A validation and reduced form of the Female Condom Attitudes Scale

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Running head: Female Condom Scale Development

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Acknowledgements

Abstract

The Female Condom Attitudes Scale is an instrument comprised of five correlated factors derived from fifteen Likert-scale survey items that measure women's attitudes toward the female condom. This scale originated from the thirty item scale of Choi, Gregorich, Anderson, Grinstead, and Gómez (2001). Exploratory factor analysis of this scale extracted eight correlated factors. Reliability coefficients and confirmatory factor analyses refined the instrument by reducing the number of factors to five and halving the number of items. The reduced form of the Female Condom Attitudes Scale demonstrated both construct and convergent validity by predicting self-reported female condom use behavior. It also correlated with self-efficacy to use male condoms, sexual comfort, and attitudes toward the male condom. The five factors remaining in the final survey instrument were Sexual Pleasure Enhancement, Inconvenience, Improved Prophylaxis, Sexual Pleasure Inhibition, and Insertion Reluctance. Implications of these findings for basic and applied intervention research are discussed.

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Women living in the United States are at risk for HIV infection; the major source of new HIV infections in women is attributable to heterosexual contact with infected male partners (Centers for Disease Control and Prevention, 1999). Furthermore, the incidence of HIV among women is dropping more slowly than that of men. For instance, from 1995 to 1999, new AIDS cases were lowered by 4% among women, yet the same reduction among men was 28% (Centers for Disease Control and Prevention, 1999). Given this disparity in HIV infection reduction between men and women, prevention efforts directed specifically towards women who are at risk of HIV infection are in order.

One relatively new HIV prevention tool that is gaining in popularity among HIV prevention experts is the female condom (Gollub & Stein, 1993). This prophylatic device is a polyurethane barrier worn inside the vagina during sexual intercourse with male partners. Previous qualitative and quantitative research suggests that substantial numbers of women are willing to try the female condom and that many women have favorable attitudes toward this method of contraception and disease transmission prevention (Macaluso, Demand, Artz, Fleenor, Robey, Kelaghan, Cabral, and Hook, 2000; Choi, Johnston, Gómez, and Grinstead, 1999). An additional benefit of the female condom is that it can facilitate feelings of empowerment and efficacy among women who use it (Gollub, 2000).

Several studies have identified factors that can hinder acceptance and use of the female condom, however, including lack of partner cooperation with using the female condom, mechanical problems with device insertion and removal, lack of sexual

communication, lack of access to the female condom immediately prior to intercourse, and women's attitudes toward the female condom (Gollub, Stein, and El-Sadr, 1995; El-Bassel, Krishnan, Schilling, Witte, & Gilbert, 1998).

Because attitude change is a necessary (though not sufficient) component of successful interventions, negative attitudes toward a method of STD prevention (e.g., the female condom) will negatively impact the efficacy of intervention efforts to promote that method of prophylaxis. Therefore, attitude change is a crucial component of any successful intervention program. A necessary corollary to assessing the efficacy of attitude change is the effective measure of relevant attitudes. In this setting, then, accurate measures of attitudes toward the female condom are vital to capturing pre-existing beliefs as well as changing attitudes toward the female condom.

Qualitative studies of the female condom provide a fertile basis for additional quantitative research into women's attitudes toward the female condom. While qualitative research yields rich and detailed results, it is by necessity time-consuming. Prevention researchers and practitioners alike can benefit from companion quantitative measures that tap into pre-specified domains of beliefs regarding the female condom. To date, we are aware of only one study that asssessed the psychometric properties of a quantitative female condom attitudes measurement instrument: Choi, Gregorich, Anderson, Grinstead, and Gómez (2001) used a 30 item measure of attitudes toward the female condom as part of a larger study of participant and situational factors that were associated with female condom usage among an ethnically diverse set of women who visited family planning clinics. Using exploratory factor analysis methods, Choi et al. (2001) extracted four general factors: Prophylatic Efficiency, Device Appearance, Device Insertion Issues, and Sexual Pleasure Inhibition. Internal

reliability for the four subscales ranged from satisfactory (alpha = .67 for device appearance) to excellent (alpha = .85 for inhibition of sexual pleasure).

Though the validity and reliability evidence of the Female Condom Attitudes Scale reported in Choi et al. (2001) appears reasonable, validation of the female condom scale was not the primary purpose of their study. By contrast, the present study is designed primarily to assess the validity and reliability of the female condom scale. Accordingly, we subjected the female condom instrument items to additional focused analyses with the specific goal of deriving a psychometrically sound reduced form of the scale from the original instrument developed by Choi et al. (2001) using the same sample of participants to ensure comparability of research findings to those reported by Choi et al. (2001).

