Mode of Interview and Reporting of Sensitive Issues: Design and Implementation of Audio Computer-Assisted Self-Interviewing

Judith T. Lessler and James M. O'Reilly

ABSTRACT

Substantial underreporting is typical in interviewing respondents on their drug use and other sensitive behaviors. This chapter reviews established strategies, self-administered questionnaires and indirect questioning techniques, for increasing the willingness of respondents to report stigmatizing behaviors. While these methods improve reporting, each has shortcomings and burdens which limit their effectiveness. A new computer-based self-interviewing approach which incorporates recorded audio playback of questions offers improved self-administered interviewing. The chapter discusses this technology, audio computer-assisted self-interviewing (audio-CASI), describing its features and positive results from the early research tests of the method.

INTRODUCTION

Drug use is a highly sensitive issue and requires a continual search for new means to both assess and improve the accuracy of self-reported use. In this chapter, the authors briefly discuss the use of various interviewing methods to ask about sensitive behaviors and then describe in detail the design of audio computer-assisted self-interviewing (audio-CASI) and the results of two experiments that compared audio-CASI to other interviewing procedures. Research has generally shown that more private methods of interviewing yield higher reports of sensitive behaviors. The two major approaches that have been adopted to increase the willingness of respondents to report stigmatizing behaviors are the self-administered questionnaire and indirect questioning techniques.

The basic problem with trying to gather information on stigmatizing behaviors is that people do not want to talk about them. In a survey, the respondents might want to conceal their behavior from a number

of entities including the general public, sponsors of the survey (universities, the government), interviewer, and other members of his or her household. Respondents may be concerned with disclosure of specific activities that have specific legal and social consequences or they may have general concerns about how they appear to others. To protect respondents from disclosure of their personal information to the general public and the institutional sponsors, survey research organizations have adopted a number of techniques.

- Requirements that survey protocols be reviewed by institutional review boards (IRBs) to ensure that regulations covering the protection of human subjects are followed and stipulations of the privacy act are met.

- Routine use of confidential data-processing techniques that separate names and addresses from files containing personal information.

- Procurement of specific confidentially pledges from interviewers and staff who have access to the survey data and identifiers.

Interestingly, few respondents are likely to have direct experience that these activities are actually taking place and must rely on the assurances of confidentiality given to them along with explanations of the procedures that are used to maintain this confidentiality. However, researchers' claims of confidentiality are probably enhanced by repeated exposure in the media to reports of surveys and scientific studies in which no person is specifically named. Given that many of the questions that are asked in the National Household Survey on Drug Abuse (NHSDA) focus on illegal behaviors, it is somewhat surprising that anyone reports any illegal drug use. Assurances of confidentiality and appeals to the need for the information that will ultimately contribute to the social well-being of society in many cases seem to outweigh the concerns about self-revelation.

QUESTIONING TECHNIQUES FOR SENSITIVE ISSUES

Both self-administered questionnaires (SAQs) using the sealed ballot approach and indirect questioning techniques serve to conceal the respondent's answers from the interviewer and other household members. In contrast to the above-mentioned procedures, which the respondent must more or less accept on faith, these procedures are

often designed to explicitly demonstrate their privacy-enhancing features. For example, no names are written on SAQs, interviewers stand where they cannot see respondents mark their answers, questionnaires are placed in sealed envelopes, and attempts are made to secure a private place within the home for the interview.

In randomized response, two questions, one sensitive and one not sensitive, are available to the respondent. The respondent uses a randomizing device to select the question to answer (Warner 1965). The interviewer records the answer without being aware of which question was chosen. In item count methods (Droitcour et al. 1991), respondents are given lists of behaviors in which the sensitive behavior is imbedded among a list of nonsensitive behaviors. Respondents indicate the number of the behaviors that apply to them rather than answering questions on the actual behaviors. Random parts of the sample receive lists with and without the sensitive behavior. Each of these methods allows the researcher to use statistical methods to estimate the total number of people who engaged in the sensitive behavior; however, they do not allow one to determine if a particular person engaged in the sensitive behavior. Because of this feature, indirect questioning methods also prevent disclosure to the general public and sponsor as well as to the interviewer and other persons who may be nearby.

