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Potential markers of female condom use among inner city African American Women

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Abstract

Despite the availability of female condom (FC) and theoretically-based interventions to promote its use, studies have indicated low level acceptability of their use among women in most populations. We aimed to determine female condom use (FCU) prevalence, and the potential markers among African American women (AAW). In an intervention trial to test the efficacy of Information-Motivation-Behavioral Skills model in increasing condom use, we utilized the baseline data of 280 AAW and examined the potential predictors of FCU. Chi square statistic and unconditional logistic regression were used to test for group independence among users and non-users of FC and to assess the potential markers of FCU respectively. After adjustment for relevant covariates associated independently with FCU, the significant potential markers for FCU were age, multiple sexual relationships (MSR), knowledge of FC, and educational status. Women having MSR compared with monogamous relationship were 5 times more likely to use FC, while women with high school education were three times more likely to use FC, prevalence odds ratio, POR = 5.32, 95% CI=1.79-15.83 and POR = 3.01, 95% CI = 1.01-8.93. Women who were not knowledgeable of FC compared to those who were, were 81% less likely to use FC, POR = 0.19, 95% CI = 0.08-0.45. Among AAW in this sample, knowledge of FCU, age, educational status, and multiple sexual relationships were significant markers of FCU. This study is therefore suggestive of the need to educate AAW on FC, given the obstacles in male condom negotiation especially among the socio-economically challenged.

Introduction

Consistent and appropriate condom (male/female) use remains a single most effective measure against HIV transmission in all populations (; Bounds, 1997; Brown-Peterside, Redding, Ren, & Koblin, 2000; Essien, Ogungbade, Kamiru, Ekong, Ward, & Holmes, 2006; Sangani, Rutherford, & Wilkinson, 2004). The female condom has now been shown in particular to reduce HIV risk for adult women. (Feldblum, et al. 2001; Welsh, Feldblum, Kuyoh, Mwarogo, & Kungu, 2001; Toroitich-Ruto, 2001). However, despite the availability of female condoms and theoretically-based interventions to promote their use, studies have indicated low levels

of female condom use among sexually active women aged 15 to 25 years (Barbara & Berbaum, 2005; Posner, Bull, Ortiz, & Evans, 2004; Krishnan, El-Bassel, Schilling, Gilbert, Witte, & Spiegler, 1996). In contrast, high level of female condom acceptability and use have been reported among women at high risk of STDs (Macaluso, Demand, et al. 2000).

Unprotected sexual intercourse, including low uptake of female condoms continues to put women at risk for sexually transmitted diseases and unintended pregnancy. Young African-American women are a group at high-risk for HIV transmission and acquisition, and yet understudied in terms of predictors female condom use (Locke, Newcomb, and Goodyear, 2002). Available evidence suggests that the prevalence proportion of female condom use is particularly low among African American women (AAW) (Krishman et al. 1996). Studies with other populations have shown the difficulties involved in using female condoms (Deniaud, 1997). African American women may have similar difficulties using female condoms and often are not well informed on the steps involved in proper female condom use.

The current study was conducted to examine the predictors of female condom use among AAW at a high risk for HIV infection. We hypothesized that the prevalence of female condom use would be low among AAW, and that socio-demographic and lifestyle factors independently predict female condom use. To test this hypothesis, we utilized the baseline data of an intervention trial to test the efficacy of Information-Motivation-Behavioral (IMB) Skills model in increasing condom use and decreasing HIV risk behavior among inner city African American women in Houston, Texas.

Methods

Participants

African American women were eligible to participate if they (1) were eighteen years and older; (2) were sexually active; (3) had a history of unprotected sex; (4) could read, speak and understand English; (5) did not plan to move to other cities during the next twelve months; (6) were not simultaneously enrolled in any other HIV/AIDS intervention study; (7) had a history of alcohol and drug abuse; and, (8) had a history of multiple sex partners. Participants were excluded if they were not of African American ethnic/racial group, were not within the census tract area and were emotionally challenged or diagnosed with any emotional disorder that may interfere with sessions.

Study Design

After appropriate approval from the relevant Institutional Review Board, we conducted a cross-sectional study based on a prospective cohort from the intervention designed to reduce HIV risk behaviors among inner-city African American women. We used a cross-sectional design to examine the baseline data in a prospective cohort of 280 inner city African American women, residing in Houston, Texas. These data were collected in 2006.

Measures

A questionnaire with composite items was used to measure the baseline response to HIV/AIDS knowledge, HIV risk perception, drug and alcohol use, condom use, intent, and obstacle to use and self-efficacy. This questionnaire had been used in similar setting in studying African American women (Kalichman & Browne-Sperling, 1999). These instruments though used in a similar setting were cross-validated in the present population prior to the main study.

