Does Audio-CASI Improve Reports Of Risk Behavior? Evidence From A Randomized Field Trial Among Male Youth In Urban India

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Abstract:

This study compares the effectiveness of audio computer-assisted self interviewing (Audio-CASI) with face-to-face interviews and self-administered questionnaires in collecting sensitive information on sexual and other risk behaviors among male youth in urban India. A randomized study design compared collected data from 900 male college students using three data collection approaches (Audio-CASI, face-to-face interviews, self-administered questionnaires) and 600 male youth residing in slums (Audio-CASI, face-to-face interviews). For college youth, the reported prevalence of risk behaviors was generally higher for young men interviewed through the Audio-CASI approach than with face-to-face interviews; self-administered questionnaires failed to yield significantly higher estimates than face-to-face interviews For slum youth, the results were more mixed, with the Audio-CASI approach failing to yield consistently higher responses for many risk behaviors compared to the face-to-face interview mode. Our results demonstrate that while Audio-CASI appears to yield higher estimates of youth risk behavior among college-educated, computer-literate populations of young men, the efficacy of this approach among less educated and less computer-literate populations appears doubtful.

The last decade has witnessed a sharp rise in interest in risk behavior among adolescents, particularly with respect to behaviors related to the transmission of HIV/AIDS (Blum et al. 2003; Bradley and Wildman 2002; Kann 2001; Zweig et al. 2001; Dekovic 1999; Jessor et al. 1995). In India, with over one-third of the estimated 4.6 million HIV-infected cases coming from the age group 15-29 years (Avert 2004; National Aids Control Organization 2004) the study of adolescent and youth risk behavior has also gained momentum (Abraham 2002; Hausner 2002; Jejeebhoy 1998; Sharma and Sharma 1997). Other risk behaviors such as alcohol consumption, drug abuse, and violence and attempted suicide have also been recognized as threats to youth health and well-being in many countries (Costa et al. 1999; Donavan et al. 1999; Gordis 1995; National Institute on Alcohol Abuse and Alcoholism 2003; Hawkins et al. 1992; Turner et al. 1998; Harris et al. 1991), including India (Bennett et al. 1998; Isaac 1998; UNAIDS and UNODC 2000; UNODC 2000; Befrienders International 2004; Sneha 2004). With this interest has come the attendant need for improved approaches to the measurement of risk behaviors.

Accurate measurement of socially stigmatized or illegal behavior is complicated by the presence of social desirability bias- attempts by the respondent to present himself or herself in a favorable light to others (interviewer or researcher) by over-reporting socially desirable behavior or under-reporting socially undesirable behavior (Gregson et al. 2002). Social desirability bias in disclosing sensitive information on sexual risk behavior is potentially more extreme than biases observed in other areas of health assessment (Catania 1999). Despite concerns that traditional face-to-face interviews are vulnerable to considerable social desirability bias when collecting information on sexual or other risk behaviors, most research and program evaluation in this area continue to rely solely upon this data collection approach.

Social desirability bias may be reduced by interview methods that ensure confidentiality, prevent embarrassment, and present easily understandable procedures. The self-administered questionnaire was developed as an interview method to reduce social desirability bias. The application of this approach in many developing country settings has been limited, however, by its requirement of respondent literacy (Turner et

al. 1998). More recently, audio computer-assisted self interviewing (Audio-CASI), developed to remove a major potential source of bias associated with interviewer presence, has generated considerable interest as a possible alternative approach to collecting data on sexual and other risk behaviors. With Audio-CASI, computers are used to display questions on the screen while respondents simultaneously listen to the questions through headphones. Respondents answer each question by pressing the appropriate computer key; for non-literate respondents, color codes on the computer key board are usually used. Audio-CASI not only provides greater privacy to the respondent than traditional face-to-face interview approaches, but in theory also eliminates the requirement of respondent literacy, since questions are conveyed verbally and respondents answer using color-coded computer keys.

Audio-CASI has been increasingly used as a method for collecting information on sensitive behavior in the United States (Turner et al. 1998; Newman et al. 2002; Sardenberg and Gloster 2001; Murphy et al. 2000; DesJarlias et al. 1999). While most U.S.-based studies have found that Audio-CASI increases the reporting of many sensitive behaviors compared to face-to-face interviews, the results have been mixed where sexual behavior and other potentially stigmatized behaviors are concerned (Metzger et al. 2000; Catania 2004; Tourangeau et al. 1997; Jobe et al. 1997). In general, higher reporting has been noted through Audio-CASI than from self-administered questionnaire approaches for highly stigmatized or illegal behaviors such as drug use or male-to-male sexual relations. For most aspects of heterosexual behavior, however, no significant differences in reporting were found between these two data collection approaches (Turner et al. 1998; DesJarlias et al. 1999).

