

Measuring Sexual Risk Using Audio Computer-Assisted Self-Interviewing (ACASI) versus Computer-Assisted Personal Interview (CAPI) in China

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ABSTRACT. The reliability of self-reports of sexual acts and sexually transmitted disease symptoms was compared among 199 food market workers in an eastern coastal city in China using audio computer-assisted self-interviewing (ACASI) and computer-assisted personal interview (CAPI). Two assessments (ACASI and CAPI) were evaluated with each participant; 100 participants were interviewed with ACASI first, followed by CAPI, and 99 participants were interviewed by CAPI first, followed by ACASI. McNemar tests showed that participants were significantly more likely to report that they had engaged in lifetime sexual intercourse when using a CAPI interview than an ACASI interview. There was no significant difference between CAPI and ACASI in reports of the number of lifetime sexual partners and two measures of sexually transmitted disease. Participants with less education were more likely to give inconsistent responses than participants with more education and older participants were more likely to have discrepancies in their sexual behavior responses than younger participants. ACASI is not necessarily a better mode of data collection than CAPI for sensitive behavioral measures among urban market workers in China. doi:10.1300/J514v19n01_04 [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2007 by The Haworth Press, Inc. All rights reserved.]

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Audio computer-assisted self-interviewing (ACASI) is a mode of computerized interviewing that enables respondents to complete an assessment without the aid of an interviewer. Questions and response categories are read to the respondent by means of recorded audio files to ensure that literacy is not a barrier to the completion of the interview. ACASI is increasingly used in social and behavioral research (Johnston & Walton, 1995; O'Reilly et al., 1994) as an alternative to computer-assisted personal interview (CAPI), which involves an interviewer asking questions to the respondent and entering the answers into the computer. ACASI is particularly useful in protecting privacy and reducing response biases in sexual behaviors or other stigmatized activities in the United States (Des Jarlais et al., 1999; Epstein, Barker, & Kroutil, 2001; Gribble et al., 1999, 2000; Kissinger et al., 1999; Kurth et al., 2004; Lessler et al., 2000; Newman et al., 2002; Turner et al., 1998).

Although ACASI has been found to reduce the effects of social desirability responses, ACASI may not be universally beneficial. A participant's preference for ACASI over CAPI is related to factors such as respondent's age (younger), ethnicity (White), educational attainment (more educated), and more computer experience (Aquilino, 1994; Couper & Rowe, 1996; Wright, Aquilino, & Supple, 1998). In Zimbabwe, women's use of ACASI to assess reports of sensitive behavior was unreliable for women with little education, compared with more educated women, and among younger persons compared with older women (Van de Wijgert et al., 2000). It has been suggested that respondents believe using computers increases the legitimacy of the data-collection effort (Tourangeau & Smith, 1996). Ongoing efforts are being made to modify ACASI design to incorporate local colloquialisms and cope with cultures where confidentiality is not the norm (Strader et al., 2001). Given the conflicting evidence on the appropriateness of ACASI in developed and developing countries, we examined the reliability of using ACASI and CAPI data collection strategies in assessing behavioral risk in China.

China is currently facing a serious HIV/AIDS epidemic. Effective prevention, intervention, and treatment efforts across the nation can save millions of lives in the coming decade (UNAIDS/WHO, 2002). Valid and reliable measures of sexual and substance use behaviors are essential to evaluate the risk of spread of HIV and other sexually transmitted diseases (STDs) to the general population. Similar to other countries, underreports of risky or sensitive behaviors are common in China (Detels et al., 2003). Cultural taboos discourage openly disclosing sensitive behaviors and lead to socially desirable responses. To address this issue, a tape recorder with earphones increased self-reports of sexual behaviors among rural Chinese farmers (Liu et al., 1998; Liu & Detels, 1999).

This study assessed the reliability of sensitive measures with ACASI compared with that of CAPI with Chinese urban residents. Specifically, we explored systematic differences between the interview strategies and if the differences were associated with other demographic factors such as gender, age, marital status, and education.

METHODS

Participants

This study was conducted among food market workers in a medium-sized, eastern coastal city in China. Residents frequently go to open-air markets to buy fresh meat, vegetables, fruits, and household goods. Usually, a market has 100 to 150 stalls with a total of 150 to 300 stall attendants, including both owners and employees.

Project staff listed all stalls and workers at the four selected food markets. Systematic random selections of 50 participants from each market were made based on the rosters, resulting in a total of 200 participants (market employees and stall owners). The refusal rate was 2% for the study.

