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# Concordant and Discordant Reports on Shared Sexual Behaviors and Condom Use Among African American Serodiscordant Couples in Four Cities

The NIMH Multisite HIV/STD Prevention Trial for African American Couples Group

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**Abstract** This paper examines the concordance of reported shared sexual behaviors, including condom use, among 535 heterosexual, African American, serodiscordant couples and identifies factors that might predict discordant reports. Percentages of agreement, Kappa and McNemar's statistics and conditional probability indices are used to measure concordance. Logistic regression models identify predictors of couples' discordant sexual reports. Analyses revealed Kappa statistics for reporting anal sex, fellatio and

cunnilingus indicated moderate to substantial agreement. The effects of demographics and the couples' relationship contexts on concordance of reported sexual behaviors were found to vary somewhat by gender and type of sexual behavior. Findings showed that concordance of reporting between the couples was consistent for the past 90 and 30 days. Findings from this paper provide new scientific insights into the knowledge base of self-reported couples' data and suggest that these data can be used to evaluate their accuracy and serve as a proxy for validity.

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**Keywords** HIV · Serodiscordant · Concordance · Discordance · African American couples

## Introduction

Retrospective self-reports remain the primary mode of assessing condom use and other shared sexual behaviors in research on HIV, including controlled clinical trial studies. Because of the sensitivity of these topics, HIV researchers have raised concerns about the reliability, validity and potential biases of self-reports [1, 2].

Several researchers suggest that concordance of responses from couples reporting on shared sexual behaviors may serve as an approach to evaluate the accuracy of self-reported data and a marker of validity [2, 3]. Discordant reports of sexual activity and HIV risk behaviors among couples are also recognized as important because increasing evidence demonstrates that such behaviors are associated with STD transmission [4].

It is important to highlight that although using couples-based data may be a useful approach to evaluate accuracy and validity, the literature on self-reports of sexual behaviors suggests that measurement and participation bias [1, 5], different understandings of the meaning of the questions, not knowing or forgetting the correct true answer over time, and random or systematic distortion in recollection [2] may still contribute to discordant reports between sexual partners.

These issues need to be taken into consideration when couples-based data are collected. Moreover, the time frame of the measurement collection may affect the reliability, validity and quality of the data. The literature has addressed this issue. For example, Jaccard et al. [6] found that the assessment of sexual behaviors over moderate time durations (3 or 6 months) rather than short or long durations (1 month or 12 months) have better self-report accuracy. Wyatt et al. (2004) [7] found that a longer time frame such as 90 days compared to 30 days is more appropriate for rare behaviors such as sexual behaviors among HIV positive women, who tend to be sexually active, but who engage in sex less frequently than negative women.

Research findings on the level of concordance on shared sexual behaviors and condom use are mixed but, overall, they demonstrate fair to good inter-partner agreement [1, 5, 8–15]. Identifying specific respondent factors predicting partners differing on sexual reports may contribute to improving couple assessment by anticipating such discrepancies and developing effective mechanisms of quality assurance to avoid, address, or better explain such discordance in couple data sets.

The findings in the literature on individual and relationship predictors on shared sexual behaviors and condom use are also mixed. Several studies found partner agreement on sexual behaviors and risks (condom use, number of sexual partners, commercial sex) did not vary by age, ethnicity, or infection status and relationship factors

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(duration of relationship, quality of relationship) [14, 16], whereas others found associations between shared sexual behaviors and demographic variables [3, 12], and between shared sexual behaviors and relationship characteristics [3]. Moreover, a study by Witte et al. (2007) [3] found that among couples where the male partner was HIV positive, there was higher discordant reporting on whether the couple used condoms compared to those in which the men were HIV negative.

Although progress has been made in HIV research on concordance of reports of sexual behaviors among couples and on the associations between demographics, relationship factors and discordant shared sexual behaviors, there are considerable gaps in the literature on these research areas, particularly with reference to serodiscordant African American couples. Furthermore, in much of the research, the sample size studied has been very small. This paper addresses some of the gaps in the literature by focusing on a large sample of African American serodiscordant couples recruited from four U.S. cities.

Two primary research questions are addressed in this paper: (1) What is the concordance of reports of sexual behaviors (oral, anal, and vaginal intercourse) and use of male and female condoms during sexual intercourse in the past 90 and 30 days among 535 heterosexual, African American, serodiscordant couples? (2) What individual-level characteristics (age, ethnicity, marital status, level of education, HIV serostatus) and relationship-level characteristics (length of relationship, sexual dysfunction and relationship quality assessment) predict discordant reporting on shared behaviors and use of male and female condoms during the past 90 and 30 days among heterosexual, African American, serodiscordant couples? The implications of these findings for prevention intervention development and future research are presented.

## Methods

### Study Design

This paper used baseline data from the Eban study, a two-arm, couples-based randomized controlled intervention trial of HIV serodiscordant African American couples from four U.S. cities (Atlanta, GA, Los Angeles, CA, New York, NY, and Philadelphia, PA). The study tested the efficacy of a couple-focused HIV/STD risk reduction intervention versus an individual-focused health promotion intervention in reducing sexual risk behaviors and STD incidence (For

more details on the study design see Bellamy [17] and NIMH Multisite HIV/STD Prevention Trial for African American Couples Group [18]). The study design and details are described in the NIMH Multisite HIV/STD Prevention Trial in this issue [19].

