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Authors

Joseph, Heather A

Pan, Yi

Mendoza, Maria

et al.

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**8HIV Acquisition and Transmission Potential among African American Men Who have Sex  
9with Men and Women in Three U.S. Cities**

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**30Abstract**

31Black men who have sex with men and women (BMSMW) are at increased HIV risk, but few  
32efficacious interventions meet their unique needs. Three HIV prevention interventions were  
33evaluated with a common protocol. Baseline data were pooled to describe sexual behavior  
34involving transmission risk with male, female, and male-to-female transgender partners and  
35identify factors associated with transmission risk. BMSMW from Los Angeles, Philadelphia, and  
36Chicago who reported sexual risk and bisexual behavior in the past year were recruited via  
37modified chain referral sampling and community recruitment. Baseline assessments were  
38conducted via audio computer-assisted interview and sexual behaviors assessed over the past 3  
39months. From December 2010 to November 2012, 584 BMSMW were enrolled across the three  
40cities. More than half (55%) were recruited by other participants. Overall, the mean age was 43.  
41Seventy-five percent reported an annual income < \$10,000 and selling sex was prevalent (31%).  
42Three-quarters identified as bisexual. Thirty-nine percent were HIV-positive. Among HIV-  
43positive participants, 46% reported sex without condoms with HIV-negative or unknown male  
44partners and 45% with HIV-negative or unknown female partners. Overall, factors associated  
45with sex without condoms included network size, education, income, sexual orientation  
46identification, HIV status, exchange sex, homonegativity, and social support. Findings support  
47the need for enhanced HIV prevention efforts for this population. Future studies should examine  
48contextual factors in addition to individual risk behaviors to inform the development and  
49implementation of promising strategies to prevent HIV and promote the overall health and  
50wellness of BMSMW and their sexual partners.

### 53Introduction

54 African Americans have the most severe burden of HIV of all racial/ethnic groups in the  
55United States. This group accounted for 44% of all new HIV diagnoses among adults and  
56adolescents in 2015, despite comprising only 12% of the U.S. population. That year, black men  
57who have sex with men (MSM) represented 39% of new diagnoses among all MSMO (men who  
58have sex with men only) and MSMW (men who have sex with men and women) (Centers for  
59Disease Control and Prevention, 2015).

60 Some have proposed that MSMW may increase the range and diversity of social and  
61sexual networks, facilitating transmission across communities (Gorbach, Murphy, Weiss, Hucks  
62Ortiz, & Shoptaw, 2009; Zule, Bobashev, Wechsberg, Costenbader, & Coomes, 2009). While  
63there is consensus that some transmission to women does occur via MSMW, the scale and impact  
64of the “bisexual bridge” has been called into question (M. R. Friedman et al., 2016; Jeffries,  
652014). Friedman et al’s meta-analysis which included 22 studies measuring behavior over a  
66period of a year or less, suggests that a woman is just as likely to encounter an HIV-positive male  
67partner who acquired HIV either through injection drug use or sex with a female as through sex  
68with a male (M.R. Friedman, Wei, et al., 2014). The potentially unjustified media focus on the  
69relationship between black MSMW and black women’s HIV risk may divert attention from the  
70acute, specific, and unmet needs of this population (Saleh & Operario, 2009).

71 Developing a more complete understanding of the sexual behavior and HIV prevention  
72needs of black MSMW has been challenging due to limitations in the research to date. Many  
73studies do not differentiate between MSMO and MSMW. Studies enrolling both groups often  
74pool data in statistical analysis. Estimates of HIV diagnoses among MSMW have only recently

75been available through national surveillance (Singh, Hu, Wheeler, & Hall, 2014). While data  
76consistently have shown that HIV burden varies by race/ethnicity, most MSMW-focused studies  
77lack sufficient sample sizes to conduct analyses comparing or isolating determinants of risk for  
78specific racial/ethnic groups. An additional challenge lies in interpreting the growing body of  
79research involving MSMW, where there is variability in how bisexual behavior is operationalized  
80(by act and period of time measured). Self-reported bisexual orientation and bisexual behavior  
81are also sometimes conflated. In our reporting of other research, we have indicated where  
82participants were defined as bisexual based on orientation rather than behavior. Unless otherwise  
83stated, MSMW behavior was reported from the past three months to one year.