Procedures

After securing written voluntary informed consent, all randomly selected participants were transported by van to the local Institute of Health Education for administration of the assessment. First, a video was shown outlining the procedure to be followed, participants' rights, and responsibilities of the research team. Second, individual meetings were held with each participant to review the consent form, emphasizing the voluntary nature of the research. All participants provided voluntary informed consent following procedures approved by the IRB of the University of California, Research Triangle Institute, and the Chinese Academy of Preventive Medicine. All participants were paid 20 yuan (US\$ 2.50) in cash and were given small gifts for their participation.

All participants were taken to a private place and interviewed by trained interviewers. They were interviewed a second time after a 7- to 10-day interval. One hundred participants were interviewed using ACASI first, followed by CAPI, while 99 individuals were interviewed using CAPI first, followed by ACASI.

A laptop computer was used for data collection in both modes of interviews. In the CAPI mode, a computer prompted an interviewer on each question; the interviewer asked the question, listened to the respondent's answers, and typed the answers into a laptop computer. Probing and clarification were often used during the interview. When using ACASI, a participant responded to a pre-recorded voice asking questions, and answers were directly input into a laptop computer by the participant using touch-screen technology. The interviews with ACASI afforded privacy for participants who did not wish to disclose sensitive information to interviewers.

Measures

Researchers at the Research Triangle Institute (RTI) developed both the ACASI and CAPI computer programs. Both systems offered the advantages of computer-assisted assessment technologies, including automated skipping patterns, consistency and range checking, and automatic data coding. There

were 88 questions asking information on demographic characteristics, employment, health and health services, and sexual risk behaviors. We identified four sensitive questions as the main variables for comparison. There were two sexual behavior questions: (1) Ever had sexual intercourse? and (2) the number of sexual partners in lifetime. Also included were two STD-related questions: (1) Ever had abnormal discharge? and (2) ever had skin problems? In China, "skin problem" is often used as a proxy for sexually transmitted diseases. Discrepancies between responses on CAPI and ACASI were measured for sexual behavior and STD-related questions.

Data Analysis

We emphasized two strategies in data analysis. First, we explored the possibility of systematic differences between the interview strategies. Second, we examined the differences to see if they were associated with other demographic factors such as gender, age, marital status, and education. To estimate the extent of agreement between CAPI and ACASI modalities, the responses to each of the four sensitive questions were tabulated and the paired proportions were compared by calculating McNemar tests. To identify the sample characteristics associated with discrepant responses, percentages and chi-squares were reported for discrepancy rates on sexual behavior and STD-related questions by gender, age, marital status, and education.

RESULTS

Of the 200 selected participants, 199 completed both the CAPI and ACASI interviews; 100 received ACASI first and 99 received CAPI first. The study sample was 55% male and about 70% were married. Approximately 32% of the participants were 25 years or younger and about 28% were 35 years or older. Most participants reported a middle school education or lower; 40% had attended only primary school or had no schooling.

In the comparison of the CAPI and ACASI results on the demographic characteristics, we

only found a significant difference between the two modalities for the lifetime sex question. Table 1 shows the percentage of affirmative answers for the four sensitive questions. About 80% of the sample reported ever having had sexual intercourse with CAPI, compared with 61% with ACASI ($p < 0.001$). In fact, 27% of those who reported lifetime sexual intercourse in the CAPI mode reported never having sexual intercourse during the ACASI interview. Conversely, only 4% of those who reported lifetime sexual intercourse in the CAPI interview reported never having sexual intercourse in ACASI. No other significant differences were found in the paired response proportions for the other three sensitive questions.

Table 2 shows participants' discrepancies in responses on sexual behavior questions and STD-related questions based on demographic characteristics. The discrepant response was defined as any discordant answer with either question about a behavior.

Participants with lower education levels were significantly more likely to give inconsistent responses than participants with a high school education or higher. Consistent with findings in Zimbabwe (Van de Wijgert et al., 2000), older participants were more likely to give discrepant responses than the younger participants. Discrepancies in self-reports of sexual behavior were similar across gender; however, married participants were more likely to give discordant answers on sexual risk acts.

Overall, there were fewer discrepant responses on STD-related questions than on reports of sexual behavior: 23.6% and 32.7%. Age, gender, education, and marital status were unrelated to STD-related discrepant re-

sponses, as shown in Table 2. Also, the order of administration of CAPI or ACASI assessments was not significantly related to discrepant responses for sex-related and STD-related questions. The frequency and direction of the discrepancies between the two modes of assessment administration were similar regardless of the order of administration.

