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Enhancing Acceptability and Use of Sexual Barrier Products Among HIV Concordant and Discordant Couples

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Abstract

Strategies to prevent HIV transmission may benefit from addressing both individual and dyadic factors. This study compared the impact of group and individual interventions on the acceptability of sexual barrier products among HIV sero-concordant and discordant couples, and evaluated the contribution of couple members' perceived product acceptability to their sexual barrier use. Participants ($n = 216$ couples) were multicultural couples in Miami, Florida. Longitudinal multilevel modeling and the actor-partner interdependence model were used for analyses. Product acceptability increased more among female group participants, and acceptability of male condoms increased more among sero-discordant couples in the group. Additionally, acceptability of products associated with prevention of STDS/HIV and pregnancy increased more among sero-concordant couples in the group condition. Both actor and partner product acceptability predicted use. Results support the use of group interventions targeting both partners in relationships in prevention programs designed to enhance sexual barrier use.

Keywords

HIV; Couples; Intervention; Acceptability; Multicultural; Urban

Introduction

HIV transmission occurs primarily as a result of sexual contact, however, until recently, few prevention studies [1] or theoretical models have conducted analyses at the dyadic level [2]. Instead, studies have typically relied on data from individual genders or combined members, thereby incorrectly inflating the sample size and violating the assumption of independence. In contrast, dyadic data analyses are designed to account for both the inter-dependence

within the couple and can also address the effect of dominance within couple interactions. For example, as power dynamics within relationships influence HIV risk behavior, the member of the couple with the greatest power may more directly influence dyadic decision-making and thereby encourage either safe or risky behaviors [3]. Dyadic analyses are also utilized to account for the substantial effect partners have on each other's beliefs and sexual behavior (the "mutual influence" couple members have on each other) [4]. Thus, dyadic models of health behavior represent both a methodological and statistical framework for assessing the response of the couple to health-based interventions, as well as the interactive influence of the response of dyad members on each other (e.g., effects of "actor" and "partner" [5]). Intervention research also requires the analysis of measurements of two or more time points, adding an additional layer of relationships within the dyad (i.e., sequential analysis of social interactions and behaviors [6]).

HIV interventions designed to change sexual risk behavior among couples should, therefore, address the couple, or dyad, as the unit of analysis when evaluating intervention efficacy [1, 7]. Couples-based HIV prevention interventions are designed to allow both partners to enhance their knowledge, engage in interpersonal behaviors, agree on mutual goals and acknowledge joint responsibility for prevention of transmission [8-10]. Understanding dyadic relationships and increasing the dyad's capacity for effective interaction can thus enhance safer sex decision-making [11]. However, while couples-based HIV prevention strategies are effective [12], the majority of studies target individuals and few have both intervened to reduce sexual risk behavior among HIV sero-discordant and HIV-positive concordant couples and conducted dyadic analyses [1, 13]. Results derived from studies of discordant and concordant couples address non-independent data, making dyadic models of sexual behavior the appropriate analysis, and also allow the estimation of the relative contribution of a person's own and his/her partner's predictor values on sexual behavior outcomes [5].

Seroconcordant couples may be less receptive to changing sexual barrier use, as they may perceive that HIV seroconcordance negates the need to use condoms [14]. An individual's serostatus within the couple has been associated with sexual risk behavior [15] and identified as a predictor of barrier use following HIV risk reduction interventions in sub-Saharan Africa [16]. Some persons living with HIV/AIDS may seek sexual partners of the same HIV status, known as "serosorting", as a sexual risk reduction strategy believed to negate the need for condom use [4, 14]. However, HIV seroconcordant couples using antiretroviral (ARV) medication risk reinfection with medication-resistant virus if either partner is non-adherent to medication and the couple is not using condoms. Thus, it is important to promote sexual barrier acceptability within HIV seroconcordant, as well as serodiscordant, couples. However, the relationship between HIV serostatus and sexual barrier acceptability within the dyad has not been explored, and the characteristics of sexual barrier products associated with acceptability in this population have not been examined.

