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Evaluation of the Condom Barriers Scale for Young Black MSM: Reliability and Validity of Three Sub-Scales

Richard Crosby, PhD^{1,2,3}, Stephanie A. Sanders, PhD^{2,3,6}, Cynthia A. Graham, PhD^{2,3,7}, Robin Milhausen, PhD^{2,3,4}, William L. Yarber, HSD^{2,3,5,6}, and Leandro Mena, MD⁸

¹College of Public Health at the University of Kentucky

²Rural Center for AIDS/STD Prevention at Indiana University

³The Kinsey Institute for Research in Sex, Gender, and Reproduction

⁴Department of Family Relations and Applied Nutrition at the University of Guelph

⁵Department of Applied Health Science, Indiana University

⁶Department of Gender Studies at Indiana University

⁷Department of Psychology at Southampton University

⁸University of Mississippi Medical Center

Abstract

Background—Reliable and valid scale measures of barriers to condom use are not available for young Black MSM (YBMSM). The purpose of this study was to evaluate the Condom Barriers Scales for application with YBMSM.

Methods—A clinic-based sample of 600 YBMSM completed a computer-assisted self-interview. The primary measure was a 14-item abbreviated version of the Condom Barriers Scale. Reliability and criterion validity were assessed.

Results—All three sub-scales were reliable: partner-related barriers (Cronbach's $\alpha=.73$), sensation-related barriers ($\alpha=.70$), and motivation-related barriers ($\alpha=.81$). A complete absence of barriers was common: 47.0% (partner-related), 30.7% (sensation-related), and 46.5% (motivation-related). Dichotomized sub-scales were significantly associated with reporting *any* condomless insertive anal sex (all= $P<.001$) and *any* condomless receptive anal sex (all= $P<.001$). The sub-scales were significantly associated with these measures of condomless sex preserved at a continuous level (all= $P<.001$, except for sensation barriers associated with condomless receptive anal sex $=.03$). Further, the sub-scales were significantly associated with reporting any condom use problems (all= $P<.001$) and a measure of condomless oral sex (all= $P<.001$, except for partner-related barriers $=.31$). Finally, the sensation-related barriers sub-scale was significantly associated with testing positive for Chlamydia and/or gonorrhea ($P=.049$).

Conclusions—The three identified sub-scales yielded adequate reliability and strong evidence of validity, thereby suggesting the utility of these brief measures for use in observational and experimental research with YBMSM.

Introduction

In the United States, men who have sex with men (MSM) have the highest incidence and prevalence of HIV.^{1–3} Of MSM, the highest incident rates occur among young Black MSM^{3–6} who account for a proportion of new HIV infections that is 100 times larger than their relative population size.⁷ Approximately 25% of young BMSM (18 to 29 years of age) are infected by age 25.⁸ In February of 2016, CDC released a report estimating that 1 of every 2 Black MSM will be infected with HIV in his lifetime.⁹ Despite the recent availability of pre-exposure prophylaxis (PrEP) as a prevention strategy, the consistent and correct use of condoms remains as a highly valuable method of preventing the transmission of HIV.^{10–12}

A recently published study on condom effectiveness against HIV acquisition among men who have sex with men (MSM) provided a 70% effectiveness rate for persons self-reporting consistent use of condoms.¹³ In addition to a potential misclassification bias from self-report, the study did not correct for lack of correct use among those using condoms consistently, a key analytic step that also creates bias toward the null.^{12,14,15} Assuming 70% as a conservative estimate of effectiveness, correct condom use is nonetheless as effective to estimates of PrEP efficacy obtained in the original study of MSM (point estimate = 44%, 95% CI = 15% to 63%) or a more recent efficacy trial of PrEP among MSM (point estimate = 86%, 90% CI = 64% to 96%).^{16,17}

Much like the use of PrEP, the protective value of condoms is a function of consistent and correct use. Past research clearly indicates that perceptions about condoms and their use strongly predict consistency of condom use.^{18–20} Some of the perceptions most strongly endorsed, and those most predictive of condom use, are related to beliefs about loss of pleasure during condom-protected sex.^{21–23} Partner-related barriers to condom use have been identified among heterosexuals,^{24–26} but only one study identified these among MSM.²⁷ Similarly, motivations to use condoms have been identified as predictive of condom use among heterosexuals,²⁸ but only one study supported this association among MSM.²⁹ Clearly, these constructs represent important psychosocial mediators that can become targeted in the context of behavioral interventions promoting condom use for YBMSM. Yet, empirical studies have not tested the reliability or validity of measures designed to assess these constructs among YBMSM.

