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Attitudes toward Interview Mode and Comparability of Reporting Sexual Behavior by Personal Interview and Audio Computer-assisted Self-interviewing : Analyses of the 1995 National Survey of Family Growth

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Respondents' attitudes toward audio computer-assisted self-interviewing (audio-CASI) relative to personal interviewing and comparability of reporting of the number of sex partners in the past year were assessed using the 1995 National Survey of Family Growth. Bivariate and multivariate analyses were used. Few women indicated that the personal interview, relative to audio-CASI, provided more honest answers or greater comfort. However, minority group members, especially Hispanics, were more likely to prefer personal interviews. Most women (83.4 percent) provided consistent reports of number of sex partners on the two modes, 12.6 percent reported more sex partners with audio-CASI, and 4.0 percent reported more partners in the personal interview. Hispanic women and women of "other" race/ethnicity were significantly more likely to have decreased reporting of sex partners with audio-CASI. Further methodologic research is needed on mode effects among minority populations. Reporting errors associated with the data collection technology could obscure important findings.

Attitudes Toward Interview Mode and Comparability of Reporting Sexual Behavior by Personal Interview and Audio Computer-Assisted Self-Interviewing Analyses of the 1995 National Survey of Family Growth

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It is difficult to obtain accurate information about sensitive behaviors on surveys. Asking a person to admit to socially undesirable or controversial behaviors tends to elicit responses that minimize self-stigmatization (DeMaio 1984). As would be expected, questions

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about behaviors that are unlawful or socially taboo carry the greatest risk of underreporting (Willis, Sirken, and Nathan 1994). And yet obtaining accurate estimates of certain sexual behaviors is critical to understanding reproductive health issues such as HIV/AIDS transmission. Improving estimates of sexual behavior obtained from surveys involves minimizing nonresponse and any systematic error associated with the survey instrument, interviewer, and mode of data collection (Catania et al. 1990). Methodological research designed to improve answers to sensitive questions has focused on developing techniques to reduce the perceived threat of questions by increasing the privacy of data collection (Tourangeau, Jobe, et al. 1997). One technique, called audio computer-assisted self-interviewing (audio-CASI) involves respondents' listening to an audiotaped recording of survey questions using headphones and entering answers directly into laptop computers.

The research literature suggests that reporting of HIV risk behaviors, drug use, and abortion improves with CASI (with or without an audio component) relative to personal interviewing (Des Jarlais et al. 1999; Jobe et al. 1998; Turner et al. 1998; Bloom 1998; Fu et al. 1998; Tourangeau, Jobe, et al. 1997; Tourangeau, Rasinski, et al. 1997; Lessler and O'Reilly 1997; Duffer et al. 1996; Guadagno et al. 1994; Lessler, Weeks, and O'Reilly 1994; Locke et al. 1992; Robinson and West 1992; Rieger, Judkins, and Sperry 1991). It is unclear, however, whether the apparent benefits of audio-CASI extend to all segments of the population and if gains in reporting are prominent within certain groups.

The 1995 National Survey of Family Growth (NSFG), a demographic and reproductive health survey of women age 15 to 44, provides a unique opportunity to explore attitudes toward mode of administration and the consistency of reporting of sex practices as ascertained by both personal interview and audio-CASI. This article first assesses whether survey participants felt that the personal interview or audio-CASI provided more honest answers or greater comfort in answering questions. While theory would suggest that audio-CASI improves reporting of sensitive behaviors, some women may prefer personal interviews and provide more accurate reporting using this mode. Reactions to certain aspects of audio-CASI are also described, for example, whether there was difficulty in using the keyboard to answer questions.

It may be the case that some women, for example, non-English speakers, have difficulty providing accurate reports because of discomfort with aspects of the audio-CASI technology. The article next compares the reporting of one sensitive behavior, number of sex partners in the past year, as ascertained by both personal interview and audio-CASI. Societal norms would suggest that younger, unmarried women would be more likely to accurately report sex partners with audio-CASI. Women who are poor, have low incomes, or who are members of minority groups may be more subject to social stigma generally and report more accurately on audio-CASI. Some evidence of mode effects for sensitive survey items by race have been reported (Aquilino, William, and LoSciuto 1990).

METHOD

THE SURVEY

As part of the 1995 NSFG, 10,847 women were interviewed in their homes regarding their pregnancy and birth history, marriage and cohabitation history, sex partner history, contraceptive use, diseases related to fertility, HIV-related behaviors, and use of HIV tests (Abma et al. 1997). The sampling frame for the NSFG was respondents to the 1993 National Health Interview Survey (NHIS) (Judkins, Mosher, and Botman 1991). Hispanics were oversampled. Spanish-speaking interviewers and a Spanish version of the audio-CASI questions were available (316 interviews were conducted in Spanish). The overall NSFG response rate was 79 percent, which incorporates the response rates to the 1993 NHIS and the NSFG. Respondents were paid \$20 as an incentive for completing the survey.

Survey respondents were asked a few questions (i.e., number of sex partners, use of abortion) using both standard interviewing techniques (i.e., an interviewer asked the question and recorded the response) and audio-CASI. The actual framing of questions for the number of sex partners differed somewhat by mode. During the personal interview, women who had never been married, had never lived with a boyfriend, or had never been pregnant were first asked a screening question: "At any time in your life, have you ever had sexual intercourse with a man,

that is, made love, had sex, or gone all the way?" Women were then asked, "During the last 12 months, that is, since [month/year] how many men, if any, have you had sexual intercourse with? Please count every male sexual partner, even those you had sex with only once."

Interviewers probed for a range if the respondent was unable to recall an exact number, and a low and high estimate was recorded. For the audio-CASI portion of the interview, respondents were told that they were going to be asked about sexual partners and were instructed to "include partners that you may have already told your interviewer about and any that you did not want to talk with the interviewer about." The same wording of the question was used as shown above.

For the analyses of consistency of reporting of number of sex partners, the key variable of interest is the difference between reports of number of sex partners by mode. The vast majority of the sample had had sex (89 percent, as ascertained by interview), and of these, virtually all reported the number of sex partners in the past year (99 percent). A variable was created to describe the consistency of reporting by mode, defined as the numerical difference between the number of partners reported on audio-CASI and the high estimate of partners provided during the personal interview. For most women (more than 90 percent), the low and high estimates of partners provided on the personal interview were the same. Zero sex partners were assigned to women reporting on interview that they had never had sex (some of these women later reported sex partners during the audio-CASI portion of the interview). For logistic regression analyses, reporting differences were categorized as follows:

1. fewer reports on audio-CASI relative to personal interview,
2. consistent reporting under two modes, and
3. greater reports on audio-CASI relative to personal interview.

At the end of the audio-CASI portion of the interview, women were asked about their response to audio-CASI itself (these questions were asked using audio-CASI):

1. Which of these methods do you think lets people give more honest answers?

- The interviewer asking the questions out loud and entering the answers into the computer
- Listening to the questions on the earphone and entering the answers into the computer
- It does not matter which method is used

2. How easy or difficult was it for you to use the keyboard to type your answers into the computer? Would you say it was

- Very easy?
- Easy?
- Difficult?
- Very difficult?

