

Survey Data Collection Using Audio Computer Assisted Self-Interview

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The Audio Computer Assisted Self-Interview (ACASI) is a computer application that allows a research participant to hear survey interview items over a computer headset and read the corresponding items on a computer monitor. The ACASI automates progression from one item to the next, skipping irrelevant items. The research participant responds by pressing a number keypad, sending the data directly into a database. The ACASI was used to enhance participants' sense of privacy. A convenience sample of 257 young urban women, ages 18 to 29 years, were interviewed in neighborhood settings concerning human immune deficiency virus (HIV) sexual risk behaviors. Notebook computers were used to facilitate mobility. The overwhelming majority rated their experience with ACASI as easy to use. This article will focus on the use of ACASI in HIV behavioral research, its benefits, and approaches to resolve some identified problems with this method of data collection.

Keywords: ACASI; survey data collection method; HIV risk behavior

When a survey interview is conducted face-to-face by a live interviewer, some behaviors might be underreported and others overreported. This is particularly true when the interview contains sensitive questions about risk behaviors that are associated with transmission of human immune deficiency virus (HIV) or considered by the person to be illegal or taboo (Catania, Chitwood, Gibson, & Coates, 1990; Turner, Ku, Rogers, & Lindberg, 1998; Weinhardt, Forsyth, Carey, Jaworski, & Durant, 1998; Williams, Freeman, & Bowen, 1998). Although the traditional pencil-and-paper, self-administered questionnaire is more private, the research participant may find the questionnaire confusing to navigate. This could result in systematic error.

The Audio Computer Assisted Self-Interview (ACASI) is a computer software application that allows the research participant to hear the survey items over a computer headset in privacy and read the items simultaneously on a computer monitor (Jones, 2002; Jones & Jedrasik, 2000; Turner et al.,

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1998). The participant does not rely solely on reading skills to accurately complete the self-interview, because the interview is heard over a headset (Des Jarlais et al., 1999; Gribble, Miller, Rogers, & Turner, 1999; Jones & Jedrasik, 2000; Turner et al., 1998). The ACASI automatically progresses to the next relevant item and skips the irrelevant items based on the previous responses, a function that would otherwise be performed by a live interviewer (Gribble et al., 1999; Turner et al., 1998; Weinhardt et al., 1998). When the response is entered, the data are sent directly to a database. This eliminates the need for the researcher to transcribe the data.

ACASI ENHANCES PRIVACY AND REPORTING OF HIGH-RISK BEHAVIORS

The ACASI was selected as a data collection method to enhance research participants' sense of privacy because the survey interview concerned intimate partner relationship issues and behaviors associated with increased risk of HIV transmission. Accurate reporting of risk behaviors is needed to assess a person's risk for HIV transmission, as well as factors related to this risk (Centers for Disease Control and Prevention, 2002). The use of ACASI in several national randomized studies has indicated that this method of interviewing is associated with higher reporting of behaviors associated with HIV transmission and a greater sense of privacy among participants. A finding from the 1995 National Survey of Adolescent Males indicated that compared with data collected by face-to-face live interviewers, self-reports of male-to-male sexual contacts and high-risk sexual behaviors were higher using ACASI (Gribble et al., 1999).

DEFINITION OF ACASI

The ACASI is a computer application that integrates audio and text files so that the user can read the text on the computer screen while simultaneously hearing the prerecorded survey questionnaire items over a computer headset in privacy. The ACASI was programmed so that a "yes" or "no" response automatically directed the user to the next appropriate field.

The ACASI program used in the current study was written in Visual Basic and programmed in Microsoft Access 97. The minimum hardware requirements included a Pentium class computer with 16MB of RAM and a SoundBlaster compatible sound card, microphone, and speakers and head-

phones. Further description of the particular ACASI used in this study is reported elsewhere (Jones & Jedrasik, 2000).