### The Study Sample and Recruitment of the Couples

The study includes 535 couples (1,070 individuals) recruited from HIV care clinics, HIV testing and counseling sites, primary care clinics, substance abuse treatment programs, churches and HIV/AIDS ministries, HIV/AIDS services providers and community-based coalitions of advocacy organizations. Participants met specific study criteria (see NIMH Multisite HIV/STD Prevention Trial for African American Couples Group [18] for greater detail on study recruitment and criteria). Study recruitment procedures and eligibility criteria are described in NIMH Multisite HIV/STD Prevention Trial in this issue [19].

### Assessment of Self-Report Measures

At baseline, data were obtained from three sources. First, participants completed a 90-min Audio Computer-Assisted Survey Interview (ACASI), which assessed sociodemographic and relationship characteristics, sexual behaviors and condom use, and psychosocial mediators that had sound psychometric properties and had previously been implemented with adult African American populations. Although both participating male and female partners completed the same ACASI assessments, the sexual behavior items were written to be appropriate for each specific gender. Subsequently, a trained African American interviewer administered validated and reliable assessments on sexual and physical abuse and a brief index assessing study participants' commitment to the African American community. Finally, males provided a urine specimen and women provided two vaginal swab specimens that were assayed for three STDs and HIV testing (for more detail see NIMH Multisite HIV/STD Prevention Trial for African American Couples Group [18]).

### *Sociodemographic Characteristics*

Study partners were asked to indicate their age, education, marital status, employment status, income, type of health insurance, and incarceration history. HIV serostatus at baseline was determined via biological testing.

### *Relationship Characteristics*

Study participants were asked questions that addressed relationship characteristics including length of relationship,

whether or not participants were cohabiting with their study partner, sexual dysfunction items and quality of relationship.

### Sexual Dysfunction

Each participant was asked three questions from the Watts Sexual Function Questionnaire [20] to examine sexual dysfunction. Both partners were asked if they desired sex with their study partner and responses ranged from (0) never (1) almost never (2) sometimes (3) almost always to (4) always. Sexual desire dysfunction was defined by responses less than 2 on this single item. Additionally, females were asked about frequency of vaginal dryness (sexual arousal dysfunction) with an identical choice of 5 responses (i.e., (0) never to (4) always). Sexual arousal dysfunction in females was defined by responses greater than 2 on this single item. Females were asked a final question regarding how often they were able to climax sexually and 5 possible responses: (0) never (1) less than half the time (2) half the time (3) more than half the time and (4) always. Sexual orgasm dysfunction in females was defined by responses less than 2 on this single item. Similarly, sexual arousal dysfunction was defined for male participants by responses of never or almost never to their reported ability to get an erection and sexual orgasm dysfunction was defined by males who responded that they had experienced premature ejaculation either more than half the time or always. For the purpose of this paper, we

constructed a single binary sexual dysfunction measure (present or absent) that was equal to one if any form of sexual dysfunction was present (orgasm, desire or arousal) [20].

### Relationship Assessment

A general scale developed by Hendrick [21] to measure relationship satisfaction in intimate relationships was used in this study. The scale consists of seven items and summary scores range from 7 (low satisfaction) to 35 (high satisfaction). Questions on this scale include: (1) “How well does your study partner meet your needs?” and (2) “In general, how satisfied are you with your relationship?” This measure has been used by a range of populations including urban African American and Latino women [22].

### Sexual Behaviors

Participants provided data on the use of male and female condoms during sex and different types of sexual behaviors they had engaged in with study partners (vaginal, anal and oral intercourse) over the past 90 and 30 days. For example, female participants were asked: “In the past 90 and 30 days, about how many times did your study partner put his penis into your vagina?”, and “In the past 90 and 30 days, when your study partner put his penis into your vagina, about how many of these times was a male condom used?”

**Table 1** Baseline demographic, relationship, alcohol and substance use characteristics

	Males ( <i>n</i> = 535)	Females ( <i>n</i> = 535)	Statistic
Agea	45.1 ± 8.1	41.7 ± 7.7	9.95**
Education			
<HS graduate	141 (26.6%)	185 (34.8%)	15.4**
HS graduate/GED	249 (46.9%)	188 (35.3%)	
Some college	141 (26.6%)	159 (29.9%)	
Employed	181 (34.1%)	121 (22.8%)	19.9**
Income			
<\$400/Mo.	158 (29.8%)	149 (28.1%)	3.5
\$400–850/Mo.	212 (40.05)	234 (44.2%)	
\$851–1,650/Mo.	103 (19.4%)	102 (19.3%)	
\$1,651+/Mo.	57 (10.8%)	45 (8.5%)	
Insured	365 (68.9%)	435 (81.9%)	26.0**
Previously incarcerated	405 (76.4%)	256 (48.6%)	90.2**
HIV positive	212 (39.6%)	323 (60.4%)	23.0**
Sexual dysfunction	119 (22.4%)	159 (29.9%)	7.5*
Living with study partner	405 (76.4%)	401 (75.5%)	0.7
>5 years with study partner	250 (47.4%)	242 (45.6%)	3.6 <sup>+</sup>
Married to study partner	175 (33.0%)	170 (32.0%)	0.9
Relationship assessment <sup>a</sup>	28.6 ± 4.3	28.1 ± 5.1	2.0 <sup>+</sup>