3. For all or most of this part of the interview, did you

- Listen to the tape and read the answers on the screen?
- Listen to the tape and turn the screen off?
- Read the screen and turn the tape off?

4. The questions on abortion and the number of sexual partners were asked earlier by the interviewer and just now over the earphones. Were you more comfortable answering these questions when the interviewer asked them or when you heard them over the earphones?

- More comfortable answering the questions when the interviewer asked them
- More comfortable answering the questions when you heard them over the earphones
- It did not matter

5. How likely is it that you would have given different answers to some of the other questions the interviewer asked you if you could have typed the answers into the computer yourself?

- Very likely
- Somewhat likely
- Not very likely
- Not at all likely

STATISTICAL ANALYSIS

Descriptive statistics and logistic regression models are presented to assess (1) whether respondent characteristics (i.e., age, marital status, race/ethnicity, language of interview, educational attainment, poverty-level household income) are associated with attitudes toward survey mode and (2) whether respondent characteristics and attitudes are associated with different responses to the personal and the audio-CASI interview. Maximum-likelihood multinomial logit models were

developed using STATA's "svymlog" command (STATA statistical software) for models that had a discrete dependent variable with more than two categories that were not ordered (StataCorp 1999). The resultant relative risk ratios are ratios of two odds (e.g., the odds of increased reports of sex partners with audio-CASI among never-married relative to married women). All *p* values are two-sided; if less than .05, they are considered statistically significant.

The NSFG has a complex survey design involving stratification, clustering, and disproportionate sampling. All proportions and population counts presented are weighted to provide national estimates. Variance estimates for proportions and logistic regression model odds ratios and relative risk ratios were calculated using the Taylor series approximation technique, taking into account the complex design of the surveys (StataCorp 1999).

RESULTS

ATTITUDES TOWARD MODE OF SURVEY ADMINISTRATION

Perception of interview mode: giving the most honest answers.

According to bivariate analyses, nearly half of women (49.0 percent) felt that the audio-CASI method gives the most honest answers, 40.4 percent felt that the mode did not matter, and 10.6 percent felt that the personal interview provided the most honest answers (see Table 1). Bivariate analyses suggest that teens are more likely to view audio-CASI as giving the most honest answers while Hispanic women (18.0 percent) and women interviewed in Spanish (34.9 percent) are more likely than White, non-Hispanic women (8.7 percent) to report that the personal interview gives more honest answers (see Table 1). Multivariate analyses indicate that younger women age 15 to 29 are significantly less likely than women age 40 to 44 to feel that the personal interview gives the most honest answers (relative risk ratio [RRR] of 0.18 for women age 15 to 19; 0.56 for women age 20 to 24; 0.75 for women age 25 to 29; see Table 2). In contrast, Hispanic women and those interviewed in Spanish were significantly more likely than White, non-Hispanic women to feel that the personal interview gives the most honest answers (RRR = 1.75 and 3.06, respectively).

Likewise, African American women (RRR = 1.53), women of “other” race/ethnicity (RRR = 1.64), women with lower educational attainment (RRR = 2.28 for women with fewer than 12 years of education; RRR = 1.45 for women with 12 years of education), and poor women (RRR = 1.21) were more likely than others to feel that the personal interview provided more honest answers (see Table 2).

Degree of comfort answering questions. The majority of women (52.7 percent) did not feel that one or the other method provided greater comfort in giving answers (see Table 1). Just more than a third (37.7 percent) of women felt that audio-CASI provided greater comfort while 9.6 percent felt greater comfort with the personal interview (see Table 1). Bivariate analyses suggest that younger women and women with higher educational attainment are more comfortable with audio-CASI. Preference for the personal interview in terms of the comfort in giving answers was significantly higher among Hispanic women (20.6 percent), women interviewed in Spanish (41.6 percent), African American women (15.1 percent), women with fewer than 12 years of education (16.5 percent), and poor women (15.5 percent; see Table 1). Multivariate analyses confirm these observed relationships. Hispanic women were more than two times as likely (RRR = 2.22), and those interviewed in Spanish three times as likely (RRR = 3.85), to feel more comfortable with the personal interview (see Table 2). This increased comfort with the personal interview was also seen among African American women (RRR = 2.16) and women of “other” race/ethnicity (RRR = 2.27), women with lower educational attainment (RRR = 2.99 for women with fewer than 12 years of education; 1.69 for women with 12 years of education), and poor women (RRR = 1.34 for women with household incomes below 150 percent of poverty; see Table 2).

Likelihood of giving different answers if audio-CASI was used for other questions. One in 10 women (9.6 percent) said that they would be very likely to give different answers to other interview questions if audio-CASI had been used, and 16.0 percent said that they were somewhat likely to give different answers (see Table 1). In general, although some subgroups of women expressed greater confidence and comfort with the personal interview (e.g., African American women, women with lower educational attainment), they were more likely than

(text continues on p. 13)

TABLE 1: Attitudes Toward Audio Computer-Assisted Self-Interviewing (Audio-CASI) by Sociodemographic Characteristics, 1995 National Survey of Family Growth

