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HIV CARE CONTINUUM DISPARITIES AMONG BLACK BISEXUAL MEN AND THE MEDIATING EFFECT OF PSYCHOSOCIAL CO-MORBIDITIES

M. Reuel Friedman, PhD, MPH^{1,2,*}, Jordan M. Sang, MPH^{2,3}, Leigh A. Bukowski, MPH^{2,3}, Derrick D. Matthews, PhD, MPH^{1,2}, Lisa A. Eaton, PhD, MPH⁴, H. Fisher Raymond, DrPH, MPH⁵, and Ron Stall, PhD, MPH^{2,3}

¹Department of Infectious Diseases and Microbiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA

²Center for LGBT Health Research, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA

³Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA

⁴Department of Human Development and Family Studies, University of Connecticut, Hartford, CT, USA

⁵Department of Epidemiology, School of Public Health, Rutgers University, Piscataway, NJ, USA

Abstract

INTRODUCTION—Differences across the HIV care continuum between men who have sex with men and women (MSMW) and men who have sex with men only (MSMO) are emerging in recent literature but have not been comprehensively documented among Black MSM. Although MSMW have lower HIV prevalence than MSMO, they are more likely to be HIV-positive unaware and be virally unsuppressed. Explanatory factors for these differences have not previously been assessed.

METHODS—Between 2014–2016, we surveyed sexually active Black MSM 18 years old at Black Gay Pride events in six U.S. cities (n=3881), 1229 of whom either self-reported HIV-positive status or tested HIV-positive onsite. We compared HIV-positive MSMW (n=196) with HIV-positive MSMO (n=1033) by HIV-positive unaware status, HIV care uptake, and viral load suppression. We conducted multivariable logistic regressions and built a structural equation model assessing mediating effects of psychosocial co-morbidities (violence victimization, depression, polydrug use) on the relationship between MSMW status and unsuppressed virus.

RESULTS—MSMW were more likely than MSMO to be HIV-positive unaware (aOR=2.17; 95% CI: 1.58, 3.00). Among those who were HIV-positive aware (n=720), MSMW were more likely to

*Corresponding author: PO Box 7319, Pittsburgh, PA, USA, 15213. 412-383-3000 (office); 412-383-1513 (FAX). Mrf9@pitt.edu. Preliminary analyses for this manuscript appeared in substantially different form in the following poster presentation: Friedman MR, Bukowski L, Matthews DD, & Stall R. “Bi behavior, bi identity, or both? Interpreting disparities among bisexual Black men in the U.S. across the HIV prevention and care continuum: results from the POWER study.” International AIDS Conference, July 18–22, 2016 (Durban, South Africa). Poster THPED340.

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report never receiving HIV care (aOR=2.74; 95% CI: 1.05, 7.16) and to report detectable viral loads (aOR=2.34; 95% CI: 1.31, 4.19). Psychosocial co-morbidities significantly mediated ($p=.01$) the relationship between MSMW status and unsuppressed virus.

DISCUSSION—Black MSMW were less likely than Black MSMO to uptake biomedical care and secondary prevention. Bio-behavioral intervention development specific to HIV-positive Black MSMW will be most successful if psychosocial co-morbidities are also addressed.

INTRODUCTION

Trends in HIV diagnoses show an overall decrease in new infections in the U.S., with 39,513 individuals diagnosed in 2015, a 19% decline from 2005.¹ While promising, these decreases are not equal among all populations. For men who have sex with men (MSM), incidence of HIV rose 6% from 2005 to 2014. Despite representing approximately 4% of the population,² this group overwhelmingly carries the burden of the disease and comprised 67% of new infections in 2014. Black MSM are the most affected subpopulation, experiencing a 22% increase in diagnoses from 2005 to 2014.¹ To better categorize and understand disparities in HIV outcomes, Gardner et al described an HIV care continuum, wherein HIV-positive individuals are initially diagnosed; linked to HIV care; retained in HIV care; uptake antiretroviral (ART) medication; and, ultimately, achieve viral suppression.³ Black MSM who are HIV-positive are less likely to be diagnosed, linked to care, to have ever used ART, and to be virally suppressed, compared to white MSM.⁴ Even research that has examined non-representative clinical samples – where we would expect higher rates of viral suppression generally – has shown that less than 40% of Black MSM have achieved this critical indicator.⁵

