensitive AIDS-related behaviors are rarely conducted among the older segments of the population. And methodological studies of factors that affect reporting of AIDS-related behaviors among those segments are virtually nonexistent. The present analysis was undertaken to help fill that gap and to assess whether methodological findings obtained with younger cohorts could be generalized to older populations. To that end, we have re-analyzed data from a large survey experiment designed to investigate the impact of the privacy of the survey mode on the willingness of respondents to report sensitive behaviors related to licit and illicit drug use.

⁸In a separate analysis, we estimated the prevalence of alcohol-related behaviors using the subsample of individuals who indicated they had used alcohol in the previous 12 months. Similarly, we conducted a separate analysis of drug-related behaviors using the subsample of individuals who reported using cigarettes or alcohol in the previous 12 months. In neither case were any of the results noticeably different from those reported in Table 3.

The inferences derived from our re-analyses are not entirely satisfying in that consistent results were not found across all drug use behaviors and across both of the two older population segments (ages 50 to 64 and age 65 and older) used in these analyses. To some extent, the variability in findings and reliability of the estimated mode effects is likely to be a function of the size of the sample. Although the experiment randomly assigned a large probability sample ($N = 3,284$) to one of two experimental conditions (interviewer- or self-administered questioning), younger segments of the population were oversampled in the field test because drug use is more common in those groups. As a result, the older sample segments were relatively small (unweighted N s of 274 for ages 50 to 64 and 273 for age 65 and older). Thus, any significant results detected in the older age groups have overcome the lack of power inherent with small sample sizes and low prevalence of the many of the behaviors. Although many findings reported here are not statistically significant, the results presented in Tables 1 through 4 hint that we could be in for some surprises if we blithely generalized findings about "survey mode effects" from research conducted among younger populations.

The reported prevalence of the recent use of marijuana and cocaine was too low to be analyzed in the 50- to 64-year-old and 65-and-older groups. However, reports of lifetime use of the two substances yielded marginally significant results. As with cigarettes and alcohol, the 12- to 49-year-old and 50- to 64-year-old groups reported higher levels of prevalence when an SAQ was used, but the 65-and-older group displayed higher prevalence when an IAQ was used. The consistent pattern of the oldest group reporting higher levels of prevalence with IAQs rather than SAQs was not only unexpected but also in the opposite direction of the effect found in the general population for most drug use behaviors (Turner et al., 1992).

A parallel finding emerged for reporting of drug problem behaviors in instances in which significant or borderline differences were found in the effect of the survey mode. When significant or borderline 3-way interactions were observed, they were found to involve one of the older age strata and IAQs. That is, the older group showed a higher prevalence of the behavior when they were questioned by an interviewer, compared with the result when they filled out a self-administered form.

There is no immediately obvious explanation for this reversal of mode effects in the older segments of the population. It may be that the human interaction afforded by interviewer-administered questioning, together with interviewer probing or other assistance, may have been more important for the older groups than for younger people. Similarly, the variation in mode effects may reflect differences in cognitive features of the measurement made under the two conditions, differences that may have had a greater effect on the older segment of the population. These and other speculations can be offered, but they do not, at present, have any firm empirical foundation.

One general conclusion, however, is inescapable. There is enough evidence here to warrant some caution in presuming that self-administered questionnaires will inevitably have the same effect in the reporting of sensitive AIDS-related behaviors in older populations as those observed in younger populations. The results of this analysis highlight the fact that relatively little is known about the sexual and AIDS-related behaviors of the older population. The lack of data on such behaviors indicate that the range of topics included in the studies of the over-50 population need to be broadened to include sexual and other AIDS-related behaviors. Furthermore, the surprising results presented here indicate that ongoing research on the effect of mode of interview needs to include the population segment over age 50, which may react very differently than the younger segments to different modes of questioning on a range of sensitive behaviors. Without further research using larger

samples of older respondents than were used in the present study, presumptions in this area could be dangerous.

Similar caveats are in order for the new technologies that are replacing paper SAQs. In recent years, an audio computer-assisted, self-interviewing (audio-CASI) technology has been developed to administer complex questionnaires in personal-interview surveys (Turner, Lessler, and Gfroerer, 1992; O'Reilly et al., 1994). In an audio-CASI interview, respondents listen to questions through headphones and enter their answers by pressing labeled keys on portable laptop computers. Studies thus far indicate that respondents have no difficulty using the new technology and that they prefer it to a paper-and-pencil SAQ. In one study among elderly monolingual Koreans (with a mean age of 71), the technology was found to be well tolerated, and the vast majority of respondents had few problems using it, even when they were assisted by non-Korean speaking interviewers (Hendershot et al., 1996; see Table 5). Hearing was, however, a problem in some instances--a factor that may apply to interviewer questioning as well.

Audio-CASI offers a different measurement context from the paper SAQs used in the experiment analyzed here, and it may well prove beneficial in surveying older populations on sensitive topics. Certainly, evidence is accumulating to indicate that it improves reporting of sensitive AIDS-related behaviors in younger populations (Turner et al., 1996a,b,c; 1997; forthcoming). However, it would be imprudent to assume that methodological findings obtained from younger samples through this new mode of survey administration will generalize to older population groups. Before such claims can be made, the audio-CASI technology will require more extensive experimental testing among older populations.

