

# Factors Associated with Condom Use Among HIV Clients in Stable Relationships with Partners at Varying Risk for HIV in Uganda

Glenn J. Wagner · Ian Holloway ·  
Bonnie Ghosh-Dastidar · Gery Ryan ·  
Cissy Kityo · Peter Mugenyi

Published online: 24 February 2010  
© GovernmentEmployee: RAND Corporation 2010

**Abstract** In Africa, HIV infections occur mostly in stable relationships, yet little is known about the determinants of condom use in this context. We examined condom use among 272 coupled HIV clients in Uganda who had just screened for ART eligibility; 128 had an HIV-positive partner, 47 HIV-negative, and 97 a partner with unknown HIV status. Sixty-six percent reported unprotected sex with their partner over the past 6 months (57–70% across the three subgroups). Multiple variables among socioeconomic characteristics, physical health, social support, and psychosocial adjustment were correlated with condom use in bivariate analysis, but in multivariate analysis, condom use self-efficacy was the only predictor of condom use in the total sample and subgroups; church attendance and physical functioning were also predictors among unknown status couples. This analysis reveals high rates of unprotected sex among coupled HIV clients, regardless of partner's HIV status, and suggests multiple targets for prevention.

**Keywords** HIV · Couples · Unprotected sex · Serodiscordant · Condom use

## Introduction

The HIV pandemic continues to ravage sub-Saharan Africa, with approximately 1.5 million new infections in 2007 across the region, including 100,000 in Uganda [1]. In Uganda and other parts of the region, at least half of the couples living with HIV are HIV serodiscordant (one member is HIV-positive and the other is HIV-negative) [2, 3], and most new adult infections occur within stable relationships [4], including 40–60% within serodiscordant couples [2, 5]. These findings highlight the need for prevention efforts that target couples; yet most prevention interventions continue to focus on individuals [6, 7], and the research involving couples in sub-Saharan Africa has focused mainly on HIV disclosure and HIV testing [8, 9]. Strikingly few studies in this region have comprehensively examined the determinants of sexual risk behavior in couples at risk for HIV transmission. A greater understanding of the factors and context influencing sexual risk behavior among couples is critical for developing effective prevention interventions that are tailored to this population.

Research of unprotected sex in couples living with HIV in sub-Saharan Africa have found rates ranging from 20 to 40% [9, 10]. The few studies that have examined factors contributing to inconsistent condom use among couples living with HIV in Africa have focused on HIV disclosure within the couple and other partner interaction variables. Individuals who have not been HIV-tested and are in relationships with HIV-positive partners often assume that they are also HIV-positive and thus do not use condoms [4, 11]. In the context of stable relationships, requests to use condoms are thought to suggest infidelity or lack of trust [12, 13], making it difficult to use condoms if a partner's HIV status is unknown [14]. A study of HIV-infected persons in South Africa [15] found that unprotected sex

---

G. J. Wagner (✉) · B. Ghosh-Dastidar · G. Ryan  
RAND Corporation, 1776 Main St., Santa Monica,  
CA 90407, USA  
e-mail: gwagner@rand.org

I. Holloway  
University of Southern California School of Social Work,  
Los Angeles, CA, USA

C. Kityo · P. Mugenyi  
Joint Clinical Research Centre, Kampala, Uganda

with a stable sex partner was associated with rural residence, lower education, lack of HIV disclosure, younger age (among women), and alcohol use (among men).

While there is little research that has broadly examined the determinants of sexual risk behavior among HIV at-risk couples in sub-Saharan Africa, some studies have been undertaken to isolate determinants of risk behavior among individuals living with HIV in the region. A study by Olley et al. [16] in South Africa found that shorter duration since testing HIV-positive, having a regular partner, not knowing a partner's HIV status, and denial and substance abuse as coping mechanisms were all associated with unprotected sex. A study by Eisele and colleagues [9, 17], also in South Africa, demonstrated that female gender, lack of HIV disclosure to partner, and alcohol use at last sex were correlated with unprotected intercourse. Other variables found to be associated with condom use in this population include education level [15], economic stability [18], and relationship characteristics (HIV status of partner, length of relationship, desire for children) [18].

Comprehensive investigations of the potential multifaceted determinants of sexual risk behavior within stable relationships at risk for HIV transmission are critical for developing effective prevention interventions. Social Cognitive Theory [19], which has been used to explain risk behavior including condom use among HIV serodiscordant couples [20], views behavior, personal factors (cognitive, affective and biological) and the social and cultural environment as influencing one another, with a key cognitive mediator of behavior being self-efficacy. Drawing from Social Cognitive Theory and the published literature, we hypothesize that health (physical and mental) and social support (vs. discrimination) influence social adjustment to HIV (self-acceptance, internalized stigma, HIV disclosure and communication with partner), which in turn influences self-confidence and expected outcomes (both generally and with regard to condom use), and ultimately determines condom use. In addition, other variables such as demographics (age, gender, education, economic independence), relationship characteristics (length of relationship, desire for children) and sociocultural factors (gender roles) may moderate effects on sexual risk behavior.

It is also important to understand whether the dynamics that influence condom use in couples are generally similar across all couples, or whether these factors differ based on the HIV status of the partners. Do key variables that influence condom use in HIV seroconcordant couples, where there is a risk for other sexually transmitted diseases, HIV super-infection and pregnancy, differ from those that determine condom use in couples where one partner is HIV-positive and the other is HIV-negative or of unknown HIV status, who have the added risk of HIV transmission? Whether or not the factors and dynamics that influence

condom use differ across these types of couples will inform whether prevention and risk reduction programs that target couples can be generalized or need to be tailored.

This paper reports analysis of baseline data from a cohort of new clients seeking HIV care in Uganda who are married or in a committed relationship. The goal of the analysis was to identify factors associated with unprotected sexual intercourse in the relationship, and to compare correlates of condom use across participants who are in relationships with partners who are HIV-positive, HIV-negative, or of unknown HIV status.

## Methods

### Study Design

Participants were enrolled in a longitudinal prospective cohort study with a 12-month follow-up period. The primary goal of the study was to examine the impact of HIV antiretroviral therapy (ART) on multiple dimensions of health.