DESIGN

This cross-sectional study was conducted to explore whether and how dyadic trust, sensation seeking, and sexual imposition relate to HIV sexual risk behaviors among culturally diverse, young, urban women with primary and nonprimary male partners. It was deemed important to explore whether there was an interaction in HIV sexual risk behaviors by partner type, primary or nonprimary. The ACASI was programmed so that women with primary partners did not see items concerning nonprimary partners, and vice versa. Women with both partner types completed the entire interview. This approach was selected to ease the work involved in navigating through a self-administered interview. The participant saw only the sections that were pertinent to her situation (Gribble et al., 1999; Jones & Jedrasik, 2000; Turner et al., 1998; Williams et al., 1998). Missing data were rare because the researcher set the program to advance to the next question only when the previous question was answered. Previous computer experience was not required to participate in the study.

SAMPLE

The ACASI was used to collect data from a convenience sample of 257 culturally diverse, young, urban women, ages 18 to 29 years. The data were collected in community settings: a public supplemental nutrition program; Women, Infant, and Children; three public housing developments; an urban 2-year county community college; and a clinical setting, a public sexually transmitted disease clinic. These sites were located in a city where the HIV infection rate is among the highest in the northeastern United States (Division of AIDS Prevention and Control, 1999).

The majority of the sample was African American (64.2%) and Latina (20.6%). The remaining sample was culturally diverse. Participants in this sample tended to be younger than 22 years old ($M = 21.62$, $SD = 3.31$). The largest proportion of participants (76.9%) completed 12th grade or higher. Nearly 10% ($n = 24$) of participants had less than 10th grade education. Of those in college, 35.5% completed 1 to 2 years of college. More than half of the women worked outside the home (59%). Of those who worked outside

the home, most worked less than 40 hours per week (77%). Most of the women did not receive any public assistance ($n = 162$, 63.3%).

This sample was selected due to the importance of understanding factors relating to HIV sexual risk behaviors among young urban women. From 1985 to 1996, the proportion of people with acquired immune deficiency syndrome (AIDS) in the United States who are adult and adolescent women more than tripled, from 7% to 25%. Of adult and adolescent women diagnosed with AIDS in 2000, 64% were infected through heterosexual contact. Two thirds of all women with AIDS in that year were African American (Centers for Disease Control and Prevention, 2002).

METHODS

Undergraduate nursing students who were of similar age, cultural background, and gender to the study sample were consulted as to the appropriateness and ease of understanding of the instructions to participants on how to use ACASI. The same students digitally prerecorded the questionnaire items, the instructions, and the informed consent using the Microsoft sound recorder at CD-recording quality (Jones & Jedrasik, 2000). Training sessions were held for the research assistants (RAs), which included a review of the study inclusion criteria, the importance of safeguarding the participant's confidentiality, setting up the notebook computers, orienting the participant to the interview, responding to problems relating to ACASI, and finally, reviewing the HIV risk-reduction materials that were to be given to each participant upon completion of the interview.

Content experts in HIV sexual risk research and ACASI reviewed both the instructions and the questionnaire items and completed a content validity index. The content validity index demonstrated high interrater reliability (Waltz, Strickland, & Lenz, 1991). Following the recommendations of the content experts, each interview began with a short practice session.

A pilot study ($N = 35$) was conducted to assess whether young urban women who may have had no previous computer experience, and for whom literacy was not a requirement, could successfully complete a lengthy interview that involved answering deeply personal questions using ACASI on a notebook computer. The pilot assessed the accuracy of the automated complex skip patterns and provided a realistic assessment of how long the interview should take. If ACASI ran properly, then the skip patterns, question numbers, answers, prompts, parameters, and voice files with near simultaneous text files were appropriately programmed (Jones & Jedrasik, 2000).

Several errors in programming were discovered during the pilot study, and these were corrected.

