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Barriers to consistent and correct condom use among heterosexual serodiscordant couples in Zambia and Rwanda

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# Barriers to consistent and correct condom use among heterosexual HIV discordant couples in Zambia and Rwanda

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Abstract

Barriers to consistent and correct condom use among heterosexual HIV discordant couples in Zambia and Rwanda

By: Kathy Marie Hageman, MPH

**Background:** An estimated 43-93% of new HIV infections in Africa occur within cohabiting adults. The negative partner in a sexually active heterosexual serodiscordant couple is at risk for HIV infection unless safe sex practices are applied; specifically, consistent and correct condom use (CCCU). The aim of this study was three-fold: to explore the behavioral influences upon the successful management of CCCU; to assess the prevalence of supportiveness towards condom use and identify predictors for couple-level supportiveness; and to investigate the desire for children and attempted pregnancy techniques.

**Methods:** A mixed-method study was conducted. First, a qualitative study was conducted from June to August 2006 in Lusaka, Zambia. Eight focus groups were conducted by sex and serostatus. The modified constant comparison method guided the data analyses. Next, a cross-sectional study was conducted from April to August 2009 among couples in Kigali, Rwanda (n=198) and Lusaka, Zambia (n=485). Men and women were interviewed separately. Data analyses included descriptive, bivariate, and multivariate logistic regression analysis along with Cohen's kappa and p-value, and conditional probability.

**Results:** The most common barrier to CCCU identified in the qualitative study was the husband's forced unprotected sex with his wife. The most common reported supportive influence was assertiveness by the wife. For the second-phase of the study, only 67.4%

of Rwandan couples and 54.0% of Zambian couples had two supportive partners. Predictors for couple-level supportiveness included individual, couple, and socio-cultural factors. The desire for children was reported by up to one-third of individuals and current condom use interruption for pregnancy attempts was reported by up to one-third of desiring couples yet couples' knowledge of a woman's fertility cycle was extremely low. **Conclusions:** The investigation of individual, couple, and socio-cultural factors that disrupt CCCU is a critical next step in the development of HIV prevention. Consideration is needed to develop problem-solving strategies and safer sex hierarchies. Likewise, reproductive counseling for HIV-affected couples continues to be a critical unmet need. A systematic and theory-driven investigation of couple-level prevention strategies for CCCU is needed to develop sustainable techniques and the establishment of sero-specific norms for this unique population.

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## Table of Contents

## LIST OF FIGURES



## LIST OF TABLES

# Chapter #1:

## Introductory Literature Review

Sub-Saharan Africa has the highest HIV seroprevalence rates in the world accounting for 67% of HIV infections worldwide and 68% of new infections among adults (UNAIDS & World Health Organization, 2009). Heterosexual transmission continues to be the primary mode of infection and an estimated 43 to 93% of HIV transmissions in Africa occur within cohabiting adults (Dunkle et al., 2008; Gelman, Kenya, Oguya, Cheluget, & Haile, 2009; Mngadi et al., 2009; Wabwire-Mangen, Odiit, Kirungi, Kisitu, & Wanyama, 2009). Few prevention programs have considered this reality (Amaro, 1995; McKenna et al., 1997). In the capital city of Kigali, Rwanda, 6.7% of adults and 10.3% of couples are HIV-affected (Institut National de la Statistique du Rwanda & ORC Macro, 2006). In the capital city of Lusaka, Zambia, 20.8% of adults and 33.6% of couples are HIV-affected (Central Statistical Office, Ministry of Health, Tropical Diseases Research Centre, University of Zambia, & and Macro International, 2009). In both cities, more than one-half of HIV-affected couples are serodiscordant meaning that one partner is HIV positive and the other negative.

Among couples knowledgeable of their HIV serodiscordant status and who are sexually active, the maintenance of consistent and correct condom use is the primary behavioral prevention option. Yet, not all couples are able to adopt consistent risk reduction behaviors to prevent transmission to the negative partner (Allen et al., 2003; Bunnell et al., 2005; VanDevanter, Thacker, Bass, & Arnold, 1999).

The question arises to gain a better understanding of the factors that impact a couple HIV risk reduction. In the context of stable cohabiting relationships, little is known regarding the circumstances that influence the maintenance of long-term condom use and how it is impacted by individual characteristics, couple dynamics, and socio-cultural factors.

**Sub-Saharan Africa continues to bear a disproportionate burden of the AIDS epidemic, particularly among urban populations**

People residing in Sub-Saharan Africa experience more new infections than any other region in the world and two-thirds of all HIV positive persons reside in this geographic area (UNAIDS & World Health Organization, 2009). Heterosexual transmission continues to be the primary mode of infection. The region has the largest percentage of HIV-infected women and women at-risk of HIV, many of whom are married and residing in pro-natalist countries. National HIV estimates for Rwanda and Zambia report strikingly higher urban HIV prevalence than rural areas (Central Statistical Office, et al., 2009; Institut National de la Statistique du Rwanda & ORC Macro, 2006). In the capital city of Kigali, Rwanda, 7% of the adult population is living with HIV, two to three times higher than other areas in the country (Institut National de la Statistique du Rwanda & ORC Macro, 2006). Among pregnant women in Kigali, 13% are HIV positive compared to 3% in other areas of the country. In Lusaka, Zambia, 22% of the adult population is living with HIV, nearly double of rural populations (Central Statistical Office, Central Board of Health, & ORC Macro, 2003). Among pregnant women in Lusaka, 25 to 28% are living with HIV compared to 11% of their rural counterparts (Central Statistical Office, et al., 2003; Sandoy, Kvale, Michelo, & Fylkesnes, 2006)

**Cohabiting couples are the largest risk group for HIV infection in sub-Saharan Africa**

Each year, it is estimated that 20 to 25% of African serodiscordant couples who do not know their HIV discordant status transmit the virus to the negative partner (Allen et al., 1992; Hira et al., 1990). Among couples living in Kigali, 10% have either one or both partners living with HIV (Institut National de la Statistique du Rwanda & ORC Macro, 2006). In Lusaka, Zambia, 34% of couples are HIV-affected (Central Statistical Office, et al., 2009). In both cities, more than half of HIV-affected couples are serodiscordant (Central Statistical Office, et al., 2009; Institut National de la Statistique du Rwanda & ORC Macro, 2006).

In addition to a low use of condoms within long-term relationships (Adentunji, 2000; Ali, Cleland, & Shah, 2004; Allen, et al., 1992; Bunnell, et al., 2005; Maharaj & Cleland, 2004), individual desires and cultural pressures for childbearing requires unprotected sex, thus increasing the risk of transmission from the HIV positive partner to the negative partner (Allen, 2005b; Allen, et al., 2003; Bell et al., 2007; Chen, Philips, Kanouse, Collins, & Miu, 2001; Cooper, Harries, Myer, Orner, & Bracken, 2007; Dyer, Abrahams, Hoffman, & van der Spuy, 2002; Frodsham, Boag, Barton, & Gilling-Smith, 2006; Harries et al., 2007; London, Orner, & Myer, 2008; Moyo & Mbizvo, 2004; Myer & Morroni, 2005; Nebie et al., 2001; Paiva et al., 2007; Panozzo, Battegay, Friedl, Vernazza, & Swiss Cohort, 2003; Santos, Ventura-Filipe, & Paiva, 1998; Stephenson & Griffioen, 1996). Although HIV continues to largely be considered a barrier to reproduction by the medical community, numerous studies have found that the desire for children continues to exist among people living with HIV, particularly within sub-

Saharan Africa where a high value is put upon childbearing and parental status (Chen, Philips, Kanouse, Collins, & Miu; Klein, Pena, Thornton, & Sauer, 2003; Nakayiwa et al., 2006; Panozzo, et al., 2003; Ryder et al., 2000; Thornton, Romanelli, & Collins, 2004; VanDevanter, et al., 1999).

**Consistent and correct condom use is the primary behavioral option for sexually active HIV serodiscordant couples yet use is not guaranteed**

Overall, a majority of couples who participate in couples' voluntary counseling and testing (CVCT) adopt the necessary behavior change of consistent and correct condom use to prevent HIV transmission (Allen, et al., 2003; McKenna, et al., 1997; Painter, 2001). Yet, condom use is not always consistent (Bunnell, et al., 2005; VanDevanter, et al., 1999). Among 936 serodiscordant couples in Lusaka, Zambia, who regularly attended quarterly CVCT visits, 26% of couples reported unprotected sex during one 3-month interval, 24% of couples reported unprotected sex during two 3-month intervals, 17% in three of four 3-month intervals, and 10% reported unprotected sex at each follow-up visit (Allen, et al., 2003). Among couples who reported consistent condom use, sperm was present on vaginal smears for 15% of the couples. Likewise, 32% of pregnancies and HIV transmissions occurred among couples that reported perfect compliance. In Rwanda, two years after counseling and testing, 43% of HIV-infected women had a new pregnancy and having less than four children was predictive of pregnancy (Allen, 2005a). Seroconversion among HIV serodiscordant couples in Rwanda and Zambia remains high with approximately 5-7% per year (Fideli et al., 2001). It is unclear why, after mutual knowledge of a serodiscordant status within the partnership and risk reduction counseling, inconsistent condom use occurs. Critical areas

for investigation include what triggers these occasional lapses, which couples are most likely to be affected, and how can such lapses be overcome.

**Greater understanding is needed regarding the behavioral gap between HIV serostatus knowledge and long-term consistent condom use among HIV serodiscordant couples**

There is limited research on the behavioral gap between knowledge of HIV status and sustainable safer sexual practices among serodiscordant couples (Semple, Patterson, & Grant, 2002; Skurnick, Abrams, Kennedy, Valentine, & Cordell, 1998; VanDevanter, et al., 1999). Study findings typically highlight the successful increase of condom use among HIV positive persons and/or at-risk individuals (Jones, Ross, Weiss, Bhat, & Chitalu, 2005; Moore et al., 2001; Wingood et al., 2004) yet most lack the investigation of the behaviors and dynamics regarding the sufficient maintenance of condom use to prevent HIV transmission in long-term relationships. Theoretical HIV behavior change models have been criticized for being individualistic in their application and fail to account for cultural factors and the gendered nature of sexual behaviors and risk reduction (Amaro, 1995; Harvey, 2000). This lack of understanding is further exacerbated by the lack of couples' level reporting (Hunter, Maggwa, Mati, Tukei, & Mbugua, 1994; VanDevanter, et al., 1999). Sexual behavior studies and self-reported data are commonly based upon individual-level reporting and individual risk factors rather than focusing upon both members of the relationship dyad, socio-sexual issues, and couples' communication (Amaro & Raj, 2000; Becker, 1996; Harvey, Beckman, & Doty, 1999; Painter, 2001; Skurnick, et al., 1998). Among the limited number of studies that have assessed couples' responses regarding the sexual relationship in relation to HIV

risk, findings show low agreement and/or inaccurate perceptions relating to the partner and partnership (Becker, 1996; Ellen, Vittinghoff, Bolan, Boyer, & Padian, 1998; Niccolai, Farley, Ayoub, Magnus, & Kissinger, 2002; Seal, 1997).

Reported barriers to condom use among U.S. and international populations knowledgeable of their serostatus and infective risk include partner refusal (Kalichman, 2000; Semple, et al., 2002; Wingood et al., 2004), not asking for a condom to be used (Semple, et al., 2002), alcohol use (Jones, et al., 2005; Kennedy et al., 1993; Marks, Burris, & Peterman, 1999; Schiltz & Sandfort, 2000; Skurnick, et al., 1998; Wingood, et al., 2004), sexual coercion (van der Straten, King, Grinstead, Serufilira, & Allen, 1995), physical violence, distress, and hostility (Kalichman, 2000; Kennedy, et al., 1993; Marks, et al., 1999; Schiltz & Sandfort, 2000; Skurnick, et al., 1998; Wingood, et al., 2004), power differential (Cusick & Rhodes, 2000; Gorbach & Holmes, 2003; Kalichman, 2000; Orubuloye, Caldwell, & Caldwell, 1993), perceptions of responsibility towards protection (Kalichman, 2000; Marks, et al., 1999), desire for children (Malamba et al., 2005; Panozzo, et al., 2003; Schiltz & Sandfort, 2000; Van Devanter, Cleary, Moore, Thacker, & O'Brien, 1998; Wesley, 2005), lack of intimacy (Marks, et al., 1999; Schiltz & Sandfort, 2000), and low perceived risk (Marks, et al., 1999). Identifying the correlates of inconsistent condom use has been an important step in understanding the behavioral challenges of the HIV epidemic. Therefore, the investigation of cultural and gender roles as well as partner and relationship dynamics, may help to understand 'when and why' these lapses occur, yet such investigations have not received serious consideration or integration into intervention planning (Amaro, 1995; Harvey, et al., 1999; Semple, et al., 2002; Skurnick, et al., 1998).

In addition to understanding inconsistent use, there is a need to investigate individual and/or couple-related mechanisms and negotiation techniques currently implemented by serodiscordant couples to prevent unprotected sex (ensuring condom use or the prevention of sex) at times when one partner is being resistant or refusing to use a condom. What prevention models have couples self-identified to work successfully for them?

**Significance of study**

Epidemiological evidence shows that serodiscordant couples contribute a high proportion of incident HIV infections in Africa and the negative partner in a sexually active serodiscordant couple is at continual high risk for HIV infection. Consistent and correct condom use is the primary behavioral option to protect the HIV negative partner from becoming infected. To ensure consistency, condom use requires a lifelong commitment and practice by both partners. The investigation of individual, partnership, and cultural influences that disrupt condom use among long-term condom users is a critical step in the development of HIV prevention for this unique population.

The proposed study is significant and innovative for a number of reasons. This study seeks to: (1) investigate the largely understudied population identified as being at high risk for HIV infection: serodiscordant African couples; (2) distinguish between the multi-levels of individual, couple, and socio-cultural influences upon HIV risk resulting in baseline data for a culturally appropriate HIV risk reduction intervention targeting serodiscordant couples; (3) identify successful prevention methods currently being used by serodiscordant couples to prevent unprotected sex when one of the partners is refusing to use a condom; and (4) build upon a biomedical infrastructure and introduce the

potential of behavioral focused approaches that may contribute to more effective health care utilization and access and policy changes.

**Conceptual framework**

Understanding the determinants of HIV risk for serodiscordant couples requires exploration at multiple levels: individual, couple, and socio-cultural. The conceptual model presented in Figure 1.1 guided the hypotheses and variable selection to facilitate our understanding of how these multi-level determinants either support or disrupt the consistent use of condoms among heterosexual HIV discordant African couples. To bridge the understanding between these multiple levels, an individual-level belief-based theory, Theory of Planned Behavior (TPB) (Montano & Kasprzyk, 2002), has been combined with a social structural theory, Theory of Gender and Power (TGP) (Wingood & DiClemente, 2000) . In addition to the synthesis of two behavioral theories, this model is grounded in a conceptual framework that includes a review of condom use risk reduction literature, past RZHRG studies, and findings a qualitative study. Two primary factors drove the selection of model constructs: (1) supported by behavioral theories and (2) the ability to operationalization items in concordance with the above mentioned previous findings. Both theories have been applied to HIV research in Africa (Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Wingood, 2007) and cultural sensitivity awareness specific to Rwanda and Zambia will be maintained.

The Theory of Planned Behavior focuses upon the individual-level behavior change determinants of attitudes, social normative perceptions, and perceived control (Conner & Armitage, 1998; Montano & Kasprzyk, 2002; Noar, 2007). Based upon TBP's premise that behavioral intention, which is determined by one's attitude towards

the behavior and one's perceptions of whether others approve or disapprove of the behavior (subjective norms), is the most important determinant to behavior change, the success of TPB to explain behavior is dictated by one's perceived control to perform the behavior (Albarracin, et al., 2001; Montano & Kasprzyk, 2002). Findings from a meta-analysis of the TPB and condom use found that (1) the theory is highly successful at predicting condom use when corresponding intentions have been previously formed and (2) interventions that attempted to change attitudes towards condom use were more effective than interventions emphasizing norms and perceived control alone (Albarracin, et al., 2001). This is particularly relevant to the maintenance of consistent use condom use since initial uptake of behavior has occurred. Future research must strive towards the inclusion of attitude-related items in baseline data collection and intervention development (Albarracin, et al., 2001).

The social structure of Gender and Power by Robert Connell has been applied to examine HIV risk factors and postulates that gender-based inequalities and disparities influence women's risk for disease (Wingood, et al., 2000). According to the theory, relationships between men and women can be characterized by three overlapping yet district structures that increase women's health vulnerability: (1) the sexual division of labor, (2) sexual division of power, and (3) social norms and affective attachments. This last structure is defined as the perceived sexual behavior of women characterized by women's emotional and sexual attachments to men that shape men and women's perceptions of women and reality.

An increase of sexual labor division correlates with decreased positive health outcomes for women and as division of power increases so does the negative exposures

and health-related risks experienced by women (Wingood, et al., 2000). As women accept the social norms and beliefs dictating their sexuality and emotional attachments to men, women are more likely to engage in high-risk behavior increasing their exposure and likelihood of adverse health outcomes. As HIV infection in women cannot be separated from the unequal status of women regarding gender, power, norms, and relationships (Amaro, 1995), TGP's inclusion of the dyadic variables of condom use communication and negotiation aids in the investigation of power differentials and cultural issues as determinants of sexual risk (Noar, 2007).

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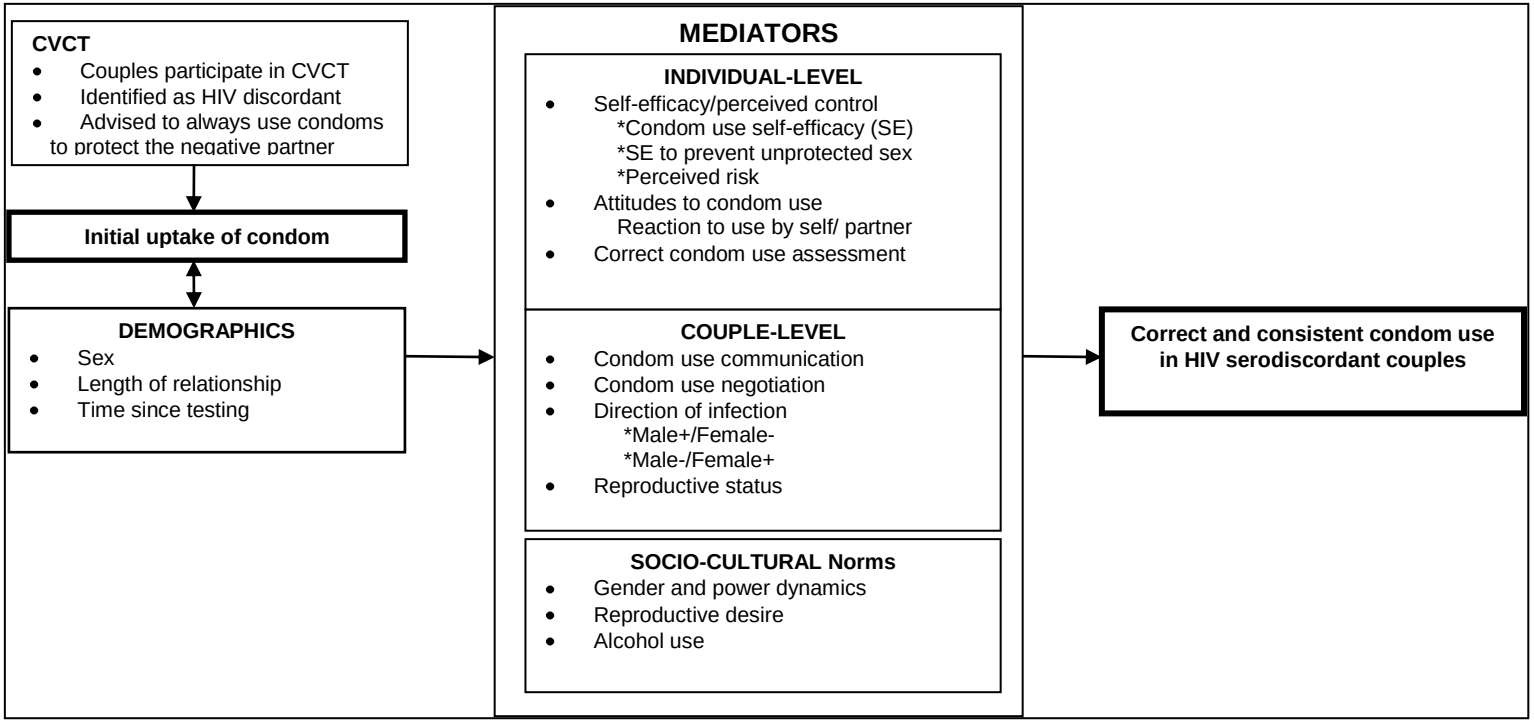


Figure 1.1. Integrated theoretical model using Theory of Planned Behavior and Theory of Gender and Power

Figure 1.1 presents the model used to guide the inquiry of the study, the design of the qualitative interview guide and quantitative survey, and analysis. The model focuses upon six main constructs: (1) self-efficacy and/or perceived control with regard to condom use, (2) attitudes towards condom use, (3) correct condom use skills, (4) condom use communication, (5) condom use decision-making and negotiations, and (6) socio-cultural norms associated with condom use.