Demographic and prognostic characteristics

The demographic characteristics were age, employment status, current income and highest education level as categorical variables. Information on sexual relationship, incarceration,

STDs and mental illness treatment status were obtained from participants. Further, participants indicated whether they traded sex for money or drugs, had sex with someone whom they know to have sex with men and if they injected drugs.

Substance use and sexual risk behaviors

Drug use was classified into major substances with which ingestion could result in altered mentation and behavioral impairment including neuro-toxicity. These agents were alcohol, marijuana, cocaine, amphetamines, and ecstasy. We assessed use of substances of intoxication in relation to sexual encounters. Participants were required to respond Yes or No to the use of these substances during the past one month and the past three months prior to sexual intercourse. In addition, participants were required to indicate the frequency of alcohol, marijuana, crack, cocaine and other drug use before sex during the past one and three months. These responses were on a continuous scale, which were later categorized into four groups prior to analysis. Participants were also asked in a dichotomous or binary pattern (Yes/No) regarding needle sharing, sex with partner who uses needle and exchange of sex for money. The internal consistency was Cronbach $\alpha = 0.62$.

Condom use, attitude, and barriers

To assess condom use, we selected an item measuring intent and utilization of condoms (past and current use). A binary scale (*yes or no*) was used to score the item for actual condom use: *I have used latex condom*. Condom attitude and barriers were assessed with a 4-item test. The items included: "Female condoms take away pleasure" (reverse score), "male condoms reduce the fun of sex (reverse score)", "I would be embarrassed to buy condom (reverse score)," and "male condoms are a hassle to use (reverse score)". Participants were required to respond to a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). A positive attitude towards condom use was determined by the lowest score. The condom attitude and barriers scale was internally consistent in the present study sample at, Cronbach $\alpha = 0.88$.

Self-efficacy

To assess the participants' self efficacy in condom use, HIV testing and substance use prior to sexual intercourse, we used a 6-item scale. Examples of items are: "Talked with sex partner about using male condoms or safer sex in the past three months", "Did not have sex because you did not have a condom" and "drank less or used drugs less before having sex to be safe". All questions were asked within the time frame of three months. We used open-ended formats for participants to indicate the number of times within the past 3 months that they participated in behaviors leading to self efficacy. The responses were categorized, with the highest score indicating enhanced self-efficacy. The self-efficacy scale was internally consistent (standardized alpha coefficient) in our sample, Cronbach $\alpha = 0.76$.

Statistical analysis

Descriptive statistics were used to examine the distribution of variables that may be associated with the female condom use. To test for independence or association of the independent variable with the outcome variable, we used Pearson chi square statistic and Fisher's exact to compensate for small cell counts. A univariable logistic regression model was then used to examine the potential predictors of female condom use as well as the possible confounders. To simultaneously adjust for potential confounders, we used the multivariable logistic regression modeling. To enter into this model, we determined *a priori* that only independent variables that were statistically significant at $p < 0.25$ and were biologically relevant such as age or gender will qualify (Hosmer & Lemeshow, 2000). Next, we tested for interactions at $p < 0.10$ for entry into the model (Hosmer & Lemeshow, 2000). Finally, to test for the fitness of the model with or without interaction, we performed the goodness of fit test following Hosmer

& Lemeshow criteria. All statistics were two-tailed at 0.05 significance level and were performed using STATA statistical package, version 9.0.