Method

<u>Participants</u>

Participants were 238 ethnically diverse women from four family planning clinics in the San Francisco Bay Area who were recruited to participate in a three-month longitudinal study on the frequency of use of female condoms. Women 18-39 years old who had two or more male sexual partners in the past year and at least one current male sexual partner were eligible to participate in the study. Women who had HIV or STD symptoms or who were commercial sex workers were ineligible for the study because their motivations for using female condoms might be different than our target population of interest. Individuals who could not speak English, those who were allergic to latex and lubricants, and women who planned to leave the Bay Area within the three months following the initial screening for study participation were also excluded.

<u>Procedure</u>

Participants initially completed a consent form followed by several questionnaires administered by a female interviewer and they received a ten minute tutorial on the use of the female condom. Based on the amount of sexual activity reported at the baseline measurement, women were mailed a monthly supply of male and female condoms and encouraged to make use of male or female condoms as needed, but not both simultaneously. Participants were also encouraged to contact the study coordinators to request that additional condoms be mailed to them if this became necessary during the course of the study. An average of two male condoms and two female condoms per week were mailed to each participant during the course of the study.

At the end of the third month, participants returned for follow-up interviews that included new versions of the questionnaires they completed at the baseline visit. Accordingly, all materials and data analyses reported below are derived exclusively from the follow-up measurement occasion.

<u>Materials</u>

In addition to questions pertaining to demographic information (i.e., age, ethnicity, marital status, and education), the questionnaire packet for the study at the follow-up measurement occasion included the following:

<u>Female Condom Attitudes Scale</u> (FCAS; Choi, Gregorich, Anderson, Grinstead, and Gómez, 2001). The FCAS is a 30 item survey instrument measuring attitudes toward the female condom. Items are scored on a four point Likert scale (1 = "disagree a lot", 2 = "kind of disagree", 3 = "kind of agree", 4 = "agree a lot"). Choi et al. (2001) identified four factors using exploratory factor analysis with oblique rotation: prophylatic efficiency in comparison

to the male condom (alpha = .78), concern with device appearance (alpha = .67), dislike with device insertion requirements (alpha = .84), and sexual pleasure inhibition (alpha = .85). Single items addressing female empowerment ("Female condoms put women in charge") and partner trust ("If a woman wants to use a female condom, her partner might think she was having sex with someone else") were incorporated into the instrument. In addition to the FCAS, the following scales were incorporated for the purpose of validity assessment of the FCAS:

Condom Self-Efficacy (CSE; Marín, Gómez, Tschann, and Gregorich, 1997). The CSE has a single higher-order factor (Condom Self-Efficacy, alpha = .88) and five lower-order factors (Regular Partner, alpha = .78; Impulse Control, alpha = .73; Partner Resistance, alpha = .74; STD Thoughts, alpha = .65, and Condom Discussion, alpha = .56). It is comprised of 19 items scored on a four-point Likert scale (1 = "definitely no", 2 = ''probably no", 3 = "probably yes", 4 = "definitely yes") with higher scores indicating greater perceived self-efficacy surrounding the use of the male condom. Individual items on this scale asked participants about whether they could discuss condom usage with steady and non-steady sex partners, follow through on condom usage while under the influence of alcohol, drugs, or sexual impulses, and negotiate condom usage successfully with resistant partners.

Sexual Comfort (Marín, Gómez, Tschann, and Gregorich, 1998). The sexual comfort scale is a two factor survey instrument that addresses women's comfort with birth control device insertion (SC1: alpha = .77) and sexual communication with their partners (SC2: alpha = .70). Responses were scored on a four point Likert scale (1 = "very uncomfortable", 2 = "somewhat uncomfortable", 3 = "somewhat comfortable", 4 = "very comfortable").

Male Condom Attitudes Scale (MCAS). Originally from the National AIDS Behavior

Survey (Catania, Unpublished Manuscript) the MCAS is a 18 item instrument that measures individuals' attitudes toward the male condom (alpha = .75). The items in this survey formed the basis of the Female Condom Attitudes Scale items reported previously.

Female Condom Usage. A single item asked participants to recall the number of times they used a female condom for vaginal intercourse with a sexual partner since the start of the study. If respondents were unable to recall the exact number of times they used a female condom during the study interval, they were asked to provide their best estimate of the number of times they used the female condom for vaginal intercourse.

Data Analysis

Overview. To assess the validity of the Female Condom Attitudes Scale, the items in this questionnaire were submitted to exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA) and assessments of reliability via Cronbach's coefficient alpha. Prior to conducting these analyses, missing data issues were addressed and joint multivariate normality of the variables' distribution was tested. Following selection of the best subset of questionnaire items for inclusion in a final, reduced form of the instrument, the resultant factors were used to predict self-reported female condom usage during the study period. Scales derived from these factors were also correlated with related instruments to assess convergent and divergent validity.