## CHAPTER #2:

# Understanding behavioral influences upon consistent condom use: a qualitative study among serodiscordant couples in Lusaka, Zambia


## ABSTRACT

**Background:** It has been estimated that 43-93% of heterosexual HIV transmissions in Africa occur within cohabiting adults. The only behavioral HIV prevention option for sexually active serodiscordant couples is consistent and correct condom use (CCCU), which may be difficult to maintain overtime. With a high proportion of incident infections occurring within cohabiting couples and the lack of a cure for HIV/AIDS, challenges regarding mutual serostatus knowledge and the successful management of CCCU must be addressed.

**Methods:** A qualitative study was conducted from June to August 2006 in Lusaka, Zambia among heterosexual serodiscordant couples. Eight focus groups were conducted, by sex and serostatus, among two types of couples, long-term prevention successes and short-term prevention failures. Prevention success couples had maintained their serodiscordant status for at least five years. Prevention failure couples were formerly serodiscordant couples in which the original HIV negative partner became infected within 15 months of enrollment into the parent study. Open-ended face-to-face interviews were conducted with each individual member of the couple, using a structured interview guide. The modified constant comparison method guided the data analyses and MAXQDA was used for data management.

**Results:** The most common barrier to CCCU reported by all groups was the husband's decision not to use a male condom, largely due to situational refusal or alcohol use, resulting in forced unprotected sex for the woman. The most common reported supportive influence reported was assertiveness by the wife to prevent unprotected sex from occurring. Examples of female assertiveness included the woman reminding the husband to put on a male condom, reaching for the male condom, putting the male condom on her husband, physically removing herself from a situation, and using a female condom. Participants also requested 'refresher courses' (by couple, gender-matched groups, or with other couples) for problem-solving help and peer support.

**Conclusions:** Female assertiveness seems to be an important social norm. Consideration is also needed to ensure that once problem-solving strategies and safer sex hierarchies are in place, strategies can be upheld in crisis situations. A systematic and theory-driven investigation of couple-level prevention strategies for CCCU is needed to develop sustainable techniques and the establishment of sero-specific norms for this unique population.

## INTRODUCTION

Sub-Saharan Africa accounts for 67% of HIV infections worldwide and 68% of new infections among adults (UNAIDS & World Health Organization, 2009). Heterosexual transmission has been the primary mode of HIV transmission in Africa since the onset of the epidemic and a series of recent studies have estimated that 43-93% of HIV transmissions in Africa occur within cohabiting adults (Dunkle et al., 2008; Gelman, Kenya, Oguya, Cheluget, & Haile, 2009; Mngadi et al., 2009; Wabwire-Mangen, Odiit, Kirungi, Kisitu, & Wanyama, 2009). In Lusaka, Zambia, 20.8% of adults are HIV positive and one-third of couples (33.6%) are HIV-affected with more than half (18.0%) being serodiscordant (where one partner is HIV positive and the other is HIV negative) (Central Statistical Office, Ministry of Health, Tropical Diseases Research Centre, University of Zambia, & and Macro International, 2009).

For sexually active serodiscordant couples in which both individuals know their serostatus and have shared their status with each other, the only behavioral HIV prevention option is consistent and correct condom use (CCCU) (Allen et al., 2003; Bunnell et al., 2005; VanDevanter, Thacker, Bass, & Arnold, 1999). With a high proportion of incident infections occurring within cohabiting couples and the lack of a cure for HIV/AIDS, challenges regarding mutual serostatus knowledge and the successful management of CCCU must be addressed.

Findings from numerous studies have identified supportive and non-supportive factors influencing consistent condom use, including those among serodiscordant couples in which both patterns are aware of each other's serostatus. These include partner refusal ( Harvey, Beckman, & Doty, 1999; Rispel, Metcalf, Moody, & Cloete, 2009; Semple,

Patterson, & Grant, 2002; Skurnick, Abrams, Kennedy, Valentine, & Cordell, 1998); desire for intimacy and sexual satisfaction (Dolezal, Remien, Wagner, Carballo-Dieguez, & Hung, 2005; Israel, Romeis, & Spitz, 2005; Remien, Carballo-Dieguez, & Wagner, 1995; Rispel, et al., 2009); self-efficacy to ensure condom use (Albarracin et al., 2005; Bandura, 1998; Orbell, Hodgkins, & Sheeran, 1997); distress (Dolezal, et al., 2005; Hugonnet et al., 2002; Kamenga et al., 1991; Remien, Wagner, Dolezal, & Carballo-Diéguez, 2003); communication (Bagozzi, 1992; Bunnell, et al., 2005; Darbes & Lewis, 2005; Dolezal, et al., 2005; El-Bassel et al., 2001; Fleming & Wasserheit, 1999; Go, Quan, Voytek, Celentano, & Nam, 2006; Hugonnet, et al., 2002; Israel, et al., 2005; Jones et al., 2001; Orengo-Aguayo & Perez-Jimenez, 2009; Palmer & Bor, 2001; Parish, Cotton, Huszti, Parsons, & Hemophilia Behav Intervention Eval, 2001; Pomeroy, Green, & Van Laningham, 2002; Remien et al., 2006; Rolland, 1994; VanDevanter, et al., 1999); female condom use (Jones, Ross, Weiss, Bhat, & Chitalu, 2005; Musaba, Morrison, Sunkutu, & Wong, 1998; Van Devanter et al., 2002); alcohol use (Bouhnik et al., 2007; Coldiron et al., 2008; Dolezal, et al., 2005; McGrath et al., 2007; Stein, Nyamathi, Ullman, & Bentler, 2007); forced sex (Dolezal, et al., 2005; Persson, 2008); and gender imbalance (Dolezal, et al., 2005; Jones, et al., 2005; Orengo-Aguayo & Perez-Jimenez, 2009; Perez-Jimenez, Seal, & Serrano-Garcia, 2009; Persson & Richards, 2008).

Understanding supportive and non-supportive influences upon CCCU can provide insight into couple dynamics, communication, and sexual behavior thus guiding the next phase of intervention development. It is crucial that upon serostatus awareness, serodiscordant couples have the necessary skills and support to prevent HIV transmission

to the negative partner, an essential component to primary and secondary prevention (Desgrees-du-Lou & Orne-Gliemann, 2008).

Once service provision needs of serodiscordant couples are met with risk reduction counseling and the provision of condoms, little is known regarding the ongoing and varying behavioral dynamics of CCCU. This qualitative study sought to investigate supportive and non-supportive influences upon CCCU among heterosexual serodiscordant couples in Lusaka, Zambia from the perspective of the individual, with differentiation between sex, HIV serostatus, and success at preventing transmission to the HIV negative partner.

**METHODS**

This study was conducted as part of a larger HIV clinical research project, the Zambia Emory HIV Research Project (ZEHRP) in Lusaka, Zambia. ZEHRP is the Zambian arm of the Rwanda Zambia HIV Research Group (RZHRG). ZEHRP provides couples' voluntary counseling and testing (CVCT) and enrolls heterosexual serodiscordant couples into cohort studies that investigate HIV behavioral and clinical risk factors for transmission.

Eligibility criteria for couple enrollment into the parent study included women 16-45 years of age and men 16-65 years of age, of African descent, reside in Zambia's capital city of Lusaka, have been cohabitating or married for at least three months, and have participated in CVCT. Antiretroviral drug use by the HIV positive partner served as an exclusion criterion. As part of the parent study, couples attended study visits every three months at the research site and men and women were seen separately by the medical staff. Study visits included care and treatment of sexually transmitted infections,

access to free male condoms and long-acting contraceptive options, the collection of clinical and behavioral data, risk reduction counseling, and HIV testing for the negative partner.

From June to August 2006, a qualitative study was conducted at ZEHRP to understand behavioral factors that influence CCCU among serodiscordant couples. Using the established cohort of discordant couples enrolled by RZHRG, we identified upon two types of serodiscordant couples to investigate supportive and non-supportive factors within the relationship: long-term prevention successes (PS) and short-term prevention failures (PF). Long-term prevention successes were current serodiscordant couples that had maintained their status for at least five years. Short-term prevention failures were formerly serodiscordant couples in which the HIV negative partner received the virus from their partner in the study within 15 months of enrollment into the parent study. Sequencing was used to confirm that seroconvertors had acquired HIV from their partner enrolled in the study.

Overall, eight focus groups were conducted (Table 1). Based upon the following four categories, separate focus groups were conducted for men and women: (1) prevention success couples in which the man was the HIV positive partner, (2) prevention success couples in which the woman was the HIV positive partner, (3) prevention failure couples in which transmission occurred from the HIV positive man to his HIV negative wife, and (4) prevention failure couples in which transmission occurred from the HIV positive woman to her HIV negative husband.

A convenience sample of couples who fell into the four categories was recruited to participate in the qualitative study. Recruitment was through the delivery of written

invitations to the couples' homes by ZEHRP community workers. Focus groups were conducted at the research site and both partners had to be present to participate. Forty two invitations were delivered and 23 were accepted. Reasons for non-participation were not investigated and we do not know if the participants where different from those that chose not to participate. Written informed consent was obtained from each participant who received approximately sixteen dollars for the day's participation. Ethical approval was received by Emory University and Zambia's Research Ethics Committees.

Focus groups consisted of a gender-matched facilitator, a note-taker, an assistant with a tape recorder, and the study investigator. A team of five experienced ZEHRP counselors, two males and three females, were trained and equally participated as facilitator, note-taker, and recording assistant. Facilitators used a structured interview guide that was translated into the local languages of Nyanja and Bemba and back-translated into English. The guide was pilot-tested with small groups of men and women enrolled in the parent study and was revised accordingly.

Interview guide topics included condom use decision-making in the home, barriers to CCCU, techniques that support CCCU, the desire for children, attempts to prevent HIV via methods other than condoms, the effect of extra-marital relations upon condom use in the home, and suggestions for additional support for serodiscordant couples. Salient themes addressed this paper include reasons for inconsistent condom use, attempted techniques to prevent unprotected sex, and suggestions for additional support for serodiscordant couples.

*Data analysis*

Audio tapes were transcribed verbatim from the local languages of Nyanja and Bemba into English and checked for accuracy by the facilitators and the study investigator. Text was imported into a qualitative data management program (MAXQDA, 2007, VERBI Software, Germany). Data were coded for general themes related to condom use guided by a modified grounded theory approach (Glaser BG & Strauss A, 1967; Strauss & Corbin, 1990) ). Following the analytic deduction method, we analyzed the text so that emerging theory fit the details of the majority of the cases. The data were then coded for subthemes within each category. The subthemes are derived from the experiences recounted by our respondents (Malterud, 2001).

## RESULTS

### Sample characteristics

Among long-term prevention successes, couples in which the husband was the HIV positive partner (M+/W-)[1] had on average older men and women (47.6 years and 39.4 years, respectively) than couples in which the wife was the HIV positive partner (M-/W+) (37.7 years and 33.8 years, respectively). Couples in which the man was HIV positive also had been cohabitating longer (28.6 years) than couples where the woman was the positive partner (18.5 years). Couples were comparable regarding mean years enrolled in the parent study (M+/W- couples= 10.8 years; M-/W+ couples= 10.2 years).

Among short-term prevention failures, the mean ages of men and of women were comparable between couples regardless of who was the index positive partner. The mean age of index HIV positive men was 33.4 years (SD 5.4) compared to 34.6 years (SD 6.6) for formerly HIV negative men who had seroconverted. Among women, the

[1] Identification of couple: M=male; W=woman; + = HIV positive partner; - = HIV negative partner

mean age of index HIV positive women was 30.0 years (SD 6.7) compared with 27.6 years (SD 5.0) for seroconvertors. Couples in which the man was the index partner had been cohabiting longer (6.0 years) than couples in which the woman was the index partner (4.3 years). Interestingly, the months to seroconversion were very comparable between couples regardless who was the index HIV positive partner (M+/W- couples= 8.6 months; M-/W+ couples= 8.4 years).

Key themes identified included barriers to consistent condom use, techniques attempted to encourage condom use, and suggestions for additional support for serodiscordant couples. Sub-themes, some that spanned more than one key theme, included sexual force by the husband/the woman's lack of decision-making to have unprotected sex, alcohol use, and female assertiveness.

**Barriers to consistent condom use**

Men and women, regardless of serostatus or prevention outcome (i.e. successfully remained serodiscordant for at least five years or failed to prevent transmission to the negative partner in the first 15 months of enrollment into the parent study), acknowledged difficulties with consistent condom use. Although each focus groups initially reported condom use as "no problem" or "we always use", further discussions elicited complex and overlapping individual and relationship dynamics that impacted use. Issues included forced unprotected sex, situational partner refusal, partner intoxication, and beliefs that the HIV positive partner attempts to intentionally infect the negative partner. Each issue was discussed only in regards to the husband's behavior as it was described by both men and women.

*Barrier theme 1: Sexual force to have unprotected sex by the husband*

Sexual force by the husband and the woman's lack of decision-making regarding unprotected sex were the most prevalent themes mentioned by men and women regardless of serostatus or success in prevention. Women overwhelmingly expressed their inability to control their sexual environment: "A woman can try to say that we use condoms but she fails. The man insists. You don't even know where to start" (W-, PF).[2] The same sentiment was also expressed by HIV positive women whose partners have been able to remain HIV negative for over five years, "It is the men who decides [about condom use]. If the man doesn't want to use a condom, he will go direct" (W+, PS).

Men openly discussed their efforts to have forced unprotected sex with their wives. An interesting technique of 'stealing sex' was mentioned by both HIV positive and negative men and was explained as, "When you go in like a thief, you wait for her to be asleep and then you have sex with her. So there is no discussion then" (M+, PF). Along with no discussion, men also mentioned the lack of physical resistance as explained by an HIV negative man:

> The woman is infected, when I want to meet with her without a condom, she refuses. I try to negotiate but she refuses. So sometimes when she is asleep, I just enter her and by the time she wakes up, I have done what I have wanted. (M-, PS)

A few men described how their wives had been successful at resisting forced unprotected sex. The first example speaks of having a strong wife, "I also tried to force my wife to have sex without a condom but my wife was very firm, my wife never gave me a chance"

[2] Identification of speaker: the speaker of each quote is identified by sex (Man or Woman), followed by whether they were the HIV negative partner or original HIV positive partner (- or +), and whether the couple was a prevention success (PS) or a prevention failure (PF). For example, a quote that is followed by (W+, PS) was a woman who was the HIV positive partner in a prevention success couple. A quote followed by (W+, PF) was a woman who was the original HIV positive partner in a prevention failure couple.

(M+, PF). The second scenario illustrates that a woman's ability to resist unprotected sex can be inconsistent: "If the woman becomes weak that is when you force her to have sex without a condom. But if she is firm, you don't have unprotected sex" (M+, PF).

*Barrier theme 2: Situational refusal of condom use following condom use adoption*

Men who had adopted condom use would at times refuse to use for the desire of 'live sex' (unprotected sex) or because they had become tired of condom use. Intersecting with gender and cultural roles, situational refusal was often related to the woman being unable to prevent her husband from having unprotected sex with her. For example, the man would refuse to use a condom because he was 'head of household' or had 'paid lobala' (bride price). Similarly, cultural obligations diminished a woman's ability to refuse unprotected sex:

> He would start by telling me that we will be having sex without a condom and persuading me. When I refuse, we start arguing. To stop arguing, I just have to accept to have sex without a condom. If we start fighting and people know about the fighting, we will be ashamed. And people will start to ask why I am not giving to my husband and people will tell me to that I have to give to my husband, so I accept. (W-, PF)

Although mentioned in each woman's focus groups, situational refusal was reported more by women who had been formerly HIV negative.

Some women questioned their husband's decision for the couple to have unprotected sex although the responses did not provide insight on how a woman could regain control of the situation:

> Sometimes my husband will come and say that we are having sex without a condom and when I ask 'why' he says it is because he just wants sex without a condom today. When I ask 'why today', he says that he just wants sex without a condom today" (W-, PF).

*Barrier theme 3: Intoxication of the husband*

The husband's drinking had a significant impact upon condom use for all groups although it was mentioned more by prevention failure couples regardless of whom was the original HIV positive partner. Men and women spoke openly of the husband's struggle to maintain consistent condom use when alcohol was involved. As explained by a woman who became HIV infected by her husband, "Sometimes he would use [condoms] and sometimes he would be difficult and not want to use especially when he came home drunk" (W-, PF). Alcohol use and the subsequent resistance to condom use would result in arguing or 'noise' in the house, as described by one woman, which ultimately ended up in the wife giving into her husband's demands to not use a condom:

> We used condoms well except for when he makes too much noise. He refuses to use condoms and we have sex without a condom. But when he is quiet, we use a condom. […] When he has been drinking is when he makes noise. (W+, PF)

Men acknowledged their awareness that drinking impacts condom use, "…when you come drunk, you do things that you shouldn't have done. After the action, you realize that you have done something wrong" (M+, PF). This disinhibition was so great that even at times when condoms were very accessible, men reported refusal, "Especially when you are drunk, it becomes very difficult [to use a condom] even when the condom is on the headboard, it is too far in a drunken state" (M-, PF).

Men also acknowledged that they would use drinking as their excuse for their wrong-doing versus taking responsibility for refusing to use condoms:

> …us men should not pretend when we are drunk to not use a condom. I used to take beer so I know. Sometimes it becomes deliberate but you say it is because of beer that you have done something wrong. (M+, PF)

Among men who had stopped drinking, an improvement in consistent condom use was noted by men, "Since I have stopped drinking, I have managed to use condoms every

time" (M-, PF) and women, "... ever since he has stopped drinking, we use condoms all the time" (W+, PF)

*Barrier theme 4: Forced unprotected sex due to husband's intoxication*

An overwhelming theme reported by both men and women, regardless of serostatus or prevention outcome, was the link between the husband's intoxication and forced unprotected sex. The concept of 'stealing sex' was also related to the husband's drinking:

> This happened because I was drunk…. I came home and she was asleep and I had sex with her. By the time that she woke up, she tried to get away because I was already in her but I forced her. Afterwards we discussed and my wife was blaming me for what I had done the night before. […] …this is how it happens several times because sometimes when I ask, she refuses [to have sex without a condom]. (M+, PF)

Women with HIV negative partners also experienced forced unprotected sex, "We used condoms well except for when he comes drunk, you can't control him. He refuses to use condoms and orders me to have sex without condoms" (W+, PF). An HIV negative man explained it from his perspective, "When one has the feelings [for sex], to have time to discuss is like a waste of time. She always asks me to use a condom but I resist. ... immediately after beer, I have problems" (M-, PS).

Men acknowledged forethought in having unprotected sex when intoxicated even when the husband was the HIV negative partner, "When my wife sees that I am going for beer, she knows that there is going to be a problem. So she must get ready and put a condom near. But sometimes I don't use it" (M-, PS). While men acknowledged forethought, women expressed their awareness of this dynamic and their inability to control their sexual environment:

> Because of beer, when he comes drunk, meaning that he has planned ahead already [to have unprotected sex], he locks you in the house and whether you refuse or accept, you will sleep without a condom. (W-, PF)

Although women in both prevention success and prevention failure relationships experienced forced unprotected sex, only those in prevention failure partnerships mentioned being locked in the home by the husband to ensure that unprotected sex occurred, "…when he comes drunk, he will lock the door and say 'today we will have live sex whether you like it or not,'" (W-, PF).

*Barrier theme 5: Intentional infections*

A few women spontaneously mentioned that they felt that their HIV positive husbands desired them to become HIV positive. As one woman who had seroconverted explained, "The man is the head and he decides [whether condoms will be used] but I think his aim was for me to contract HIV as well. I didn't want to be meeting without a condom" (W-, PF). Surprisingly, this sentiment was also expressed by women who had been able to maintain their HIV negative status for more than five years. One woman's frustration had tempted her to leave her husband, "We have problems with men especially if he is the one who is positive. It is like he wants you to also be infected. So, sometimes you think about leaving him but then on second thought you decide to just stay" (W-, PS).

An approach taken by some women was to use a female condom rather than depend upon the husband's willingness to use a male condom, "Some of us, we use female condoms because sometimes our husbands are difficult because they want us to be the same [status]" (W-, PS).

**Techniques attempted to encourage condom use**

We were interested in identifying techniques that men and woman had attempted to support consistent condom use. Four themes emerged and included communication, condom accessibility in the bedroom, female assertiveness, and the use of female condoms.

*Technique theme 1: Communication about condom use*

Men, particularly those in prevention success couples, credited their wife's communication about condom use as helping to ensure condom use, "My wife says 'get the condom' or 'are you wearing a condom' and will then check to see if the condom is on" (M+, PS). Women's most common approach, regardless of serostatus or prevention outcome, was to request the use of condoms. An extension of this approach was the use of familial pressure:

> I talked to him and told him that his relatives will come crying to me [because he will become infected] so it is better to keep putting on a condom. Then we continued to use condoms and sometimes it is me who puts the condoms on him. (W+, PS)

*Technique theme 2: Condom accessibility*

The importance of keeping condoms close to the bed was reported in all groups and was primarily the responsibility of the woman. Men acknowledged that quick access to a condom is crucial to ensure use:

> The condom must be near. You tell your wife to keep it near so that just a hand can reach it, for example, just under the pillow. We, men are difficult, if the condom is far, we won't use it. (M-, PF)

Men largely depended upon the woman to ensure that a condom was quickly accessible, "As for me, my wife... knows the days that we will have sex so she prepares the condoms in advance. The wife is the one who puts the condoms under the pillow" (M+, PF).

Condom accessibility also helped women when her husband was trying to 'trick' her into having unprotected sex. As explained by a man whose partner had become HIV positive, "As for me, the condoms are always near the bed or in the headboard drawer. Even if you want to trick your wife, she will reach for the condom and give it to you" (M+, PF). Women also recognized the importance of convenient access to condoms, "I put the whole packet on the table and then a few under the pillow so when he comes home and starts to shake me, I just reach for them and hand them over" (W-, PS).

