Published in final edited form as:

AIDS Behav. 2015 September ; 19(9): 1642–1654. doi:10.1007/s10461-015-1052-8.

Female Condom Use and Adoption Among Men and Women in a General Low-Income Urban U.S. Population

Margaret R. Weeks¹, Weihai Zhan², Jianghong Li¹, Helena Hilario³, Maryann Abbott¹, and Zahíra Medina¹

Margaret R. Weeks: mweeks@icrweb.org

¹Institute for Community Research, 2 Hartford Sq. W., Ste. 100, Hartford, CT 06106, USA

²Connecticut Department of Children and Families, Hartford, CT, USA

³University of Connecticut Health Center, Farmington, CT, USA

Abstract

HIV prevention is increasingly focused on antiretroviral treatment of infected or uninfected persons. However, barrier methods like male condoms (MC) and female condoms (FC) remain necessary to achieve broad reductions in HIV and other sexually transmitted infections (STI). Evidence grows suggesting that removal of basic obstacles could result in greater FC use and reduced unprotected sex in the general population. We conducted four annual cross-sectional surveys (2009–2012) of urban residents (N = 1614) in low-income neighborhoods of a northeastern U.S. city where prevalence of HIV and other STIs is high. Findings indicate slow FC uptake but also heterosexual men's willingness to use them. Factors associated with men's and women's FC use included positive FC attitudes, network exposure, and peer influences and norms. These results suggest that men can be supporters of FC, and reinforce the need for targeted efforts to increase FC use in both men and women for HIV/STI prevention.

Keywords

Female condom; HIV prevention; STI prevention; Women; Men; Gender differences

Introduction

Public health attention to HIV is increasingly focused on antiretroviral treatment (ART) for prevention of new infections, either by treating people with HIV to reduce their infectivity rate [1, 2] or by providing ART to uninfected at-risk individuals as a pre-exposure prophylactic (PrEP) [3–5]. However, ART drugs are disease specific and do not address the other ongoing and growing sexually transmitted infection (STI) epidemics in the U.S. and globally that are both independent of and comingled with the HIV epidemic. Further, for many reasons, including unwillingness to use ART for prevention, insufficient adherence to achieve effective treatment or prevention, or limited access to these expensive drugs, barrier methods such as male condoms (MC) and female condoms (FC) remain necessary and

important prevention components to achieve broad reaching reductions in new HIV and other STIs [6, 7].

The FC is as effective as MC in preventing both HIV and STIs [8] and has been available for sale or distribution for over two decades [6, 9]. However, the FC has had very narrow promotion resulting in extremely limited availability for anyone who might either benefit from it or prefer it to MC. One of the primary documented barriers to increased FC promotion and availability is the negative attitudes of providers, who might otherwise support its greater adoption in the high-risk and general populations, but who are skeptical of its potential uptake given challenges for first-time users, its awkward looks, its higher cost than MC, and providers' own disbelief that it might become popular or that it can contribute substantially to public health [10–12].

Despite provider skepticism, evidence continues to grow suggesting that removal of some of the basic obstacles to FC use, such as lack of awareness of it, access to it, and knowledge of its proper insertion, could result in greater initial trial and adoption of FC, along with a concurrent decrease in unprotected sex. Our own and other studies of FC use and adoption in the U.S. provide strong evidence of the willingness of heterosexual women to initiate it with minimal education and demonstration of proper insertion, use and disposal, and also indicate interest by their male partners to try it [13–18]. Further, studies have demonstrated the value of FC promotion to heterosexual couples, whether or not one partner is HIV infected, which suggests that FC has significant potential for uptake in the general population [19–21]. Such an outcome could lead to the kind of “normalization” of FC that characterizes MC, even if the former never achieves the popularity of the latter. Such efforts could greatly impact the ongoing STI and HIV epidemics in the U.S., particularly in urban centers, where these epidemics are concentrated.

We conducted a study of community-level factors affecting FC use and adoption by the general heterosexual population in low-income neighborhoods of a northeastern U.S. city. This was part of a larger community engagement study to develop indigenous multilevel interventions to expand availability of FC and promote its increased uptake [12]. This paper presents a comparison of women's and men's pre-intervention exposure to, attitudes toward, and use of FC along with MC and their other efforts to prevent HIV or STI. Data presented here are derived from a multi-year, cross-sectional survey of city residents' demographic, risk/prevention behavior, and health characteristics. The purpose of the four annual surveys reported here was to examine community trends in FC use and factors associated with it, which could also be used as multiple baselines for subsequent assessment of a community-level intervention planned for later implementation.

Methods

Study Design and Theoretical Framework

We used a prospective case study design in a single northeast U.S. city with high HIV prevalence to develop and pilot multilevel interventions designed to increase community availability, accessibility, support for, and use of FC [12]. As part of the study, we conducted a multi-year examination of the community context affecting FC use prior to

implementing the multilevel interventions. To do so, we used longitudinal, mixed methods to examine factors expected to be associated with FC availability, extant use, and potential for its expanded promotion and adoption in the general population. This included mixed methods ethnography [22] of the community intervention development process as well as repeated community assessments of FC availability in provider organizations and of FC attitudes and use in the residential population of the city. Annual cross-sectional surveys of a sample of urban residents primarily from low-income, high HIV prevalence neighborhoods constituted an assessment over time of pre-intervention FC use in the city.

Figure 1 illustrates the theorized relationships among key factors that guided our analysis of FC use in the sample population. This model was informed by our prior research on associations in high-risk urban U.S. women among personal (demographic, health status/history, risk behavior and perception, prevention knowledge and attitudes), sex partner-related (relationship number, types and characteristics, abuse history), and peer (perceived influence and norms, network exposure) inputs on FC cognitive factors (knowledge, attitudes) and initial and continued FC use [14]. Though the model was developed and tested with women, we hypothesized the same theoretical relationships among co-factors and first- and second-level outcomes for both men and women in this study.

Recruitment and Survey Interview Methods

In each of four consecutive years (2009–2012) prior to intervention implementation, we conducted cross-sectional surveys of a sample of approximately 400 men and women living in the city. Eligibility criteria included being a city resident, being 16 or older, and self-reported having had sex with a person of the opposite sex in the prior month. To generate the sample, we used respondent driven sampling (RDS) [23], a commonly used method for conducting HIV assessments in high-risk and/or hidden populations [24, 25]. We began each annual survey cycle by identifying 8–10 recruitment “seeds,” seeking equal numbers of men and women volunteers representing different ethnic groups and age groups distributed across the city’s predominantly low-income neighborhoods. These were also the neighborhoods with the highest rates of STI and HIV infections. After each “seed” completed the survey, she/he was provided three coupons with her/his ID number on it and asked to recruit three other people who were city residents over the age of 16, without restriction on neighborhood of residence. Because our prior experience with RDS indicated the tendency of both men and women to recruit men, we required that each person use at least one of their coupons to recruit a woman in order to maintain gender balance in the sample. Any person who came in for a survey with one of the project coupons was screened for eligibility and voluntariness, surveyed if eligible, and also provided three coupons to recruit others after completing their own survey. Recruitment continued in this manner until the target annual sample size of 400 was reached. Recruitment chains and number of tiers away from the seeds were tracked using social network visualization software Netdraw [26].

