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Lifetime prevalence and correlates of female condom use for anal sex in a geographically diverse sample of Men who have sex with men (MSM) in the United States

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Abstract

Objectives: Examine use of the female condom (FC) for anal sex among Men who have sex with men (MSM) in the United States (US).

Methods: An online survey among 3,837 MSM.

Results: 5.2% had used the FC for anal sex. Use was higher among those who had used the FC for vaginal sex (OR=14.39, $p<0.001$), those with multiple partners, (OR=2.68, $p=0.004$), and those who were HIV-positive (OR=2.07, $p<0.001$) or on PrEP (OR=2.66, $p<0.001$).

Conclusions: FC use for anal sex was associated with risk of HIV infection/transmission and may be a risk reduction strategy used by MSM in the US.

Keywords

Female Condom; anal sex; men who have sex with men (MSM); United States of America (US)

Introduction

Unprotected anal intercourse is an important risk factor for HIV and other sexually transmitted infections (STIs) among men who have sex with men (MSM) (Caceres et al., 1997; Koblin et al., 2003; Valleroy et al., 2000); and there is evidence that unprotected anal sex also contributes to HIV infection among heterosexually active women (Baldwin & Baldwin, 2000; Gross et al., 2000; Halperin, 1999; Rodrigues et al., 1995; Satterwhite et al., 2007). Physical barriers, such as condoms, are an important means of protection. Although

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the US Food and Drug Administration (FDA) has never approved any condom specifically for use during anal intercourse, male condoms are assumed to be safe and effective when used during both vaginal and anal sex (Scarce, 1999). The female condom (FC) is another physical barrier that was approved for use during vaginal intercourse by the FDA in 1993 (Food and Drug Administration, 1993). The FC is effective for preventing pregnancy (Farr et al., 1994; Trussell, 1998), and has a high likelihood of efficacy for STI prevention when used vaginally (Cecil et al., 1998; Feldblum et al., 2001; Fontanet et al., 1998; French et al., 2003; Hoffman et al., 2004). However, there have been only three studies on the safety and acceptability of the FC for anal intercourse, all of which had flaws that make conclusions difficult. In one study, 14 MSM couples were given male and FCs and asked to return the used condoms for evaluation and complete a survey a month later. Only 79% of couples completed the survey and only 1 male and 31 FCs were returned (none had evidence of breaks or leaks). In the survey, all couples reported difficulty using the FC anally and disliking the inner ring of the FC, which they were instructed to leave-in. Results from this study were never published (Jobst & Johns, 1991; Scarce, 1999). In another study, FCs were given to 750 MSM who were asked to use them for anal sex (leaving the inner ring in) and complete a survey. Only 14% of participants returned the survey and they reported difficulty with insertion (33%), breakage (1%), and irritation (17%) (Gibson et al., 1999). The third study used a cross-over design to compare experiences with male and FCs for anal sex among 55 MSM couples. FC use instructions in this study recommended removal of the inner ring. In this study, there were significantly more reports of slippage upon condom removal, pain or discomfort, and bleeding with the FC compared to the male condom, but there was no significant difference in inflammation or rectal mucosal epithelial disruption based on rectal pap smears. However, as with previous studies, there was high loss to follow-up, and only 68% of participants completed the study (Renzi et al., 2003). These three safety studies all had small sample sizes, limiting statistical power to identify differences, high loss to follow-up which may lead to biased results, limited comparison with male condoms, and varied in terms of instructions regarding the inner ring, all of which make it hard to draw conclusions about safety; and there have been no efficacy studies.

Despite the lack of safety and efficacy data, four studies conducted between 1996 and 2009 found that some MSM were using the FC for anal sex, with lifetime prevalence rates (ever having used the FC for anal sex) ranging from 13%–21% (Gross et al., 1999; Kelvin et al., 2011; Renzi et al., 2003; Wolitski et al., 2001). Notably, these studies were all conducted in large urban areas with large gay communities (Boston, Massachusetts (Gross et al., 1999); Chicago, Illinois (Gross et al., 1999); Denver, Colorado (Gross et al., 1999); New York City, New York (Gross et al., 1999; Kelvin et al., 2011; Wolitski et al., 2001); San Francisco, California (Gross et al., 1999; Wolitski et al., 2001); and Seattle, Washington (Gross et al., 1999; Renzi et al., 2003)).