Having reliable and valid measures of the barriers to condom use, as perceived by YBMSM, is an important asset to researchers conducting observational research or experimental research testing intervention approaches that promote safer sex. A highly cited measure of these barriers is known as the Condom Barriers Scale (CBS).^{19,30,31} Unfortunately, the CBS has yet to be evaluated for use with YBMSM. Accordingly, the objective of this study was to identify sub-scales of an adapted and abbreviated version of the CBS and to test the reliability and criterion validity of these sub-scales.

Methods

Study Sample

A convenience sample of 600 YBMSM was recruited for participation from a NIH-funded randomized controlled trial (RCT) of a safer sex intervention program designed specifically for this population. For the current study, only baseline data (collected before randomization and intervention) are presented. Participant recruitment occurred in a federally supported clinic designated for the diagnosis and treatment of HIV and other sexually transmitted infections. The clinic was located in a mid-size southern city where incidence rates of HIV are particularly high. Inclusion criteria included: 1) assigned male at birth; 2) self-identification as Black/African American; 3) aged 15 to 29 years; 4) attending the clinic to be tested for HIV or other STIs, 5) having engaged in penile-anal sex with a male partner at least once in the past 6 months, and 6) the ability to speak and comprehend English.

All age-eligible Black men were approached in the clinic and asked about their interest in volunteering for an HIV prevention study. Those expressing interest were screened for eligibility. A total of 789 men were screened; of these, 623 were eligible. After being offered the opportunity to enroll, 14 declined, yielding an overall participation rate of 97.7%. Nine of the enrolled men participated only as pilot subjects leaving a sample in the trial of 600 YBMSM. All study procedures were approved by the Institutional Review Boards of the University of Mississippi Medical Center, the Mississippi State Department of Health, and the University of Kentucky.

Study Procedures

After providing written informed consent (or parental consent for those under 18 years of age) participants completed an online questionnaire using Qualtrics® (Provo, UT) in a private office not physically connected to the clinic. The questionnaire collected information relative to socio-demographic characteristics, including age, race, gender identity; sexual risk behaviors; and their sexual experiences. Also, men were evaluated for Chlamydia and gonorrhea in three anatomic locations: urethral and rectal infections were detected through nucleic acid amplification testing (NAAT) performed on a urine specimen and a rectal swab respectively; oral infections were detected through NAAT testing of an oral swab. In addition, HIV testing was performed (if not already HIV-infected) by using Clearview® Complete HIV 1/2 (Alere™) or by standard HIV test processed at the Mississippi State Department of Health Public Health Laboratory in blood specimens.

Measures

The CBS was developed for heterosexuals as a 26-item measure and it obtained strong evidence of reliability and validity.^{30,31} For brevity of assessment, we developed and employed an abbreviated and slightly altered version of the CBS that contained only 14 items. Each item was scored on a five-point Likert scale ranging from (1) "strongly disagree" to (5) "strongly agree." Because each question was worded as a barrier to condom use (see Table 1), higher scores represented greater perceived barriers to condom use.

To assess the criterion validity of the abbreviated and adapted CBS, two measures of condomless sex were also assessed. Using a 3-month recall period, men were asked how many times they had engaged in anal sex as a “top” and the next questionnaire item asked them to indicate how many of those times involved the use of a condom. The next two questions were essentially the same except they pertained to having anal sex as a “bottom.” For each pair of questions, the latter was subtracted from the former to create a distribution of condomless anal sex.