84        Though MSMW are a small proportion of the U.S. male population (0.3-1.6%) (Jeffries  
85& Dodge, 2007; Rogers & Turner, 1991), Friedman's meta-analysis estimates that 39% of MSM  
86are MSMW (M.R. Friedman, Wei, et al., 2014). Several studies have indicated that this  
87percentage may be higher among black MSM (Montgomery, Mokotoff, Gentry, & Blair, 2003;  
88Sanchez et al., 2006). In general, MSMW are less likely to be HIV-positive than MSMO, but  
89more likely to be HIV-positive than men who have sex with only women (Levin, Koopman, Aral,  
90Holmes, & Foxman, 2009; Zule et al., 2009). Surveillance data from 2011 indicate that 16% of  
91adults diagnosed with HIV were MSMW, compared to 45% who were MSMO (Singh, 2014).  
92Friedman's meta-analysis estimated the weighted mean HIV prevalence among MSMW (past  
93year) as a whole to be 21% (M.R. Friedman, Wei, et al., 2014). Studies incorporating HIV testing  
94have reported rates as high as 30-50% among black MSMW (Latkin et al., 2011; Tieu et al.,  
952012). Black MSMW may also be more likely than MSM of other race/ethnicities to have  
96undiagnosed infection (Maulsby, Sifakis, German, Flynn, & Holtgrave, 2012; Young, Shoptaw,

97Weiss, Munjas, & Gorbach, 2011). A concurrent diagnosis of HIV and AIDS has been shown to  
98be more common among MSMW than MSM (33% vs 24%) (Singh et al., 2014).

99       Apart from HIV prevalence estimates, the lived experiences of MSMW may be quite  
100different from MSMO, with implications for HIV prevention. Specific organizations, gathering  
101places, and residential areas may be less common for bisexual than for either heterosexual or  
102homosexual identified groups (Miller, Serner, & Wagner, 2005), resulting in fewer targeted  
103messaging opportunities. Furthermore, HIV prevention messages tend to reach MSM  
104populations by using norms, images, and language that largely appeal to gay-identified men.  
105Some research suggests that Black MSMW also may experience higher levels of homonegativity  
106than MSMO (Dyer et al., 2013; Jeffries, 2014). Among MSMW and MSMO of all races and  
107ethnicities, anti-gay attitudes and gay-related stigma have been found to be associated with HIV-  
108positive status and HIV-related risk behaviors (Jeffries & Johnson, 2015; Shoptaw et al., 2009).  
109Additionally, depression and lack of social support appear to more common among MSMW  
110compared to MSMO . Related to these psychosocial factors, economic marginalization may be  
111particularly acute for MSMW, who are at greater risk for poverty, unemployment, unstable  
112housing, and incarceration compared to men who have sex with women and MSMO (Dyer et al.,  
1132013; Jeffries, 2014). This translates into HIV risk; compared to Black MSMO, Black MSMW  
114may be more likely to receive money or drugs for sex (Dyer et al., 2013; Wheeler, Lauby, Liu,  
115Van Sluytman, & Murrill, 2008). Occupational health risks among male sex workers include sex  
116with multiple partners, sexual role versatility, sex with male, female, and transgender partners,  
117sex with older male partners, and reciprocal sex exchange, i.e., purchasing sex from other sex  
118workers who are themselves at high risk for HIV (Baral et al., 2015; M.R. Friedman, Kurtz, et  
119al., 2014; Millett et al., 2012).

120 It is likely that sexual behaviors differ between male, female, and transgender partners of  
121MSMW (Harawa et al., 2014). Some research suggests that MSMW practice more unprotected  
122sex with their female partners than with their male partners (Dodge, Jeffries, & Sandfort, 2008;  
123Mimiaga et al., 2009) and with primary partners compared to non-primary partners (Sanchez et  
124al., 2006; Sullivan, Salazar, Buchbinder, & Sanchez, 2009). Harawa et al noted that Black  
125MSMW who had only primary female partners had fewer male partners and were also more  
126likely to have only primary partners (Harawa et al., 2014) .