Influencing couples' established condom use requires both sexual partners to make significant changes in their sexual practices. Although both male and female condoms have high efficacy in reducing transmission of HIV and other STDs, their *impact* on disease prevention may be limited by low acceptability and, in the case of the female condom, limited exposure [17-22]. Previous studies in Africa utilizing group interventions have found sexual behavior interventions to enhance acceptability and use of sexual barrier products among HIV seropositive and negative women and men [23, 24], though in the US, sexual risk reduction counseling is typically delivered post HIV counseling in an individual or couples-based format [25]. However, dyadic analyses have not been applied to assess the potential of interventions to influence the relationship between willingness to use condoms

for transmission prevention, the acceptability of sexual barriers and their combined impact on actual condom use.

This study examined the mutual impact of couple members as a source of influence on prevention, product acceptability and sexual barrier use. Building on previous women-focused research, an evidence-based HIV prevention model for HIV seroconcordant and serodiscordant couples was developed (New Opportunities for Women & Partners; NOW2), modifying intervention components to be appropriate to men and women [26, 27]. The resulting randomized trial was designed to enhance sexual barrier acceptability and use among urban, multicultural HIV-positive and serodiscordant couples. This study compared 'intervention modalities' to assess whether the HIV risk reduction intervention would be more likely to increase product acceptability and use when delivered to couples in a group or individual format. It was hypothesized that the group intervention would be more effective in increasing acceptability and use of sexual barriers. Additionally, HIV seroconcordant and discordant couples were compared, and it was theorized that the intervention would increase acceptability and use of sexual barrier products more for serodiscordant couples.

Methods

Ethical review and approval was received from the Institutional Review Board at University of Miami Miller School of Medicine prior to study onset. The NOW2 study recruitment, screening, and enrollment were conducted from May 2006 through October 2009. Heterosexual couples ($n = 216$) were enrolled, completed a baseline assessment and were randomized to receive either a group or individual HIV risk reduction intervention. Couples attended 4 intervention sessions and completed 3 follow-up assessments. Both the group- and individual-based interventions aimed at increasing couples' skills in sexual risk reduction, condom negotiation, and conflict resolution strategies. Participants were drawn from the Miami metropolitan area and primarily recruited from community health centers and the special immunology clinic at the Jackson Memorial Hospital/University of Miami Miller School of Medicine. Participants were recruited in-person as well as through flyers and word-of-mouth referral.

Eligibility screening was conducted at recruitment venues and by telephone. Couples were eligible for the study if they met the following criteria; (a) member of a couple for 6 months or more and both members willing to enroll and attend study sessions, (b) age 18 or older, (c) one or both members of the couple diagnosed HIV seropositive, (d) sexually active within the last month, (e) in sero-discordant couples, negative member willing to be tested for HIV, (f) willing and able to give informed consent, and (g) able to understand and communicate in English. Couples status was verified at the study offices to ensure male and female dyads were primary sexual partners [28]. Couples were separated and asked a rotating series of six parallel questions of an intimate and personal nature drawn from a pool of 21 questions that were compared for consistency. The majority (85 %) of couples screened for eligibility met enrollment criteria, and were enrolled in the study. The most frequent reasons for non-enrollment were lack of sexual intercourse within the last month and not being a member of a couple for at least 6 months. Participants provided consent in English and completed a baseline assessment using an audio computer assisted survey instrument (ACASI). Using ACASI, participants listened to the questions from the computer using audio headphones with the option of simultaneously reading the questions on the computer screen; responses were recorded by touching the appropriate symbol on the computer touch screen. All participants received monetary compensation for their time and travel expenses (four assessments, \$US50; 4 sessions, \$US25). During study participation, in the event of permanent loss of one member of a couple (e.g., illness, death, estrangement, prison), individual participants were encouraged to continue to participate but were not

allowed to participate with a new partner. The primary causes for attrition were substance use relapse, incarceration, illness and death.