### Sample

The study was conducted at two HIV clinics operated by the Joint Clinical Research Center (JCRC) in Uganda, one in Kampala and the other Kakira. Kampala is the only large urban center in Uganda and Kakira is a small rural town located next to a sugar plantation about 100 km outside Kampala. Consecutive new clients were approached to participate in the study if they were found to be eligible after being screened for ART eligibility. Half of the cohort was eligible for and about to start ART, while the other half was not yet eligible for ART but had signs of disease progression. A client was eligible if he/she was (1) age 18 or older; (2) new to the clinic and had just completed evaluation for ART eligibility; (3) agreed to and was prescribed ART if eligible ( $CD4 < 200$  cells/mm<sup>3</sup> or AIDS diagnosis), or if not ART eligible, then  $CD4 < 350$  cells/mm<sup>3</sup>. While statistics on eligible clients who refused to participate were not collected, the study coordinators reported that very few (less than 10 at each site) clients declined to participate after being informed of the study.

Eligible clients were informed of the study by a clinic staff member at the visit in which their eligibility for ART was determined (usually by the 2nd or 3rd clinic visit); those who expressed interest were referred to the study coordinator for consent procedures and administration of the baseline interview. Nearly all eligible clients agreed to participate. Participants were paid 5000 Uganda Shillings (~\$2.50 USD) to complete the interview. The study protocol was approved by the Institutional Review Boards at

both RAND and JCRC, as well as the Uganda National Council for Science and Technology. Participants went onto be scheduled for follow-up interviews at months 6 and 12; however, only baseline data is included in the analysis for this paper.

## Measures

All measures were translated into Luganda (the most common native language in Kampala and surrounding region) and interviewer-administered.

### *Background and Demographic Characteristics*

These included age (of participant and their partner), gender, ethnic/tribal group, education level (highest level of formal schooling including primary grades, secondary, technical/trade school, and university), HIV test date, attendance at church (using a rating scale from 1 “more than once a week” to 5 “never”; responses were recoded such that higher scores represent greater attendance), and current work status and assets as measured by modules of the World Bank Living Standard Measurement Surveys [21].

### *Physical and Mental Health*

CD4 count and WHO HIV disease stage (stages I–IV, with III and IV representing an AIDS diagnosis) were abstracted from the client’s medical chart. Measures from the Uganda-adapted Medical Outcomes Study HIV Health Survey [22] included physical health functioning, which is a 6-item subscale with higher scores representing better health and functioning. Libido or sexual interest was assessed with a single item, “Loss of sexual interest or sexual pleasure”, and response options from 0 “not at all” to 3 “extremely”; responses were recoded such that higher scores represent greater libido. Depression was assessed with the 9-item Patient Health Questionnaire (PHQ-9) [23]; total score is the sum of all items and higher scores represent greater depression. Alcohol use was measured using the 3-item Alcohol Use Disorders Identification Test [24].

### *Social Environment and Support*

General social support was assessed using a single item, “I can count on my family and friends to give me the support I need”, and a 4-point rating scale with higher scores representing greater support. HIV discrimination was measured using an 8-item scale developed by Berger and colleagues [25]. Participants used a 4-point scale to rate their level of agreement with statements indicating the presence of discriminatory events due to their HIV status

such as loss of friends, people avoiding touching them, and people not wanting them around their children; mean item scores were computed and higher scores represent greater discrimination. Data from the discrimination scale demonstrated high internal consistency (Cronbach’s  $\alpha = 0.91$ ) and item-total correlations ranged from 0.68 to 0.91. We developed two items to assess peer community support amongst fellow HIV clients at the clinic, “I feel a sense of community when I am with other HIV clients here at the clinic” and “The HIV clients at the clinic do not support each other”, which were rated from 1 “strongly disagree” to 4 “strongly agree”; after reversing the latter item, mean item scores were computed and higher scores represent greater peer support.

### *Social Adjustment to HIV*

Internalized HIV stigma was assessed with an 8-item scale developed by Kalichman et al. [26]. Participants were asked to rate their level of agreement with statements such as “I am ashamed that I am HIV-positive” using a 5-point rating scale; mean item scores were computed and higher scores represent greater stigma. Internal reliability for this scale was good (Cronbach’s  $\alpha = 0.77$ ) and item-total correlations ranged from 0.48 to 0.86. HIV disclosure was assessed with regard to friends and family using separate items and response options of “none,” “some” or “all.” Participants who reported being in a relationship or having a main sexual partner were asked if they had informed the partner of their HIV status, as well as their knowledge of the HIV status of the partner. We developed three items to measure prevention advocacy (talking to friends and family about HIV, encouraging people to use condoms, and encouraging people to get HIV-tested), with each item using a 4-point response format to rate level of agreement; mean item scores were computed and higher scores represent greater advocacy. This 3-item scale demonstrated adequate internal consistency (Cronbach’s  $\alpha = 0.61$ ) and item-total correlations ranged from 0.75 to 0.78.

### *Self-Efficacy*

We developed items that asked participants to rate their level of confidence (using a scale of 0–10 with 10 being high confidence) in being able to perform seven behaviors such as condom use, medical adherence, finding work to support self and family, and interacting well with others in social situations. Mean item scores were computed to represent general self-efficacy. Internal reliability was adequate (Cronbach’s  $\alpha = 0.64$ ) and item-total correlations ranged from 0.48 to 0.69.

## Sexual Behavior

Relationship status (marriage or committed relationship), presence of a regular sexual partner, and number of casual sex partners over the past 6 months were assessed. For sex with one's spouse or main partner, frequency of sexual intercourse (number of encounters of sexual intercourse) and the use of condoms during intercourse over the past month were assessed, as well as a global rating of use of condoms during sexual intercourse over the past 6 months using a 5-point rating scale from "never" to "always".

## Data Analysis

Bivariate statistics were used to examine differences across subgroups of participants based on the HIV status of their spouse/partner, as well as the strength of the relationship between unprotected sexual intercourse and continuous (using *t* tests) or categorical (using  $\chi^2$  tests) variables among participants with HIV-positive (seroconcordant) or unknown HIV status partners; if the partner was HIV-negative (serodiscordant), nonparametric tests (Fisher's Exact and Mann–Whitney *U* tests) of significance were used due to the small number of such participants. Unprotected sexual intercourse was represented in analyses by a dichotomous variable indicating whether or not condoms were always used in the past 6 months. With this being an exploratory study, the small sample size, and the absence of similar comprehensive evaluations involving this population in the published literature, we chose not to correct for multiple comparisons.