| Characteristic | Method With Most Honest Answers (n = 10,679) | | | Method More Comfortable Giving Answers With (n = 9,734) | | | Likelihood of Giving Different Answers to Other Interview Questions if Audio-CASI Used (n = 10,681) | | | |
|-----------------------------|---|------------|-------------------|---|------------|-------------------|---|--------------------|--------------------|----------------------|
| | Audio- CASI | Interview | Doesn't Matter | Audio- CASI | Interview | Doesn't Matter | Very Likely | Somewhat Likely | Not Very Likely | Not at All Likely |
| Total population | 49.0 (0.7) | 10.6 (0.3) | 40.4 (0.6) | 37.7 (0.7) | 9.6 (0.4) | 52.7 (0.7) | 9.6 (0.3) | 16.0 (0.4) | 28.0 (0.5) | 46.4 (0.6) |
| Age at interview (years) | | | | | | | | | | |
| 15 to 19 | 58.0 (1.6) | 5.2 (0.6) | 36.8 (1.5) | 41.3 (2.0) | 8.7 (1.2) | 50.0 (2.0) | 10.5 (1.0) | 16.0 (1.1) | 26.1 (1.3) | 47.4 (1.6) |
| 20 to 24 | 52.5 (1.6) | 9.2 (0.7) | 38.3 (1.5) | 39.9 (1.7) | 7.7 (0.8) | 52.4 (1.7) | 11.4 (0.9) | 17.7 (1.2) | 27.1 (1.3) | 43.8 (1.4) |
| 25 to 29 | 47.4 (1.4) | 10.5 (0.8) | 42.1 (1.4) | 37.5 (1.4) | 9.4 (0.8) | 53.1 (1.4) | 10.1 (0.8) | 16.9 (1.1) | 28.3 (1.3) | 44.7 (1.2) |
| 30 to 34 | 46.6 (1.3) | 12.9 (0.8) | 40.5 (1.2) | 35.9 (1.2) | 10.0 (0.8) | 54.1 (1.2) | 9.5 (0.7) | 16.2 (0.8) | 29.0 (1.0) | 45.3 (1.1) |
| 35 to 39 | 46.1 (1.3) | 12.1 (0.7) | 41.8 (1.2) | 37.8 (1.1) | 10.0 (0.7) | 52.3 (1.1) | 8.8 (0.6) | 15.7 (1.0) | 29.5 (1.1) | 46.0 (1.4) |
| 40 to 44 | 45.0 (1.2) | 12.4 (0.9) | 42.6 (1.3) | 36.4 (1.3) | 10.8 (0.8) | 52.7 (1.4) | 8.0 (0.6) | 13.8 (0.9) | 27.4 (1.2) | 50.8 (1.3) |
| Marital status | | | | | | | | | | |
| Never married | 53.5 (1.1) | 8.9 (0.5) | 37.6 (1.0) | 40.3 (1.2) | 9.3 (0.6) | 50.4 (1.2) | 11.0 (0.6) | 17.4 (0.6) | 27.6 (0.8) | 44.0 (0.9) |
| Married | 46.8 (0.9) | 11.1 (0.5) | 42.1 (0.8) | 36.5 (0.8) | 8.9 (0.5) | 54.6 (0.8) | 8.1 (0.4) | 14.4 (0.5) | 28.5 (0.7) | 49.0 (0.8) |
| Formerly married | 44.2 (1.5) | 13.4 (0.9) | 42.4 (1.4) | 36.7 (1.5) | 12.8 (1.0) | 50.5 (1.4) | 11.5 (0.9) | 17.9 (1.2) | 27.3 (1.3) | 43.2 (1.4) |
| Race/ethnicity | | | | | | | | | | |
| Hispanic | 39.4 (1.4) | 18.0 (0.9) | 42.6 (1.3) | 29.1 (1.7) | 20.6 (1.6) | 50.4 (2.0) | 16.4 (1.2) | 18.2 (1.0) | 23.3 (1.4) | 42.0 (1.3) |
| White, non-Hispanic | 50.8 (0.8) | 8.7 (0.4) | 40.5 (0.8) | 39.3 (0.8) | 6.6 (0.4) | 54.1 (0.8) | 6.4 (0.3) | 14.1 (0.5) | 30.1 (0.6) | 49.3 (0.7) |
| African American | 48.6 (1.5) | 13.8 (0.9) | 37.6 (1.4) | 36.3 (1.3) | 15.1 (0.9) | 48.6 (1.4) | 18.8 (1.0) | 21.1 (1.0) | 22.9 (1.0) | 37.2 (1.3) |
| Other | 45.8 (3.7) | 12.0 (1.7) | 42.2 (3.5) | 37.4 (3.6) | 13.8 (2.5) | 48.9 (3.7) | 15.0 (2.2) | 25.0 (2.6) | 21.7 (2.1) | 38.4 (2.7) |

| | | | | | | | | | | |
|-----------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Language of interview | | | | | | | | | | |
| English | 49.6 (0.7) | 10.0 (0.3) | 40.4 (0.6) | 38.3 (0.7) | 8.8 (0.4) | 53.0 (0.7) | 9.5 (0.3) | 16.0 (0.4) | 28.2 (0.5) | 46.3 (0.6) |
| Spanish | 22.1 (2.7) | 34.9 (2.7) | 43.0 (2.8) | 15.2 (2.1) | 41.6 (3.7) | 43.2 (3.5) | 15.6 (2.4) | 17.9 (2.4) | 18.7 (2.7) | 47.8 (2.8) |
| Educational attainment | | | | | | | | | | |
| Fewer than 12 years | 48.3 (1.1) | 11.9 (0.6) | 39.7 (1.1) | 33.2 (1.2) | 16.5 (0.9) | 50.3 (1.2) | 13.1 (0.7) | 17.3 (0.8) | 24.4 (1.0) | 45.2 (1.2) |
| 12 years | 45.5 (1.0) | 11.5 (0.6) | 42.9 (1.0) | 35.4 (0.9) | 9.8 (0.6) | 54.8 (0.9) | 9.7 (0.5) | 16.9 (0.7) | 27.1 (0.9) | 46.3 (0.9) |
| More than 12 years | 52.2 (0.9) | 8.9 (0.5) | 38.9 (0.8) | 41.7 (1.0) | 6.3 (0.4) | 52.0 (0.9) | 7.5 (0.4) | 14.6 (0.6) | 30.9 (0.8) | 47.0 (0.9) |
| Poverty-level income ^a | | | | | | | | | | |
| 0 to 149 percent | 45.5 (1.3) | 14.5 (0.8) | 40.1 (1.2) | 33.5 (1.2) | 15.5 (0.8) | 50.9 (1.2) | 13.8 (0.9) | 19.5 (0.8) | 24.6 (1.0) | 42.1 (1.3) |
| 150 percent and greater | 50.0 (0.7) | 9.4 (0.4) | 40.6 (0.7) | 38.9 (0.7) | 7.9 (0.4) | 53.2 (0.7) | 8.4 (0.3) | 15.0 (0.4) | 29.0 (0.6) | 47.6 (0.6) |

a. The National Health Interview Survey poverty index was used, which is based on family size, number of children under 18 years of age and family income using the 1993 poverty levels derived from the August 1994 Current Population Survey.

TABLE 2: Logistic Regression Models: Sociodemographic Characteristics Associated With Attitudes Toward Audio Computer-Assisted Self-Interviewing (Audio-CASI), 1995 National Survey of Family Growth

| Characteristic | Interview Gives the Most Honest Answers ^a | | Most Comfortable Giving Answers With Interview ^a | | Likely to Have Given Different Answers to Other Interview Questions if Audio-CASI Used ^b | |
|--------------------------|--|-----------|---|-----------|---|-----------|
| | Risk Ratio | 95% CI | Risk Ratio | 95% CI | Odds Ratio | 95% CI |
| Age at interview (years) | | | | | | |
| 15 to 19 | 0.18* | 0.12-0.27 | 0.36* | 0.23-0.54 | 0.83 | 0.65-1.06 |
| 20 to 24 | 0.56* | 0.43-0.73 | 0.54* | 0.40-0.73 | 1.25* | 1.04-1.51 |
| 25 to 29 | 0.75* | 0.59-0.95 | 0.75* | 0.58-0.99 | 1.22* | 1.02-1.46 |
| 30 to 34 | 0.97 | 0.79-1.20 | 0.86 | 0.69-1.08 | 1.18* | 1.01-1.39 |
| 35 to 39 | 0.94 | 0.77-1.16 | 0.85 | 0.67-1.06 | 1.14 | 0.96-1.35 |
| 40 to 44 | — | — | — | — | — | — |
| Marital status | | | | | | |
| Never married | 1.01 | 0.81-1.25 | 0.93 | 0.74-1.17 | 1.14* | 1.00-1.31 |
| Married | — | — | — | — | — | — |
| Formerly married | 1.08 | 0.88-1.31 | 1.11 | 0.89-1.38 | 1.22* | 1.05-1.42 |
| Race/ethnicity | | | | | | |
| Hispanic | 1.75* | 1.37-2.23 | 2.22* | 1.61-3.07 | 1.88* | 1.64-2.16 |
| White, non-Hispanic | 1.53* | 1.24-1.88 | 2.16* | 1.77-2.65 | 2.30* | 2.02-2.60 |
| African American | 1.53* | 1.24-1.88 | 2.16* | 1.77-2.65 | 2.30* | 2.02-2.60 |
| Other | 1.64* | 1.12-2.40 | 2.27* | 1.40-3.68 | 2.56* | 2.06-3.18 |
| Language of interview | | | | | | |
| English | — | — | — | — | — | — |
| Spanish | 3.06* | 2.00-4.68 | 3.85* | 2.49-5.94 | 0.79 | 0.61-1.01 |
| Educational attainment | | | | | | |
| Fewer than 12 years | 2.28* | 1.81-2.87 | 2.99* | 2.32-3.85 | 1.54* | 1.31-1.80 |
| 12 years | 1.45* | 1.21-1.72 | 1.69* | 1.40-2.05 | 1.23* | 1.08-1.39 |
| More than 12 years | — | — | — | — | — | — |