Measures

Demographics—This section included information on age, ethnicity, educational level and employment status. Serostatus and partner data included approximate date of HIV diagnosis, marital status/current partner and living situation.

Sexual Activities Questionnaire (SAQ)—This section was a 55-item scale adapted from the sexual risk behavior assessment schedule [29]. Responses reflected self-reported sexual behavior over the last month and indicated the frequency of sexual intercourse with primary partners (most frequent sexual relations) and non-primary partners (any other partners, number of partners). The questionnaire also assessed sexual barrier use (scored using a Likert scale of 0 (never), 1 (once), 2 (sometimes), 3 (half of the time), 4 (most of the time), 5 (all of the time)).

Sexual Diary—This section assessed sexual activities for each day of the week (sexual intercourse). The type of sexual barrier method used, if any, was assessed for each day with a pictorial representation of each sexual barrier product presented in the intervention.

Barrier Questionnaire—This section was adapted from the University of California at San Francisco Center for AIDS Prevention Studies Barrier Questionnaire, and measured current and previous use of and willingness to use sexual barriers using Likert-type scales. Acceptability, here defined as “liking” a product, was measured by asking each individual how much they like using (a) male condoms (b) female condoms, (c) creams, and (d) gels. Participants responded using the scale “like very much = 5, like somewhat = 4, neutral = 3, dislike somewhat = 2, strongly dislike = 1; never used = 0.” An aggregate variable measuring general acceptability of barrier methods across the four product types was computed by summing across these items. Participants also reported their “willingness to use” a product that could potentially (a) prevent pregnancy, (b) prevent pregnancy, HIV infection, and other STDs, and (c) allow you to get pregnant but still protect against other STDs. These items were rated as “very willing to use = 4, moderately willing = 3, slightly willing = 2, not at all willing = 1”.

Risk Reductions Strategies—This section assessed if participants had practiced specific risk reduction actions. Participants are asked in general “When you have sex, how often do you use a condom?” and respond using a 5-point rating scale (5 = every time, 4 = almost every time, 3 = sometimes, 2 = almost never, and 1 = never).

Interventions

Both group and individual manualized intervention conditions consisted of four structured, 2 hour sessions delivered weekly by gender-matched female or male facilitators trained in the delivery of the intervention. All facilitators had at least a master’s degree or commensurate academic and practical experience in HIV prevention and were trained and supervised by a clinical psychologist. Quality assurance (QA) was conducted using digital recordings of intervention sessions which were reviewed using QA checklists to monitor fidelity to the intervention and provide feedback to facilitators.

Groups consisted of a maximum of ten participants per group, and the group-based cognitive behavioral HIV risk reduction intervention was guided by the theories of reasoned action (i.e., attitudes and subjective norms influence intentions which influence beliefs about behavior) [30] and planned behavior (i.e., perceived behavioral control influences intentions

and resulting behavior) [31] to predict sexual barrier use. The core components of the group intervention focused on sexual risk reduction, adherence to the use of male and female condoms, introduction to vaginal lubricants, sexual negotiation skills and effective communication, conflict resolution, sexual risk associated with substance use, and ARV medication adherence. Facilitators applied cognitive behavioral strategies to the components of the intervention (e.g., reframing thoughts, heightening participants' awareness of their reactions to condom use in their sexual relationships and reframing automatic thoughts that may impede barrier use and communication). Sessions also addressed intimate partner violence and antecedents to conflict and violence, and each session included relaxation techniques to use during stressful interactions (deep breathing, imagery or meditation). Group strategies included establishment of a safe environment for sharing personal experiences, role-playing negotiation, problem solving and communication skills, and hands-on experiential training with condoms. While all sessions were gender separate, participants were given "homework" to work on as a couple at home. Each subsequent week, participants were encouraged to share their experiences and apply cognitive behavioral skills in problem solving.