Logistic regression models were used to examine predictors of condom use (always vs. not always) over the past 6 months. Separate regression analyses were conducted for the total sample, participants with seroconcordant partners, and participants who did not know the HIV status of their partner. A separate analysis of participants with serodiscordant partners was not performed because the sample size was too small to produce precise model parameters.

## Results

### Sample Characteristics

Enrollment consisted of 602 clients, 300 from Kakira and 302 from Kampala; 272 (45%) reported having a spouse or being in a committed relationship and it is on this subset that analyses for this paper were conducted. Of the 272 participants, 128 (47%) reported that their partner was HIV-positive (seroconcordant), 47 (17%) had HIV-negative partners (serodiscordant), and the remaining 97 (36%) reported not knowing the HIV status of their partner. The

demographics and background characteristics of the total sample and each of the three subgroups of participants by HIV status of the partner are listed in Table 1. Among participants with serodiscordant partners, 62% were male compared to only 38% of the participants with seroconcordant or unknown HIV status partners ( $\chi^2 = 8.78$ ,  $P < 0.05$ ). Participants with HIV-negative partners were more highly educated with 33% having primary school education or less compared to 48 and 56% among participants whose partners were HIV-positive or of unknown status, respectively ( $\chi^2 = 9.83$ ,  $P < 0.05$ ).

Participants attending the two sites were similar with regard to demographic and background characteristics with the exceptions that those attending the Kampala clinic were less likely to be currently working (58 vs. 71%;  $\chi^2 = 5.45$ ,  $P < 0.05$ ) and have any financial savings (15 vs. 91%;  $\chi^2 = 158.65$ ,  $P < 0.01$ ), and more likely to have an AIDS diagnosis (57 vs. 28%;  $\chi^2 = 23.68$ ,  $P < 0.05$ ) and lower mean CD4 count (210 vs. 236;  $t = -1.87$ ,  $P < 0.05$ ) (data now shown in the table).

### Relationship Characteristics

A little over half (58%) of participants with unknown HIV status partners had disclosed their HIV status to their partner compared to 97 and 87% of participants with seroconcordant and serodiscordant partners, respectively ( $\chi^2 = 56.55$ ,  $P < 0.01$ ). All other relationship characteristics were similar across the three subgroups of participants (see Table 1). Most participants (>60%) had been with their spouse/partner for several years, and less than 10% reported having other sexual partners over the past 6 months.

### Prevalence of Unprotected Sexual Intercourse

As listed in Table 1, two-thirds to three-quarters of the participants in each type of couple reported having had sexual intercourse with their partner in the month prior to the interview. Among the 194 study participants who reported sexual intercourse, 84% reported one to four intercourse events. When asked to indicate how many of these events involved the use of a condom, 180 (93%) reported using condoms either in all events or no event (data not shown in the table). The prevalence of any unprotected sexual intercourse with one's partner over the past month was 54% for the whole sample, and ranged from 49% among participants with seroconcordant partners to 60% among those who did not know the HIV status of their partner. Participants who were diagnosed with HIV less than 1 month prior to baseline ( $n = 55$ ) were less likely to report always using condoms over the past month compared to those who knew their HIV status for the entire

**Table 1** Demographic and relationship characteristics of participants by HIV status of the partner ( $N = 272$ )

	Total	HIV serostatus of partner			Test statistic
		HIV+	HIV–	Unknown/ untested	
<i>N</i> (%)	272 (100%)	128 (47%)	47 (17%)	97 (36%)	
Demographics and background characteristics					
Kampala clinic	47%	45%	49%	49%	$\chi^2 = 0.456$
Male	42%	38%	62%	38%	$\chi^2 = 8.783^{**}$
Mean age (range)	35 (20–62)	35 (21–58)	35 (22–55)	34 (20–62)	$F = 0.369$
Ethnic tribe (top three)					
Baganda	38%	38%	40%	37%	$\chi^2 = 0.417$
Basoga	23%	22%	23%	25%	
Banyakole	8%	6%	9%	12%	
Education					
Primary school or less	48%	48%	33%	56%	$\chi^2 = 9.831^{**}$
Secondary school (S1–S6)	41%	40%	46%	38%	
Some university or higher	12%	12%	21%	6%	
Currently working	65%	63%	68%	65%	$\chi^2 = 0.351$
Owns home	42%	48%	36%	36%	$\chi^2 = 4.229$
Have children	93%	96%	96%	91%	$\chi^2 = 3.148$
Mean CD4 (range)	224 (2–472)	227 (2–455)	223 (3–426)	219 (11–472)	$F = 0.158$
AIDS diagnosis	41%	43%	43%	38%	$\chi^2 = 0.575$
Relationship characteristics					
Married	88%	90%	89%	85%	$\chi^2 = 1.577$
Length of relationship:					
12 months or less	9%	7%	11%	9%	$\chi^2 = 4.360$
1–5 years	24%	19%	26%	29%	
6 years or greater	67%	74%	64%	62%	
Non-disclosure of HIV status to partner	19%	3%	13%	42%	$\chi^2 = 56.552^{**}$
Extramarital sex in past 6 months	7%	5%	9%	10%	$\chi^2 = 2.616$
Had sexual intercourse with partner in last month	71%	67%	72%	76%	$\chi^2 = 2.264$
Unprotected sexual intercourse with partner in last month <sup>a</sup>	54%	49%	56%	60%	$\chi^2 = 1.859$
Unprotected sexual intercourse with partner in last 6 months	66%	66%	57%	70%	$\chi^2 = 2.393$

\*\* Indicate differences across couple type at  $P < 0.05$  level

<sup>a</sup> Among those who reported sexual intercourse with main partner in past month

month (29 vs. 49%;  $\chi^2 = 4.53$ ,  $P < 0.05$ ); findings were similar within each of the three subgroups of participants (data not shown in the table).