127 Despite what is known about the elevated risks among this group and their distinct  
128prevention needs, few interventions have been rigorously evaluated and demonstrated to be  
129effective for reducing risk among black MSMW (Fernandez et al., 2016; Harawa et al., 2013;  
130Williams et al., 2013). We undertook a study to better understand the sexual and HIV risk  
131behaviors of black MSMW. The overall aim of the research was to support three specific  
132intervention trials specifically developed for black MSMW. The pooled baseline data collected  
133for these trials also provided an opportunity to learn more about black MSMW sexual behavior  
134related to transmission and acquisition risk with multiple types of partners as well as proximal  
135intersectional risk factors related to the social and economic context in which many MSMW live.  
136Our research questions were: What are the frequencies of vaginal and anal sex, sex without  
137condoms, and sex without condoms involving transmission risk with male, female, and male-to-  
138female transgender partners? What factors are associated with number of episodes of sex without  
139condoms with male, female, and male-to-female transgender partners? Finally, what factors are  
140associated with the number of episodes of sex without condoms involving transmission risk with  
141male, female, and male-to-female transgender partners?

## 143 **Methods**

### 144 *Study Sample and Procedures*

145 From December 2010 to November 2012, we conducted three behavioral intervention  
146 trials for black MSMW in three U.S. cities: Philadelphia, PA, Chicago, IL, and Los Angeles, CA.  
147 The study sites developed and evaluated novel interventions specifically designed for this  
148 population; each aimed to reduce the risk of acquisition and transmission of HIV with male,  
149 female, and male-to-female transgender partners. To be eligible, participants had to be cis  
150 gendered male, black or African American, 18 years of age or older, report sex (oral, anal, or  
151 vaginal) with a man and a woman in the past 12 months, report vaginal or anal sex without  
152 condoms, and two or more vaginal/anal sex partners in the past three months. Also, because the  
153 planned interventions were developed specifically to address sexual risk reduction, those who  
154 reported injection drug use in the past 12 months were ineligible. Since the intervention tested in  
155 Los Angeles was tailored to meet the needs of recently released bisexually active men,  
156 participants in that city must have experienced incarceration in the last 12 months (defined as  
157 any time incarcerated, even less than 24 hours).

158 To recruit participants, study sites used outreach methods and a modified chain referral  
159 sampling strategy. Community recruitment involved engaging initial or index participants via  
160 print advertisements (e.g., commuter papers), Craigslist.org, and health and community agencies  
161 serving black MSMW, including AIDS service organizations. As index participants were enrolled  
162 and completed the baseline interview, they were invited to recruit up to five potentially eligible  
163 black MSMW from their social networks. Men recruited by index participants were invited to  
164 recruit up to five additional men (who were considered the second wave of participants). In



165Philadelphia and Los Angeles, the number of chain referral waves was restricted; Chicago did  
166not limit the number of waves. At the end of the baseline visit, each participant (who was eligible  
167to recruit) was offered the opportunity to recruit others into the study. Interested men were given  
168a brief training on how to approach and describe the study to potential participants. Recruiters  
169received \$10 for each individual successfully referred and enrolled into the study. Referral  
170coupons were tracked so that participants could be linked to their recruiters in the study data.

171       After a confirmatory screening for eligibility and informed consent, participants  
172completed an audio computer-assisted self interview (ACASI) that took on average 115 minutes  
173(site average ranged from 110-125 minutes). Participants received \$30-\$50 for completing the  
174baseline assessment (amount varied by site).

175

#### 176*Measures*

177       The comprehensive ACASI covered demographics, drug and alcohol use, STI/HIV  
178testing and diagnoses, psychosocial factors, and sexual behavior. Items were chosen based on  
179their theoretical relevance (as moderators and mediators) to the behavioral interventions and  
180suspected associations with transmission risk behavior.

