Using T-ACASI to Improve the Accuracy of STD Measurement

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In the absence of population surveys that collect and test biological specimens (Ku et al., 2002; Johnson et al., 2001; Turner et al., 2002; NHANES), estimates of the burden of STDs in a population must rely upon either counts of diagnosed infections reported to local health departments or respondents' self-reports of STD symptoms and diagnoses provided in surveys. Both of these sources underestimate the true burden of infection in a population. Since the extent of this undercount bias is not thought to be uniform over time or localities, inferences about trends over time or variations across jurisdictions in diagnosed infections are subject to non-trivial inaccuracy. Furthermore, these counts provide no information on the burden of undiagnosed and untreated infections in the population.

In theory, well-conducted population surveys repeated over time might provide a more accurate alternative for monitoring both the burden of diagnosed STDs, as well as symptoms that suggest STDs for which treatment was not sought. Validation studies indicate, however, that STDs are substantially underreported in both clinical studies (Zenilman et al, 1995; Turner & Miller, 1997) and population surveys when interviewers conduct the interview. This underreporting is thought to arise from respondents' hesitancy to admit to a human interviewer that they have acquired an STD. Such underreporting bias is frequently found in the reporting of stigmatized, illicit, or embarrassing behaviors or characteristics — a phenomenon sometimes attributed to the tautologically-defined concept of "social desirability" bias (DeMaio, 1984).

A decade of research suggests that the mode of interview can improve the validity and quality of sensitive self-reported measures made in population surveys. For in-person measurements with literate respondents, paper self-administered questionnaires (Paper SAQs) provide a straightforward way of eliminating the disclosure of potentially sensitive information to a human interviewer. Audio computer-assisted self interviewing (Audio-CASI) provides parallel advantages for both literate and illiterate respondents (Turner et al. 1998, Tournageau and Smith, 1996, Al-Tayyib 2002, Rogers et al, 2005).

Until recently, telephone surveys could not offer a similarly private mode of questioning for respondents. In 1995, Cooley et al. (1998; 2000) adapted an Audio-CASI system to support complex telephone surveys. A preliminary test of this system (Turner et al 1996), suggested that T-ACASI interviews were feasible, well tolerated by respondents, and could reduce the underreporting bias for sexual topics. The T-ACASI system was subsequently used in a randomized experiment embedded in the 1996-98 Urban Men's Health Survey (UMHS) — a survey of men reporting sex with men in four cities in the USA. Gribble et al. (2000) examined the reporting of illicit drug use in the UMHS; they report respondents interviewed by T-ACASI were substantially more likely to report use of a range of illegal drugs, concern for their current drug use, and exchange of money or drugs for sex.

National STD and Behavior Measurement Experiment (NSBME).

The 1999-2000 NSBME was designed to assess the impact of T-ACASI on reporting of STDs and a range of other sensitive characteristics and behaviors. The NSBME extends evaluation of T-ACASI to surveys of the adult population of the U.S.A. The NSBME randomly assigned a probability sample of U.S. adults ages 18 to 45 to have sensitive questions asked either by a human telephone interviewer (T-IAQ: telephone interviewer-administered questioning) or by T-ACASI. In this paper, we report NSBME findings for survey questions asking about respondents' history of STD symptoms and diagnoses, health care for STD symptoms, and interactions with main partner about STDs.

METHODS

The protocol for this research was approved and supervised by Institutional Review Boards for the Protection of Human Subjects at the Research Triangle Institute and the University of Massachusetts.

Sample Design. The NSBM experiment was embedded in a telephone survey of a probability sample of women and men aged 18 to 45 years residing in U.S. households

with working land lines telephones. The survey was conducted between September, 1999 and April, 2000. Two sample strata were recruited for this survey measurement experiment: (1) a sample of the telephone-accessible U.S. household population aged 18 to 45 (national stratum), and (2) a parallel sample of the telephone-accessible population of the city of Baltimore, MD (Baltimore stratum). A list-assisted random digit dialed (RDD) sample was drawn for each stratum using the Genesys Sampling System (2002), Villarroel et al. (2002; 2004) present additional details of the NSBME sample design and execution.