Missing data. From the total sample of 218 participants who returned for three month follow-up interviews, 66 individuals had at least one incomplete item on the Female Condom Attitude Scale. Listwise data deletion would result in a total sample size of 152, a 30% loss of data. A more optimal strategy for handling incomplete data is to use maximum likelihood based methods of missing data handling (Little & Rubin, 1987; Wothke, 2000). Accordingly,

we used full information maximum likelihood to generate exploratory factor analysis results using the Mplus statistical software program (Muthén & Muthén, 2001). Similarly, we used the AMOS 4.0 software program to compute coefficient alpha values with full information maximum likelihood enabled to handle missing data (Arbuckle & Wothke, 1999).

Confirmatory factor analysis. Due to their flexibility of model specification, confirmatory factor analysis models may be used in an exploratory context to further refine solutions provided by exploratory factor analyses. The test statistics and standard errors provided by confirmatory factor analysis software allow investigators to identify items that have weak relationships with their corresponding factors and to subsequently prune these items from further analyses. The end result is a shorter, more psychometrically sound measurement instrument. This benefit comes with an associated cost, however: confirmatory factor analysis models test model fit and compute standard errors of parameter estimates using maximum likelihood estimators that typically assume joint multivariate normality of the underlying distribution of the observed variables (Bollen, 1989). Violations of this assumption lead to inflated model fit test statistics and deflated standard errors of parameter estimates, even when full information maximum likelihood is used to handle missing data (Enders, 2000).

AMOS 4.0 contains a test of joint multivariate normality and it allows investigators to employ the bootstrap (Efron & Tibshirani, 1993) to obtain appropriate model fit tests and standard errors under conditions of non-normality (Bollen & Stine, 1993). The bootstrap offers an alternative to employing statistical methods that assume an underlying normal distribution. Instead of relying on a known normal distribution as a prerequisite for hypothesis testing, bootstrap procedures resample, with replacement, randomly selected cases from the

original database. The investigator draws a substantial number of bootstrap samples (e.g., 2000) of size N from the original data. In any given sample, some cases may appear multiple times whereas other cases may not be selected at all. Thus, there is variation among the bootstrap samples. The bootstrap samples are then used to construct an empirical sampling distribution which is then used as the reference for hypothesis testing rather than an assumed normal distribution as is the case with most parametric statistical procedures (Efron & Tibshirani, 1993; Bollen & Stine, 1993). Simulation studies have shown that the bootstrap offers excellent performance in the confirmatory factor analysis context, even when the sample size is small relative to the number of parameters estimated (Fouladi, 1998). The AMOS 4.0 multivariate normality and bootstrap utilities require the analyst to input complete data to the AMOS program, so Multiple Imputation (MI; Shafer, 1997) was used to impute several complete databases for the confirmatory factor analyses reported below (Shafer, 1997).

Based on Rubin's (1987) finding that five imputations result in 94 percent parameter estimate efficiency when 30% of the data are missing, it was determined that five imputations from the original database were necessary to ensure sufficient parameter estimate efficiency. Since the largest amount of missing data on any single item was 16%, the actual parameter estimate efficiency could exceed the 94% lower boundary. Multiple imputations were generated using NORM 2.02 for Windows (Shafer & Olsen, 1999). Ten thousand iterations were performed with complete databases generated at intervals of two thousand iterations to ensure independence of the imputed databases. Each imputed database contained $\underline{N} = 218$ cases, and all analyses reported below were based on $\underline{N} = 218$.

Results

Preliminary Analyses

Age, ethnicity, marital status, and education level were assessed at the baseline interview for the 238 study participants. 218 of the original 238 female participants returned for follow-up interviews and survey completion at three months (a 92% retention rate). Of the 218 participants, 71% had some college education, showing our sample to be well-educated. The sample was also relatively young (mean age = 25 years; oldest participant = 39 years) and unmarried (74%). Table 1 displays the demographic characteristics of this sample of 218 women.

Insert Table 1 about here

Exploratory Factor Analysis

      Exploratory factor analysis was conducted on the female condom scale as the first step

in assessing construct validity. Exploratory factor analysis was conducted using the Mplus

software program (Muthén & Muthén, 2001) due to its ability to handle missing data points

via full information maximum likelihood (Wothke, 2000). Using promax rotation to allow for

correlations among the factors, Mplus extracted eight factors with eigenvalues that exceeded

1.00. Items with absolute factor loading values of .40 or higher were retained from this

analysis; these items are shown in Table 2.