A review of department of health websites for all 50 states and the 29 largest municipalities in the US in 2014 found that 27.8% mentioned anal use of the FC, 40.9% of which were supportive, 43.2% neutral and 4.0% explicitly discouraged this use. The supportive websites were all in the West Coast (Los Angeles and San Francisco), Pacific North West (Oregon and Seattle) and North East (Massachusetts, Boston, Baltimore, and Washington DC). Anal use of the FC was more often mentioned on the websites of the large municipalities than the

states (83.3% versus 33.3%) and the municipality websites were also more likely to provide instructions (70.0% versus 24.0%), although those instructions varied in recommendations around the inner ring (leave it in or remove it) and mode of insertion (insert in anus versus place on penis). With the exception of Texas and Chicago, all the websites that provided instructions were in the West Coast (Los Angeles, San Francisco), Pacific North West (Oregon and Seattle), and North East (Massachusetts, Boston, Baltimore, and Washington DC) (Rodriguez et al., 2015). In 2011, the San Francisco Department of Health initiated a campaign promoting the FC specifically to MSM (Gomez, 2013). Interestingly, the distribution of information about anal use of the FC on department of health websites is fairly similar (urban, North East, West Coast and Pacific North West) to the distribution of the studies documenting anal use of the FC described above.

Whether anal use of the FC occurs in other parts of the country remains unknown. There is also little information about the demographic and behavioral characteristics of those who have used the FC for anal sex, although one study found that having used the FC for anal sex was associated with also having used it for vaginal sex (Kelvin et al., 2011).

The fact that some MSM are using the FC for anal sex, despite a lack of safety and efficacy evidence and the contradictory messaging on department of health websites, suggests an unmet need for a proven insertive anal condom. This is true even today with the availability of Pre-Exposure Prophylactic (PrEP) as PrEP uptake has been slow. By 2016, only 7% of the estimated 1.1 million people in the US eligible for PrEP were taking it (Huang et al., 2018). Clearly alternate prevention strategies are needed.

In September 2018, the FDA reclassified insertive condoms, including the FC, from class 3 to class 2, making it easier to seek FDA approval (Food and Drug Administration, 1993). This may open the US market to a number of other insertive condom designs that are already available for vaginal use in other countries (Global Campaign for Microbicides, 2019). The history of off-label use of the FC for anal sex among MSM in the US is important in informing the roll-out of new insertive condoms. As new insertive condoms become available, experimentation and possible adoption of these new products for anal sex, as occurred with the FC, seems likely. It is important to better understand the FC experience, including what groups are more likely to use the product for anal sex, to ensure that the premarketing research needs and roll out messaging for new insertive condoms is informed, appropriate, targeted, promotes safe use, and prevents unsafe use. Therefore, the aims of this study were to identify correlates of anal use of the FC among a large, geographically diverse sample of MSM in the US. Correlates considered fell within one of three categories: (1) characteristics of place of residence, (2) demographic characteristics and (3) behaviors related to HIV risk or transmission.

Materials and Methods

Recruitment

The study methods have been previously described (Groves et al., 2018). but briefly, between May 2016 and March 2017, data were collected from participants recruited via advertisement on internet sites and mobile phone apps. To be eligible, participants had to

report being over age 18 years, cisgender male, and have had sex with men in the past 5 years. Our advertisements were US national in their reach, and were not restricted to any one area in the United States. The recruitment venues were:

1. (1) Online via a sexual networking website, where we hosted a banner advertising the survey for 30 days.
2. (2) Online via various internet gay porn sites, where the same banner was used for a period of 39 days.
3. (3) Mobile devices via a geo-social sexual networking app popular for men-for-men connections, where we had a pop-up message that was displayed to participants when they opened the app for the first time during a given 12-hour window.
4. (4) Online via a social networking site popular with the general public (not primarily oriented toward MSM or about facilitating sexual relationships), where we ran an advertisement for 11 days.

As an incentive, participants were entered into a raffle to win one of fifty \$20 amazon gift cards. The online survey was anonymous, but participants were told they would need to provide an email address if they wanted to be entered into the raffle.