181       Sociodemographic characteristics included age, education, annual income, history of  
182homelessness in the past 12 months, employment status, sexual orientation identification, and  
183incarceration history (defined as ever spending more than one day in jail, prison or detention  
184facility). We asked about any use of the following substances in the past three months: powdered  
185or rock cocaine, marijuana, methamphetamine, poppers, erectile medications, club drugs, heroin  
186(unspecified if injection or non-injection), or any other opiates, depressants, or stimulants that

187were not prescribed. Alcohol was measured using the 4-item RAPS measure (Cherpitel, 2000);  
188scores ranged from 0-4 and  $> 1$  was considered to indicate dependence. We measured social  
189networks by asking participants how many men they personally knew in the following non-  
190mutually exclusive categories: MSM, black MSM, and black MSMW. In addition, participants  
191were asked if they had ever disclosed their same sex behavior to anyone else (labeled as being  
192“out”). Lack of social support was measured using a 5-item scale developed for the Brothers y  
193Hermanos study (Ayala, Bingham, Kim, Wheeler, & Millett, 2012; J. L. Lauby et al., 2012)).  
194Internalized homonegativity was assessed through an 8-item scale adapted from two different  
195scales (Ross, Rosser, & Neumaier, 2008; Wagner, 2013). This scale was previously used with  
196MSMW (LaPollo, Bond, & Lauby, 2013). STI diagnoses in the past year, as well as HIV testing  
197history and most recent result were assessed. Men who were HIV-positive were asked if they are  
198“receiving regular and ongoing medical care” for their HIV infection and their last viral load.

199        Sexual behavior was measured for the prior three months. We asked participants to  
200indicate their number of male, female, and male-to-female transgender vaginal and anal sex  
201partners. Transgender partners were defined as those who were born male but now identify as  
202female or transgender/transsexual. For each partner gender, we asked participants to report the  
203number of episodes with and without condoms for the last two main and all non-main partners. A  
204main partner was defined as “someone you are both emotionally and sexually involved with.”  
205Non-main partners were all others, including sexual exchange partners. Sexual exchange was  
206defined as reporting any episode of giving or receiving “any type of payment (for example,  
207money, drugs, or a place to stay) in exchange for any type of sex.” The three separate variables  
208include: any selling of sex, any buying of sex, and both buying and selling sex. We also  
209measured disclosure of same sex behavior to female main or non-main partners. Finally, we

210report on partner HIV status; in this analysis, all participants and their partners are categorized as  
211either HIV-positive or HIV-negative/unknown. We grouped HIV-negative and unknown status  
212together because of the challenges associated with valid self-report of HIV-negative status, which  
213depends on risk behavior of the respondent and the respondent's partners since the last negative  
214test. Additionally, from a behavioral perspective, both groups may experience perceived risk for  
215HIV acquisition which may affect behavior.

216

### 217*Analysis*

218       The primary outcomes of interest were number of episodes of sex without condoms with  
219male, female, transgender, and all partners combined. We also conducted secondary analyses to  
220examine these behaviors in the context of transmission risk. For HIV-positive men, we  
221examined number of episodes of sex without condoms with HIV-negative and unknown male,  
222female, transgender, and all partners combined. For HIV-negative/unknown men, we examined  
223number of episodes of sex without condoms with male, female, transgender, and all partners  
224combined – we considered any unprotected sex among this subset as involving risk of infection.  
225We investigated associations between these outcomes and sociodemographic variables, lack of  
226social support, internalized homonegativity, and being “out” to at least one person.

227       Generalized estimating equations, with a negative binomial distribution and a log link  
228and assuming a robust variance estimator, were used to model the data. The negative binomial  
229distribution was used due to the over-dispersion in count outcomes, typically observed using a  
230Poisson process. We considered several other distributions that could account for over-  
231dispersion (i.e., zero-inflated Poisson, Hurdle-Poisson, zero-inflated negative binomial, and

232Hurdle negative binomial). The negative binomial distribution best fit our data, as evidenced by  
233graphical display, goodness of fit statistics, and allowance of over-dispersion. Compound  
234symmetry covariance structure was used to describe the correlation between individuals within  
235the same network (i.e., those referred by the same index participant or in the second wave  
236instigated by the index), indicating the correlations were presumed to be the same for individuals  
237within the same network. We first conducted a series of bivariate analyses to examine individual  
238relationships with the outcome variables. All candidate variables that had p-values  $\leq 0.2$  in the  
239bivariate model were entered into the multivariable selection. In developing a final multivariable  
240model, a backward selection was applied with a p-value less than .05 as the selection criterion.  
241Study site and HIV-status (when applicable) were retained in all models. The models produced a  
242means ratio for one or more pairs of subgroups within each independent variable, that is, the ratio  
243of the estimated average number of episodes of sex without condoms for the two subgroups  
244being compared. The analysis was conducted using the SAS GENMOD procedure in SAS  
245software, Version 9.3 of the SAS System for Windows (SAS Institute Inc., Cary, NC).