TABLE 2: Continued

| | | | | | | |
|-----------------------------------|-------|-----------|-------|-----------|-------|-----------|
| Poverty level income ^c | | | | | | |
| 0 to 149 percent | 1.21* | 1.02-1.44 | 1.34* | 1.13-1.59 | 1.19* | 1.04-1.36 |
| 150 percent and greater | — | — | — | — | — | — |

NOTE: CI = confidence interval.

a. Results of multinomial logistic regression comparing personal interview to audio-CASI. The resultant relative risk ratios are ratios of two odds, controlling for the other sociodemographic characteristics in the model.

b. Results of logistic regression comparing personal interview to audio-CASI. Very likely and somewhat likely were coded 1; not very likely and not at all likely were coded 0. The resultant odds ratios are the ratio of two probabilities, controlling for other variables in the model.

c. The National Health Interview Survey poverty index was used, which is based on family size, number of children younger than 18 years of age, and family income using the 1993 poverty levels derived from the August 1994 Current Population Survey.

* $p < .05$, two-tailed.

others to say that they would have given different answers with audio-CASI if it had been used for other interview questions. In short, they appear to be more likely to prefer the interview but reported likely response effects with audio-CASI. The exception to this is women interviewed in Spanish. They were three times more likely to prefer the interview in terms of the honesty of answers and comfort but were not more likely to report giving different answers if audio-CASI had been used for other questions (RRR = 0.79; see Table 2).

The experience of audio-CASI. Very few respondents (1.4 percent, SE = 0.1) said that it was very difficult or difficult to use the keyboard to type answers into the computer. Hispanics, and especially women interviewed in Spanish, were significantly more likely to report difficulties in using the keyboard (3.2 percent, SE = 0.6, and 8.0 percent, SE = 1.7, respectively) than White, non-Hispanics (0.7 percent, SE = 0.09). Likewise, women of "other" race/ethnicity were significantly more likely to report difficulty in use of the keyboard (4.8 percent, SE = 1.7).

Hispanics, and especially women interviewed in Spanish, relied much more heavily than White, non-Hispanics on listening to the audiotape (with or without the use of the screen) than on reading the questions on screen with the tape turned off (65.7 percent [SE = 1.8] of Hispanics, and 77.1 percent [SE = 3.2] of women interviewed

TABLE 3: Number of Sex Partners in Past Year, as Reported by Interview and Audio Computer-Assisted Self-Interviewing (Audio-CASI), 1995 National Survey of Family Growth

| <i>Number of Sex Partners</i> | <i>Audio-CASI (n=10,666)</i> | | | <i>Highest Number Reported by Either Mode^a</i> |
|-------------------------------|------------------------------|----------------------------------|-------------------------------|---|
| | <i>All Cases</i> | <i>Recoded Cases^a</i> | <i>Interview (n = 10,773)</i> | |
| M (SE) | 1.7 (0.1) | 1.3 (0.0) | 1.0 (0.0) | 1.4 (0.0) |
| Range | 0-888 | 0-300 | 0-170 | 0-300 |
| Percent distribution (SE) | | | | |
| 0 | 18.2 (0.5) | 18.2 (0.5) | 17.5 (0.5) | 15.5 (0.5) |
| 1 | 64.3 (0.5) | 64.7 (0.5) | 72.4 (0.5) | 66.5 (0.5) |
| 2 | 9.0 (0.3) | 9.1 (0.3) | 6.2 (0.2) | 9.4 (0.3) |
| 3 | 3.2 (0.2) | 3.2 (0.2) | 2.1 (0.2) | 3.4 (0.2) |
| 4 | 1.7 (0.1) | 1.7 (0.1) | 0.9 (0.1) | 1.9 (0.1) |
| 5 | 1.0 (0.1) | 1.0 (0.1) | 0.3 (0.1) | 1.1 (0.1) |
| 6 or more | 2.6 (0.2) | 2.1 (0.2) | 0.5 (0.1) | 2.3 (0.2) |

a. Forty-seven cases were recoded. If the interview and audio-CASI reports were consistent (e.g., both were 22), the value was not recoded.

in Spanish, as compared to 48.4 percent [SE = 1.1] of White, non-Hispanics).

COMPARISON OF REPORTING OF SEX PARTNERS IN PAST YEAR, BY MODE

More sex partners are reported by audio-CASI than by personal interview. The mean number of partners is greater (1.7 vs. 1.0), the percent reporting six or more partners increases (2.6 vs. 0.5 percent), and the range of number of partners is wider (1-888 vs. 0-170; see Table 3). If some women are more comfortable providing answers to sensitive questions by personal interview rather than audio-CASI, it may be appropriate to assess number of sex partners as the highest number reported, either by interview or audio-CASI. When this is done, the average number of partners increases somewhat (from 1.3 with audio-CASI to 1.4 with either mode; see Table 3).

While audio-CASI increases the number of reported sex partners, there appear to be errors in response introduced by audio-CASI. Some women may have made data-entry errors when keying in their number of sex partners. Among the 303 survey respondents reporting six or more sex partners in the past year, 47 may have held the numeric key down too long so that the intended value was entered incorrectly (i.e., 11, 22, 33, 44, 55, 111, 222, 333, 888). When these 47 cases were recoded to their likely values (e.g., 333 = 3, 888 = 8), the difference between the audio-CASI and interview reported average number of sex partners is reduced. The mean sex partners is reduced from 1.7 to 1.3, and the range of values is reduced from 1-888 to 1-300 (see Table 3). All subsequent tables show results with recoded values.

There is a drop in the share of women reporting no sex partners in the personal interview as compared to audio-CASI (from 18.2 percent with audio-CASI to 15.5 percent with either mode; see Table 3). A detailed look at the 457 women who reported more partners during the personal interview than by audio-CASI reveals that two thirds (299) of these women reported one partner during the interview and zero partners by audio-CASI. The majority of these 299 women are older (60 percent are 35 to 44 years) and married (76 percent). These women were twice as likely as others to be Hispanic or "other" race/ethnicity.