Similar to reports of condom use over the past month, 80% of the sample reported either “never” or “always” using condoms with their partner over the past 6 months; hence, this variable was dichotomized to indicate whether or not condoms were always used. Sixty-six percent of the total sample reported unprotected sexual intercourse with their partner over the past 6 months, with rates ranging from 57% among participants with serodiscordant partners to 70% among those with unknown status partners (see Table 1). Participants who were diagnosed with HIV less than 6 months ago ( $n = 83$ ) were less likely to report always using condoms over the past 6 months compared to

those who knew their HIV status throughout the 6 months (24 vs. 44%;  $\chi^2 = 12.24$ ,  $P < 0.001$ ); findings were similar regardless of the HIV status of the partner (data not shown in the table).

#### Correlates of Unprotected Sexual Intercourse by HIV Status of Partner

Results of the bivariate analysis of correlates of unprotected sex over the past 6 months for the total sample are listed in Table 2; results for each of the three subgroups of participants are listed in Table 3. Variables within each conceptual domain (background and demographics, physical and mental health, social environment and support, social adjustment to HIV, self-efficacy) were associated

**Table 2** Correlates of condom use (always vs. not always) with partner in the past 6 months for total sample ( $N = 258$ )

	Condom use		Test statistic
	Always (88)	Not (170)	
<b>Demographics</b>			
Age of participant	34.9	34.3	$t = -0.597$
Age of partner	35.3	35.8	$t = 0.455$
Male gender	44%	40%	$\chi^2 = 0.445$
Primary education or less	49%	50%	$\chi^2 = 0.875$
Kampala clinic (urban)	27%	52%	$\chi^2 = 14.817^{**}$
Months since HIV test	20.8	15.5	$t = -1.478$
HIV test <6 months ago	34%	57%	$\chi^2 = 12.238^{**}$
Church attendance	4.01	3.44	$t = -4.880^{**}$
Currently working	69%	62%	$\chi^2 = 1.442$
No financial savings	26%	50%	$\chi^2 = 15.991^{**}$
<b>Health</b>			
Physical health	81.16	75.05	$t = -2.380^{**}$
AIDS diagnosis	31%	45%	$\chi^2 = 5.146^{**}$
CD4 count	237	213	$t = -1.640$
Libido	2.01	1.60	$t = -2.711^{**}$
Depression	3.67	5.30	$t = 3.791^{**}$
Alcohol use	22%	26%	$\chi^2 = 0.579$
<b>Social environment</b>			
Social support	3.44	3.38	$t = -0.451$
Discrimination	1.11	1.22	$t = 1.670^*$
Peer community support	3.57	3.21	$t = -4.340^{**}$
<b>Social adjustment</b>			
No disclosure (friends)	26%	28%	$\chi^2 = 0.205$
No disclosure (family)	14%	15%	$\chi^2 = 1.197$
No disclosure (partner)	14%	20%	$\chi^2 = 1.655$
Internalized HIV stigma	2.02	2.54	$t = 4.589^{**}$
Prevention advocacy	3.59	3.13	$t = -5.266^{**}$
<b>Self-efficacy</b>			
General self-efficacy	8.16	7.92	$t = -1.732^*$
Condom self-efficacy	8.83	6.51	$t = -6.414^{**}$

$N$  is less than 272 due to missing data from sexual behavior assessment

with unprotected sex at a statistically significant ( $P < 0.05$ ) level. Among the demographic and background characteristics, greater likelihood of unprotected sex was associated with: attending the Kampala clinic among participants with seroconcordant and serodiscordant partners, and the total sample; testing HIV-positive less than 6 months ago and less church attendance among participants with seroconcordant and unknown status partners as well as the total sample; and having no financial savings among participants with seroconcordant partners and the total sample.

Several measures of physical and mental health were correlates of unprotected sex in both seroconcordant and serodiscordant couples, as well as the total sample; these

included lower physical health functioning, lower libido, and greater depression. Having an AIDS diagnosis was associated with unprotected sex among serodiscordant couples and the total sample. Lower CD4 count was associated with unprotected sex in only serodiscordant couples. Lower support and sense of community from other HIV clients at the clinic was associated with having unprotected sex among participants with seroconcordant and serodiscordant partners as well as the total sample, and greater HIV discrimination was a correlate among participants with seroconcordant partners. Higher internalized HIV stigma was associated with having unprotected sex among participants with seroconcordant and unknown status partners, as well as the total sample, while prevention advocacy was a correlate among all three subgroup of participants and the total sample. Finally, lower general self-efficacy was associated with unprotected sex only among participants with seroconcordant partners, whereas condom use self-efficacy was a correlate among participants with seroconcordant and unknown status partners, as well as the total sample.

#### Multivariate Analysis of Correlates of Unprotected Sex

Correlates of unprotected sex in the bivariate analysis (at  $P < 0.05$  level) with regard to the total sample and in at least one of the three subgroups of participants were entered into the regression model to predict unprotected sex over the past 6 months. These variables included clinic location, recent HIV testing, church attendance, financial savings, physical health functioning, CD4 count, libido, depression, peer community support, internalized HIV stigma, HIV prevention advocacy, and condom use self-efficacy. CD4 count was included instead of AIDS diagnosis, because the latter overlaps with CD4 count and physical health. Gender was also included in the models because of its documented association to condom use in other research involving couples. Lastly, HIV status of the participant's partner was added to the model involving the total sample.

Table 4 lists the results of the logistic regression models for predicting unprotected sex among the total sample and participants with HIV seroconcordant and unknown status partners. Note that the recent HIV testing variable was dropped from the model with participants who had unknown status partners because its inclusion resulted in the model no longer fitting the data—likely due to the small sample size creating instability in the model. The Hosmer and Lemeshow statistic indicated that there was no evidence of lack of fit for any of the models ( $P$  values of 0.28–0.93). The Nagelkerke  $R^2$  ranged from 0.45 to 0.51, indicating moderate predictive power across all of the models.