246

## 247**Results**

248 Data were collected from 584 black MSMW across the three sites; 161 from  
249Philadelphia, 211 from Chicago, and 212 from Los Angeles. The sample of black MSMW was  
250selected through a combination of community recruitment (45%) and chain referral (55%).  
251Referrals were made via friends (59%), acquaintances (23%), current sex partners (6%), and  
252former sex partners (6%). As displayed in Table 1, the mean age of the participants was 43  
253(SD=10). Approximately 75% reported their sexual orientation as “bisexual.” The sample was  
254economically vulnerable; only 20% were employed full time, 75% had incomes of less than

255\$10,000 annually, and 49% reported considering themselves homeless at some point in the past  
256year. Generally, the sample from Los Angeles was more economically marginalized than the  
257other two cities. Drug use was common and also somewhat more common in Los Angeles.  
258Across the cities, 50% reported marijuana and 34% cocaine or crack use. Heroin, opiates,  
259depressants were reported by 16%. As mentioned previously, those reporting injection drug use  
260in the past year were excluded from the study. However, in the baseline assessment, we did not  
261ascertain if heroin was snorted, smoked or injected; those reporting use of this drug may have  
262only used it non-intravenously or may not have disclosed it during the screening. About 36% of  
263the sample was classified as having alcohol dependence. Most (96%) had been tested for HIV in  
264their lifetimes; 76% in the past year. Approximately 39% of the sample had been diagnosed with  
265HIV, though prevalence varied across cities and was highest in Chicago (63%). A high  
266percentage of those diagnosed reported receiving HIV medical care (93%). Sixty-nine percent of  
267those in care reported having an undetectable viral load.

268       As shown in Table 2, most participants reported both male (94%) and female (93%)  
269partners in the past three months. About 42% reported having a transgender partner. Selling sex  
270(31%) was slightly more common than buying sex (24%), whereas an additional 17.4% reported  
271both. All participants reported sex without condoms, as this was a requirement for study  
272participation. Participants were slightly more likely to report anal sex without condoms with  
273male partners (89%) than anal or vaginal sex without condoms with female partners (83%).  
274Participants reported a mean of 3.5 male partners and 3.6 female partners. Participants also  
275reported transmission risks; 46%, 46%, and 11% of HIV-diagnosed men reported sex without  
276condoms with HIV-negative or unknown status male, female, and transgender partners,

277respectively. Among HIV-negative/unknown status men, the corresponding frequencies were  
27886%, 88%, and 36%.

279 Table 3 presents findings from the multivariable analysis among all participants for  
280number of episodes of sex without condoms with all, male, and female partners. Compared to  
281straight identified men, those who identified as “other” reported 47% fewer episodes with all  
282partners. Compared to men who identified as straight, those who identified as gay reported 2.1  
283times the number of episodes with male partners and those who identified as bisexual reported  
2842.3 times such episodes. For female partners, patterns were in the opposite direction, but were  
285not statistically significant. Compared to men who identified as straight, those who identified as  
286other reported 61% fewer episodes with female partners. Compared to HIV-negative/unknown  
287men, those who were HIV-positive reported 21% fewer episodes of sex without condoms with all  
288partners. Compared to men who did not exchange any sex, men who reported both buying and  
289selling reported 81% more episodes with all partners and 124% more episodes with female  
290partners. Finally, compared to men who reported high social support, those with low social  
291support reported 35% more episodes of sex without condoms with all partners and 44% more  
292episodes with male partners.

