

Acceptability of A-CASI by HIV-Positive IDUs in a Multisite, Randomized, Controlled Trial of Behavioral Intervention (INSPIRE)

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Summary: Audio computer-assisted self-interviewing (A-CASI) is now widely used to gather information from many types of research participants, including injection drug users (IDUs). The purpose of this study was to describe how HIV-positive IDUs participating in an intervention trial viewed A-CASI and to identify the characteristics of participants who held unfavorable attitudes toward A-CASI. Using a sample of participants who completed 12-month assessments (n = 821), we found that most (>80%) of the sample held favorable or neutral attitudes toward A-CASI. Approximately 18% said that they would prefer an interview with a person to a computer, 12% said that they did not understand the questions they heard on the computer, and 14% said that the computer made it hard to be open and honest about risk behavior. Multivariate analyses found that participants who were more socially marginalized (with unstable housing and lower sense of empowerment) and had greater physical limitations and lower CD4 cell counts were consistently more likely to report various negative A-CASI attitudes; however, some outcome-specific findings were also noted. Our research supports the feasibility and general acceptability of A-CASI with HIV-positive IDUs, and it suggests further research exploring the associations between A-CASI attitudes and characteristics of disadvantaged populations.

Key Words: audio computer-assisted self-interviewing, attitudes, HIV, injection drug use, seropositive

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Audio computer-assisted self-interviewing (A-CASI) has gained support for use among researchers who study HIV risk behaviors. Although various versions of automated self-interviewing systems (eg, video-CASI in which study participants view questions on a computer screen; T-CASI, which is A-CASI adapted for use in telephone surveys) have been developed,¹ A-CASI seems to be most widely used in the field. In A-CASI, study participants sit by themselves at the computer, listen to questions by means of headphones, and enter their responses directly onto the computer. Because interview questions are preprogrammed and prerecorded, A-CASI allows standardization of interview administration (ie, questions are asked in a consistent manner regardless of respondents), and thus eliminates interviewer bias. A-CASI also affords a greater sense of privacy to study participants than face-to-face interviews, because participants are not talking to a live interviewer. Studies have found that compared with face-to-face interviews, A-CASI elicits more reporting of sensitive or stigmatizing behaviors, including HIV sexual and injection risk behaviors.^{2–7} Computer-assisted data collection technology also prevents problems such as illegible handwriting, deviations from skip patterns, and the entry of out-of-range values, thus improving data quality and allowing researchers to save time on data entry and cleaning. A-CASI has now been widely used for populations with a range of computer experience, including injection drug users (IDUs).^{2,8,9}

Some studies, however, suggest that despite its utility, A-CASI may not be the preferred mode of data collection for everyone. For example, Hewitt¹⁰ found that among women who participated in the 1995 National Survey of Family Growth, those who were Hispanic or African American, had lower educational attainment, or were poor were more likely than their counterparts to prefer in-person interviews to A-CASI. In a Brazilian study by Simoes and her colleagues,⁹ reporting of problems using the computer was associated with lower educational level. Potdar and Koenig¹¹ found in their study of young urban men in India that although prevalence of reported risky sexual and other behaviors was higher among college students interviewed through A-CASI than those who were interviewed face-to-face, A-CASI failed to yield higher

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responses among those who were less educated and less computer-literate.

The Intervention for Seropositive Injectors—Research and Evaluation (INSPIRE), a randomized controlled trial of an HIV prevention intervention designed for HIV-positive IDUs, used A-CASI as a mode of data collection. The decision to use A-CASI was informed by the research indicating higher reporting of sensitive behaviors by the use of this technology.²⁻⁷ In this article, we describe how INSPIRE participants, who were mostly socioeconomically disadvantaged,¹² viewed their experiences with A-CASI, looking at 3 separate aspects of A-CASI attitudes described below. We also describe the characteristics of participants who held relatively unfavorable attitudes toward A-CASI to identify a subgroup for whom A-CASI may not work as the best mode of data collection. For the latter analysis we examined potential correlates of each of the 3 A-CASI attitudes, including background characteristics, physical and mental health status, psychosocial factors, and HIV risk behaviors.