As a further test of criterion validity, a 6-item index of problems experienced during condom use was used. Again, using the recall period of the past three months, these items assessed whether condoms: broke during sex, slipped off during sex, slipped off during withdrawal, dried out during sex, were applied after sex had begun, and were removed before sex ended. Additionally, a measure of condomless oral sex (past 3 months) was used to evaluate criterion validity. Finally, whether men tested positive for Chlamydia and/or gonorrhea was used to evaluate criterion validity.

Data Analysis

Sub-scales were created by summing items which reflected St. Lawrence’s²⁸ original scale structure. Specifically, 5 items comprised the Partner-Related sub-scale, 5 items comprised the Sensation-related sub-scale, and 4 items comprised the Motivation-Related sub-scale. Inter-item reliability was tested by calculating Cronbach’s alpha. Each of the scale distributions were then assessed for normality. Due to extreme skewness each scale was then dichotomized to contrast men indicating a complete absence of barriers (zero endorsement) to all remaining men. To determine whether the analyses would require tests for a possible moderating effect of HIV status on the associations between the sub-scales and the outcome measures of condomless anal sex, chi-square tests were used to detect association between the sub-scales and HIV status.

Criterion validity was then assessed by two methods. First, using chi-square tests, the each dichotomized scale measure was evaluated as a correlate of the two measures of *any* condomless anal sex (condomless sex as a top and as a bottom). Second, using independent groups t-tests, the dichotomized scale measures were treated as the Group variable (complete absence of barriers vs. the remainder) and the two measures of condomless anal sex (preserved in continuous form) were treated as the outcomes. Next, the 6-item index of condom use problems was dichotomized to represent men without any of the 6 problems (45.2%) versus the remainder who experienced one or more problems. Next, t-tests were used to compare the mean number of times men reported having condomless oral sex in the past 3 months relative to whether they reported the absence or presence of barriers. Finally, as a possible measure of criterion validity, associations between the sub-scales and whether men tested positive for STIs at the time of assessment were tested by chi-square. Version 23.0 of SPSS was used to analyze the data, and statistical significance was determined by a P -value $< .05$.

Results

Characteristics of the Sample

Mean age was 22.62 years, (SD) = 3.2. Only a small percentage (1.5%) were under the age of 18 years. An average monthly income of less than \$1,000 was reported by 46.1%. The majority of participants (58.6%) reported they were currently employed. More than one-half of the sample (59.8%) reported having education beyond high school graduation and 47.3% reported currently enrollment in a school or college. About one-quarter (25.5%) were HIV-infected and 35.0% tested positive for one or more of the assessed STIs.

Descriptive Findings and Sub-Scale Reliability

Table 1 displays the three sub-scales that were created based on this factor analysis. The first scale shown represents Partner-Related barriers to condom use. This 5-item scale produced an alpha of .73. The second scale shown represents Sensation-Related barriers to condom use. This 5-item scale produced an alpha of .70. The third scale shown represents Motivation-Related barriers to condom use. This 4-item scale produced an alpha of .81.

As shown in Table 1, means and standard deviations for each of the items were relatively low given the possible range of 1.0 through 5.0. The low means are a reflection of the large number of men endorsing none of the perceived barriers to condom use (i.e., responding “strongly disagree” to each scale item). For the scale representing partner-related barriers to condom use, 286 (47.0%) men endorsed none of the barriers. For the scale representing sensation-related barriers to condom use, 187 (30.7%) men endorsed none of the barriers. For the scale representing motivation-related barriers to condom use 283 (46.5%) men endorsed none of the barriers.

None of the sub-scales were associated with men’s HIV status: partner-related sub-scale = .98; sensation-related sub-scale = .67; and motivation-related sub-scale = .45.

Evaluation of Criterion Validity

Table 2 displays the chi-square findings for the associations between each of the dichotomized scale measures and the two outcome measures of condomless anal sex (dichotomized as any condomless anal sex vs. no condomless anal sex). As shown, for each sub-scale each of the outcomes (any condomless anal sex as a top or as a bottom) had a significant association with the scale measure, in the direction expected to support criterion validity.

Table 3 displays the findings from the independent groups t-tests that evaluated associations between the dichotomized sub-scale measures and the two outcome measures preserved in a continuous form. As shown, each of the six t-tests indicated large differences between means (in the direction supporting criterion validity) and all of the t-values were significant.