The individual-based intervention condition was delivered to either the male or female partner in individual sessions. The weekly session content represented an enhanced standard of care and was modeled on the Florida Department of Health Counseling and Testing Services Department program. Participants were provided with HIV risk reduction information and counseling. The counseling was provided to assist them in making plans for their own behavior change and adopting strategies for ongoing appraisal of their own behaviors [32]. Participants were provided with hands-on condom use training and opportunity for discussion with the facilitator. All were encouraged to practice HIV risk reduction strategies and share HIV information with their partners. When necessary, individual sessions were supplemented with HIV related health education videos for time equivalence with the group condition.

Participants in all sessions received a week's supply of condoms and vaginal lubricant products to use at home, i.e., male and female condoms, gels and creams. Participants were provided with over the counter vaginal lubricant gels and creams to assess their response to potential vehicles for vaginal microbicides under development.

Statistical Analyses

Descriptive analyses were used to characterize participants by demographic and behavioral variables, and differences between groups were assessed using *t* tests and χ^2 tests of independence. The analytic sample sizes varied somewhat across demographic and behavioral factors due to instances of missing data on questionnaire items. Because this research involved longitudinal dyadic data [5], multilevel modeling using restricted maximum likelihood was used for the primary analyses to account for nonindependence of scores within dyads and across time. Unless otherwise noted, these models treated condition as a between-dyads independent variable, and time and gender were treated as within dyads predictor variables. Our first set of analyses examined the effects of time, condition, gender, and HIV concordance on a) acceptability (i.e., "liking") of sexual barrier methods and b) willingness to use methods that prevent pregnancy, STDs, or both. In our second set of analyses we examined whether acceptability of barrier methods and willingness to use these methods were predictive of reported barrier use. Because acceptability and willingness vary across partners as well as across dyads, these analyses were framed within the Actor-Partner Interdependence Model (APIM) approach. Specifically, we investigated the effect of a person's own acceptance of a method on that person's reported use. The effect of a person's predictor on that person's outcome is referred to as an actor effect in the APIM. We also estimated the effect that the partner's predictor has on the person's outcome, called a partner

effect in the APIM. The variables for each of these analyses, including acceptability, willingness, typical condom use, and weekly condom use were assessed at baseline, 3 month follow-up and 6 month follow-up for each of the two partners. All analyses were conducted with Predictive Analytics Software 18 (PASW®).

Results

Demographics

Two hundred sixteen couples (432 individuals) completed baseline assessments in this study. Participants were primarily African-American ($n = 323$, 75 %), ranging from age 20 to 73 (mean 45 ± 8). Most were not working ($n = 325$, 75 %) and reported $< \$5,000$ of personal income for the previous year ($n = 231$, 54 %). Over half ($n = 222$, 51 %) reported that they were on disability. Although more than half lived in their own (or partner's) house or apartment ($n = 237$, 55 %), 19 % ($n = 82$) were living in a homeless shelter or halfway house. Almost all ($n = 398$, 92 %) had a grade twelve education or less. No differences between conditions in demographic variables aside from ethnicity were observed in our sample, and ethnicity did not influence sexual behavior. Eighty-five percent of participants were HIV-positive ($n = 368$) and 15 % ($n = 64$) were negative, resulting in 30 % ($n = 64$) of couples being serodiscordant. The mean length of time since HIV diagnosis was 11.2 ± 6.7 years, and most ($n = 264$, 72 %) reported that they were on ARV medication at study entry. Table 1 details demographic information by condition.