METHODS

Participants

We report on data collected at the 12-month follow-up time point from the INSPIRE, a randomized controlled trial of an HIV prevention intervention designed for HIV-positive IDUs. The study was conducted in 4 cities in the United States (Baltimore, Miami, New York, and San Francisco) from August 2001 through March 2005. Participants were recruited using active and passive strategies in a variety of HIV care and community venues, including AIDS service organizations, medical clinics, methadone clinics, and street-based settings. Individuals were eligible for the study if they were at least 18 years old, confirmed to be HIV-positive by testing of an oral specimen, reported injection drug use in the past 12 months, and reported having sex with an opposite-sex partner in the past 3 months. A detailed description of the INSPIRE project and its methodology has been reported elsewhere.¹² Of the 966 participants who were randomized into the study, 821 (85%) completed the 12-month assessment during which the variables reported in this article were assessed. The 12-month sample consisted predominantly of African Americans (65%) and of men (62%), with a median age of 42 years. Half the sample (49.6%) reported having an annual income of <\$5000, and 42% reported having less than a high school education. This sample did not differ significantly from the sample of randomized participants, except that male and Miami participants were more likely to drop out from the 12-month assessment.

Data Collection

During study assessment visits, INSPIRE participants were administered A-CASI to answer questions regarding sexual and drug-using behaviors, utilization of health care, adherence to HIV medications, and potential correlates of these behaviors. Using the Questionnaire Development System (QDS; NOVA Research Company, Bethesda, MD), interview questions were programmed into A-CASI with logic checks so that data inconsistencies would be minimized. The A-CASI system displayed interview questions on a computer monitor

while simultaneously playing audio recordings of the questions through headphones. Male and female human voices were used to record most of the questions, with a female voice reading questions regarding sexual matters. The human voices were not necessarily matched for race of participants. A computer-generated voice was used to read response options and statements alerting participants when they entered illogical values (eg, total number of sex partners = 3, number of female sex partners = 6). To reduce boredom, participants could answer the question at any point during the time it was displayed and being read.

Participants entered their responses to the questions directly into the computer using a touch screen. Some study sites used laptop computers with an overlay type touch screen, whereas others used desktop computers with special touch screen monitors. After initial calibration, no problems were reported with respect to the use of the touch screen. Before starting A-CASI, data collection staff collected data on basic demographic and clinical information (eg, gender, date of HIV diagnosis, types of HIV medication currently taking); they then walked the participants through the use of the computer, using a brief series of practice questions. Participants were offered a second set of practice questions if they desired. Participants who expressed the desire to take an assessment in Spanish were offered the Spanish version of A-CASI. After going through practice questions, participants were left to themselves to complete the entire A-CASI interview.

There were 2 breaks programmed into the interview, and refreshments were offered during the breaks. Participants were also free to take as many breaks as they needed. Data collection staff was available (but out of view of the participant) in case any technical problems arose or participants had questions; however, staff did not have access to the data entered into the computer. Although almost all the questions had a “refused to answer” option, most participants (>95% for each question) provided responses other than this option. On average, participants took approximately 1 hour ($M = 1.03$, $SD = 0.54$) to complete the A-CASI assessment at 12 months. We did not find significant associations between the time spent to complete the interview and any of the A-CASI attitudes. Participants also had a blood draw at the 12-month visit to measure their CD4 cell count and viral load.

Measures

Dependent Variables

We assessed 3 conceptually different aspects of attitudes toward A-CASI: (1) preference for A-CASI versus another mode of interview administration (“I would have preferred to do the survey with a person rather than a computer”), (2) overall comprehension of the questions heard on the computer (“Overall, I could not understand the questions I heard on the computer”), and (3) assessment of the sense of privacy for sensitive questions with A-CASI compared with face-to-face interviews (“Compared to an interview with a person, the computer made it harder for me to be open and honest about my sexual and drug using behavior”).