Insert Table 2 about here

Excluded items were: "It's embarrassing to buy female condoms in a store", "It's

embarrassing to put a female condom on in front of a man", "It is hard to find places to buy

female condoms", "It's easier to get men to go along with using female condoms", "You like

being able to put the female condom in ahead of time", and, "The female condom makes too

much noise".

      The first extracted factor, "Sexual Pleasure Enhancement", consisted of items that

identified positive qualities associated with female condoms that participants viewed as

making sex better, more pleasurable, or more enjoyable. The second extracted factor,

"Inconvenience", contained items that measured several negative qualities of female condoms, including inconvenience, messiness, oddity, and a general evaluation item ("Female condoms are better than male condoms"). The third extracted factor, "Improved Prophylaxis", addressed the dual issues of pregnancy avoidance and sexually-transmitted disease prevention, as well as a more general item that asked about the strength of female condoms ("Female condoms are stronger than male condoms"). A fourth factor, "Convenience", assessed the degree to which participants viewed the female condom as being too time-consuming to use and the portability of the device ("It is hard to carry female condoms in a purse because of their size").

A fifth factor brought out the issue of "Choice". This factor contained a question about empowerment/efficacy ("Female condoms put the woman in charge"), as well as more specific questions about prophylactic options offered by the female condom. The sixth factor, "Sexual Pleasure Inhibition", involved the degree to which participants felt that use of the female condom diminished their sexual enjoyment. The seventh factor addressed the issue of "Insertion Reluctance" or participants' dislike of the mechanics of donning the female condom. A final factor, "Trust", consisted of a single item derived from the original Female Condom Attitudes Scale reported in Choi et al. (2001), "If a woman wants to use a female condom, her partner might think she was having sex with someone else".

Factor intercorrelation findings, shown in the lower diagonal portion of Table 3, showed a strong relationship between the Inconvenience and the Sexual Pleasure Inhibition factors ($r = .62$). In addition, there were several modest relationships between the Inconvenience and Sexual Pleasure Enhancement factors ($r = -.41$), the Sexual Pleasure Enhancement and Improved Prophylaxis factors ($r = .28$), the Sexual Pleasure Enhancement

and Sexual Pleasure Inhibition factors (r = -.32), and the Convenience and Insertion

Reluctance factors (r = .37).

Insert Table 3 about here

Internal Reliability

Internal reliability was measured by computing Cronbach's alpha coefficient for each

of the multiple-item factors described above. Initial reliability coefficients for each of the

eight subscales were computed using full information maximum likelihood missing data

handling (Wothke, 2000). Coefficient alpha values for the Convenience (.46) and Choice

factors (.32) were low enough to prompt us to drop these subscales from consideration in

further analyses. For the Sexual Pleasure Enhancement factor, the alpha value was marginally

acceptable (.68); dropping the item, "Female condoms make sex last long" pushed the

obtained alpha to .72. The Improved Prophylaxis factor evidenced a strong alpha of .77,

though deleting the item, "Female condoms are stronger than male condoms" resulted in a

higher alpha value (.82). Similarly, the Insertion Reluctance factor's alpha was strong (.84),

but removing the most general item from this factor, "You don't like putting the female

condom inside yourself", resulted in a higher alpha value (.87). By contrast, the Sexual

Pleasure Inhibition factor's original alpha of .84 was strong and deleting single items from

this factor worsened the overall scale alpha for the remaining items, so this factor's items

were left intact. Final coefficient alpha values for each scale are shown in parentheses

following the factor name in Table 2.

Tests of Joint Multivariate Normality

We used Mardia's measured of multivariate kurtosis to assess the joint multivariate normality of the collection of Female Condom Attitudes Scale (Arbuckle & Wothke, 1999). The average multivariate kurtosis value across the five imputed samples was 20.91 ($\underline{SE}$ = 3.52), returning a $\underline{Z}$ test value of 5.94, p < .0001. Since the null hypothesis is that the data arise from a joint multivariate normal population distribution, this result suggests non-normality of the Female Condom Attitudes Scale item distributions.

Validity Assessment: CFA Model Goodness of Fit Tests

The reduced subset of questionnaire items derived from the exploratory factor analysis and reliability assessments described above were submitted to a confirmatory factor analysis using the five imputed databases. To establish common points of reference for the comparison of descriptive model fit statistics, the null model consisting of only measured variables' estimated variances and the saturated model consisting of all possible estimable parameters were also fit to the imputed databases. Overall model fit to the data was assessed using the chi-square model test statistic of absolute fit with a bootstrap-based p-value to correct for non-normality of the data distribution (Bollen & Stine, 1993; Fouladi, 1998). Each p-value was based upon 2000 bootstrap samples. The means and ranges of the chi-square test statistics and the corresponding Bollen-Stine p-values are reported for each model that as fit to the five imputed databases.