CONCLUSIONS

Among the sample of Chinese market workers, ACASI did not elicit higher rates of reporting for sensitive behaviors than CAPI assessment. For a population that seldom uses computers, it is likely that Chinese market workers are uncomfortable interacting directly with a computer. In this pilot, we found that there was a better response agreement for sexual behavior questions between ACASI and CAPI for market workers with a higher educational level. Respondents with more education have more experience with computers and are more comfortable reporting sexual behaviors with computers. Given that 82% of participants reported only a middle school education or less, it is likely that many of them might have trouble reading and listening to a computer and using a keyboard to answer questions.

To improve respondents' willingness to reveal socially undesirable behaviors in an interview, two important factors have been identified: (1) Belief in the confidentiality of the data provided and (2) the degree of anonymity of responses (Aquilino, 1994; Grove, 1990; Schwartz et al., 1991). Using ACASI, a participant can answer questions in complete privacy, which may lead to high response anonymity and a greater willingness to honestly answer

TABLE 1. Self-Reports on Sensitive Questions, by Interview Method (N = 199)

Affirmative Response (%)	CAPI	ACASI	McNemar Statistic	p-Value
Ever had sexual intercourse	79.7	60.9	29.13	< 0.001
More than one sexual partner in lifetime	10.7	12.2	0.47	0.648
Ever had skin problems	22.6	18.6	1.78	0.243
Ever had abnormal discharge	7.0	8.0	0.29	0.791

TABLE 2. Discrepant Responses on Sexual Behavior and Questions Regarding STD by Gender, Age, Marital Status, Education, and Interviewing Procedure (N = 199)

	Discrepant Responses on	
	Sex-Related Questions	STD-Related Questions
Gender		
Male	32.1	20.2
Female	33.3 $\chi^2 = 0.03$	27.8 $\chi^2 = 1.58$
Age		
25 or younger	21.9	28.1
26-34	34.2	26.6
35 or older	42.9 $\chi^2 = 6.11^*$	14.3 $\chi^2 = 3.81$
Marital status		
Ever married	38.1	21.6
Single	20.0 $\chi^2 = 6.26^*$	28.3 $\chi^2 = 1.06$
Education		
Primary school or lower	40.0	26.3
Middle school	34.5	19.1
High school or higher	11.4 $\chi^2 = 9.27^{**}$	28.6 $\chi^2 = 1.76$
Interviewing procedure		
CAPI first	34.3	19.1
ACASI first	31.0 $\chi^2 = 0.25$	28.0 $\chi^2 = 2.14$

* $p < 0.05$; ** $p < 0.01$.

sensitive questions. Nevertheless, ACASI technology does not necessarily convince respondents in China that their answers are confidential. Especially for respondents who are computer illiterate, lack of knowledge regarding how data are stored, accessed, and transferred may affect their belief in the confidentiality of the ACASI strategy. During CAPI interviews, an experienced interviewer can build trust, pick up cues (verbal or nonverbal), reassure respondents if needed, and alleviate their confidentiality concerns. Furthermore, the establishment of trust and an affective bond between an interviewer and a respondent is likely to increase perceptions of confidentiality. The presence of an interviewer may also encourage participants to take the time to consider questions more carefully. In order to make ACASI a more effective mode of data collection, researchers must address these issues.

This study did not provide evidence supporting ACASI or CAPI as a better mode of accurate data collection for Chinese market workers. The discordant responses between the two assessment strategies should alert researchers that the effectiveness of these strategies may be affected by cultural factors.

Therefore, there is a need to develop and adopt culturally sensitive and population-specific data collection methods for future studies. Given the importance of collecting reliable data for HIV/STD prevention and intervention in China, potential advantages of using ACASI need to be further examined and enhanced by the continuing confidentiality assurance and appropriate staff training.

REFERENCES

- Aquilino, W. S. (1994). Interview mode effects in surveys of drug and alcohol use: A field experiment. *Public Opinion Quarterly*, 58, 210-240.
- Couper, M. P. and Rowe, B. (1996). Evaluation of a computer-assisted self-interview component in a computer-assisted personal interview survey. *Public Opinion Quarterly*, 60, 89-105.
- Des Jarlais, D. C., Paone, D., Milliken, J., Turner, C. F., Miller, H. J., Gribble, Q., Shi, H., and Friedman, S. R. (1999). Audio-computer interviewing to measure risk behavior for HIV among injecting drug users: A quasi-randomized trial. *Lancet*, 353, 1657-1661.
- Detels, R., Wu, Z., Rotheram, M. J., Li, L., Guan, J., Yin, Y., Liang, G., Lee, M., and Hu, L. (2003). Sexually transmitted disease prevalence and characteristics of market vendors in Eastern China. *Sexually Transmitted Diseases*, 30(11), 803-808.