Sample Execution. For the national stratum, 14,250 telephone numbers were generated, and 12,322 telephone numbers (86.5%) were successfully screened for eligibility. 2,183 of these screened telephone numbers were found to be residential numbers with one or more eligible English-speaking respondents aged 18 to 45. One eligible household member of these households was randomly selected for participation in the survey (without substitution). 1,452 of the 2,183 target respondents in the national strata completed interviews (66.5%), and 91 respondents (4.2%) completed partial interviews that included at least one substantive questionnaire section. Up to a maximum of 91 calls were made to screen households and complete an interview in the national stratum. . Of 709 completed interviews assigned to be conducted in the T-ACASI experimental condition, 10 interviews were lost due to a technical malfunction, and 24 (3.4%) were administered in T-IAQ mode because respondents did not have a touchtone telephone. (Data for these 24 cases are excluded from our analyses.)

The second sample stratum was drawn to represent the adult population of Baltimore, MD. For the Baltimore stratum, 7,498 telephone numbers were generated and 6,326 (84.4%) were successfully screened for eligibility. Screening identified 1,072 households with an eligible respondent, and 697 of these eligible respondents completed interviews (65.0%). An additional 47 respondents (4.4%) completed partial interviews. Up to a maximum of 82 calls were made to screen households and complete an interview in the Baltimore stratum. Of 332 completed Baltimore interviews assigned to be conducted in the T-ACASI experimental condition, 15 (4.5%) were completed in T-IAQ

mode because respondents did not have a touchtone telephone. (These 15 cases are excluded from analyses.)

Sample Size. A total 1,024 T-ACASI interviews and 1,214 T-IAQ interviews were conducted in the mode randomly assigned. Due to partial interviews, we report on the responses of 955 T-ACASI respondents and 1,186 T-IAQ respondents who completed questions about a main sex partner (1/3 into the full interview) and questions about STD knowledge and history (2/3 into the full interview).

Interview Modes. Telephone numbers were randomly assigned to the T-IAQ or T-ACASI conditions prior to their release to the telephone survey unit. Following screening and recruitment into the study, telephone interviewers at the Center for Survey Research (University of Massachusetts, Boston) conducted the survey either by asking the respondent questions and recording their answers (T-IAQ condition) or by transferring the respondent to the T-ACASI system developed at RTI by Cooley et al (2000). After the T-ACASI interview began, the interviewer remained on the line for the first 9 non-sensitive questions to ensure that the system was working properly and that the respondent was comfortable using the touchtone telephone's keypad to answer questions. The interviewer then informed the respondent that he/she was leaving the three-way connection so that the respondent could complete the survey in private. Both men and women interviewers were used for screening, recruitment and in the T-IAQ condition. The T-ACASI condition played the interview in a woman's voice.

Sample Equivalence across Interview Modes. While randomization should ordinarily yield approximately equivalent groups, the T-ACASI condition had a higher survey break off rate than the T-IAQ condition --- particularly in the national sample strata.1 We have previously tested the demographic equivalence of the samples and found generally small and statistically insignificant variations across experimental conditions — with the exception of educational attainment (Villarroel et al., 2002; 2004).

1In addition, some divergence in sample composition might be expected because the T-IAQ sample included approximately three percent of cases that did not have a touchtone phone. While these cases have been excluded from the T-ACASI sample in our analysis, they could not be excluded from the T-IAQ sample. (A last-minute survey modification resulted in accidental elimination of a screening question that asked about the availability of touchtone telephones.)

The T-ACASI condition found 2.5% of respondents reported having an 8th grade education or less while only 0.8% of respondents told a human interviewer they had left school in 8th grade or earlier. There was also a slightly greater proportion of respondents in T-ACASI reporting vocational or trade school versus T-IAQ (6.8% versus 4.4%; $p<0.05$). We suspect that this variation in reported educational attainment may reflect an impact of survey mode — with respondents being more willing to report very low levels of educational attainment in the more private T-ACASI interview condition.

Measurements. Survey questions on sexually transmitted infections were adapted from Tanfer (1993) National Survey of Men, Catania et al.'s (1992) National AIDS Behavior Survey, Johnson et al. (1994) Sexual Attitudes and Lifestyles, Sonenstein et al (1995) National Survey of Adolescent Males, and Laumann et al (1994) National Health and Social Life Survey) Wordings for all survey questions reported in this article are presented in Appendix 1.