The limited evidence from developing countries also suggests mixed results with respect to the use of Audio-CASI. A study using Audio-CASI to elicit sensitive sexual behavior information among both male and female adolescents in Kenya found that with this approach among some subgroups, boys reported higher incidences of behavior such as perpetrating forced sex or having had a sexually transmitted infection (Mensch et al. 2003). However, in some settings of the same study the Kenyan youths' fear of computers appeared to largely negate the advantages of privacy and confidentiality

associated with Audio-CASI (Mensch et al. 2003). A study of Zimbabwean women found that the efficacy of Audio-CASI varied significantly by educational level: women with middle school or higher education performed with greater ease on the computer (Wijgert et al. 2000). Two other studies from Zimbabwe and Mexico concluded that other less expensive and less technologically challenging methods resulted in higher reporting of sensitive behaviors than the Audio-CASI approach (Gregson et al. 2002; Lara et al. 2001), In contrast, a study of college students in Thailand found that Audio-CASI improved the reporting of sensitive sexual behaviors, particularly among female students (Rumakom et al. 2001). In India, the effectiveness of Audio-CASI in eliciting information on sensitive behavior remains unknown.

Studies indicate that adolescents and youth in urban India are at the vanguard of changes in attitudes toward sexuality and in sexual behavior (Jeejeebhoy 1998; Abraham 2002; Hausner 2002; Sharma and Sharma 1997). At the same time, the challenges of studying sexual risk behaviors among unmarried youth in a culturally conservative society such as India are considerable, given the strong prohibition against pre-marital sexual activity. Hence, the Audio-CASI approach, with its potential for privacy and ease of use, may represent a promising approach for collecting such information. The present study was undertaken to evaluate the effects of Audio-CASI on the reporting of sexual and other risk behaviors in the city of Pune in the central Indian state of Maharashtra. The question of interest is the efficacy of the Audio-CASI approach in both highly educated and less educated study populations, relative to conventional interview approaches.

The choice of unmarried male youth as our study population was motivated by several factors. First, relatively little is known about risk behaviors among young men in India (Hausner 2002; Abraham and Kumar 1999). Second, the available evidence from India indicates that young men have a higher propensity to engage in sexual and other risk behaviors than young women (Hausner 2002; Abraham and Kumar 1999; Goparaju 1998; Rangaiyan 1996). Male college youth were chosen as a part of the study population since they are by definition affiliated with an educational institution and available for interviews on campus, and thus a readily accessible youth population (Hausner 2002). College students are also a literate population, which allows the comparison of the

efficacy of both the self-administered questionnaire and Audio-CASI approaches with face-to-face interview approaches. Our study also included non-college going male youth in two slum areas of Pune: Pune has a substantial slum youth population, and thus provides an appropriate setting for assessing the efficacy of the Audio-CASI approach versus conventional face-to-face interviews in a lower literacy population. The study was designed as a randomized trial to compare the efficacy of alternative data collection approaches for obtaining information on sexual and other risk behaviors. Of central interest was the question of whether the Audio-CASI approach yielded significantly higher levels of reporting of sensitive behaviors relative to the other data collection approaches.

METHODS

Study Design

The overall study consisted of two separate components-- a study of unmarried male college students in which three interview modes were tested, and a study of unmarried non-college males residing in slums, in which two interview modes were tested. Since studies in India indicate the modal age of sexual initiation for males to be around 17-18 years (Abraham 2002), the age criterion for both samples was restricted to 18 to 22 years. Sample size calculations led to a target sample size of 300 respondents per interview mode.

The first component of our study consisted of a sample of 900 unmarried male students drawn from four colleges in Pune. Since literacy was universal among this population, three data collection techniques were used: face-to-face interviews, self-administered questionnaires, and Audio-CASI. Accordingly, the sample consisted of 900 unmarried male students who had been randomly assigned to one of the three interview modes. The second study component consisted of a sample of unmarried male youth drawn from two slums in urban Pune, India, between the ages 18-22 years, and not attending college. Since the self-administered questionnaire required respondent literacy, only two interview modes were tested in the slum component: face-to-face interviews and Audio-CASI. Accordingly, the sample consisted of 600 unmarried male students who had been randomly assigned to one of the two interview modes. For both studies, the

random allocation of study participants ensured comparability across study populations with respect to socio-economic characteristics and risk behaviors.