Values shown are *N* (%) or mean ± SD. *p* values for continuous variables were determined by paired *t* tests; *p* values for categorical variables were determined by Chi-square tests

<sup>+</sup> *p* < 0.10; \* *p* < 0.05;

\*\* *p* < 0.01

Statistical Analysis Methods

Distributions of categorical variables are summarized by frequencies and percents while continuous variables are summarized by means and corresponding standard deviations. Because of the couple pairings, appropriate paired test statistics were constructed and evaluated. Paired *t* tests are presented in order to compare the distribution of continuous measures for males and females in the study, while Mantel–Hansel statistics are presented in order to compare the distribution of categorical measures for males and females.

We report the frequency and percent of concordant responses (e.g., both partners reporting “yes” and/or both partners reporting “no”) and discordant responses (one partner reporting “yes” and one partner reporting “no”) to questions asking whether the participants had engaged in vaginal, anal or oral sex with their study partners in the past 90 days, as well as questions on sexual risk behaviors (e.g., consistent condom use in the past 30 days and the past 90 days, and condom use at last vaginal and anal sex). Kappa statistics are also reported to measure concordance of couple responses, over and above what would be expected by chance alone. In general, values of Kappa from 0 to 0.20 indicate poor agreement, 0.21 to 0.40 indicate fair agreement, 0.41 to 0.60 indicate moderate agreement, 0.61 to 0.80 indicate substantial agreement, and values greater than .80 indicate excellent agreement [23]. However, it has been widely shown that Kappa values can be misleadingly low when the prevalence of the responses being measured is

skewed. Thus, as proposed by Ochs and Binik [10] we present conditional probability indices (CP+ and CP–), in conjunction with Kappa, as an additional measure to explore the degree to which couple reporting of categorical sexual behavior data are consistent. The positive conditional probability (CP+) is the averaged probability that one partner reports a behavior of interest, given that the other partner also reports the activity. Similarly, the negative conditional probability (CP–), is the averaged probability that one partner does not report a behavior, given that the other partner also does not report that activity.

A third measure of agreement, McNemar’s statistic, is also provided, along with its associated *p* value. Unlike the Kappa and conditional probability measures, McNemar’s statistic does not address agreement within couples directly. Instead, it measures the symmetry of discordant responses. Applied in the context of this study, McNemar’s statistic reflects the difference between the number of couples where women answered “yes” but men answered “no” and the number of couples where men answered “yes” but women answered “no” for each binary outcome of interest. Thus, a significant *p* value associated with a test of McNemar’s statistic implies that the observed discordance is related to a tendency of men to answer the question differently than women, independent of the experience of any given couple.

Concordance of reporting on continuous sexual behavioral measures was examined using paired *t* tests to measure the differences between partners’ reports of shared

**Table 2** Concordance of couple’s reported sexual behaviors (in the past 90 days)

	Agreement <i>N</i> (%)	Kappa	CP+ <sup>a</sup>	CP– <sup>b</sup>	McNemar statistic
Had vaginal sex					
Both report yes	494 (94.6%)	0.11	0.97	0.13	0.2
Both report no	2 (0.4%)				
Discordant	26 (5.0%)				
Total	522				
Had anal sex					
Both report yes	64 (12.1%)	0.65	0.71	0.94	4.3 <sup>+</sup>
Both report no	410 (77.8%)				
Discordant	53 (10.1%)				
Total	527				
Had oral sex (cunnilingus)					
Both report yes	259 (49.2%)	0.43	0.78	0.64	10.2 <sup>**</sup>
Both report no	125 (23.8%)				
Discordant	142 (27.0%)				
Total	526				
Had oral sex (fellatio)					
Both report yes	279 (53.4%)	0.51	0.83	0.68	1.0
Both report no	127 (24.3%)				
Discordant	117 (22.4%)				
Total	523				

<sup>+</sup> *p* < 0.10; \* *p* < 0.05; <sup>\*\*</sup> *p* < 0.01

<sup>a</sup> Positive conditional probability index—see definition in “Methods” section

<sup>b</sup> Negative conditional probability index—see definition in “Methods” section

**Table 3** Concordance of couple's reported sexual risk behaviors (categorical variables)

	Agreement <i>N</i> (%)	Kappa	CP+	CP–	McNemar statistic
Consistent condom use (past 90 days)					
Both report yes	53 (10.9%)	0.34	0.48	0.85	3.2 <sup>+</sup>
Both report no	319 (65.8%)				
Discordant	113 (23.3%)				
Total	485				
Used condom at last vaginal sex					
Both report yes	152 (29.0%)	0.50	0.71	0.80	1.6
Both report no	246 (47.0%)				
Discordant	126 (24.1%)				
Total	524				
Used condom at last anal sex					
Both report yes	11 (17.7%)	0.23	0.50	0.73	0.2
Both report no	29 (46.8%)				
Discordant	22 (35.5%)				
Total	62				

sexual behaviors including: frequency of vaginal, anal, and oral sex and frequency of condom-protected sex over the past 30 days and the past 90 days. Additionally, we calculated correlation statistics (Pearson and Spearman) and the frequency of identical responses reported by both male and female partners in each couple. We also constructed Wilcoxon signed rank tests to compare median values of male and female responses via the *S* statistic (the sum of the ranks of non-identical male and female responses) and its corresponding *p* value.