Statistical Analysis. Our analyses are intended to determine whether mode of interview affects the likelihood that a respondent will report STD risk behaviors, discussion of STDs with their sexual partner, and histories of STD symptoms, infection and treatment. To make this determination, we combine the national and Baltimore sample strata. The combined sample strata are treated as a population that has been randomly allocated to one of two experimental conditions: T-ACASI or T-IAQ interview mode2. Data in these analyses are unweighted, and our statistical analyses assess the likelihood that observed fluctuations in survey responses across the two interview modes arose by chance from the random allocation of respondents to one of the two experimental groups. When this null hypothesis is rejected, we conclude that the mode of interview had an effect on survey response.

To assess the magnitude of this effect, we compute the crude odds ratios for the reporting of protective STD behaviors, related symptoms, STI history and knowledge in T-ACASI versus T-IAQ interview modes. Since the availability of touchtone phones and

2 This strategy is common in methodological experiments embedded in surveys in which the impact of an aspect of survey methodology — rather than estimation of a population characteristic — is the research goal. In the present instance application of population weighting would reduce the effective N of experimental subjects from Baltimore by more than 99%.

differential sample loss in the two conditions introduced possible divergence in the socio-demographic composition of the respondents assigned to the two modes (Villarroel et al., 2002; 2004), we also report adjusted odds ratios testing the impact of survey mode on response while controlling for the impact of deviations in sample composition. Adjusted ORs are calculated using multivariate logistic regression models that control for sample strata (national and Baltimore), gender; age group (18-25, 26-35, 36-45) educational level (<HS, HS, some college, >=4 year college degree), marital status (married, cohabiting, divorced/widowed/separated, unmarried), presence of children in household, race-ethnicity (non-Hispanic Black, non-Hispanic White, non-Hispanic other, Hispanic), six geographical regions of the country3, and four levels of urbanization4. (Covariate controls entered as categorical dummy variables); all respondents in Baltimore sampling strata were coded as residing in the South Atlantic and in one of the 21 largest MSAs [Baltimore-Washington MSA].) All of the foregoing analyses were carried out using STATA, version 6.0 (STATA Corporation 2000).

RESULTS

Table 1 describes the sample population by interview mode. The results indicate that the respondents assigned to the two conditions were statistically equivalent.

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3 Geographical regions: North East (CT, MA, ME, NH, NJ, NY, PA, RI & VT); North Central (IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD & WI); South Atlantic (DC, DE, FL, GA, MD, NC, SC, VA & WV); South Central (AL, AR, KY, LA, MS, OK, TN & TX); Mountain (AZ, CO, ID, MT, NM, NV, UT & WY); Pacific (AK, CA, HI, OR & WA).

4 21 largest MSAs refers to counties belonging to the top 21 metro areas (based on household counts from 1990 Census): Atlanta, Boston-Worcester-Lawrence-Lowell-Brockton, Chicago-Gary-Kenosha, Cleveland-Akron, Dallas-Fort Worth, Detroit-Ann Arbor-Flint, Houston-Galveston-Brazoria, Los Angeles-Riverside-Orange, Miami-Fort Lauderdale, Minneapolis-St. Paul, New Haven-Bridgeport-Stanford-Waterbury-Danbury, New York-Northern New Jersey-Long Island, Philadelphia-Wilmington-Atlantic City, Phoenix-Mesa, Pittsburgh, San Diego, San Francisco-Oakland-San Jose, Seattle-Tacoma-Bremerton, St Louis, Tampa-St. Petersburg-Clearwater, Washington-Baltimore. Counties with 85,000+ households are counties with 85,000 or more households in metropolitan areas not included in the 21 largest MSAs. Counties with 20,000-84,999 households are counties with 20,000 or more households not included in the larger categories. Counties with <20,000 households are all remaining areas not included in the larger categories described above.

Table 2 presents results for questions that were asked about the respondent's "main sex partner during the past year"[5] (85.2% reported a main partner in the past year; 11.6% did not report having a "main partner" but they did report a sexual relationship that had lasted at least one month, and 3.3% reported neither). Respondents assigned to the T-ACASI condition were more likely to report that their main partner in the past year had a history of STD (7.9% vs. 3.5%, $p < .001$) and that they had never talked to their partner about protecting themselves against STDs (48.2% in T-ACASI vs. 41.6% in T-IAQ, $p < .05$). Among those respondents who reported talking about STD protection, there was no difference in reporting that it occurred before rather than after first engaging in sexual activity (82.0% vs. 83.0%, n.s.). T-ACASI respondents were also more likely to report more frequent discussions of their sex life with their main partner. 48% of T-ACASI respondents reported having such discussions weekly compared to 40% of respondents in the T-IAQ condition ($p<0.01$). Finally, we note that respondents assigned to T-IAQ were less likely to report never avoiding sex to prevent a STD than those in the T-ACASI condition (59% vs 54%, $p <0.05$), however this difference was not significant when controlling for respondent's characteristics.