Across interview modes, the questions were identically worded and introduced in the same order. The questionnaires were available in the two principal languages of the area, Marathi and English, and respondents were allowed to choose the language they were most familiar with for the interview. In order to facilitate responses, all questions were either dichotomized or multiple-choice responses. The questionnaire consisted of two parts: the first collected background information about the respondent, while the second consisted of questions on respondent risk behavior. For the Audio-CASI interviews, the first part was administered through face-to-face interviews, while the second part was administered on the computer. For the self-administered questionnaire, given only to the college population, the entire questionnaire was filled out by the respondents. There were no skip patterns in any of the three modes and the respondents were requested to answer all questions. The questionnaire was extensively pre-tested and revised prior to finalization.

Data collection for the college sample

For each college, the first step was to contact the principal and teaching faculty and explain the importance of the study and its design. Permission was also obtained at that time to use empty classrooms and the college computer lab for conducting the interviews. The next step was to identify classes which were in session during the times of computer availability, and to obtain advance permission from faculty teaching those classes to allow their students to participate in the study. Once these arrangements were made, the interview team entered selected classrooms at a designated time. The study was introduced briefly to all students attending class that day, and students who were ineligible to participate in the study — female students, married male students, and unmarried male students outside of the 18 to 22 year age range — were excused from the classroom. The remaining students were informed of their right to refuse to participate (no respondents refused to participate), and were then randomly assigned to one of the three interview modes. For each data collection method, all respondents were first asked to read, agree to, and sign an informed consent form before the interview began. In

addition, all participants were assured that the interview was completely anonymous and confidential. No identifiers of individual respondents were included in any of the three interview modes.

Face-to-face and self-administered interviews were conducted in separate classrooms to ensure privacy. For the face-to-face interviews, interviewers and respondents either sat in isolated corners of an empty classroom or chose quiet spots outside on the campus grounds. Six to seven face-to-face interviews were usually conducted simultaneously. Respondents assigned to self-administered questionnaires were requested to sit in a separate classroom, and were given questionnaires to complete; one of the study team members supervised the group. Students were requested to sit one seat apart from each other and to not discuss questions among themselves. By design, the self-administered questionnaire required the least input from interviewers, and one interviewer could be assigned to monitor six to seven self-administered questionnaire respondents at a time.

Respondents assigned to the Audio-CASI method were escorted by one of the interviewers to the computer lab, typically consisting of functioning desktop computers for the survey. In the computer lab, computer screens were placed facing away from each other, to ensure visual privacy among respondents. For auditory privacy, the respondents used headphones. Due to the restricted availability of computer labs, it was not possible to ensure complete privacy for each Audio-CASI respondent by having only one respondent at a time complete the survey in the same room. The average number of respondents per Audio-CASI session was again six to seven students. Before the Audio-CASI interview began, respondents were given a brief demonstration of the use of the computer by a trained interviewer. Project staff remained nearby on call in the event respondents needed assistance during the interview. In general, college participants were familiar with computers, and after the initial demonstration of the use of the software, required little help. In a typical day, three sessions of each mode of interviewing were completed, consisting of a total of approximately 50 respondents per day. The survey was carried out between July and November 2003, with a total of 50 classrooms interviewed,

ranging anywhere in size from 15 to 30 respondents interviewed through one of the three interview approaches per college class.

Data collection for the slum sample

In one of the slum areas, project staff was able to establish linkages with the principal social welfare organization active in the area, in order to build upon the rapport established over time between the organization and the local community. The importance of the study and its design were explained, and permission was obtained to use its premises to set up the desktop computers for the Audio-CASI interviews and for additional rooms to conduct the face-to-face interviews. In the second slum area, where no social welfare organization was found to be actively functioning, a commercial guest house was rented, and partitioned into two rooms for the Audio-CASI and face-to-face interview components. The local elected official from each area was contacted and requested to provide a list of all youth clubs functioning in the area, which were all included in the study. On average, each youth club had about 20 members, primarily within the age range (18-22 years) and marital status (unmarried) of interest for our study. After obtaining advance permission from club leaders for their youth club to participate in the study, two members of the interview team entered the selected club at a designated time (usually late in the day after most youth had completed their jobs), introduced the study to all youth attending the club that day, and requested eligible males to accompany them to the interview site to participate in the study. Participation was voluntary and no monetary or other rewards were provided. At the interview site, participants were informed of their right to refuse to participate (no respondent refused to participate), and were then randomly assigned to one of the two interview modes. For each interview mode, respondents were first asked to read, agree to, and sign the informed consent form before the interview began. Those participants who could not read were verbally read the contents of the consent form and then asked to sign (all participants could at least sign their names). Participants were assured that the interview was completely anonymous and confidential; no identifiers of individual respondents were included in either of the two interview modes.