Responses were scored from “strongly disagree” (1) to “strongly agree” (5). Because responses were not normally distributed and because we were interested in identifying

participants who held negative attitudes toward A-CASI, we further dichotomized each response into “having negative attitudes” (those who agreed or strongly agreed to the questions above) and “having neutral or positive attitudes,” and these constituted our 3 dependent variables.

Potential Correlates

Background Characteristics

We examined the sociodemographic variables of age (in years), biological sex, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, or other), city of residence (Baltimore, Miami, New York, or San Francisco), education (high school or more vs. less than high school), and income (\$5000 or more per year vs. <\$5000 per year). For housing stability, participants were asked “Do you currently have a place where you stay 5 to 7 days a week?” Those who responded “no” were labeled as “unstably housed.”

Physical and Mental Health Status

CD4⁺ lymphocyte count was measured from the blood sample provided by participants. We dichotomized the measure into <200 and ≥200 CD4⁺ T cells/mm³. Participants' self-perceived health status was measured by the 6-item Physical Functioning subscale of the Medical Outcome Study (MOS).¹³ A higher score indicated more limited physical functioning reported by the participant (Cronbach α = 0.89). Depressive symptoms were measured by the 7-item Depression subscale of the Brief Symptom Inventory.¹⁴ A higher score indicated more depressive symptoms (Cronbach α = 0.92).

Psychosocial Factors

Perceived social support was measured by a 5-item scale adapted from the social support scale developed by Barrera.¹⁵ A higher score indicated greater perceived social support (Cronbach α = 0.88). Empowerment was assessed by a 28-item scale measuring perceived ability to influence one's environment developed by Rogers and associates.¹⁶ A higher score indicated greater empowerment (Cronbach α = 0.80).

Risk Behaviors

Participants were asked whether they used a variety of injection and noninjection drugs. For this study, we examined more commonly used drugs in the past 3 months. For parsimony, 2 dichotomous drug variables were used in the analyses: “use of stimulants” (crack, cocaine by itself,

amphetamines, heroin and cocaine together [speedball], or heroin and amphetamines together [goofball]) and “use of heroin by itself.” Participants were also asked whether they engaged in any injection risk behavior (ie, lending a needle to or sharing cotton, cooker, or rinse water with HIV-negative or unknown serostatus partners) in the past 3 months. Responses were dichotomized. Finally, sexual risk behavior was measured by asking whether participants engaged in any unprotected vaginal or anal sex with HIV-negative or unknown serostatus partners in the past 3 months. Again, responses were dichotomized.

Statistical Analysis

First, we provided the descriptive statistics for the outcome variables. Bivariate analyses were then conducted to examine the associations between the 3 dependent variables and each of the potential correlates. For correlates that are categorical variables, we used χ^2 tests, and for continuous variables, we used analysis of variance (ANOVA) and the Wilcoxon test. These parametric and nonparametric tests yielded essentially the same results; thus, ANOVA results are reported here for ease of interpretation. Finally, multivariate analyses (logistic regression) were conducted by entering significant bivariate correlates ($P \leq 0.1$) into the models. Parsimonious models were then developed through backward elimination of variables based on their associations with the outcomes. All analyses were conducted with SPSS 12.0 to 14.0 (SPSS, Chicago IL).