293 We next conducted analyses stratified by participant’s HIV status. For participants who  
294were HIV-positive, no variables remained at the .05 significance level in models for the number  
295of episodes of sex without condoms with all partners and male partners who were HIV-  
296negative/unknown. Several variables, however, were retained when examining number of  
297episodes of sex without condoms with female partners who were HIV-negative/unknown (data  
298not shown). HIV-positive men aged 50 and older reported 41% fewer episodes with HIV-  
299negative/unknown females than men aged 18-39. Compared to straight men, those who identified

300as bisexual reported 2.8 times as many episodes of sex without condoms with female partners.  
301Compared to straight men, those who identified as “other” reported 77% fewer episodes of sex  
302without condoms with female partners. HIV-positive men who had disclosed same sex behavior  
303to anyone reported 87% fewer episodes with female partners than men who had not disclosed.  
304Finally, compared to men who did not exchange any sex, men who bought sex reported 12%  
305more episodes of sex without condoms with female partners.

306       Table 4 presents results among HIV-negative/unknown participants for number of  
307episodes of sex without condoms with all, male, and female partners. For all partners, men who  
308did not have a high school diploma reported 1.48 times the number of episodes as men with at  
309least some college; men who had only a high school diploma reported 1.28 times the number of  
310episodes as men with at least some college. A similar pattern was observed among female  
311partners. Compared to straight men, those who identified as “other” reported 49% fewer episodes  
312with all partners. Compared to straight men, those who identified as gay reported 2.5 times as  
313many episodes of sex without condoms with male partners and those who identified as bisexual  
314reported 2.1 times as many episodes with male partners. The direction differed for female  
315partners. Compared to straight men, those who identified as bisexual reported 33% fewer  
316episodes of sex without condoms with female partners and those who identified as other reported  
31762% fewer episodes with female partners. Compared to men who did not exchange any sex,  
318those who bought (and did not sell) sex reported 47% more episodes and those who both bought  
319and sold reported 70% more episodes with all partners. Compared to men who did not exchange  
320any sex, men who reported both buying and selling reported 58% more episodes of sex without  
321condoms with male partners. Compared to men who reported low internalized homonegativity,  
322those with high homonegativity reported 23% fewer episodes of sex without condoms with all

323partners. Finally, compared to men who reported high social support, those with low social  
324support reported 53% more episodes of sex without condoms with male partners.

325

### 326**Discussion**

327       These findings underscore the urgent need to address HIV among black MSMW. Results  
328should be considered in light of the enrollment criteria, intentionally designed to recruit men  
329with at least some behavioral risk for intervention studies. However, the resulting sample  
330reflected significant risk over and above the behavioral criteria. The study population reported a  
331high HIV prevalence as well as high prevalence of sex without condoms and multiple partners  
332within a short time frame. We also noted sex without condoms involving transmission and  
333infection risk among both men who were HIV-positive and HIV-negative/unknown. Most men  
334who knew they were HIV-positive were in care; however, only about two-thirds reported an  
335undetectable viral load, which would significantly reduce transmission potential (Montaner et al.,  
3362010). Unrecognized infection may be more prevalent among black MSMW than other groups,  
337suggesting that both HIV-positive and HIV-negative/unknown partners represent a significant  
338source of acquisition risk (Jeffries, 2014). Most men in this sample had been tested in the prior  
33912 months; however, annual testing may not be frequent enough; some research suggests that  
340some sexually active MSM may benefit from HIV testing every 3-6 months (Finlayson et al.,  
3412011).

342       As with other studies with this population (Asare Bempong, Ramamurthi, McCuller,  
343Williams, & Harawa, 2014; J. Lauby et al., 2008), we recruited a sample characterized by  
344economic vulnerability – low employment and income, frequent substance use and exchange sex.