Predicting Sexual Barrier Acceptability with Couple Serostatus, Intervention Condition, Gender, and Time

First, the ability of the intervention to influence acceptability was examined, including the effects of the dyad members' serostatus (concordant vs discordant). Acceptability was assessed by the aggregated general acceptability variable as well as participant reports of liking for each of the four methods (male condom, female condom, cream, gel). Analyses revealed a strong main effect of time for the aggregate acceptability variable, $F(2,393) = 28.29$, $p < 0.001$. Post-hoc means tests using a Bonferroni correction indicated that averaging over gender, intervention condition, and serostatus, acceptability increased from baseline ($M = 7.01$, $SD = 4.64$) to 6 months ($M = 9.08$, $SD = 4.97$) and from baseline to 12 months ($M = 8.56$, $SD = 5.06$), with no difference between 6 and 12 month means. However, a significant interaction between time, gender, and intervention condition also emerged, $F(2,385) = 3.54$, $p = 0.030$. To break down this interaction, we examined the time by intervention interaction separately for men and women. For men, the interaction was not statistically significant, $F(2,351) = 0.58$, $p = 0.562$, but for women, there was a time by condition interaction, $F(2,386) = 3.70$, $p = 0.026$, such that women in the individual condition did not differ over time in their general acceptability, $F(2,181) = 2.02$, $p = 0.136$. In contrast, women in the group condition increased substantially over time, $F(2,208) = 22.17$, $p < 0.001$ (baseline $M = 6.93$, $SD = 3.80$; 6 months $M = 10.14$, $SD = 4.79$; 12 months $M = 9.10$, $SD = 5.36$).

Examination of the individual sexual barrier products yielded mixed results. Male condom acceptability was significant in the condition by serostatus interaction, $F(1,219) = 4.33$, $p = 0.039$. The means indicated that for couples who were discordant, male condoms were viewed as more acceptable in the group intervention ($M = 3.84$, $SD = 1.62$) relative to the individual intervention ($M = 3.32$, $SD = 1.73$). No such difference emerged for couples who were concordant (group condition $M = 3.58$, $SD = 1.57$; individual condition $M = 3.69$, $SD = 1.55$) (see Fig. 1).

Acceptability of female condoms showed a significant main effect of time, $F(2,397) = 10.55$, $p < 0.001$, such that female condoms were more acceptable at 6 months ($M = 1.91$, $SD = 2.02$) and 12 months ($M = 1.80$, $SD = 2.02$) than at baseline ($M = 1.37$, $SD = 1.94$). Likewise, acceptability of vaginal creams also showed a significant main effect of time, $F(2, 401) = 6.86$, $p = 0.001$, increasing from baseline ($M = 0.85$, $SD = 1.61$) to 6 months ($M = 1.25$, $SD = 1.81$), but then, declining somewhat and not differing from baseline at 12 months ($M = 1.16$, $SD = 1.78$). There was also a significant main effect of serostatus on acceptability of vaginal creams, $F(1,217) = 4.26$, $p = 0.040$, with creams being significantly more acceptable in discordant couples ($M = 1.30$, $SD = 1.83$) than in concordant couples ($M = 0.99$, $SD = 1.69$). Finally, acceptability of vaginal gels showed only a main effect of time, $F(2,405) = 27.08$, $p < 0.001$ such that acceptability of gels increased from baseline ($M = 1.33$, $SD = 1.95$) to 6 months ($M = 2.22$, $SD = 2.14$) and from baseline to 12 months ($M = 1.95$, $SD = 2.13$), with no difference between 6 and 12 month means.

Predicting Willingness to Use Barriers with Couple Serostatus, Intervention Condition, Gender, and Time