All surveys were conducted in private offices in our community research institute, which is centrally located in the city. Trained interviewers used computer assisted interviews (CAI) to conduct the face-to-face survey. Proof of age was required for eligibility. Identifying information (names, date of birth, residence) were collected separately and used to confirm

eligibility, to track repeat participation in subsequent cycles of data collection (which was allowed), and to prevent repeat participation in any given cycle (even if the candidate came in with a different person's coupon). All participants received \$30 for completing the 1-h survey. Anyone who successfully referred an eligible person into the study received \$10 for that referral. Surveys were conducted in English or Spanish at the request of the participant. Written informed consent was gained before initiating the survey. All recruitment and data collection protocols received full review by the Institute for Community Research Institutional Review Board.

Survey Content and Measures

The survey measured several domains anticipated to be potential cofactors in FC use (Fig. 1). These included *demographics* (ethnicity recoded as Black/African American, Puerto Rican/other Latino, non-Hispanic White/others; gender; age; educational attainment; marital status; homeless status; monthly income; employment status), *drug use and sexual HIV/STI risk, prevention, history, and perception* (last 30 day number of sex partners, vaginal and anal sex, unprotected sex, MC use; last 30 day alcohol use to intoxication, drug injection, crack use; history of STI and current STI symptoms; HIV diagnosis; perceived HIV risk), *sexual relationships* (partner types including primary, casual, paying; reproductive intentions; relationship power; history of physical or sexual abuse before or after age 16 and currently), *peer norms/influence* (likelihood people you spend time with would use/are using FC or think you should, range 1–4), and *network exposure* (whether or not [yes/no] one or more people in your personal network ever said anything positive or negative to you about FC). *Perceived relationship power* with one's primary partner was measured using a 15-item scale [27], including questions about who has control over decisions, actions, etc. in the relationship (range 1–4; $\alpha = 0.81$ for men; $\alpha = 0.88$ for women; $\alpha = 0.86$ total sample).

We also measured first-level (cognitive) and second-level (behavioral) FC outcomes (Fig. 1). Cognitive factors included *FC knowledge*, measured as the proportion correct of six true/false statements about FC (range 0–1), and *FC attitudes*, measured using a 24-item scale [28] of responses to perceived FC characteristics (range 1–4, negative items recoded so higher score is more positive attitudes; $\alpha = 0.71$ for men; $\alpha = 0.61$ for women; $\alpha = 0.67$ total sample). We measured *self-efficacy to use the FC* with each type of sex partner as the mean of six items (e.g., “How sure are you that you could talk to a [...] partner about using FC for vaginal sex” and “If you only had FC available, how sure are you that you could refuse vaginal sex with a [...] partner who refused to use it”; range 1–4; $\alpha = 0.75$ for primary partner; $\alpha = 0.77$ for casual partner; $\alpha = 0.87$ for paying partner). *Locus of control for STI prevention* had three items: Internal: “If I take care of myself, I can keep from getting a STI,” Partner: “My partner controls my ability to protect myself against a STI,” and Fate: “If it is meant to be, I will get a STI” (range 1–4). We also asked *reasons for not having used FC and MC* over the past 30 days with different partner types, and *prevention efforts* they had taken to protect themselves from HIV/STI infection.

FC use was measured in several ways, including: ever having used FC (yes/no; yes was used as a marker for initial use), lifetime number of times used FC (never, once, 2–4 times, 5–10 times, >10 times), used FC in the prior 30 days (yes/no), and stage of FC use (never thought

about it; thought about or got it but didn't use it; tried FC but decided not to use it again; use FC occasionally; use FC as regular or primary prevention option). For correlational analyses of factors associated with FC use, we defined "FC users" as those who had used it in the prior 30 days (57 women's reports; 57 men's reports) or who had used it at least 5 times in their lifetime (66 women's reports; 48 men's reports). The number 5 was chosen because it indicates the person has overcome initial barriers to insertion and may consider the FC a manageable option for HIV/STI and/or pregnancy prevention [16].

Statistical Methods

To conduct analysis for this paper, we combined the samples from all four annual cycles into a single database. We kept all respondents from each year, even those who had participated in previous annual surveys (216 participants attended at least two cycles, totaling 486 of the 1614 observations). Generalized estimating equation (GEE) was used to address the problem of non-independence resulting from repeated measures. We examined whether there were any significant differences in percent of FC-users in each year by including time in the model predicting FC-users and did not find any significant differences. Descriptive statistics were conducted with women and men. We tested differences for significance using Chi square tests for categorical variables and Wilcoxon rank sum test for continuous or ordinal variables. GEE models with a logit link function were used to determine (1): what factors are associated with FC use, and (2) whether FC use is associated with reduced overall unprotected sex.

The following steps were used to build the final model for an adjusted GEE analysis of both FC use and unprotected sex. First, we conducted a series of unadjusted GEE analyses to identify the variables to include in the initial model building process. Variables with a *p* value below 0.25 in the unadjusted analyses were included in this process. Second, we used a manual backward selection procedure to sequentially eliminate the covariates that did not remain significant. The significance level was defined as *p* < 0.05. SAS software (version 9.1, SAS Institute Inc., Cary, NC) was used for the analysis. Although methods have been developed to weight RDS data for analysis [23, 25, 29], we decided not to weight our sample. Available RDS weights are for the purpose of population inferences of prevalence, which is not the primary purpose of this paper. Also, use of weights in logistic regression can be problematic and remains an ongoing discussion among statisticians [30]. The general consensus is to avoid use of weights as it could inflate the variance of the estimates of the log odds.

Results

The combined four-cycle sample included 1614 records. Table 1 indicates the demographic and risk characteristics of the full sample and comparisons by gender.

Gender Differences in FC Knowledge, Attitudes, and Peer Influences and Perceived HIV Risk

Table 2 indicates that women were significantly more knowledgeable than men about FC (*M* = 0.72, *SD* = 0.20, in women; *M* = 0.68, *SD* = 0.21, in men; range 0–1, *p* < 0.01) and had

more positive attitudes toward it than men ($M = 2.79$, $SD = 0.34$, in women; $M = 2.71$, $SD = 0.30$, in men; range 1–4, $p < 0.001$). Women also indicated greater belief in their efficacy to use FC with a primary partner ($M = 3.0$, $SD = 0.75$, range 1–4, $p < 0.001$) or casual partner ($M = 3.1$, $SD = 0.77$, $p < 0.01$) than men did ($M = 2.84$, $SD = 0.74$; $M = 2.86$, $SD = 0.73$, respectively). Notably, men reported lower perceived relationship power in their primary relationships than women indicated ($M = 2.84$, $SD = 0.39$ in men; $M = 3.0$, $SD = 0.49$ in women, range 1–4, $p < 0.001$). Both genders reported high belief in their own ability to control their STI prevention, though men felt more strongly than women that their partner controls their likelihood of getting infected ($M = 2.2$, $SD = 0.85$ in men; $M = 1.98$, $SD = 0.83$ in women, range 1–4, $p < 0.001$) or that fate controls it ($M = 1.96$, $SD = 0.84$ in men; $M = 1.87$, $SD = 0.85$ in women, range 1–4, $p < 0.01$). Reported peer norms and peer influence related to FC use indicated that women were more likely than men to believe their peers thought they should be using FC ($M = 1.69$, $SD = 1.30$ in women; $M = 1.54$, $SD = 0.94$ in men, range 1–4, $p < 0.01$). Also more women than men reported exposure to FC information within their personal networks ($p < 0.001$). Differences in perceived HIV risk were not statistically significant by gender and most participants believed their risk to be low.