Although condom accessibility resulted in positive outcomes at times, it was inconsistent in success, "Yes, we used to discuss. We would start to touch each other and then I hand him a condom and he would say that we aren't going to use a condom. When I would refuse sometimes he would beat me" (W+, PF).

*Technique theme 3: Female assertiveness*

The ability of women to assert condom use and the acceptance by their partners to do so seems crucial in consistent use. Techniques reported by men and women included the woman putting the male condom on her partner (sober or intoxicated) and the woman able to physically remove herself from a crisis moment.

Women in prevention success couples were more likely to report success at ensuring condom use by putting the condom on her partner, "Even if he drinks beer, when he comes home, I give him a condom or put it on for him. In the morning, he thanks me for doing that" (W+, PS). Similar to the woman's responsibility to ensure quick condom access, such responsibility was also mentioned in regards to the woman putting the condom on the man, "The wife is supposed to know her job… she is suppose

to put the condom on me. She is also the one who is supposed to put the condoms under the pillow. It is her job. (M+, PF)

Another approach used by women to prevented unprotected sex was to physically remove themselves from the situation, "I used to leave the bedroom and sleep in the sitting room" (W+, PF) or "sleep on the children's bed and he would be in our bed" (W+, PF). A unique variation of removing oneself from a crisis situation was developed by one woman to prevent unprotected sex from occurring that included an interesting negotiation tactic:

> The man will start the discussion by saying that today we will have sex without a condom because we have had condom use for too long. [...] I told my husband to use a condom now and in the morning, we can have sex without a condom, and then early in the morning, I would leave early and go to the field. (W+, PF)

Interestingly, this approach of removing oneself from the situation was only reported by HIV positive women whose husbands have seroconverted suggesting that this technique was not able to be maintained enough to prevent transmission. No men mentioned removing themselves from a situation to prevent unprotected sex from occurring.

*Technique theme 4: Use of female condoms*

A small number of couples, both prevention success and prevention failures, had tried female condoms and was recommended highly by both men and women. Men appreciated that the female condom took the emphasis off of his use of a male condom, "When I am drunk, the wife will put on the female condom and not say anything to me. That is why it is very good that they make both male and female condoms" (M+, PS). Women appreciated the ability to prepare for unprotected sex when it was likely to occur, "… sometimes our husbands beg us to have live sex when they are drunk. So sometimes

you decide to wear a female condom in advance" (W+, PS). Men provided no negative comments regarding the female condom. Women discussed that it can be noisy at times but once the condom warms to body temperature, the noise stops.

**Additional support**

We were also interested in understanding how current and former serodiscordant couples felt they could have been further supported in their efforts to maintain consistent condom use in their relationship. With an open-ending question asking how serodiscordant could be helped or better supported, two topics emerged: the request for 'refresher' counseling sessions and greater access and information regarding female condoms.

*Support theme 1: Refresher counseling sessions*

Each focus group suggested having periodic "refresher" counseling which was followed with a discussion as to the best format: by couple, by gender-matched groups, or both. Benefits of being counseled as a couple included, "It is good to be together [as a couple] because men are problems. They are very difficult. It is good to call the man and woman, sit them down and tell them" (W+, PS). Gender-matched groups were also suggested so that they could discuss their situations with others like them (same sex and serostatus). In reference to the focus group providing such a format, one man said, "This is the first time that I have seen discussions with only men and this has been very good" (M+, PF).

After the groups' discussion as to which format would be better (by couple or gender-matched group) for the refresher sessions, consensus typically took the form of first having gender-matched groups and then move into couples or a larger support group

of many couples. Men and women liked the opportunity to learn from their gender-matched counterparts but also recognized the importance of being together when such information is discussed, "... [we] should learn together because when you learn together one can't refuse when you get home because you have heard it together" (M+, PF).

Another benefit to meeting other HIV-affected couples was that it would provide support to those newly identified as being serodiscordant, "As my friends have said, some of us have thought that the world has come to the end. It is good for us to keep being invited to different types of topics to be discussed" (M-, PF).

*Support theme 2: Female condoms*

Women expressed the usefulness of female condoms in their efforts to maintain condom use particularly when facing forced unprotected sex, "I use the female condom when I fear the live sex" (W-, PF) and they requested greater access:

> [the project] should provide the female condom. Even if he comes drunk and he tries to force you, you already have it in place. When he comes and wants to have live sex, and you have already put it on he will think that there is no condom. It feels the same as live sex. That helped me in 2003, when I got the virus it was because I wanted a child. But the female condom helped me a lot to stay negative. It took a long time for me to be infected. After he sleeps, I take out the condom. (W-, PF)

Men were also in support of the female condom, "Women always want males to use male condoms. When they come to the study [visits], teach them the goodness of the female condom, so when the male is tired of the male condom, we can use the female condoms" (M+, PS).

**DISCUSSION**

Consistent condom use (CCCU) is the primary HIV prevention method for sexually active serodiscordant couples. Maintaining consistent use for the duration of the

relationship can be challenging (Allen, et al., 2003; Bunnell, et al., 2005; VanDevanter, et al., 1999) and prone to varying behavioral influences overtime. Although it has been recognized that serodiscordant couples contribute a high proportion of incident HIV infections in regions of the world with a generalized epidemic (UNAIDS & World Health Organization, 2009), little is known about how CCCU is influenced or how best to support serodiscordant couples in their efforts to maintain consistent use. With UNAIDS's continued call for greater mutual serostatus knowledge (UNAIDS & World Health Organization, 2009), the next step in HIV prevention research for serodiscordant couples is the successful management of ongoing and varying behavioral barriers to CCCU. Ensuring that couples have the necessary skills and support to maintain CCCU needs to go hand in hand with the global expansion of mutual serostatus knowledge thus providing an excellent opportunity to address this critical gap between in primary and secondary HIV prevention efforts (Desgrees-du-Lou & Orne-Gliemann, 2008).

Here we focused on heterosexual serodiscordant couples in Lusaka, Zambia and the behavioral dynamics of CCCU. We sought to identify behaviors that were supportive or non-supportive towards CCCU following risk reduction counseling and provision of male condoms.

Similar to other studies, influences to CCCU identified in our study included: partner refusal (Harvey, et al., 1999; Rispel, et al., 2009; Semple, et al., 2002; Skurnick, et al., 1998), sensation-seeking and sexual satisfaction (Dolezal, et al., 2005; Israel, et al., 2005; Remien, et al., 1995; Rispel, et al., 2009); self-efficacy to ensure condom use (Albarracin, et al., 2005; Bandura, 1998; Orbell, et al., 1997); distress (Dolezal, et al., 2005; Hugonnet, et al., 2002; Kamenga, et al., 1991; Remien, et al., 2003); motivation to

use condoms (El-Bassel, et al., 2001) ; communication (Bagozzi, 1992; Bunnell, et al., 2005; Darbes & Lewis, 2005; Dolezal, et al., 2005; El-Bassel, et al., 2001; Fleming & Wasserheit, 1999; Go, et al., 2006; Hugonnet, et al., 2002; Israel, et al., 2005; Jones, et al., 2001; Orengo-Aguayo & Perez-Jimenez, 2009; Palmer & Bor, 2001; Parish, et al., 2001; Pomeroy, et al., 2002; Remien, et al., 2006; Rolland, 1994; VanDevanter, et al., 1999); female condom use (Jones, et al., 2005; Musaba, et al., 1998; Van Devanter, et al., 2002); and attempts to prevent unprotected sex from occurring (Bunnell, et al., 2005). These issues were overlaid with the cultural acceptance of excessive alcohol use (Bouhnik, et al., 2007; Coldiron, et al., 2008; Dolezal, et al., 2005; McGrath, et al., 2007; Stein, et al., 2007), forced sex (Dolezal, et al., 2005; Persson, 2008), and gender imbalance (Dolezal, et al., 2005; Jones, et al., 2005; Orengo-Aguayo & Perez-Jimenez, 2009; Perez-Jimenez, et al., 2009; Persson & Richards, 2008). Such influences are not unique to serodiscordant couples but with the added infective risk of unprotected sex with a known HIV positive person, an ecological perspective to prevention is particularly relevant (Bronfenbrenner, 1979; El-Bassel, et al., 2001; Svenson, Östergren, Merlo, & Råstam, 2002).

The most common barrier to CCCU reported by men and women was the husband's decision not to use a male condom, largely due to situational refusal or alcohol use, resulting in forced unprotected sex for the woman. With HIV positive and negative men self-reporting refusal, we found the husband's serostatus was not necessarily related to better or worse condom use. This was true even among couples who had maintained their serodiscordant status for an extended period of time.

Most women were not part of the decision-making process when unprotected sex occurred nor had options to prevent it. Of women who were able to prevent such occurrences, prevention was still largely dependent upon their husband's consent. For example, if a husband was not comfortable with his wife sleeping in another room such a prevention strategy would not have been viable. Therefore, greater understanding is needed regarding relationship and sexual dynamics and how best to integrate couple-level prevention strategies that can be maintained in crisis moments (Burton, Darbes, & Operario, 2010; Darbes & Lewis, 2005; Desgrees-du-Lou & Orne-Gliemann, 2008; Harman & Amico, 2009; Painter, 2001; Perez-Jimenez, et al., 2009; Stein, et al., 2007). Unfortunately, HIV prevention models typically target individual behavior (Amaro, 1995; Amaro & Raj, 2000; Becker, 1996; Harvey, 2000; Harvey, et al., 1999; Painter, 2001; Skurnick, et al., 1998) although sexual decision-making and behavior is dependent upon mutual agreement or one person overpowering the other.

The most common supportive influence reported by men and women, regardless of serostatus, was the wife's assertiveness to control her sexual environment and prevent unprotected sex from occurring. Examples of female assertiveness included the woman reminding the husband to use a male condom, reaching for the male condom, putting the male condom on her husband, physically removing herself from a situation, and using a female condom.

The acceptance for female assertiveness in the context of HIV prevention seems to be an important social norm necessary for this unique population. Addressing social and peer norms of serodiscordant couples may be less of changing norms than establishing new ones. For examples, key social norms we identified included the

husband having final say when demanding unprotected sex, acceptance of forced unprotected sex, and excessive alcohol use. All of these norms are indicative of the broader Zambian culture although the couples, with their serodiscordant status, were no longer indicative of the broader Zambian culture. Rather, they are serodiscordant couples at high-risk for HIV transmission facing ongoing emotional, physical, sexual, social, and relationship challenges (Kalichman, Rompa, Luke, & Austin, 2002; Persson & Richards, 2008; Remien, et al., 2003). In this context, efforts to establish serostatus-specific social and peer norms need greater attention particularly as the most successful and longest lasting behavioral interventions draw upon peer pressure and addressing group norms (Broadhead & Heckathorn, 1994; Broadhead et al., 2002).

Similar to what our respondents termed 'refresher courses' (by couple, gender-matched groups, or a group of couples), such efforts could help couples develop problem-solving strategies and a safer sex hierarchy through peer discussion and social reinforcement, thus potentially creating serostatus-specific norms. Social support, peer support, and partner's perceptions of support have been shown to increase condom use and reduce risk behavior particularly among steady partners (Darbes & Lewis, 2005; Morrison-Beedy, Carey, & Lewis, 2002; Remien, et al., 2006; Svenson, et al., 2002).

Consideration is also needed to ensure that once problem-solving strategies and safer sex hierarchies are in place, strategies can be upheld in crisis situations. Active interventions strategies, such as HIV-specific communication skills, problem-solving, role-playing, and sexual negotiations, have resulted in greater increases in condom use than reflexive strategies such as speaking to a mostly passive audience (Johnson, Carey, Marsh, Levin, & Scott-Sheldon, 2003; Kalichman, Carey, & Johnson, 1996; Kelly,

1995). Participants who develop and practice strategies for sexual risk situations increase implementation intentions, self-regulation, and self-efficacy (Bandura, 1998; Orbell, et al., 1997; Svenson, et al., 2002).

As exposure to intimate partner violence and relationship power inequity are associated with increased HIV risk (Jewkes, Dunkle, Nduna, & Shai, 2010), behavioral interventions and programmatic efforts must address these risk factors in the context of couples HIV prevention. For example, a group-based intervention to increase condom use and reduce HIV risk among serodiscordant couples in India, Thailand, and Uganda targeted communication, problem-solving, and negotiation skills to improve coping skills. At the three-month follow-up, participants reported increased condom use and 90% had used the intervention skills in their relationships (McGrath, et al., 2007). Likewise, efforts to improve gender balance were successful among HIV positive Zambian women who participated with their male partners in a cognitive-behavioral gender-based group intervention to reduce sexual risk behavior (Jones, et al., 2005). At 12-month follow-up, 94% of couples reported no unprotected sex as well as high levels of risk avoidance and female condom use, improved condom attitudes, a decrease in negative coping skills, and an increase in positive coping skills. Meeting with other women also provided the opportunity for the women to 'share strategies with each other for achieving gender equity within their relationships'. Similarly, a HIV behavioral intervention conducted in South Africa found a significant reduction of physical or sexual intimate partner violence at the 24-month follow-up as reduced problem drinking at 12-month follow-up (Jewkes et al., 2008).

In an effort to conceptualize the next phase of intervention development for serodiscordant couples, systematic and theory-driven investigation of couple-level prevention strategies related to CCCU needs to be undertaken with emphasis on sustainable techniques for crisis moments and the establishment of sero-specific social and peer norms for this unique population.

Limitations were present in this study. First, this was a convenience sample of former and current serodiscordant couples enrolled in ZEHRP's cohort studies that chose to participate in the focus groups following invitation. Second, no follow-up was done among couples who chose not to participate therefore we do not know if it was due to scheduling conflicts or refusal. Third, as all couples received HIV risk reduction counseling during CVCT and again individually during each study visit, responses may have been biased due to social desirability of being enrolled in an HIV research study. Efforts were made to assure participants there were no right or wrong answers and participants were encouraged to be honest. Finally, although facilitators did not inform the respective focus groups that each participant shared the same HIV serostatus and prevention outcome, early in each session the groups self-disclosed their serostatus and prevention outcome. It was not intended that participants or study staff become aware of the categorization of each group and therefore we do not know if this awareness altered the respondents' answers. Delivery of the interview guide and facilitation of the focus groups were not altered by the study staff following awareness of the categorization.

With global efforts to increase mutual serostatus knowledge among couples, critical primary and secondary prevention gaps remain for serodiscordant couples aware of their status but unable to maintain consistent condom use. Our findings identified a

theme of female assertiveness that distinguished couples who were able to implement some action to prevent unprotected sex when the husband was resistant to use of a male condom. Although useful, a stronger conceptual and theoretical understanding of relationship and sexual dynamics related to HIV risk that accommodates cultural, social, and peer norms is greatly needed (Burton, et al., 2010; Harman & Amico, 2009). Until both partners are accepting of such norms as female assertiveness and gender balance related to HIV prevention, attempts at skill-building, role-playing, communication may be limited.

It is critical that that the HIV community is able to support the behavioral prevention needs of serodiscordant couples following serostatus awareness. As condom use requires consent of both partners, HIV prevention for sexually active serodiscordant couples must be addressed at the couple-level (Darbes & Lewis, 2005; Desgrees-du-Lou & Orne-Gliemann, 2008; Harman & Amico, 2009; Painter, 2001; Stein, et al., 2007). Behavioral barriers that serodiscordant couples encounter during the duration of their relationship highlights the need for the development of tested intervention efforts to address the ongoing and varying needs for support, skill-building, and behavioral counseling.

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**Table 2.1 Interview structure and characteristics of focus groups among heterosexual serodiscordant couples in Lusaka, Zambia**

| Type of couple | Direction of infection | Participants | Mean age (SD) | Mean years cohabiting (SD) | Mean years enrolled (SD) | Mean months to seroconversion |
|---|---|---|---|---|---|---|
| Long-term prevention successes (current serodiscordant > 5 years) | M+, W- | Focus Group 1: Women (n=5)<br>Focus Group 2: Men (n=5) | 39.4 (2.7)<br>47.6 (3.4) | 28.6 (5.3) | 10.8 (0.4) | N/A |
| | M-, W+ | Focus Group 3: Women (n=6)<br>Focus Group 4: Men (n=6) | 33.8 (7.2)<br>37.7 (10.7) | 18.5 (2.5) | 10.2 (0.4) | N/A |
| Short-term prevention failures (former serodiscordant < 15 months) | M+, W- | Focus Group 5: Women (n=7)<br>Focus Group 6: Men (n=7) | 27.6 (5.0)<br>33.4 (5.4) | 6.0 (1.0) | N/A | 8.6 (3.6) |
| | M-, W+ | Focus Group 7: Women (n=5)<br>Focus Group 8: Men (n=5) | 30.0 (6.7)<br>34.6 (6.6) | 4.3 (4.9) | N/A | 8.4 (4.0) |

N/A= Not applicable

# CHAPTER #3:

## Prevalence and predictors of supportiveness towards condom use among heterosexual serodiscordant couples in Zambia and Rwanda


## ABSTRACT

**Background:** Heterosexual transmission continues to be the primary mode of HIV infection in Africa with an estimated 43-93% of new infections occurring within cohabiting adults. The negative partner in a sexually active serodiscordant couple is at risk for HIV infection unless safe sex practices are applied; specifically, consistent and correct condom use. The aim of this study was to assess the prevalence of supportiveness towards condom use in the last three months at the individual-, partner-, and couple-level as well as identify predictors for couple-level supportiveness.

**Methods:** From April to August 2009, a cross-sectional, questionnaire-based behavioral interviews was conducted among serodiscordant couples in Kigali, Rwanda (n=198) and Lusaka, Zambia (n=485). Based upon formative research, the questionnaire was developed specifically for this population of couples aware of their serodiscordant status with ongoing access to free male condoms and risk reduction counseling. Domains covered in the survey included sexual behavior, HIV-related beliefs and knowledge, and condom use. Data analysis involved descriptive, bivariate, and multivariate logistic regression analysis.

**Results:** Individual-level support was reported by 79.7%-91.2% of respondents. Partner's perception of respondent's supportiveness was 69.2%-87.1%, lower than respondent's self-report by 3.9%-16.2%. At the couple-level, only two-thirds of Rwandan couples

(67.4%) and just over half of Zambian couples (54.0%) included two supportive partners. Predictors for low couple-level supportiveness included men and women who perceived that the HIV negative partner is at 'high' risk for infection in the next 12 months; men and women who believed it was acceptable for a husband to force his wife to have unprotected sex; women who reported condom breakage in the last three months; women who believed there was a drug that an HIV positive person could take to prevent transmission; and residing in Zambia.

**Conclusions:** The investigation of individual, couple, and socio-cultural factors that disrupt consistent condom use is a critical step in the development of HIV prevention for serodiscordant couples. Individual-level data greatly overestimated couple-level supportiveness highlighting the importance for couple-level data collection for understanding couple-level behaviors. To tackle couple-level prevention and close the behavioral gap between HIV serostatus knowledge and consistent condom use, further investigation of cultural beliefs and sex roles as well as partner and couple dynamics is needed to understand when and why lapses of condom use occur.

## INTRODUCTION

Sub-Saharan Africa has the highest HIV seroprevalence rates in the world accounting for 67% of HIV infections worldwide and 68% of new infections among adults (UNAIDS & World Health Organization, 2009). Heterosexual transmission continues to be the primary mode of infection and an estimated 43-93% of HIV transmissions in Africa occur within cohabiting adults (Dunkle et al., 2008; Gelman, Kenya, Oguya, Cheluget, & Haile, 2009; Mngadi et al., 2009; Wabwire-Mangen, Odiit, Kirungi, Kisitu, & Wanyama, 2009). In the capital city of Kigali, Rwanda, 6.7% of adults and 10.3% of couples are HIV-affected (Institut National de la Statistique du Rwanda & ORC Macro, 2006). In Lusaka, Zambia, 20.8% of adults and 33.6% of couples are HIV-affected (Central Statistical Office, Ministry of Health, Tropical Diseases Research Centre, University of Zambia, & and Macro International, 2009). In both cities, more than half of HIV-affected couples are serodiscordant (where one partner is HIV positive and the other is HIV negative) (Central Statistical Office et al., 2009; Institut National de la Statistique du Rwanda & ORC Macro, 2006).

The negative partner in a sexually active serodiscordant couple is at risk for HIV infection unless safe sex practices are applied; more specifically, unless both partners engage in consistent and correct condom use (CCCU). However, maintenance of condom use is difficult (Allen et al., 2003; Bunnell et al., 2005; VanDevanter, Thacker, Bass, & Arnold, 1999). Over a 12-month period in which sexual behavior was assessed among 936 heterosexual serodiscordant couples in Lusaka, Zambia who were provided with free male condoms and on-going risk reduction counseling, one-fourth of couples (26%) reported unprotected sex during one 3-month interval, 24% of couples reported

unprotected sex during two 3-month intervals, 17% in three of four 3-month intervals, and 10% reported unprotected sex at each follow-up visit (Allen et al., 2003).

Once service provision needs have been met (mutual serostatus knowledge, risk reduction counseling, and access to male condoms), little is known regarding the circumstances that influence CCCU and how it is impacted by individual characteristics, couple dynamics, and socio-cultural factors. Therefore, we sought to (1) investigate the prevalence of supportiveness towards condom use at the individual-, partner-, and couple-level in the last three months and (2) identify predictors for couple-level supportiveness for condom use.