**Table 3** Correlates of condom use (always vs. not always) with partner in the past 6 months by subgroup ( $N = 258$ )

	HIV+			HIV–			Unknown		
	Always (41)	Not (79)	Test statistic	Always (19)	Not (25)	Test statistic	Always (28)	Not (66)	Test statistic
<b>Demographics</b>									
Age of participant	35.5	34.3	$t = -0.843$	34.5	35.2	$MW = 218.5$	34.5	34.1	$t = -0.218$
Age of partner	35.9	37.7	$t = 1.120$	33.3	33.8	$MW = 229.5$	35.7	34.2	$t = -0.796$
Male gender	44%	34%	$\chi^2 = 1.089$	58%	60%	$\chi^2 = 0.020$	36%	39%	$\chi^2 = 0.113$
Primary education or less	45%	52%	$\chi^2 = 0.835$	33%	32%	$\chi^2 = 1.508$	65%	55%	$\chi^2 = 2.168$
Kampala clinic (urban)	24%	49%	$\chi^2 = 6.970^{**}$	26%	60%	$\chi^2 = 4.940^{**}$	32%	53%	$\chi^2 = 3.445^*$
Months since HIV test	24.0	17.2	$t = -1.304$	18.6	8.3	$MW = 176.5$	17.6	16.1	$t = -0.237$
HIV test <6 months ago	27%	52%	$\chi^2 = 6.908^{**}$	47%	68%	$\chi^2 = 1.901$	36%	59%	$\chi^2 = 4.305^{**}$
Church attendance	4.10	3.47	$t = -3.852^{**}$	3.79	3.32	$MW = 171.5^*$	4.04	3.45	$t = -2.775^{**}$
Currently working	73%	58%	$\chi^2 = 2.595$	74%	60%	$\chi^2 = 0.900$	61%	67%	$\chi^2 = 0.306$
No financial savings	24%	56%	$\chi^2 = 10.688^{**}$	21%	36%	$\chi^2 = 1.159$	32%	49%	$\chi^2 = 2.135$
<b>Health</b>									
Physical health	84.15	72.26	$t = -3.292^{**}$	83.77	68.67	$MW = 153.0^{**}$	75.00	80.81	$t = 1.385$
AIDS diagnosis	32%	47%	$\chi^2 = 2.542$	21%	56%	$\chi^2 = 5.454^{**}$	36%	39%	$\chi^2 = 0.113$
CD4 count	251	215	$t = -1.815^*$	270	178	$MW = 143.0^{**}$	195	223	$t = 1.036$
Libido	2.14	1.68	$t = -2.038^{**}$	2.53	1.12	$MW = 81.5^{**}$	1.46	1.68	$t = 0.862$
Depression	3.32	5.20	$t = 2.957^{**}$	3.89	6.80	$MW = 134.0^{**}$	4.04	4.85	$t = 1.133$
Alcohol use	24%	22%	$\chi^2 = 0.128$	11%	28%	$\chi^2 = 2.026$	25%	30%	$\chi^2 = 0.270$
<b>Social environment</b>									
Social support	3.56	3.24	$t = -1.664^*$	3.68	3.48	$MW = 217.5$	3.11	3.52	$t = 1.533$
Discrimination	1.05	1.19	$t = 2.053^{**}$	1.06	1.21	$MW = 205.5$	1.23	1.26	$t = 0.187$
Peer community support	3.60	3.23	$t = -3.098^{**}$	3.79	3.16	$MW = 118.5^{**}$	3.38	3.21	$t = -1.091$
<b>Social adjustment</b>									
No disclosure (friends)	20%	20%	$\chi^2 = 0.462$	21%	24%	$\chi^2 = 0.729$	39%	38%	$\chi^2 = 0.440$
No disclosure (family)	10%	16%	$\chi^2 = 3.851$	16%	8%	$\chi^2 = 0.821$	18%	17%	$\chi^2 = 0.060$
No disclosure (partner)	0%	3%	$\chi^2 = 1.056$	16%	13%	$\chi^2 = 0.096$	32%	44%	$\chi^2 = 1.136$
Internalized HIV stigma	1.89	2.50	$t = 3.957^{**}$	2.19	2.76	$MW = 173.0$	2.08	2.50	$t = 2.129^{**}$
Prevention advocacy	3.69	3.15	$t = -4.623^{**}$	3.61	3.13	$MW = 152.0^{**}$	3.44	3.11	$t = -2.019^{**}$
<b>Self-efficacy</b>									
General self-efficacy	8.19	7.79	$t = -2.029^{**}$	8.45	8.41	$MW = 227.0$	7.93	7.88	$t = -0.179$
Condom self-efficacy	8.66	6.38	$t = -4.091^{**}$	9.32	7.72	$MW = 198.5$	8.75	6.20	$t = -4.141^{**}$

\*  $P$  value < 0.10, \*\*  $P$  value < 0.05 $N$  is less than 272 due to missing data from sexual behavior assessment $MW$  Mann–Whitney  $U$  test

In the analysis of the total sample, condom use self-efficacy was the only significant independent predictor, with HIV testing less than 6 months ago, church attendance, peer community support, depression and HIV prevention advocacy all being marginally significant. All of these predictors, except depression, increased the odds of

condom use. A unit increase in condom use self-efficacy increased the odds of condom use by a factor of 1.53. A unit increase in recent HIV testing, church attendance, peer community support and HIV prevention advocacy increased the odds of condom use by a factor of 1.99, 1.58, 1.62 and 1.79, respectively; a unit increase in depression

**Table 4** Multivariate logistic regression for always using condoms in the past 6 months in total sample and among participants with seroconcordant and serostatus unknown partners