Table 3 tests for differences in the reported occurrence and incidence of four STD related symptoms: dysuria, genital sores, genital discharge, and genital warts. For all symptoms except genital warts, T-ACASI respondents were significantly more likely to report having the symptom within the past year (adj. ORs = 1.5 to 2.8). A similar pattern is observed for the reported incidence of genital warts but this result is statistically unreliable ($p =0.15$ for linear trend).

Table 4 tests for differences in reporting that treatment was not sought during the last time a STD related symptom occurred. For all four symptoms, T-ACASI respondents were more likely than T-IAQ respondents to report that they did not seek medical treatment for these symptoms (ORs = 1.2 to 1.9). These results are statistically

5 Respondents who reported that they did not have a main sex partner in the past year were asked to report on the last partner with whom they "had an ongoing sexual relationship that lasted at least a month". Respondents who reported no main partner and also no sex partner that lasted at least one month were not asked questions about sex partners. No reporting difference by interview mode was found for the type of partnership in the past year.

reliable for reporting of dysuria and genital discharge but not for the other two symptoms which were reported by fewer respondents (base Ns = 36 to 68).

Table 5 examines reported knowledge of gonorrhea, chlamydia, pelvic inflammatory disease and one fictitious STD (genital phlemoria). Whereas the majority of respondents had heard of gonorrhea, significantly fewer respondents in T-ACASI reported knowing of the disease (Adj. OR = 0.4, $p < .001$). T-ACASI respondents were, however, more likely to claim knowledge of the fictitious disease, genital phlemoria (Adj. OR = 1.5, $p < .001$). No statistically reliable difference was found for reported knowledge of chlamydia or pelvic inflammatory disease.

Table 6 examines the reported incidence of these same STDs. Respondents were more likely to report in T-ACASI than in T-IAQ recent diagnosis of gonorrhea (0.8% vs. 0.3%, Adj. OR 4.0, $p<0.05$) or chlamydia (1.2% vs. 0.3%, Adj. OR 6.5, $p<01$). Due to the low incidence of occurrence of these two infections, logistic regression model did not control for all demographic differences. Additional analyses (not shown) examined the number of times respondents reported having each of the three real STDs and whether they informed their partners that they had been diagnosed with gonorrhea or chlamydia. These analyses revealed an increased reporting in T-ACASI for contracting chlamydia more than once (1.6% vs. 0.8%; OR 2.0, ns) and informing all sexual partners during the last infection (94% vs. 90%, OR 1.6, ns) but due to sample size (66 vs. 74) the difference was statistically insignificant. No interview mode effect was noted for repeated infections of gonorrhea or PID, and partner notification for gonorrhea.

DISCUSSION

Our findings suggest that within the general population of adults, respondents assigned to T-ACASI were more likely to report recent STIs and STI related symptoms, and not seeking treatment for some of these symptoms in comparison to respondents assigned to T-IAQ. Respondents assigned to T-IAQ were more willing to present themselves as socially appealing (e.g., disease free and with disease-free sexual partners). We found that T-IAQ respondents were less likely to report that a main partner in the past

year had a STD and more likely to report protective behaviors, such as avoiding sex to prevent an STD and discussing STD protection with their main partner.

These results confirm findings from previous population-based studies that attribute differences in reporting of sensitive sexual and HIV-related risk behaviors to the enhanced privacy afforded by ACASI and T-ACASI compared to methods involving human interviewers. Considering the advantages of telephone surveys (less costly than in-person surveys, expedited turn around, precise sampling, etc), this paper sought to measure the extent of the possible underreporting found in the typical well-conducted telephone survey in the general population for STD related questions.