Given that a significant proportion of incident HIV infections within generalized epidemics occur within the context of stable relationships, understanding the influences upon CCCU within serodiscordant couples is an important next step in the development of HIV behavioral interventions.

## METHODS

### Procedures

This behavioral study was conducted in collaboration with a larger HIV clinical research program, the Rwanda Zambia HIV Research Group (RZHRG) that maintains cohorts of heterosexual serodiscordant couples in Lusaka, Zambia and Kigali, Rwanda. Eligibility for couple enrollment into the parent study included women 16-45 years old and men 16-65 years old, being of African descent, residing in the capital city of Lusaka, Zambia or Kigali, Rwanda, at least three months of cohabitation or marriage, and participation in couples' voluntary counseling and testing. Antiviral drug use by the HIV positive partner served as an exclusion criterion. As part of the parent study, the HIV

negative partner participated in monthly visits and the HIV positive partner participated in quarterly visits. Study visits occurred at the research sites with men and women interviewed separately by trained medical staff. All visits included the collection of clinical and sexual behavior data, care and treatment of sexually transmitted infections, risk reduction counseling, assess to free male condoms and long-acting contraceptive options, and HIV testing for the negative partner.

From April to August 2009, a cross-sectional, questionnaire-based behavioral study was conducted. Data collection occurred during the HIV positive partner's quarterly visit and the corresponding monthly visit for the HIV negative partner. The sample consisted of 685 couples with 485 couples from Zambia and 198 couples from Rwanda. Eligibility criteria followed that of the parent study. In addition, the survey had to be completed by both partners within 20 days of each other. Upon completion, couples were reimbursed approximately three dollars in addition to their study visit reimbursement. Institutional Review Board approval was received by Emory University and the Rwanda and Zambia ethic review boards.

Based upon formative research, the behavioral questionnaire was developed specifically for this population of couples aware of their serodiscordant status with ongoing access to free male condoms and risk reduction counseling. Domains covered in the survey included sexual behavior, HIV-related beliefs and knowledge, and condom use. In Zambia, questions were translated into Nyanja and back-translated into English. In Rwanda, questions were translated into Kinyrwanda and French and back-translated into English. Medical staff members were trained in behavioral data collection. The survey was pilot-tested by 25 serodiscordant couples at each site and revisions made.

Quality control measures were implemented at the data collection and data entry phases. Data error reports were run during the data collection process which guided ongoing training of the medical and data staff.

**Measures**

*Supportiveness towards condom use in the last three months*

We were interested in the supportiveness towards condom use at the individual-, partner-, and couple-level in the last three months. At each level, a composite variable was created (Figure 3.1). Individual-level: a series of three questions investigated how often the respondent was supportive, resistant, and angry/violent towards condom use. Response options were 'often', 'sometimes', and 'never'. A composite variable was created by identifying individuals who responded positively to all three questions (i.e. 'never angry', 'never resistant', and 'often supportive') versus those that did not. Partner-level: a similar series of three questions investigated the respondent's perception of how often their partner's behavior had been supportive, resistant, and angry/violent towards condom use. Response options and creation of the partner-level composite variable were the same as for the individual-level variable. Couple-level: With the respondent's self-report of supportiveness and their partner's perception of their supportiveness, we were able to compare these responses to identify couples in which both partners were found to be supportive and their spouses perceived them as supportive versus couples in which non-supportiveness was reported by at least one partner (alpha=0.76). This couple-level variable served as the dependent variable for bivariate and multivariate analyses.

*Individual- and couple-level characteristics*

Retrieved from the parent study's demographic data, measures included respondent's sex, current age (continuous), years of cohabitation (continuous), years since enrollment (continuous), country of residence (Zambia or Rwanda), and direction of infection (who is the HIV positive and negative partner in the relationship).

*Behavioral measures*

When appropriate, variables that were not dichotomous were collapsed to contrast the response options that are protective towards HIV infection and not protective.

*Sexual behavior* questions included perceived risk of HIV transmission to the negative partner, occurrence of condom breakage, condom skills, and desire for children. Each is described below. Perceived risk: One item assessed the chance that the negative partner would become HIV positive in the next 12 months based upon condom use in the last 12 months (or since study enrollment if it had been less than 12 months). Response options were 'very high chance', 'somewhat high chance', or 'low chance'. The categories 'low chance' and 'somewhat high/high chance' were used for the analysis. Condom breakage: One item was used to assess condom breakage in the last three months (yes/no). Condom skills assessment scale: Respondents demonstrated how to put a male condom onto a model penis and verbally reported how the condom would be removed and disposed of properly. Interviewers had a 12-step condom skills checklist in which they assessed if each skill was performed correctly (yes/no). Scale range was 0-12 with a higher score representing more skills successfully completed (alpha=0.78). Desire for children scale: Three questions assessed the desire for the couple to have a child by the respondent, their partner, and family/friends. Response options were 'yes', 'no', and

'do not know' which were recoded as 'no' and 'yes/do not know'. Items were summed (range: 0-3) with a higher score representing higher desire (alpha=0.82).

*HIV-related beliefs* were investigated by ten questions. Response options included 'yes', 'no', and 'do not know' which were dichotomized as noted below for each question. Questions included: (1) can a couple be serodiscordant (yes/no); (2) does your partner believe that a couple can be serodiscordant ('yes' versus 'no/do not know'); (3) did you believe the serodiscordant test results when you first received them (yes/no); (4) did your partner believe the serodiscordant test results when s/he first received them ('yes' versus 'no/do not know'); (5) would it be easier for your relationship if both of you were HIV positive (yes/no); (6) is it acceptable for a wife to insist that her husband use a condom (yes/no); and (7) is it acceptable for a husband to have unprotected sex with his wife after she refuses (yes/no). Three questions assessed the beliefs that the exchange of genital fluids is important to maintain the health of the man, woman, and fetus. Response options of 'yes', 'no', and 'I think so' were collapsed as 'no' versus 'yes/I think so' and summed (range: 0-3). A higher score illustrated correct knowledge that fluid exchange is not necessary to maintain health (alpha=0.70).

*HIV-related knowledge* was assessed by ten questions. We investigated the knowledge of when a woman is most likely to become pregnant if she is sexually active. Response options included: a week before menstruation, during menstruation, a week after menstruation, halfway between periods, anytime/it does not matter, and do not know. Responses were dichotomized into the correct answer of 'halfway between periods' versus all other responses. Other knowledge questions included: are there drugs or a vaccine that prevent transmission, does traditional medicine protect against HIV

infection, and does male circumcision benefit an HIV negative woman or HIV positive man. The response options of 'yes', 'no', and 'I think so' were recoded as 'no' versus 'yes/I think so'. Three questions inquired if HIV transmission can occur without the presence of genital sores, whether male circumcision benefits an HIV negative man, and whether condoms protect from HIV infection. The response options of 'yes', 'no', and 'I think so' were also recoded into 'yes' versus 'no/I think so'.

*Reasons for non-use of condoms in the last three months* were investigated. Response options were 'yes' and 'no'. Reasons for non-use included: afraid to suggest condom use; was not part of the decision-making process; alcohol drinking was involved; genital sores were not present so thought it was safe; wanted to have a baby; religious beliefs; there was little friction because the vagina was wet so thought it was safe; did not think transmission would happen; desired the sensation of 'skin to skin' sex; condom-related issues (i.e. had run out, condoms were not close by, wanted to take a break from use, lost erection, took condom off and continued having sex); and other.

**Analysis**

*Individual- and couple-level characteristics*

Means, standard deviations, and ranges are presented by country and sex for age, years of cohabitation, and years since study enrollment. Percentages are presented by country and sex for the direction of infection.

*Behavioral measures*

Frequencies, means, and standard deviations are presented by country and sex. Percentages are presented by country and sex for supportiveness towards condom use in the last three months at the individual-, partner-, and couple-level. Bivariate analyses

were conducted by first merging Zambian and Rwandan data into sex-specific groups. Each predictor was then tested against the dependent variable of couple-level supportiveness for condom use. Variable inclusion for model building was determined by a $p<0.10$ significance level and a distribution of responses that included a count of five or more per cell. Using SAS 9.2 (Cary, North Carolina, USA), logistic regression was performed to identify predictors associated with couple-level supportiveness towards condom use in the last three months.

## RESULTS

### Sample characteristics

Mean age of Zambian women was 32.4 years (SD= 6.9) and 30.4 years (SD= 6.3) for Rwandan women (Table 3.1). The mean age of Zambian men was Zambia: 38.8 years (SD= 8.2) and 35.3 years (SD= 8.0) for Rwandan men. Zambian couples had been cohabiting longer (9.9 years) than Rwandan couples (6.1 years), and had also been enrolled in the study longer (2.9 years versus 1.2 years). Both countries had slightly more couples in which the woman was the HIV positive partner in the relationship (Zambia: 58.8%; Rwanda: 52.0%).

### Descriptive analysis

*Supportiveness towards condom use in the last three months*

Individual-level supportiveness towards condom use was reported at a higher rate by women than men in both countries (Rwanda: 91.0%; Zambia: 85.5%). In both countries, husband's perception of wife's supportiveness was lower than women's self-report (Figure 3.2). Eighty seven percent of Rwandan men agreed with their wife regarding her supportiveness as did 74.5% of Zambian men.

Among men, supportiveness towards condom use was reported at a higher rate by Rwandans (91.2%) than Zambians (79.7%) as was their supportiveness according to their wives. Three-quarters of Rwandan women reported that their husband had been supportive as did 69.2% of Zambian women.

Couple-level supportiveness towards condom use (couples in which only supportive behavior and no resistance, angry, or violence was reported regarding condom use) was identified among 54.0% of Zambian couples and 67.4% of Rwandan couples. Among all couples, 58.0% met this criterion for couple-level supportiveness towards condom use.

*Sexual behavior*

Women's reported desire for children (either by self, partner, and/or family and friends) was similar between countries with just over one-third reporting desire (Zambia: 37.3%; Rwanda: 35.9%). Among men, 45.5% of Zambians reported a desire for a child compared to 35.4% of Rwandans (Table 3.2).

Perceived risk that the HIV negative partner would become infected in the next 12 months varied by country and sex. In Zambia, 17.4% of women and 11.2% of men reported a perceived risk. Rwanda was the opposite with 13.2% of women reporting a high risk versus 17.2% of men. Regarding condom breakage in the last three months, 20.5% of Zambian women and 9.6% of Rwandan women reported breakage. The condom skills assessment results were lower than expected as, on average, Zambian women completed 9.0 of the 12-steps of the condom skills assessment and Rwandan women completed 6.7 correct steps. Similarly, Zambian men reported three times as much condom breakage as Rwandan men (23.4% versus 8.1%) and successfully

completed an average of 9.0 of the 12 condom skills. Rwandan men completed 8.1 of the 12 skills successfully.

*HIV-related beliefs*

HIV-related beliefs varied by sex and countries. Women were similar regarding whether a couple could be serodiscordant (Rwanda: 97.0%; Zambia: 98.6%); whether their partner believed a couple could be discordant (93.9%; 97.1%); acceptance towards forced unprotected sex by a husband (6.1%; 6.8%); believing that the exchange of genital fluids is needed to maintain health (44.4%; 42.6%); and that a woman can insist that her husband use a condom (78.8%; 84.5%).

Regarding whether the respondent and partner initially believed their serodiscordant test results, 74.2% of Rwandan women reported they believed the results and 79.8% reported that their husband believed the results. In Zambia, 90.9% of women reported believing the test results and 89.3% reported that their husband believed the results. Interestingly, when asked if it would be easier if both partners were HIV positive, 16.3% of Zambian women responded positively whereas only 2.5% of Rwandan women reported so. Finally, when asked if it was okay for a woman to insist that her husband use a condom, 84.5% of Zambian women and 78.8% of Rwandan women responded positively.

Men were similar in their beliefs regarding whether a couple could be serodiscordant (Rwanda: 98.0%; Zambia: 99.4%); whether their partner believed that a couple could be serodiscordant (93.4%; 94.6%); acceptance towards forced unprotected sex by the husband (3.0%; 4.6%); and that a woman can insist that her husband use a condom (81.3%; 80.1%).

Regarding whether the respondent and partner initially believed their serodiscordant test results, 72.2% of Rwandan men believed the results and 74.2% reported that their wife believed the results. In Zambia, 93.2% men reported believing the results and 91.5% reported that their wife believed the results. When asked if it would be easier for the relationship if both partners were HIV positive, less than one percent of Rwandan men reported positively as did 26.1% of Zambian men. Finally, just over half of Zambian men (53.0%) and 43.2% of Rwandan men believed that the exchange of genital fluids was important to maintain health.

*HIV-related knowledge*

HIV knowledge was similar among women in both countries regarding whether there are drugs or a vaccine available to prevent transmission. Less than seven percent of Rwandan and Zambian women had incorrect knowledge. Among men, up to 12.8% of Zambians believed this to be true while less than seven percent of Rwandan men did.

Among men and women in both countries, there was confusion regarding who benefits from male circumcision, whether genital sores need to be present for HIV transmission to occur, and when during a woman's fertility cycle she is most likely to become pregnant. Thirteen percent of Zambian women believed that male circumcision protects an HIV negative woman and 17.2% of Rwandan women believed that it can protect an HIV positive man. Among men, approximately twelve percent of Zambians believed that male circumcision benefited an HIV negative woman and an HIV positive man. In Rwanda, 14.1% of men believed that it benefited an HIV positive man. Understanding that male circumcision is only beneficial to an HIV negative man was low

in both countries with less than one-quarter of women and men providing correct responses.

Men and women in both countries also had a great misunderstanding of the impact of genital sores upon HIV transmission. More than half of Zambian women (56.9%) and one-third of Rwandan women (36.6%) believed that genital sores needed to be present for HIV transmission to occur as did 43.3% of Zambian men and 29.8% of Rwandan men. Regarding knowledge of a woman's fertility cycle, less than five percent of Zambian women (4.1%) and just over a quarter of Rwandan women (27.3%) were correct as were only 3.9% of Zambian men and 14.7% of Rwandan men.

*Condom use in the last three months*

Reasons for non-use of condoms in the last three months were similar among women in both countries. The most often reported reason was that the husband decided that they would have unprotected sex and the woman did not have a choice (Zambia: 14.1%; Rwanda: 9.6%). This was followed by alcohol use (8.9%; 6.1%), did not think that transmission would happen (6.8%; 3.0%), and wanted to have a baby (6.7%; 3.0%).

Men's reasons for lack of condom use were very different between countries. Zambian men reported that the greatest reason was due to drinking (7.4%), followed by wanting the feeling of 'skin to skin' sex (6.8%), desire of a baby (4.8%), and having run out of male condoms (4.3%). Rwandan men reported fewer reasons for interruption of condom use. The greatest reason for disruption was the desire for the feeling of 'skin to skin' sex (4.1%), followed by drinking (2.5%), and wanting a baby (2.5%).

**Bivariate analyses**

The bivariate relationship was assessed for the dependent variable of couple-level supportiveness towards condom use and all independent variables for women and men (Table 3.3). Low couple-level supportiveness was associated with two demographic characteristics: being Zambian ($p<0.01$) and the woman being the HIV positive partner in the relationship ($p<0.05$).

For both sexes, three of the four sexual behavior variables were significantly associated with low couple-level supportiveness for condom use. These included: the desire to have children (women: $p< 0.001$; men: $p< 0.001$), perceived risk that the HIV negative partner would become infected in the next 12 months (women: $p< 0.001$; men: $p< 0.001$), and having experienced condom breakage in the last three months (women: $p< 0.001$; men: $p<0.05$). A quarter of the women (24.8%) and the men (24.8%) who had low couple-level supportiveness towards condom use experienced condom breakage in comparison to 13.6% of women and 16.9% of men who had a high couple-level supportiveness towards condom use. Similarly, a quarter of the women (25.4%) and one-fifth of the men (19.5%) with low supportiveness reported a perceived risk that the HIV negative partner will become infected in the next twelve months in comparison to 13.6% of women and 16.9% of men with high couple-level support.

Only one HIV-related belief was associated with low couple-level support. Approximately seven percent (6.7%) of men who reported low supportiveness also reported that it was acceptable for a husband to have unprotected sex after the woman refuses versus 3.0% of men who had high couple-level supportiveness ($p< 0.01$). Associations with HIV-related knowledge and low couple-level supportiveness towards condom use varied between men and women. For men, the only item significantly

associated with low supportiveness was not believing that condoms protect ($p<0.05$). For women, two items were associated with low supportiveness for condom use. Women who reported low supportiveness were more likely to believe that traditional medicine can protect from HIV (3.8% versus 1.1%) ($p<0.05$) and that there is a drug that the HIV positive partner could take to prevent transmission (9.0% versus 3.3%) ($p<0.01$).

Among men and women's reasons why condoms had not been used in the last three months, nearly every response was significantly associated with low couple-level supportiveness towards condom use. Due to small cell count (less than five per cell) none of the significant items were included in model building and the bivariate findings should be interpreted with caution.

**Logistic regression**

Table 3.4 presents the results of the logistic regression model identifying predictors of couple-level supportiveness for condom use. Men's desire for a child resulted in greater likelihood of being in a relationship with low supportiveness (OR: 1.3; CI: 1.1-1.4; $p<0.01$). Men and women who perceived that the HIV negative partner was at high risk for infection in the next 12 months had an increased likelihood for low couple-level supportiveness for condom use. Men's perceived risk resulted in a 3.0 fold increase in odds of being in a relationship with low supportiveness (OR: 3.0; CI: 1.8-5.1; $p<0.001$) while women's perceived risk resulted in 2.2 times increase (OR: 2.2; CI: 1.4-3.6; $p<0.01$). Men and women who believed that it is acceptable for a husband to force his wife to have unprotected sex were far more likely to have low couple-level supportiveness, with even greater risk when reported by the woman (OR: 3.9; CI: 1.1-8.8; $p<0.01$) in comparison to the man (OR: 2.6; CI: 1.1-6.3.; $p<0.05$). Women who reported

condom breakage in the last three months were also more likely to be in a relationship with low supportiveness (OR: 1.7; CI: 1.1-2.7; $p<0.05$) as were women who believed there was a drug that an HIV positive person could take to prevent transmission (OR: 2.5; CI: 1.6-5.4; $p<0.05$). Finally, for couples in Zambia, the odds of being in a relationship with low supportiveness towards condom use was 1.6 compared to Rwandan couples (OR: 1.6; CI: 1.1-2.4; $p<0.05$). .

**DISCUSSION**

Serodiscordant couples contribute a significant proportion of HIV incident infections within generalized epidemics (UNAIDS & World Health Organization, 2009) and greater understanding is needed regarding the influences upon consistent and correct condom use among this sub-population of HIV-affected people. This cross-sectional study sought to investigate two important aspects of condom use behavior among heterosexual serodiscordant couples: (1) the prevalence of supportiveness towards condom use in the last three months at the individual-, partner-, and couple-level and (2) predictors for couple-level support towards condom use. First, we found that couple-level support for condom use was considerably lower than self-reported levels of support. Second, the identification of predictors for couple-level supportiveness towards condom use included influences from each of the levels that we investigated: individual characteristics, couple dynamics, and socio-cultural factors.

*Prevalence of supportiveness towards condom use in the last three months*

At the individual-level, more than ninety percent of Rwandans and eighty percent of Zambians reported supportiveness towards condom use. When the husband and wife's responses were compared to their partner's perception of their supportiveness, two-thirds

of Rwandan couples and just over half of Zambian couples were found to have been supportive in the last three months.

These findings are important for two reasons. First, we had expected to find greater supportiveness towards condom use particularly as the respondents were already participating in an HIV research study that promoted condom use and provided free male condoms. Lower than expected supportiveness was largely driven by the lack of agreement between the respondent's self-reported supportiveness and their partner's perception of their supportiveness, illustrating the need for further research on couple dynamics that affect sexual behavior including communication, partner perceptions, and couple agreement. This lack of agreement also suggests a disconnect in couples' communication. Couple's communication may be one of the most important variables in predicting condom use (Amaro, 1995; Painter, 2001) and has been associated with lower levels of distress within a relationship (Remien, Wagner, Dolezal, & Carballo-Diéguez, 2003) and improved coping skills (Bunnell et al., 2005). Typically, HIV prevention efforts have been focused upon individuals, rather than couples, thus failing to account for the nature of sexual behaviors and joint risk reduction (Amaro, 1995; Harvey, 2000). Our findings highlight the importance of couple-level prevention efforts to improve couple's communication and behavior management skills specific to condom use.

Second, the differing perspectives of the respondent's supportiveness and their partner's perception of their supportiveness illustrates that individual-level data did not accurately reflect couple-level supportiveness. This highlights the importance for couple-level data collection to become the gold standard for the investigation of couple-level behaviors. Had we depended upon only one partner's reporting of supportiveness

towards condom use, couple-level support in each country would have been overestimated by twenty to thirty percent. Unfortunately, sexual behavior studies are commonly based upon individual-level reporting and individual risk factors rather than focusing upon both members of the relationship dyad (Amaro & Raj, 2000; Becker, 1996; Harvey, Beckman, & Doty, 1999; Painter, 2001; Skurnick, Abrams, Kennedy, Valentine, & Cordell, 1998). Among studies that have assessed couples' responses regarding sexual relationships and HIV risk, lower than expected couple agreement and inaccurate partner perceptions have been found (Becker, 1996; Ellen, Vittinghoff, Bolan, Boyer, & Padian, 1998; Niccolai, Farley, Ayoub, Magnus, & Kissinger, 2002; Seal, 1997).