Differences in reports of sex partners between interview and audio-CASI are shown in Table 4. The vast majority of women reported consistently on the two modes (83.4 percent). Reporting of additional sex partners occurs on audio-CASI relative to interview for 12.6 percent of women. There is a very small group of women (4.0 percent) who reported more sex partners during the personal interview than on audio-CASI. These women tend to be older (age 40 to 44) and of Hispanic and "other" race/ethnicity (see Table 4).

When additional partners are reported on audio-CASI, it is usually an additional one or two partners. A very small share of women have discrepancies in reporting of four or more partners (1.9 percent; see Table 4). Six percent of women who said during the personal interview that they had not had sex reported one or more sex partners in the past year when interviewed by audio-CASI. Three quarters (76.1 percent)

TABLE 4: Difference Between Number of Sex Partners in Past Year as Reported by Interview and Audio Computer-Assisted Self-Interviewing (Audio-CASI) by Sociodemographic Characteristics, 1995 National Survey of Family Growth

| <i>Characteristic</i> | <i>Audio-CASI Underreports (≤ 1)</i> | <i>Consistent Reporting (0)</i> | <i>Audio-CASI Increased Reporting</i> | | | | |
|--------------------------|--|---------------------------------|---------------------------------------|------------|-----------|-----------|-----------|
| | | | <i>(≥ 1)</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4+</i> |
| Total population | 4.0 (0.2) | 83.4 (0.4) | 12.6 (0.3) | 7.3 (0.3) | 2.2 (0.1) | 1.1 (0.1) | 1.9 (0.2) |
| Age at interview (years) | | | | | | | |
| 15 to 19 | 2.9 (0.5) | 79.8 (1.2) | 17.3 (1.1) | 10.1 (0.8) | 3.5 (0.7) | 1.6 (0.3) | 2.2 (0.4) |
| 20 to 24 | 3.3 (0.4) | 77.8 (1.2) | 18.9 (1.1) | 9.8 (0.9) | 3.8 (0.5) | 2.2 (0.4) | 3.2 (0.5) |
| 25 to 29 | 3.2 (0.5) | 82.7 (1.1) | 14.1 (1.0) | 8.8 (0.8) | 1.7 (0.3) | 0.9 (0.3) | 0.3 (0.5) |
| 30 to 34 | 4.0 (0.5) | 85.3 (0.9) | 10.7 (0.8) | 6.6 (0.6) | 1.4 (0.3) | 0.9 (0.3) | 1.8 (0.3) |
| 35 to 39 | 4.8 (0.5) | 85.9 (0.8) | 9.2 (0.7) | 5.5 (0.6) | 1.6 (0.4) | 0.9 (0.2) | 1.2 (0.2) |
| 40 to 44 | 5.4 (0.5) | 87.2 (0.8) | 7.3 (0.6) | 4.4 (0.5) | 1.6 (0.3) | 0.6 (0.2) | 0.8 (0.2) |
| Marital status | | | | | | | |
| Never married | 3.2 (0.3) | 78.4 (0.7) | 18.4 (0.6) | 10.4 (0.5) | 3.4 (0.3) | 1.9 (0.2) | 2.6 (0.3) |
| Married | 4.2 (0.3) | 90.2 (0.5) | 5.6 (0.3) | 3.4 (0.3) | 0.8 (0.1) | 0.3 (0.0) | 1.0 (0.2) |
| Formerly married | 5.3 (0.6) | 72.1 (1.2) | 22.6 (1.2) | 13.4 (1.0) | 3.8 (0.5) | 1.0 (0.2) | 3.3 (0.5) |
| Race/ethnicity | | | | | | | |
| Hispanic | 5.5 (0.6) | 80.1 (1.5) | 14.3 (1.2) | 8.8 (0.9) | 2.6 (0.4) | 1.5 (0.4) | 1.5 (0.4) |
| White, non-Hispanic | 3.4 (0.2) | 86.4 (0.4) | 10.2 (0.4) | 6.4 (0.3) | 1.6 (0.1) | 0.8 (0.1) | 1.4 (0.2) |
| African American | 4.8 (0.5) | 70.8 (1.3) | 24.3 (1.2) | 11.7 (0.7) | 5.4 (0.6) | 2.7 (0.5) | 4.6 (0.6) |
| Other | 7.0 (1.6) | 81.5 (2.0) | 11.5 (1.8) | 5.3 (1.0) | 2.3 (0.9) | 1.4 (1.0) | 2.6 (1.1) |

| | | | | | | | |
|-----------------------------------|-----------|------------|------------|------------|-----------|-----------|-----------|
| Language of interview | | | | | | | |
| English | 4.0 (0.2) | 83.5 (0.4) | 12.5 (0.3) | 7.2 (0.3) | 2.2 (0.2) | 1.2 (0.1) | 1.9 (0.2) |
| Spanish | 4.3 (0.9) | 80.6 (2.9) | 15.1 (2.6) | 11.3 (2.2) | — | — | — |
| Educational attainment | | | | | | | |
| Fewer than 12 years | 3.9 (0.4) | 78.0 (0.9) | 18.1 (0.8) | 10.0 (0.6) | 3.7 (0.4) | 1.7 (0.3) | 2.7 (0.3) |
| 12 years | 4.7 (0.4) | 82.6 (0.7) | 12.7 (0.6) | 7.3 (4.2) | 2.2 (0.3) | 1.0 (0.2) | 2.2 (0.3) |
| More than 12 years | 3.5 (0.3) | 87.5 (0.6) | 9.0 (0.5) | 5.7 (0.4) | 1.2 (0.2) | 0.9 (0.2) | 1.2 (0.2) |
| Poverty-level income ^a | | | | | | | |
| 0 to 149 percent | 4.5 (0.4) | 74.9 (1.0) | 20.6 (0.9) | 11.5 (0.7) | 3.4 (0.4) | 2.2 (0.4) | 3.4 (0.4) |
| 150 percent and greater | 3.9 (0.2) | 85.8 (0.4) | 10.3 (0.4) | 6.1 (0.3) | 1.9 (0.2) | 0.8 (0.1) | 1.5 (0.2) |

NOTE: Values are presented as percent distribution (SE). A dash in the column indicates the sample size was too small for estimation.

a. The National Health Interview Survey poverty index was used, which is based on family size, number of children younger than 18 years of age, and family income using the 1993 poverty levels derived from the August 1994 Current Population Survey.

of such reports were from teens. Younger women appear to be more likely to report additional sex partners on audio-CASI than interview, but teens appear to have comparable reporting by mode as women in their early 20s. According to bivariate analyses, audio-CASI appears to provide the greatest gains in reporting among women who are formerly married (22.6 percent reported additional partners), African American (24.3 percent reported additional partners), and poor (20.6 reported additional partners; see Table 4).