There were indications that the T-ACASI system was well-received among respondents. After the main survey was completed, T-ACASI respondents were asked a brief series of questions about their participation. When asked which method was preferred for answering sensitive questions about sex and STDs, 87% thought that most people would prefer T-ACASI and 72% thought T-ACASI was best for protecting privacy. Virtually identical results were obtained for T-ACASI respondents who broke off the interview and were subsequently re-contacted by a phone interviewer the next day to continue with the interview in T-ACASI (83% thought most people would prefer T-ACASI for sex and STD questions, and 75% thought T-ACASI was best for protecting privacy).

Future analyses will provide national estimates (weighted data) of the "improved" reports of T-ACASI for STD history, symptoms, treatment seeking and prevalence of STD protective behaviors. Due to small sample size for some of the risk factors, extensive analysis to measure differences in reporting by interview mode across population subgroups are not possible.

APPENDIX 1

Questions were adapted from the listed source preceding each question. All other questions were composed by researchers at RTI. New questions borrowed CAGE response categories from the Medicare Registry and opinion items from the General Social Survey (GSS).

REPORTING OF AVOIDING SEX AND DISCUSSIONS WITH MAIN PARTNER ABOUT SEX and STD

Adapted from Catania et al's (1992) National AIDS Behavioral Survey (NABS):
Now we need to know whether you have had a main sex partner in the past year. This person could be your spouse, a lover, or a former spouse or lover __ anyone with whom you had an ongoing sexual relationship that lasted at least a year.
Have you had a main sex partner in the past year?

1 Yes
5 No

Have you ever had a partner with whom you had an ongoing sexual relationship that lasted at least a month?

1 Yes
5 No

Adapted from Catania et al's (1992) NABS: (for respondents who had a main sex partner in past year)
During the last 12 months, how often have you and that partner discussed your sex life?

1 At least once a week
2 Once or twice a month
3 Once a month
4 Less than once a month
5 Never

Adapted from Johnson et al's (1994) Sexual Attitudes and Lifestyles:
Have you ever avoided having sex to prevent the possibility of getting an infection or disease?

1 Yes
5 No

Adapted from Tanfer's (1993) National Survey of Men:
As far as you know, has that partner EVER had any sexually transmitted diseases, such as herpes, gonorrhea, or syphilis?

1 Yes
5 No

Adapted from Tanfer's (1993) National Survey of Men:
Did you and that partner ever talk about protecting yourselves from sexually transmitted diseases?

1 Yes
5 No

Adapted from Tanfer's (1993) National Survey of Men:
Did you and that partner first talk about protecting yourselves from STDs BEFORE or AFTER you engaged in any sexual activity?

1 Before
2 After

STD SYMPTOMS and MEDICAL TREATMENT

Next we have some questions about symptoms that some people experience.
Adapted from Sonenstein et al's National Survey of Adolescent Males (NSAM), 1995:
Have you EVER had a burning feeling when you urinate?

1 Yes
5 No

When was the last time you had a burning feeling when you urinated?

1 Within the past week

2 Between 1 and 4 weeks ago

3 Between 1 and 2 months ago

4 Between 3 and 6 months ago

5 Between 7 and 12 months ago

6 More than 1 year ago

At that time did you see a doctor or nurse about the burning feeling?

1 Yes

5 No

Adapted from Sonenstein et al's NSAM, 1995:

Have you EVER had painful sores or blisters on your sex organs?

1 Yes

5 No

When was the last time you had painful sores or blisters on your sex organs?

1 Within the past week

2 Between 1 and 4 weeks ago

3 Between 1 and 2 months ago

4 Between 3 and 6 months ago

5 Between 7 and 12 months ago

6 More than 1 year ago

At that time did you see a doctor or nurse about the sores or blisters?

1 Yes

5 No

Adapted from Sonenstein et al's (1995) NSAM:

Have you EVER had dripping or oozing or a discharge from your sex organs that had a strange color or smell?

1 Yes

5 No

When was the last time you had such dripping or discharge from your sex organs?

1 Within the past week

2 Between 1 and 4 weeks ago

3 Between 1 and 2 months ago

4 Between 3 and 6 months ago

5 Between 7 and 12 months ago

6 More than 1 year ago

At that time did you see a doctor or nurse about the dripping or discharge from your sex organs?

1 Yes

5 No

Adapted from Sonenstein et al's (1995) NSAM:

Have you EVER had warts on your sex organs?

1 Yes

5 No

When was the last time you had warts on your sex organs?