	Total Sample ( <i>n</i> = 258) OR (CI)	HIV Seroconcordant ( <i>n</i> = 120) OR (CI)	HIV Status Unknown ( <i>n</i> = 94) OR (CI)
Male gender	1.26 (0.60–2.62)	1.88 (0.56–6.25)	0.92 (0.24–3.50)
Kampala clinic (urban)	0.42 (0.11–1.58)	1.13 (0.10–13.32)	0.96 (0.08–11.06)
Church attendance	1.58 (0.96–2.59)	1.73 (0.65–4.61)	3.21 (1.14–9.02)
No savings	0.60 (0.18–2.02)	1.47 (0.19–11.70)	0.88 (0.11–7.04)
Recent HIV testing	1.99 (1.00–3.97)	1.73 (0.57–5.26)	–
Physical health	0.99 (0.98–1.01)	1.01 (0.98–1.05)	0.96 (0.92–1.00)
CD4 count	1.25 (0.61–2.55)	1.73 (0.53–5.64)	1.51 (0.41–5.53)
Libido	0.78 (0.56–1.10)	0.58 (0.33–1.04)	0.60 (0.30–1.20)
Depression	0.90 (0.80–1.02)	0.91 (0.77–1.08)	0.91 (0.69–1.20)
Peer community support	1.62 (0.93–2.82)	1.13 (0.46–2.77)	1.48 (0.56–3.92)
Internalized HIV stigma	0.76 (0.46–1.24)	0.53 (0.24–1.19)	0.53 (0.19–1.45)
HIV prevention advocacy	1.79 (0.93–3.44)	2.26 (0.73–6.97)	1.70 (0.46–6.32)
Condom self-efficacy	1.53 (1.31–1.78)	1.52 (1.22–1.88)	1.65 (1.22–2.21)
Serodiscordant partner	1.57 (0.61–4.06)	–	–
Unknown status partner	1.10 (0.52–2.31)	–	–
Hosmer & Lemeshow $\chi^2$	9.841 (df = 8, <i>P</i> = 0.276)	3.140 (df = 8, <i>P</i> = 0.925)	7.959 (df = 8, <i>P</i> = 0.437)

\* *P* value < 0.10, \*\* *P* value < 0.05

decreased the odds of condom use by a factor of 0.90. (Note that the continuous variables are measured on different response scales, so that a unit change in the independent variable has different scientific implication across the measures).

Among participants with seroconcordant partners, condom use self-efficacy was the only significant independent predictor, with libido being marginally significant. A unit increase in the condom use self-efficacy scale increased the odds of condom use by a factor of 1.52, while a unit increase in libido decreased the odds of condom use by a factor of 0.58. Among participants where the partner's HIV status is unknown, church attendance, condom use self-efficacy and physical health functioning were significant independent predictors; a unit increase in condom use self-efficacy and church attendance increased the odds of condom use by factors of 1.65 and 3.21, respectively, while a unit increase in HIV physical functioning decreased the odds of condom use by a factor of 0.96. Note that the confidence bands around the regression coefficients are large, warranting an emphasis on these findings as being exploratory. However, we also note that even large odds ratios with sizeable effect sizes were only marginally significant, likely due to lack of power.

## Discussion

This is one of the first studies to conduct a comprehensive examination of the multidimensional determinants of

condom use among HIV clients in stable relationships in Africa. Nearly half of the study participants reported that their spouse was also HIV-infected, leaving the other half with partners who were either HIV-negative or of unknown HIV status (or not tested for HIV), and thus at high risk for HIV transmission. High levels of unprotected sex within the couple were reported by participants regardless of the HIV status of the partner. One might expect higher rates of unprotected sex among HIV seroconcordant couples and more condom use among serodiscordant and unknown status couples, yet most participants (50–70%) in all three types of couples reported unprotected sexual intercourse with their partner. These rates are at the high end of the range reported in other studies of unprotected sex among individuals [9, 16] and couples living with HIV [9, 10] in Sub-Saharan Africa.

HIV disclosure to one's partner was highly prevalent among participants who had an HIV-positive (97%) or HIV-negative (87%) partner, but participants who had a partner of unknown HIV status were much less likely to have disclosed their HIV status (58%). Not disclosing one's HIV status likely contributes to the partner not getting HIV-tested (and thus having unknown HIV-status), and may be indicative of less overall communication about health and sexual risk in the relationship. The other variable that differentiated the three subgroups of participants was gender, with the study participant much more likely to be male if the partner's HIV status was seronegative rather than seropositive or unknown. This gender difference may



reflect a power differential between men and women in Ugandan culture [18], with men being more likely to enter relationships with healthy, uninfected partners, despite the economic and social disadvantages of their HIV status.

Our exploration of the determinants of unprotected sex within stable relationships was guided largely by Social Cognitive Theory, [19] which views behavior, personal factors (cognitive, affective and biological) and the social and cultural environment as influencing one another. Consistent with this framework, our evaluation included assessments of demographic and socioeconomic characteristics, physical and mental health, social and community support, social adjustment to HIV, and confidence in being able to use condoms. Condom use self-efficacy was the strongest independent predictor of whether participants used condoms with their spouse or main partner when other variables were controlled for in the multivariate analysis, which is not surprising given that it is consistently associated with heterosexual condom use [27] and might even be considered a proxy. With condom self-efficacy being so closely linked to actual condom use, most of the correlates of condom use mentioned in this paper may also influence self-efficacy. However, some prevention interventions are aimed more directly at improving confidence and motivation to use condoms; these strategies include methods for eroticizing condoms to increase the sense of sexual pleasure experienced with condoms, and mitigating fears that proposing condom use is a sign of mistrust or infidelity by reinforcing the concept that condom use is an expression of love and commitment to the health and safety of one's partner and the relationship [28, 29].

Among background and demographic characteristics, a key variable to examine was the timing of when individuals became aware of their HIV status. Those who tested only recently and did not know their serostatus for the entire period of the condom use assessment (past month or 6 months) were much less likely to report always using condoms with their partner, regardless of the HIV status of the partner. While these findings reveal that knowledge of HIV status is strongly related to condom use, it is striking that participants who were fully aware of their HIV infection were just as likely to not use condoms with their partner as they were to use condoms, even if the partner's HIV status was seronegative or unknown. HIV testing is widely thought to contribute to HIV prevention and safe sex [30], but clearly knowledge of one's HIV status and ability to transmit the virus is not sufficient in and of itself to prevent risk behavior.

Those who attended the Kampala clinic and largely resided in an urban setting were more likely to report unprotected sex, compared to those living in and around the rural setting of Kakira. This finding is contrary to other studies that have shown that urban residence is associated

with higher condom use [15], and may suggest that other factors that differentiate these clinic sites may be more relevant to condom use. For example, Kakira is located within a sugar cane plantation and thus affords greater opportunities for work and financial saving, both of which were more common among those attending the Kakira clinic, and having savings was associated with a greater likelihood of always using condoms in bivariate analysis. Other studies have shown that economic independence and empowerment contribute to an ability to negotiate for the use of condoms, particularly among women [18]. Accordingly, interventions that combine income generating activities, entrepreneurial skills training, or microfinance with HIV prevention strategies are beginning to emerge and show promise [31]. It should also be noted that free condoms were widely available at both sites; therefore, all participants at both sites had ready access to condoms. Attendance at church is the other background characteristic that was associated with condom use, with participants who attended church more often being more likely to always use condoms when having sex with their partner, as has been shown in other studies [32].