FC Awareness, Use and Reported Reasons for Not Using FC and MC

Women were more likely than men ever to have heard of FC (93.5 % of women vs. 90.8 % of men, $p < 0.05$) or seen FC (82.4 % of women vs. 72.5 % of men, $p < 0.001$) and were more likely ever to have used it (35.6 % of women vs. 27.3 % of men, $p < 0.001$) (Table 3). However, of those who had ever used FC, more men than women reported having used it in the prior 30 days (27.4 % of men vs. 18.8 % of women who had ever used FC, $p < 0.05$). Women indicated significantly more lifetime use of FC than men ($p < 0.01$), including 7.8 % of women and 6.3 % of men who reported having used FC five or more times ever. Perceived stage of use was also significantly different by gender ($p < 0.001$), with more men never having used or thought about using it, more women having thought about but rejected it, and more women using it as a primary prevention method. Only 2–3 % of men and women reported that they had tried FC and then decided not to use it again.

Table 4 indicates that men were statistically significantly more likely than women to report not having used FC in the prior 6 months because they had never heard of it (12.6 % of men vs. 7.9 % of women, $p < 0.01$) or their partner said no to it (6.3 % of men vs. 2.5 % of women, $p < 0.01$). Women's responses reflected more experience with using FC; they were more likely than men to report not having used it in the past 6 months because they were not able to insert it properly (2.8 % of women vs. 0.9 % of men, $p < 0.05$), it is too expensive (3.1 vs. 0.7 %, $p < 0.01$), they had a bad experience with it (3.6 vs. 1.5 %, $p < 0.05$), no one had shown them how to use it (12.5 vs. 6.1 %, $p < 0.001$), or they generally disliked it (17.4 vs. 9.1 %, $p < 0.001$). However relatively few (<10 %) of either gender perceived most of these reasons as barriers to FC use. Slightly more than half of both men and women reported not using FC simply because they did not see any reason to use it. Only about 5 % of men and women said they didn't want to ask or talk to their partner about using it.

We also asked reasons for not using MC with primary and casual partners in the prior 30 days (not shown in the table). Nearly one-third of both men and women indicated they either

did not want to use MC or they had used one every time they had sex during that period. Only a small percent of both genders said their primary partner refused to use MC (range 3–5 %) or their casual partners refused it (range 1–4 %). Also less than 2 % said they were not comfortable asking their primary or casual partners to use MC as a reason for not using them in the prior 30 days. When asked what other efforts they were making to prevent exposure to HIV/STI, responses varied somewhat by gender. More women than men (53.4 vs. 48.1 %, $p = 0.04$) indicated they had only one sex partner to prevent HIV exposure, while more men than women indicated they reduced the number of sex partners (8.3 vs. 3.5 %, $p < 0.001$) or selected partners more carefully (12.7 vs. 5.8 %, $p < 0.001$).

Correlates of Factors Associated with FC Use and Overall Unprotected Sex

Unadjusted and adjusted GEE conducted separately with the women and men indicated several factors were associated, alone or in combination, with being a FC user (Table 5). For these analyses, we defined “FC users” as having used FC in the prior 30 days and/or lifetime FC use of at least five times. Using this definition, FC users included 93 records from women and 83 records from men. All analyses use 95 % confidence intervals (CI). In adjusted analysis of the women when including only significant covariates, having injected drugs (OR = 3.54; CI = 1.47, 8.48; $p < 0.01$), having STI symptoms (OR = 2.01; CI = 1.08, 3.72; $p < 0.05$), having multiple sex partners (OR = 2.05; CI = 1.11, 3.78; $p < 0.05$), being a MC user (OR = 2.20; CI = 1.30, 3.73; $p < 0.01$), positive FC attitudes (OR = 7.61; CI = 3.85, 15.03; $p < 0.001$), positive peer influence (likelihood people you spend time with think you should use FC, OR = 1.62; CI = 1.31, 2.00; $p < 0.001$), and network exposure to FC information (OR = 2.26; CI = 1.21, 4.19; $p > 0.05$) significantly increased the odds of being a FC user. By contrast, in adjusted analysis of the men, being a MC user (OR = 2.86; CI = 1.51, 5.41; $p < 0.01$), positive FC attitudes (OR = 7.61; CI = 3.09, 18.76; $p < 0.001$), peer influence (people you spend time with think you should use FC, OR = 1.36; CI = 1.06, 1.74; $p < 0.05$), peer norms (people you spend time with are using FC, OR = 1.50; CI = 1.14, 1.96; $p < 0.01$), and network exposure to FC information (OR = 2.82; CI = 1.62, 4.90; $p < 0.001$) significantly increased the odds of being a FC user.

Similar analyses were conducted to identify factors associated with inconsistent protected sex, meaning having had any sex without a male or female condom in the prior 30 days (Table 6). We particularly wanted to examine whether FC use might contribute to reducing unprotected sex. In our sample, 566 participants (297 women and 269 men) reported consistent condom use during all sexual encounters in the prior 30 days, and the remaining 986 (including 530 women and 456 men) were inconsistent condom users. Among women, the odds of being an inconsistent condom user (95 % CI) decreased with age (OR = 0.97; CI = 0.95, 0.98; $p < 0.001$) and with being a MC user (OR = 0.01; CI = 0.00, 0.02; $p < 0.001$), but increased with being Latina (OR = 1.64; CI = 1.05, 2.57; $p < 0.05$). Among men, the odds of being an inconsistent condom user decreased with age (OR = 0.97; CI = 0.95, 0.99; $p < 0.001$) and being a MC user (OR = 0.01; CI = 0.00, 0.03; $p < 0.001$), but increased with being married (OR = 3.98; CI = 2.16, 7.31; $p < 0.001$), with trying to have a baby (OR = 3.70; CI = 1.42, 9.65; $p < 0.01$), and with perceived HIV risk (OR = 1.66; CI = 1.29, 2.13; $p < 0.001$). Among both men and women, being a FC user did not increase the odds of being a consistent condom user in the prior 30 days.

Discussion

Several demographic and risk characteristics known to be associated with or mitigated by FC use [13, 14, 31–33] were evident among women and men in this sample. Of greatest note were prior experiences of sexual or physical abuse (more among women), being homeless or injecting drug users (more men), having STI symptoms (more women), and having multiple or casual sex partners (more men), as well as anyone with HIV (about 9 % of both men and women). Having FC available for incorporation into routine prevention efforts is especially beneficial for these participants at highest risk and could potentially reduce the overall number of men and women who had any unprotected sex in the prior month (about 60 % of both genders).