*Predictors for couple-level supportiveness towards condom use*

Our second area of investigation was predictors for couple-level supportiveness towards condom use. Eight predictors were identified that spanned multiple levels of influence. These included individual characteristics (personal desire for children and incorrect knowledge about the availability drugs to prevent HIV transmission), couple dynamics (partner's desire for children, perceived risk, condom breakage), and socio-cultural factors (family and friends' desire for children and acceptance of forced unprotected sex). Aside from residing in Zambia, each risk factor can be largely mitigated. In addition, the assessment of couple-level agreement of sexual behaviors and beliefs, such as perceived risk of HIV infection and condom breakage, can provide immediate insight into the couple's sexual environment and aid in the identification of couples struggling with consistent condom use.

Our bivariate and logistic regression results supported previous studies that investigated barriers to condom use among populations knowledgeable of mutual serostatus and infective risk. These barriers included: partner refusal (Harvey et al., 1999; Rispel, Metcalf, Moody, & Cloete, 2009; Semple, Patterson, & Grant, 2002; Skurnick et al., 1998), not asking for a condom to be used (Semple et al., 2002); alcohol use (Jones, Ross, Weiss, Bhat, & Chitalu, 2005; Kennedy et al., 1993; Marks, Burris, & Peterman, 1999; Schiltz & Sandfort, 2000; Skurnick et al., 1998; Wingood et al., 2004); sexual coercion (van der Straten, King, Grinstead, Serufilira, & Allen, 1995), physical violence, distress, and hostility (Kalichman, 2000; Kennedy et al., 1993; Marks et al., 1999; Schiltz & Sandfort, 2000; Skurnick et al., 1998; Wingood et al., 2004); power differential (Cusick & Rhodes, 2000; Gorbach & Holmes, 2003; Kalichman, 2000; Orubuloye, Caldwell, & Caldwell, 1993); perceived risk (Marks et al., 1999), and desire for children (Malamba et al., 2005; Panozzo, Battegay, Friedl, Vernazza, & Swiss Cohort, 2003; Rispel et al., 2009; Schiltz & Sandfort, 2000; Van Devanter, Cleary, Moore, Thacker, & O'Brien, 1998; Wesley, 2005).

The desire for children continues to exist among people living with HIV (Chen, Philips, Kanouse, Collins, & Miu, ; Klein, Pena, Thornton, & Sauer, 2003; Nakayiwa et al., 2006; Panozzo et al., 2003; Rispel et al., 2009; Ryder et al., 2000; Thornton, Romanelli, & Collins, 2004; VanDevanter et al., 1999), particularly within sub-Saharan Africa where a high value is put upon childbearing (Allen, 2005; Allen et al., 2003; Allen et al., 1993; King et al., 1995; Malamba et al., 2005; Panozzo et al., 2003; Schiltz & Sandfort, 2000; Van Devanter et al., 1998; Wesley, 2005). Addressing the desire for children among serodiscordant couples could further aid condom use supportiveness.

With more than one-third of respondents reporting a desire for a child, our findings highlight a globally neglected area of HIV prevention among affected populations: the lack of HIV-related reproductive counseling messages or programmatic guidance (de Bruyn, 2004; Harries et al., 2007; Paiva, Filipe, Santos, Lima, & Segurado, 2003; Rispel et al., 2009). Standardized HIV-related reproductive counseling protocols and risk-reduction approaches are needed, such as those proposed by Barreiro et al (2007) and Matthews et al (2009), so that couples choosing to forgo condom use for pregnancy attempts can do so with sufficient HIV and reproductive knowledge to minimize transmission risks such as when a woman is most likely to become pregnant during her fertility cycle (Delvaux & Nostlinger, 2007).

The occurrence and cultural acceptance of forced unprotected sex and lack of sexual decision-making by the woman is not unique to HIV-affected populations (Garcia-Moreno, Jansen, Ellsberg, Heise, & Watts, 2006) but with the added infection risk of unprotected sex with a known HIV positive partner, intimate-partner violence (IPV) must be addressed as part of couple-level HIV prevention. Counseling on CCCU is of limited value in settings where one partner is forced to have sex against her or his will (Martin & Curtis, 2004). With forced unprotected sex the most common reason reported for lack of condom use in the last three months by women in both countries, greater understanding of the intersection between intimate partner violence, condom refusal, and sexual risk-taking is needed (Dunkle et al., 2004) particularly among this population so that condom promotion is utilized effectively as an HIV prevention strategy.

Inaccurate HIV knowledge and beliefs were identified. Topics requiring clarification included who benefits from male circumcision, when a woman is most likely

to become pregnant during her fertility cycle, whether HIV transmission can occur without the presence of genital sores, and whether the exchange of genital fluids is important to maintain the health of the man, woman, and/or fetus. It is necessary for intervention efforts to ensure discussion of such culturally-specific beliefs and recognize that such topics may require additional support to encourage change. Also, with more than twenty percent of Zambian men and women reporting that it would be easier for their relationship if both partners were HIV positive, understanding why such a belief is present, whereas it is not in Rwanda, is greatly needed.

Lastly, additional condom use skill-building is needed to improve proficiency and reduce condom breakage as approximately twenty percent of Zambian and ten percent of Rwandan men and women reported breakage in the last three months. We had expected less reported breakage and higher performance of condom skills due to participation in the parent study. This highlights the importance of not assuming that long-term condom users and previously trained individuals are correctly using the condoms. Rather, it would be beneficial to have such skills reviewed and assessed periodically. Correct condom skills is one of the most important skills for serodiscordant couples to have and for health care providers to ensure. Efforts to increase condom use become irrelevant if condom use skills are not strong. As HIV-affected individuals seek health care, it is important that health care providers use this opportunity to ensure that individuals have the basic skills to protect themselves from HIV infection.

There are limitations present in this study. First, the serodiscordant couples enrolled in the parent study are a convenience sample with a high level of exposure to risk reduction counseling and access to free male condoms and knowledgeable of their

mutual serostatus. Generalizations to serodiscordant couples in Africa are limited. Social desirability may have impacted responses as the parent study promotes condom use and respondents may not have felt comfortable reporting lack of use. Attempts were made to modify this impact through the training of interviewers on the importance of building rapport with the client, assuring the client there were no right or wrong answers, and creating a non-judgmental environment.

With serodiscordant couples contributing a high proportion of incident HIV infections in regions of the world with a generalized epidemic, the investigation of individual, couple, and socio-cultural factors that disrupt CCCU is a critical step in the development of HIV prevention. Prevention typically highlights the successful increase of condom use among HIV positive persons and at-risk individuals (Jones et al., 2005; Moore et al., 2001; Wingood et al., 2004) however much less focus has been placed on the behaviors and influences at the couple-level necessary for CCCU to prevent infection to a regular partner. To tackle couple-level prevention and close the behavioral gap between HIV serostatus knowledge and CCCU, further investigation of cultural beliefs and sex roles as well as partner and couple dynamics is needed to understand when and why lapses of condom use occur.

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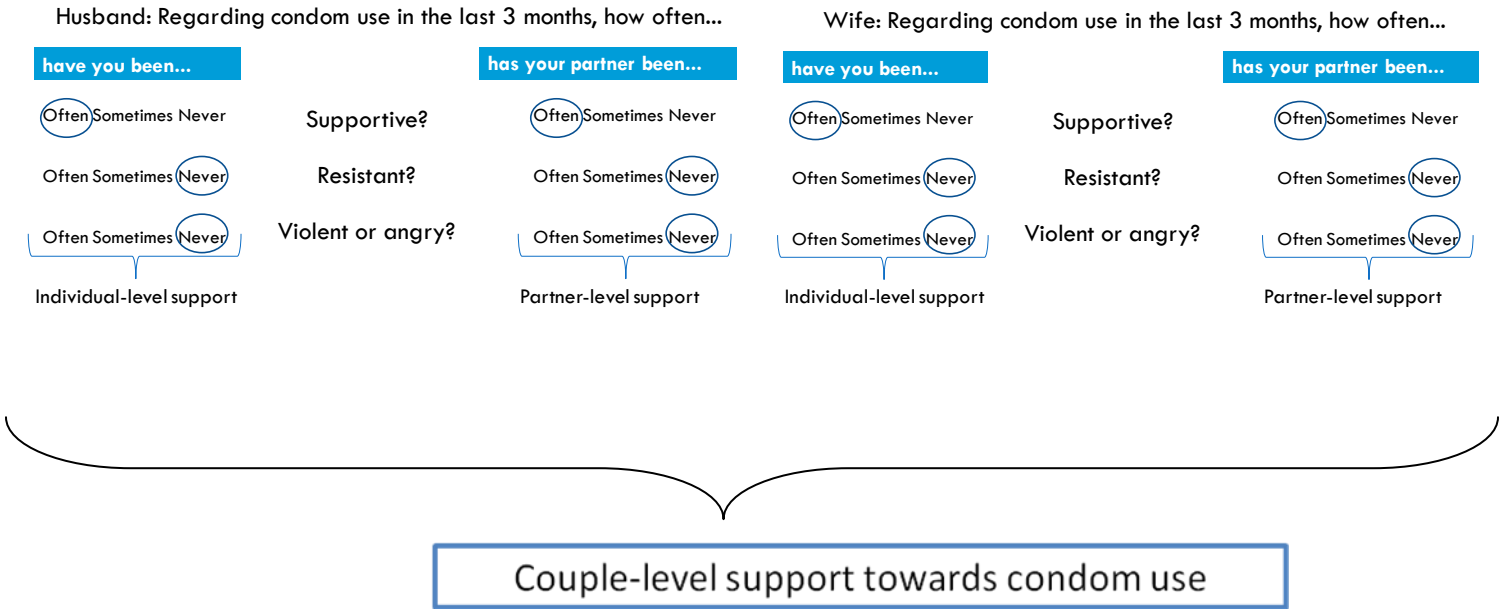


Figure 3.1. Construction of dependent variable, supportiveness towards condom use, based upon the husband and wife's responses and couple agreement among heterosexual serodiscordant couple in Lusaka, Zambia and Kigali, Rwanda.

Table 3.1. Individual- and couple-level characteristics of heterosexual serodiscordant couples in Lusaka, Zambia and Kigali, Rwanda

| | Women % or mean (SD) | | Men % or mean (SD) | |
|---|---|---|---|---|
| | Zambia (n=485) | Rwanda (n=198) | Zambia (n=485) | Rwanda (n=198) |
| Current age | 32.4 (6.9) | 30.4 (6.3) | 38.8 (8.2) | 35.3 (8.0) |
| Range | 18-52 | 21-47 | 24-68 | 23-62 |
| Years of cohabitation | * | * | 9.9 (6.7) | 6.1 (4.9) |
| Range | | | 0-34 | (1-22 |
| Years since CVCT/study enrollment | 2.9 (6.7) | 1.2 (0.7) | 2.9 (6.7) | 1.2 (0.7) |
| Range | 0-34 | 0-2 | 0-34 | 0-2 |
| Direction of infection | | | | |
| Woman HIV positive, man HIV negative | 58.8 | 52.0 | 58.8 | 52.0 |
| Man HIV positive, woman HIV negative | 41.2 | 48.0 | 41.2 | 48.0 |

*Question only asked to men

Figure 3.2. Individual-, partner-, and couple-level supportiveness towards condom use in the last three months among heterosexual serodiscordant couples inLusaka, Zambia and Kigali, Rwanda

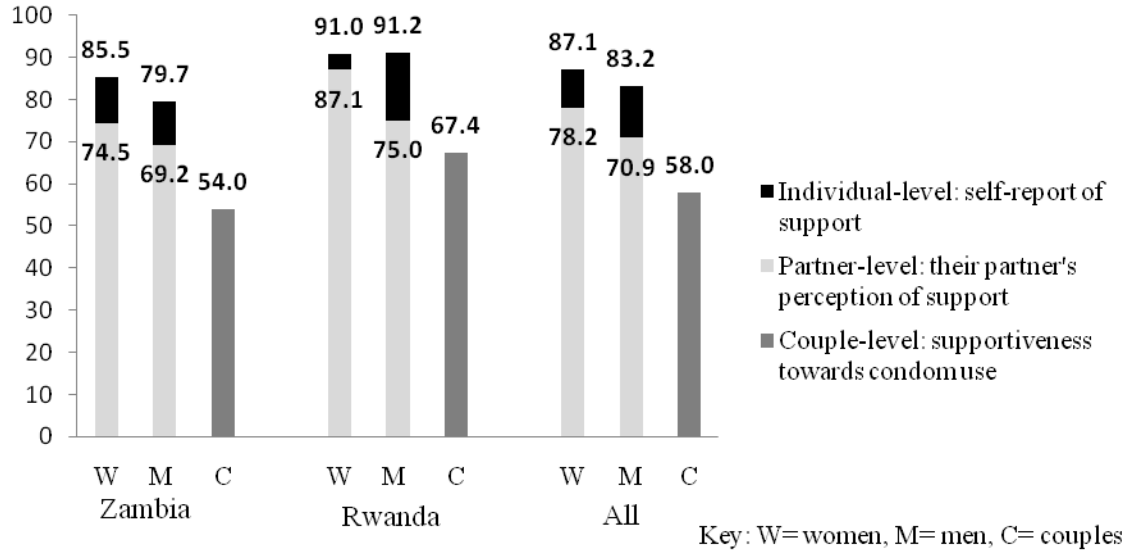

Table 3.2. Individual- , partner-, and couple-level characteristics of heterosexual serodiscordant couples in Lusaka, Zambia and Kigali, Rwanda

| | Women % or mean (SD) | | Men % or mean (SD) | |
|---|---|---|---|---|
| | Zambia (n=485) | Rwanda (n=198) | Zambia (n=485) | Rwanda (n=198) |
| *Sexual behavior* | | | | |
| Desire for a child (by self, partner, and/or family/friends) | 37.3 | 35.9 | 45.4 | 35.4 |
| Desire for child scale (range 0-3) | 0.8 (1.2) | 0.6 (0.9) | 1.0 (1.2) | 0.6 (0.9) |
| HIV negative partner is at 'high' risk for infection in the next 12 months | 17.4 | 13.2 | 11.2 | 17.2 |
| Male condoms skills assessment (range: 0-12) | 9.0 (3.0) | 6.8 (2.6) | 9.0 (2.0) | 8.1 (2.2) |
| Experienced condom breakage in the last three months | 20.5 | 9.6 | 23.4 | 8.1 |
| *HIV-related beliefs* | | | | |
| Believes that a couple can be serodiscordant | 98.6 | 97.0 | 99.4 | 98.0 |
| Partner believes that a couple can be serodiscordant | 97.1 | 93.9 | 94.6 | 93.4 |
| Initially believed serodiscordant test results | 90.9 | 74.2 | 93.2 | 72.2 |
| Partner initially believed serodiscordant test results | 89.3 | 79.8 | 91.5 | 74.2 |
| Believes it would be easier if both partners were HIV positive | 16.3 | 2.5 | 26.1 | 0.5 |
| It is acceptable for a wife to insist that her husband use a condom | 84.5 | 78.8 | 80.1 | 81.3 |
| It is acceptable for a husband to have unprotected sex after wife refuses | 6.8 | 6.1 | 4.6 | 3.0 |
| Exchange of genital fluids during sex is important for health | 42.6 | 44.4 | 53.0 | 43.2 |
| Genital fluid exchange scale (range 0-3) | 2.1 (1.2) | 2.0 (2.2) | 1.9 (1.2) | 2.1 (1.2) |
| *HIV-related knowledge* | | | | |
| There is a drug that the HIV+ partner can take to prevent transmission | 6.2 | 4.6 | 12.8 | 6.6 |
| There is a drug that the HIV- partner can take to prevent transmission | 5.2 | 5.1 | 9.1 | 3.0 |
| There is a vaccine that protects from HIV infection | 5.2 | 3.0 | 9.1 | 2.5 |
| Traditional medicine can protect from HIV infection | 2.7 | 2.0 | 5.8 | 1.5 |
| Male circumcision can benefit an HIV- woman from infection | 13.4 | 5.1 | 12.2 | 7.1 |
| Male circumcision can benefit an HIV+ man | 9.7 | 17.2 | 12.8 | 14.1 |
| Male circumcision can benefit an HIV- man from infection | 23.3 | 18.7 | 24.3 | 21.2 |
| Genital sores are needed to transmit the virus to the negative partner | 56.9 | 36.6 | 43.3 | 29.8 |
| Knows when a woman is likely to become pregnant during fertility cycle | 4.1 | 27.3 | 3.9 | 14.7 |
| Condoms protect from HIV infection | 93.6 | 100.0 | 94.2 | 97.5 |
| *Reasons why condoms were not used in the last 3 months*[#] | | | | |
| It was not respondent's decision, partner decided | 14.1 | 9.6 | 3.7 | 0.5 |
| Did not think HIV transmission would happen | 6.8 | 3.0 | 2.1 | 1.5 |
| Wanted to have the feeling of 'skin to skin' sex | 4.7 | 0.5 | 6.8 | 4.1 |
| Wanted to take a break from using condoms | 0.8 | 2.0 | 2.5 | 1.0 |
| Afraid to suggest using a condom | 2.5 | 0.5 | 0.6 | 0.5 |
| One or both had been drinking | 8.9 | 6.1 | 7.4 | 2.5 |
| Condoms were not close by | 1.0 | 1.5 | 1.9 | 1.0 |
| Started with a condom but took off and continued having sex | 1.7 | 0.5 | 0.8 | 0.5 |
| Ran out of condoms | 3.3 | 0.5 | 4.3 | 2.0 |
| Religious beliefs do not support condom use | 0.4 | 0.5 | 0.2 | 0.5 |
| There was little friction ('wet sex') so thought it was safe | 2.5 | 1.0 | 1.2 | 1.5 |
| Erection did not last after condom was put on | 0.8 | 1.0 | 0.6 | 0.0 |
| There were no genital sores so thought it was be safe | 0.8 | 1.0 | 1.2 | 0.5 |
| Wanted to have a baby | 6.7 | 3.0 | 4.8 | 2.5 |
| Other | 0.2 | 1.0 | 0.6 | 0.0 |

[*]Multiple responses allowed

Table 3.3. Association between individual- , partner-, and couple-level characteristics and supportiveness towards condom use among heterosexual serodiscordant couples in Lusaka, Zambia and Kigali, Rwanda

| | All women (n=635) % or mean (SD) | | | All men (n=635) % or mean (SD) | | |
|---|---|---|---|---|---|---|
| | Low support | High support | p-value | Low support | High support | p-value |
| *Demographics* | | | | | | |
| Current age | 31.7 (6.8) | 31.8 (6.8) | 0.78 | 37.4 (8.5) | 37.9 (8.2) | 0.47 |
| Years of cohabitation | 8.8 (6.6) | 8.7 (6.3) | 0.93 | 8.8 (6.6) | 8.7 (6.3) | 0.93 |
| Years since CVCT/study enrollment | 2.3 (2.5) | 2.3 (2.6) | 0.53 | 2.3 (2.5) | 2.3 (2.6) | 0.53 |
| Direction of infection | | | 0.04 ‡ | | | 0.04 ‡ |
| Woman HIV positive, man HIV negative | 61.8 | 53.8 | | 61.8 | 53.8 | |
| Man HIV positive, woman HIV negative | 38.2 | 46.2 | | 38.2 | 46.2 | |
| Country | | | <0.01 ‡ | | | <0.01 ‡ |
| Zambia | 77.2 | 65.8 | | 77.2 | 65.8 | |
| Rwanda | 22.9 | 34.2 | | 22.9 | 34.2 | |
| *Sexual behavior* | | | | | | |
| Desire for a child scale (range: 0-3) | 1.0 (1.2) | 0.6 (1.1) | <0.001 ‡ | 1.1 (1.3) | 0.7 (1.1) | <0.001 ‡ |
| HIV negative partner is at 'high' risk for infection in the next 12 months | 25.4 | 9.8 | <0.001 ‡ | 19.5 | 7.6 | <0.001 ‡ |
| Condoms skills assessment scale (range: 0-12) | 8.3 (3.2) | 8.4 (3.0) | 0.75 | 8.6 (2.1) | 8.7 (2.1) | 0.40 |
| Experienced condom breakage in the last three months | 24.8 | 13.6 | <0.001 ‡ | 24.8 | 16.9 | 0.01 ‡ |
| *HIV-related beliefs* | | | | | | |
| Believes that a couple can be serodiscordant | 98.1 | 98.4 | 0.82 | 99.6 | 98.4 | 0.14 |
| Partner believes that a couple can be serodiscordant | 98.9 | 96.5 | 0.70 | 94.4 | 94.3 | 0.96 |
| Initially believed serodiscordant test results | 86.9 | 85.1 | 0.51 | 88.4 | 85.1 | 0.23 |
| Partner initially believed serodiscordant test results | 87.3 | 85.6 | 0.55 | 88.4 | 85.1 | 0.23 |
| Believes it would be easier if both partners were HIV positive | 15.7 | 10.6 | 0.06 ‡ | 21.8 | 16.6 | 0.10 ‡ |
| It is acceptable for a wife to insist that her husband use a condom | 85.4 | 81.8 | 0.23 | 78.2 | 82.1 | 0.23 |
| It is acceptable for a husband to have unprotected sex after wife refuses | 10.9 | 2.5 | <0.001 | 6.8 | 2.5 | 0.01 ‡ |
| The exchange of genital fluids is important for health scale (range: 0-3) | 2.1 (1.2) | 2.1 (1.2) | 0.19 | 1.9 (1.2) | 1.9 (1.2) | 0.60 |
| | 0.9 | 0.9 | | 1.1 | 1.1 | |
| *HIV-related knowledge* | | | | | | |
| There is a drug that the HIV+ partner can take to prevent transmission | 9.0 | 3.3 | <0.01 ‡ | 11.6 | 10.3 | 0.61 |
| There is a drug that the HIV- partner can take to prevent transmission | 6.7 | 4.1 | 0.14 | 9.0 | 6.3 | 0.19 |
| There is a vaccine that protects from HIV infection | 6.0 | 3.0 | 0.06 ‡ | 8.7 | 6.0 | 0.20 |
| Traditional medicine can protect from HIV infection | 3.8 | 1.1 | 0.02 | 5.2 | 4.1 | 0.49 |
| Male circumcision can benefit an HIV- woman from infection | 11.2 | 10.3 | 0.71 | 12.7 | 9.2 | 0.16 |
| Male circumcision can benefit an HIV+ man | 10.5 | 12.5 | 0.45 | 12.7 | 23.6 | 0.75 |