Question structure in interviewer-administered questionnaires (IAQs) has also been shown to have an impact on reporting of sensitive behaviors (Bradburn and Sudman 1979; Groves 1989). Open-ended questions, longer questions, and questions incorporating wording that implies that the behavior is more or less common are techniques that have been used to improve response to sensitive questions.

RESEARCH ON SAQs AND INDIRECT QUESTIONNAIRE TECHNIQUES

Research has generally shown that SAQs and indirect questioning techniques yield higher reports of sensitive behaviors (Bradburn 1983; Catania et al. 1990; Miller et al. 1990; Schwarz et al. 1991). For example, in the case of SAQs, Hay (1990) found differences in reported consump- tion of alcoholic beverages and cigarette use in a study of some 1,500 students in grades 2 through 12 who were randomly assigned to receive either an SAQ or a personal interview. The differences were 74 versus 63 percent for ever using alcohol and 38 versus 30 percent for use of cigarettes. Turner and colleagues

(1992), in a large-scale field experiment in which 3,200 respondents were randomly assigned to either an interviewer or SAQ, found that the difference between the two modes of data collection increased as the sensitivity of the behavior increased. Table 1 shows the ratio between the proportion of SAQ respondents reporting a given behavior to the proportion of respondents reporting that behavior when the interviewer administered the questions. The table displays the results for three time periods and three types of drug.

TABLE 1. *Ratio of prevalence estimates from SAQs and IAQs.*

Drug type	Lifetime	Past 12 months	Past 30 days
Alcohol	0.99	1.04	1.06
Marijuana	1.05	1.3	1.38
Cocaine	1.06	1.58	2.4

Examining table 1, one notes that the superiority of the SAQ relative to the IAQ increases as admitting drug use becomes more sensitive. For alcohol, the ratios are approximately equal to one for all time periods. For marijuana, the ratio is very close to one for lifetime use, indicating that respondents are nearly as willing to report use of marijuana in answer to an IAQ as when answering an SAQ as long as they are talking about use at some time in their life; however, as the reference period becomes more proximate, they are less willing to report use of marijuana to an interviewer. For cocaine, which use is more stigmatized than marijuana, a similar pattern emerges with even larger differences between the SAQ and IAQ; respondents completing an SAQ are nearly 2.5 times more likely to report using cocaine during the past 30 days.

Similarly, Bradburn (1983) notes that randomized response has been demonstrated to yield higher reports of drug use, abortion, and degree of fault in automobile accidents. Miller (1986) found item count techniques resulted in higher reports of heroin use although later tests revealed little differences for marijuana and cocaine use (Droitcour et al. 1991).

LIMITATIONS OF SAQs AND INDIRECT QUESTIONING

There are difficulties with each of these approaches. For SAQs, the most obvious difficulty is that they require that the respondent can read.[1] In addition, the respondents must complete a number of the questionnaire administration tasks such as finding and reading instructions, implementing skip patterns, and marking answers. In addition, respondents are prone to the same types of errors seen in IAQs: missing, out-of-range, and inconsistent answers. Even if a respondent can read, branching or contingent questioning is a particular problem (Turner et al. 1992), and researchers have been advised to use question structures that eliminate branching (Messmer and Seymour 1982). Although attention to the graphical design of the questionnaire has potential to reduce branching errors (Jenkins and Dillman 1994), incorporating branching options may compromise respondents' willingness to report sensitive behaviors in the SAQ (Gfroerer 1994).