Importantly, perceived risk of contracting HIV was relatively low among both men and women in the sample (about 15 % felt somewhat or very at risk). This contrasted with their self-reported high rates of sexual risk behaviors and history of STI as well as the high HIV and STI prevalence rates in the city. This may partly explain the overall rates of reported unprotected sex. However, high perceived HIV risk increased the odds of reporting unprotected sex in the prior 30 days, though this unexpected reversal may be explained if having had unprotected sex leads to higher perceived HIV risk. FC use to supplement MC use or to reduce unprotected sex was strikingly low, given this context. Only 32 % of women and 26 % of men reported ever having used FC, and most reported never having thought about using it. Though recent MC use was clearly higher than FC use (about 60 % of the sample had used MC in the prior 30 days), greater awareness of community-level and personal risk of exposure to HIV and other STI might provide impetus to increase use of all barrier methods for greater protection of self and partners.

Nearly all cognitive and attitudinal factors associated with FC use indicated women's greater awareness of FC and readiness to use them than men's. Women are more exposed to FC information, free samples of FC, and encouragement to try to use them than are men. This partially explains men's lesser FC knowledge, poorer attitudes toward it, less peer influence to use FC or network exposure to it, and ultimately, less use of it [13, 14, 34]. Especially important is shared information about FC within personal networks, which may explain the greater likelihood that women had at least tried FC even if they had heard some negative things about it [18]. If information in the network were increased among men, more of them might make initial efforts to use the device [35]. Men's lower reported sense of power in primary relationships is not explained by our data, but may partly explain men's lower perceived efficacy to use FC with primary partners [36, 37]. However, despite these disadvantages for men in terms of awareness and capacity to use FC, men were more likely than women to report prior 30 day use. This suggests potential to build on the recent experiences of those who have tried it [35, 38] and to expand efforts to encourage more men's initial use of it. The likelihood for increasing FC use at men's initiation is also suggested by the similar rates by gender of occasional use and lifetime use of more than 2 or more than 10 times, though women were more likely to report the last category.

Reasons men and women gave for not having used FC in the prior 6 months were also suggestive. Comparing gender differences for not using FC (Table 4), women were more

likely to report barriers related to lack of support (“too expensive,” “no one told or showed me how to use it”) and negative experiences using FC (“had a bad experience,” “don’t like female condom”). But men were more likely to report lack of access (“never heard of them”) and partner reasons (“partner said no”). A common concern indicated in the literature is that women’s decision to use FC may be impeded by male partner refusal [31, 39, 40]. This did not appear to be a significant factor for women in this sample, but was more likely to be an issue for men. It is possible that some men’s female partners had tried FC and had an unsuccessful experience with it, or that men need more skills to negotiate initial or ongoing FC use with their female partners [35], who may be skeptical of it. Notably, neither women nor men in this sample reported unwillingness to ask a partner or partner refusal as barriers to use MC with either primary or casual partners.

These findings suggest that future intervention to promote FC should not only include men, but should also address the different needs of men and women. Couples intervention should focus on increased barrier use in general and the importance of involving male partners in efforts to increase FC use by expanding men’s capacity to encourage their female partners of its benefits and to facilitate its proper use [35, 39].

A positive association between FC use and MC use was supported by our adjusted GEE analyses. This finding suggests that many FC users may have overcome some of the common impediments to barrier method use by having previously used MC. These include discomfort introducing a barrier method to partners, negotiating it within intimate and trusting sexual relationships as well as in casual encounters, and accepting the potential interruption during the sex act to put on or insert it as well as the less than natural feel of it during intercourse. If these factors do not interfere with barrier method use in general, then the FC simply provides another option to the array of MC currently on the market, and will also likely expand as more FC models become available [41].

Also importantly, the most common reason both men and women gave for not using FC was that they did not see a reason to use it. Explanations for this could not be determined, though it may reflect their low perceived risk of infection. However, perceived lack of need is contradicted by personal and contextual conditions of risk. These conditions suggest the benefits of programs to increase general risk awareness while offering multiple effective barrier methods to reduce it.

Perceived lack of need for FC may also be explained if participants felt that having MC was adequate or simply by very low awareness of FC. Both men and women reported that MC use was their primary means of protected sex. Yet MC use was very inconsistent. Further, the fact that being a FC user did not lower the odds of having had unprotected sex in the prior 30 days suggests that adoption and use of the product has not yet filled the sexual risk gap that still remains as a result of inconsistent MC use. The current inadequate promotion and availability and modest adoption of FC may be too limited to contribute measurably to an increase in sexual protection in this general heterosexual population. Significantly greater efforts at FC education, promotion, availability and access, and broader uptake of the product are needed to produce a marked population-level increase in protected sex and consequent reduction in transmission of HIV and STI. FC may never achieve the popularity

of MC, but it may still have an important role for those who have a perceived need for a barrier method and want other options besides MC.

This study has several limitations. First, it uses cross-sectional data; therefore, relationships among factors cannot be interpreted as causal. Second, these data are drawn from a sample of heterosexual men and women in a single city and may not be generalizable to the residents of other cities with different population compositions. Although RDS is essentially a type of snowball sampling rather than probability sampling, we attempted to maximize the sample's representativeness of heterosexual, low-income men and women in this city in several ways. We followed proper procedures for generating a respondent driven sample [42, 43], which requires producing long waves of recruitment chains to reduce sample interdependence. In all annual cycles of recruitment, at least half of our 8–10 seeds produced chains that reached between 10 and 20 links from the initial recruiter, which far exceeds the minimum standard of 4–5 links [43]. This greatly minimizes the possibility of sample bias resulting from homophily within recruitment chains [23, 25, 42]. Additionally, GIS mapping of participant residences indicated that the sample was well distributed across all low-income neighborhoods of the city. Further, the demographic and socio-economic characteristics of the each year's sample and the total sample reflect those of the larger city population from which they were recruited. A third limitation to the study is that all data are based on self-report; some of the sensitive measures may be affected by social desirability or recall bias. However, we made great efforts to create a relaxed and safe environment and encouraged honest and complete responses from all participants by using carefully trained interviewers and conducting interviews in a well-known, comfortable and private community-based setting. A final limitation is the small number of participants who were identified as "FC users" in statistical analyses, though this may be reflective of the city and the nation given the slow advancement of FC as a prevention option. Statistical inferences related to FC use may be affected by this small number of participants and should be interpreted with caution.

Recommendations

The need for additional effective HIV/STI prevention options besides MC is clear, and FC undoubtedly could have a role in filling this gap. Findings from this study indicate that heterosexual men can be willing to use FC [35, 44–46], although they are still being forgotten in current intervention efforts. Effective and targeted outreach to men to introduce them to FC, instruct them on how to propose it to their partners and assist them with proper insertion, as well as other supports, may help overcome barriers men have faced, and also support women's efforts to use FC more often. These findings have implications for targeted efforts to increase FC use in both heterosexual men and women for HIV/STI prevention and could be used to encourage providers to expand their efforts and change their outlook on FC promotion.