Table 3.3. continued

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Male circumcision can benefit an HIV- man from infection | 71.5 | 76.0 | 0.20 | | 71.9 | 73.9 | 0.57 | |
| Genital sores are needed to transmit the virus to the negative partner | 55.1 | 48.8 | 0.12 | | 38.6 | 37.5 | 0.78 | |
| Knows when a woman is likely to become pregnant during fertility cycle | 10.1 | 12.0 | 0.47 | | 7.5 | 6.8 | 0.73 | |
| Condoms protect from HIV infection | 93.6 | 96.5 | 0.10 | ‡ | 93.3 | 97.0 | 0.03 | ‡ |
| *Reasons why condoms were not used in the last 3 months* | | | | | | | | |
| It was not respondent's decision, partner decided | 31.2 | 1.1 | <0.001 | | 6.4 | 0.5 | <0.001 | |
| Did not think HIV transmission would happen | 13.5 | 0.5 | <0.001 | | 4.1 | 0.3 | 0.00 | |
| Wanted to have the feeling of 'skin to skin' sex | 8.2 | 0.3 | <0.001 | | 13.9 | 1.1 | <0.001 | |
| Wanted to take a break from using condoms | 2.6 | 0.3 | 0.01 | | 4.9 | 0.3 | <0.001 | |
| Afraid to suggest using a condom | 4.9 | 0.0 | <0.001 | | 1.1 | 0.3 | 0.18 | |
| One or both had been drinking | 18.7 | 1.1 | <0.001 | | 13.2 | 1.4 | <0.001 | |
| Condoms were not close by | 2.6 | 0.3 | 0.01 | | 3.0 | 0.5 | 0.01 | |
| Started with a condom but took off and continued having sex | 3.0 | 0.3 | 0.00 | | 1.5 | 0.3 | 0.08 | |
| Ran out of condoms | 4.9 | 0.8 | 0.00 | | 8.3 | 0.5 | <0.001 | |
| Religious beliefs do not support condom use | 0.8 | 0.0 | 0.10 | | 0.4 | 0.3 | 0.82 | |
| There was little friction ('wet sex') so thought it was safe | 4.9 | 0.3 | <0.001 | | 3.4 | 0.0 | 0.00 | |
| Erection did not last after condom was put on | 2.3 | 0.0 | 0.00 | | 1.1 | 0.0 | 0.04 | |
| There were no genital sores so thought it was safe | 1.9 | 0.3 | 0.04 | | 2.3 | 0.0 | 0.00 | |
| Wanted to have a baby | 13.9 | 0.0 | <0.001 | | 9.5 | 0.6 | <0.001 | |
| Other | 0.5 | 0.0 | 0.04 | | 0.3 | 0.2 | 0.38 | |

‡ Variable met model inclusion criteria ($p<0.10$ and each cell had at least five respondents)

Table 3.4. Predictors of couple-level supportiveness for condom use and key characteristics among serodiscordant couples in Lusaka, Zambia and Kigali, Rwanda (n=629) (p= <0.0001)

| | Odds Ratio | 95% CI | p-value |
|---|---|---|---|
| Men: Desire for child | 1.25 | 1.1 - 1.4 | $p<0.01$ |
| Men: The HIV negative partner is at 'high' risk for infection in the next 12 months | 3.00 | 1.8 - 5.1 | $p<0.001$ |
| Woman: The HIV negative partner is at 'high' risk for infection in the next 12 months | 2.20 | 1.4 - 3.6 | $p<0.01$ |
| Men: It is acceptable for a husband to have unprotected sex after wife refuses | 2.58 | 1.1 - 6.3 | $p<0.05$ |
| Women: It is acceptable for a husband to have unprotected sex after wife refuses | 3.93 | 1.7 - 8.8 | $p<0.001$ |
| Women: There is a drug that the HIV+ partner can take to prevent transmission | 2.49 | 1.2-5.4 | $p<0.05$ |
| Women: Experienced condom breakage in the last three months | 1.71 | 1.1 - 2.7 | $p<0.05$ |
| Country: Zambia | 1.63 | 1.1 - 2.4 | $p<0.05$ |

# CHAPTER #4:

## Desire for children and its impact upon condom use among heterosexual serodiscordant couples in Zambia and Rwanda


## ABSTRACT

**Background:** Heterosexual serodiscordant couples in resource-limited settings face a risk of HIV transmission from the infected partner to the negative partner. With 43-93% of HIV transmissions in Africa occurring within cohabitating adults and 80% of HIV positive people in their reproductive years, little is known of the fertility desires and pregnancy attempts of this significant sub-population of HIV-affected people.

**Methods:** From April to August 2009, a cross-sectional study was conducted among heterosexual serodiscordant couples in Kigali, Rwanda (n=198) and Lusaka, Zambia (n=485) to assess fertility desires at the individual- and partner-level, sexual behaviors related to pregnancy attempts, and couple-level agreement regarding these issues. Men and women were interviewed separately by trained medical staff. For analysis, four groups of couples were created to compare each item by country (Zambia and Rwanda) and direction of infection (whether the man or woman was the HIV positive partner). Couple-level agreement was assessed by percentages, Cohen's kappa and p-value, and conditional probability.

**Results:** In each of the four groups, the desire for children was consistently reported although discrepancies existed between individual responses and couple-level agreement. At the individual-level, a considerable proportion of respondents reported desiring a child (8.4%-31.9%) although couple agreement was considerably lower (4.2%-15.1%).

Inaccurate perception of the spouse's desire for a child ranged from 15.5%-30.9% of couples. External pressure by family and friends for the couple to have children was reported by many (12.6%-35.1%) even when the couple's serostatus had been disclosed (8.3%-50.8%). Current condom use interruption for pregnancy attempts was reported by up to one-third of couples desiring a child (10.0%-32.4%) yet couples' knowledge of a woman's fertility cycle was extremely low (0.4%-5.3%).

**Conclusions:** With the identification of continued fertility desires and associated condom use interruption for pregnancy, reproductive counseling for HIV-affected couples continues to be a critical unmet need. The development and global adoption of standardized counseling protocols is urgently required. In addition, reproductive HIV risk reduction measures need to become standard-of-care and integrated into HIV counseling and testing. The overestimating of partner's desire for a child highlights the need for further research on couples' dynamics and communication as well as the development of couple-level behavioral interventions. Finally, couple-level data collection should become the gold standard to assess couple-level behaviors as individual-level data did not accurately represent couple-level dynamics.

## INTRODUCTION

Heterosexual serodiscordant couples in resource-limited settings face a risk of HIV transmission from the infected partner to the negative partner and, in the case of pregnancy, from the infected mother to the child. With an estimated 43-93% of HIV transmissions in Africa occur within cohabitating adults (Dunkle et al., 2008; Gelman, Kenya, Oguya, Cheluget, & Haile, 2009; Mngadi et al., 2009; Wabwire-Mangen, Odiit, Kirungi, Kisitu, & Wanyama, 2009) and 80% of HIV positive people in their reproductive years (Bendikson, Anderson, & Hornstein, 2002), little is known of the fertility desires and pregnancy attempts of this significant sub-population of HIV-affected people.

Numerous studies have found that childbearing desires continue among HIV-affected individuals, driven by personal, partner, societal, and cultural influences, thus creating additional barriers to consistent condom use (Allen et al., 2003; Bell et al., 2007; Chen, Philips, Kanouse, Collins, & Miu, 2001; Cooper, Harries, Myer, Orner, & Bracken, 2007; Dyer, Abrahams, Hoffman, & van der Spuy, 2002; Frodsham, Boag, Barton, & Gilling-Smith, 2006; Harries et al., 2007; London, Orner, & Myer, 2008; Moyo & Mbizvo, 2004; L. Myer & Morroni, 2005; Nebie et al., 2001; Paiva et al., 2007; Panozzo, Battegay, Friedl, Vernazza, & Swiss Cohort, 2003; Santos, Ventura-Filipe, & Paiva, 1998; Stephenson & Griffioen, 1996). Furthermore, up to 80% of HIV-affected couples have engaged in unprotected sex to attempt pregnancy (Klein, Pena, Thornton, & Sauer, 2003).

Serodiscordant couples that lack access to technology-assisted reproductive services to reduce the risk of transmission, such as sperm washing and artificial

insemination, face reproductive-related decisions that pit the risk of infection against the desire for a child. Greater understanding of fertility-related influences and behavior can aid in the development of primary and secondary prevention programs for this high-risk population.

Zambia and Rwanda have experienced very different HIV epidemics. In Zambia, 16.1% of women and 12.3% of men are HIV positive as are 14.7% of women in union and 11.6% of pregnant women (Central Statistical Office, Ministry of Health, Tropical Diseases Research Centre, University of Zambia, & and Macro International, 2009). Of the 19.2% of couples that are HIV-affected, more than half (11.2%) are in serodiscordant relationships. The capital city of Lusaka has a higher HIV prevalence with 22.4% of women and 19.0% of men infected. Of the 33.6% of couples HIV-affected, more than half (18.0%) are serodiscordant couples.

In Rwanda, the HIV prevalence is considerably lower with 3.6% of women and 2.3% of men HIV positive as are 2.8% of women in union and 2.2% of pregnant women (Institut National de la Statistique du Rwanda & ORC Macro, 2006). Of the 3.9% of couples that are HIV-affected, more than half (2.2%) are in serodiscordant relationships. The capital city of Kigali has a higher HIV prevalence with 8.0% of women and 5.2% of men infected. Of the 10.3% of couples HIV-affected, more than half (5.8%) are serodiscordant couples.

The desire for children also varies by country. More than half of Zambian women (55.9%) and men (69.7%) reported a desire for a child (Central Statistical Office et al., 2009). When individuals who reported being ‘undecided’ were included, desire increased to 62.5% and 73.2% respectively. In Rwanda, 44.2% of women (Ministry of

Health, National Institute of Statistics of Rwanda, & Macro., 2009) and 52.4% of men (Institut National de la Statistique du Rwanda & ORC Macro, 2006) reported a desire for a child. When 'undecided' individuals were included, desire increased to 45.2% and 53.3% respectively.

In this paper we sought to assess the desire to have a child on multiple levels (respondent, partner, and family/friends) and sexual behaviors related to pregnancy attempts among cohabitating heterosexual couples in Zambia and Rwanda knowledgeable of their serodiscordant status. We compared men and women's responses at the individual-level, evaluated the accuracy of perceived spousal desire for a child, and assessed couple agreement.

## METHODS

### Procedures

This behavioral study was conducted in collaboration with a larger HIV clinical research program, the Rwanda Zambia HIV Research Group (RZHRG), which maintains cohorts of heterosexual serodiscordant couples in Lusaka, Zambia and Kigali, Rwanda. Eligibility for couple enrollment into the parent study included women 16-45 years old and men 16-65 years old, being of African descent, residing in the capital city of Lusaka, Zambia or Kigali, Rwanda, at least three months of cohabitation or marriage, and participation in couples' voluntary counseling and testing. The only exclusion criterion was antiretroviral drug use by the HIV positive partner. As part of the parent study, men and women were interviewed separately during study visits by trained medical staff at the research sites. The HIV negative partner was seen on a monthly basis and the HIV positive partner on a quarterly basis. Study visits included treatment for sexually

transmitted infections, collection of clinical and sexual behavior data, risk reduction counseling, access to free male condoms and long-acting contraception, and HIV testing for the HIV negative partner.

From April to August, 2009, a behavioral study was undertaken. Couple-based survey data were collected from serodiscordant couples in Lusaka, Zambia (n=485) and Kigali, Rwanda (n=198) during the HIV positive partner's quarterly visit and the corresponding monthly visit for the HIV negative partner. Eligibility criteria were the same as for the parent study. In addition, the survey had to be completed by both partners within 20 days of each other. Upon completion of the survey by both partners, couples were reimbursed approximately three dollars. Institutional Review Board approval was received by Emory University and Rwanda and Zambia ethics review boards.

The questionnaire was based upon formative research and developed specifically for this population of serodiscordant couples knowledgeable of their status with repeated exposure to risk reduction counseling and access to male condoms. Questions investigated fertility desires and sexual behavior related to pregnancy attempts. In Zambia, questions were translated into Nyanja and back-translated into English. In Rwanda, questions were translated into Kinyrwanda and French and back-translated into English. Medical staff members were trained in behavioral data collection. The survey was pilot-tested by 25 serodiscordant couples at each site with revisions made as necessary. Quality control measures were implemented at the data collection and data entry phases. Data error reports were run during the collection process which guided ongoing training of the medical and data staff.

**Measures**

*Individual- and couple-level characteristics*

Retrieved from the parent study's demographic data, measures included respondent's sex, current age (continuous), years of cohabitation (continuous), years since enrollment (continuous) and direction of infection (who the HIV positive partner is in the relationship).

*Survey*

Five questions investigated the desire for children (by self, their partner, and family/friends), how pregnancy desires were currently disrupting condom use, and knowledge of a woman's fertility cycle. For the conditional probability analyses conducted, dichotomous variables are preferred. Therefore, when appropriate, variables were recoded to distinguish between response options protective of HIV infection and not protective as noted below for each question.

*Desire for children* by the respondent, partner, and family/friends was assessed with three questions. Response options included 'yes', 'no', and 'do not know' which were recoded into 'no' and 'yes/do not know'. *Knowledge of the couple's serostatus by family and friends* who desired the couple to have children was asked to respondents who reported that they had experienced external pressure to have children (yes/no).

The *interruption of condom use by those who reported a desire to have children* (by self, their partner, or family/friends) was assessed by one item (yes/no). Finally, we asked *when a woman was most likely to become pregnant from one menstrual period to the next.* Response options included: a week before menstruation, during menstruation, a week after menstruation, halfway between periods, anytime, I do not know, and other.

Response options were recoded into the correct answer of ‘halfway between periods’ and all other responses.

**Analysis**

Four groups of couples were created to compare each item by country (Zambia and Rwanda) and direction of infection (who is the HIV positive partner). These groups were: (1) woman positive/man negative in Zambia (n=285); (2) man positive/woman negative in Zambia (n=200); (3) woman positive/man negative in Rwanda (n=103); and (4) man positive/woman negative in Rwanda (n=95).

*Characteristics of the respondents and couple*

Means, standard deviations, and ranges for age, years of cohabitation, and years since enrollment are presented by group.

*Survey*

Individual and couple-level analyses were conducted by group. Individual-level analysis is presented as percentages of men and women who agreed with each item. Couple-level analyses included the percent of couples who agreed positively and negatively to each item, Cohen’s kappa and p-value, and conditional probability. To derive the most accurate and complete perspective of the data, it is important to consider each of these statistical assessments as complementary information for each item.

The kappa statistic is a widely used measure of reliability for dichotomous outcomes which corrects for chance agreement (Fliess, Levin, & Cho Paik, 2003; Kraemer, Periyakoil, & Noda, 2002). Landis and Koch’s nomenclature of kappa values was followed: 0.0 to 0.39 indicates low agreement; 0.40 to 0.74 indicates fair, and 0.75 and greater denotes excellent agreement (Landis & Koch, 1977). It should be noted that

when the binary variables have asymmetric data, kappa statistics can convey incomplete and possibly misleading information as well as be overly conservative when derived from behaviors that occur at either high or low base-rates (Cicchetti & Feinstein, 1990; Kraemer & Bloch, 1988; Ochs & Binik, 1999).

Conditional probability assesses the probability of one partner's response given the other partner's response (Fliess et al., 2003; Ochs & Binik, 1999). Direction of the agreement is determined by the positive and negative probability results. Positive conditional probability (CP+) is the likelihood that both members of the couple reported that an event or behavior occurred (Harvey, Bird, Henderson, Beckman, & Huszti, 2004). Negative conditional probability (CP-) is the likelihood that the couple reported that an event or behavior did not occur.

Due to skip patterns in the survey, we were unable at times to assess the true level of couple agreement as doing so required both partners to respond similarly to filter questions. When partners responded differently to such questions, the couple was removed from the analysis (due to the missing data of the partner that skipped) prior to assessing couple agreement. Although we were unable to adjust for discrepant responses between partners seen in the skip patters in a manner that allowed for statistical comparisons, we were able to descriptively report such information and feel that its inclusion provides further insight into couple agreement.

Individual- and couple-level results are summarized by group first and then by topic. Data were analyzed using SAS version 9.2 (Cary, North Carolina, USA) and Microsoft Excel 2007 (Redmond, Washington, USA).

**RESULTS**

**Sample demographics**

*Zambia*

Mean age of men and women were comparable between couples in which the woman was the HIV positive partner (W+/M-) and the man was the positive partner (M+/W-). Men were approximately 38 years old (W+/M- men: 39.2 years; M+/W- men: 38.2 years) and women were 32 years old (W+/M- women: 32.5 years; M+/W- women: 32.2 years) (Table 4.1). Mean years of cohabitation was slightly longer for couples where the HIV positive partner was the man rather than the woman (11.1 years versus 9.1 years). Couples in both groups had been enrolled in the parent study for approximately for three years (W+/M- years enrolled: 2.8; M+/W- years enrolled: 3.2).

*Rwanda*

Men and women's ages were similar between groups. The mean age of men was approximately 35 years old (W+/M- men: 34.9 years; M+/W- men: 35.8 years) and approximately 30 years old for women (W+/M- women: 30.8 years; M+/W- women: 30.1 years). Similar to Zambia, couples in which the man was the HIV positive partner had been in relationship slightly longer than W+/M- couples (6.7 years versus 5.4 years). Couples in both groups had been enrolled for 1.2 years (SD 0.7).

**By group**

*Zambia: HIV positive women (n=285)*

Individual-level responses identified differences regarding the desire for a child (Table 4.2). Men were more likely to desire a child than their HIV positive wives (31.9% versus 26.7%). Among the 43.5% of couples that had at least one partner report a desire for a child, only 15.1% of couples were in agreement, resulting in two-thirds of couples

in disagreement (28.4%). Just of half of couples (56.5%) were in agreement that they did not desire additional children.

We also investigated the accuracy of perceived spousal desire for a child and found that nearly one-third of couples were in disagreement (Figure 4.1). This was largely driven by respondents who inaccurately believed that their spouse desired a child when s/he did not. When comparing the husband's desire to his wife's perception of his desire, half of the couples (50.2%) agreed that the husband did not desire a child and 20.0% were in agreement he did. Of the 29.8% of couples in disagreement regarding his desire, 17.9% were due to the wife believing the husband desired a child when he did not. Regarding the wife's desire, 51.6% of couples agreed on no further desire and 17.5% agreed on desire. Of the 30.9% of couples with incongruent responses, 21.8% were due to the husband believing that his wife desired a child when she did not.

When asked if any family or friends desired the couple to have a child, husbands were more likely to report outside pressure (35.1%) than their wives (25.3%). Fifteen percent of couples (15.1%) reported that both had experienced pressure and 30.2% of couples had one partner report external pressure while the other did not. Just over half of the couples were in agreement about having felt no external pressure (54.7%).

Women were more likely than men to disclose their serodiscordant status to family and friends who desired the couple to have children (50.8% versus 38.2%). Less than a quarter of couples (22.2%) had both partners report disclosure leaving 44.5% of couples without mutual disclosure. Due to skip patterns, when one partner reported pressure and the other did not, both partners were removed from the analysis for the following question regarding disclosure. This resulted in 65 of 101 possible couple

(64.4%) removed. With their inclusion, only 7.9% of couples (n=8) had mutual disclosure and 80.2% of couples (n=81) did not.

When asked if the desire for a child by the respondent, their partner, or family/friends had currently disrupted their condom use, twice as many women reported interruption than men (32.4% versus 13.7%) resulting in only 5.5% of couples in positive agreement (where both partners reported 'yes' to the question) and 43.8% in disagreement. Upon adjusting for the filtering of 76 of the 149 possible couples (51.0%), couple agreement dropped to 2.7% (n=4) and disagreement increased to 72.5% of couples (n=108).

All men and women were asked when a woman is most likely to become pregnant. Approximately five percent of men (4.6%) and women (5.3%) correctly reported that it was "halfway between periods" with less than 1% of couples in correct agreement.

*Zambia: HIV positive men (n=200)*

Individual-level responses identified differences regarding the desire for a child (Table 4.3). Men were more likely to desire a child than their HIV negative wives (31.0% versus 21.0%). Among the 38.0% of couples that had at least one partner report a desire for a child, only 14.0% of couples were in agreement, resulting in nearly two-thirds of couples in disagreement (24.0%). Almost two-thirds of couples (62.0%) were in agreement that they did not desire additional children.