1 Within the past week

2 Between 1 and 4 weeks ago

3 Between 1 and 2 months ago

4 Between 3 and 6 months ago

5 Between 7 and 12 months ago

6 More than 1 year ago

At that time did you see a doctor or nurse about the warts on your sex organs?

1 Yes

5 No

RECOGNITION AND INCIDENCE OF STDs AND PID

Adapted from Sonenstein et al's NSAM, 1995 and Laumann et al.'s (1994) National Health and Social Life Survey (NHSLS).

Have you ever heard of a disease called gonorrhea?

1 Yes

5 No

Adapted from Sonenstein et al's (1995) NSAM, and Laumann et al.'s (1994) NHSLS (1994).

Has a doctor or nurse EVER told you that you had gonorrhea or "clap"?

1 Yes

5 No

How many times in your life has a doctor or nurse told you that you have gonorrhea, or clap?

Enter a number from 1 to 9. If you had gonorrhea more than 9 times, enter 9.

When was the last time a doctor or nurse told you you had gonorrhea or the clap?

1 Within the past week

2 Between 1 and 4 weeks ago

3 Between 1 and 2 months ago

4 Between 3 and 6 months ago

5 Between 7 and 12 months ago

6 More than 1 year ago

Adapted from Sonenstein et al's (1995) NSAM, and Laumann et al.'s (1994) NHSLS (1994).

Have you ever heard of a disease called chlamydia?

1 Yes

5 No

Adapted from Sonenstein et al's (1995) NSAM, and Laumann et al.'s (1994) NHSLS (1994).

Has a doctor or nurse EVER told you that you had chlamydia?

1 Yes

5 No

How many times in your life has a doctor or nurse told you that you have chlamydia? Enter a number from 1 to 9. If you had gonorrhea more than 9 times, enter 9.

When was the last time a doctor or nurse told you that you had chlamydia?

1 Within the past week

2 Between 1 and 4 weeks ago

3 Between 1 and 2 months ago

4 Between 3 and 6 months ago

5 Between 7 and 12 months ago

6 More than 1 year ago

Have you ever heard of a disease called genital phlemoria?

1 Yes

5 No

Has a doctor or nurse EVER told you that you had genital phlemoria?

1 Yes

5 No

How many times in your life has a doctor or nurse told you that you have genital phlemoria?

Enter a number from 1 to 9. If you had gonorrhea more than 9 times, enter 9.

When was the last time a doctor or nurse told you that you had genital phlemoria?

1 Within the past week

2 Between 1 and 4 weeks ago

3 Between 1 and 2 months ago

4 Between 3 and 6 months ago

5 Between 7 and 12 months ago

6 More than 1 year ago

Have you ever heard of pelvic inflamatory disease (PID)?

1 Yes

5 No

Has a doctor or nurse EVER told you that you had pelvic inflammatory disease (PID)?

1 Yes

5 No

How many times in your life has a doctor or nurse told you that you have pelvic inflammatory disease or PID? Enter a number from 1 to 9. If you had gonorrhea more than 9 times, enter 9.

When was the last time a doctor or nurse told you that you had pelvic inflammatory disease (PID?

1 Within the past year
2 Between 1 and 5 years ago
3 Between 5 and 10 years ago
4 More than 10 years ago

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TABLE 1. Demographic characteristics of respondents by interview mode. (Unweighted data from 1999-2000 NSBM Experiment, combined National and Baltimore sample strata). [a]