Participants were asked whether they would be willing to use barriers that would prevent pregnancy but not protect against STDs, to use barriers that would protect against STDs but not pregnancy, and to use methods that would protect against both. For methods that prevent pregnancy but not STDs, the only significant effect was by gender, with men being more willing to use such methods ($M = 3.47$, $SD = 1.03$) than women ($M = 3.29$, $SD = 1.19$). Results for willingness to use barriers that would prevent STDs but not pregnancy were somewhat more complex, with analyses showing both a significant main effect of time, $F(2,395) = 5.69$, $p = 0.004$, and a significant interaction between time, intervention condition, and serostatus, $F(2,395) = 4.48$, $p = 0.012$. The time main effect indicated an increase in willingness from baseline ($M = 2.82$, $SD = 1.37$) to 12 months ($M = 3.12$, $SD = 1.26$), with no difference between baseline and 6 months ($M = 2.91$, $SD = 1.33$). To break down the interaction, we examined the effects of time and serostatus separately for the individual and group intervention conditions. For the individual condition, the only significant effect was for time $F(2,190) = 3.26$, $p = 0.040$, with willingness increasing from baseline ($M = 2.88$, $SD = 1.37$) to 6 months ($M = 3.12$, $SD = 1.29$) and decreasing slightly at 12 months ($M = 2.91$, $SD = 1.35$) and not differing from either baseline or 6 months. For the group condition, there was a significant interaction between time and serostatus, $F(2,210) = 3.06$, $p = 0.049$. Concordant couples in the group condition changed significantly over time, $F(2,160) = 6.79$, $p = 0.001$, increasing from baseline ($M = 2.68$, $SD = 1.40$) to 6 months ($M = 3.11$, $SD = 1.24$) with no decline at 12 months ($M = 2.97$, $SD = 1.31$), whereas discordant couples in the group condition did not change significantly over time, $F(2,45) = 2.38$, $p = 0.104$.

Finally, we examined willingness to use barriers that protect against both pregnancy and STDs, and found evidence of an interaction between serostatus and time, $F(2,402) = 5.20$, $p = 0.006$. Examination of the effects of time separately for discordant and concordant couples yielded somewhat anomalous results with neither main effect for time showing statistical significance. Instead, there was a pattern such that discordant couples drop in willingness from baseline to 6 months (baseline $M = 3.67$, $SD = 0.90$; 6 months $M = 3.45$, $SD = 1.09$, 12 months $M = 3.54$, $SD = 0.94$) and concordant couples increased in willingness from baseline to 6 months (baseline $M = 3.59$, $SD = 0.94$; 6 months $M = 3.71$, $SD = 0.80$, 12 months $M = 3.66$, $SD = 0.87$).

Predicting Use of Barriers with Sexual Barrier Acceptability

We assessed participants' use of barriers using a variety of measures. Participants estimated their rate of male condoms used in the past week, and they also rated how often they used

(a) protection, (b) male condoms specifically and c) female condoms specifically during vaginal sex for the past month on a five-point scale (5 = all the time 1 = never in the past month). They also used the same endpoints to respond to the question “when you have sex, how often do you use a condom?” We used the APIM [5] for these analyses, and our key predictors were the person’s perception of barrier acceptability and the partner’s perception of acceptability. We then examined actor and partner effects for both the aggregate acceptability variable as well as acceptability of male and female condoms specifically. Table 2 details the results of sexual barrier use.

The actor effects for the aggregate acceptability measure were statistically significant for three of the five use variables: Condom use rate in the past week, frequency of barrier use in the past month during vaginal sex, and frequency of female condom use in the past month during vaginal sex. These actor effects indicated that individuals who reported more accepting attitudes towards barriers (i.e., they liked the barriers more) tended to report higher use of these barriers. Results also indicate that the partner’s level of acceptance also predicted general condom use during sex—such that individuals report higher general condom use when their partners are more accepting of barrier methods.

We also examined the effects of acceptability of male condoms and female condoms separately. Individuals who reported more accepting attitudes towards male condoms reported using barriers more often in the past month during sex, as well as more frequent male condom use. There was also a negative actor effect for frequency of female condom use: Individuals who liked male condoms more tended to report less use of female condoms. In addition to the actor effects, there is some evidence that the partner’s attitude towards male condoms also predicts the person’s barrier use. Specifically, individuals reported more frequent barrier use in the past month when their partners’ had more positive attitudes towards male condoms. Finally, there were two significant actor effects for female condom acceptability: Individuals who reported more positive attitudes towards female condoms reported higher frequency of barrier use in general as well as higher use of female condoms. There were no partner effects for acceptability of female condoms.