Regarding partner perceptions, 57.5% of couples agreed that the husband did not desire a child and 16.0% agreed he did (Figure 4.1). Similarly, 59.0% of couples agreed that the wife had no further desires and 14.5% agreed she did. For men and women's

desires, one-quarter of partners (26.5% and 26.5%) had inaccurate perceptions of their spouse's desire for a child, resulting in 20.0% of men overestimating their wife's desire and 11.5% of women overestimating their husband's desire.

Men and women reported similar outside pressure to have a child (26.5% and 25.5%, respectively) resulting in 11.5% of couples in which both partners experienced outside pressure and one-fourth of couples (29.0%) with only one partner reporting pressure. Men (40.9%) and women (42.1%) were also similar in disclosure of their status to desiring family and friends although only 42.1% of couples had mutually disclosed. More than one-third of couples (36.8%) had neither partner disclose their status and 21.1% of couples had one partner do so. It should be noted that this over represents couple agreement due to differences in partners' response to the filter question as 44 of the 63 possible couples (69.8%) were in disagreement of the filter question and removed from analysis. After adjusting, 12.7% of couples (n=8) had both partners mutually disclose their serostatus and 76.2% of couples (n=48) had only one partner report disclosure.

Men and women reported similarly regarding current interruption of condom use due to pregnancy desires (17.8% and 18.5%, respectively). Yet, only 5.7% of couples were in positive agreement leaving more than one-quarter of couples (28.6%) in disagreement. Filtering removed 57 of 92 of possible couples (62.0%). When these couples were included, only 2.2% of couples (n=2) were in agreement with 72.8% in disagreement (n=67).

There was a great misunderstanding of when a woman is most likely to become pregnant. Approximately three percent of men (3.0%) and women (2.5%) reported

correctly that it was ‘halfway between periods’ with less than 1% of couples in correct agreement.

*Rwanda: HIV positive women (n=103)*

Individual-level responses were similar regarding the desire for a child (Table 4.4). Women were slightly more likely to desire a child than their HIV negative husbands (18.5% versus 14.6%). Among the 24.2% of couples that had at least one partner report a desire for a child, only 8.7% of couples were positive agreement, resulting in nearly two-thirds of couples in disagreement (15.5%). Three-fourths of couples (75.7%) were in agreement that they did not desire additional children.

Perception of partner’s desire for a child was greatly overestimated among men and women. For husband’s desire, 64.1% of couples agreed that there was no future desire and 13.6% agreed upon desire (Figure 4.1). Of the 22.3% of incongruent responses, 21.4% of women believed that the husband wanted a child when he did not. Regarding the wife’s desire, 68.9% of couples agreed on no further desire and 15.5% agreed on desire. Of the 15.5% of couples in disagreement, 12.6% of men believed that their wife desired a child when she did not.

Similar individual-level trends among men and women were reported when asked if family or friends desired the couple to have a child. Approximately twenty percent of men (19.4%) and women (20.4%) reported external pressure to have a child although only 9.7% of couples were in agreement. Twenty percent of couples (20.4%) had only one partner reporting external pressure. More women had disclosed the couple’s HIV status to desiring family and friends than men (43.8% versus 31.3%) resulting in 25.0% of couples in which both partners had disclosed their results. Adjusting for the skip

pattern's removal of 16 of 24 of possible couples (66.7%), only 8.3% (n=2) of couples had by partners reporting disclosure leaving 75.0% of couples (n=18) in which only one partner had disclosed.

When asked if the desire for a child by the respondent, their partner, or family/friends had currently impacted their condom use, nearly twice as many women than men (17.7% versus 10.0%) reported interruption resulting in only 9.5% of couples in positive agreement. Fourteen percent of couples (14.3%) disagreed on current interruption. With 22 of 43 of possible couples (51.2%) removed due to incongruent responses to the filter question, when included, positive couple agreement dropped to 4.7% (n=2) and 58.1% (n=25) of couples were in disagreement.

Regarding when a woman is most likely to become pregnant, couples had a great misunderstanding. Women were twice as likely to be correct (25.2%) than men (12.6%) resulting in only 3.9% of couples in correct agreement.

*Rwanda: HIV positive men (n=95)*

Individual-level responses regarding the desire for a child varied between men and women (Table 4.5). Men were more likely to desire a child than their HIV negative wives (14.7% versus 8.4%). Among the 18.9% of couples that had at least one partner report a desire for a child, only 4.2% of couples were agreement, resulting in three-quarters of couples in disagreement (14.7%). Four-fifths of couples (81.1%) were in agreement that they did not desire additional children.

Regarding the accuracy of perceived spousal desire for a child, couple disagreement was driven by the belief that the spouse desires a child when s/he did not. Seven percent of couples (7.4%) agreed that the man desired a child and 71.6% of

couples agreed he did not. Of the 21.1% of couples in disagreement, 13.7% were due to the woman believing the husband desired a child when he did not. Regarding the woman's desire, 68.4% of couples agreed that the woman did not want a future child while 5.3% agreed she did. Of the 26.3% of couples in disagreement, 23.2% were due to the husband believing that his wife desired a child when she did not (Figure 4.1).

Although men and women reported comparably about family and friends desiring the couple to have a child (12.6% versus 14.7%), only 2.1% of couples reported both partners having experienced external pressure. Interestingly, men reported much greater disclosure of the couple's status to family and friends than their HIV negative wives (22.2% versus 8.3%) resulting in no couples in agreement.

Current interruption of condom use due to the desire for a child was reported similarly between men and women (22.7% versus 23.5%) although only 14.3% of couples were in agreement, leaving 28.6% of couples disagreeing. Due to filtering, 25 of 32 possible couples removed due to filtering (78.1%) and, with their inclusion, positive couple agreement dropped to 3.1% (n=1) and disagreement increased to 84.4% (n=27).

Finally, nearly twice as many women were aware of when a woman was most likely to become pregnant than men (29.5% versus 16.8%) with only 5.3% of couples in correct agreement.

**By topic**

At the individual-level, a considerable proportion of respondents reported desiring a child (8.4%-31.9%) although couple agreement was considerably lower (4.2%-15.1%). Inaccurate perception of the spouse's desire for a child ranged from 15.5%-30.9% of couples. Couples in agreement that they did not desire additional children ranged from

56.5%-81.1%. External pressure by family and friends for the couple to have children was reported by many (12.6%-35.1%) even when the couple's serostatus had been disclosed (8.3%-50.8%). Current condom use interruption for pregnancy attempts was reported by up to of couples desiring a child (10.0%-32.4%) yet couples' knowledge of a woman's fertility cycle was extremely low (0.4%-5.3%).

*Desire for a child and perception of partner's desire*

The desire for a child remained for individuals in serodiscordant couples (8.4%-31.9%), particularly in Zambia, although couple agreement towards the desire for child was lower at 4.2%-15.1%. Regardless of serostatus, Zambian men and women reported greater desire for a child than Rwandans. Zambian couples also had greater couple disagreement than Rwandans (approximately twenty-five percent versus fifteen percent). For three of the four groups, the HIV positive partner was more likely to desire a child than their negative partner.

Men's desire for a child was higher than women's for all groups except for M+/W- couples in Rwanda. Interestingly, men's desire for a child did not vary by serostatus in either country. In Zambia, about one-third of all men desired a child as did about 15% of Rwandan men. Women's desire varied by serostatus in both countries with desire being higher among W+/M- couples than M+/W- couples (Zambia: 26.7% versus 21.0%; Rwanda: 18.5% versus 8.4%).

Women's perception of their husband's desire for a child resulted in 20-30% of couples in disagreement and women overestimating their husband's desire in three of the four groups. A particularly interesting finding was among W+/M- couples in Rwanda in which nearly all the incongruent responses were due to the woman wrongly believing that

her husband desired a child. Men's perception of their wife's desire for a child also resulted in low agreement and was overestimated by all groups. Approximately twenty percent of Zambian men in both groups wrongly believed their wife desired a child (W+/M- couples: 21.8; M+/W- couples: 20.0%). In Rwanda, men's belief regarding their wife's desire for a child differed by serostatus. When the man was positive, 23.2% of men wrongly believed their wife desired a child whereas when the woman was HIV positive only 12.6% of men wrongly believed there was desire. Overall, W+/M- couples in Rwanda had the least disagreement regarding the wife's desire for a child (15.5%). The three remaining groups were considerably higher with 26.3%-30.9% of couples in disagreement.

*External pressure to have a child*

External pressure to have children was reported by many individuals (12.6%-35.1%) and even among those who had disclosed the couple's serostatus (8.3%-50.8%). All groups had 20-30% of couples with one partner reporting pressure while the other did not. More Zambian men and women reported external pressure than Rwandan men and women. In both countries, men and women in W+/M- relationships reported more pressure than those in M+/W- relationships.

When asked if the family and friends who desired the couple to have a child knew of the couples' serodiscordant status, results varied greatly. Women of W+/M- couples had disclosed their status more than their HIV negative husbands or M+/W- couples. This led to nearly half of Zambian couples with an HIV positive wife (44.5%) having one partner who had disclosed and the other had not. Rwandan W+/M- couples followed a similar but not as extreme pattern with a 25.0% having only one partner who had

disclosed the couple's serodiscordant status. Among M+/W- couples, 21.1% of Zambian couples had only one partner who had disclosed and in Rwanda, no couples had mutually disclosed.

*Condom use interruption due to pregnancy attempts*

Current condom interruption due to personal, partner, or external desires for pregnancy was reported. Current interruption was reported by 10.0%-32.4% of individuals. More than half of the possible couples (51.2%) were removed from the analysis due to differing responses to the filter question. Once adjustments were made, there was overwhelming disagreement in both countries. Approximately three-fourths of Zambian couples were in disagreement regarding whether pregnancy desires were currently disrupting condom use. In Rwanda, 58.1% of couples in which the woman was the HIV positive partner and 84.4% of couples where the man was the positive partner were also in disagreement.

*Fertility cycle knowledge*

Knowledge of when a woman is most likely to become pregnant during her fertility cycle was extremely low in both countries. Zambians, regardless of sex or serostatus were largely unaware of the fertility cycle with about five percent of men and women reporting accurately. In Rwanda, more than one-fourth of women knew when a woman was most likely to become pregnant which was double that of men. Less than one percent of Zambian couples were correct as were about 5% of Rwandan couples.

**DISCUSSION**

With a significant proportion of HIV infections occurring within serodiscordant couples in Africa (UNAIDS & World Health Organization, 2009), greater understanding

is needed regarding childbearing desires and associated interruption of consistent condom use. We conducted a cross-sectional study among heterosexual serodiscordant couples in Kigali, Rwanda and Lusaka, Zambia to assess fertility desires at the individual- and partner-levels, sexual behavior related to pregnancy attempts, and couple agreement regarding these issues. We investigated these issues in four groups of respondents based on country (Zambia and Rwanda) and who was the positive partner in the relationship (husband or wife).

Our findings were of particular interest for three reasons: (1) individual-level responses did not accurately reflect couple agreement, (2) the identification of continued fertility desires and associated condom use interruption, and (3) the inaccurate perceptions of partner desire for children and fertility cycle knowledge.

*Comparison of individual-level responses and couple-level agreement*

With the collection of both partners' responses, we assessed couple-level agreement and found it to be considerably lower than individual-level responses. Such discrepancies between individual-level responses and couple-level agreement illustrate that assessing only one partner in a couple may not accurately reflect the other partner's responses or the sentiment of the couple, a critical aspect when asking couples to engage in behaviors that to some extent require mutual agreement. Among Zambian and Rwandan couples that had at least one partner reporting a desire for child, about two-thirds of men and women differed in their personal desire for a child, perception of their spouse's desire for a child, and their family and friends' desire for the couple to have a child. Among couples with at least one partner reporting outside pressure to have a child, less than one-fifth of couples had both partners disclose the couple's serodiscordant

status. Likewise, of couples that had at least one partner reporting current pregnancy attempts, less than one-fifth of couples were in agreement.

Previous studies have investigated couple-level agreement and found varied outcomes. Whereas some studies found individual-level responses to be reliable measures at the couple-level (Harvey et al., 2004; Ochs & Binik, 1999; Padian, Aral, Vranizan, & Bolan, 1995; Seal, 1997; Upchurch et al., 1991; Witte, El-Bassel, Gilbert, Wu, & Chang, 2007), we found that men and women differed in responses. At the individual-level, up to one-third of respondents reported desiring a child (8.4%-31.9%) and experiencing external pressure to have a child (12.6%-35.1%) even when the couple's serodiscordant status had been disclosed (8.3%-50.8%). Likewise, up to one-third of couples desiring a child were currently trying to become pregnant (10.0%-32.4%). In comparison to the above individual-level responses, couple agreement was considerably lower for each topic. For example, couple agreement regarding the desire for a child ranged from 4.2%-15.1% of couples. Likewise, only 5.5%-14.3% of couples agreed they were currently trying to become pregnant and 2.1%-15.1% of couples had both partners report experiencing outside pressure for a child.

We found that individual-level responses provided a limited, if not, inaccurate viewpoint whereas the couple-level data provided additional and complementary perspectives that were critical to understanding couple-related behaviors and attitudes. Such findings support that couple-level reporting provides the most reliable measure of partnership-related dynamics and that couple agreement cannot be assumed even within long-term and cohabiting relationships (Anglewicz, Bignami-Van Assche, Clark, & Mkandawire, Becker, 1996; Chen et al., 2001; de Walque, 2007; Ellen, Vittinghoff,

Bolan, Boyer, & Padian, 1998; Niccolai, Farley, Ayoub, Magnus, & Kissinger, 2002; Seal, 1997; Stoner et al., 2003; Witte et al., 2007). The collection of couple-level data should be considered the gold standard for couple-related behaviors unless previous research justifies individual-level data for couple-level inferences. Targeting couple-level behavior based upon individual-level data has become an acceptable mismatch of research methodology and, ultimately, is a disservice to the partnerships that we aim to better understand and aid.

*Continued fertility desires and associated condom use interruption*

A consistent theme of continued fertility desires and associated condom use interruption was reported by all groups regardless of country or direction of infection. Similar to earlier studies, we found that the desire for children remains among HIV-affected persons (Allen et al., 2003; Bendikson et al., 2002; Chen et al., 2001; Frodsham et al., 2006; Landon Myer, Morroni, & Rebe, 2007; Nebie et al., 2001; Paiva et al., 2007; Panozzo et al., 2003; Rispel, Metcalf, Moody, & Cloete, 2009; Santos et al., 1998; Stephenson & Griffioen, 1996), particularly in Zambia. With that said, reproductive desires reported in our study were lower than the general population in Zambia (married men: 63.3%; married women: 55.9%) (Central Statistical Office et al., 2009) and Rwanda (married men: 52%, married women: 44%) (Institut National de la Statistique du Rwanda & ORC Macro, 2006), suggesting that childbearing intentions may be modified but not eliminated with an HIV positive status (Cooper, Harries, Myer, Orner, & Bracken, 2007). But, the desire for children may also be higher among serodiscordant couples then reported here as our study population excluded couples in which the HIV positive partner was on antiretroviral medication (ARV) and use of ARVs may enhance fertility desires

due to improved health (Chen et al., 2001; Cooper, Harries, Myer, Orner, & Bracken, 2007; Harries et al., 2007; Maier et al., 2009; Vernazza, Hollander, Semprini, Anderson, & Duerr, 2006).

When asked about current pregnancy attempts, a surprising 10.0%-32.4% of respondents desiring a child reported in the positive. This infective risk is further underscored by the expected need for repeated sexual exposures to achieve conception and that HIV positive women experience lower fertility than HIV negative women (Ross et al., 2004).

Similar to other studies (Beyeza-Kashesya, 2009; London et al., 2008), we also found that couples in both countries experienced pressure from family and friends to have a child, with particularly high rates in Zambia where more than a quarter of men and women reporting pressure. We found that outside pressure continued even for those who had disclosed the couple's serostatus to those who desired them to have a child. Childbearing is a socio-cultural expectation that many individuals and couples are expected to fulfill (Bell et al., 2007; Cooper, Harries, Myer, Orner, & Bracken, 2007; Dyer et al., 2002; Harries et al., 2007; London et al., 2008; Moyo & Mbizvo, 2004; L. Myer & Morroni, 2005; Paiva et al., 2007) that seemingly overpowers the realities of HIV infection.

With the identification of strong continued fertility desires and pregnancy attempts, the desire for a child by HIV-affected couples needs to be addressed with some urgency. The reproductive needs of HIV-affected couples have been largely overlooked even though 80% of HIV positive people are in their reproductive years and many will

have to make reproductive-related decisions after awareness of their status (Bendikson et al., 2002).

*Inaccurate perceptions of partner desire for children and HIV-related knowledge*

A surprising finding was the considerable number of individuals who had an inaccurate perception of their partner's desire for a child (15.5%-30.9%) highlighting the need for improved partner communication as part of HIV prevention. Heys et al found that among HIV-affected couples in rural Uganda, 32% of respondents overestimated their spouse's desires for a child and 36% underestimated desire (Heys, Kipp, Jhangri, Alibhai, & Rubaale, 2009). Such misconceptions could result in unnecessary interruption of condom use as partner's desire for children can significantly impact fertility desires and pregnancy attempts (Forsyth et al., 2002; Forsyth, Davis, Freudigman, Katz, & Zelterman, 2002; Paiva, Filipe, Santos, Lima, & Segurado, 2003; Paiva et al., 2002; Sherr & Barry, 2004).

We were also surprised at the low level of knowledge regarding when a woman is most likely to become pregnant during her menstrual cycle. This lack of knowledge coincided with the finding that the most common approach to condom disruption to attempt pregnancy was the spontaneous stoppage of condom use versus the risk reduction method of attempting to 'time' unprotected sex with when a woman is most likely to become pregnant. Less than five percent of Zambian men and women had correct knowledge which was strikingly lower than the general population of Zambian women in which 23.5% were found knowledgeable (Central Statistical Office et al., 2009). Inversely, more than a quarter of Rwandan respondent (25.2%-29.5%) had correct knowledge which was considerably higher than the general population of Rwandan

women (13.1%) (Institut National de la Statistique du Rwanda & ORC Macro, 2006). We are unclear as to why our surveyed populations' responses were so different from the general population.

The reproductive needs of HIV-affected couples are a critical gap in HIV prevention. Serodiscordant couples are often caught between personal desires and cultural pressures to have children and a medical community that largely discourages pregnancies among HIV-affected persons (de Bruyn, 2004; Feldman & Maposhere, 2003; Paiva et al., 2003) even though HIV-related discrimination regarding fertility has been discouraged, if not considered unethical, for nearly ten years. In 2001, the U.S. Centers for Disease Control and Prevention (CDC) stated that the medical community should 'provide information and give support to any reproductive option for HIV-positive patients' (Centers for Disease Control and Prevention, 2001). Similar guidelines were established by the World Health Organization (WHO), the U.S. Department of Health and Human Services, and UNAIDS to support people with HIV to 'reproduce and freely decide whether, when and how often to do so' (Global Network of People Living with HIV et al., 2009; Perinatal HIV Guidelines Working Group, 2006; World Health Organzation European Region, 2006). HIV-related medical advice and counseling towards fertility decision-making and risk reduction should be provided prior to any attempts at pregnancy (Barreiro, Castilla, Labarga, & Soriano, 2007; Barreiro, del Romero et al., 2006; Barreiro, Duerr, Beckerman, & Soriano, 2006; Dhai & Noble, 2005) and should be considered an important aspect of secondary HIV prevention (Santos et al., 1998).

HIV-related stigma and discrimination regarding fertility exits among healthcare providers (de Bruyn, 2004; Feldman & Maposhere, 2003; Paiva et al., 2003) resulting in HIV-positive persons feeling ashamed, judged, or ignored thus negatively impacting care-seeking behavior (Cooper, Harries, Myer, Orner, & Bracken, 2007; Gruskin, Ferguson, & O'Malley, 2007; Harries et al., 2007; Ko & Muecke, 2006; London et al., 2008; Moyo & Mbizvo, 2004; Paiva et al., 2002; Panozzo et al., 2003; Santos et al., 1998; Shelton, 2001). Resistance by the medical community to discuss fertility matters also results in the lack of vital risk-reduction information provided to those who have already made the decision to attempt pregnancy. Such behavior by the medical community needs to be openly acknowledged and aggressively addressed so that attitudes supportive of secondary prevention can develop (Santos et al., 1998) while ending the mindset that healthcare providers are the decision-makers for fertility among HIV-affected populations (Shelton, 2001).

Instead of perceiving reproductive counseling as condoning or encouraging fertility among HIV-affected persons, healthcare providers have "an untapped and great opportunity and a unique position to support HIV positive clients to make responsible fertility decisions which would reduce HIV transmissions" (Beyeza-Kashesya, 2009). More so, couples that have discussed pregnancy intentions with health care providers were found to be three times more likely to use condoms (Beyeza-Kashesya, 2009). The medical community needs to encourage HIV-affected persons to discuss their reproductive plans with their health care providers (Harries et al., 2007; Matthews & Mukherjee, 2009; Tandler-Schneider et al., 2008). Lastly, with greater global access to ARVs, healthcare providers need to proactively address the needs of this newly expanded

segment of HIV positive persons that, with improved health, they may have renewed reproductive desires.

This paper does not argue that it is safe for HIV-affected persons to attempt pregnancy because transmission risks can be minimized; rather that it is the responsibility of healthcare providers to meet the reproductive needs of HIV-affected persons. This includes asking individuals about their reproductive plans in a non-judgmental manner, providing accurate and complete HIV-related reproductive information, and explaining how to minimize risks so that individuals can make their own decisions related to reproduction (Cooper, Harries, Myer, Orner, Bracken et al., 2007; Rispel et al., 2009).