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TABLE 1

Estimates of reported prevalence of substance use, by age and survey mode.

BEHAVIOR	ALL AGES			12-49			50-64			65+			HOMOGENEITY ^[a]					
	IAQ	SAQ	O.R.	Sig	IAQ	SAQ	O.R.	Sig	IAQ	SAQ	O.R.	Sig	3 Age Groups	Chi Sq	Sig	2 Age Groups	Chi Sq	Sig
Alcohol Use																		
30 days	51.9	54.8	1.13	0.09	54.0	57.1	1.13	NS	54.8	62.2	1.36	0.08	39.5	34.9	0.82	NS	3.97	0.14
Past Year	70.2	72.9	1.14	0.09	72.4	76.0	1.21	0.05	74.5	75.5	1.06	NS	56.3	54.8	0.94	NS	1.57	0.40
Lifetime	86.7	86.1	0.95	NS	84.6	85.4	1.07	NS	94.1	89.7	0.55	0.06	88.0	85.5	0.80	NS	4.31	0.12
Cigarettes																		
30 days	23.4	25.9	1.14	0.09	25.3	28.6	1.18	0.08	26.6	28.7	1.11	NS	12.1	9.6	0.76	NS	1.95	0.38
Past year	27.0	30.3	1.18	0.04	30.1	34.1	1.20	0.04	28.4	31.4	1.15	NS	12.1	9.6	0.77	NS	2.09	0.35
Lifetime	69.9	72.7	1.12	NS	67.1	69.7	1.13	NS	78.5	85.2	1.57	0.04	73.2	68.9	0.81	NS	4.95	0.08
Marijuana																		
30 days	3.1	5.0	1.65	0.01	4.6	7.3	1.65	0.01	0.0	0.0	---	N/A	0.0	0.0	---	N/A	N/A	N/A
Past year	6.6	8.6	1.33	0.03	9.5	12.6	1.36	0.02	0.9	0.0	---	N/A	0.0	0.0	---	N/A	N/A	N/A
Lifetime	35.0	36.7	1.08	NS	46.7	47.5	1.03	NS	14.2	21.1	1.58	0.04	5.4	2.8	0.47	NS	5.71	0.06
Cocaine																		
30 days	0.5	1.2	2.6	0.02	0.7	1.8	2.57	0.03	0.0	0.0	---	N/A	0.0	0.0	---	N/A	N/A	N/A
Past year	1.9	3.0	1.58	0.04	2.8	4.3	1.53	0.06	0.0	0.4	---	N/A	0.0	0.0	---	N/A	N/A	N/A
Lifetime	12.5	13.2	1.06	NS	18.4	18.7	1.02	NS	0.0	1.4	---	N/A	0.3	0.0	---	N/A	6.33	0.04
UNWEIGHTED Ns ^[b]	1650	1634			1363	1374			140	134			147	126			1.14	0.29

^[a]Tests significance of interaction of age group, mode, and behavior. Comparisons based on 3 age groups (12-49; 50-64; and 65 and older) have three degrees of freedom. Comparisons based on 2 age groups (12-64 and 65 and older) are have one degree of freedom.

^[b]Due to item nonresponse the Ns for each question are slightly smaller than the base Ns reported here.

N/A: Not applicable due to zero marginals.

Estimates of selected parameters of saturated log-linear models for 3-way table of: Substance use behavior by Mode of survey by Age. (95% confidence interval shown in parentheses.)

TABLE 2

LOG-LINEAR MODEL PARAMETERS		SUBSTANCE USE BEHAVIOR					
Parameter	Category	Alcohol, 30 days		Cigarettes, Ever		Marijuana, Ever	
		O.R.	Sig	O.R.	Sig	O.R.	Sig
Age*Substance Use {AS}	65+ and Used	0.48	0.0001	1.13	ns	0.05	0.0001
	50-64 and Used	1.13	ns	2.10	0.0001	0.24	0.0001
Substance Use * Mode {SM}	Used and SAQ	1.08	ns	1.13	ns	0.96	ns
Substance Use * Mode	Used and SAQ and 65+	0.73	ns	0.72	ns	0.52	ns
*Age {SMA}	Used and SAQ and 50-64	1.20	ns	1.40	ns	1.54	0.10

NOTE. SAQ: self-administered questionnaires; OR: odds ratio; CI: confidence interval; ns: not significant.

TABLE 3
Estimated prevalence of drug-related problem behaviors, by survey mode and age.