Demographic characteristic	T-ACASI %	T-ACASI n	T-IAQ %	T-IAQ n	p [b]
Gender					
Female	59.0	955	58.7	1,184	>.5
Male	41.0		41.3		
Age					
18-25	22.9	953	24.8	1,180	>.5
26-35	37.6		36.6		
36-45	39.6		38.6		
mean [SD]	33 [8]	953	32 [8]	1180	0.273
Marital Status					
Married	42.5	954	41.4	1,182	>.5
Cohabiting	10.8		9.3		
Divorced, separated, widowed [c]	13.8		14.1		
Never married	32.9		35.2		
Education					
Less than high school [d]	7.8	954	8.5	1,182	>.5
High school	23.5		24.2		
Some college or trade school	36.2		34.1		
College graduate or more	32.6		33.2		
Children in Household					
No	39.9	953	40.7	1,182	>.5
Yes	60.1		59.3		
Race - Ethnicity					
Black (non-Hispanic)	24.1	952	24.6	1,170	>.5
White (non-Hispanic)	61.2		58.8		
Hispanic - Latino origin	7.6		8.1		
Other (non-Hispanic)	7.1		8.5		
Sample					
National	66.0	955	68.8	1184	0.172
Baltimore	34.0		31.2		
Level of Urbanization [e]					
21 largest MSAs	36.4	607	36.2	796	0.367
Counties with 85,000+ households	31.1		34.4		
Counties with 20,000-84,999 households	17.5		17.2		
Counties with <20,000 households	15.0		12.2		
Region [e]					
Northeast [f]	15.7	630	20.1	814	0.356
North Central	27.6		24.6		
South Atlantic	18.1		18.3		
South Central	17.0		15.9		
Mountain	7.6		7.1		
Pacific	14.0		14.0		

[a] Analysis compares participants who reached the last question of the sexually transmitted disease section that was asked to all respondents (question 84 for women and question 82 for men).

[b] P-value for Pearson chi-square test.

[c] Includes 3.1% separated, 9.8% divorced and 1.1% widowed

[d] The T-ACASI condition found 2.3% of respondents reported having an 8th grade education or less while only 0.9% reported this educational level in the T-IAQ condition (p=0.006). A greater proportion of TACASI respondents reported vocational or trade school as the highest year of schooling received, where as a greater proprtion of TIAQ resporndents reported completion of a 4-5 year college degree.

[e] National sample only

[f] The 4.4% difference in sample composition between the two conditions is statistically reliable (p=0.03)

TABLE 2. Reporting of avoidance of sex and discussions about sex and STD with main partner in the past year

MEASUREMENT	T-ACASI %	T-IAQ %	OR	Adjusted OR
Never avoided sex to prevent STD [a]	59.0	53.9	1.2*	1.2
(Base N)	920	1147		
If Main Partner in the Past Year: [b]				
Frequency of discussion about sex life [c]				
Once a week	47.6	40.1	1.4**	1.4**
Once or twice a month	24.7	23.0	1.1	1.2
Once a month	8.8	15.8	0.5***	0.5***
Less than Once a Month	13.4	11.5	1.2	1.1
Never	5.5	9.6	0.6**	0.5**
(Base N)	(782)	(973)		
Partner ever had STD	7.9	3.5	2.3***	2.4***
(Base N)	(785)	(988)		
Never talked about protecting against STDs	48.2	41.6	1.3**	1.3*
(Base N)	(784)	(987)		
When talked about STD protection [d]				
Before sex	82.0	83.0	0.9	0.9
After sex	18.0	17.0		
(Base N)	(405)	(571)		

* p<0.05; ** p<0.01, *** p<0.001

[a] Question excludes 97 (4.3%) participants who reported never having sex with anyone. 56.6% of the 33 TIAQ participants and 44.4% of the 54 TACASI participants reported avoiding sex to prevent an infection (p=0.235)

[b] Participants who reported never having a sex partner in their lifetime skipped questions about partnerships (main sex partner last year and ever having an ongoing sexual relationship that lasted at least one month). We report on questions asked about the main partner.

[c] Mantel-Haenszel test for linear association for all categories listed from most frequent to never is p<0.001.

[d] Excludes respondents who reported never talking to main sex partner about protecting against STDs

TABLE 3. Reported Incidence of STD related symptoms

MEASUREMENT	T-ACASI %	T-IAQ %	OR	Adjusted OR	Linear trend [a]
SYMPTOMS					
Burn when urinate					
Within past year	13.3	9.5	1.5**	1.5**	0.0325
over 1 year ago	21.1	23.4	0.9	0.8	
never	65.6	67.2	0.9	0.9	
(Base N)	953	1,185			
Genital Sores or Blisters					
Within past year	3.9	1.4	2.8**	2.8**	0.0000
over 1 year ago	3.3	1.6	2.1*	2.0**	
never	92.9	96.7	0.4***	0.4***	
(Base N)	952	1,185			
Genital Discharge or Dripping					
Within past year	6.4	3.3	2.0***	2.2***	0.0024
over 1 year ago	7.9	7.2	1.1	1.1	
never	85.7	89.5	0.7**	0.7**	
(Base N)	950	1,183			
Genital Warts					
Within past year	0.8	0.4	2.0	1.9 [b]	0.1501
over 1 year ago	4.3	3.5	1.3	1.2	
never	94.9	96.1	0.7	0.8	
(Base N)	953	1,181			

* p<0.05; ** p<0.01, *** p<0.001

[a] Mantel-Haenszel test for linear association. Ordered categories (not shown here) from the most recent time to most distant time (within past week, 1-4 weeks ago, 1-2 months ago, 3-6 months ago, 7-12 months ago, >1 year ago). In this ordering, "Never" was placed *after* the most distant time.