To identify predictors of discordant reports, we first created binary discordant response variables to identify cases where only one partner in a couple reported engaging in a given behavior. We then fit logistic regression models for the discordant response variable on each reported binary sexual or sexual risk behavior, adjusting for male and female partners' sociodemographic characteristics and relationship characteristics. Odds ratios and corresponding 95% CIs are presented to summarize these findings. All analyses were completed using SAS Version 9.2 (SAS Institute, Cary NC, USA).

## Results

### Individual and Relationship Characteristics

Table 1 presents gender-specific summaries of individual and relationship characteristics. Males were significantly older than their female partners (45.1 vs. 41.7 years;  $p < 0.01$ ), were more likely to have a high school diploma/GED equivalent, (73.5 vs. 65.2%;  $p < 0.01$ ) and were more likely to be employed (34.1 vs. 22.8%;  $p < 0.01$ ). Male partners were less likely to have health insurance (68.9 vs.

81.9%;  $p < 0.01$ ) and reported significantly higher incarceration histories (76.4 vs. 48.6%;  $p < 0.01$ ) than female partners. Males were less likely to be HIV positive (39.6 vs. 60.4%;  $p < 0.01$ ).

### Relationship Contexts

Males were less likely to report sexual dysfunction (22.4 vs. 29.9%,  $p < 0.01$ ). On average, males reported significantly higher relationship satisfaction scores than females (28.6 vs. 28.1,  $p = 0.05$ ).

### Consistency of Couple Reports

Table 2 reports the concordance and discordance of both partners responding either "yes" or "no" to having engaged in vaginal, anal and oral sex (fellatio and cunnilingus) with their study partner in the past 90 days. The percentages of agreement for each type of sexual behavior are high (73–95%). Kappa statistics for reporting anal sex, fellatio and cunnilingus indicate moderate to substantial agreement (0.43–0.65). However, Kappa for reporting vaginal sex indicates poor agreement (0.11), in spite of the exceptionally high percentage (95%) of concordant responses to this question. This is an example of an oft-cited situation wherein Kappa values appear misleadingly low when the prevalence of the responses is skewed [24], as is the case with reports of vaginal sex (where both partners report "yes" in 94.6% of couples). In this case in particular, the conditional probability indices provide additional insight into the results. The Positive Conditional Probability Index (CP+) shows that the agreement for positive responses (i.e., agreement that it occurred) on vaginal sex is high (0.97), but the Negative Conditional



**Table 4** Concordance of couple's reported sexual risk behaviors in the past 90 days (continuous variables)

	Males mean $\pm$ SD	Females mean $\pm$ SD	Paired <i>t</i> test statistic	Pearson's correlation	No identical responses	Spearman's correlation	Signed rank test <i>S</i> statistic
Frequency of vaginal sex ( <i>n</i> = 513)	25.1 $\pm$ 33.7	25.1 $\pm$ 37.6	0.01	0.33***	47	0.42***	2551
Frequency of anal sex ( <i>n</i> = 523)	0.9 $\pm$ 4.2	0.7 $\pm$ 3.7	0.84	0.28***	429	0.65***	490 <sup>+</sup>
Frequency of oral sex (fellatio) ( <i>n</i> = 519)	9.0 $\pm$ 25.4	7.7 $\pm$ 14.7	1.1	0.19***	164	0.57***	1459
Frequency of oral sex (cunnilingus) ( <i>n</i> = 518)	8.1 $\pm$ 19.5	10.1 $\pm$ 33.3	-1.3	0.22***	158	0.50***	-3754 <sup>+</sup>
Frequency of protected sex ( <i>n</i> = 512)	11.7 $\pm$ 24.2	9.5 $\pm$ 18.1	2.3*	0.41***	153	0.55***	3497 <sup>+</sup>

<sup>+</sup>  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ 

Probability Index (CP-) shows that the agreement for negative responses (i.e., agreement that it did not occur) is low (0.13), since only two couples provided concordantly negative responses. These indices also show high agreement on both positive and negative responses for anal and oral sex (0.64–0.94). A higher percentage of agreement on negative responses versus positive responses is found for anal sex (0.94 vs. 0.71), but higher agreement on positive responses versus negative responses is found for cunnilingus and fellatio (0.78 vs. 0.64 and 0.83 vs. 0.68).