Expanded intervention to promote FC is most relevant to high risk groups (e.g., those with drug injection risk, sexual risks, abuse history). However, low perceived risk continues to impede adoption of barrier methods for protection against all types of STIs. Greater recognition of risk and emphasis on risk reduction should be the primary message for both

genders, and especially for women. Men's social networks should also be mobilized in order to motivate them as FC supporters. Further, more intervention delivered to couples could reduce challenges for both men and women to introduce or use FC with primary partners [19]. This requires significantly greater efforts on the part of all providers, including primary care, HIV and STI specialists, and community health educators, to promote and support FC with as much enthusiasm, even if with fewer resources, as has been given to the promotion and demonstration of MC over the past three decades.

It is time to "normalize" FC in the general population in order to generate a tipping point of community awareness and recognition of the value of FC, which will benefit the highest risk members as well as the broader community. This is despite the likelihood that some potential users may have mixed feelings about it and MC may continue to dominate barrier method preferences. Nevertheless, such normalization is needed in order to make FC truly available to those individuals and couples who want or need alternatives to MC but still require or prefer barrier methods to protect against a variety of sexually transmitted diseases and also unwanted pregnancy. Further research is needed to understand better what supports are sufficient for highest risk women and men to be able to use FC correctly and consistently so that it can contribute more to reducing unprotected sex. Programs like the publically supported citywide, multilevel efforts to promote FC in Washington DC, San Francisco, Chicago, and New York [6, 40] and to incorporate it into the full spectrum of HIV/STI prevention efforts have shown significant effectiveness and cost effectiveness [41]. Such broad-based efforts contribute greatly to normalizing FC, and should be expanded and replicated in order to achieve the best use of limited resources to curb the intertwined epidemics of HIV and STIs most effectively.

Acknowledgments

The authors are deeply indebted to the project Steering Committee, including Paul Botticello, Clair Kaplan, Shawn Lang, Lucy Rohena, and Danielle Warren-Diaz, and other members of the project research team, including Emil Coman, Paige Nuzzolillo, Joella Morris, Mary Prince, Zulma Rios and Ellen Cromley. This study was supported by the National Institute of Mental Health (Grant Number 1R01MH084724), and was an affiliated study of the Center for Interdisciplinary Research on AIDS (P30MH062294). The content of this paper is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Mental Health or the National Institutes of Health.

References

1. Granich R, Crowley S, Vitoria M, Smyth C, Kahn JG, Bennett R, et al. Highly active antiretroviral treatment as prevention of HIV transmission: review of scientific evidence and update. *Curr Opin HIV AIDS*. 2010; 5(4):298–304. [PubMed: 20543604]
2. Holtgrave DR, Maulsby C, Wehrmeyer L, Hall HI. Behavioral factors in assessing impact of HIV treatment as prevention. *AIDS Behav*. 2012; 16(5):1085–91. [PubMed: 22491813]
3. Golub SA, Operario D, Gorbach PM. Pre-exposure prophylaxis state of the science: empirical analogies for research and implementation. *Curr HIV/AIDS Rep*. 2010; 7(4):201–9. [PubMed: 20809218]
4. Young I, McDaid L. How acceptable are antiretrovirals for the prevention of sexually transmitted HIV?: a review of research on the acceptability of oral pre-exposure prophylaxis and treatment as prevention. *AIDS Behav*. 2014; 18(2):195–216. [PubMed: 23897125]
5. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med*. 2011; 365(6):493–505. [PubMed: 21767103]

6. Hoffman S. The female condom in the age of antiretroviral-based HIV prevention. *J Womens Health*. 2013; 22(1):7–8.
7. Vermund SH, Hayes RJ. Combination prevention: new hope for stopping the epidemic. *Curr HIV/AIDS Rep*. 2013; 10(2):169–86. [PubMed: 23456730]
8. Minnis AM, Padian NS. Effectiveness of female controlled barrier methods in preventing sexually transmitted infections and HIV: current evidence and future research directions. *Sex Transm Infect*. 2005; 81(3):193–200. [PubMed: 15923284]
9. Warren M, Philpott A. Expanding safer sex options: introducing the female condom into national programmes. *Reprod Health Matters*. 2003; 11(21):130–9. [PubMed: 12800710]
10. Mantell JE, West BS, Sue K, Hoffman S, Exner TM, Kelvin E, et al. Health care providers: a missing link in understanding acceptability of the female condom. *AIDS Educ Prev*. 2011; 23(1):65–77. [PubMed: 21341961]
11. Mantell JE, Hoffman JA, Weiss E, Adeokun L, Delano G, Jagha T, et al. The acceptability of the female condom: perspective of family planning providers in New York City, South Africa, and Nigeria. *J Urban Health*. 2001; 78(4):658–68. [PubMed: 11796812]
12. Weeks MR, Abbott M, Hilario H, Radda K, Medina Z, Prince M, et al. Structural issues affecting creation of a community action and advocacy board. *Health Educ Res*. 2013; 28(3):375–91. [PubMed: 23660461]
13. Weeks MR, Coman E, Hilario H, Li J, Abbott M. Initial and sustained female condom use among low-income urban U.S. women. *J Womens Health*. 2013; 22(1):26–36.
14. Weeks MR, Hilario H, Li J, Coman E, Abbott M, Sylla LN, et al. Multi-level social influences on female condom use and adoption among urban United States women. *AIDS Patient Care STDS*. 2010; 24(5):297–309. [PubMed: 20438372]
15. Campbell AN, Tross S, Hu MC, Pavlicova M, Kenney J, Nunes EV. Female condom skill and attitude: results from a NIDA clinical trials network gender-specific HIV risk reduction study. *AIDS Educ Prev*. 2011; 23(4):329–40. [PubMed: 21861607]
16. Beksinska M, Smit J, Joanis C, Hart C. Practice makes perfect: reduction in female condom failures and user problems with short-term experience in a randomized trial. *Contraception*. 2012; 86(2):127–31. [PubMed: 22264667]
17. Gallo MF, Kilbourne-Brook M, Coffey PS. A review of the effectiveness and acceptability of the female condom for dual protection. *Sex Health*. 2012; 9(1):18–26. [PubMed: 22348629]
18. Coman EN, Weeks MR, Yanovitzky I, Iordache E, Barbour R, Coman MA, et al. The impact of information about the female condom on female condom use among males and females from a U.S. urban community. *AIDS Behav*. 2013; 17(6):2194–201. [PubMed: 23212854]
19. Jones D, Kashy D, Villar-Loubet O, Weiss S. Enhancing acceptability and use of sexual barrier products among HIV concordant and discordant couples. *AIDS Behav*. 2013; 17(6):2185–93. [PubMed: 23494224]
20. Witte SS, El-Bassel N, Gilbert L, Wu E, Chang M, Hill J. Promoting female condom use to heterosexual couples: findings from a randomized clinical trial. *Perspect Sex Reprod Health*. 2006; 38(3):148–54. [PubMed: 16963388]
21. Corbett M, Dickson-Gomez J, Hilario H, Weeks MR. A little thing called love: condom use among high-risk primary heterosexual couples. *Perspect Sex Reprod Health*. 2009; 41(4):218–24. [PubMed: 20444176]
22. Schensul, JJ.; LeCompte, MD. *Essential ethnographic methods: a mixed methods approach*. 2. Lanham: Rowman Altamira; 2012.
23. Heckathorn DD. Respondent-driven sampling: a new approach to the study of hidden populations. *Soc Probl*. 1997; 44(2):174–99.
24. Gallagher KM, Sullivan PS, Lansky A, Onorato IM. Behavioral surveillance among people at risk for HIV infection in the US: the National HIV Behavioral Surveillance System. *Public Health Rep*. 2007; 122(Suppl 1):32. [PubMed: 17354525]
25. Salganik MJ, Heckathorn DD. Sampling and estimation in hidden populations using respondent-driven sampling. *Sociol Methodol*. 2004; 34(1):193–240.
26. Borgatti, SP. *NetDraw: graph visualization software*. Boston: Analytic Technologies; 2002.