345The monetary incentives for participation and for recruitment may have been more compelling to  
346those with less resources and more time due to lack of formal employment. However, these  
347characteristics have been noted in other research focused on MSMW, who appear to experience  
348more economic marginalization than other men (Jeffries, 2014). Associated with economic  
349vulnerability, low educational attainment may also contribute to increased frequency of  
350condomless sex. Interventions to prevent transmission may need to acknowledge and address  
351these difficult life circumstances and ameliorate the potential negative impact of low educational  
352attainment on uptake of preventive behaviors. Additionally, sexual risk-reduction interventions  
353may need to promote risk-reduction strategies that are tailored to partner types, including those  
354involving different exchange agreements for money, drugs, and survival needs such as a place to  
355stay. Formative research on how best to address the needs for male sex workers suggests  
356incorporating harm reduction approaches, access to social services and medical care with  
357community level anti-stigma campaigns to maximize effectiveness (Baral et al., 2015). In  
358general, structural interventions, messages, and policies outside of the health sector that enhance  
359educational opportunities, counteract racism and decrease intersectional stigma of same sex  
360practices, commercial sex, and HIV-positive status, may be better suited to address the  
361underlying and intersecting forces that marginalize Black MSMW. For example, interventions  
362such as Acceptance Journey's, an anti-homophobia social marketing campaign for the black  
363community, are promising (Hull et al., 2017).

364       Several studies have compared sexual risk behaviors with male and female partners.  
365Some older studies have indicated MSMW may have unprotected sex more often with their  
366female partners than male partners (Goldbaum et al., 1998; Kalichman, Roffman, Picciano, &  
367Bolan, 1998; Wohl et al., 2002). In this sample, the frequency of reporting main female and male

368partners was similar, as was the frequency of sex without condoms and number of such episodes.  
369However, correlates of sex without condoms differed by the gender of the partner. Notably,  
370compared to HIV-negative and unknown status men who identified as straight, sexual orientation  
371identification as bisexual was associated with more risk among male partners and less risk  
372among female partners. Collectively, these findings reinforce the importance of specifically  
373addressing sexual risk with partners across the gender spectrum, including transgender partners.  
374They also reinforce the need for messages and interventions that can be tailored for MSMW with  
375a diversity of sexual partners, identities, and patterns.

376       We found low social support was associated with more episodes of sex without condoms  
377with all partners, and specifically with male partners. This finding echoes other research among  
378MSM that has associated lower levels of support with HIV risk and higher levels of support with  
379HIV testing (Carlos et al., 2010; J. L. Lauby et al., 2012; Peterson et al., 1992) and greater viral  
380load suppression (Blashill et al., 2015; M.R. Friedman et al., 2017). Friedman and others have  
381explored how viral load suppression, ART adherence, and co-occurring psychosocial factors,  
382such as depression, form a synergistic epidemic among MSM, with roots in early life adversities  
383such as sexuality-related stigma and marginalization (Blashill et al., 2015; M.R. Friedman et al.,  
3842017; Stall et al., 2003). Sexual minorities experience disparities in social support and  
385connectedness, mediating the development of harmful psychosocial outcomes (Coulter, Herrick,  
386Friedman, & Stall, 2016; Frost, Meyer, & Schwartz, 2016). However, cultivating sources of  
387social support may be particularly difficult for some black MSMW, who often face ongoing  
388marginalization from familial and religious institutions into adulthood (Dodge et al., 2008).  
389Interventions that enhance social support may be particularly effective in reducing sexual risk as

390well as generating other positive effects on holistic wellbeing (Jeffries, 2014; Williams,  
391Ramamurthi, Manago, & Harawa, 2009).

392 Other research has found that black MSM with positive gay and racial self-identification  
393reported higher levels of self-esteem, HIV prevention self-efficacy, stronger social support  
394networks, greater levels of life satisfaction, and lower levels of male gender role and  
395psychological distress compared to men who reported less positive African American and gay  
396identity development (Crawford, Allison, Zamboni, & Soto, 2002). Similarly, the psychological  
397impact of both gender role conflict and internalized homonegativity may be low self-worth or  
398value, which in turn may translate to less self-protective behavior. However, the relationship  
399between risk and internalized homonegativity may not be direct nor consistent across subgroups  
400(Halkitis et al., 2013; Mansergh et al., 2015). We found that HIV-negative and unknown status  
401men who reported more homonegative attitudes reported fewer episodes of sex without condoms  
402with all partners. It is possible that ambivalence about gay identity and same-sex attraction  
403operates differently among MSMW and MSMO. As minority stress theory suggests,  
404homonegative attitudes may promote illicit substance use and other unhealthy behaviors among  
405MSMO (Hatzenbuehler, McLaughlin, & Nolen-Hoeksema, 2008; Newcomb & Mustanski,  
4062011). Among MSMO, these maladaptive behaviors may stem from a struggle to reconcile  
407sexual behaviors with beliefs that such behaviors are morally wrong or from coping with societal  
408stigma (Jeffries & Johnson, 2015). However, for MSMW, this relationship may be reversed.  
409Homonegative attitudes might suppress maladaptive behaviors among MSMW because these  
410beliefs offer some self-validation, self-worth, and social approval derived from sex with women.  
411MSMW with internalized homophobia may also be less inclined than other MSMW to socially  
412engage with MSMO - among whom condomless sex is common (Centers for Disease Control