RESULTS

Table 1 reports responses to each of the questions asking participants about their attitudes toward A-CASI. Overall, >80% of the participants held positive or neutral attitudes toward A-CASI. Approximately 18% said that they would prefer an interview with a person to a computer-administered survey, 12% said that they did not understand the questions they heard on the computer, and 14% said that the computer made it hard to be open and honest about sexual and drug-using behavior. When these data were cross-tabulated, 8% ($n = 62$) of participants reported negatively to A-CASI with respect to all 3 questions. Table 2 shows the results of bivariate analyses examining the associations between “preferring interview with a person” and its potential correlates. We found that lower education, lower income,

TABLE 1. Response to “Attitudes Toward A-CASI” Questions by HIV-Positive IDUs: Data From the INSPIRE Study Conducted In 4 US Cities (Baltimore, Miami, New York, and San Francisco) From 2001 to 2005

	I Would Have Preferred to Do the Survey With a Person Rather Than a Computer (n = 810) % (n)	I Could Not Understand the Questions I Heard on the Computer (n = 809) % (n)	The Computer Made It Harder for Me to Be Open and Honest About My Sexual and Drug-Using Behavior (n = 809) % (n)
Strongly disagree	31.0% (251)	41.7% (337)	39.1% (316)
Disagree	35.2% (285)	38.1% (308)	37.7% (305)
Neutral	16.0% (130)	8.4% (68)	9.0% (73)
Agree	12.1% (98)	7.7% (62)	9.5% (77)
Strongly agree	5.7% (46)	4.2% (34)	4.7% (38)

TABLE 2. Bivariate Associations Between “Preferring to Do the Survey With a Person Rather Than a Computer” and Potential Correlates Among HIV-Positive IDUs: Data From the INSPIRE Study Conducted in 4 US Cities (Baltimore, Miami, New York, and San Francisco) From 2001 to 2005

	Negative A-CASI Attitudes (n = 144) Mean (SD) or % (n)	Positive/Neutral A-CASI Attitudes (n = 666) Mean (SD) or % (n)	P
Age, years	41.9 (6.7)	42.6 (6.5)	0.210
Biological sex			
Male	63.2% (91)	62.5% (250)	0.869
Female	36.8% (53)	37.5% (416)	
Race/ethnicity			
Black	63.1% (89)	67.9% (443)	0.653
Hispanic	17.0% (24)	15.2% (99)	
White	12.1% (17)	9.2% (60)	
Other	7.8% (11)	7.7% (50)	
City			
Baltimore	21.5% (31)	27.9% (186)	0.293
Miami	30.6% (44)	24.3% (162)	
New York	23.6% (34)	22.5% (150)	
San Francisco	24.3% (35)	25.2% (168)	
Education			
<High school	53.1% (76)	39.5% (262)	0.003
High school or higher	46.9% (67)	60.5% (401)	
Annual income			
<\$5000	62.2% (84)	49.8% (320)	0.008
\$5000 or higher	37.8% (51)	50.2% (323)	
Unstably housed	24.3% (34)	10.3% (68)	0.000
CD4 count			
<200 cells/mm ³	40.2% (53)	28.9% (181)	0.011
Self-perceived health status	0.93 (0.54)	0.81 (0.53)	0.009
Depressive symptoms	2.28 (1.05)	1.90 (0.91)	0.000
Social support	3.91 (0.94)	4.11 (0.90)	0.000
Empowerment	2.78 (0.30)	2.92 (0.30)	0.000
Stimulant drug use past 3 months			
Yes	46.2% (66)	46.4% (307)	0.968
Heroin use (by itself) past 3 months			
Yes	14.7% (21)	17.3% (115)	0.450
Risky injection behavior past 3 months			
Yes	5.6% (8)	6.4% (42)	0.738
Risky sexual behavior past 3 months			
Yes	13.0% (18)	10.6% (69)	0.395

Because of missing data on various variables, sample size does not necessarily add up to 810 in each of the analyses.

unstable housing, lower CD4 count (<200 cells/mm³), greater perception of limited physical functioning, greater depression, lower social support, and lower sense of empowerment were significantly associated with preferring an interview with a person rather than with a computer. In multivariate analysis, unstable housing, lower CD4 cell count, greater physical limitation, and lower empowerment remained significant (Table 3; *P* < 0.05).