27. Pulerwitz J, Amaro H, DeJong W, Gortmaker SL, Rudd R. Relationship power, condom use and HIV risk among women in the USA. *AIDS Care*. 2002; 14(6):789–800. [PubMed: 12511212]
28. Neilands TB, Choi K. A validation and reduced form of the female condom attitudes scale. *AIDS Educ Prev*. 2002; 14(2):158–71. [PubMed: 12000233]
29. Gile KJ. Improved inference for respondent-driven sampling data with application to HIV prevalence estimation. *J Am Stat Assoc*. 2011; 106(493):135–46.
30. Winship C, Radbill L. Sampling weights and regression analysis. *Sociol Methods Res*. 1994; 23(2):230–57.
31. Choi KH, Gregorich SE, Anderson K, Grinstead O, Gomez CA. Patterns and predictors of female condom use among ethnically diverse women attending family planning clinics. *Sex Transm Dis*. 2003; 30(1):91–8. [PubMed: 12514450]
32. Holmes L Jr, Ogunbade GO, Ward DD, Garrison O, Peters RJ, Kalichman SC, et al. Potential markers of female condom use among inner city African–American women. *AIDS Care*. 2008; 20(4):470–7. [PubMed: 18449825]
33. Witte SS, Wada T, El-Bassel N, Gilbert L, Wallace J. Predictors of female condom use among women exchanging street sex in New York City. *Sex Transm Dis*. 2000; 27(2):93–100. [PubMed: 10676976]
34. Mantell JE, Smit JA, Beksinska M, Scorgie F, Milford C, Balch E, et al. Everywhere you go, everyone is saying condom, condom. But are they being used consistently? Reflections of South African male students about male and female condom use. *Health Educ Res*. 2011; 26(5):859–71. [PubMed: 21693684]
35. Beksinska M, Smit J, Mabude Z, Vijayakumar G, Linda J. Male partner involvement and assistance in female condom use. *Eur J Contracep Reprod Health Care*. 2008; 13(4):400–3.
36. Harvey SM, Bird ST, Galavotti C, Duncan EAW, Greenberg D. Relationship power, sexual decision making and condom use among women at risk for HIV/STDs. *Women Health*. 2002; 36(4):69–84. [PubMed: 12555803]
37. Paranjape A, Bernstein L, George DM, Doyle J, Henderson S, Corbie-Smith G. Effect of relationship factors on safer sex decisions in older inner-city women. *J Womens Health*. 2006; 15(1):90–7.
38. Jones DL, Weiss SM, Chitalu N, Mumbi M, Shine A, Vamos S, et al. Acceptability and use of sexual barrier products and lubricants among HIV-seropositive Zambian men. *AIDS Patient Care STDS*. 2008; 22(12):1015–20. [PubMed: 19072108]
39. Hoffman S, Exner TM, Leu CS, Ehrhardt AA, Stein Z. Female-condom use in a gender-specific family planning clinic trial. *Am J Public Health*. 2003; 93(11):1897–903. [PubMed: 14600063]
40. Vijayakumar G, Mabude Z, Smit J, Beksinska M, Lurie M. A review of female-condom effectiveness: patterns of use and impact on protected sex acts and STI incidence. *Int J STD AIDS*. 2006; 17(10):652–9. [PubMed: 17059633]
41. Beksinska M, Smit J, Joanis C, Potter W. New female condoms in the pipeline. *Reprod Health Matters*. 2012; 20(40):188–96. [PubMed: 23245425]
42. Heckathorn DD. Respondent-driven sampling II: deriving valid population estimates from chain-referral samples of hidden populations. *Soc Probl*. 2002; 49(1):11–34.
43. Volz E, Heckathorn DD. Probability based estimation theory for respondent driven sampling. *J Off Stat*. 2008; 24(1):79–97.
44. Hirky AE, Kirshenbaum SB, Melendez RM, Rollet C, Perkins SL, Smith RA. The female condom: attitudes and experiences among HIV-positive heterosexual women and men. *Women Health*. 2003; 37(1):71–89. [PubMed: 12627611]
45. Penman-Aguilar A, Hall J, Artz L, Crawford MA, Peacock N, van Olphen J, et al. Presenting the female condom to men: a dyadic analysis of effect of the woman's approach. *Women Health*. 2002; 35(1):37–51. [PubMed: 11942468]
46. Seal DW, Ehrhardt AA. Heterosexual men's attitudes toward the female condom. *AIDS Educ Prev*. 1999; 11(2):93–106. [PubMed: 10214494]

Fig. 1.
Analytical model of factors associated with initial and continued female condom (FC) use

Table 1

Total 4-cycle cross-sectional survey sample: demographics, HIV/STI risks, and male condom use by gender (N = 1614)

	Women		Men		Total	
	N	(%)	N	(%)	N	(%)
Total	851	(52.7)	763	(47.3)	1614	
Ethnic group						
Black/African American	264	(31.0)	233	(30.5)	497	
Puerto Rican/other Latino	487	(57.2)	429	(56.2)	916	
White/other groups	100	(11.8)	101	(13.2)	201	
High school graduate ***	382	(44.9)	418	(54.8)	800	
Age category ***						
16-25	143	(16.8)	82	(10.7)	225	
26-35	157	(18.5)	129	(16.9)	286	
36-45	248	(29.1)	241	(31.6)	489	
46-55	259	(30.4)	228	(29.9)	487	
56 or older	44	(5.2)	83	(10.9)	127	
Marital status ***						
Single	415	(48.8)	416	(54.5)	831	
Married/living together	325	(38.2)	199	(26.1)	524	
Divorced/separated/widowed	111	(13.0)	148	(19.4)	259	
Homeless ***	120	(14.1)	228	(29.9)	348	
Prior month income <\$500 *	401	(62.7)	389	(69.5)	790	
Currently employed	118	(13.9)	115	(15.1)	233	
Substance use in last 30 days						
Alcohol use until intoxicated	117	(19.2)	89	(15.2)	206	
Injected drug use **	44	(5.2)	66	(8.7)	110	
Crack use	69	(8.1)	53	(7.0)	122	
Sexually transmitted infections (STI)						
Past STI *	91	(37.5)	49	(27.8)	140	
Current STI symptoms ***	95	(11.2)	19	(2.5)	114	