For the face-to-face interviews, interviews were carried out in isolated corners of the vacant room or in quiet spots outside on the grounds. At any one time, six to seven face-to-face interviews were conducted. At all times, maximum privacy for each face-to-face interview was sought, within the constraints of the limited space available. Procedures for the Audio-CASI arm were exactly the same as those followed for the college study population. Before the Audio-CASI interview began, respondents were given a brief demonstration of the use of the computer by a trained interviewer, and project staff remained nearby on call in the event respondents needed assistance during the interview. In general, participants were unfamiliar with computers, and frequently required assistance. In a typical evening, two sessions of each mode of interviewing were completed, totaling approximately 20 respondents. Similar to the college student component, the slum component of the study was carried out between July and November of 2003. In all, 600 slum youth were interviewed, 300 each by face-to-face interviews and Audio-CASI interviews, respectively.

RESULTS

[TABLE 1 ABOUT HERE]

Table 1 presents data on selected socio-demographic characteristics of respondents by interview mode for both the college and slum non-college populations. The results provide confirmation that the randomization procedures ensured comparability in the characteristics of respondents assigned to each of the interview modes. Within the college population, respondents from the three interview modes are highly similar with respect to current age, caste, religious affiliation, parental education, and current income and employment. Table 1 also shows that the socio-demographic characteristics of the slum population respondents, randomly assigned to one of the two interview modes, are likewise highly similar. At the same time, marked differences in characteristics are evident between the college and slum study populations, with the latter much more likely to belong to a scheduled caste/tribe, to have parents with either no education or primary school only, and to be currently employed.

[TABLE 2 ABOUT HERE]

Table 2 shows the prevalence of reported risk behaviors across the three interview modes for the college population and across the two interview modes for the slum non-college population. With respect to the college population, the prevalence of most sexual and other risk behaviors is very low across all three interview modes. With respect to sexual behaviors specifically, the self-administered questionnaire generally failed to yield significantly higher levels of affirmative responses relative to conventional face-to-face interviews. The exceptions were reports of masturbation (6.0% vs. 3.7%) and of male-to-male sexual relations (3.0% vs. 0.7%), most notably oral sex with another male (2.3% vs. 0.7%), and of attempted suicide (2.3% vs. 0.7%). In contrast, relative to face-to-face interviews, the Audio-CASI interview mode generally yielded significantly higher levels of reported sexual and other risk behaviors. Statistically significant differences between these two modes included the prevalence of reported male-to-female sexual relations (11.0% vs. 7.0%), and male-to-male sexual relations (5.0% vs. 0.7%). In terms of specific types of sexual activity, compared to face-to-face interviews, Audio-CASI yielded significantly higher reported levels of oral sex with a woman (9.0% vs. 4.7%), oral sex with a man (5.0% vs. 0.7%), as well as having ever been coerced into sex by either a man or a woman (6.3% vs. 0.7%). Among the 25 respondents across the three interview modes who reported having experienced coercive sex, the sex of the reported coercer was more likely to have been a woman than a man (N=16 and 9, respectively).

Table 2 also shows that with respect to other risk behaviors among the college population, levels of reported attempted suicide were significantly higher for both the self-administered questionnaire mode (2.3%) and the Audio-CASI mode (4.7%) than for the face-to-face interview mode (0.7%). Reporting of ever use of drugs was also somewhat higher with the self-administered questionnaire and the Audio-CASI mode (2.7% and 2.0%, respectively, relative to the face-to-face interview mode of 1.0%), although not statistically significant. Among the subsample of college respondents who reported having ever been sexually active (n=88), the percentages reporting having ever used condoms during sexual intercourse (31.7% vs. 19.0%), and having ever had a non-

regular sexual partner (e.g., commercial sex worker, stranger, or casual acquaintance) (44.0% vs. 23.8%) were significantly higher with the Audio-CASI interview mode as compared to face-to-face interviews. Somewhat higher levels of reporting were also evident with self-administered questionnaires as compared to Audio-CASI and face-to-face interviews although no differences attained statistical significance.