The findings suggested in bivariate analyses are confirmed when reporting behavior is modeled using multinomial logistic regression analyses. Results are first shown for correlates of increased reporting on audio-CASI (shown on the right side of Table 5). Results are next shown for decreased reports on audio-CASI relative to interview (shown on the left side of Table 5). The risk ratios shown represent the probability of more or less reporting relative to the probability of consistent reporting on interview and audio-CASI.

Certain attributes (being African American, formerly married, and having lower educational attainment) are associated with inconsistent reporting—either increased or decreased reports of number of sex partners on audio-CASI relative to interview (see Table 5). Characteristics uniquely associated with increased reporting with audio-CASI include younger age, never having been married, and poverty. Hispanics and women of “other” race/ethnicity are unique in having audio-CASI decrease reports of sex partners. Audio-CASI appeared to have no effect on women interviewed in Spanish: It did not increase or decrease reports of sex partners.

Attitudes toward interview mode appear to be associated with actual reporting behavior. According to bivariate analyses, women who said that they would very likely have given different answers on other questions if audio-CASI were available were in fact the most likely to provide discrepant answers. Women who indicated that interviews give more honest answers than audio-CASI were more likely to report more partners on interview than audio-CASI (see Table 6). These apparent consistencies in attitude and reporting behavior may be artifactual. Women may merely be reflecting on the attitude questions how they responded in the two modes. The attitudinal questions may not measure long-held or relatively fixed attitudes about the mode.

TABLE 5: Multinomial Logistic Regression Risk Ratios: Sociodemographic Correlates of Decreased and Increased Reports Relative to Consistent Reports of Sex Partners in the Past Year as Reported by Interview and Audio Computer-Assisted Self-Interviewing (Audio-CASI), 1995 National Survey of Family Growth

| <i>Characteristic</i> | <i>Audio-CASI Decreased Reports</i> | | <i>Audio-CASI Increased Reports</i> | |
|-----------------------------------|-------------------------------------|---------------|-------------------------------------|---------------|
| | <i>Risk Ratio</i> | <i>95% CI</i> | <i>Risk Ratio</i> | <i>95% CI</i> |
| Age at interview (years) | | | | |
| 15 to 19 | 0.51* | 0.30-0.88 | 1.28 | 0.94-1.75 |
| 20 to 24 | 0.69 | 0.46-1.02 | 2.17* | 1.66-2.85 |
| 25 to 29 | 0.63* | 0.43-0.94 | 1.84* | 1.39-2.44 |
| 30 to 34 | 0.77 | 0.55-1.08 | 1.47* | 1.14-1.90 |
| 35 to 39 | 0.92 | 0.68-1.25 | 1.29 | 0.99-1.67 |
| 40 to 44 | — | — | — | — |
| Marital status | | | | |
| Never married | 0.94 | 0.71-1.25 | 2.67* | 2.19-3.25 |
| Married | — | — | — | — |
| Formerly married | 1.37* | 1.02-1.84 | 4.32* | 3.59-5.20 |
| Race/ethnicity | | | | |
| Hispanic | 1.83* | 1.35-2.49 | 1.17 | 0.91-1.51 |
| White, non-Hispanic | — | — | — | — |
| African American | 1.65* | 1.25-2.17 | 2.04* | 1.74-2.39 |
| Other | 2.28* | 1.39-3.75 | 1.12 | 0.78-1.60 |
| Language of interview | | | | |
| English | — | — | — | — |
| Spanish | 0.59 | 0.32-1.07 | 1.12 | 0.71-1.76 |
| Educational attainment | | | | |
| Fewer than 12 years | 1.47* | 1.04-2.08 | 1.66* | 1.33-2.06 |
| 12 years | 1.37* | 1.07-1.74 | 1.28* | 1.07-1.55 |
| More than 12 years | — | — | — | — |
| Poverty-level income ^a | | | | |
| 0 to 149 percent | 1.12 | 0.86-1.46 | 1.36* | 1.17-1.58 |
| 150 percent and greater | — | — | — | — |

NOTE: CI = confidence interval.

a. The National Health Interview Survey poverty index was used, which is based on family size, number of children younger than 18 years of age, and family income using the 1993 poverty levels derived from the August 1994 Current Population Survey.

* $p < .05$, two-tailed.

TABLE 6: Difference Between Number of Sex Partners in Past Year as Reported by Interview and Audio Computer-Assisted Self-Interviewing (Audio-CASI) by Attitudes Toward Interview Mode, 1995 National Survey of Family Growth

| <i>Characteristic</i> | <i>Audio-CASI Underreports (≤ 1)</i> | <i>Consistent Reporting (0)</i> | <i>Audio-CASI Increased Reporting</i> | | | | |
|---|--|---------------------------------|---------------------------------------|------------|-----------|-----------|-----------|
| | | | <i>(≥ 1)</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4+</i> |
| Total population | 4.0 (0.2) | 83.4 (0.4) | 12.6 (0.3) | 7.3 (0.3) | 2.2 (0.1) | 1.1 (0.1) | 2.4 (0.2) |
| Method giving most honest answer | | | | | | | |
| Interview | 6.0 (0.8) | 82.2 (1.2) | 11.8 (1.0) | 7.4 (0.9) | 2.2 (0.5) | 1.0 (0.3) | 1.2 (0.3) |
| Audio-CASI | 3.6 (0.2) | 81.5 (0.6) | 14.9 (0.6) | 8.4 (0.4) | 2.9 (0.3) | 1.2 (0.2) | 2.5 (0.3) |
| Does not matter | 4.0 (0.3) | 85.9 (0.5) | 10.1 (0.5) | 6.1 (0.4) | 1.5 (0.2) | 1.1 (0.2) | 1.5 (0.2) |
| Method most comfortable with | | | | | | | |
| Interview | 6.6 (0.9) | 79.2 (1.7) | 14.1 (1.3) | 8.3 (0.9) | 3.0 (0.6) | 1.1 (0.4) | 1.7 (0.4) |
| Audio-CASI | 4.0 (0.3) | 79.1 (0.7) | 16.9 (0.7) | 9.6 (0.5) | 2.8 (0.3) | 1.6 (0.2) | 2.9 (0.4) |
| Does not matter | 4.5 (0.3) | 84.8 (0.5) | 10.7 (0.5) | 6.3 (0.4) | 1.7 (0.2) | 1.1 (0.2) | 1.7 (0.2) |
| Likelihood of giving different answers on other questions if could have used audio-CASI | | | | | | | |
| Very likely | 5.7 (0.7) | 67.6 (1.6) | 26.8 (1.5) | 12.5 (1.1) | 6.4 (0.9) | 2.9 (0.5) | 5.0 (0.7) |
| Somewhat likely | 4.7 (0.6) | 73.5 (1.2) | 21.8 (1.2) | 12.9 (0.9) | 3.7 (0.5) | 2.2 (0.4) | 3.1 (0.5) |
| Not very likely | 4.2 (0.4) | 84.7 (0.7) | 11.1 (0.6) | 6.5 (0.5) | 1.9 (0.3) | 0.9 (0.2) | 1.8 (0.3) |
| Not at all likely | 3.3 (0.3) | 89.2 (0.5) | 7.5 (0.4) | 4.8 (0.4) | 1.1 (0.2) | 0.6 (0.1) | 1.0 (0.2) |

DISCUSSION

The NSFG provides a valuable opportunity to assess attitudes toward mode of survey administration and actual reporting of sensitive behaviors with both personal interview and audio-CASI. Previous experimental research on mode preference suggests that the mode experienced affects attitudes. In the context of a face-to-face interview, for example, personal interviews are favored, and in the context of a telephone survey, telephone administration is preferred (Groves 1989). The NSFG does not offer the advantages of an experimental test of preferences (i.e., random assignment of respondents to groups), but it does ask attitudinal questions in the context of the experience of both personal interview and audio-CASI.