Difficulties with indirect questioning techniques include respondents' failure to understand and accept the methods, availability of measurements at the aggregate rather than individual level, and high variance of the resulting estimates. Groves (1989) notes that there has been little research on whether respondents actually believe that the randomized response protects their privacy or on the degree to which respondents implement the procedure correctly. Hubbard and associates (1989) indicated that some respondents had difficulty understanding the privacy-enhancing features of item count techniques and were suspicious of them. In addition, it was demonstrated that in spite of detailed explanations of how to implement the technique, respondents made errors, often responding with the number of the item (i.e., its position in the list) rather than the number of items that applied to them. Although it is possible to use randomized response and item count procedures to make subgroup estimates, for some behaviors that have very low prevalence (and that often are also the most sensitive), the higher variance of these procedures reduces their usefulness in studying subgroup differences. Thus, because of these difficulties, direct questioning using SAQs is often selected over indirect questioning in a survey.

COMPUTER-ASSISTED METHODS FOR SELF- ADMINISTERED QUESTIONING

Computer-assisted self-interviewing (CASI) and audio-CASI systems have been developed to overcome some of the difficulties associated with the response to SAQs. With CASI, respondents read questions as they appear on the screen and enter their answers with the keyboard (or some other input device). The computer takes care of the "housekeeping" or administrative tasks for the respondent. The advantages of CASI are automated control of complex question routing, the ability to tailor questions based on previous responses, real-time control of out-of-range and inconsistent responses, and the general standardization of the interview.

CASI possesses significant disadvantages, however. Most obviously, CASI demands that the respondent can read with some facility. A second, more subtle disadvantage is that, at least with the character-based displays of many CASI applications of today, the visual and reading burden imposed on the respondent appears to be much greater than with an attractively designed paper form. The size of the characters and other qualities of the computer user interface seem to demand more reading and computer screen experience than that possessed by many who might be competent readers of printed material. Graphical user interfaces may reduce or eliminate this problem, but the present software used to developed CASI applications usually lacks this feature.

By adding simultaneous audio renditions of each question and instruction aloud, audio-CASI can remove the literacy barriers to self-administration of either CASI or SAQ. In audio-CASI, an audio box is attached to the computer; respondents put on headphones and listen to the question and answer choices as they are displayed on the screen. Respondents have the option of turning off the screen so that people coming into the room cannot read the questions, turning off the sound if they can read faster than the questions are spoken, or keeping both the sound and video on as they answer the questions. Respondents can enter a response at any time and move to the next question without waiting for completion of the audio question and answer choices for a question.

The advantages of audio-CASI, then, are that the addition of audio makes CASI fully applicable to a very wide range of respondents. Persons with limited or no reading abilities are able to listen, understand, and respond to the full content of the survey instrument.

Observers of audio-CASI interviews also often report that even with seemingly strong readers, audio-CASI interviews seem to more effectively and fully capture respondents' concentration. This may be because wearing headphones increases the insulation of the respondent for external stimuli, and also may be explained by the fact that the recorded human voice in the audio component evokes a more personalized interaction between the respondent and the instrument.

CASI AND AUDIO-CASI RESEARCH

Comparisons of CASI with personal interviews have noted findings similar to those cited above for the comparison of SAQs to IAQs. Waterton and Duffy (1984) compared reports of alcohol consumption under CASI and personal interviews. Overall, reports of alcohol consumption were 30 percent higher under the CASI procedure, and reports of liquor consumption were 58 percent higher. This may understate the potential gains because in this study respondents were first asked by an interviewer whether they had consumed any alcoholic beverages in the past 7 days. Only those respondents who indicated that they had done so received the CASI interview.[2]

Several recent studies comparing CASI to personal interviews in clinic settings have also noted the superiority of this method. Locke and associates (1992) found significant differences between the reporting of risk behaviors for the human immunodeficiency virus (HIV) when CASI was used to administer questions to donors at an American Red Cross donor center (4.4 percent versus 0.3 percent in the traditional interview procedure). Robinson and West (1992) compared reporting of symptoms in a genitourinary clinic using CASI, SAQs, and physician interviews. They found that more symptoms were reported by computer than by paper, and that both methods found more than were found in physician interviews. Levine and colleagues (1989) found that patients who had been admitted to a hospital after harming themselves were more likely to report suicidal ideation in a computer interview than to a physician. The CASI version of the Diagnostic Interview Schedule (DIS) yielded diagnostic information consistent with the traditional interviewer-administered DIS and patients considered the computer contact to be less embarrassing (Erdman et al. 1992); a computer interview with sex offenders yielded large numbers of previously undetected crimes (Weinrott and Saylor 1991); and a comparison of clinician and computer interviews directed at identifying obsessive-compulsive disorders found that the two

methods were equally good at distinguishing those with the disorder and that patients showed no preference for clinician interviews (Rosenfield et al. 1992).