For the slum population component of the study, the effect of interview mode upon the reporting of risk behaviors was much more erratic. The reporting of most sexual and other risk behaviors was high for both the face-to-face and Audio-CASI approaches. However, the reporting of risk behaviors was not consistently higher with Audio-CASI. Face-to-face interviews elicited significantly higher response rates compared to Audio-CASI for some sexual behaviors such as vaginal intercourse (35.0% vs. 11.0%) and anal sex with a man (7.3% vs. 4.3%). In contrast, relative to face-to-face interviews, the Audio-CASI interview mode yielded significantly higher levels of response for some other sexual behaviors, including masturbation (63.0% vs. 8.0%), male-to-female oral sex (11.7% vs. 5.3%), male-to-female anal intercourse (15.0% vs. 4.3%), male-to-male oral intercourse (6.0% vs. 2.0%). Among the subsample of ever sexually active respondents, significantly higher reporting levels with Audio-CASI was only evident with regard to testing/treatment for HIV or STDs (28.6% vs. 9.8%).

With respect to other risk behaviors among the slum population, reported levels of having ever carried a weapon/gun were significantly higher for face-to-face interviews (24.7%), compared to the Audio-CASI mode (15.0%). Reports of ever use of alcohol were also higher with the face-to-face interview method than the Audio-CASI method (52.7% vs. 41.3%) and were statistically significant. In contrast, reported attempted suicide rates were higher for Audio-CASI respondents, but were not statistically different (6.4% vs. 4.0%).

[TABLE 3 ABOUT HERE]

In Table 3, we quantify the relative differences in reported risk by interview modes. Logistic regression results of adjusted odds ratios are presented of the likelihood

of reporting specific risk behaviors by interview mode. Statistical analyses were conducted using the STATA 8 (special edition) software. For both the college and slum populations, the face-to-face interview method has been set as the reference category (OR= 1.00), with dummy variables created for the other interview modes. All odds ratios thus represent the likelihood of specific risk behaviors being reported, relative to the face-to-face interview mode. Controls have been introduced for respondents' age, religion, caste, father's education, mother's education, income, and employment status. The p values in Table 3 test the null hypothesis that no significant differences exist across interview modes in the reporting of specific sexual and other risk behaviors.

The differences between crude and adjusted odds ratios were minimal, which would be expected given the randomization in assignment of respondents to interview mode (results not shown). In the case of the college population, although several risk behaviors--male-to-male sexual activity, coercive sex, attempted suicide, and condom use-- are notably higher for the self-administered questionnaire than for the face-to-face interview modes, none of these differences are statistically different. In contrast, many of the differences in reported risk behaviors between the Audio-CASI and face-to-face questionnaire modes presented in Table 2 remain highly statistically significant. Significantly higher reporting through the Audio-CASI interview mode exists for male-to-female sexual relations (OR= 1.80), most notably oral sex with a female (OR= 2.08). The adjusted odds ratios for reports of ever having engaged in male-to-male sexual relations are pronounced, with respondents eight times more likely to report this occurrence when interviewed through Audio-CASI compared to face-to-face interviews (OR= 8.10); again this is most notable in reporting ever having engaged in oral sex with another man (OR= 7.75). Particularly striking are differences in the reporting of coercive sex, with the likelihood more than 11-fold higher through Audio-CASI than through face-to-face interviews (OR= 11.35). The previously observed significant difference in the reporting of attempted suicide also persists, with Audio-CASI respondents more than seven times more likely (OR= 7.49) to report having attempted suicide compared to face-to-face interview respondents. Among the subsample of respondents who reported having ever had sex, no significant differences are evident, although the odds of reporting both

condom use and sex with a non-regular partner remain more likely with Audio-CASI respondents.

In the case of the subsample of slum youth, many of the previously observed differences in reported risk behaviors between the two interview modes remain statistically significant. The odds of reporting masturbation are more than 20-fold higher with Audio-CASI than with face-to-face interviews (OR= 22.53). Audio-CASI respondents are significantly more likely to report both oral (OR=2.40) and anal (OR=3.87) sex with a woman, but significantly less likely to report vaginal intercourse (OR =0.23). Relative to respondents of face-to-face interviews, Audio-CASI respondents are also significantly more likely to report having had oral sex with another man (OR=3.20), but less likely (but not significantly) to report anal sex with another man (OR=0.59). As a result of these counterbalancing tendencies, the overall prevalence of reported male-to female sexual relations and male-to-male sexual relations were not significantly different between the face-to-face and Audio-CASI approaches (OR= 0.84 and 1.18, respectively).