Lower physical health functioning and lower CD4 count were associated with a greater likelihood of not using condoms in bivariate analysis, but in the regression analysis better physical health was associated with increased odds of unprotected sex among participants who did not know their partner's HIV status, which is consistent with other studies showing that better physical health is associated with increased sexual activity and less condom use [33]. The somewhat limited range of physical health and CD4 count that is present in our sample, as a function of the study's eligibility criteria, may contribute to these mixed findings. Similarly, lower libido was associated with less condom use in bivariate analysis, but in the multivariate analysis greater libido was marginally associated with unprotected sex (among those with seroconcordant partners). The change of direction of the relationships to unprotected sex in the multivariate analysis suggests that other confounding variables are involved in determining the influence of variables such as physical health and libido, which are at least somewhat accounted for in the regression models. To the extent that physical health and disease progression influence sexual risk taking, it is important to better understand the impact of ART on sexual behavior. Analysis of our follow-up data will enable us to examine whether improved physical health and immune status associated with ART will be accompanied by changes in condom use.

Our finding in bivariate analysis that depression was associated with a lower likelihood of always using condoms is consistent with studies of HIV-infected individuals in Africa [16, 34] and serodiscordant couples [35] in the

United States. Evidence that depression is associated with sexual risk behavior, as well as poor ART adherence and clinical outcomes [36, 37], suggests the need for mental health care to have a greater emphasis in HIV care and for policy makers and donors to support augmenting ART and HIV care with mental health services.

Greater peer community support from other clients at the clinic, less internalized stigma and greater advocacy for prevention among one's social network, were all associated with an increased likelihood of always using condoms in bivariate analysis and are consistent with other studies showing an association between HIV stigma, low social support and sexual risk behavior [38–40]. These findings suggest the importance of a social environment that enables people living with HIV to gain self-acceptance and self-esteem, and to feel part of a supportive community, which serve to motivate and empower individuals and couples to engage in health behaviors including condom use and perhaps also be agents for prevention in their social networks. It is surprising that disclosure of HIV status was not associated with condom use in this study, in contrast to the findings of other research [15–17]; we plan to further explore disclosure and its determinants in the study sample in future analyses.

We expected that variables influencing condom use in couples at high risk for HIV transmission (HIV status of partner is seronegative or unknown) would be different from the variables that influence condom use among seroconcordant couples. Yet, the correlates of unprotected sex in the bivariate analysis were fairly consistent regardless of the HIV status of the participant's partner. A possible explanation for this finding is that factors and dynamics that influence condom use in couples may be generalizable to most couples. While couples may or may not live with the risk of HIV transmission, many of the potential risks (sexually transmitted diseases, unwanted pregnancy) and benefits (childbearing) of unprotected sex are relevant to all couples living with HIV.

There are several limitations to this exploratory study. One is its reliance on the study participant's self-report of the HIV status of his/her partner. However, the perception or belief about the HIV status of one's partner is arguably most important when considering what influences behavior and condom use decisions. Nonetheless, data collected directly from the participants' spouses or partners would have strengthened our data and allowed us to analyze couple-level data. Other limitations include the small sample size and limited power to assess condom use correlates within each participant subgroup, lack of generalizability of the findings given the nonrandom nature of the sample and that all participants are receiving HIV care, and the inability to infer causality given the cross-sectional nature of the data.

In summary, these findings reveal a high prevalence of unprotected sexual intercourse among HIV clients in stable relationships with partners regardless of the HIV status of the partner, providing further evidence of the need for prevention interventions that specifically target couples. For interventions to be effective, knowledge of the multi-dimensional factors and complexities that contribute to sexual risk behavior in at-risk couples is imperative. This exploratory analysis suggests that socioeconomic characteristics, knowledge of HIV status, physical and mental health, peer community support, psychosocial adjustment to HIV and self-efficacy may all play a role in understanding the dynamics and context in which couples make condom use decisions. Further research using health behavior frameworks such as Social Cognitive Theory are needed to further delineate these relationships and potential targets for intervention.

**Acknowledgements** We would like to thank the study coordinators (Tonny Kizza, Joseph Bebe, Mark Magina), the clinic directors (Drs. William Tamale and Grace Namayanja), nurse Erina Turya, and counselors (Hellen Nakyambadde, Rose Byaruhanga, Grace Barungi) who helped to identify and refer participants, and the client participants who gave so generously of their time and their personal information. This research is supported by a grant from the Rockefeller Foundation (Grant No. HE 007; PI: G. Wagner).

## References

1. United Nations Programme on HIV/AIDS (UNAIDS). Towards universal access: scaling up priority HIV/AIDS interventions in the health sector. *Progress Report*, 2008.
2. Uganda AIDS Commission (UAC). The Uganda HIV modes of transmission and prevention response analysis. Kampala, Uganda: UAC; 2009.
3. de Walque D. Sero-discordant couples in five African countries: implications for prevention strategies. *Popul Dev Rev*. 2007; 33(3):501–23.
4. Bunnell R, Ekwaru JP, Solberg P, et al. Changes in sexual behavior and risk of HIV transmission after antiretroviral therapy and prevention interventions in rural Uganda. *AIDS*. 2006;20(1): 85–92.
5. Dunkle KL, Stephenson R, Karita E, et al. New heterosexually transmitted HIV infections in married or cohabiting couples in urban Zambia and Rwanda: an analysis of survey and clinical data. *Lancet*. 2008;371(9631):2183–91.
6. Crepaz N, Lyles CM, Wolitski RJ, et al. Do prevention interventions reduce HIV risk behaviours among people living with HIV? A meta-analytic review of controlled trials. *AIDS*. 2006;20(2):143–57.
7. Gordon CM, Stall R, Cheever LW. Prevention interventions with persons living with HIV/AIDS: challenges, progress, and research priorities. *J Acquir Immune Defic Syndr*. 2004;37(Suppl 2):S53–7.
8. Desgrees-du-Lou A, Orne-Gliemann J. Couple-centred testing and counselling for HIV serodiscordant heterosexual couples in sub-Saharan Africa. *Reprod Health Matters*. 2008;16(32):151–61.
9. Eisele TP, Mathews C, Chopra M, et al. Changes in risk behavior among HIV-positive patients during their first year of antiretroviral therapy in Cape Town South Africa. *AIDS Behav*. 2009;13:1097–1105.