The current authors have participated in two experimental tests that compared audio-CASI with other forms of interviewing. O'Reilly and colleagues (1994) compared paper SAQs, CASI, and audio-CASI in a small-scale experiment designed to assess the technology's potential. Subjects answered questions on drug use, sexual behaviors, and income. A Greco-Latin square design was used to assign subjects to one of three interviewing modes for each topic, producing an experiment that was fully balanced across mode and content. For eight of nine rating scales comparing these modes, respondents reported a preference for one of the two CASI methods. Although the sample size was small, a total of 40, O'Reilly and colleagues found that the two CASI methods tended to produce significantly more reports of marijuana and cocaine use; few differences in sexual behaviors were found. Table 2 summarizes some of the results.

Respondents were also asked which method they thought was better and consistently rated the two CASI methods as better on eight of nine facets rated: "liked best," "best for asking sensitive questions," "easiest to change answers," "most interesting," "easiest to use," "best for getting honest answers," "best for privacy after interview," "best for privacy during the interview," and "overall preference." Respondents felt it was easier to change answers using paper-and-pencil SAQs. Audio-CASI was rated consistently higher than CASI; however, the difference was significant only for three items: "overall preference," "interest," and "ease of use."

ABORTION REPORTING IN THE NATIONAL SURVEY OF FAMILY GROWTH PRETEST

With funding from the National Center for Health Statistics (NCHS), scientists at NCHS, Battelle, and the Research Triangle Institute (RTI) collaborated in a formal field experiment that compared abortion reporting under three different interviewing conditions. Respondents were randomly assigned to receive either an in-home computer-assisted personal interview (CAPI) interview only, an in-home CAPI interview followed by a audio-CASI interview that asked additional questions about abortions, or a CAPI interview at a neutral site away from the respondent's home. Respondents in the audio-CASI treatment were first asked to report their abortions to

TABLE 2. *Proportion of respondents reporting use of drugs by interviewing method.*

	Interviewing method			
	Audio-CASI	CASI	Paper SAQ	P
Alcohol				
Past 30 days	0.43	0.68	0.46	0.82
Past 12 months	0.64	0.76	0.62	0.65
Ever in lifetime	0.86	0.92	0.77	0.02[1]
Marijuana				
Past 30 days	0.21	0.17	0.00	0.09[1]
Past 12 months	0.29	0.6	0.08	0.04[1]
Ever in lifetime	0.64	0.83	0.46	0.10[1]
Cocaine				
Past 30 days	0.00	0.00	0.00	
Past 12 months	0.07	0.08	0.00	0.31
Ever in lifetime	0.29	0.33	0.00	0.03[1]
Ns[2]	14	12	13	

KEY: 1 = Paper SAQ different from CASI and audio-CASI at $p < 0.10$ by t-test. CASI and audio-CASI not significantly different from each other by same test. 2 = Ns shown are the minimum sample size for calculation of any proportion shown in the column.

SOURCE: Data from O'Reilly et al. 1994.

the interviewer during a section of the CAPI interview that asked about the outcome of each pregnancy that they ever had. The question asked:

"Now I'd like to ask some questions about your [N-TH] pregnancy. Please look at Card B-1. Thinking about your [N-TH] pregnancy, in which of the ways shown on Card B-1 did the pregnancy end? (READ LIST. CODE ALL THAT APPLY.)

"Miscarriage? (Occurs naturally, during the first 6 months of pregnancy),
"Stillbirth? (Baby born dead after 7 or more months of pregnancy),

"Abortion? (Induced during the first 6 months of pregnancy; include D&C, vacuum extraction, suction, and saline injections),

"Ectopic pregnancy? (Occurs outside the uterus or womb),

"Live birth by Cesarean section?