With regard to other risk behaviors among the slum youth interviewed in this study, of particular interest is the significantly lower likelihood of respondents interviewed by Audio-CASI reporting ever having carried a weapon/gun (adjusted OR= 0.51) and ever having drunk alcohol (adjusted OR= 0.64), in comparison to those interviewed face-to-face. For the subsample of respondents who reported having ever had sex with a female, the only statistically significant difference was found in the issue of testing or treatment for HIV/STDs, with Audio-CASI respondents more than three times more likely (OR = 3.07) to report in the affirmative relative to face-to-face interview respondents.

DISCUSSION

The challenges associated with collecting culturally sensitive information related to sexual or other risk behaviors have led to new efforts to develop and field-test innovative approaches to data collection. Our objective in the present study has been to evaluate the efficacy of three such approaches in collecting data on risk behaviors from a

sample of male youth in urban India— one well-established (face-to-face interviews), one increasingly used (self-administered questionnaires), and one relatively new data collection approach (Audio-CASI). With its removal of interviewer presence and (at least in principle) non-requirement of literacy, the Audio-CASI approach has received particular attention from among researchers interested in understanding sensitive risk behaviors among both literate and low literacy populations in developing country settings. Our study design allows for the evaluation of the Audio-CASI approach in both highly educated college and lower literacy slum populations of male youth.

Our findings provide new and important information to the presently limited evidence on the efficacy of these data collection approaches in low resource settings. The randomized design of our study strengthens our conclusions that the observed differences in reported risk behaviors are wholly attributable to differences in interview mode. Our results for the college population indicate that while both the self-administered and Audio-CASI interviews represented improvements over face-to-face interviews in the reporting of sensitive risk behavior, only Audio-CASI resulted in significantly higher reporting levels of many risk behaviors. This finding reinforces the conclusions from several other studies that found that Audio-CASI provided high prevalence estimates of a number of socially stigmatized behaviors (Turner et al. 1998; DesJarlias et al. 1999). The higher levels of reporting with Audio-CASI were especially pronounced for more socially stigmatized behaviors such as reported male-to-male sex, sexual coercion, and having ever attempted suicide.

While male-to-male sexual relations are largely regarded as taboo in India, there is growing evidence that some men seek sexual fulfillment with other men (Asthana and Oostvogels 2001; Hausner, 2002), a fact that may be explained by the social segregation between the sexes and the limited opportunities for unmarried young males to have sexual relations with young women,. In the context of HIV/AIDS and sexually transmitted diseases, however, male-to-male sex in India constitutes a high risk behavior, since condoms are rarely used in this activity. It should also be observed that the relatively higher rates of reported sexual behavior with Audio-CASI interviews extended

to the reporting of other aspects of heterosexual behavior as well, including male-to-female sex and oral sex with a female.

We note that the percentage of respondents reporting sexual activity across interview modes (10%) in our study is somewhat lower than the findings in other studies on male college youth in India: 26% by Abraham (2002) in her study in Mumbai and 32% by Hausner (2002) in his study in Chennai. These differences in estimates of sexual activity across studies may be due to several different factors, including differences in definitions of sexual activity (the Hausner study employed a much broader definition of sexual activity than the other two studies), differences in study population ages (the Hausner study included unmarried college students aged 17-33 years, compared to 16-22 years in the Abraham study, and 18-22 years in our own study), differences in the socio-economic profile of students (the Abraham study population consists of students of lower socio-economic backgrounds compared to the middle class background of students in the two other studies), as well as geography.

The findings for the slum population of this study demonstrate that in contrast to findings for the college population, the Audio-CASI interview method does not result in consistently higher reporting of sensitive risk behaviors relative to face-to-face interviews. This finding reinforces the conclusions from the study in Zimbabwe that college-level respondents performed better with Audio-CASI than did respondents with lower levels of education (Gregson et al. 2002).

A focus group discussion arranged with interviewers upon the completion of this study provides insights into the apparent lower efficacy of Audio-CASI with lower literacy populations. Unfamiliarity with computers compounded by low literacy levels led to some confusion about the operation of the computer keyboard keys and the meaning of certain questions. Some sexual terms (e.g., masturbation, oral sex, vaginal and anal intercourse and male-to-male sex) were unfamiliar to respondents who only knew the local dialect or crude terms for these behaviors. While interviewers in the face-to-face interview approach were able to describe these terms as they came up in the questionnaire with respondents, Audio-CASI respondents were given only a brief