Predicting Use of Barriers with Willingness to Use Barriers

Finally, we examined whether we could predict a person’s reported use of barriers as a function of the person’s and partner’s reported willingness to use methods that protect against pregnancy alone, STD alone, or pregnancy and STD. There was only one statistically significant actor effect and two significant partner effects. Individuals who reported greater willingness to use barriers that protect against both pregnancy and STDs reported significantly lower use of female condoms, $b = -0.190$, $\beta = -0.133$, $s.e. = 0.065$, $p = 0.004$. Individuals whose partners were more willing to use barriers that protect against pregnancy but not STDs reported lower condom use rate, $b = -0.031$, $\beta = -0.077$, $s.e. = 0.016$, $p = 0.048$. The other partner effect showed that individuals whose partners reported greater willingness to use methods that prevent against STDs but not pregnancy tended to report lower general condom use during sex, $b = -0.079$, $\beta = -0.074$, $s.e. = 0.036$, $p = 0.027$.

Discussion

This study of urban, multicultural HIV seropositive-concordant and -discordant couples used dyadic analyses to illustrate the mutual impact of couple members as a source of influence on product acceptability and use. This study compared ‘intervention modalities’ to assess whether the HIV risk reduction intervention would be more likely to increase acceptability when delivered to couples in a group or individual format. Consistent with previous research in Africa [15], the group intervention had the greatest impact on acceptability. While acceptability of vaginal lubricant products overall increased over time in both conditions,

overall product acceptability increased more among female group participants. In addition, though acceptability of male condoms increased more among sero-discordant couples in the group condition, willingness to use products associated with prevention of STDS/HIV and pregnancy increased more among seroconcordant couples in the group condition. Both sexual partners as well as HIV serostatus were important sources of influence on the acceptability of sexual barriers. Results also demonstrated that uptake of sexual barrier products may rely on acceptability. While product acceptability often predicted use, anticipated willingness to use products to prevent transmission did not.

This study illustrated that addressing couples' behavior at the dyadic level and using the APIM approach enabled the detection of important influences of partners on each other within specific intervention conditions [1, 2, 4]. Both "actors" and "partners" were identified as predictive sources of influence on both male and female condom use within the dyad and thereby, each represent a potential avenue to reduce transmission risk within the couple. While the association between acceptability and use was robust, hypothetical willingness to engage in a prevention behavior may have been less salient among those who showed the greatest increase in willingness to engage in prevention, seroconcordant couples. The elements in the group intervention designed to enhance uptake and acceptability within couples, e.g., communication, negotiation, information, may have also stimulated a temporarily renewed commitment or increased awareness of the need for prevention of transmission among members of sero-concordant couples. However, while serodiscordant couples may have had more motivation to find sexual barriers more acceptable, seroconcordant couples may have ultimately found the prevention message less compelling. Both outcomes highlight the influence of serostatus within couples.

Also of note are gender differences in acceptability and intervention uptake, such that while women increased perceptions of product acceptability, products that would prevent pregnancy were less acceptable to women than to their male counterparts. Study outcomes also illustrated that acceptability among women was more likely to increase when delivered in a group format, while men's attitudes regarding acceptability were less amenable to change. Women may have been more likely to be influenced by a group strategy than men, lending support for the use of the women's HIV intervention groups to influence acceptability.

This study highlights the importance of increased acceptability as a predictor of use, rather than reliance on anticipated or theoretical scenarios to predict eventual product uptake. Both partners and their preferences influenced product use, such that types of acceptability also influenced the use of other sexual barriers, for example, increased male condom acceptability and use was associated with decreased female condom use. These outcomes have important implications for microbicide product development, delivery systems for products, and product preferences and use. Perhaps most importantly, results support the assessment of both the dyad and the mutual influences of both members of the couple to evaluate the impact of interventions targeting acceptability and product uptake within couples. The influence of sexual barrier acceptability on subsequent barrier use has not previously been examined using the APIM approach, which presented a unique perspective on this population.