To ensure access to information and support for HIV-positive people regarding their reproductive options, four key human rights principles have been identified (Gruskin et al., 2007). These include (a) being able to make non-coerced and autonomous decisions on sexuality and fertility; (b) having access to relevant information, counseling, and services tailored to such needs; (c) confidentiality and giving informed consent for all procedures; and (d) whenever possible, the opportunity to involve their partner in sexual and reproductive decision-making. Guided by such principles, detailed counseling protocols for HIV-affected persons desiring children have been proposed that address minimizing risks, enabling informed reproductive choices, understanding HIV and pregnancy-related risks, preparing for psychological impacts, and discussing the possibility of fostering or adopting (Barreiro et al., 2007; Matthews & Mukherjee, 2009). Such protocols provide a starting point for discussion directed towards development and adoption of a standard of care for reproductive counseling in this population.

Unfortunately, this lack of any standardized reproductive counseling message or universally adopted programmatic guidance represents a critical gap in HIV prevention (de Bruyn, 2004; Harries et al., 2007; Paiva et al., 2003). With knowledge that serodiscordant couples are attempting pregnancy and forgoing consistent condom use, inclusion of reproductive counseling is urgently needed as the standard of care for HIV-affected persons and it should be integrated into HIV counseling and testing services (Delvaux & Nostlinger, 2007). Universal adoption of HIV-related reproductive counseling could also reduce practitioner stigma, provide the necessary information and training for appropriate counseling, and allow such guidelines to be culturally adapted.

There are limitations present in this study. First, the parent study in which this behavioral study was in collaboration with was a convenience sample of serodiscordant couples enrolled in an HIV research program that includes access to free male condoms and repeated exposure to risk reduction counseling. Inferences to serodiscordant couples in the general population are limited. Second, an individual's responses may have been impacted by social desirability as information requested was sensitive and the questionnaire was administered during routine study visits where clients know they will be counseled on risk-reduction methods following reports of unprotected sex. However, interviewers were trained to encourage honest responses, create a non-judgmental environment, and to not counsel until completion of all data collection. Third, as our outcome was to assess couple agreement, couples in which both partners did not answer similarly to a filter question were excluded from statistical analyses resulting in partially incomplete assessment of couple agreement.

The desire for children exists among serodiscordant couples and results in the interruption of condom use, risking HIV transmission to the negative partner. With serodiscordant couples contributing a significant proportion of new infections, HIV-related reproductive counseling continues to be a critical gap in primary and secondary HIV prevention. Global effort is needed to ensure that healthcare providers are aware and respectful of the principles of reproductive rights (Santos et al., 1998) and have the information and tools to provide reproductive counseling to all patients regardless of serostatus (Rispel et al., 2009; Santos et al., 1998). In cooperation with WHO, UNAIDS, and CDC's recommendations that HIV-affected couples receive equivalent reproductive counseling, care, and treatment as the general population, explicit and standardized reproductive counseling policies need to be adopted at the global level. To ensure policy success, provider stigma must be addressed along with training to provide non-judgmental information and support. The importance of reproductive counseling prior to any pregnancy attempts cannot be stressed enough and needs to be implemented as standard-of-care for HIV individuals and as part of HIV counseling and testing services. In addition, behavioral interventions for HIV-affected couples are needed to address such issues as external pressures to have children even after serostatus disclosure and inaccurate perceptions of a partner's desire for a child.

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Table 4.1. Individual and couple-related demographics of heterosexual serodiscordant couples in Zambia and Rwanda

| | Age | | Years cohabiting* | | Years enrolled | |
|---|---|---|---|---|---|---|
| | Mean | SD (range) | Mean | SD (range) | Mean | SD (range) |
| Zambia: Woman HIV+/Man HIV- (n=285) | | | | | | |
| Women | 32.5 | 6.8 (19-52) | 9.1 | 6.3 (0-29) | 2.8 | 2.7 (0-14) |
| Men | 39.2 | 8.6 (24-68) | | | | |
| Zambia: Man HIV+/Woman HIV- (n=200) | | | | | | |
| Women | 32.2 | 7.1 (18-52) | 11.1 | 7.0 (0-34) | 3.1 | 3.2 (0-14) |
| Men | 38.2 | 7.6 (24-63) | | | | |
| Rwanda: Woman HIV+/Man HIV- (n=103) | | | | | | |
| Women | 30.8 | 6.3 (21-47) | 5.4 | 4.0 (0-21) | 1.2 | 0.7 (0-2) |
| Men | 34.9 | 8.8 (23-62) | | | | |
| Rwanda: Man HIV+/ Woman HIV- (n=95) | | | | | | |
| Women | 30.1 | 6.3 (21-47) | 6.7 | 5.5 (1-22) | 1.2 | 0.7 (0-2) |
| Men | 35.8 | 7.1 (25-54) | | | | |

*Question asked to men only

Table 4.2. Individual-level reporting and couple agreement of fertility desires and pregnancy attempts among heterosexual serodiscordant couples in Lusaka, Zambia where the woman is the HIV positive partner (N=285)

| | Individual-level | | | Couple-level comparison | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Women % | Men % | n (W/M) | Agree+ % | Agree- % | N | Total % agree | Total % disagree | $\kappa$ | *p* | CP+, CP- |
| Would like to have a (another) child | 26.7 | 31.9 | 285 | 15.1 | 56.5 | 285 | 71.6 | 28.4 | § | *** | 0.52, 0.80 |
| Husband would like another child (or wife is unsure) [a] | 37.9 | 31.9 | 285 | 20.0 | 50.2 | 285 | 70.2 | 29.8 | § | *** | 0.59, 0.81 |
| Wife would like another child (or husband is unsure) [a] | 26.7 | 39.3 | 285 | 17.5 | 51.6 | 285 | 69.1 | 30.9 | § | *** | 0.55, 0.82 |
| Family/friends desire couple to have child (or am unsure) | 25.3 | 35.1 | 285 | 15.1 | 54.7 | 285 | 69.8 | 30.2 | § | *** | 0.53, 0.85 |
| Family/friends know of couple's discordant status | 50.8 | 38.2 | 61/76 | 22.2 | 33.3 | 36 | 55.6 | 44.5 | § | | 0.45, 0.58 |
| *Adjusted for filtering* | | | | *7.9* | *11.9* | *101* | *19.8* | *80.2* | - | - | - |
| Mentioned desire(s) has currently disrupted condom use | 32.4 | 13.7 | 105/117 | 5.5 | 50.7 | 73 | 56.2 | 43.8 | § | | 0.20, 0.70 |
| *Adjusted for filtering* | | | | *2.7* | *8.1* | *149* | *27.5* | *72.5* | - | - | - |
| Knows when a woman is most likely to become pregnant | 5.3 | 4.6 | 285/284 | 0.4 | 90.5 | 284 | 90.8 | 9.2 | § | | 0.07, 0.95 |

P-value (*p*): * <0.05; ** <0.01; *** <0.001

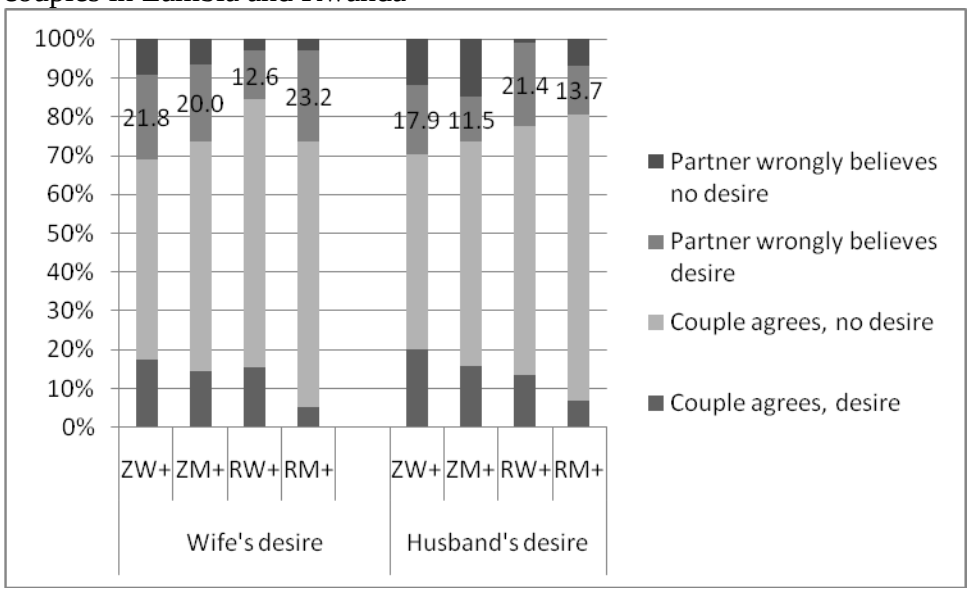
Kappa (*K*): §=0.0-0.39 (low); §§=0.40-0.74 (fair); §§§=0.75 and greater (excellent)

CP+: positive conditional probability; CP-: negative conditional probability

[a] Compares partner's perceptions of spouse's behavior/belief to the spouse's self-report of behavior/belief

N/A: Unable to calculate due to small cell size
-- :Unable to calculate due to filtering

Figure 4.1. Accuracy of spousal desire for a child among heterosexual serodiscordant couples in Zambia and Rwanda




Key: ZW+: Zambian couples in which the woman was the HIV positive partner
ZM+: Zambian couples in which the man was the HIV positive partner

RW+: Rwandan couples in which the woman was the HIV positive partner
RM+: Rwandan couples in which the man was the HIV positive partner

Table 4.3. Individual-level reporting and couple agreement of fertility desires and pregnancy attempts among heterosexual serodiscordant couples in Lusaka, Zambia where the man is the HIV positive partner (N=200)

| | Individual-level | | | Couple-level comparison | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Women % | Men % | n (W/M) | Agree+ % | Agree- % | n | Total % agree | Total % disagree | $\kappa$ | $p$ | CP+, CP- |
| Would like to have a (another) child | 21.0 | 31.0 | 200 | 14.0 | 62.0 | 200 | 76.0 | 24.0 | § | *** | 0.54, 0.84 |
| Husband would like another child (or wife is unsure) [a] | 27.5 | 31.0 | 200 | 16.0 | 57.5 | 200 | 73.5 | 26.5 | § | *** | 0.55, 0.81 |
| Wife would like another child (or husband is unsure) [a] | 21.0 | 34.5 | 200 | 14.5 | 59.0 | 200 | 73.5 | 26.5 | § | *** | 0.52, 0.82 |
| Family/friends desire couple to have child (or am unsure) | 25.5 | 26.5 | 200 | 11.5 | 59.5 | 200 | 71.0 | 29.0 | § | *** | 0.4, 0.80 |
| Family/friends know of couple's discordant status | 42.1 | 40.9 | 38/44 | 42.1 | 36.8 | 19 | 79.0 | 21.1 | §§ | ** | 0.80, 0.78 |
| *Adjusted for filtering* | | | | *12.7* | *11.1* | *63* | *23.8* | *76.2* | - | - | - |
| Mentioned desire(s) has currently disrupted condom use | 18.5 | 17.8 | 54/73 | 5.7 | 65.7 | 35 | 71.4 | 28.6 | § | | 0.29, 0.82 |
| *Adjusted for filtering* | | | | *2.2* | *25.0* | *92* | *27.2* | *72.8* | - | - | - |
| Knows when a woman is most likely to become pregnant | 2.5 | 3.0 | 199/200 | 0.5 | 95.0 | 199 | 95.5 | 4.5 | § | * | 0.18, 0.10 |

P-value ($p$): * <0.05; ** <0.01; *** <0.001

Kappa ($K$): §=0.0-0.39 (low); §§=0.40-0.74 (fair); §§§=0.75 and greater (excellent)

CP+: positive conditional probability; CP-: negative conditional probability

[a] Compares partner's perceptions of spouse's behavior/belief to the spouse's self-report of behavior/belief

N/A: Unable to calculate due to small cell size
-- :Unable to calculate due to filtering

Table 4.4. Individual-level reporting and couple agreement of fertility desires and pregnancy attempts among heterosexual serodiscordant couples in Kigali, Rwanda where the women is the HIV positive partner (N=103)

| | Individual-level | | | Couple-level comparison | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Women % | Men % | n (W/M) | Agree+ % | Agree- % | n | Total % agree | Total % disagree | $\kappa$ | *p* | CP+, CP- |
| Would like to have a (another) child | 18.5 | 14.6 | 103 | 8.7 | 75.7 | 103 | 84.5 | 15.5 | §§ | *** | 0.53, 0.91 |
| Husband would like another child (or wife is unsure) [a] | 35.0 | 14.6 | 103 | 13.6 | 64.1 | 103 | 77.7 | 22.3 | § | *** | |
| Wife would like another child (or husband is unsure) [a] | 18.5 | 28.2 | 103 | 15.5 | 68.9 | 103 | 84.5 | 15.5 | § | *** | 0.55, 0.86 |
| Family/friends desire couple to have child (or am unsure) | 20.4 | 19.4 | 103 | 9.7 | 69.9 | 103 | 79.6 | 20.4 | § | ** | 0.67, 0.90 |
| Family/friends know of couple's discordant status | 43.8 | 31.3 | 16 | 25.0 | 50.0 | 8 | 75.0 | 25.0 | §§ | | 0.49, 0.87 |
| *Adjusted for filtering* | | | | *8.3* | *16.7* | *24* | *25.0* | *75.0* | - | - | - |
| Mentioned desire(s) has currently disrupted condom use | 17.7 | 10.0 | 34/30 | 9.5 | 76.2 | 21 | 85.7 | 14.3 | §§ | * | 0.67, 0.80 |
| *Adjusted for filtering* | | | | *4.7* | *37.2* | *43* | *41.9* | *58.1* | - | - | - |
| Knows when a woman is most likely to become pregnant | 25.2 | 12.6 | 103 | 3.9 | 66.0 | 103 | 69.9 | 30.1 | § | | |

P-value (*p*): * <0.05; ** <0.01; *** <0.001

Kappa (*K*): §=0.0-0.39 (low); §§=0.40-0.74 (fair); §§§=0.75 and greater (excellent)

CP+: positive conditional probability; CP-: negative conditional probability

[a] Compares partner's perceptions of spouse's behavior/belief to the spouse's self-report of behavior/belief

N/A: Unable to calculate due to small cell size
-- :Unable to calculate due to filtering

Table 4.5. Individual-level reporting and couple agreement of fertility desires and pregnancy attempts among heterosexual serodiscordant couples in Kigali, Rwanda where the man is the HIV positive partner (N=95)

| | Individual-level | | | Couple-level comparison | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Women % | Men % | n (W/M) | Agree+ % | Agree- % | n | Total % agree | Total % disagree | $\kappa$ | $p$ | CP+, CP- |
| Would like to have a (another) child | 8.4 | 14.7 | 95 | 4.2 | 81.1 | 95 | 85.3 | 14.7 | § | ** | 0.37, 0.92 |
| Husband would like another child (or wife is unsure) [a] | 21.1 | 14.7 | 95 | 7.4 | 71.6 | 95 | 79.0 | 21.1 | § | ** | 0.41, 0.87 |
| Wife would like another child (or husband is unsure) [a] | 8.4 | 28.4 | 95 | 5.3 | 68.4 | 95 | 73.7 | 26.3 | § | * | 0.29, 0.84 |
| Family/friends desire couple to have child (or am unsure) | 14.7 | 12.6 | 95 | 2.1 | 74.7 | 95 | 76.9 | 23.2 | § | | 0.15, 0.87 |
| Family/friends know of couple's discordant status | 8.3 | 22.2 | 12/9 | 0.0 | 100.0 | 1 | 100.0 | 0.0 | | | N/A |
| *Adjusted for filtering* | | | | *0.0* | *5.0* | *20* | *5.0* | *95.0* | - | - | - |
| Mentioned desire(s) has currently disrupted condom use | 23.5 | 22.7 | 17/22 | 14.3 | 57.1 | 7 | 71.4 | 28.6 | § | | 0.23, 0.77 |
| *Adjusted for filtering* | | | | *3.1* | *12.5* | *32* | *15.6* | *84.4* | - | - | - |
| Knows when a woman is most likely to become pregnant | 29.5 | 16.8 | 95 | 5.3 | 59.0 | 95 | 64.2 | 35.8 | § | | 0.23, 0.77 |

P-value ($p$): * <0.05; ** <0.01; *** <0.001

Kappa ($K$): §=0.0-0.39 (low); §§=0.40-0.74 (fair); §§§=0.75 and greater (excellent)

CP+: positive conditional probability; CP-: negative conditional probability

[a] Compares partner's perceptions of spouse's behavior/belief to the spouse's self-report of behavior/belief

N/A: Unable to calculate due to small cell size
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# Chapter #5:

## Summary and conclusions

Epidemiology evidence shows that the HIV epidemic in Africa, especially in Zambia and Rwanda, is driven by heterosexual transmission (Central Statistical Office, et al., 2009; Institut National de la Statistique du Rwanda & ORC Macro, 2006; UNAIDS & World Health Organization, 2009). Much of this transmission occurs among adults in heterosexual couples in which one partner is HIV positive and the other is not. A major challenge to serodiscordant couples is to prevent the transmission from the infected to the uninfected partner and the only means available is consistent safe sex. Consistent and correct condom use (CCCU) is the primary behavioral HIV prevention method for sexually active serodiscordant couples. Yet critical gaps in primary and secondary HIV prevention efforts remains as consistent use for the duration of the relationship can be challenging and influenced by many behavioral factors.

Chapter Two focused on the qualitative findings of behavioral dynamics of CCCU among heterosexual serodiscordant couples in Lusaka, Zambia. We sought to identify behaviors that were supportive or non-supportive towards CCCU following risk reduction counseling and the provision of male condoms. The most common barrier to CCCU reported by men and women was the husband's decision not to use a male condom, largely due to situational refusal or alcohol use, resulting in forced unprotected sex for the woman. With HIV positive and negative men self-reporting refusal, we found the husband's serostatus was not necessarily related to better or worse condom use regardless of their prevention outcome. Greater understanding is needed regarding relationship and sexual dynamics and how best to integrate couple-level prevention strategies. Intimate partner violence and relationship power inequity is associated with increased HIV risk and needs to be addressed in the context of couples HIV prevention.

Building upon the findings from the qualitative study, Chapter Three investigated the prevalence of supportiveness towards condom use in the last three months at the individual-, partner-, and couple-level as well as identify predictors for couple-level supportiveness. The lower than expected prevalence of supportiveness towards condom use was largely driven by the lack of agreement between the respondent's self-reported supportiveness and their partner's perception of their supportiveness. Predictors for couple-level supportiveness towards condom use identified eight factors that spanned multiple levels of influence. These included individual characteristics (personal desire for children, and incorrect knowledge about the availability drugs to prevent HIV transmission), couple dynamics (partner's desire for children, perceived risk, condom breakage), and socio-cultural factors (family and friends' desire for children and acceptance of forced unprotected sex). Aside from residing in Zambia, each risk factor can be largely mitigated.

Chapter Four further investigated the desire for children among serodiscordant couples. We found that individual-level responses did not accurately reflect couple agreement towards the desire for a child, that fertility desires were present and associated condom use interruption occurred, couples experienced pressure from family and friends to have a child even following the couple's serostatus disclosure, and that there were considerable amount of inaccurate perceptions of partner desire for children.

With serodiscordant couples contributing a high proportion of incident HIV infections in regions of the world with a generalized epidemic, the investigation of individual, couple, and socio-cultural factors that disrupt consistent condom use is a critical step in the development of HIV prevention. In particular, the successful management of ongoing and varying behavioral barriers to CCCU.

Our findings provide guidance for individual- and couple-level recommendations as well as community and structural. At the individual- and couple-level, with the identification of strong continued fertility desires and pregnancy attempts, the desire for a child by HIV-affected couples needs to be addressed with urgency. The reproductive needs of HIV-affected couples have been largely overlooked. This highlights a globally neglected area of HIV prevention: the lack of HIV-related reproductive counseling messages or programmatic guidance. Standardized HIV-related reproductive counseling protocols and risk-reduction approaches are needed so that couples choosing to forgo condom use for pregnancy attempts can do so with sufficient HIV and reproductive knowledge to minimize transmission risks.

Secondly, with the identification that most women were not part of the decision-making process when unprotected sex occurred nor had options to prevent it, intimate partner violence must be addressed as part of HIV prevention as well as greater understanding of how cultural beliefs, sex roles, and couple dynamics impact consistent condom use. This highlights the importance of couple-level prevention efforts to improve behavioral management, couples' communication, and problem-solving skills specific to condom use. Also, greater effort is needed to support the psychosocial needs of serodiscordant couples. In particular, to increase one's self-efficacy to prevent unprotected sex and provide the necessary mental health support.

At the community- and structural-levels, distinct yet overlapping issues need to be addressed as part of HIV prevention. These include the societal acceptance of excessive alcohol use and intimate partner violence and the constructions of gender. Efforts to change social norms and policy to support a woman's right to control her sexual environment are greatly needed. This can be supported through efforts to destigmatize HIV-affected couples and the

recognition that serodiscordant couples face unique personal and societal challenges that require additional support and intervention.

In an effort to conceptualize the next phase of intervention development and to ensure that couples have the necessary skills and support to maintain CCCU, a systematic and theory-driven investigation of couple-level prevention strategies related to condom use needs to be undertaken with emphasis on sustainable techniques for crisis moments and the establishment of sero-specific social and peer norms for this unique population.

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