Bivariate analyses with other A-CASI attitudes found similar set of correlates (results not shown). Exceptions are that for “not understanding the questions heard on the computer,” Hispanic race/ethnicity and living in Miami were significant bivariate correlates, whereas income was not a significant bivariate correlate. In multivariate analysis,

Hispanic race/ethnicity, lower CD4 count, greater physical limitation, and lower empowerment remained significantly associated with the odds of not understanding the questions heard on the computer (see Table 3; *P* < 0.05).

For the question stating that “the computer made it harder to be open and honest” (results not shown), city of residence was a significant bivariate correlate; Miami participants were more likely to agree with this statement, whereas Baltimore participants were less likely to agree with this statement. African Americans were less likely than other racial/ethnic groups to agree with this statement. Also, those who reported risky injection behavior were less likely to agree with this statement. Education was not a significant bivariate correlate of this outcome. In multivariate analysis,

TABLE 3. Multivariate Analyses (Logistic Regression) of Association Between Significant Bivariate Correlates and Attitudes Toward A-CASI: Data From the INSPIRE Study Conducted in 4 US Cities (Baltimore, Miami, New York, and San Francisco) from 2001 to 2005

Correlates	Prefer to Do a Survey With a Person	Did Not Understand the Questions Heard on the Computer	Computer Made It Harder to Be Open and Honest
	Odds Ratios (95% Confidence Intervals)		
Race/ethnicity			
Hispanic	—	1.82 (1.03 to 3.21)†	—
Race/ethnicity			
Black	—	—	0.58 (0.37 to 0.92)†
Have place to stay			
No	2.40 (1.44 to 3.99)*	—	2.15 (1.21 to 3.83)*
CD4 count			
<200 cells/mm ³	1.53 (1.003 to 2.34)†	2.26 (1.40 to 3.67)*	2.07 (1.32 to 3.27)*
Depression	—	1.26 (0.98 to 1.63)‡	—
Physical limitation	1.63 (1.09 to 2.42)†	1.71 (1.06 to 2.76)†	1.76 (1.14 to 2.72)†
Empowerment	0.25 (0.12 to 0.52)*	0.35 (0.14 to 0.87)†	0.33 (0.15 to 0.71)*
Risky injection behavior	—	—	0.11 (0.02 to 0.85)†
Yes			
Sample size	718	731	702

* $P < 0.01$; † $P < 0.05$; ‡ $P < 0.1$.

African-American race, unstable housing, lower CD4 count, greater physical limitation, lower empowerment, and injection risk behavior remained significant ($P < 0.05$; see Table 3).

DISCUSSION

Most of the INSPIRE participants who completed the 12-month postintervention interviews held favorable or neutral attitudes toward A-CASI. It is noteworthy that our participants, who were socially and economically disadvantaged, generally liked this mode of data collection. Some, however, expressed negative attitudes toward A-CASI; nearly 1 in 5 said they would prefer an interview with a person to a computer-administered survey. In our bivariate analyses, participants who held negative attitudes toward A-CASI were those who were particularly marginalized and were physically and emotionally distressed. In multivariate analyses, unstable housing, greater physical limitation, lower CD4 count, and lower sense of empowerment were consistently associated with an increase in the odds of reporting various unfavorable attitudes toward A-CASI.

The associations between social problems (eg, unstable housing, lower sense of empowerment) or medical problems (eg, lower CD4 count, perception of greater limited physical functioning) and negative A-CASI attitudes found in this study were quite striking. In fact, the finding that medical problems were consistently and significantly associated with negative A-CASI attitudes resonates with anecdotal observations of study staff who noted that some participants had a harder time manipulating the screen with their hands if they had neuropathy and that those who were sicker were more tired and had a harder time getting through the assessment. Additional analyses also showed that when participants who

refused to answer >50% of questions for >3 sections were flagged ($n = 24$), these participants were more likely to report greater physical limitations and had lower CD4 counts (<200 cells/mm³) ($P < 0.05$; results not shown).