Emerging research has suggested significant differences in outcomes across the care continuum between men who have sex with men only (MSMO) and men who have sex with men and women (MSMW).^{6,7} HIV diagnosis data are often collected in a manner precluding the identification of MSMW (who are aggregated alongside MSMO as MSM), though community-based samples consistently report lower prevalence rates of HIV among MSMW compared to MSMO: a recent meta-analysis estimated that MSMW were 59% less likely to have HIV than MSMO.⁸ Despite their lower HIV prevalence rates, MSMW are more likely to experience later HIV diagnoses, lower rates of viral load suppression, and potentially greater disease progression compared to MSMO. An analysis of HIV-positive MSM enrolled in the Multicenter AIDS Cohort Study demonstrated that MSMW were 1.4-fold more likely than MSMO to have unsuppressed viral load.⁷ An analysis of HIV-positive MSM using National HIV Reporting System data estimated that, compared with MSMO, a greater percentage of MSMW received an AIDS diagnosis within 1 year (5.6% higher) and 3 years (6.8% higher) of initial HIV diagnosis, suggesting that MSMW were more likely to be receive delayed HIV diagnoses and less likely to initiate and maintain ART.⁹ These differences may result from double discrimination (e.g., biphobia) conferred upon MSMW from both the gay and straight communities.^{10–12} This discrimination can lead to MSMW receiving relatively less social support than MSMO, which has been theoretically and empirically associated with their greater burden of psychosocial comorbidities, including depression, substance use, and intimate partner violence.^{13–16}

Though researchers have begun to examine differences in sexual risk behavior and psychosocial health between Black MSMW and Black MSMO^{16–18}, there is a lack of research on differences in outcomes across the HIV care continuum between these groups. Despite the large body of literature examining correlates of HIV care continuum outcomes among Black MSM, and the aforementioned evidence of psychosocial disparities, researchers have not yet attempted to assess whether differences in psychosocial comorbidities between MSMW and MSMO may help explain differences in HIV-related outcomes within Black MSM. We asked the following research questions: First, are Black HIV-positive MSMW more likely than Black HIV-positive MSMO to be HIV-positive unaware; to report never being in HIV care; to report not currently being in HIV care; to report lower uptake of ART; and to report detectable viral loads? Second, does a constellation of psychosocial health disparities (intimate partner violence; physical assault victimization; depression symptoms; and substance use) mediate the relationship between MSMW status and lower viral suppression in this population? We assessed these research questions using a large community sample of Black MSM collected over three years in six different U.S. cities.

METHODS

Sample

Data for this study comes from POWER, a serial cross-sectional, community engaged study of BMSM and Black transgender women in six U.S. cities: Atlanta, GA; Detroit, MI; Houston, TX; Memphis, TN; Philadelphia, PA; and Washington, DC). From 2014–2016, POWER utilized time-location sampling (TLS) to recruit individuals at Black Gay Pride events who: (1) were assigned male sex at birth; (2) reported having a male sexual partner in their lifetime; and (3) were 18 years or older. Overall study design and sampling strategies have been described in greater detail elsewhere.^{19,20} This study only includes those who: self-identified as “Black” or “African American”; had a current gender identity of “male”; reported past-year anal sex with other men; and reported being HIV-positive or reported being HIV-negative and consented to onsite HIV testing, whereupon results indicated HIV-positive status.

A total of 4931 surveys were completed over three years by unique participants who identified as males at birth and who were 18 years or older. We identified and excluded: 152 transgender individuals; 223 individuals who did not identify as Black; 675 individuals who either who reported no anal sex with male partners in the past year, or whose past-year sexual behavior data was missing; and 2652 individuals who declined to either report or assess their HIV status, or whose HIV-negative status was confirmed onsite. This resulted in a sample size of 1229 HIV-positive Black MSM.

Procedures

Participants completed an anonymous, behavioral health survey designed to take approximately 20 minutes. In order to assess whether individuals took the survey more than once, participants were asked a series of questions to create a unique identifier code.²¹ We identified 204 duplicated participants and included only their first response in the current

study. The behavioral health survey contained questions about HIV testing history and status: participants who responded that they were HIV-positive answered further questions related to the HIV care continuum (see measures below), while participants who self-reported HIV-negative or unknown status were offered the opportunity to receive a confidential HIV test from a local, community based organization (CBO) located onsite. CBOs utilized their own rapid HIV-testing protocol and one of three rapid HIV-tests: 1) Oraquick (OraSure Technologies, Inc., Bethlehem, PA); 2) Clearview STAT-PAK (Alere Inc., Waltham, MA); or 3) INSTI (bioLythical Laboratories, Richmond, BC). If participants accepted confidential HIV testing, they received their HIV test result and \$20. When participants declined confidential HIV testing, they were offered the opportunity to provide an anonymous OraQuick mouth swab sample for the purpose of epidemiological surveillance. Participants providing an anonymous mouth swab sample did not receive their HIV test results but did receive \$20. Participants who declined both forms of HIV testing were compensated \$10 for completion of the survey. HIV test results were anonymously linked to survey files via a unique subject ID. All study procedures were approved by the Institutional Review Board at [blinded for review].