10. Kamenga M, Ryder RW, Jingu M, et al. Evidence of marked sexual behavior change associated with low HIV-1 seroconversion in 149 married couples with discordant HIV-1 serostatus: experience at an HIV counselling center in Zaire. *AIDS*. 1991;5(1):61–7.
11. Brou H, Agbo H, Desgrees Du Lou A. Impact of HIV counseling and testing during antenatal consultation for HIV-women in Abidjan (Cote d'Ivoire): a quantitative and qualitative study (Ditrane Plus 3 project, ANRS 1253). *Sante*. 2005;15(2):81–91.
12. Maharaj P, Cleland J. Risk perception and condom use among married or cohabiting couples. *Int Fam Plan Perspect*. 2005;31(1):24–9.
13. Bauni E, Jarabi BO. The low acceptability and use of condoms within marriage: evidence from Nakuru District, Kenya. *Etude Popul Afr*. 2003;18(1):51–65.
14. Nebie Y, Meda N, Leroy V, et al. Sexual and reproductive life of women informed of their HIV seropositivity: a prospective cohort study in Burkina Faso. *J Acquir Immune Defic Syndr*. 2001;28(4):367–72.
15. Lurie M, Pronyk P, DeMoor E, et al. Sexual behaviour and reproductive health among HIV-infected patients in urban and rural South Africa. *J Acquir Immune Defic Syndr*. 2008;47(4):484–93.
16. Olley BO, Seedat S, Gxamza F, Reuter H, Stein DJ. Determinants of unprotected sex among HIV-positive patients in South Africa. *AIDS Care*. 2005;17(1):1–9.
17. Eisele TP, Mathews C, Chopra M, et al. High levels of risk behavior among people living with HIV initiating and waiting to start antiretroviral therapy in Cape Town South Africa. *AIDS Behav*. 2008;12(4):570–7.
18. MacLachlan E, Neema S, Luyirika E, et al. Women, economic hardship and the path of survival: HIV/AIDS risk behavior among women receiving HIV/AIDS treatment in Uganda. *AIDS Care*. 2009;21(3):355–67.
19. Bandura A, Bandura A. Social foundations of thought and action: a social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall Inc; 1986.
20. NIMH Multisite HIV/STD Prevention Trial for African American Couples Group. Eban HIV/STD risk reduction intervention: conceptual basis and procedures. *J Acquir Immune Defic Syndr*. 2008;49:S15–S27.
21. Grosh M, Glewwe P. Designing household survey questionnaires for developing countries: lessons from 15 years of the living standards measurement study, vol 1, 2, and 3. The World Bank; 2000.
22. Mast TC, Kigozi G, Wabwire-Mangen F, et al. Measuring quality of life among HIV-infected women using a culturally adapted questionnaire in Rakai district, Uganda. *AIDS Care*. 2004;16(1):81–94.
23. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606–13.
24. Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG. The alcohol use disorders identification test: guidelines for use in primary care. 2nd ed. Geneva: World Health Organization; 2001.
25. Berger BE, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: psychometric assessment of the HIV stigma scale. *Res Nurs Health*. 2001;24(6):518–29.
26. Kalichman SC, Simbayi LC, Jooste S, et al. Development of a brief scale to measure AIDS-related stigma in South Africa. *AIDS Behav*. 2005;9(2):135–43.
27. Sheeran P, Abraham C, Orbell S. Psychosocial correlates of heterosexual condom use: a meta-analysis. *Psychol Bull*. 1999;125(1):90–132.
28. Pivnick A. HIV infection and the meaning of condoms. *Cult Med Psychiatry*. 1993;17(4):431–53.
29. Wingood GM, DiClemente RJ. Application of the theory of gender and power to examine HIV-related exposures, risk factors, and effective interventions for women. *Health Educ Behav*. 2000;27(5):539–65.
30. Glick P. Scaling up HIV voluntary counseling and testing in Africa: what can evaluation studies tell us about potential prevention impacts? *Eval Rev*. 2005;29(4):331–57.
31. Dworkin SL, Blankenship K. Microfinance and HIV/AIDS prevention: assessing its promise and limitations. *AIDS Behav*. 2009;13(3):462–9.
32. Trinitapoli J, Regnerus M. religious involvement and HIV risk: initial results from a panel study of rural malawians. Population Association of America Annual Meeting, Philadelphia, PA; 2004.
33. Stolte IG, Dukers NH, de Wit JB, Fennema JS, Coutinho RA. Increase in sexually transmitted infections among homosexual men in Amsterdam in relation to HAART. *Sex Transm Infect*. 2001;77(3):184–6.
34. Smit J, Myer L, Middelkoop K, et al. Mental health and sexual risk behaviours in a South African township: a community-based cross-sectional study. *Public Health*. 2006;120(6):534–42.
35. Kennedy CA, Skurnick J, Wan JY, et al. Psychological distress, drug and alcohol use as correlates of condom use in HIV-serodiscordant heterosexual couples. *AIDS*. 1993;7(11):1493–9.
36. Ammassari A, Antinori A, Aloisi MS, et al. Depressive symptoms, neurocognitive impairment, and adherence to highly active antiretroviral therapy among HIV-infected persons. *Psychosomatics*. 2004;45(5):394–402.
37. Paterson DL, Swindells S, Mohr J, et al. Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. *Ann Intern Med*. 2000;133(1):21–30.
38. Parker RG, Easton D, Klein CH. Structural barriers and facilitators in HIV prevention: a review of international research. *AIDS*. 2000;14(Suppl 1):S22–32.
39. Skinner D, Mfecane S. Stigma, discrimination and its implications for people living with HIV/AIDS in South Africa. *SAHARA J*. 2005;1(3):157–64.
40. Adih WK, Alexander CS. Determinants of condom use to prevent HIV infection among youth in Ghana. *J Adolesc Health*. 1999;24(1):63–72.