The pilot study indicated that notebook computers would facilitate mobility for on-site data collection in neighborhood settings. This approach was used for the main study. The interviews were conducted in relatively quiet private settings. All the interviews at Women, Infant, and Children were conducted in private rooms. At public housing developments, the interviews were conducted two at a time at opposite ends of a long table or at opposite corners of a large community room. During the interviews, the community room was closed off to usual activities so that only the RA, the principal investigator (PI), and the participants were in the room. At the sexually transmitted disease clinic, the interviews were conducted in private interview rooms immediately after normal clinic operations were completed.

At each site, the study was announced or individuals were approached to participate. The participant let the PI or the RA know if she was interested in participating. If the woman had small children, the researcher and RA assisted with child care during the interview. A written copy of a "Statement to the Participant" that included all the elements of informed consent was given to each participant to read and to keep. The "Statement to the Participant" was also heard over a headset and displayed on the computer monitor. The participant entered a 1 once the statement was completed to indicate consent. This eliminated the need for a signed consent form to preserve anonymity.

The participant began the interview by listening to instructions over two mini speakers on how to use ACASI and how to press the keys on the computer keypad. This way, the participant and the PI or RA were able to follow and assist as needed. The participant practiced answering three demographic items (age, whether she lives in a city, and which city). When the participant was comfortable, the speakers were switched to the headset. The PI or RA adjusted the headset to a comfortable fit and instructed the participant on using the volume switch to adjust the volume. The respondent heard the survey questions using the headset and responded by pressing a number or "enter" key on the computer keyboard.

During the 30- to 40-minute interview, the PI or RA was seated opposite to the monitor screen so as not to see the interview items but was available at all times to respond to any questions. These questions were related to the computer, ACASI, or the questionnaire. When the participant asked a question, the type of question was noted on a checkoff list, as were comments made by the participant. This was done to facilitate future analysis that might guide improvements in this data collection method.

TABLE 1: Participants' Rating of Audio Computer Assisted Self-Interview (ACASI)

<i>Rating of ACASI</i>	<i>Frequency</i>	<i>Percentage</i>
Very easy to use	243	94.9
Fairly easy to use	10	3.9
A little difficult to use	2	0.8
Very difficult to use	1	0.4
Total	256	100.0

NOTE: One response is missing.

Upon completion of the interview, a culture- and gender-relevant pamphlet on HIV risk reduction available from the New Jersey Department of Health and Senior Services was reviewed with the participant. Ten dollars was given to compensate the participant for her time.

FINDINGS

The overwhelming majority of the 257 participants rated their experience with ACASI as easy to use (98.5%). Only 3 of the participants found ACASI difficult to use (see Table 1). After the interviews, several participants reported it was easier to acknowledge to the computer what they might not have said to a live person. Statements such as, "I could be more honest to the computer than to a person," and "This was easy" were the most frequently reported ACASI-related exit comments noted by the PI and RAs. Gross et al. (2000) and Turner et al. (1998) reported similar observations. Out-of-treatment drug users similarly perceived greater privacy using ACASI (Williams et al., 1998).

In this study of 257 participants, there were only 2 participants who randomly missed data on four items in the demographic section. As will be discussed subsequently, these missing data were attributed to how the keys were pressed. None of the 257 respondents reported difficulty with pressing the number keypad. Out-of-range responses to closed-ended questions did not occur.

High proportions of women in the current study acknowledged engaging in sexual risk behaviors. The majority of the women (57.4%) responded that a condom was not used during their last intercourse. Only 22% of the women reported using condoms all the time. The items for partner-specific intercourse during the previous 3 months revealed that the most common form of

intercourse with primary partners and nonprimary partners was vaginal (96% and 82.5%, respectively). Less than one fifth (19%) of the women with primary partners always used condoms, and roughly half (51%) of the women with nonprimary partners always used condoms with vaginal sex during the previous 3 months. One fourth of the women in this sample engaged in anal intercourse with their primary partner, and 13% engaged in anal intercourse with their nonprimary partner during the previous 3 months. Nearly two thirds of the women (63.3%) never used condoms with a primary partner during anal sex, and one third of the women (33.3%) never used condoms with a nonprimary partner during anal sex. In fact, higher proportions of women reported that they never used condoms with anal sex when compared with vaginal sex.