Data Collection

Participants completed a self-administered online survey that took approximately 10 minutes. The survey collected data on demographic characteristics, HIV status and HIV-related risk and protective behaviors, including use of the FC. Study procedures were approved by the Institutional Review Board of the City University of New York.

Measures

Outcome—Participants were provided with a picture of the male and the FC side by side and asked “Do you know what a FC (FC2 or Femidon) is (A thin, soft, loose-fitting sheath with a flexible ring at each end. (See photo))?” If they responded “yes” they were then asked “Have you EVER used a FEMALE condom, FC2 or Femidon (a thin, soft, loose-fitting sheath with a flexible ring at each end)? If yes, was it (check all that apply): (a) for vaginal sex with a female partner, (b) for vaginal sex with a transfemale (M to F) partner, (c) for anal sex with a male partner. (d) for anal sex with a transmale (F to M) partner, (e) for anal sex with a female partner, (f) for anal sex with a transfemale (M to F) partner?” Based on response to this set of questions we created an indicator for ever having used the FC for anal sex with any partner (response options c, d, e and/or f checked) which was our primary outcome of interest for these analyses. In addition, we described the types of partners with whom participants had used the FC for anal sex.

Independent variables—We looked at a number of potential correlates to see if they were associated with use of the FC for anal sex. These variables were organized into three categories: (1) characteristics of place of residence, (2) demographic characteristics, and (2) variables potentially related to HIV risk or transmission.

The characteristics of place of residence examined were defined based on reported zip code of residence and classified as: (1) US region of residence, which was examined in 9 divisions as defined by the US Census ("Census Regions and Divisions of the United State," n.d.), and (2) type of community in which the participant resided, classified as a large city, small city/large town, or small town/rural area, defined according to the Rural Health Research Center ("Rural-Urban Commuting Area Codes (RUCAs)," n.d.).

Demographic characteristics examined included (1) sexual identity, which was based on response to the question "Which best describes how you identify your sexual orientation?" Participants could choose from among 4 response options (Gay, Queer, or Homosexual; Bisexual; Heterosexual/Straight; or Other). Education was determined by response to the question "What is the highest grade of school you have completed?" Participants could choose from among 6 options, which were collapsed into four categories for analysis (high school degree, GED or less [grade 12]; Associate's degree or some college [<4 year college degree]; college degree; at least some graduate school). Race/ethnicity was determined based on response to two questions "Which racial or ethnic group do you belong to?" and "Do you consider yourself Hispanic or Latino?" Responses were combined into 6 categories (white, black, Asian, Hispanic, Native American/Alaskan national/Pacific Islander, and multi-racial/other). Age was also examined as a numeric variable in years.

HIV risk or transmission-related factors examined included the participant's HIV status, defined as HIV-negative and not taking Pre-Exposure Prophylaxis (PrEP), HIV-Negative and taking PrEP, HIV-positive, and unknown HIV-status. We also included indicators for having a main partner in general and for having an HIV-positive main partner. We examined the number of people the participant had had sex with in the past 3 months, which was collected as a count but categorized as zero, one, or two or more for analysis. We also examined an indicator for ever having used the FC for vaginal sex in the model predicting having used the FC for anal sex. Finally, we looked at the venue from which the participant was recruited (general social networking website, sexual networking website for MSM, geo-social sexual networking phone app for MSM, or a gay porn website).

Data Analysis

We described the sample overall and by use of the FC for anal sex. We used chi-square tests (Fisher's exact tests when expected cell counts were < 5) to assess the significance of differences in use for anal sex across categorical variables and the Mann-Whitney U test for differences in age, examined as a continuous variable.

We used logistic regression to determine the association of each independent variable with anal use of the FC. We conducted crude and multivariable regression in which all independent variables mentioned above were included. We also conducted a number of sensitivity analyses to examine the impact of certain modeling decisions on the associations. Specifically, we examined the adjusted model for anal use of the FC excluding those who reported that they did not know what the FC was and we used Generalized Estimating Equations (GEE) to adjust for possible clustering within state of residence.