"Live birth by vaginal delivery? (Includes delivery through natural or induced labor)"

At the end of the interview, respondents were trained in the audio-CASI procedures and were asked additional questions on abortion.

The field experiment included a comparison of audio-CASI, in-home CAPI, and out-of-home CAPI. It was hypothesized that women's willingness to report sensitive information would be increased if they were interviewed outside of their homes because in earlier rounds of the survey respondents had indicated a concern that family members would overhear their responses. An incentive experiment was also included. The out-of-home respondents were paid $40 and the in-home respondents received either no incentive or a $20 incentive.

The National Survey of Family Growth (NSFG) is the major source of information in the United States on pregnancy, family formation, contraceptive use, and childbearing. Prior rounds of the NSFG identified significant underreporting of abortion (Jones and Forrest 1992), and the absence of good information on abortion presents considerable difficulty to analysts who are attempting to understand the relationship between sexual activity, contraceptive use, contraceptive failure, and childbearing. This difficulty in obtaining accurate reports of abortion (and other sensitive behaviors) was the main motivation for the experimental comparison of alternative modes of data collection.

Table 3 compares the results from the audio-CASI question on whether a woman had ever had an abortion and both the pilot questions and pregnancy outcome questions (in section B). There was one refusal of the audio-CASI. Six additional women reported having had an abortion at some time in their life in the audio-CASI interview,

which represents a 14 percent increase in the number of women reporting ever having had an abortion.

TABLE 3. *Relationship of abortion reporting in the CAPI and the audio-CASI interview, NSFG Cycle V Pretest.*

	Abortion reported as a birth outcome		
Audio-CASI: Ever had an abortion	Yes	No	N
Yes	42	6	48
No	0	129	129
Total	42	135	177

Results showed that abortion reporting was also increased in the out-of-home interviews, and a higher proportion of the respondents who received an incentive reported having had an abortion. In addition, some women who reported an abortion in section B reported additional abortions in the audio-CASI interview. In all cases when there was a difference in the number of abortions reported between the CAPI interview and the subsequent audio-CASI interview, more abortions were reported, indicating that the different numbers of abortions reported in the audio-CASI is probably not due to random error.

The current authors also fit a series of logistic regression models to determine if there were significant differences due to interviewing conditions. Independent variables included the type of interview (CAPI only, audio-CASI, or neutral site), incentive for in-home interviews (none or $20), race/ethnicity (Hispanic, black, non-Hispanic, non-black), marital status (married, not married), income (unknown, greater than $20,000, or other), and age. A stepwise selection procedure was used in which an independent variable that was significant at the 0.15 level was added to the model. Table 4 summarizes the results.

Based on these results, it was concluded that both the neutral site and the audio-CASI increase the number of women who report that they ever had an abortion. In addition, the incentive has a marginal effect; however, it is not possible to determine if the incentive directly affects willingness to report or if higher reports in this group are due to the higher response rates and a different population of women being included.

TABLE 4. *Analysis of the impact of characteristics of women and interview conditions on abortion reporting, NSFG Cycle V Pretest.*

	Parameter estimate	Standard error	Probability	Odds ratio
Intercept	-2.52	0.49	0.0001	1.081
$20 incentive	0.38	0.27	0.1348	1.488
Married	-0.34	0.23	0.1428	0.714
Age	0.03	0.01	0.0264	1.033
Audio-CASI	0.54	0.27	0.0419	1.723
Neutral site	0.83	0.31	0.0067	2.294

Respondent Attitudes

When asked about their attitudes toward the alternative methods of reporting abortion, women who received the audio-CASI interview indicated that they preferred the audio-CASI method. Table 5 presents the results.