Results

There were 280 female participants with a relatively low prevalence of female condom use, 44 (15.9%) compared with male condom use 77 (27.9%). Table 1 presents the study characteristics stratified by female condom use. The users and non-users of female condoms were statistically significantly different with respect to the type of sexual relationship (abstinence, single partner, and multiple partners), age, and knowledge of female condom. In contrast, users and non-users of female condoms were not statistically significantly different regarding education, income, incarceration, AIDS concerns, oral contraceptive use, attitude towards male condoms, negotiation of male condom use, condom use self-efficacy, drug use during the past three months, number of male sexual partners during the last three months, number of female sexual partners during the last three months, and condom use difficulties. Users of female condoms were more likely to have higher education compared to non-users, 81.8% versus 61.8%. Non-users of female condoms were more likely to practice abstinence compared to users, 35.2% versus 20.9%. Users of female condoms were more likely to be younger (18 - 30 years) compared to non-users, 56.8% versus 35.3%. Users of female condoms were more likely to have prior knowledge of female condoms compared to non-users, 40.5% versus 20.8%. Users of female condoms were less likely to be concerned about contracting HIV compared to non-users, 31.8% versus 36.4%. Users of female condoms were less likely to use oral contraceptives compared to non-users, 59.1% versus 61.2%. Users of female condoms had more positive attitude towards female condoms compared to non-users, 23.8% versus 17.2%. Users of female condoms were more likely to negotiate condom compared to non-users, 86.4% versus 79.9%. Condom use self-efficacy was higher among female condom users compared with non-users, 90.7% versus 80.7%. Non-users were less likely to consume alcohol during the last three months prior to sexual intercourse compared with users, 39.1% versus 31.9%. Non-users of female condom were less likely to use marijuana during the last three months prior to sexual intercourse compared to users, 10.7% versus 15.0%. Non-users of female condom were less likely to have male sexual partners during the past three months compared to users, 57% versus 67.5%. Users of female condoms were less likely to experience difficulties with condom use compared to non-users, 60% versus 74%.

Table 2 presents the univariable logistic regression model on the potential predictors of female condoms use among AAW. Compared with abstinence, women with multiple sexual partners were five times more likely to use female condom, crude odds ratio (OR) = 5.5, 95% Confidence Interval (CI), 1.98 - 15.44. Relative to younger women, aged 18-30 years, older women, aged 50 years and above were 78% less likely to use female condom, OR = 0.22, 95% CI, 0.06-0.78. The knowledge of female condom use was statistically significantly associated with female condom use. Women without such awareness were 52% less likely to use female condom, OR = 0.48, 95% CI, 0.24-0.96. Compared with women who do not use male condoms, those who do use male condoms were six times more likely to use female condoms, OR = 6.12, 95% CI, 1.86-20.70. There were no statistically significant associations between female condom use and education, self-efficacy, oral contraceptive use, attitude towards male condom use, condom negotiation, and drug use.

Table 3 presents the multivariable logistic regression model of the potential markers of female condom use, controlling for age and educational status. Multiple sexual partners was the most potent positive predictor of female condom use. After adjustment of the relevant covariates, AAW with multiple sex partners, compared with those practicing abstinence were 8 times more likely to use a female condom, OR=8.45, 95% CI, 2.35-30.36. Second, education was a positive potent predictor of female condom use. Compared with women without High School education,

those with High School education were three times more likely to use a condom, OR, 3.01, 95% CI, 1.01-8.93. Third, women without knowledge of female condom use were 81% less likely to use female condom, OR=0.19, 95% CI, 0.08-0.45. Next, age was associated with female condom use. Compared with women, aged 18-30 years, women aged 31-40 years were 78% less likely to use a female condom, OR=0.22, 95% CI, 0.07-0.67

Discussion

This study examined the predictors of female condom use in a population that has not been fully studied in this respect, inner city African American women. Whereas the prevalence of female condom use was relatively low in this sample (15.9%), compared with male condom use (27.9%), we identified significant predictors of female condom use. First, multiple sexual partners was a statistically significant positive predictor of female condom use. Secondly, knowledge of female condom and educational status correlated directly with condom use. Thirdly, there was an inverse correlation between age and female condom use, with younger women more likely to use female condoms.

In this study, there is a low prevalence of female condom use among inner city African American women. This finding is not unique since studies consistently show low acceptability and prevalence of female condom use even among women at high risk for sexually transmitted diseases (Krishnan, El-Bassel, Schilling, Gilbert, Witte, & Spiegler, 1996; Barbara & Berbaum, 2005; Posner, Bull, Ortiz, & Evans, 2004). For example, a study on barriers to conception among African Americans found a low preference (23%) for female condom, (Eldridge, St Lawrence, Little, Shelby & Brasfield, 1995). Likewise, a prospective study of female condom use indicated that 8% of the female used this method as exclusive barrier method, while 15% used male condom exclusively (Macaluso, et al. 2000). The low prevalence of female condom use demonstrated in the current study is therefore consistent with past research. Despite the availability of the female condoms over 20 years ago, low use of this method had been associated with availability, access, and difficulties compared with the male condom (Deniaud, 1997). In spite of these barriers, the female condom is preferable as a controlled method, compared with male condom which requires male cooperation. (Eldridge, St Lawrence, Little, Shelby & Brasfield, 1995).