Results

Description of the Sample

A total of 3837 of participants had valid responses to the questions about the FC and are included in this analysis. These participants included residents of all 50 US states and the District of Columbia, with the number per state ranging from two in North Dakota to 515 in California. There was at least one participant reporting having used the FC for anal sex in 41 states and the District of Columbia (82.4% of states). (Data not shown)

Participants were spread across the 9 US regions in approximate proportion to the population within each region, ranging from 4.5% in New England to 19.2% in the South Atlantic region. The majority of participants lived in large cities (89.3%) with only 6.8% living in small cities/large towns and 3.9% living in small towns/rural areas. The majority of participants identified as gay (79.9%), with 17.8% identifying as bisexual, 1.0% as straight and 1.3% as other. Only 15.5% had a high school degree, GED or less education, with the majority of participants having either an Associate's degree or some college (38.6%). Most participants identified as white (62.5%), while 19.1% identified as Hispanic, 9.2% as black, 3.3% as Asian, 1.3% as Native American, Alaskan, Hawaiian, or Pacific Islander native, and 4.6% as multi-racial or other race/ethnicity. The mean age of participants was 39 years. (Table 1)

Most participants were HIV-negative and not taking PrEP (64.3%), 10.4% were HIV-negative and taking PrEP, 17.3% were HIV-positive, and 8.1% were unsure of their HIV status. Thirty-six point nine percent of participants had a main partner, and 4.7% had a main partner they knew or thought was HIV-positive. Most participants had had sex with two or more people in the past 3 months (67.8%). (Table 1)

Overall, 71.4% of participants reported that they knew what a FC is, and 6.1% reported having used a FC, with 1.3% having used it for vaginal sex and 5.2% for anal sex (0.4% had used it for both vaginal and anal sex). Of those who had used the FC for anal sex, 94.9% had done so with male, 4.0% with transgender, and 3.0% with female partners. (Table 1)

There were significant differences in the proportion who had ever used the FC for anal sex by region, with a range from 3.4% in the East South Central region to 9.1% in the Pacific region ($p < 0.001$); however, there was no significant difference among those living in large cities, small cities/large towns, and small towns/rural areas ($p = 0.589$). Those who had used the FC for anal sex were older on average (mean age 44.2 versus 39.0 years, $p < 0.001$), and those who were HIV-positive (9.2%) and HIV-negative and taking PrEP (10.3%) were more likely to report this use compared to those HIV-negative and not taking PrEP (3.7%) and those of unknown HIV status (1.9%, $p < 0.001$). Those with an HIV-positive main partner were also more likely to have used the FC for anal sex (10.6% versus 4.9%, $p = 0.001$). In addition, participants who had had two or more sex partners in the past 3 months were more likely to report this use (6.1% versus 3.9% among those with one partner and 2.0% among those with no recent partners, $p < 0.001$). Those who had use the FC for vaginal sex were also more likely to also have used it for anal sex (32.0% versus 4.8%, $p < 0.001$). Anal use of the FC was also higher among participants recruited from gay porn websites (6.9%) and sexual

networking websites (6.3%) compared to general social networking website or the geo-social sexual networking app (4.0% and 4.5% respectively, $p=0.035$). (Table 1)

Regression Models looking at correlates of use of the FC for anal sex

The crude regression model results are presented in table 2 and are generally similar to the distribution of the variables stratified on anal use of the FC above. In the multivariable model, those living in the Pacific region (versus South Atlantic) had higher odds of using the FC for anal sex (OR=2.00, $p=0.005$). Those identifying as bisexual had significantly lower odds of anal use of the FC compared to those who identified as gay (OR=0.59, $p=0.036$), and anal use of the product increased with age (OR=1.03, $p<0.001$). Those who were HIV-negative and taking PrEP and HIV-positive had higher odds of this use compared to those HIV-negative and not on PrEP (OR=2.66, $p<0.001$, OR=2.07, $p<0.001$, respectively). The association with having two or more sex partners in the past three months (versus none) and with having used the FC for vaginal sex were also significant (OR=2.68, $p=0.004$, OR=14.39, $p<0.001$, respectively). And finally, those recruited through the porn websites had 2.05 times higher odds of anal use of the FC compared to those recruited through the general social networking website ($p=0.027$). (Table 2)