	Women		Men		Total	
	N	(%)	N	(%)	N	(%)
HIV-positive (self-report)	81	(9.5)	70	(9.2)	151	
Any physical/sexual abuse history ***	469	(55.3)	214	(28.1)	683	
Childhood abuse history ***	364	(42.9)	152	(20.0)	516	
Adulthood abuse history ***	315	(37.2)	85	(11.2)	400	
Current partner abuse	18	(2.1)	18	(2.4)	36	
Multiple sex partners last 30 days ***	123	(14.5)	216	(28.3)	339	
Sex partner types in last 30 days						
Primary partner ***	748	(87.9)	603	(79.0)	1351	
Casual partner(s) ***	187	(22.0)	276	(36.2)	463	
Paying partner(s)	25	(2.9)	30	(3.9)	55	
Pregnant or trying **	35	(4.1)	54	(7.1)	89	
Any anal sex in last 30 days	84	(12.9)	89	(15.6)	173	
Used a male condom in last 30 days *	460	(54.1)	459	(60.2)	919	
Any unprotected sex in last 30 days	527	(61.9)	454	(59.5)	981	

Significance reflects differences between men and women on each characteristic. Statistical tests reported are Pearson Chi square test

* p < 0.05,

**

p < 0.01,

*** p < 0.001

Table 2

Cognitive factors and peer influences regarding female condom (FC) use by gender (Mean $\pm$ SD, Median, except where indicated)

	Women (N = 851)	Men (N = 763)	Total N
FC knowledge (range 0–1) **	0.72 $\pm$ 0.20, 0.67	0.68 $\pm$ 0.21, 0.67	1605
FC attitudes (range 1–4) ***	2.79 $\pm$ 0.34, 2.79	2.71 $\pm$ 0.30, 2.68	1195
FC efficacy (range 1–4) ^a			
With primary partner ***	3.00 $\pm$ 0.75, 3.00	2.84 $\pm$ 0.74, 2.83	1427
With casual partner **	3.10 $\pm$ 0.77, 3.25	2.86 $\pm$ 0.73, 2.92	377
With paying partner	2.70 $\pm$ 0.96, 2.67	2.94 $\pm$ 0.83, 3.00	26
Relationship power (range 1–4) ***	3.00 $\pm$ 0.49, 2.93	2.84 $\pm$ 0.39, 2.87	1614
Locus of control of STI prevention (range 1–4) **	3.05 $\pm$ 0.54, 3.00	2.97 $\pm$ 0.52, 3.00	1195
Internal (my own behavior)	3.15 $\pm$ 0.82, 3.00	3.17 $\pm$ 0.78, 3.00	1614
Partner (my partner's behavior) ***	1.98 $\pm$ 0.83, 2.00	2.20 $\pm$ 0.85, 2.00	1614
Fate (if it is meant to be) **	1.87 $\pm$ 0.85, 2.00	1.96 $\pm$ 0.84, 2.00	1614
Perceived peer norms/influence (range 1–4)			
Likelihood most people you spend time with would use FC	1.70 $\pm$ 0.95, 1.00	1.69 $\pm$ 0.95, 1.00	1601
Likelihood most people you spend time with think you should use FC **	1.69 $\pm$ 1.03, 1.00	1.54 $\pm$ 0.94, 1.00	1606
Likelihood most people you spend time with are using FC	1.60 $\pm$ 0.92, 1.00	1.53 $\pm$ 0.87, 1.00	1601
	N (%)	N (%)	
Network exposure to FC information *** ^b	459 (53.9)	345 (45.2)	804
Believes self to be either somewhat or very likely to get HIV/AIDS	104 (13.5)	105 (15.2)	209

Significance reflects differences between men and women on each characteristic. Statistical tests reported are Pearson Chi square test for categorical variables and Wilcoxon rank sum test for continuous or ordinal measures

^a Includes only those who reported having each kind of sex partner

^b Network exposure to FC information is a dichotomous variable (Y/N) defined as having one or more persons in one's network who has ever said anything positive or negative about FC

* p < 0.05,

** p < 0.01,

*** p < 0.001

SD standard deviation

Table 3

Female condom (FC) awareness and use by gender (N = 1614)

	Women (N = 851)		Men (N = 763)		Total	
	N	(%)	N	(%)	N	
Ever heard of FC *	796	(93.5)	693	(90.8)	1489	
Ever seen FC ***	701	(82.4)	553	(72.5)	1254	
Ever used FC ***	303	(35.6)	208	(27.3)	511	
Used FC in last 30 days (% of ever used) *	57	(18.8)	57	(27.4)	114	
Total times ever used FC (lifetime) **						
Never	549	(64.5)	555	(72.7)	1104	
Once	96	(11.3)	68	(8.9)	164	
2–4 times	140	(16.4)	92	(12.1)	232	
5–10 times	33	(3.9)	29	(3.8)	62	
More than 10 times	33	(3.9)	19	(2.5)	52	
Stage of FC use ***						
Never thought about using	356	(59.4)	418	(72.3)	774	
Thought about/got but didn't use	108	(18.0)	53	(9.2)	161	
Tried but decided not to use again	22	(3.7)	12	(2.1)	34	
Use FC occasionally	63	(10.5)	66	(11.4)	129	
Use FC as regular or primary prevention	50	(8.4)	29	(5.0)	79	

Significance reflects differences between men and women on each characteristic. Statistical tests reported are Pearson Chi square test

* p <0.05,

** p <0.01,

*** p <0.001

Table 4

Reasons for not using female condoms (FC) in past 6 months by gender (N = 1149)

	<u>Women (N = 610)</u>		<u>Men (N = 539)</u>	
	N	(%)	N	(%)
Reasons for not using FC in past 6 months				
Never heard of them **	48	(7.9)	68	(12.6)
Didn't know where to get one	45	(7.4)	38	(7.1)
Tried to get them but they weren't available	21	(3.4)	19	(3.5)
Didn't want to ask or talk to partner about it	27	(4.4)	32	(5.9)
Partner said no **	15	(2.5)	34	(6.3)
Tried to insert it but couldn't *	17	(2.8)	5	(0.9)
Too expensive to buy **	19	(3.1)	4	(0.7)
Had a bad experience with them *	22	(3.6)	8	(1.5)
No one told or showed me how to use ***	76	(12.5)	33	(6.1)
Heard bad things about them ^a	3	(0.5)	4	(0.7)
Don't like female condoms ***	106	(17.4)	49	(9.1)
Don't see any reason to use it	314	(51.5)	297	(55.1)

Only participants who had not used FC in the prior 6 months responded to these questions

Significance reflects differences between men and women on each characteristic. Statistical tests reported are Pearson Chi square test except where indicated

^a p value obtained using Fisher's exact test

* p < 0.05,

** p < 0.01,

*** p < 0.001

Table 5

Factors associated with being a female condom (FC) user by gender (N = 1614)