413and Prevention, 2013) - and, subsequently, may be less exposed to sexual risk promoting norms.  
414Additional research elucidating the influences of homonegative attitudes and gender-role conflict  
415among these populations is needed.

416       The findings from this study should be considered in the context of several limitations.  
417The sample may not be generalizable due to the non-random chain referral method. Since these  
418data are cross-sectional, we cannot draw any causal inference. Additionally, the eligibility  
419criteria included sexual risk that influenced the overall profile of the sample. Although ACASI  
420has been shown to reduce reporting bias (Langhaug, Sherr, & Cowan, 2010), we relied on self-  
421report of sexual practices and HIV status with no biological markers. Desirability bias may have  
422played a role and may have been particularly acute for HIV-positive participants reporting sex  
423with HIV-negative or unknown status partners, since this was a felony in two of the states where  
424the study was conducted. The study was originally proposed as conclusive evidence was  
425mounting regarding the effectiveness of treatment as prevention (Das et al., 2010) Given this  
426timing, the sample was not powered to model factors predictive of sexual transmission risk  
427among participants who were HIV-positive and have a detectable viral load, which is a more  
428accurate portrayal of transmission risk potential. As a matter of practice, future research should  
429incorporate viral load status when describing transmission risk.

430       The average interview time was 115 minutes, which may have been onerous for some  
431participants and led to invalid reporting to conclude the interview. Additionally, the classification  
432of serodiscordant sex and high risk behaviors did not take into account seropositioning or other  
433prevention strategies such as PrEP. Participants were asked to report behaviors separately for  
434male, female, and male-to-female transgender partners. For ease of language, we used the terms  
435male/men and female/women interchangeability and did not precisely define the terms.

436 However, we did define “transgender” in the assessment: “By transgender, we mean male-to-  
437 female, that is, those who were born male but now identify as female or as  
438 transgender/transsexual. No respondents reported any difficulty understanding this; however, the  
439 approach risks conflating gender and biological sex which may have led to some undetected  
440 error in reporting. Finally, the analytic sample includes respondents who may have been  
441 ineligible. Heroin use in the past three months was reported by 5% of the sample in the baseline  
442 assessment. However, injection drug use in the past year was an exclusion criterion. Since we did  
443 not ask about route of administration in the baseline assessment, we are unable to determine if it  
444 was injected, snorted, or smoked; those reporting use of this drug may have used it non-  
445 intravenously or may not have disclosed IDU during the eligibility screening.

446       This study contributes to the body of literature establishing that black MSMW are in need  
447 of interventions that address their high risk for HIV infection and significant social  
448 marginalization. While the overall study was primarily focused on meeting this need via the  
449 development of new individual and group interventions that focused on sexual risk, additional  
450 strategies that reach beyond individual behavior are needed. Though sexual risk behavior does  
451 contribute to these men’s risk for HIV transmission and acquisition; environmental factors also  
452 appear to contribute to increased risk (Millett et al., 2012; Millett, Peterson, Wolitski, & Stall,  
453 2006). Future studies should examine contextual factors in addition to individual risk behaviors  
454 to help inform the development and implementation of the most promising strategies to prevent  
455 HIV and enhance the overall health and wellness of black MSMW, thereby serving to enhance  
456 the health black MSMW, their sexual partners, and wider communities.

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