Sensitivity analyses

When we conducted the multivariable model for anal use of the FC only among those who reported that they knew what a FC is, the results in terms of strength and significance of the associations were essentially unchanged. Similarly, when we conducted the model with GEE to adjust for any clustering by state of residence, the results were similar except that the difference in FC use for anal sex between those identifying as bisexual versus gay was only of borderline statistical significance (OR=0.59, $p=0.055$). (Data not shown)

Discussion

We found that the majority of participants (71.4%) knew what a FC is, and lifetime prevalence of anal use of the FC in this geographically diverse sample was 5.2%, which is lower than that reported in previous studies (lifetime prevalence range of 13-21%) (Gross et al., 1999; Kelvin et al., 2011; Renzi et al., 2003; Wolitski et al., 2001). Our lower lifetime prevalence is likely due to differences in sampling methods as the other studies recruited from a HIV vaccine preparedness cohort study (Gross et al., 1999), an HIV clinic (Renzi et al., 2003) and at venues catering specifically to MSM (Kelvin et al., 2011; Wolitski et al., 2001) and may have included participants who were more connected to the gay community and/or had higher behavioral risk. Our study recruited from more varied sources and may have included some at lower risk and/or less connected to the gay community and therefore less likely to have heard about or used the FC. Despite the relatively low lifetime prevalence that we found, in absolute numbers on a national level it would be a large number of men having ever used the FC for anal sex, possibly indicating an unmet need for a barrier method of protection during anal intercourse. If the men who use the FC for anal sex are at high risk for contracting or transmitting HIV, then it is important to ensure that this behavior is safe and effective at preventing disease transmission. We did find that anal use of the FC was associated with a number of factors related to risk of HIV infection or transmission, such as

the participant's HIV status and PrEP use, having had multiple recent sex partners, as well as having used the FC for vaginal sex. This suggests that some men may try the FC for anal sex as one among a variety of HIV-prevention methods to protect themselves from becoming HIV-infected or to prevent transmitting HIV to others for those already infected. PrEP might be another alternative for these men, which may explain the association between FC use for anal sex and PrEP use, but, as previously described, PrEP uptake remains low (Huang et al., 2018) and some may look for alternative methods to protect themselves before turning to PrEP. In addition, PrEP only protects against HIV and therefore a barrier method is needed even while taking PrEP for protection against other STIs.

A previous study (Kelvin et al., 2011) found an association between having used the FC for vaginal sex and using it for anal sex, similar to our finding. Also as previously reported (Kelvin et al., 2011), we found that some MSM are also using the FC for anal sex with female partners. If the same association occurs among heterosexual couples who practice anal sex, the prevalence of anal use of the FC might be even higher than what we found in this study among MSM since, in absolute numbers, many more heterosexual couples have anal sex than MSM, and vaginal use of the FC among those heterosexual partnerships is likely also higher than among MSM. A study found that 30% of heterosexual women and 35% of heterosexual men reported having had anal sex in the past year (Hess et al., 2016). Among heterosexual couples who practice anal sex, the FC may be first used for vaginal sex, as per indication, and later experimented with it for anal sex, but there are no studies about this behavior among heterosexuals so this is only speculation and research is needed to explore anal use of the FC among heterosexuals.

We found that study participants in 82.4% of US states reported having used the FC for anal sex at least one time. While there were no urban/rural differences in anal use of the FC, there were regional differences, with higher lifetime prevalence in the Pacific region. This may be related to the department of health messaging (Rodriguez et al., 2015) and, in the case of San Francisco, the explicit promotion of the FC to MSM (Gomez, 2013).

Although it seems to be good news that some men may be trying to reduce their risk of acquiring or transmitting HIV, the lack of data on the safety and efficacy of the FC for disease prevention when used for anal sex is a huge limitation. Furthermore, there is no data about the optimal method for using the FC for anal sex. Distinct from the male condom, the FC has two rings, an inner ring that fits over the cervix to hold the condom in place during vaginal intercourse and an outer ring which sits outside of the body ("Female Condom Use," 2016). Some may remove the inner ring for improved comfort when using the FC for anal sex; however, the removal of the inner ring may cause it to slide out during use, leading to reduced efficacy. In one study, men who reported that they had removed the inner ring the last time they used the FC for anal sex were more likely to report condom slippage during sex, while those who had not removed the inner ring were more likely to report that the FC had a negative impact on pleasure during anal sex (Kelvin et al., 2011). Although these associations were not statistically significant, they suggest that some research on the optimal method of use is needed. Interestingly, department of health websites that provide instructions for using the FC for anal sex vary widely in their recommendations regarding the inner ring (leave it in or remove it), as well as insertion instructions (place in the anus or