The  $p$  value for McNemar's statistic is not significant for questions on vaginal sex or fellatio, indicating relative symmetry between male and female responses across couples with discordant answers to these questions. However, the McNemar's test for anal sex is significant ( $p = 0.05$ ), reflecting the fact that there were only 19 couples (3.6% of the total) where the female partner reported "yes" but the male partner reported 'no,' vs. 34 couples (6.5%) where the male partner reported "yes" and the female partner reported 'no.' The McNemar's test for cunnilingus is also significant ( $p = 0.002$ ), but with asymmetry in the opposite direction. Here, there were 90 couples (17.1% of the total) where the female partner reported "yes" and the male partner reported 'no,' vs. only 52 couples (9.9%) where the male partner reported "yes" and the female partner reported "no".

Table 3 presents a similar summary of percent agreement, Kappa and McNemar statistics and conditional probability indices for three reported sexual risk behaviors (consistent condom use with study partner during the past 90 days, condom use at last vaginal sex with study partner, and condom use at last anal sex with study partner). We observed high agreement for couple responses for each of these behaviors: 76.7% agreement for consistent condom use; 76.0% agreement for condom use at last vaginal sex and 64.5% agreement for condom use at last anal sex. The corresponding estimated Kappa statistics for these three

outcomes were 0.34, 0.50 and 0.23, respectively, indicating fair to moderate agreement. The conditional probability indexes show higher agreement on negative responses than positive responses for these three condom use behaviors, while the McNemar statistic indicates relative symmetry among discordant responses for these three condom use behaviors. The analysis of condom use at last vaginal sex with the study partner and condom use at last anal sex with the study partner were restricted to those participants who reported engaging in those behaviors in the past 90 days. Note that the prevalence of anal sex in the study was very low, so the number of individuals contributing to summaries of this behavior was also low. Participants were also asked about consistent condom use over the past 30 days, and the concordance of their responses to this question (not shown in Table 3) was similar to that for the question of consistent condom use over the past 90 days. Specifically, the Kappa for the 30-day question was 0.38, vs. 0.34 for the 90-day question. The positive and negative conditional probability indices for the 30 days were 0.55 and 0.83, respectively, compared to values of 0.48 and 0.85, respectively, for the 90 days. The McNemar statistic for the 30 days question (0.7,  $p = 0.45$ ) was lower than that for the 90 days time frame (3.2,  $p = 0.09$ ), indicating more balance between male and female responses among discordant couples, but neither result was statistically significant.

Table 4 summarizes results from paired  $t$  tests, Pearson's and Spearman's correlation coefficients and Wilcoxon signed rank tests for continuous sexual behavior outcomes with study partners in the past 90 days. Consistency of male and female partner reporting for each of these outcomes was moderately high. Specifically, Spearman's correlation coefficient ranged from 0.42 to 0.65 and all estimated coefficients were significantly different from zero ( $p < 0.001$  for each outcome). There were no significant differences in male and female reports of frequency of sexual activity during the past 90 days (frequency of



**Table 5** Estimated odds ratio (OR) and 95% confidence intervals (CI) from logistic regression analysis predicting discordant couple reports of sexual behaviors with study partner