These results suggest that researchers might consider offering alternative data collection methods when participants are noted as having serious physical challenges with A-CASI. The human element of the in-person interview may be an important sustaining factor for individuals with less energy or more physical challenges. Alternatively, these individuals may need to have frequent check-ins and support from assessment staff to minimize the demand of the computer. When A-CASI staff noted participants struggling through the assessment in the present study, they offered refreshments or encouraged them to get up and stretch or to go outside for a break, and this usually helped. The staff also had to remain somewhat removed, however, so that the participants thought that their privacy was respected. It was noteworthy that having medical problems was significantly associated with agreement with the statement about the computer making it hard to be open and honest about risky behaviors. It is unclear why having medical problems may be associated with this aspect of A-CASI attitudes, however, and additional data are needed to explore this association further. It may be that this association was driven by the 8% who expressed negative attitudes to all 3 A-CASI questions, and for them, these questions may have tapped a more general dissatisfaction with the A-CASI interview or their experience at the 12-month follow-up visit.

An interesting question-specific finding is that Hispanic participants were more likely to say they did not understand the questions they heard on the computer. One of the study inclusion criteria was that participants be able to speak and participate in interventions in English. We did provide the

Spanish version of the A-CASI to participants who chose to use it; however, only 1 participant chose the Spanish version. It could be that some Hispanic participants might have had limited English comprehension even though they had chosen to use the English version.

Another question-specific finding worth noting is that those who reported injection risk behavior were less likely to say that the computer made it harder to be open and honest about risk behavior. A flip side of this association, however, is the relation between not reporting risk behavior and agreement with the statement that the computer made it harder to be open and honest. This association may imply that participants who thought that the computer made it harder to be open and honest may have underreported risk behavior, and risk data of those holding such negative A-CASI attitudes may need to be viewed with caution.

This study has the following limitations. First, the data are cross sectional; thus, we are unable to establish causal relations from this analysis. Second, because we used a convenience sample of HIV-positive IDUs and used data from participants who completed the 12-month postintervention assessment, the results are not generalizable to the broader population of HIV-positive IDUs. There is a possibility that those who did not like A-CASI did not come back for follow-up assessments, which resulted in an overestimation of the positive response to A-CASI. We conducted an additional analysis to see whether characteristics of those who dropped out from the 12-month assessment were similar to characteristics of those who expressed negative A-CASI attitudes but did not find such evidence (results not shown). Third, this study was about participants' attitudes toward A-CASI and not about the validity of reporting by use of A-CASI technology. Thus, having negative/positive A-CASI attitudes does not mean that participants' reporting was invalid or valid. Finally, the 3 questions used to assess A-CASI attitudes do not provide more specific information that could be useful for future implementation of A-CASI, such as why certain participants preferred face-to-face interviews to A-CASI, what types of questions were particularly difficult to understand on the computer, and why certain people thought A-CASI did not provide a sense of privacy.

With the caveats outlined previously, we found that A-CASI was widely acceptable to our sample of HIV-positive IDUs. Our data also suggest that we should consider the study population carefully before choosing to adopt A-CASI as a mode of data collection, however. Although the INSPIRE participants (HIV-positive IDUs who were generally from socioeconomically disadvantaged segments of the society) were, overall, receptive to A-CASI technology, a subset of those who were more socially marginalized and had medical problems did not respond as positively to it. We believe that it is important to examine these individuals closely to understand the implication for use of this emerging technology. For individuals with less energy or more physical challenges, researchers might be prepared to offer alternative data collection methods (eg, in-person interviews). These are important points to consider, particularly because A-CASI has become a widely used data collection tool in the field of HIV research. Future research should explore the link between

significant correlates and A-CASI attitudes to identify the reasons why certain individuals hold negative attitudes and find out the ways in which this technology is most effectively implemented.

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