NEED FOR THE AUDIO COMPONENT OF AUDIO-CASI

The above-mentioned results have not demonstrated the need for the audio component of the audio-CASI system. Except for respondent preferences, the feasibility experiment showed no differences in reporting between the audio-CASI and the CASI treatments; the various clinic experiments achieved superior reporting with CASI, not audio-CASI. However, no one can dispute the fact that respondents who cannot read will not be able to complete an SAQ or CASI interview on their own. The solution that survey researchers used in SAQs was to have the interviewer read the questions and responses while the respondent marked the answers. This technique has also been used in a recently reported study by Boekeloo and associates (1994) in which respondents in a sexually transmitted disease (STD) clinic were randomly assigned to complete a self-administered interview either by reading the questions themselves or by marking answer sheets while listening to questions using a cassette player and headphones. These authors found that the

TABLE 5. *Respondents' attitudes toward methods of reporting abortion. NSFG Cycle V Pretest.*

	Response	Percent

		respondent
How do you rate telling the interviewers your answers to questions on abortion?	Poor	15.2
	Fair	20.3
	Good	30.5
	Very good	17.5
	Excellent	16.4
How do you rate using the computer and earphones to answer questions on abortion?	Poor	2.8
	Fair	8.5
	Good	17.5
	Very good	26.0
	Excellent	45.2
Which method of answering questions on abortion is the most private?	Earphones and computer	62.7
	No difference	32.2
	Telling the interviewer	4.5
	Don’t know	0.6
Which method do you recommend for the main study?	Interviewer	16.9
	Computer	58.2
	Do not ask about abortion	2.8
	Does not matter	22.0

audio interview yielded more complete data and identified by more HIV risk behaviors.

Reading questions to respondents, however, completely precludes the use of contingent questioning because branching to the correct followup questions would violate the privacy of the respondent's answers. In addition, reading questions aloud even if the interviewer does not know the answers has the potential to compromise the respondent's ability to conceal responses from household members. While those who can overhear the interviewer reading the questions will be similarly ignorant of the answers, the respondent is subject to a subsequent interrogation as to what the answer was after the interview is complete. This is the reason to obtain a private place for conducting sensitive interviews. The desire to conceal answers from other members of the household may be the factor that is operating to produce the finding from the NSFG Cycle V pretest that those who were interviewed outside the home reported more abortions.

CONCLUSION

Overall, the authors believe that audio-CASI is superior to methods that have been traditionally used to gather data on sensitive issues. It provides the same privacy enhancements that traditional SAQs do and makes it easier to use contingent questioning because it avoids the difficulties associated with having respondents implement complex skip instructions. In contrast to indirect questioning techniques, it allows researchers to know if a particular respondent (who may be anonymous) reported the sensitive behavior, which facilitates analysis of the relationship between the sensitive behaviors and other characteristics. In addition, audio-CASI allows researchers to ask questions in any language of any respondent who can see and hear. Literacy on the part of the respondent is not required. Finally, it is noted that audio-CASI is suitable for use in a variety of settings, including clinics and households.[3]

NOTES

1. The National Adult Literacy Survey (NALS) was conducted in 1992 using a nationally representative sample of 13,600 persons aged 16 and older. Literacy was measured in terms of five proficiency levels on three scales—prose, document, and quantitative. The survey found that the percentage of adults in the lowest level of proficiency was 21

percent for prose literacy, 23 percent in document literacy, and 22 percent in quantitative literacy (National Center for Education Statistics 1993).

2. In the literature, this study is often reported as a CAPI study. It was actually a CASI study in which computers were taken into the homes and respondents asked to enter their responses on selected questions while the interviewer stood in a part of the room that did not permit observation of the respondent's answers.

3. Since this chapter was originally written, audio-CASI has been used in the homes of over 10,000 women who have responded to Cycle V of the NSFG. As of September 1995, that survey is continuing, and it is expected that more than 11,000 women will have used the audio-CASI by the completion of data collection.

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AUTHORS

Judith T. Lessler, Ph.D.
Director
Statistics Research Division

James M. O'Reilly, Ph.D.
Coordinator of Technology and Marketing

Research Triangle Institute
3040 Cornwallis Road
P.O. Box 12194
Research Triangle Park, NC 27709-2194

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