Having multiple sexual partners was demonstrated to be the most potent predictor of female condom use. This result is analogous to studies that have found high prevalence of female condom use in women at high risk for sexually transmitted diseases (Macaluso, et al. 2000). Also, women with multiple sexual partners in our study were more likely to use male condom. The use of male condom was an independent predictor of female condom use. However, it is not possible from our data to assess the temporal relationship between male and female condom or to assess, which factor enhances the other. Nevertheless, these data support the observation that women in multiple sexual relationship are more likely to use female condom, suggestive of the need to educate and recommend appropriate and consistent female condom use in this sub-population of AAW, especially among the impoverished AAW with impaired condom negotiation skills.

We have shown also that educational status and knowledge of female condom positively predicted female condom use among inner city AAW. These factors were independently associated with female condom use and persisted as significant predictors after adjustment for the potential confounders in the multivariable logistic regression model. The alteration in the prevalence odds ratio between the crude and adjusted odds is indicative of the possibility of mediation on the effect of education and knowledge of female condom in predicting female condom use. This finding is implicitly supported by the Information-Motivation-Behavioral Skills (IMB) model of HIV preventive behavior, which propagates that treatment effects on

behavior occur largely as a result of treatment effects on behavioral skills, which follow from the effects on information and motivation (Andersonm, et al. 2006) In this cohort of AAW, having information on female condoms directly predicted female condom use as well as education which allows for facilitated processing of information and motivation to change or adapt.

The results of this study are not without limitations. First, there is limited opportunity for generalization since this study is not representative of all inner city AAW in Houston, Texas. The AAW in this study were those from public housing development, representing largely a low socio-economic sample. Secondly, there is concern on temporal sequence, given the cross-sectional nature of our data. Thirdly, despite controlling for the potential confounders in our data, it is possible that residual confounding, which may result from broad categories, may very well have influenced our results. Finally, like in all behavioral and epidemiologic studies these findings may be driven in part by unmeasured confounding since no amount of statistical modeling may completely eliminate the effect of confounding.

In summary, despite these limitations, this study has shown that among inner city African American women residing in Houston, Texas, having multiple sexual partners was the potent predictor of female condom use. In addition, female condom use was predicted by educational attainment and knowledge of female condoms. Our data are suggestive of the need for education of AAW on how to correctly use a female condom, especially those with multiple sexual partners, poor male condom use negotiation skills, and those who are economically marginalized.

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Table 1

Distribution of Study Characteristics of Inner City African American Women by Female Condom Use

Variable	Female Condom Use		2(df)	p-value
	Use, n (%)	Non-Use, n (%)		
Education			3.1 (1)	0.08
< High School	8 (18.2)	72 (31.4)		
> High School	36 (81.8)	157 (68.6)		
Sexual Relations			13 (3)	0.005
Abstinence	9 (20.9)	77 (35.2)		
SMP	11 (25.6)	17 (7.8)		
SPST	5 (11.6)	29 (13.2)		
SPLT	18 (41.9)	96 (43.8)		
Income			0.16 (1)	0.68
\$0 - 20,000	35 (85.4)	185 (87.7)		
>\$20,000	6 (14.6)	26 (12.3)		
Age			8.5 (3)	0.04
18 - 30	25 (56.8)	82 (35.3)		
31 - 40	10 (22.7)	59 (25.4)		
41 - 50	6 (13.6)	47 (20.7)		
≥ 50	3 (6.8)	44 (19.0)		
Incarceration			0.004 (1)	0.95
No	34 (79.1)	182 (79.5)		
Yes	9 (20.9)	47 (20.5)		
Knowledge of female condom			4.4 (1)	0.04
Yes	17 (40.5)	56 (24.8)		
No	25 (59.5)	170 (75.2)		
Worried about contracting HIV			0.33 (1)	0.56
No	30 (68.2)	140 (63.6)		
Yes	14 (31.8)	80 (36.4)		
Oral contraceptive			0.07 (1)	0.79
No	18 (40.9)	81 (38.8)		
Yes	26 (59.1)	128 (61.2)		
Attitude towards male condom			0.006 (1)	0.94
Negative	36 (81.8)	177 (82.3)		
Positive	8 (18.2)	38 (17.7)		
Attitudes towards female condom			1.007 (1)	0.32
Negative	32 (76.2)	159 (82.8)		
Positive	10 (23.8)	33 (17.2)		
Male condom negotiation			1.0 (1)	0.32
No	6 (13.6)	42 (20.1)		
Yes	38 (86.4)	167 (79.9)		
Condom use Self-efficacy			2.48 (1)	0.13*
No	4 (9.3)	41 (19.13)		
Yes	39 (90.7)	171 (80.7)		
Alcohol use			1.29 (4)	0.66*
No	26 (61.9)	143 (69.1)		
1 - 4	13 (31.0)	50 (24.15)		
5 - 9	2 (4.8)	10 (4.8)		
10 - 14	1 (2.38)	3 (1.45)		
≥15	0 (0.00)	1 (0.48)		
Marijuana use			6.66 (4)	0.25*
0	34 (85.0)	184 (89.3)		
1 - 4	4 (10.0)	13 (6.3)		
5 - 9	1 (2.5)	5 (2.4)		
10 - 14	1 (2.5)	0 (0.00)		
≥ 15	0 (0.00)	4 (1.9)		
Number of male sex partner within last 3 months			2.98 (3)	0.36*
0	14 (32.5)	89 (43.0)		
1	22 (51.2)	98 (47.3)		
2	7 (16.3)	19 (9.2)		
3	0 (0.00)	1 (0.5)		
Number of female sex partner within last 3 months			0.91 (2)	0.51*
0	36 (85.7)	182 (89.7)		
1	6 (10.6)	20 (9.8)		
2	1 (0.00)	1 (0.5)		
Condom use difficulties			0.27 (1)	0.27
No	6 (40.0)	19 (26.0)		
Yes	9 (60.0)	54 (74.0)		

