

The Validity of Teens' and Young Adults' Self-reported Condom Use

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Objective: To examine the concordance between teens' and young adults' self-reported condom use, assessed by audio-computer-assisted self-interviewing, and Y-chromosome polymerase chain reaction (Yc-PCR) assay, a nondisease marker for detecting the presence of sperm in vaginal fluid for 14 days after unprotected vaginal sex.

Design: Randomized trial of a human immunodeficiency virus prevention program. Only data from baseline (before randomization) were used for this analysis.

Setting: A clinic-based sample in Atlanta, Georgia.

Participants: Eligible teens and young adults were African American female teens and young adults 15 to 21 years old who had reported sexual activity in the previous 60 days. Of 1558 teens and young adults screened from March 1, 2002, through August 31, 2004, 847 were eligible and 715 (84.4%) participated at baseline.

Main Outcome Measures: Self-reported consistent condom use in the 14 days before baseline and Yc-PCR results.

Results: Of participants who reported vaginal sex in the past 14 days, 186 reported consistent condom use, defined as 100% condom use. Of these, 63 had a positive Yc-PCR result, indicating detection of the Y chromosome in the vaginal fluid. Participants who reported consistent condom use with a self-reported history of sexually transmitted diseases were 2.4 times more likely to have a positive Yc-PCR result (adjusted odds ratio, 2.4; 95% confidence interval, 1.2-4.8; $P = .01$).

Conclusions: A significant degree of discordance between self-reports of consistent condom use and Yc-PCR positivity was observed. Several rival explanations for the observed discordance exist, including (1) teens and young adults inaccurately reported condom use; (2) teens and young adults used condoms consistently but used them incorrectly, resulting in user error; and (3) teens and young adults responded with socially desirable answers. Using an objective biological measure may provide one strategy for validating teens' and young adults' self-reported condom use.

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SELF-REPORTED BEHAVIOR HAS been the cornerstone of reproductive and sexual health research from large observational studies, such as the Youth Risk Behavior Surveillance study,¹ to efficacy trials of sexual behavior change interventions.²⁻⁴ Yet it has long been recognized that self-report of sexual behaviors may be prone to many types of biases, including recall bias (encoding, distortion, retrieval, reconstruction)⁵⁻⁷ and social desirability bias.^{8,9}

During the past several decades, improvements in the formatting and framing of sexual behavior questions have enhanced the validity of self-reported sexual behaviors. For instance, estimates of sexual behavior are more likely to be valid if surveys inquire about behaviors that occurred during shorter recall periods.^{7,9} Use

of cues, such as activities and important events, has also been beneficial.^{5,10,11} Further, the advent of audio-computer-assisted self-interviewing (ACASI) has reduced barriers to literacy and social desirability bias and has yielded higher rates of responding about risky sexual behaviors than interviewer-administered or self-administered surveys.^{9,12}

The incidence of sexually transmitted diseases (STDs) has also been used to assess the validity of self-reported sexual activity.¹³⁻¹⁵ This method is objective and quantifiable; however, it requires conducting research with a high-risk sample (ie, one in which the prevalence and incidence rates of STDs are substantial), enrolling a large sample, and following up the sample for a long period.

Taking another biological approach, researchers established that prostate-

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specific antigen (PSA) was detectable in vaginal fluid for 24 to 48 hours after exposure to semen¹⁶ and could be used as a measure of condom failure.¹⁷ Another method used a Y-chromosome polymerase chain reaction (Yc-PCR) assay, which detects Y-chromosome DNA as a biomarker of sperm in vaginal fluid. The assay was observed to be more sensitive than the PSA assay.^{18,19} Findings demonstrated that using this method, the Y chromosome is detectable for up to 2 weeks after coitus in the vaginal fluid of sexually active women, providing a broader detection window relative to the PSA assay.²⁰ Additional evaluation of this procedure found discrepancies between self-reported condom use and detectable Yc-PCR. Of women who reported consistent (100%) condom use via an interviewer-administered survey in the 2 weeks before providing a vaginal swab specimen, 55% had a positive Yc-PCR assay result.²¹ However, interviewer-administered surveys are prone to reporting biases, particularly socially desirable responding, when assessing sensitive behaviors. The purpose of this study was to determine concordance between female teens' and young adults' self-reports of consistent condom use (assessed by ACASI) and results from a Yc-PCR assay, thus extending earlier studies with older women by using optimal behavioral data collection techniques (ie, ACASI) with a younger sample.