description of the terms before the computer interview began. Once the computer interview had started, respondents were left in privacy and they appeared embarrassed to ask for help on sexual terms. This could be a major explanation for why the Audio-CASI mode failed to yield consistently higher prevalence of behaviors than the face-to-face approach. The higher levels of reporting with Audio-CASI appeared to be pronounced for some behaviors such as masturbation, oral and anal sex with a woman and oral sex with a man, as well as whether the respondent had ever been tested/treated for HIV/STDs. However, for the reporting of certain other behaviors, namely, ever having had vaginal or anal intercourse with a woman, carrying a weapon, and drinking alcohol, the face-to-face interview mode yielded higher prevalence estimates. One explanation advanced by the interviewers was that the respondents in this slum setting did not regard vaginal intercourse as socially aberrant, and were more concerned with obtaining counseling about their sexual behaviors and the health risks involved, than with embarrassment about their sexual practices. This observation is consistent with findings from an earlier study on the differential effects of face-to-face interview and Audio-CASI modes, where face-to-face interviewing elicited greater demand for social support and less concern about embarrassment (Newman et al. 2002).

Two potential limitations of our study should be mentioned. The first relates to the interview setting for the Audio-CASI component of our study. Due to lack of space and time in the college computer laboratories, the Audio-CASI interviews could not be fielded in complete privacy—that is, one computer per respondent per room. This absence of privacy and concerns about confidentiality may have inhibited respondents and prevented them from fully disclosing information related to risk behavior. If this were the case, then actual differences between Audio-CASI and the other two interview modes in the reporting of sensitive risk behaviors might be even more pronounced than reported in our study. A second potential limitation concerns our assumptions regarding the underreporting versus overreporting of risk behaviors. An implicit assumption in our study is that differences across data collection methodologies are likely to reflect differences in underreporting, rather than overreporting, of specific risk behaviors. While we cannot, in fact, rule out the possibility of overreporting of sexual or other risk behaviors among the sample of college men, we believe that such differences are more

likely to reflect intentional underreporting in the non-Audio-CASI data collection approaches given the highly stigmatized nature of many of the risk behaviors of interest in our study (e.g., male-to-male sex, coercive sex, attempted suicide).

Our study has demonstrated that Audio-CASI appears to represent an efficacious data collection approach among a sample of highly educated and computer-literate college men. At the same time, our results raise important doubts concerning the efficacy of the Audio-CASI approach for assessing risk behaviors among less educated and low computer literacy populations such as slum residents. Further research on this issue is clearly warranted, since the relevance of the Audio-CASI approach to research in low resource settings such as India rests heavily upon its applicability to lower literacy populations. Important unanswered questions also exist concerning the efficacy of the Audio-CASI approach to studying sexual and other risk behaviors among female respondents in culturally conservative settings such as India, given pervasive cultural pressures toward female chastity.

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Table 1. Respondent characteristics by interview mode: Pune, India, 2003

Independent Variable	College Youth			Slum Youth	
	Face-to-Face Interview %	Self- Administered Questionnaire %	Audio-CASI %	Face-to-Face Interview %	Audio-CASI %
Respondent age					
18 years	41.0	45.4	45.0	46.0	48.0
19-20 years	37.4	38.0	39.7	30.7	29.3
21-22 years	22.0	16.7	15.7	23.3	22.3
Caste					
Scheduled caste/tribe/Other backward castes	26.0	29.0	22.3	83.0	83.7
Non-scheduled castes/other [§]	74.0	71.0	77.7	17.0	16.3
Religion					
Hindu	84.7	83.7	85.7	50.3	49.7
Other	15.3	16.3	14.3	49.7	50.3
Respondent's education					
Primary	-	-	-	45.3	44.3
Secondary	-	-	-	54.7	55.7
University	100.0	100.0	100.0	-	-
Father's education					
Primary	6.3	8.3	6.3	43.3	38.4
Secondary	37.4	31.4	32.4	54.0	59.7
University	56.4	60.4	61.4	2.7	2.0
Mother's education					
Primary	12.0	14.0	13.0	68.3	68.7
Secondary	48.0	44.4	41.4	31.3	31.3
University	40.4	41.7	45.7	0.3	0.0
Own monthly income last 6 months					
< Rs 500	47.4	43.0	43.4	40.3	46.0
500-1000	20.7	21.7	19.4	14.7	11.0
1000-3000	20.4	23.4	19.4	36.3	31.0
>3000	11.7	12.0	18.0	8.7	12.3
Currently employed	13.0	15.0	12.7	54.0	53.0
(N)	(300)	(300)	(300)	(300)	(300)

Table 2. Respondent reports of risk behavior by mode of interview: Pune, India, 2003