Based on the recommendations of Hu & Bentler (1999) and Marsh, Balla, & McDonald (1988), the following descriptive and approximate measures of model fit are reported: the standardized root mean residual (SRMR; Bollen, 1989), the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and the Root Mean Square Error of Approximation (RMSEA; Browne & Cudek, 1993) with upper and lower 90% confidence intervals. Hu and Bentler

(1999) provided guidelines suggesting that TLI values of .95 or higher, RMSEA values of .06 or lower, and SRMR values of .08 or lower indicate good model fit when these fit statistics are considered together.

Initial exploration of the model was conducted using a separate single imputed database derived for model exploration (Shafer & Olsen, 1999). The fit of this model was rejected on an absolute basis, $\chi^2(80) = 141.94$, $p < .02$, and the descriptive model fit statistics were equivocal: the TLI was .93, which indicated insufficient fit of the model to the data, yet the SRMR was .06 and the RMSEA was .06 (.04-.08), which indicated acceptable model fit. Examination of the squared-multiple correlations for each item showed strong multiple correlations between each item and its respective factor (all R^2s exceeded .30), with one notable exception: the item, "Having part of the female condom hang out is gross" shared only 16 percent of its variance with the Inconvenience factor. Omission of this item resulted in a reduced model with substantially superior fit: this model was accepted on an absolute basis, average $\chi^2(67) = 100.97$, $p < .20$, and the descriptive model fit statistics matched or exceeded the Hu & Bentler (1999) criteria for good model fit: the TLI was .96, the SRMR was .05, and the RMSEA was .05 (.03-.07). Refitting the model to the five multiply imputed databases resulted in similar fit statistics: the average model fit $\chi^2(67) = 109.20$ (range = 101.66 to 117.99), average $p < .12$ (range = .05 to .20); the TLI was .95, the SRMR was .06, and the RMSEA was .05 (.03-.07).

Standardized factor loadings and standard errors for each imputed database were generated via the bootstrap with 2000 bootstrap samples and then combined using the NORM program's implementation of Rubin's (1987) rules of scalar estimands to obtain an overall factor loading for each item on five factors: Sexual Pleasure Enhancement, Inconvenience,

Improved Prophylaxis, Sexual Pleasure Inhibition, and Insertion Reluctance. All items loaded

significantly on their respective factors. The factor loadings and reliability coefficients for

this final model appear in Table 2. The interfactor correlations and significance levels

derived from the final confirmatory factor analysis model appear in the upper diagonal

portion of the correlation matrix displayed in Table 3.

Construct Validity Assessment

One method used to assess construct validity is to measure the ability of the derived

factors to predict or explain behavioral data. Although this study is limited to self-reported

behaviors, an item in the survey packet asked female participants how often they used the

female condom within the past three months (Female Condom Usage). Responses ranged

from zero to sixty uses, with a mean usage of 6.19 (SD = 9.78) condoms; however, the

median number of condoms used was two and the mode was one condom ($n = 38$), followed

by zero ($n = 37$) and two uses ($n = 32$). A steadily decreasing number of participants used

increasing numbers of female condoms throughout the three month interval of the study.

We regressed the female condom usage variable onto each of the five factors

contained in the final CFA model reported above. The resulting model fit well on an absolute

basis, average $\chi^2(76) = 128.78$ (range = 121.05 to 138.66), average $p < .06$ (range = .02 to

.10), and the descriptive model fit statistics matched or exceeded the Hu & Bentler (1999)

criteria for good model fit, with the exception of the TLI . The TLI was .94, the SRMR was

.05, and the RMSEA was .06 (.04-.07). Furthermore, all factor loadings were statistically

significant and comparable in value to those reported for the original CFA model in Table 2.

The standardized regression coefficient of the Inconvenience factor on self-reported condom

usage was statistically significant ($\beta= -.81$, $SE = .33$, $p < .05$). By contrast, Sexual Pleasure

Enhancement (β= -.32, $\underline{SE}$ = .30, $\underline{NS}$), Improved Prophylaxis (β= .04, $\underline{SE}$ = .13, $\underline{NS}$), Sexual

Pleasure Inhibition (β= .15, $\underline{SE}$ = .17, $\underline{NS}$), and Insertion Reluctance (β= -.05, $\underline{SE}$ = .09, $\underline{NS}$)

did not exhibit statistically significant impacts on self-reported female condom usage. The

zero-order correlations of these factors with self-reported female condom usage showed

significant negative relationships between female condom usage and Inconvenience ($\underline{r}$ = -.39,

$\underline{p}$ < .0001), Sexual Pleasure Inhibition ($\underline{r}$ = -.22, $\underline{p}$ < .01), and Insertion Reluctance ($\underline{r}$ = -.16, $\underline{p}$

< .01). Taken together, these findings suggest that the collection of factors derived from the

FCAS were associated with self-reported female condom usage in our sample.