Outcome	Vaginal sex past 90 days	Anal sex past 90 days	Cunnilingus past 90 days	Fellatio past 90 days	Consistent condom use past 90 days	Condom use at last vaginal sex	Condom use at last anal sex
No of discordant responses	26	53	142	117	113	126	22
Adjusting for male partner characteristics							
Age	1.0 (0.96, 1.1)	1.0 (0.98, 1.1)	1.0 (0.98, 1.0)	1.0 (0.97, 1.0)	1.0 (0.97, 1.0)	1.0 (0.97, 1.0)	1.0 (0.9, 1.1)
<HS graduate	2.5 (1.1, 5.5)*	1.5 (0.8, 2.7)	1.1 (0.7, 1.7)	1.1 (0.7, 1.7)	1.3 (0.8, 2.1)	1.0 (0.6, 1.6)	1.2 (0.4, 3.8)
Income <\$850/mo	3.5 (1.0, 11.7)*	1.5 (0.8, 3.0)	1.1 (0.7, 1.7)	1.3 (0.8, 2.1)	1.2 (0.8, 1.9)	1.7 (1.1, 2.7)*	2.2 (0.6, 7.7)
Insured	0.9 (0.4, 2.2)	1.2 (0.6, 2.2)	0.7 (0.5, 1.1)	1.2 (0.8, 1.9)	0.8 (0.5, 1.2)	1.0 (0.6, 1.5)	3.0 (0.9, 10.5)
Incarceration history	1.8 (0.6, 5.2)	0.7 (0.4, 1.3)	1.0 (0.7, 1.6)	0.7 (0.4, 1.1)	0.7 (0.4, 1.2)	0.7 (0.5, 1.1)	0.7 (0.1, 3.5)
HIV positive	2.2 (0.98, 4.8)	0.6 (0.3, 1.1)	1.0 (0.7, 1.5)	1.0 (0.7, 1.6)	1.3 (0.9, 2.0)	1.6 (1.1, 2.4)*	0.9 (0.3, 2.7)
Sexual dysfunction	2.8 (1.2, 6.3) *	1.3 (0.7, 2.4)	1.4 (0.9, 2.2)	1.3 (0.8, 2.1)	1.0 (0.6, 1.6)	0.9 (0.6, 1.5)	2.1 (0.6, 7.6)
>5 years with study partner	1.3 (0.6, 2.9)	1.0 (0.6, 1.8)	0.7 (0.5, 0.99)*	0.8 (0.5, 1.2)	1.1 (0.7, 1.6)	1.0 (0.7, 1.6)	0.8 (0.3, 2.3)
Relationship assessment	1.0 (0.9, 1.0)	1.0 (0.9, 1.0)	1.0 (0.95, 1.0)	1.0 (0.96, 1.1)	1.0 (0.95, 1.1)	1.0 (0.9, 1.0)	1.0 (0.9, 1.1)
Married to study partner	0.6 (0.2, 1.5)	0.9 (0.5, 1.6)	0.6 (0.4, 0.97)*	0.7 (0.4, 1.1)	0.96 (0.6, 1.5)	1.2 (0.8, 1.8)	1.0 (0.3, 3.5)
Adjusting for female partner characteristics							
Age	1.0 (0.99, 1.1)	1.0 (0.97, 1.1)	1.0 (0.98, 1.0)	1.0 (0.96, 1.0)	1.0 (0.99, 1.0)	1.0 (0.99, 1.0)	1.0 (0.96, 1.1)
<HS graduate	2.3 (1.0, 5.1)*	1.8 (1.0, 3.2)*	1.0 (0.7, 1.5)	1.0 (0.6, 1.5)	1.2 (0.8, 1.9)	1.3 (0.8, 1.9)	2.1 (0.7, 6.3)
Income < \$850/mo	1.7 (0.6, 4.5)	2.0 (0.9, 4.2)	1.1 (0.7, 1.6)	1.5 (0.9, 2.5)	1.3 (0.8, 2.0)	1.2 (0.7, 1.9)	1.0 (0.2, 3.7)
Insured	1.2 (0.4, 3.7)	1.5 (0.7, 3.4)	0.8 (0.5, 1.3)	0.8 (0.5, 1.3)	0.6 (0.4, 1.1)	0.9 (0.5, 1.5)	1.6 (0.4, 6.7)
Incarceration history	0.4 (0.2, 0.96)*	1.8 (1.0, 3.3)*	1.1 (0.8, 1.7)	1.0 (0.6, 1.5)	0.7 (0.5, 1.1)	0.6 (0.4, 0.9)	1.1 (0.4, 3.2)
HIV positive	0.5 (0.2, 1.0)	1.8 (0.9, 3.3)	1.0 (0.7, 1.4)	1.0 (0.6, 1.5)	0.8 (0.5, 1.2)	0.6 (0.4, 0.9)*	1.1 (0.4, 3.1)
Sexual dysfunction	2.1 (0.96, 4.7)	0.8 (0.4, 1.6)	1.6 (1.1, 2.5)*	1.6 (1.0, 2.4)*	1.0 (0.6, 1.6)	1.4 (0.9, 2.2)	1.2 (0.4, 3.8)
>5 years with study partner	1.1 (0.5, 2.5)	1.1 (0.6, 1.9)	0.7 (0.4, 0.97)*	0.9 (0.6, 1.4)	0.9 (0.6, 1.4)	1.0 (0.7, 1.6)	1.1 (0.4, 3.1)
Relationship assessment	0.9 (0.9, 1.0)	1.0 (0.9, 1.0)	1.0 (0.96, 1.0)	1.0 (0.95, 1.0)	1.0 (0.9, 1.0)	1.0 (0.95, 1.0)	1.0 (0.9, 1.1)
Married to study partner	0.5 (0.2, 1.4)	0.8 (0.4, 1.5)	0.7 (0.4, 1.0)	0.8 (0.5, 1.2)	0.9 (0.6, 1.4)	1.3 (0.8, 2.0)	1.1 (0.3, 3.7)

\*  $p < 0.05$ 

vaginal sex, anal sex, or oral sex). However, males reported a statistically significant higher frequency of condom-protected sex than did their female partners (11.7 vs. 9.5; paired  $t$  test  $p = 0.02$ ; signed rank test  $p = 0.05$ ).

The concordance of responses with regard to frequency of vaginal sex, frequency of anal sex, and frequency of protected sex over the past 30 days was similar to that of responses to the equivalent 90 days questions. Specifically, with regard to frequency of vaginal sex, the mean response from males exactly matched that from females for both the 90 days question (25.1 sex episodes) and the 30 days

question (9.8 episodes). The  $p$  values from a paired  $t$  test (0.99 and 0.97) and the Pearson's (0.33 and 0.31) and Spearman's correlation coefficients (0.42 and 0.49) were very similar for the 90 days and 30 days questions, respectively.