In addition (not shown in table form), two of the three sub-scales were significantly associated with condomless oral sex. The mean frequency of condomless oral sex among men indicating an absence of sensation-related barriers was 4.88 times compared to 8.27 times among men indicating a presence of these barriers ($t = 3.21$; adjusted $df = 509.41$; $P < .$

001). The mean frequency of condomless oral sex among men indicating an absence of motivation-related barriers was 3.48 times compared to 9.16 times among men indicating a presence of these barriers ($t = 3.48$; adjusted $df = 472.30$; $P < .001$). Significant differences in means pertaining to partner-related barriers (6.56 vs. 7.82) were not observed ($t = 1.02$ $df = 524$, $P = .31$).

Also, chi-square test results indicated significant associations between the dichotomized measure of condom use problems and each of the three sub-scales. Of 286 men indicating an absence of partner-related barriers, 136 (47.6%) reported recent condom use problems compared to 190 of 309 (61.5%) men indicating the presence of partner-related barriers ($P = .001$). Of 187 men indicating an absence of sensation-related barriers, 70 (37.4%) reported recent condom use problems compared to 256 of 408 (62.7%) men indicating the presence of sensation-related barriers ($P < .001$). Finally, of 283 men indicating an absence of motivation-related barriers, 122 (43.1%) reported recent condom use problems compared to 204 of 312 (65.4%) men indicating the presence of motivation-related barriers ($P < .001$).

One of the three sub-scales was significantly associated with whether men tested positive an STI. In this analysis, of 163 men indicating an absence of sensation-related barriers, 47 (28.8%) tested positive for an STI compared to 132 of 350 (37.7%) men indicating the presence of sensation-related barriers ($P = .049$). Associations were not observed for the partner-related barriers sub-scale ($P = .78$) or the motivation-related sub-scale ($P = .44$).

Discussion

In this study of 600 YBMSM attending an STI clinic that diagnose and treat STIs, three reliable and valid sub-scales were identified for future use with this high-risk population. Reliability was adequate (Cronbach's $\alpha > .70$) for each sub-scale. More importantly, ample evidence for the criterion validity of each sub-scale was observed. Each sub-scale, for instance, was associated in the expected direction with measures of condomless insertive anal sex, condomless receptive anal sex, and condomless oral sex. Each sub-scale was also associated in the expected direction with the measure of condom use problems, thus offering further evidence of criterion validity. Because STI acquisition is a product of network factors rather than simply individual-level behaviors (e.g., condom use), an inherent bias toward the null exists when using this measure as an outcome. Despite this bias, the finding that the partner-related barriers sub-scale was significantly associated with testing positive for STIs was therefore added evidence for criterion validity.

As behavioral research increasingly becomes focused on YBMSM, researchers may find that these three sub-scales have a great deal of utility. For example, intervention studies that promote condom use may gain precision by assessing the three constructs described in this study at baseline and each follow-up time point. Favorable changes in these constructs would be strong evidence of potential program efficacy. Moreover, pre-intervention research may benefit from the assessment of these constructs. Given the observed reliability and validity of each sub-scale, these measures can serve as a needs assessment prior to intervention development.

Beyond the psychometric evaluation of these three sub-scales, the findings also have utility relative to understanding YBMSM. In this sample of 600 YBMSM it was exceedingly clear that a substantial proportion (47.0% for partner-related barriers, 30.7% for sensation-related barriers, and 46.5% for motivation-related barriers) endorsed none of the barriers on the three sub-scales. This finding suggests that many YBMSM may be favorably pre-disposed to the consistent and correct use of condoms thereby suggesting that a focus on issues such as access to, and affordability of, high-quality condoms and lubricants may be more productive than focusing on men's barriers to condom use.

Limitations

Findings are limited by the use of a convenience sample and by the validity of participant self-report. Findings must also be interrupted with the inherent limitations of a cross-sectional study design. Also, the study assessed the 14 barriers to condom use on a generic basis rather than asking participants to complete one set of assessments for main partners and another for non-main partners. Because main and non-main sexual partnerships are quite fluid in this population (with many having both) the lack of relationship type-specific evaluation is potentially problematic.