<u>Convergent and Divergent Validity Assessment</u>

Another method is assessment of validity via an instrument's convergency and

divergency with other instruments that have known properties (Anastasi, 1988). Three such

instruments were included in the present study: the Condom Self-Efficacy Scale (CSE), the

Sexual Comfort Scale (SC), and the Male Condom Attitudes Scale (MCAS). Ideally, the

Female Condom Attitudes Scale should show convergent validity in the form of correlations

between its subscales and several scales from the CSE, SC, and MCAS. Not all FCAS factors

should be strongly correlated with with the CSE, SC, and MCAS, however, in order to

esablish the FCAS as a unique measure of attitudes toward the female condom (divergent

validity).

To assess convergent and divergent validity we created item composites that were the

means of the items for each factor and correlated those item composites with the CSE, SC,

and MCAS composite scores. As was the case for the CFA models reported previously, the

correlations among the scales were generated for each of the five imputed databases

separately. Due to the non-normal distribution of the input data, the correlations were

estimated in AMOS via the bootstrap with 2000 replications per analysis to ensure stability of

parameter estimates and to minimize parameter estimate bias (Bollen and Stine, 1993). The

bootstrapped correlations and their standard errors were then combined using Rubin's (1987)

rules of scalar estimands to obtain Z-tests of the significance of the correlations. Correlations

among the five FCAS factors and the CSE, SC, and MCAS scales appear in Table 4.

Insert Table 4 about here

Inconvenience of the female condom was negatively associated with the device

insertion subscale of the sexual comfort scale ($r = -.20$, $p < .01$) – women who were more

comfortable with insertion of birth control devices were less likely to view the female

condom as being messy or inconvenient. Improved Prophylaxis was associated with the

communication component of sexual comfort ($r = .19$, $p < .01$), indicating that greater

openness with sexual communication was associated with views of the female condom as

being a superior prophylactic device. Sexual Pleasure Inhibition was strongly negatively

correlated with the MCAS ($r = -.40$, $p < .0001$), which suggests that as women exhibited

increasingly favorable attitudes toward the male condom, their perceptions of the female

condom's inhibition of sexual pleasure lessened. Insertion Reluctance was strongly negatively

associated with the comfort with the birth control device insertion subscale of sexual comfort

($r = -.52$, $p < .0001$), a particularly reassuring finding given that the items of both subscales

exhibit similar properties – both ask about women's comfort levels with insertion of birth

control devices: the FCAS Insertion Reluctance scale is a measure of female condom device

insertion discomfort whereas the SC2 is a measure of general comfort with birth control

device insertion. The Insertion Reluctance factor of the Female Condom Attitudes Scale was also negatively associated with the Male Condom Attitudes Scale ($r = -.15$, $p < .01$), indicating that women who had less device insertion reluctance had more favorable attitudes toward the male condom.

Finally, there was no direct relationship between Sexual Pleasure Enhancement with Condom Self-Efficacy, Sexual Comfort, and the MCAS. Similarly, Inconvenience was unrelated to Condom Self-Efficacy and Improved Prophylaxis was unrelated to Condom Self-Efficacy and the MCAS. Sexual Pleasure Enhancement was also unrelated to the MCAS. Taken together, these findings may be taken as provisional evidence of divergent validity of the FCAS. Since many of the FCAS items were derived directly from the MCAS, demonstrating divergent validity of the FCAS from the MCAS was crucial to establishing the overall validity of this instrument.

Discussion

Consistent with the findings reported by Choi et al. (2001), the Female Condom Attitudes Scale exhibited a multi-factor structure and its subscales demonstrated satisfactory internal reliability. Three of the five factors derived in this analysis were equivalent to those reported by Choi et al.: Sexual Pleasure Inhibition is similar to the pleasure inhibition factor reported by Choi et al., and Insertion Reluctance resembles dislike of device insertion requirements. Improved Prophylaxis is conceputally similar to Choi et al.'s prophylatic efficiency construct. By contrast, the Sexual Pleasure Enhancement and Inconvenience factors are unique to this analysis.

Though exploratory factor analysis extracted a Choice factor that appeared to tap an empowerment dimension of the female condom, that factor was not retained in the final scale,

which contradicts literature that suggests one positive attribute of the female condom is its ability to empower its users to take charge of their birth control and STD prevention efforts (e.g., Gollub, Stein, and El-Sadr, 1995). Possibly empowerment was of less concern to members of our sample because our participants were mostly unmarried, well-educated American women who were independent and motivated enough to visit family planning clinics and to willingly participate in a research study. These women also had other prophylatic options readily available to them, including the male condom. It is also possible that the FCAS empowerment survey items did not measure this construct fully. Given that many intervention efforts promote the female condom on the basis of empowering female choice, this issue deserves further scrutiny in future research studies with multiple at-risk populations.