[b] Due to no reports of genital warts within the past year in some locales and in the "non-Hispanic other" ethnic/racial group, this logistic regression equation did not control for race/ethnicity, urbanicity, and region of the country.

TABLE 4. Percent of respondents reporting that they did no seek medical treatment in response to an STD symptom [a]

SYMPTOM	T-ACASI %	T-IAQ %	OR	P [b]
Burn urinate: did not see MD	29.1	22.1	1.4	0.03
(Base N)	327	389		
Sores: did not see MD	54.4	50.0	1.2	0.67
(Base N)	68	36		
Discharge: did not see MD	22.1	12.9	1.9	0.05
(Base N)	136	124		
Warts: did not see MD	14.3	10.9	1.4	0.62
(Base N)	49	46		

[a] Due to small numbers, odds ratio are not adjusted for possible subgroup differences.
[b] Pearson chi-square statistic in 2x2 table.

TABLE 5. Reported recognition of real and fictitious STDs

MEASUREMENT	T-ACASI %	T-IAQ %	OR	Adjusted OR
Gonorrhea: heard of	92.6	96.1	0.5***	0.4***
(Base N)	955	1,186		
Chlamydia: heard of	83.0	81.8	1.1	1.1
(Base N)	954	1,184		
Pelvic Inflammatory Disease (PID): heard of	61.6	62.7	0.9	0.9
(Base N)	955	1,184		
Gen phlemoria: heard of [a]	27.1	20.9	1.4**	1.5***
(Base N)	954	1,184		

* $p<0.05$; ** $p<0.01$, *** $p<0.001$

[a] Genital Phlemoria is a fictitious disease.

TABLE 6. Reported incidence of STDs and PID

Infection or Disease [a]	T-ACASI %	T-IAQ %	OR	Adjusted OR
Gonorrhea: [b]				
Within past year	0.8	0.3	3.3	4.0* [d]
over 1 year ago	5.1	4.6	1.1	1.1
never	94.1	95.1	0.8	0.8
(Base N)	952	1,185		
Chlamydia: [b]				
Within past year	1.2	0.3	4.6*	6.5** [e]
over 1 year ago	5.9	6.2	0.9	1.0
never	93.0	93.6	0.9	0.8
(Base N)	953	1,183		
Pelvic Inflammatory Disease (PID): Females only [b c]				
Within past 5 years	1.6	1.7	0.9	1.0
over 5 years ago	1.1	2.2	0.5	0.5
never	97.3	96.1	1.5	1.4
(Base N)	563	695		
Genital phlemoria:				
Ever genital phlemoria	0.3	0.1	3.7	~
(Base N)	954	1,184		

* p<0.05; ** p<0.01, *** p<0.001

[a] Participants who reported they had "never heard of the disease" are included in the category as never having the disease

[b] Mantel-Haenszel test for linear association was non-significant (gonorrhea p=0.17; chlamydia p=0.14; PID p=0.48). Ordered categories (not shown here) for gonorrhea and chlamydia from the most recent time to most distant time (within past week, 1-4 weeks ago, 1-2 months ago, 3-6 months ago, 7-12 months ago, >1 year ago). For PID, ordered categories from most recent time (past year, 1-5 years ago, 5-10 years ago, over 10 years ago). In this ordering, "Never" was placed *after* the most distant time.

[c] Although PID is a disorder of the female reproductive tract, we purposely asked this question on PID to both males and females. Two males (excluded here) reported that they had been diagnosed with PID.

[d] Due to no reports of gonorrhea in the past year in some locales, this logistic regression equation did not control for urbanicity and region of the country.

[e] Due to low reports of chlamydia in the past year in some locales and by educational level, this logistic regression equation did not control for education, urbanicity and region of the country.