	College Youth			Slum Youth	
Risk Behavior	Face to Face Interview (%)	Self-Administered Questionnaire (%)	Audio-CASI (%)	Face to Face Interview (%)	Audio-CASI (%)
Sexual Behavior					
Masturbation	3.7	6.0*	4.7*	8.0	63.0***
Sexual relations with a woman (a)	7.0	8.0	11.0*	35.7	31.7
Oral sex	4.7	4.3	9.0*	5.3	11.7**
Vaginal intercourse	3.7	4.0	6.0	35.0***	11.0
Anal intercourse	0.0	0.3	1.3	4.3	15.0***
Sexual relations with a man (b)	0.7	3.0*	5.0**	7.3	8.3
Oral sex	0.7	2.3*	5.0***	2.0	6.0**
Anal intercourse	0.3	1.3	1.3	7.3*	4.3
2+ sexual partners (c)	4.3	6.0	8.3***	47.7	47.7
Ever experienced coercive sex	0.7	1.3	6.3	4.3	8.0
Other Risk Behaviors					
Ever carried a weapon/gun	5.3	6.0	5.0	24.7	15.0*
Ever tried to commit suicide	0.7	2.3*	4.7**	4.0	6.4
Ever drank alcohol	24.3	20.7	23.0	52.7	41.3*
Respondent ever engage in abusive violent behavior after drinking	1.7	2.3	3.0	10.7	10.3
Ever used drugs	1.0	2.0	2.7	9.0	6.3
(N)	(300)	(300)	(300)	(300)	(300)
Among Sexually Active					
Condom use (d)	19.0	34.6	31.7*	42.0	55.2
Non-regular partner (c)	23.8	34.6	44.0	44.6	37.0
Ever tested/treated for HIV/STDs	9.5	15.4	12.0*	9.8	28.6**
(N)	(21)	(26)	(41)	(112)	(105)

(a) Includes oral sex, and vaginal and anal intercourse
(b) Includes oral sex and anal intercourse
(c) Either male or female partners
(d) With either male or female partners

Note: Significantly different from reported percentages in face-to-face interview at the following levels: * p<.05, ** p<.01, *** p<.001

Table 3. Crude and adjusted odds ratios for reporting of sexual and other risk behaviors by mode of interview: Pune, India, 2003

	College Youth			Slum Youth	
Risk Behavior	Face-to-face Interview	Self-Administered Interview	Audio-CASI	Face-to-face Interview	Audio-CASI
		Adjusted OR†	Adjusted OR†		Adjusted OR†
Sexual Behavior					
Masturbation	1.00	1.61	1.28	1.00	22.53***
Sexual activity with a woman (a)	1.00	1.13	1.80*	1.00	0.84
Oral sex	1.00	0.95	2.08*	1.00	2.40**
Vaginal intercourse	1.00	1.17	1.99	1.00	0.23***
Anal intercourse ‡	-	-	-	-	3.87***
Sexual activity with a man (b)	1.00	4.22	8.10**	1.00	1.18
Oral sex	1.00	3.16	7.75**	1.00	3.20*
Anal intercourse	1.00	4.55	4.58	1.00	0.59
2+ sexual partners (c)	1.00	0.81	1.55	1.00	1.02
Ever experienced coercive sex	1.00	2.13	11.35**	1.00	1.99
Other Risk Behaviors					
Ever carried a weapon/gun	1.00	1.05	0.95	1.00	0.51**
Ever tried to commit suicide	1.00	3.53	7.49**	1.00	1.58
Ever drink alcohol	1.00	0.84	0.97	1.00	0.64**
Respondent ever engage in abusive violent behavior after drinking	1.00	1.56	2.17	1.00	1.02
Ever take drugs	1.00	2.09	2.82	1.00	0.70
(N)	(300)	(300)	(300)	(300)	(300)
Among Sexually Active					
Condom use (d)	1.00	2.07	2.09	1.00	1.04
Non-regular partner (c)	1.00	1.12	1.52	1.00	0.77
Ever tested/treated for HIV/STDs	1.00	1.99	1.53	1.00	3.07**
(N)	(21)	(26)	(41)	(112)	(105)

(a) Includes oral sex and vaginal and anal intercourse
(b) Includes oral sex and anal intercourse
(c) Either male or female partners
(d) With either male or female partners

† Adjusted for the effects of respondent age, caste, religion, father's education, mother's education, respondent's monthly income and respondent's employment status.

‡ Odds ratio not calculated because of 0 cell value for this behavior in the face-to-face interview mode

§ Denominator for college population = 88, denominator for slum population = 217

*p<.05 **p<.01 ***p<.001