over the penis) (Rodriguez et al., 2015). Thus in the absence of empirical data, recommendations are inconsistent and likely based on anecdote and personal experience. The story of anal use of the FC should be a lesson for the US FDA approval and roll-out of new insertive condoms designed for vaginal use. Those new condoms, as well as the FC that is already available in the US, should be rigorously evaluated for safety and efficacy when used for anal sex so that evidence-based messaging can be provided to ensure that MSM and others who engage in anal sex can make informed decisions about how to best protect themselves.

This study has a number of limitations which should be considered in its interpretation. First, the sample was recruited via advertisements on internet sites and a mobile App, most of which were oriented towards MSM. Thus our sample was unlikely to be representative of MSM in the US and our lifetime prevalence estimates are likely not representative of the broader MSM population. In addition, we restricted our sample to cisgender men because we anticipated being underpowered to explore differences between cisgender men and transgender men and women. To our knowledge there are no published studies of FC use among transmen and transwomen, and this would be an important arena for future investigation. Furthermore, the data was collected via an anonymous online survey and may have included misclassification due to misunderstanding of the questions, lack of facility answering questions online, which might be especially problematic on a small mobile phone, as well as social desirability bias and possible intentional misinformation. In addition, due to survey length constraints, we were unable to include detailed questions about FC use and, for example, we do not know if those using the FC for anal sex were doing so as the insertive or receptive partner, what they did regarding the inner ring, or what their experience was. We also do not know when participants used the FC for anal sex and therefore we cannot determine temporal order regarding if this use was with current partners or before or after they seroconverted HIV-positive or started taking PrEP. Longitudinal studies are needed to assess temporal order and better understand why some use the FC for anal sex (e.g. to prevent infection or transmission or for some other reason).

Despite these limitations, we report that use of the FC for anal sex among MSM in the US is geographically widespread and while lifetime prevalence was fairly low among our sample of MSM, it suggests an unmet need for a safe and effective barrier method alternative to the male condom. Research looking at anal use of the FC among heterosexual and transgender people is needed to get a better sense of the extent of this behavior, and longitudinal data is needed to determine temporal order. Furthermore, research on the safety, efficacy and optimal use method during anal sex of the FC currently available and for all insertive condoms that are approved for use in the US going forward is needed so couples can make informed choices about the best ways to protect themselves and their loved ones against HIV and other STIs.

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Data availability statement:

Data is available from the corresponding author (CG) upon reasonable request.

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Table 1.

Description of the sample overall and by anal use of the FC for the total sample and separately among those who report that they had heard of the FC

	Total N (%)	Used the Female Condom for Anal Sex		Chi-square p-value
		N (%) Yes	N (%) No	
Total	3837 (100%)	198 (5.2%)	3635 (98.4%)	NA
US region of residence				<0.001
New England	173 (4.5%)	8 (4.6%)	165 (95.4%)	
Middle Atlantic	561 (14.6%)	27 (4.8%)	532 (95.2%)	
East North Central	575 (15.0%)	22 (3.8%)	553 (96.2%)	
West North Central	239 (6.2%)	9 (3.8%)	230 (96.2%)	
South Atlantic	737 (19.2%)	30 (4.1%)	706 (95.9%)	
East South Central	175 (4.6%)	6 (3.4%)	169 (96.6%)	
West South Central	441 (11.5%)	20 (4.5%)	420 (95.5%)	
Mountain	280 (7.3%)	16 (5.7%)	264 (94.3%)	
Pacific	656 (17.1%)	60 (9.1%)	596 (90.9%)	
Type of community				0.589
Large city	3332 (89.3%)	174 (5.2%)	3154 (94.8%)	
Small city/large town	252 (6.8%)	10 (4.0%)	242 (96.0%)	
Small town/rural	145 (3.9%)	6 (4.0%)	139 (95.9%)	
Sexual identity				0.261 ¹
Gay	3064 (79.9%)	166 (5.4%)	2895 (94.6%)	
Bisexual	683 (17.8%)	27 (4.0%)	655 (96.0%)	
Straight	40 (1.0%)	1 (2.5%)	39 (97.5%)	
Other	50 (1.3%)	4 (8.0%)	46(92.0%)	
Education				0.388
High school diploma, GED, or less	596 (15.5%)	23 (3.9%)	573 (95.1%)	
Some college, Associate's degree, or currently enrolled in college	1480 (38.6%)	76 (5.1%)	1402 (94.9%)	
4-year college degree	1034 (26.9%)	60 (5.8%)	972 (94.2%)	
Graduate school	727 (18.9%)	39 (5.4%)	688 (94.6%)	
Race/ethnicity				0.368
Hispanic	731 (19.1%)	39 (5.3%)	690 (94.7%)	
Black	353 (9.2%)	17 (4.8%)	335 (95.2%)	
White	2395 (62.5%)	122 (5.1%)	2272 (94.9%)	
Asian	128 (3.3%)	3 (2.3%)	125 (97.7%)	
Native American, Alaskan, Hawaiian or pacific Islander native	51 (1.3%)	5 (9.8%)	46 (90.2%)	
Mixed or other	177 (4.6%)	12 (6.8%)	165 (93.2%)	
Age				<0.001 ²
Mean (SD)	39 (13.8)	44.2 (12.8)	39.0 (13.7)	
Median (Range)	37 (18-85)	45.0 (18-83)	37 (18-85)	