Respondents to the NSFG hold generally positive attitudes toward audio-CASI: The vast majority express either greater confidence and comfort with audio-CASI relative to personal interview or that the mode does not matter to them. Only 1 in 10 express either greater confidence or increased comfort with the personal interview. Furthermore, there appears to be a high level of consistency of reports of sex partners with the two modes of administration, with 83.4 percent providing consistent reports by mode.

There are a number of possible explanations for the relatively high level of consistent reports of sex partners. The vast majority of women reported two or fewer sex partners in the previous year, making such reporting less prone to problems with recall that might occur with higher frequency phenomenon. In some cases, a respondent may have aimed for consistency, reporting on audio-CASI the same information reported earlier, irrespective of the truth. The audio-CASI response was clearly dependent on the first response, in that the respondent was mindful of prior answers. Alternatively, women may not perceive number of sex partners to be especially sensitive and feel comfortable reporting truthfully and reliably.

Increased reports of sex partners on audio-CASI may be attributable to the greater anonymity afforded by this mode and may truly represent a woman's sex history. The increased audio-CASI reports of sex partners by women who are poor or who are members of minority groups could be explained if such women were more subject to social stigma. The HIV/AIDS epidemic could, for example, contribute to stigma.

African American, Hispanic, and poor women all have higher rates of HIV/AIDS, and there may be a reluctance to report fully on number of sex partners, a well-known risk factor for HIV/AIDS.

The benefits of audio-CASI relative to personal interview are, however, difficult to ascertain in the context of the NSFG because of the survey's design. The audio-CASI portion was administered at the very end of the interview, following a lengthy personal interview (average length 103 minutes). The personal interview asked detailed questions about every sex partner reported during the interview portion of the interview (e.g., use of contraception, fertility). It is feasible that women were prompted to remember additional sex partners during the audio-CASI portion of the interview because they had just reviewed their entire sexual, contraceptive, and marital/partner history during the personal interview. To assess whether the personal interview acted as an aid to memory, a crossover design would be necessary to evaluate the impact of the ordering of the two modes. Another explanation for increased reporting on audio-CASI might be that following the lengthy personal interview, the respondent had a revised understanding of what is meant by sex partner for the audio-CASI interview. Alternatively, the very special treatment of the questions about sex partners afforded by audio-CASI during the interview may have prompted women to respond more honestly.

Fewer sex partners may have been reported during the audio-CASI as compared to the personal interview if the women misunderstood the intent of the audio-CASI interview and mentioned only partners that were not mentioned during the earlier personal interview. Inconsistent reporting may also represent random error, the unreliability in reporting that might easily be associated with fatigue among women after a prolonged interview period. Women who were more sexually active may have had greater difficulty recalling their total number of partners or remembering whether a particular sex partner counted during the one-year recall period. It is not clear from these analyses whether the characteristics associated with underreporting on personal interview are related to different degrees of recall difficulty or to responses to social stigma associated with sexual activity. Women who were formerly married, for example, reported higher numbers of sex partners, and so their noted tendency to underreport on personal interview may be related to recall difficulties rather than deliberate misreporting earlier in the interview.

Comparisons of abortion reporting by interview and audio-CASI on the 1995 NSFG suggest that reporting number of sex partners is not as subject to mode effects as is abortion (Fu et al. 1998). Researchers studying abortion reporting found 61 percent of women reported consistently on the two modes, a lower level of consistency than for sex partner reporting. Audio-CASI contributed to more women admitting to having had an abortion—17 percent of women reported at least one abortion in the self-report while reporting none in the interview. Using external information on abortion use, the investigators found fewer than 60 percent of abortions to be reported on the survey, even with improvements in reported associated with audio-CASI. Many of the characteristics that these investigators found to be associated with gains in reporting of abortion with audio-CASI are also found to be associated with increased reporting of sex partners in these analyses (e.g., younger age, never married, poverty).

Given the design of the NSFG, it is difficult to sort out the cause of reporting differences. There does appear, however, to be important subgroups of women who differ markedly in their attitudes toward mode and their reporting behavior. Of particular concern are Hispanics, especially those interviewed in Spanish, and women of “other” race/ethnicity. Women in these groups expressed relatively high levels of confidence and greater comfort with the personal interview as compared to audio-CASI, and for these women, audio-CASI is not associated with gains in reports of sex partners. In fact, declines in reports of sex partners are significantly more likely with audio-CASI among Hispanic women and women of “other” race/ethnicity. Most of the discrepancy appears to be among married, older women reporting husbands as sex partners during the interview but failing to report them as such on audio-CASI. If women are in fact not having sex with their husbands, audio-CASI allows women to honestly report this without feeling stigma. On the other hand, this pattern of reporting could have resulted if some women (especially Hispanics and women of “other” race/ethnicity) were confused about the intent of the audio-CASI interview that followed the NSFG personal interview. Some may have thought that only illicit partners or partners not previously reported were to be entered onto the computer.

The experience of audio-CASI appears to differ by race/ethnicity. Hispanics, and especially women interviewed in Spanish, relied much more heavily than others on listening to the audiotape rather than

reading the questions on screen (in Spanish). This could relate to a number of factors, including literacy, culturally based preferences for oral communication, or problems with the technology. Difficulties in using audio-CASI could arise if the Spanish translation of the instrument used for the written and audio portion of the audio-CASI interview did not account for regional differences in wording and expression. For the audio portion, a woman without a notable Spanish dialect or accent was used (Kelly et al. 1997). U.S. Spanish varies considerably by region, and it may be that some groups found the audio version inconsistent with their dialect.

Hispanics, especially women completing the interview in Spanish, were much more likely to report difficulty in using the keyboard to enter answers during the audio-CASI interview. Hispanic women may be somewhat less familiar with computers and so prefer personal interviews, even for sensitive questions. According to information on computer use from the 1997 Current Population Survey, reproductive-age Hispanic women are much less likely than other women to use computers at home or at work (Current Population Survey 1997).