The signed rank test statistic for the 90 days question was higher than that for the 30 days question (2551 vs. 445), but both  $p$ -values were non-significant (0.38 vs. 0.87.) The concordance of responses to the question of the frequency of anal sex over the past 90 days and 30 days were also fairly similar, as shown by the  $p$ -value for the paired  $t$  test (0.40

and 0.19, respectively), the Pearson's correlation coefficient (0.28 and 0.19, respectively), and Spearman's correlation coefficient (0.65 vs. 0.47.) While only the 30 days time frame produced a significant result to the signed rank test, the *p* values for the 90 days and 30 days questions were very close (0.06 vs. 0.04). Finally, for the frequency of protected sex, the concordance results for the 90 days question and the 30 days time frame were nearly identical as measured by the Pearson's correlation coefficient (0.41 vs. 0.45, respectively), the Spearman's correlation coefficient (both 0.55), and the signed rank test (*p* = 0.05 in both cases). The *p* value for the paired *t* test was only significant for the 90 days question (*p* = 0.02), but the result for the 30 days time frame was relatively close (*p* = 0.09).

#### Predicting Discordance on Vaginal Sex

Table 5 presents multivariate models for predicting discordant responses (that is, responses wherein one partner reports "yes" and the other reports "no") on each binary sexual behavior. Couples in which the male partner did not have a high school diploma or GED were significantly more likely to have discordant reports on vaginal sex in the past 90 days compared with those in which the male partner did have a high school diploma/GED (OR = 2.5, 95% CI = 1.1–5.5). Couples in which the male partner reported income of less than \$850 per month were significantly more likely to have discordant reports on vaginal sex compared with those couples in which the male partner reported income over \$850 per month (OR = 3.5, 95% CI = 1.0–1.7). Compared with couples in which the male partner did not report sexual dysfunction, those couples in which the male partner reported sexual dysfunction were significantly more likely to have discordant reports on vaginal sex in the past 90 days (OR = 2.8, 95% CI = 1.2–6.3).

Couples in which the female partner did not have a high school diploma or GED were more likely to have discordant reports on vaginal sex than those in which the female partner did have a high school diploma/GED (OR = 2.3, 95% CI = 1.0–5.1). Couples in which the female partner had a history of incarceration were significantly less likely to have discordance on vaginal sex than those couples in which the female partner had never been incarcerated (OR = 0.4, 95% CI = 0.2–0.96).

#### Predicting Discordance on Anal Sex

Couples in which the female partner did not have a high school diploma or GED were significantly more likely to have discordant reports on anal sex in the past 90 days compared with those in which the female partner did have a high school diploma or GED (OR = 1.8, 95% CI = 1.0–3.2). Couples in which the female partner had incarceration

history were significantly more likely to have discordant reports on anal sex than those couples in which the female partner had never been incarcerated (OR = 1.8, 95% CI = 1.0–3.3).

#### Predicting Discordance on Oral Sex (Cunnilingus)

Couples in which the male partner reported having been with his study partner for at least 5 years were less likely to have discordant reports on cunnilingus in the past 90 days than those couples in which the male partner reported less than 5 years with his study partner (OR = 0.7, 95% CI = 0.5–0.998). The same held true for couples where the female partner reported having been with her study partner for at least 5 years versus those couples in which the female partner reported less than 5 years together (OR = 0.7, 95% CI = 0.4–0.97). Males who reported being married to their female study partners were more likely to have discordant reports on having engaged in cunnilingus in the past 90 days, compared to unmarried male participants (OR = 0.628, 95% CI: 0.409, 0.965). There was a similar effect for married females (relative to unmarried females), however this finding was not statistically significant (OR = 0.670, 95% CI: 0.436, 1.030). Couples in which the female partner reported sexual dysfunction were significantly more likely to have discordant reports on cunnilingus than couples in which the female partner did not report sexual dysfunction (OR = 1.6, 95% CI = 1.1–2.5).

#### Predicting Discordance on Oral Sex (Fellatio)

Couples in which the female partner reported sexual dysfunction were more likely to have discordant reports on fellatio in the past 90 days than those in which the female partner did not report sexual dysfunction (OR = 1.6, 95% CI = 1.0–2.4).

#### Predicting Discordance on Condom Use

Couples in which the male partner reported income of less than \$850 per month were significantly more likely to have discordant reports on condom use at the last vaginal sex compared with those couples in which the male partner reported income over \$850 per month (OR = 1.7, 95% CI = 1.1–2.7). Couples in which the male partner was HIV positive were significantly more likely to have discordant reports on condom use at the last vaginal sex compared with those couples in which the female partner was HIV positive (OR = 1.6, 95% CI = 1.1–2.4). No significance was found in the models for predicting discordance on condom use at the last anal sex or consistent condom use in the past 90 days. We also examined predictors of discordance on the question of consistent condom use in the past

30 days. The results here were consistent with the results found on consistent condom use in the past 90 days, with one minor exception. Couples with men who were HIV positive were more likely to have discordant reports on consistent condom use over the past 30 days than couples with HIV negative men (OR = 1.6, 95% CI = 1.0–2.4.) Although significant, this still differs only slightly from the results on concordance for the corresponding 90 days question (OR = 1.3, 95% CI = 0.9–2.0).

## Discussion

To our knowledge, this is the only paper in the HIV literature that examines concordance of sexual behaviors and condom use and predictors of discordant reports of these behaviors, exclusively focusing on a large sample of African American serodiscordant couples recruited from four U.S. cities.