Variables	Odds ratio (95 % confidence interval) among 851 records from 652 women		Odds ratio (95 % confidence interval) among 763 records from 692 men	
	Unadjusted	Adjusted ^a	Unadjusted	Adjusted ^a
Age	1.01 (0.99–1.03)	–	1.02 (1.00–1.04)*	–
Ethnic group				
Black/African American	1.00	–	1.00	–
Puerto Rican/other Latino	1.91 (1.07–3.41)*	–	1.47 (0.85–2.53)	–
White/other groups	1.82 (0.79–4.18)	–	1.28 (0.59–2.80)	–
Marital status				
Single	1.00	–	1.00	–
Married/living together	1.14 (0.71–1.83)	–	1.26 (0.73–2.16)	–
Divorced/separated/widowed	1.44 (0.74–2.79)	–	1.50 (0.84–2.65)	–
High school graduate	0.81 (0.51–1.30)	–	0.59 (0.37–0.94)*	–
Homeless	1.58 (0.84–2.95)	–	0.96 (0.57–1.63)	–
Prior month income <\$500	0.60 (0.37–0.97)*	–	0.90 (0.55–1.46)	–
Currently employed	0.55 (0.26–1.19)	–	1.20 (0.65–2.20)	–
Pregnant or trying	1.35 (0.61–3.00)	–	1.24 (0.54–2.85)	–
Alcohol use until drunk in last 30 days	0.44 (0.20–0.98)*	–	1.22 (0.62–2.37)	–
Injection drug use in last 30 days	2.73 (1.37–5.45)**	3.54 (1.47–8.48)**	0.62 (0.22–1.70)	–
Current STI symptoms	1.93 (1.10–3.40)*	2.01 (1.08–3.72)*	1.54 (0.48–4.98)	–
Childhood abuse history	1.67 (1.02–2.72)*	–	1.85 (1.11–3.08)*	–
Perceived HIV risk	1.20 (0.91–1.59)	–	1.02 (0.75–1.38)	–
Multiple sex partners in last 30 days	2.44 (1.31–4.55)**	2.05 (1.11–3.78)*	2.09 (1.30–3.34)**	–
Male condom user	2.23 (1.32–3.78)**	2.20 (1.30–3.73)**	3.67 (2.02–6.68)***	2.86 (1.51–5.41)**
FC cognitive factors				
FC knowledge	2.96 (0.93–9.41)	–	0.35 (0.12–0.98)*	–
FC attitudes	6.58 (3.30–13.09)***	7.61 (3.85–15.03)***	9.71 (4.31–21.88)***	7.61 (3.09–18.76)***
FC efficacy w primary partner	1.62 (1.11–2.37)*	–	1.59 (1.13–2.23)**	–
Relationship power	0.99 (0.61–1.59)	–	1.44 (0.82–2.52)	–
Locus of control of STI prevention	1.02 (0.61–1.71)	–	0.72 (0.43–1.21)	–
Perceived peer norms				
Likelihood most people you spend time with would use FC	1.65 (1.32–2.08)***	–	1.94 (1.58–2.39)***	–
Likelihood most people you spend time with think you should use FC	1.70 (1.41–2.06)***	1.62 (1.31–2.00)***	1.96 (1.61–2.39)***	1.36 (1.06–1.74)*
Likelihood most people you spend time with are using FC	1.68 (1.38–2.05)***	–	2.09 (1.67–2.61)***	1.50 (1.14–1.96)**
Network exposure to FC information ^b	2.39 (1.28–4.44)***	2.26 (1.21–4.19)*	4.41 (2.63–7.40)***	2.82 (1.62–4.90)***

Female condom (FC) user was defined as having used FC during the past 30 days or having ever used FC five or more times. By this definition, FC users included 93 records from women and 83 records from men; FC non-users included 758 records from women and 680 records from men. Generalized estimating equation was used to estimate odds ratios (OR) between covariates and FC use (95 % confidence interval—CI).

^a Unadjusted variables with $p < 0.25$ were included in the initial model building process, with $p = 0.05$ being excluded from the final model.

^b Network exposure to FC information is a dichotomous variable (Y/N) defined as having one or more persons in one's network who has ever said anything positive or negative about FC.

*
 $p < 0.05$

**
 $p < 0.01$

 $p < 0.001$

Table 6

Factors associated with inconsistent male and/or female condom use by gender (N = 1614)

Variables	Odds ratio (95 % confidence interval) among 851 records from 652 women		Odds ratio (95 % confidence interval) among 763 records from 692 men	
	Unadjusted OR (CI)	Adjusted ^a OR (CI)	Unadjusted OR (CI)	Adjusted ^a OR (CI)
Age	0.98 (0.97–1.00)*	0.97 (0.95–0.98)***	0.98 (0.97–1.00)*	0.97 (0.95–0.99)***
Ethnic group				
Black/African American	1.00	1.00	1.00	–
Puerto Rican/other Latino	2.23 (1.58–3.13)***	1.64 (1.05–2.57)*	1.69 (1.20–2.39)**	–
White/other groups	0.90 (0.59–1.38)	0.67 (0.35–1.27)	1.31 (0.80–2.13)	–
Marital status				
Single	1.00	–	1.00	1.00
Married/living together	2.43 (1.75–3.39)***	–	3.72 (2.42–5.72)***	3.98 (2.16–7.31)***
Divorced/separated/widowed	1.05 (0.65–1.69)	–	1.05 (0.71–1.55)	1.54 (0.87–2.73)
High school graduate	0.69 (0.52–0.93)*	–	1.10 (0.81–1.50)	–
Homeless	0.90 (0.59–1.40)	–	0.73 (0.53–1.00)	–
Prior month income <\$500	1.06 (0.78–1.43)	–	0.93 (0.67–1.28)	–
Currently employed	1.02 (0.67–1.54)	–	1.01 (0.67–1.54)	–
Pregnant or trying	17.88 (2.70–118.25)**	–	3.49 (1.69–7.18)***	3.70 (1.42–9.65)**
Alcohol use until drunk in last 30 days	1.20 (0.79–1.81)	–	0.84 (0.54–1.30)	–
Injection drug use in last 30 days	1.22 (0.64–2.32)	–	0.81 (0.48–1.39)	–
Current STI symptoms	1.40 (0.86–2.26)	–	2.34 (0.77–7.11)	–
Childhood abuse history	1.13 (0.84–1.52)	–	1.03 (0.70–1.52)	–
Multiple sex partners in last 30 days	1.02 (0.66–1.56)	–	1.14 (0.80–1.61)	–
Perceived HIV risk	1.44 (1.16–1.77)***	–	1.29 (1.06–1.56)*	1.66 (1.29–2.13)***
Male condom (MC) user	0.01 (0.01–0.03)***	0.01 (0.00–0.02)***	0.01 (0.00–0.02)***	0.01 (0.00–0.03)***
Female condom (FC) user ^b	0.58 (0.35–0.97)*	0.87 (0.34–2.20)	0.90 (0.42–1.30)	0.90 (0.31–2.60)

Inconsistent protected sex was defined as less than 100 % condom use (including male or female condoms) with all sexual partners in the past 30 days. Consistent protected sex included 297 records from women and 269 records from men; inconsistent protected sex included 530 records from women and 456 records from men. Generalized estimating equation was used to estimate odds ratios (OR) between covariates and inconsistent condom use (95 % confidence interval—CI)

^aUnadjusted covariates with $p < 0.25$ were included in the model building process, with $p = 0.05$ being excluded from the final model except the main predictor, FC users, which was included in the final model no matter its level of significance

^bFemale condom (FC) user was defined as having used FC during the past 30 days or having ever used FC five or more times. By this definition, FC users included 93 records from women and 83 records from men; FC non-users included 758 records from women and 680 records from men

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$