Limitations of this study include its focus on changing sexual barrier acceptability and use within established couples, who may be especially unwilling to influence or unlikely to change. Changing established condom use patterns requires both sexual partners to agree to major revisions in sexual practice [33]. In addition, study outcomes relied on self-reported sexual behavior which may be less valid due to biased reporting, though the randomization of participants should have distributed this bias equally between study conditions. Finally,

the majority of couples were seroconcordant, precluding more refined comparisons with serodiscordant couples and limiting the external validity of study results to sero-discordant populations. Future studies should continue to address these limitations and explore the influence of serostatus on the uptake of prevention strategies.

Conclusion

This study examined the mutuality of sexual barrier acceptability and use among urban, multicultural HIV-positive and serodiscordant couples in established sexual dyads, and their response to differing intervention strategies, utilizing unique analytic strategies. This study provided support for the use of group gender-specific HIV risk reduction interventions to increase acceptability and use and highlighted the critical role of HIV of product acceptability in sexual barrier uptake.

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Fig. 1.
Acceptability of male condoms

Table 1

Demographics

Characteristic (n = 432 individuals)	Total n (%) m (sd)	Group n = 224	Individual n = 208	t, χ^2
Age	45 (8)	44 (7)	45 (8)	1.7
Ethnicity				9.6**
African-American	323 (75 %)	184 (82 %)	145 (70 %)	
Hispanic	35 (8 %)	12 (5 %)	23 (11 %)	
Other	74 (17 %)	28 (13 %)	40 (19 %)	
Employment Status				1.0
Employed	107 (25 %)	60 (27 %)	47 (23 %)	
Unemployed	325 (75 %)	164 (73 %)	161 (77 %)	
Income (USD Annually)				3.9
<5,000	231 (54 %)	117 (52 %)	114 (55 %)	
5,000–10,000	157 (36 %)	78 (35 %)	79 (38 %)	
>10,000	44 (10 %)	29 (13 %)	15 (7 %)	
Education				0.05
Grade 12	398 (92 %)	207 (92 %)	191 (92 %)	
>Grade 12	34 (8 %)	17 (8 %)	17 (8 %)	
HIV-Positive Only n = 369				
Length of time since HIV diagnosis (yrs)	11.2 (6.7)	11.1 (6.3)	11.3 (7)	0.19
On ART				0.30
Yes	264 (72 %)	140 (70 %)	124 (73 %)	
No	105 (28 %)	59 (30 %)	46 (27 %)	

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

Table 2
Actor and partner regression coefficients for predicting barrier use as a function of perceptions of barrier acceptability

	Aggregate acceptability		Acceptability of male condoms		Acceptability of female condoms	
	Intercept	Actor b (β)	Partner b (β)	Intercept	Actor b (β)	Partner b (β)
Rate of condom use in past week (%)	0.671	0.009 [*] (0.096)	0.000 (0.003)	0.670	0.015 (0.054)	0.002 (0.006)
Freq of barrier use in past month during vaginal sex	3.623	0.055 ^{**} (0.167)	0.023 ⁺ (0.071)	3.615	0.273 ^{**} (0.268)	0.150 ^{**} (0.147)
Freq of male condom use in past month during vaginal sex	4.167	0.003 (0.013)	-0.009 (-0.035)	4.105	0.224 ^{**} (0.295)	0.032 (0.042)
Freq of female condom use in past month during vaginal sex	1.648	0.059 ^{**} (0.225)	0.008 (0.029)	1.716	-0.085 [*] (-0.104)	-0.006 (-0.008)
General condom use during sex	3.881	0.002 (0.007)	0.025 ^{**} (0.089)	3.883	0.042 (0.047)	0.057 ⁺ (0.065)

⁺ $p < 0.10$;
^{*} $p < 0.05$;
^{**} $p < 0.01$