Measures

Sociodemographics—Participants self-reported data on race, Hispanic/Latino ethnicity, age, annual income, educational attainment, and sexual identity. City and year sampled were included as covariates in multivariable models. Ethnicity, annual income <\$10,000, and age (40 years and older) were treated as dichotomous covariates in multivariable models.

MSMW status—Participants who reported one or more past-year male anal *and* one or more past-year female anal or vaginal sexual partners were classified as MSMW; those reporting one or more past-year male anal sex partners, but no past-year female vaginal or anal sex partners, were classified as MSMO.

Sexual identity—Participants were asked how they identified their current sexuality. Choices included gay/same-gender loving; bisexual; straight; and other. Based on sexual behavior and identity responses, we further classified individuals in post-hoc analyses (see below) as gay-identified MSMO (gay MSMO); gay-identified MSMW; bi-identified MSMO; bi-identified MSMW; straight-identified MSMO; straight-identified MSMW; other-identified MSMO; and other-identified MSMW.

Psychosocial comorbidities—Dichotomous measures for past-year intimate partner violence (IPV), past-year physical assault victimization, current depression symptoms (CES-D-10), and polydrug use (use, in the past three months, of two or more of the following substances: GHB, ecstasy/MDMA, prescription opiates not prescribed for them, heroin, methamphetamines, powder cocaine, crack cocaine, poppers, and marijuana) are described elsewhere in greater detail.^{16,22}

HIV-positive unaware status—Self-report and biological data were used to assess HIV-positive unaware status. HIV-positive aware status was determined if participants identified themselves as HIV-positive in the questionnaire. HIV-positive unaware status was

determined if participants received an HIV-positive test result and responded “HIV-negative,” “indeterminate,” or “I don’t know,” when asked the result of their most recent HIV test, or who responded that they had never previously received HIV test results. As per Gardner’s care continuum and its operationalization by federal entities, we considered those participants who were HIV-positive unaware to constitute a subset of the total subsample of HIV-positive MSM in our study: in this way, we could estimate the percentage of those who were HIV-positive but undiagnosed, thereby characterizing the first step in the HIV care continuum.^{3,23}

HIV care continuum measures—Participants who reported being HIV-positive aware were asked whether they had ever received HIV care (“Have you ever been seen by a doctor, nurse, or other health care provider for a medical evaluation or care related to your HIV infection?”); whether they were currently receiving HIV care (“Are you currently being seen by a doctor, nurse, or other health care provider for a medical evaluation or care related to your HIV infection?”); and whether they were currently taking ART (“Are you currently taking antiretroviral medicines to treat your HIV infection?”). Participants were given response options of yes; no; or prefer not to say. To assess viral suppression, participants were asked, “What were the results of your most recent HIV lab tests (viral load)?” Participants were given response options of undetectable; detectable, but under 10,000 copies; 10,000 – 100,000 copies; higher than 100,000 copies; don’t know; refuse to answer; and not applicable. Responses were dichotomized into undetectable vs. detectable, with other responses considered as missing.

Statistical analysis

First, we conducted chi-square analyses to assess differences in sociodemographics and psychosocial comorbidities between Black, HIV-positive MSMW and MSMO, using Fisher’s exact tests for small cell numbers ($n < 5$). Then, we conducted a brief series of multivariable logistic regressions to assess differences in HIV care continuum outcomes between MSMW and MSMO groups, adjusting for sampling differences (e.g., city and year), categories with significant chi-square differences (e.g., income), and previous research on sociodemographic predictors of viral load outcomes among HIV-positive MSM (e.g., older age, Hispanic ethnicity).⁷ Analyses predicting HIV-positive unaware status included the full sample of HIV-positive Black MSM ($n=1229$); analyses predicting HIV care uptake and viral load suppression included only those participants who were HIV-positive aware ($n=720$). A parallel set of post-hoc multivariable logistic regression analyses contrasted HIV care continuum outcomes across sexual identity/behavior categories, using gay-identified MSMO as the reference group.

We then built a structural equation model (SEM) to examine pathways between MSMW status and detectable viral load. Following previous research on bisexual health disparities^{16,24}, we constructed an SEM assessing total, direct and indirect pathways between MSMW status, socioeconomic status, psychosocial comorbidities, and detectable viral load, adjusting for age, Hispanic ethnicity, income, education, and city and year sampled, reporting beta coefficients and observed information matrix (OIM) standard errors. Latent variables in this model were created for socioeconomic status (comprised of annual

income and educational attainment) and psychosocial co-morbidity (comprised of physical assault, IPV, polydrug use, and depression symptoms). We conducted sensitivity analyses for absolute model fit, applying a threshold of $<.08$ for standardized root mean square residual (SRMR) before interpreting results.²⁵ Based on results from this model, we conducted a post-hoc analysis, constructing an SEM to test for serial mediation by deconstructing the latent psychosocial comorbidities variable in order to assess 1) the mediating effects of violence victimization (IPV and physical assault) on the relationship between MSMW status and psychosocial state (depression symptoms and polydrug use); and 2) the mediating effects of violence victimization on the relationship between MSMW status and psychosocial state (depression symptoms and polydrug use). Because we sought to test predefined theoretical models, we did not compare relative fit indices across iterative models. Analyses were conducted using Stata (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP).