METHODS

STUDY SAMPLE

Participants were African American female teens and young adults enrolled in a randomized trial of a human immunodeficiency virus (HIV) prevention program in Atlanta, Georgia. Only data collected at baseline (before randomization and intervention occurred) were used for this study. Recruitment sites were a publicly funded STD clinic, a teen clinic based in a large public hospital, and a family planning clinic (all in Atlanta). From March 1, 2002, through August 31, 2004, project recruiters screened female teens and young adults to assess eligibility. Teens and young adults were eligible to participate if they were African American, female, 15 to 21 years old, and reported sexual activity in the previous 60 days. Exclusion criteria were being married, being pregnant, or attempting to become pregnant, as collected through self-report. Of 1558 screened, 847 teens and young adults were eligible and were asked to participate in the study. The study achieved an 84% baseline participation rate (N=715). The institutional review board at Emory University approved the study protocol before implementation.

DATA COLLECTION

The baseline interview was administered via ACASI to minimize literacy barriers, enhance privacy and confidentiality, and minimize reporting bias. The interview was 40 minutes in duration. The use of shorter recall periods,²² cues (a calendar with a standardized script), and separation assessment of partner types (main partner, casual partner) were used in collecting condom use data to further minimize reporting bias. Research staff remained in the testing room to answer any questions. Participants then self-collected a vaginal swab specimen by performing a vaginal sweep for 10 to 15 seconds (Swube applicator; Becton Dickinson Microbiology Systems, Sparks, Maryland). Trained monitors instructed participants to collect vaginal fluid using a lifelike model of a vagina and were available at all times

for assistance. Subsequently, specimens were frozen and shipped to the Johns Hopkins Division of Infectious Disease Laboratory, where they were evaluated for the presence of Y chromosome using methods described in the article by Melendez et al.²³ The Yc-PCR assay can detect the presence of the Y chromosome in vaginal fluid for up to 14 days after coitus. Although an earlier study²⁴ suggested that Yc-PCR may also detect the Y-chromosome DNA from other cells, such as epithelial cells deposited during oral sex or digital penetration, subsequent extraction protocols have been optimized to remove any type of male and female epithelial cells. Therefore, any Y-chromosome DNA detected in the vaginal fluid would come from sperm cells. In addition, all samples were processed by a female technician, thereby decreasing the possibility of contamination. Participants were compensated \$50 for completion of assessment procedures.

STATISTICAL ANALYSIS

We examined the baseline sample of participants who reported sexual activity in the 14 days before specimen collection (n=537) and who also had usable Yc-PCR assays (n=484). Two items assessed condom use: "How many times did you have vaginal sex in the past 14 days?" and "How many of these times did you use a condom?" The ACASI defined "vaginal sex" as when "a guy puts his penis in your vagina." Responses to the latter item were divided by the former, thereby creating a proportional measure of condom use.²⁵ We dichotomized the measure into consistent condom use (100%) vs inconsistent use (any level of use less than 100%).

RESULTS

The mean (SD) age of the adolescents was 17.6 (1.7) years; most were students currently enrolled in school, and 25.2% (122) had graduated or received their general equivalency diploma. Most (88.6%; 429) reported a current boyfriend, whereas 33.3% (161) reported current casual sex partner(s). The primary analysis examined the concordance between teens' and young adults' self-report of consistent condom use and Yc-PCR results. Consistent condom use was reported by 186 teens and young adults during the 14 days before Y-chromosome specimen collection. Of these, 63 (33.9%) had a positive Yc-PCR assay result, thereby indicating discrepancy between their self-reported consistent condom use data and the biological indicator of sexual risk behavior.

A number of STD-associated risk factors were examined for those teens and young adults reporting consistent condom use compared with Yc-PCR test results. Risk factors included prior STD history, age, frequency of sex in past 14 days, having sex while "high" on drugs or alcohol or while partner was "high" on drugs or alcohol, number of partners in past 14 days, and physical, emotional, or sexual abuse history. Only prior STD history and frequency of sex were statistically significantly associated ($P < .02$) in bivariate analyses (**Table**). These variables were subsequently entered as independent variables in a multivariable logistic regression model predicting the Yc-PCR test result. Of participants who reported consistent condom use, those with a history of STDs were 2.4 times more likely to have a positive Yc-PCR assay result (discordant result) (adjusted odds ratio, 2.4; 95% confidence interval, 1.2-4.8).