Interestingly, of the five factors, only the Inconvenience factor predicted self-reported female condom usage in our sample. This finding has practical implications for future interventions that are designed to increase acceptance of the female condom among members of at risk populations, though it is also worth noting that different factors from the FCAS may have differential predictive impact on behavior depending upon the population that is under study. The convergent and divergent validity assessments indicated sufficient convergency and divergency of the FCAS with existing measures of attitudes toward the male condom scale, sexual comfort, and condom self-efficacy.

The genereralizability of the results from the present study are limited because the sample was self-selected, it was limited in size, behaviors were self-reported, and the conducted analyses were exploratory. Replication of the factor structure in larger samples of diverse ethnic and age groups, as well as assessment of the equality of the obtained factor

structure in cross-cultural settings is highly desirable, as are test-retest reliability assessments. The properties of the FCAS in populations of women who do not frequent family planning clinics, women with HIV and other STDs, and commercial sex workers, are important topics of further investigation, as are differences among women who elect to use the female condom frequently, infrequently, or never. Though our sample contained all three types of women, the modest sample size precluded direct comparisons of these groups' factor structures on the FCAS. Another related line of inquiry is to explore the formation of attitudes toward the female condom among women who have no prior experience with the device for pregnancy and STD prevention.

The low prevalence of female condom usage among our participants also deserves further scrutiny. In addition to the possibility of attenuating correlations resulting from restriction of range in the female condom usage variable, the modest usage of female condoms by participants is of concern from a broader prevention perspective. While some studies in the literature have found an association between favorable attitudes toward male and female condoms and condom usage (e.g., Choi et al., 2001; Van Devanter et al., 2002; Marin et al., 1997; Catania et al., 1994), the strengths of these associations vary. Further research is required to tease apart the conditions under which attitudes toward the female condom are predictive of meaningful amounts of positive prevention behavior.

An additional crucial area of exploration is the attitudes of males toward the female condom because partner attitudes have been found to facilitate female condom use (Choi, Johnson, Gómez, & Grinstead, 1999). Future research should explore and test the factor structure of male attitudes toward the female condom and compare this factor structure with that of females to assess the equivalency of the two sexes' factor structures on the FCAS.

Furthermore, men who have sex with men also use the female condom rectally to prevent infection from STDs (Gibson, McFarland, Wohlfeiler, Scheer, and Katz, 1999); attitudes of this population toward the female condom for STD prevention should be studied.

Despite these limitations, the present study findings provide preliminary evidence that the Female Condom Attitudes Scale is a valid measurement instrument. Furthermore, the reduced form Female Condom Attitudes Scale presented here will enable researchers and practitioners to use the FCAS as an attitude assessment instrument in time-limited measurement situations. Potential areas of application of the Female Condom Attitudes Scale are many, ranging from basic and applied research projects to applications involving the measurement of attitude change interventions among men and women who are at risk for contracting sexually-transmitted diseases.

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Table 1

Sample Characteristics of Participants (N=218)

	%	(N)
Ethnicity		
African American	33	(72)
Asian American	12	(26)
Latina	14	(30)
White	41	(90)
Age (mean = 25 years)		
18 - 19	17	(37)
20 - 24	37	(81)
25 - 29	27	(58)
30 - 34	13	(30)
35 - 39	6	(12)
Marital status		
Never married	74	(162)
Living with a sexual partner	16	(34)
Married	3	(7)
Separated/Divorced/Widowed	7	(15)
Education		
Less than high school	8	(18)
High school	21	(45)
Some college	44	(95)
College graduate	28	(60)

Table 2

Attitudes Toward the Female Condom Scale: Standardized Exploratory Factor Analysis

Loadings, Confirmatory Factor Analysis Loadings, and Final Reliability Coefficients

Factor (Cronbach alpha)	EFA	CFA
Sexual Pleasure Enhancement (.72)		
Female condoms make sex better for women.	.64	.77***
Female condoms feel more natural than regular male condoms.	.59	.71***
Female condoms make sex last long.	.41	—
Inconvenience (.72)		
Female condoms are better than male condoms.	-.63	-.73***
Female condoms are weird.	.59	.61***
Female condoms are inconvenient.	.58	.61***
Female condoms are messy.	.51	.52***
Having part of the female condom hang out is gross.	.60	—
Improved Prophylaxis (.82)		
Female condoms offer better protection against unwanted pregnancy than male condoms do.	.71	.89***
Female condoms offer better protection against sexually transmitted diseases than male condoms do.	.92	.77***
Female condoms are stronger than male condoms.	.52	—

(Table 2 continued)

Convenience (.46)

  The female condom takes too long to put in.   .42   —

  It is hard to carry female condoms in a purse because of their size.   .55   —

Choice (.32)

  Female condoms put the woman in charge.   .50   —

  The female condom provides women another contraceptive choice.   .48   —

  The female condom provides women another choice to protect   .55   —

  themselves against HIV and other sexually transmitted diseases.