	Total N (%)	Used the Female Condom for Anal Sex		Chi-square p-value
		N (%) Yes	N (%) No	
Participant's HIV status				<0.001
HIV-positive	664 (17.3%)	61 (9.2%)	603 (90.8%)	
HIV-negative, on PrEP	398 (10.4%)	41 (10.3%)	356 (89.7%)	
HIV-negative, not on PrEP	2466 (64.3%)	90 (3.7%)	2373 (96.3%)	
Unsure	309 (8.1%)	6 (1.9%)	303 (98.1%)	
Has a main partner				0.363
No	2423 (63.1%)	119 (4.9%)	2301 (95.1%)	
Yes	1414 (36.9%)	79 (5.6%)	1334 (94.4%)	
Main partner known or thought to be HIV-positive				0.001
No	3658 (95.3%)	179 (4.9%)	3475 (95.1%)	
Yes	179 (4.7%)	19 (10.6%)	160 (89.4%)	
Number of partners in past 3 months				<0.001
None	496 (12.9%)	10 (2.0%)	48 (98.0%)	
One	739 (19.3%)	29 (3.9%)	710 (96.1%)	
Two or more	2602 (67.8%)	159 (6.1%)	2440 (93.9%)	
Heard of the female condom				NA
No	1098 (28.6%)	0 (0%)	1098 (100%)	
Yes	2739 (71.4%)	198 (7.8%)	2537 (92.8%)	
Ever used the female condom for vaginal or anal sex				NA
No	3601 (93.9%)	0 (0%)	3601 (100%)	
Yes	232 (6.1%)	198 (85.3%)	34 (14.7%)	
Ever used the female condom for vaginal sex				<0.001 ¹
No	3783 (98.7%)	182 (4.8%)	3601 (95.2%)	
Yes	50 (1.3%)	16 (32.0%)	34 (68.0%)	
Ever used the female condom for anal sex				NA
No	3635 (98.4)	0 (0%)	3635 (98.4)	
Yes	198 (5.2)	198 (5.2)	0 (0%)	
Types of partners with whom used the female condom for anal sex (among those who have used it for anal sex) ³				NA
Male	188 (94.9)	188 (94.9)	0 (0%)	
Female	6 (3.0)	6 (3.0)	0 (0%)	
Transgender	8 (4.0)	8 (4.0)	0 (0%)	
Recruitment source				0.035
General social networking website	475 (12.4%)	19 (4.0%)	456 (96.0%)	
Sexual networking Website	948 (24.7%)	60 (6.3%)	888 (95.2%)	
Geo-social sexual networking phone app	1949 (50.8%)	82 (4.5%)	1858 (95.5%)	
Gay porn website	465 (12.1%)	32 (6.9%)	433 (93.1%)	

¹Fisher's exact test (calculated in SAS 9.3)

²Mann Whitney U test

³Categories are not mutually exclusive

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Table 2.