BEHAVIOR (12 month recall for all behaviors)	ALL AGES			12 to 49			50-64			65+			HOMOGENEITY ^[a]			
	IAQ	SAQ	O.R.	Sig.	IAQ	SAQ	O.R.	Sig.	IAQ	SAQ	O.R.	Sig.	3 Age Groups Chi Sq	Sig.	2 Age Groups Chi Sq	Sig.
ALCOHOL RELATED																
Felt aggressive or cross while drinking	7.5	8.6	1.16	NS	9.3	11.4	1.24	NS	6.7	2.5	0.37	0.02	0.6	2.3	2.84	NS
Got into heated argument while drinking	5.9	7.8	1.35	0.03	7.0	10.1	1.52	0.01	5.2	4.4	0.85	NS	2.0	0.5	0.22	NS
Tossed down several drinks quickly for effect	5.7	6.6	1.17	NS	8.1	9.0	1.12	NS	1.0	1.7	1.67	NS	0.4	1.1	3.38	NS
Afraid of being/becoming alcoholic	4.3	4.4	1.02	NS	4.6	5.8	1.25	NS	7.0	2.3	0.30	0.01	0.4	0.5	1.12	NS
Unable to remember things while drinking	5.8	6.3	1.09	NS	7.6	8.5	1.14	NS	3.7	1.9	0.49	NS	0.4	0.5	1.12	NS
Got drunk/high while drinking alone	6.6	7.7	1.18	NS	8.0	10.2	1.32	0.06	6.1	2.7	0.45	0.06	1.4	1.5	1.07	NS
DRUG USE BEHAVIORS																
Taken more pain killer than should ^[b]	4.3	5.7	1.33	0.08	5.3	6.8	1.30	NS	2.0	4.5	2.31	0.1	2.6	1.8	0.69	NS
Health problems due to substance use ^[c]	2.9	3.1	1.08	NS	2.7	3.3	1.23	NS	3.3	2.3	0.69	NS	3.5	3.1	0.88	NS
Irritability due to substance use ^[c]	4.0	4.2	1.08	NS	5.1	5.4	1.06	NS	1.1	2.8	2.59	NS	2.0	0.6	0.30	NS
Ever took valium for nonmed reasons ^[d]	4.4	5.3	1.23	NS	5.3	6.3	1.20	NS	3.8	4.5	1.19	NS	1.3	1.0	0.77	NS
Ever took tranquilizers for nonmed reason ^[b]	3.2	4.2	1.30	NS	3.7	4.8	1.31	NS	3.8	4.4	1.17	NS	0.7	0.9	1.29	NS
UNWEIGHTED Ns ^[e]	1650	1634			1363	1374			140	134			147	126		

^[a] Tests significance of interaction between age group, mode, and behavior. Comparisons based on 3 age groups (12-49; 50-64; and 65 and older) have three degrees of freedom. Comparisons based on 2 age groups (12-64 and 65 and older) have one degree of freedom

^[b] Responses for questionnaires using original wording are recoded from the number of times respondent took more analgesic than was prescribed into ever took more analgesic than prescribed. Responses for questionnaires using modified wording asked if respondent had ever taken that type of drug either in a greater dosage or more frequently than prescribed.

^[c] Questionnaires using the original wording ask directly if the respondent has experienced the behavior because of drug use. Questionnaires with the modified wording ask if the respondent has experienced the behavior and then if the behavior was the result of drug use.

^[d] Results based on data datae from IAQ and SAQ questionnaires that used original wording. Questionnaires with modified wording did not include a corresponding question.

^[e] Prevalence estimates are based on the weighted entire sample

Estimates of selected parameters of saturated log-linear models for 3-way table of: Substance use problem behavior by survey mode by age.

TABLE 4

LOG-LINEAR MODEL PARAMETERS		PROBLEM BEHAVIOR					
Parameter	Category	Heated Arguments	Felt Aggressive	Fearful Becoming Alcoholic	Drunk while Alone		
		O.R.	Sig	O.R.	Sig	O.R.	Sig
Age*Behavior {AB}	65+ and Yes	0.14	0.0001	0.13	0.0001	0.12	0.0001
	50-64 and Yes	0.56	0.01	0.39	0.0001	0.80	0.0005
Behavior*Mode {BM}	Yes and SAQ	0.75	ns	1.14	ns	0.80	ns
Behavior*Mode*Age {BMA}	Yes and SAQ and 65+	0.22	0.10	2.52	ns	0.98	ns
	Yes and SAQ and 50-64	0.55	ns	0.30	0.01	0.25	0.01
						0.34	0.02

TABLE 5

Evaluation of the ease of use of audio-CASI technology by elderly monolingual Koreans residing in metropolitan Washington (mean age = 71.3; N=30)

<u>Ease in use of computer</u>	
Very comfortable	50%
Somewhat comfortable	37%
Somewhat uncomfortable	13%
Very uncomfortable	0%
<u>Understanding of questions</u>	
Very easy	27%
Somewhat/very easy	50%
Somewhat difficult	13%
Very difficult	10%

Note: Tabulated from responses to the following questions: How easy or difficult was it for you to understand the questions being asked in the tape recording? Was it very easy, somewhat easy, somewhat difficult, or very difficult for you to understand the questions being asked? and How comfortable did you feel typing into the computer? Did you feel very comfortable, somewhat comfortable, somewhat uncomfortable, or very uncomfortable typing your answers into the computer?

Source. Hendershot et al., 1996.