DISCUSSION

Consistent with the literature, the use of ACASI facilitated a sense of privacy in a study that assessed young urban women's HIV sexual risk behaviors. The ACASI reduced the risk of unintended systematic missing data. This was possible because the researcher set a parameter in the database that required the participant to advance to the next question only after answering the previous item.

Each participant heard exactly the same questionnaire items, instructions, and informed consent, because they were prerecorded and played over the headset. Turner et al. (1998) also noted that ACASI permitted the research team to standardize the interview, reducing a source of investigator error because each respondent hears the identical instructions and items.

Although the participant responded by pressing a number on a computer keyboard, computer skill was not required. Use of the keypad eliminated the skill required to use a mouse to enter the data. An alternative approach to entering responses would be a touch screen (Gribble et al., 1999).

To enhance the reliability of the responses to quantitative items, participants automatically heard voice and text reminders of their last response. For example, after reporting having vaginal intercourse 12 times in the previous 3 months, the participant heard, "Your answer was 12, if this is correct press 1, if this is not correct, press 2." The participant had the option to agree with the previous response or go back and change the answer.

The participants' responses were directly entered into the computer database. This eliminated a huge step in the data entry process and reduced error. The data were easily imported into the Statistical Package for the Social

Sciences (SPSS) Version 9.0 for Windows 95/98 from the Access database for data analysis.

The open-ended items required the participant to answer "How many times" a behavior occurred. The rest of the items required responses to closed-ended items. The range of possible responses was automated so that the participant could not continue the interview if she entered a response that was out of range (Gribble et al., 1999; Jones & Jedrasik, 2000).

A limitation to the use of ACASI on notebook computers was that access to an electrical outlet in community settings restricted the options on where to conduct the interviews. Only areas with electric wall outlets could be used. In addition to carrying the notebook computers and mini speakers, surge protectors and extension cords were brought to the interview sites. This was done to accomplish both privacy in a room and access to an electrical outlet. This problem may be addressed with the use of long-life battery-powered computers, or wireless access to a secured Web-based ACASI.

Missing data were rare. One or two participants with very long fingernails tended to press the number key with the finger pad and simultaneously touch another key with the tip of the nail. This action might have canceled out the response, allowing ACASI to continue on to the next question. There were only a few items with one or two missing responses. Once this problem was discovered, the PI and the RA stressed how to press the number keys so that no further missing data occurred. In the future, the data can be entered using a computer stylus with a keypad or touch screen. An ACASI with the touch screen as the user interface was found to be appropriate by Williams et al. (1998) in their study with out-of-treatment drug users.

Another problem concerning how the computer keys were pressed had been discovered and corrected during the pilot study. For ease of use, the participant entered the data using a small number keypad. If the participant pressed too hard on the number key, the answer would repeat for the next few questions. These items were identified in the database by a variable that recorded the time spent on each item. If the time spent on the item was zero, and several answers were the same as the previous answer, these items were considered missing data and the case was eliminated. This problem was discovered during the pilot study and was addressed in the main study by reinforcing the instructions to the participant on how to press the number key. The PI or RA who was in the room with the participant observed the participant's technique of pressing the number keys. These actions were effective. An additional approach, if the computer keyboard is used, is to select the slow option for the keyboard properties. If the key is pressed too hard, the key is less likely to repeat.

Although ACASI is not a new technology, it is an emerging approach to survey data collection. Using ACASI, the burden of navigating complex skip patterns was automated. Missing data were nearly eliminated. Automated reminders and limits on out-of-range responses were approaches used to enhance both the reliability and validity of the data. The reliance on reading skills alone was reduced, because the survey questionnaire items were heard privately over a headset. Although this study concerned HIV sexual risk behaviors, ACASI may be used in other areas of nursing research, particularly those areas that involve highly personal health concerns. The use of ACASI in nursing practice to interview patients and in the educational process to accommodate those with different learning styles is also applicable.

NOTE

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