Conclusions

To our knowledge, this study is the first to evaluate the reliability and validity of an adapted and abbreviated form of the Condom Barriers Scale to the population of YBMSM. The three identified sub-scales yielded adequate reliability and strong evidence of validity, thereby suggesting the utility of these brief measures for use in observational and experimental research with YBMSM.

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Summary

A study of 600 young Black MSM identified three reliable and valid scale measures of barriers to condom use. These measure have utility for behavioral interventions.

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Table 1

Items Comprising the Three Sub-Scales and Mean Their Values and Standard Deviations

Item	Mean	SD
<u>Partner-Related Items</u>		
I won't use a condom unless my partner asks me to do so	1.53	1.05
If a guy asked me to use a condom, I would think that he didn't trust me.	1.57	1.18
If a guy asked me to use a condom, he would think I was accusing him of cheating.	1.59	1.14
If I asked my male sex partner to use a condom, he might think I was cheating.	1.87	1.38
I get turned off when my partner suggests that we use a condom.	1.41	.92
<u>Sensation-Related Items</u>		
Condoms rub and make you feel sore.	1.41	.92
Condoms don't feel good.	1.69	1.15
Condoms feel unnatural.	2.11	1.35
Condoms reduce the intensity of my orgasm.	1.90	1.33
Condoms don't fit right.	1.63	1.03
<u>Motivation-Related Items</u>		
Condoms spoil the mood.	1.57	1.08
I would get angry if my partner asked that we use a condom.	1.30	.81
I feel closer to my partner without a condom.	2.08	1.41
It is insulting to me when my partner asks if we can use a condom.	1.37	.91

Table 2

Associations Between the Dichotomized Scale Measures and the Two Dichotomized Measures of Condomless Anal Sex

Scale	n/N % condomless as top	<i>P</i>	n/N % condomless as a bottom	<i>P</i>
<u>Partner-related barriers</u>				
Zero endorsement	50/264 (18.9)	<.001	44/203 (21.7)	<.001
Presence of barriers	99/275 (36.0)		107/227 (47.1)	
<u>Sensation-related barriers</u>				
Zero endorsement	30/176 (17.0)	<.001	27/129 (20.9)	<.001
Presence of barriers	119/363 (32.8)		124/301 (41.2)	
<u>Motivation-related barriers</u>				
Zero endorsement	47/262 (17.9)	<.001	48/205 (23.4)	<.001
Presence of barriers	102/277 (36.8)		103/225 (45.8)	

n = number of men indicating condomless anal sex

N = number of men indicating endorsing no barriers or presence of barriers

Table 3

Associations Between the Dichotomized Scale Measures and the Two Continuous Measures of condomless Anal Sex

Scale	Mean as a top ¹	t-value	degrees of freedom ²	P
<u>Partner-related barriers</u>				
Zero endorsement	.56	4.29	351.40	<.001
Presence of barriers	2.00			
<u>Sensation-related barriers</u>				
Zero endorsement	.46	4.41	518.42	<.001
Presence of barriers	1.70			
<u>Motivation-related barriers</u>				
Zero endorsement	.46	4.91	334.76	<.001
Presence of barriers	2.09			
Scale	Mean as a bottom ³	t-value	degrees of freedom ²	P
<u>Partner-related barriers</u>				
Zero endorsement	.65	3.98	238.05	<.001
Presence of barriers	3.87			
<u>Sensation-related</u>				
Zero endorsement	1.22	2.17	409.40	.03
Presence of barriers	2.84			
<u>Motivation-related barriers</u>				
Zero endorsement	1.14	2.79	279.17	<.001
Presence of barriers	3.45			

¹ Mean number of condomless anal sex acts, as a top, in the past 90 days (N = 539)

² Because all of the t-tests had a failed Levine's test (indicating a lack of heteroscedasticity) the degrees of freedom reported correspond to an alternative method of calculating the t-value

³ Mean number of condomless anal sex acts, as a bottom, in the past 90 days (N = 430)