Abbreviations: SMP = Sex with Multiple Partner, SPSP = Sex with Single Partner for a Short Period (Less than 1 year), SPLP = Sex with Single Partner for a Long Period (More than 1 year). * Fisher's exact

Table 2

Univariable logistic regression model of Potential markers of female condom use among inner city African American Women

Variable	Prevalence Odds Ratio (Unadjusted)	95% Confidence Interval	p-value
Self-Efficacy			
No	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Yes	2.3	0.79 - 6.91	0.12
Alcohol use			
None	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
1 - 4 times	1.43	0.68 - 23.00	0.34
5 - 9 times	1.1	0.23 - 5.31	0.91
10 - 15 times	1.83	0.18 - 18.31	0.61
Sexual relation			
Abstinence	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
SMP	5.53	1.98 - 15.44	0.001
SPST	1.47	0.45 - 4.77	0.52
SPLT	1.60	0.68 - 3.77	0.28
Age			
18 - 30	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
31 - 40	0.56	0.25 - 1.24	0.15
41 - 50	0.42	0.16 - 1.10	0.08
> 50	0.22	0.06 - 0.78	0.02
Education			
<High School	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
>High school	2.06	0.91 - 4.66	0.08
Marijuana Use			
None	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
1 - 4 times	1.66	0.51 - 5.41	0.40
5 - 9 times	1.08	0.12 - 9.55	0.94
Oral Contraceptives			
No	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Yes	0.91	0.47 - 1.77	0.79
Knowledge of Female condom			
Yes	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
No	0.48	0.24 - 0.96	0.04
AIDS Worried			
Yes	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
No	0.82	0.41 - 1.63	0.57
Attitudes towards female condom			
Negative	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Positive	1.50	0.67 - 3.36	0.32
Condom Use			
Yes	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
No	6.12	1.86 - 20.70	0.003
Attitudes towards male condom			
Negative	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Positive	1.03	0.45 - 2.40	0.94
Male condom negotiation			
No	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Yes	1.59	0.63 - 4.02	0.32
Incarceration			
No	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Yes	1.02	0.46 - 2.28	0.95

Notes: The frequency of marijuana and alcohol refers to the use of these substances prior to sexual intercourse during the past three months;

Abbreviations: SMP = Sex with Multiple Partner, SPSP = Sex with Single Partner for a Short Period (Less than 1 year), SPLP = Sex with Single Partner for a Long Period (More than 1 year).

Table 3

Multivariable Logistic Regression Model of Potential Markers of Female Condom use among Inner City African American Women

Variable	Adjusted Prevalence Odds Ratio	95% Confidence interval	p-value
Male Condom Use			
No	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Yes	4.2	0.70 - 25.63	0.11
Condom use self-efficacy			
No	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Yes	2.21	0.58 - 8.40	0.24
Age (years)			
18 - 30	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
31 - 40	0.22	0.07 - 0.67	0.008
41 - 50	0.50	0.16 - 1.57	0.23
≥ 50	0.86	0.17 - 4.37	0.85
Sexual relationship			
Abstinence	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
Multiple Partner	8.45	2.35 - 30.36	0.001
Single Partner	1.59	0.60 - 4.21	0.35
Knowledge of female condom use			
Yes	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
No	0.19	0.08 - 0.45	<0.001
Education			
< High School	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)
>High School	3.01	1.01 - 8.93	0.047