- Epstein, J. F., Barker, P. R., and Kroutil, L. A. (2001). Mode effects in self-reported mental health data. *Public Opinion Quarterly*, 65, 529-549.
- Gribble, J. N., Miller, H. G., Rogers, S. M., Cooley, P. C., Catania, J. A., Pollack, L., and Turner, C. F. (2000). The impact of T-ACASI interviewing on reported drug use among men who have sex with men. *Substance Use Misuse*, 35, 869-890.
- Gribble, J. N., Miller, H. G., Rogers, S. M., and Turner, C. F. (1999). Interview mode and measurement of sexual behaviors: Methodological issues. *Journal of Sex Research*, 36, 16-24.
- Grove, R. M. (1990). Theories and methods of telephone surveys. *Annual Review of Sociology*, 16, 221-240.
- Johnston, J. and Walton, C. (1995). Reducing response effects for sensitive questions: A computer-assisted self interview with audio. *Social Science Computer Review*, 13, 304-319.
- Kissinger, P., Rice, J., Farley, T., Trim, S., Jewitt, K., Margavio, V., and Martin, D. H. (1999). Application of computer-assisted interviews to sexual behavior research. *American Journal of Epidemiology*, 149, 950-954.
- Kurth, A. E., Martin, D. P., Golden, M. R., Weiss, N. S., Heagerty, P. J., Spielberg, F. et al. (2004). A comparison between audio computer-assisted self-interviews and clinician interviews for obtaining the sexual history. *Sexually Transmitted Disease*, 31(12), 719-726.
- Landis, J. R. and Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33, 159-174.
- Lessler, J. T., Caspar, R. A., Penne, M. A., and Barker, P. R. (2000). Developing computer assisted interviewing (CAI) for the national household survey on drug use. *Journal of Drug Issues*, 30, 9-34.
- Liu, H. and Detels, R. (1999). An approach to improve validity of responses in a sexual behavior study in a rural area of China. *AIDS and Behavior*, 3, 243-249.
- Liu, H., Xie, J., Yu, W., Song, W., Gao, Z., Ma, Z., and Detels, R. (1998). A study of sexual behavior among rural residents of China. *JAIDS*, 19, 80-88.
- Newman, J. C., Des Jarlais, D. C., Turner, C. F., Gribble, J., Cooley, P., and Paone, D. (2002). The differential effects of face-to-face and computer interview modes. *American Journal of Public Health*, 92, 294-297.
- O'Reilly, J. M., Hubbard, M. L., Lessler, J. T., Biemer, P. P., and Turner, C. F. (1994). Audio and video computer assisted self-interviewing: Preliminary tests of new technologies for data collection. *Journal of Official Statistics*, 10, 197-214.
- Schwartz, N., Strack, F., Hippler, H. J., and Bishop, G. (1991). The impact of administration mode on response effects in survey measurement. *Applied Cognitive Psychology*, 5, 193-212.
- Strader, L. C., Gribble, J. N., Cooley, P. C., Ganapathi, L., Kirmeyer, S. E., Hartwell, T. et al. (2001, October). *Development of a multi-lingual survey instrument in ACASI*. Paper presented at the meeting of the American Public Health Association, Atlanta, GA.
- Tourangeau, R. and Smith, T. W. (1996). Asking sensitive questions: The impact of data collection mode, question format, and question context. *Public Opinion Quarterly*, 60, 275-304.
- Turner, C. F., Ku, L., Roger, S. M., Lindberg, L. D., Pleck, J. H., and Sonenstein, F. L. (1998). Adolescent sexual behavior, drug use, and violence: Increased reporting with computer survey technology. *Science*, 280, 867-873.
- UNAIDS, WHO. (2002). AIDS epidemic update: December 2002. Available at: http://www.unaids.org/html/pub/publications/irc-pub06/jc943-epiupdate2003_en_pdf.pdf. Accessed June 1, 2005.
- Van de Wijgert, J., Padian, N., Shiboski, S., and Turner, C. (2000). Is audio computer-assisted self-interviewing a feasible method of surveying in Zimbabwe? *International Journal of Epidemiology*, 29(5), 885-890.
- Wright, D. L., Aquilino, W. S., and Supple, A. J. (1998). A comparison of computer-assisted and paper-and-pencil self-administered questionnaires in a survey on smoking, alcohol, and drug use. *Public Opinion Quarterly*, 62, 331-353.

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