Logistic regression models looking at correlates of anal use of the female condom

	Crude Models		Multivariable Model (n=3723)				
	Number in Model	Odds Ratio	95% Confidence Interval	P-value	Odds Ratio	95% Confidence Interval	P-Value
US region (ref=South Atlantic)	3833						
New England		1.14	0.51-2.54	0.746	1.40	0.62-3.18	0.421
Middle Atlantic		1.19	0.70-2.03	0.513	0.98	0.55-1.75	0.947
East North Central		0.94	.53-1.64	0.818	1.08	0.60-1.92	0.803
West North Central		0.92	0.43-1.97	0.832	0.92	0.42-2.01	0.831
East South Central		0.84	0.34-2.04	0.693	0.86	0.34-2.16	0.751
West South Central		1.12	0.63-2.00	0.700	1.12	0.61-2.06	0.715
Mountain		1.43	0.77-2.66	0.264	1.47	0.77-2.83	0.243
Pacific		2.37	1.51-3.72	<0.001	2.00	1.24-3.23	0.005
Type of community (ref=large city)	3725						
Small city or large town		0.75	0.39-1.44	0.384	1.09	0.55-2.14	0.811
Small town or rural		0.78	0.34-1.80	0.563	1.01	0.42-2.45	0.979
Sexual identity (ref=gay)	3833						
Bisexual		0.72	0.47-1.09	0.119	0.59	0.36-0.97	0.036
Straight		0.45	0.06-3.28	0.428	0.33	0.04-2.73	0.301
Other		1.52	0.54-4.26	0.430	1.56	0.45-5.36	0.482
Highest education (ref=high school graduate, GED or less)	3833						
Some college or Associate's degree		1.35	0.84-2.18	0.216	1.36	0.81-2.28	0.242
4-year college graduate		1.54	0.94-2.51	0.086	1.40	0.81-2.40	0.226
Graduate school		1.41	0.83-2.39	0.199	1.01	0.56-1.83	0.976
Race/ethnicity (ref=white)	3832						
Hispanic		1.05	0.73-1.53	0.786	1.29	0.85-1.98	0.235
Black		0.95	0.56-1.59	0.831	0.965	0.54-1.72	0.904
Asian		0.45	0.14-1.43	0.173	0.65	0.20-2.14	0.476
Native American Alaskan		2.02	0.79-5.19	0.142	2.28	0.86-6.06	0.099
National and Pacific Islander							
Mixed or other race		1.35	0.73-2.50	0.333	1.36	0.68-2.73	0.0384

	Crude Models			Multivariable Model (n=3723)			
	Number in Model	Odds Ratio	95% Confidence Interval	P-value	Odds Ratio	95% Confidence Interval	P-Value
Age (years)	3833	1.03	1.02-1.04	<0.001	1.03	1.02-1.05	<0.001
HIV status (ref=HIV-negative and not on PrEP)	3833						
HIV-positive		2.67	1.90-3.74	<0.001	2.07	1.41-3.04	<0.001
HIV-negative and on PrEP		3.04	2.07-4.47	<0.001	2.66	1.75-4.04	<0.001
Unknown		0.52	0.23-1.20	0.127	0.52	0.21-1.32	0.169
Has a main partner	3833	1.15	0.86-1.53	0.364	0.89	0.62-1.27	0.515
Has an HIV-positive main partner	3833	2.31	1.40-3.80	0.001	1.46	0.79-2.70	0.222
Number of sex partners in past 3 months (ref=none)	3833						
One		1.98	0.96-4.10	0.066	1.83	.83-4.03	0.133
Two or more		3.16	1.66-6.03	<0.001	2.68	1.36-5.27	0.004
Ever used the female condom for vaginal sex	3833	9.31	5.05-17.18	<0.001	14.39	7.10-29.16	<0.001
Recruitment source (ref= general social networking website)	3822						
Sexual networking website		1.62	0.96-2.75	0.073	1.45	0.80-2.61	0.217
Geo-social sexual networking phone app		1.12	0.68-1.87	0.652	1.34	0.76-2.35	0.316
Gay porn site		1.77	0.99-3.18	0.054	2.05	1.08-3.86	0.027