Sexual Pleasure Inhibition (.84)

  Sex doesn't feel as good when you use a female condom.   .76   .74***

  Female condoms make it hard for a woman to have an orgasm (cum).   .90   .81***

  Female condoms make it hard for a man to have an orgasm (cum).   .71   .73***

  Female condoms take all the fun out of sex.   .54   .71***

Insertion Reluctance (.87)

  You don't like putting the female condom inside yourself.   .50   —

  You don't like having to touch yourself to put the female condom in.   .81   1.01**

  You don't like having to use your finger to push the female condom in.   .84   .88*

Trust

  If a woman wants to use a female condom, her partner might think she was   .69   —

  Having sex with someone else.

(Table 2 continued)

Notes: Items appearing in boldface type are retained in the final version of the scale. EFA

factor loadings were estimated via full information maximum likelihood; CFA factor loadings

were estimated via the bootstrap with 2000 replications per imputed sample, following

multiple imputation of five imputed databases used for analyses. $* = p < .05$, $** = p < .01$,

$*** = p < .0001$. $N = 218$.

Table 3

Female Condom Attitude Scale: Factor Correlations from Exploratory and Confirmatory

Factor Analysis

Factor	1	2	3	4
1. Sexual Pleasure Enhancement	—	-.68***	.44***	-.48***
2. Inconvenience	-.41	—	-.30**	.64***
3. Improved Prophylaxis	.28	-.06	—	-.03
4. Sexual Pleasure Inhibition	-.32	.62	.07	—
5. Insertion Reluctance	-.01	.21	-.14	.08
6. Choice	.24	-.15	.22	-.12
7. Convenience	-.05	.28	.22	.13
8. Trust	.23	.09	.14	.15

(Table 3 continued)

Factor	5	6	7	8
1. Sexual Pleasure Enhancement	-.41			
2. Inconvenience	.17			
3. Improved Prophylaxis	.05			
4. Sexual Pleasure Inhibition	.15			
5. Insertion Reluctance	—			
6. Choice	.02	—		
7. Convenience	.37	.20	—	
8. Trust	.23	.17	.28	—

Notes: EFA factor correlations appearing in the lower diagonal were estimated via full

information maximum likelihood; CFA factor correlations shown in the upper diagonal

were estimated via the bootstrap with 2000 replications per imputed sample, following

multiple imputation of five imputed databases used for used for analyses. $* = p < .05$,

$** = p < .01$, $*** = p < .0001$. $N = 218$.

Table 4

Female Condom Scale: Factor Correlations of the Female Condom Attitudes Scale with the Condom Self-Efficacy, Sexual Comfort, and Male Condom Attitudes scales and Female Condom Usage

Factor / Scale	1	2	3	4	5
1. Sexual Pleasure Enhancement	—				
2. Inconvenience	-.45***	—			
3. Improved Prophylaxis	.33***	-.21**	—		
4. Sexual Pleasure Inhibition	-.37***	.52***	-.02	—	
5. Insertion Reluctance	-.02	.17**	.04	.13	—
6. CSE	.05	-.03	-.10	-.11	-.06
7. SC1	.06	-.20**	-.08	-.13	-.52***
8. SC2	-.03	-.13*	.19**	-.06	-.13
9. MCAS	-.03	-.09	-.11	-.40***	-.15*
10. Female Condom Usage	.13	-.39***	.06	-.22**	-.16**

(Table 4 continued)

Factor / Scale	6	7	8	9	10
1. Sexual Pleasure Enhancement					
2. Inconvenience					
3. Improved Prophylaxis					
4. Sexual Pleasure Inhibition					
5. Insertion Reluctance					
6. CSE	—				
7. SC1	.17**	—			
8. SC2	.23***	.22***	—		
9. MCAS	.32***	.21**	.22***	—	
10. Female Condom Usage	.05	.13	.03	.02	—

Notes: CFA factor correlations shown in the lower diagonal were estimated via the bootstrap

with 2000 replications per imputed sample, following multiple imputation of

five imputed databases used for analyses. $* = p < .05$, $** = p < .01$, $*** = p < .0001$.

$N = 218$. CSE = Condom Self-Efficacy scale; SC1 = Sexual Comfort (device insertion factor);

SC2 = Sexual Comfort (communication factor); MCAS = Male Condom Attitudes Scale.