The high level of discordance between the teens' and young adults' self-report of consistent condom use and the Yc-PCR assay result is a cause for concern. A positive Yc-PCR test result for female teens and young adults who reported 100% condom use likely indicates either overreporting of condom use or, more likely, user error, that is, incorrect condom use on the part of participants and their male sex partners. It is unknown what proportion of those reporting 100% condom use with a positive Yc-PCR assay result actually attempted to use condoms at each episode of vaginal intercourse but were unsuccessful in preventing sperm from entering the vaginal fluid. Research has shown that teen and young adult error in condom use, including breakage, leakage, slipping off, reuse, and the late application or early removal of condoms, can be as high as 38%.^{26,27} Regardless of whether the problem is condom user error or misreporting, the unfortunate result, in terms of risk for STDs and HIV, is the same. Thus, if our measure of consistent use could have been adjusted to account for various forms of condom error that probably occurred, we would be better able to discern whether those testing Yc-PCR positive were displaying dishonesty or poor recall. Future studies will need to also measure condom use error to more accurately assess the validity of self-reported condom use. In addition, the finding that participants with a prior STD history were 2.4 times more likely to have a discrepant result suggests that social desirability bias may be an important factor because the ACASI was administered in the clinics, although it was not part of the clinic services. If participants returned to the clinic to complete the baseline interview several weeks after receiving the counseling associated with a positive STD result, they may be more likely to misreport consistent condom use. As a result of technological advances, the Yc-PCR sample is easy to collect, transport, and process and can be helpful in assessing the validity of self-report and potential condom misuse or failure.

This study has several limitations. Our study marker can only validate sexual behavior reported in the 2 weeks before Yc-PCR specimen collection and can only be conducted with female participants. Participants collected the vaginal specimen themselves, a condition that could influence the consistency and accuracy of sampling procedures. Also, the study was based on a sample of African American female teens and young adults. Similar studies would be needed with other racial/ethnic groups to confirm these findings.

Self-report of any behavior, especially sensitive, sexual behavior, is subject to recall and social desirability problems. Future studies seeking to improve the validity of sexual reporting in this population could consider using daily electronic diaries (personal digital assistants that can signal users to enter data). This more qualitative approach may yield better data on condom use, condom error, and other sensitive sexual behaviors. In addition, using a biological marker of the Y chromosome in vaginal fluid can provide an objective strategy for validating self-reported condom use during a short recall period (14

Table. Bivariate Associations Between Yc-PCR Test Result and STD Risk Factor

STD Risk Factor	Pearson <i>r</i>	<i>P</i> Value
Age	.096	.19
Prior STD history	.232	.002
Frequency of sex in past 14 days	.175	.02
No. of partners in past 14 days	.133	.07
Frequency of sex while "high" on alcohol or drugs in past 60 days	.013	.87
Frequency of sex while partner "high" on alcohol or drugs in past 60 days	.066	.37
Physical, emotional, and sexual abuse history ^a	.416	.52

Abbreviations: STD, sexually transmitted disease; Yc-PCR, Y-chromosome polymerase chain reaction.

^aStatistical test performed was Pearson χ^2 .

days). This measure can also be especially valuable in providing a short-term objective indicator in abstinence research. Although cost intensive, when economically and logistically feasible, using a triangulated approach, including survey data, STD tests, and the Yc-PCR assay, may yield a more comprehensive picture of STD and HIV risk for female teens and young adults.

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Author Contributions: Dr DiClemente had full access to all the data in this study and takes responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Rose, DiClemente, Crosby, and Zenilman. *Acquisition of data:* Rose, DiClemente, Wingood, Sales, and Zenilman. *Analysis and interpretation of data:* Rose, DiClemente, Sales, Latham, Zenilman, Melendez, and Hardin. *Drafting of the manuscript:* Rose. *Critical revision of the manuscript for important intellectual content:* Rose, DiClemente, Wingood, Sales, Latham, Crosby, Zenilman, Melendez, and Hardin. *Statistical analysis:* Sales,

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Most unhealthy fast food burger? Carl's Jr Double Six Dollar Burger. "This one is a doozy both for size and the number of calories and fat grams. Would you believe this hamburger weights in at 1520 calories and 111 grams of fat?"

—Kristie Leong, MD, on www.healthmad.com, January 20, 2008