These analyses of the 1995 NSFG confirm what other studies have found: Audio-CASI increases reports of sensitive behaviors as compared to personal interview. The design of the NSFG, however, limits the ability to interpret whether the gains in reporting are solely attributable to the anonymity afforded by audio-CASI. Data on attitudes toward audio-CASI and reporting patterns observed among minority populations suggest that more research is needed to confirm the benefits of audio-CASI for all segments of the population. Evidence from the NSFG suggests that Hispanic women, especially those interviewed in Spanish, are more likely than others to prefer being interviewed in person and to feel that interviews provide more honest answers. Cognitive research such as debriefing interviews or focus groups would help clarify what underlies these reported attitudes. Methods to make audio-CASI more user friendly should also be explored because a significant share of women report having difficulties with aspects of the technology. To further explore potential mode effects on sensitive behaviors among minority populations, experimental designs are needed. Methodologic research is critical because many studies of sensitive behaviors are targeted to minority populations (HIV/AIDS risk behaviors, use of drugs of abuse) and

reporting errors associated with the data collection technology could obscure important findings.

REFERENCES

- Abma, Joyce C., Anjani Chandra, William D. Mosher, Linda S. Peterson, and Linda J. Piccinino. 1997. "Fertility, Family Planning, and Women's Health: New Data From the 1995 National Survey of Family Growth." *Vital and Health Statistics* 23(19):1-114.
- Aquilino, William S. and Leonard A. LoSciuto. 1990. "Effects of Interview Mode on Self-Reported Drug Use." *Public Opinion Quarterly* 54:362-95.
- Bloom, David E. 1998. "Technology, Experimentation, and the Quality of Survey Data." *Science* 280:847-48.
- Caspar, Rachel, Allen Duffer, and Donna Jewell. 1998. "ACASI Issues for Cycle VI of the NSFG: Final Report." *National Survey of Family Growth: Professional Services Contract*. Prepared for the National Center for Health Statistics.
- Catania, Joseph A., David R. Gibson, Dale D. Chitwood, and Thomas J. Coates. 1990. "Methodological Problems in AIDS Behavioral Research: Influences on Measurement Error and Participation Bias in Studies of Sexual Behavior." *Psychological Bulletin* 108: 339-62.
- Current Population Survey. 1997. *Special Tabulations* (via Ferret). Retrieved December 13, 1997, from www.census.gov.
- DeMaio, Teresa J. 1984. "Social Desirability and Survey Measurement: A Review." Pp. 257-81 in *Surveying Subjective Phenomena*, vol. 2, edited by C. F. Turner and E. Martin. New York: Russell Sage.
- Des Jarlais, Don C., Denise Paone, Judith Milliken, Charles F. Turner, Heather Miller, James Gribble, Qiuhi Shi, Holly Hagan, and Samuel R. Friedman. 1999. "Audio-Computer Interviewing to Measure Risk Behaviour for HIV Among Injecting Drug Users: A Quasi-Randomised Trial." *Lancet* 353:1657-61.
- Duffer, Allen P., Judith T. Lessler, Michael F. Weeks, and William D. Mosher. 1996. "Impact of Incentives and Interviewing Modes: Results From the National Survey of Family Growth Cycle V Pretest." Pp. 147-151 in *Health Survey Research Methods: Conference Proceedings*, edited by R. Warnecke. Hyattsville, MD: U.S. Department of Health and Human Services.
- Fu, Haishan, Jacqueline E. Darroch, Stanley K. Henshow, and Elizabeth Kolb. 1998. "Measuring the Extent of Abortion Underreporting in the 1995 National Survey of Family Growth." *Family Planning Perspectives* 30(3):128-33.
- Groves, Robert M. 1989. *Survey Errors and Survey Costs*. New York: John Wiley.
- Guadagno, Mary Ann, Joyce C. Abma, Anjani Chandra, Kathy A. London, Linda S. Peterson, Linda J. Piccinino, and Jacqueline B. Wilson. 1994. "Women's Reports of Sensitive Health Conditions, Attitudes and Behaviors." Pp. 82-87 in *1994 Proceedings of the Government Statistics Section*. Alexandria, VA: American Statistical Association.
- Jobe, Jared B., William F. Pratt, Roger Tourangeau, Alison K. Baldwin, and Kenneth A. Rasinski. 1998. "Effects of Interview Mode on Sensitive Questions in a Fertility Survey." Pp. 311-329 in *Survey Measurement and Process Quality*, edited by L. E. Lyberg, P. P. Biemer, M. Collins, E. D. de Leeuw, N. Schwarz, and D. Trewin. New York: John Wiley.
- Judkins, David R., William D. Mosher, and Steven Botman. 1991. "National Survey of Family Growth: Design, Estimation, and Inference." *Vital and Health Statistics* 2(109):1-52.

- Kelly, Janice E., William D. Mosher, Allen P. Duffer, and Susan H. Kinsey. 1997. "Plan and Operation of the 1995 National Survey of Family Growth." *Vital and Health Statistics* 1(36):1-89.
- Lessler, Judith T. and James M. O'Reilly. 1997. "Mode of Interview and Reporting of Sensitive Issues: Design and Implementation of Audio Computer-Assisted Self-Interviewing." *NIDA Research Monograph* 167:366-82.
- Lessler, Judith T., Michael F. Weeks, and James M. O'Reilly. 1994. "Results From the National Survey of Family Growth Cycle V Pretest." Pp. 64-70 in *1994 Proceedings of the Section on Survey Research Methods*. Alexandria, VA: American Statistical Association.
- Locke, Steven E., Hollis B. Kowaloff, Robert G. Hoff, Charles Safran, Mark A. Popovsky, Deborah J. Cotton, Dianne M. Finkelstein, Peter L. Page, and Warner V. Slack. 1992. "Computer-Based Interview for Screening Blood-Donors for Risk of HIV Transmission." *Journal of the American Medical Association* 268:1301-1305.
- Rieger, S., D. Judkins, and S. Sperry. 1991. *National Survey of Family Growth: Cycle IV CATI Phase, Final Report*. Hyattsville, MD: National Center for Health Statistics.
- Robinson, Rachael, and Robert West. 1992. "A Comparison of Computer and Questionnaire Methods of History-Taking in a Genito-Urinary Clinic." *Psychology and Health* 6:77-84.
- StataCorp. 1999. *Stata Statistical Software: Release 5.0*. College Station, TX: Stata Corporation.
- Tourangeau, Roger, Jared B. Jobe, William F. Pratt, and Kenneth Rasinski. 1997. "Design and Results of the Women's Health Study." *NIDA Research Monograph* 167:344-65.
- Tourangeau, Roger, Kenneth Rasinski, Jared B. Jobe, Tom W. Smith, and William F. Pratt. 1997. "Sources of Error in a Survey on Sexual Behavior." *Journal of Official Statistics* 13:341-65.
- Turner C. F., L. Ku, S. M. Rogers, L. D. Lindberg, J. H. Pleck, and F. L. Sonenstein. 1998. "Adolescent Sexual Behavior, Drug Use, and Violence: Increased Reporting With Computer Survey Technology." *Science* 280:867-73.
- Willis, Gordon B., Monroe G. Sirken, and Gail Nathan. 1994. "The Cognitive Aspects of Responses to Sensitive Survey Questions." Cognitive Methods Staff Working Paper Series No. 9.

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