Couples' reports on having had anal and oral sex in the past 90 days (both reported 'yes,' both 'no,' and discordant), show moderate to high concordance as measured by the Kappa index, which is consistent with most previous studies [2, 3, 10, 12, 14, 25]. However, Kappa for reporting vaginal sex indicates poor agreement (because Kappa values can be misleadingly low when the prevalence of the responses is skewed, as is the case with reports of vaginal sex). Using Conditional Probability Indices shows that the agreement of positive response (e.g., that it occurred) on vaginal sex is high, but low for Negative Conditional Probability Index. These indices are high for anal and oral sex. The p-value for McNemar's statistic is not significant for vaginal sex or fellatio, indicating relative symmetry between male and female responses across couples with discordant answers to these questions. However, the McNemar's test for anal sex is significant. This means that more male partners report anal sex than the female partners. These results may reflect gender norms in which women compared to men may perceive anal sex as unacceptable behavior. For cunnilingus, the McNemar's test is significant with asymmetry in the appositive direction. More female partners reported this sexual act. This result may also be explained that female partners compared to male partners are more likely to perceive cunnilingus as an acceptable sexual act.

We also found high agreement for couples' reports on consistent condom use over 90 days and for condom use at last vaginal and anal sex; Kappa statistics for these three variables were in fair to moderate agreement, which is also consistent with previous studies [2, 3, 10, 12, 14, 25]. Using continuous variables, we had findings consistent with previous studies, showing moderate to high concordance on frequency of vaginal, anal and oral sex for both fellatio and cunnilingus in both 90 and 30 days time frames [2, 3].

Demographics and relationship predictors of couple's discordant reports on sexual behaviors varied somewhat by gender and type of sexual behavior (vaginal, anal and oral). Unlike other studies [3, 12], age was not associated with discordant reports for female and males. However, the findings were consistent with Witte et al. [3] on the associations between discordant sexual behaviors reported and level of education and income.

Among couples where females and males have no high school diploma compared to those with this degree, discordant reports for vaginal sex were more likely to occur, but for anal sex, this was only true for couples where the female partner lacked a high school diploma. Couples in which the male partner had low income (less than \$850 per month versus more than \$850) were more likely to have discordant reports on vaginal sex and consistent condom use for vaginal sex. These findings underscore the need to invest in strategies to improve self-reports on sexual behaviors and condom use among couples with lower levels of education and low income men. Although men were more likely to have a history of incarceration than women, this did not influence whether their reports were discordant. Among couples where the female had a history of incarceration versus females with no incarceration history, discordance on vaginal and oral sex were more likely to be reported. This was not significant for men. Women who have been incarcerated may fear being judged and stigmatized, which in turn may affect how they report their sexual behaviors.

In terms of relationship contexts, couples who were together for 5 years compared to those with less than 5 years together were less likely to have discordant reports for anal sex. Males married to their female study partners were more likely to have discordant reports of having engaged in cunnilingus in the past 90 days, compared to unmarried male participants. There was a similar effect for married females (relative to unmarried females); however, this finding was not statistically significant. These findings are consistent with those in Witte et al. [3].

Couples in which the male partner reported sexual dysfunction (compared to their counterparts) were significantly more likely to have discordant reports on vaginal sex in the past 90 days. Couples in which the female partner reported sexual dysfunction (compared to couples where the female partner did not report this dysfunction) were more likely to have discordant reports on female to male oral sex (fellatio). These findings may be explained by self-presentation and social desirability. Each member of the couple may mask their sexual dysfunction by reporting higher sexual abilities and sexual functioning, which lead them to have discordant reports about their shared sexual behaviors.

Couples in which the male partner was HIV positive (compared with those in which the female partner was HIV

positive) were significantly more likely to have discordant reports on condom use at the last vaginal sex. This was also true for questions about consistent condom use over the past 30 days, although in this case the results were just borderline significant. These findings clearly underscore the need to provide condom communication skills to increase concordant results and help couples to protect each other.

The study has several limitations. The study sample was not selected randomly. We recruited HIV serodiscordant couples engaging in HIV risk behaviors. Couples who participated in this study could be self selected and could differ from other African American serodiscordant couples. Moreover, this paper focuses only on shared sexual behaviors reported in data collected at the baseline interview.

Despite these limitations, the study's findings show a high level of concordance on self reported shared sexual behaviors among the couples across various time frames and for multiple types of sexual behaviors.

If a greater number of studies focused on the couple dyad, there would be more opportunities to expand our understanding of couples' reporting on shared and non-shared sexual behaviors such as on partner concurrency, sex trading, etc. There is also a need to conduct qualitative research where couples debrief on the differences in their reports. More research is required to assess predictors of discordant data over time. Elish et al. [9] found that partner agreement for condom use and frequency of sexual activity decreased as the recall period increased and higher agreement was found for questions with definite answers compared to the more open-ended sexual behaviors questions.

The findings from this paper provide new scientific insights into the knowledge base on the utility of self-reported data generated by couples and may suggest that these data can be used to evaluate their accuracy and may serve as a proxy for validity. If the couples do not agree in their reports, then the accuracy and validity may be doubtful. Measuring discordant behaviors among couples separately may enable HIV intervention researchers to better understand how to target these issues in the intervention, using strategies to normalize fears and concerns and provide a safe environment for disclosure of these behaviors.

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