RESULTS

In the overall sample of 1229 HIV-positive, sexually active Black MSM, 720 (58.6%) were aware of their HIV-positive status. Table 1 shows that 1033 (84.1%) participants reported sex with men only, and 196 (15.9%) reported sex with both men and women. There were no significant differences between these groups in older age, Hispanic ethnicity, and city or year sampled. There were marginally significant differences ($p<.10$) in educational attainment between these groups, with lower proportions of MSMW reporting achieving college and graduate degrees. Significantly higher proportions of MSMW reported annual incomes of less than \$10,000 (32.1% vs. 20.3%). MSMW and MSMO varied significantly by sexual identity, with greater proportions of MSMW identifying as bisexual (47.4% vs. 7.8%) and smaller proportions identifying as gay (49.5% vs. 90.8%). MSMW were significantly more likely than MSMO to report experiencing IPV (33.7% vs. 17.7%), physical assault (28.1% vs. 15.8%), depression symptoms (32.5% vs. 25.0%), and polydrug use (15.8% vs. 7.8%).

Results from multivariable logistic regressions adjusted for sociodemographics are shown in Table 2. HIV-positive MSMW were significantly more likely than HIV-positive MSMO to report being unaware of their HIV-positive status (56.4% vs. 38.3%; aOR=2.17; 95% CI: 1.58, 3.00). Black MSMW constituted 11.8% ($n=85$) of the total number of HIV-positive, sexually active Black MSM aware of their HIV status in this sample ($n=720$). In this sub-sample of HIV-positive aware Black MSM, MSMW were significantly more likely than MSMO to report never accessing HIV-related care (7.1% vs. 3.3%; aOR=2.74; 95% CI: 1.05, 7.16) and to have a detectable viral load (31.5% vs. 15.5%; aOR=2.34; 95% CI: 1.31, 4.19). There were no significant differences between these groups in current HIV care or ART uptake. Low-income status and younger age significantly predicted unknown-positive and detectable viral load (p -values $<.05$; data not shown); sociodemographic characteristics were not otherwise associated with HIV care continuum outcomes.

Table 3 shows total and indirect effects of the relationship between MSMW status and detectable viral load among Black, sexually active, HIV-positive aware MSM. In a structural equation model accounting for sociodemographics, city, and year sampled, the total effect of MSMW status on detectable viral load was $\beta=0.16$ ($p=.001$). Table 3 also shows that

MSMW status significantly predicted ($\beta=0.17$; $p<.001$) the latent psychosocial comorbidities mediating variable (composed of IPV, physical assault, depression symptoms, and polydrug use).

Psychosocial co-morbidities were marginally associated with detectable viral load ($\beta=0.09$; $p=.07$), and explained 12.9% (95% CI: 6.7%, 14.5%) of the relationship between MSMW status and detectable viral load, constituting a significant indirect effect ($\beta=0.02$; $p=.01$). The SEM had an SRMR <0.03 , achieving the absolute model fit threshold of <0.08 .

Pathways showing total and indirect effects of the relationships between MSMW status, psychosocial comorbidities, and detectable viral load are shown in Figure 1.

Appendix 1 shows frequencies and adjusted odds ratios of HIV care continuum outcome by sexual identity/behavior groups among sexually active, HIV-positive Black MSM in this sample. Compared with gay-identified MSMO, bi-identified MSMO (aOR=2.01; 95% CI: 1.26, 3.19), gay-identified MSMW (aOR=1.77; 95% CI: 1.15, 2.72), and bi-identified MSMW (aOR=2.99; 95% CI: 1.88, 4.75) were significantly more likely to be HIV-positive unaware. In the sample of those who were HIV-positive aware, bi-identified MSMW (aOR=4.67; 95% CI: 1.22, 17.89) were significantly more likely than gay-identified MSMO to report never receiving HIV care. Both gay-identified MSMW (aOR=2.42; 95% CI: 1.16, 5.05) and bi-identified MSMW (aOR=2.46; 95% CI: 1.05, 5.79) were more likely than gay-identified MSMO to report having unsuppressed viral loads. Appendix 2 shows total and indirect effects of the pathways between MSMW status, violence victimization (IPV and assault), psychosocial state (polydrug use and depression symptoms), and detectable viral load in a serial mediation SEM. In this model, the total effect of MSMW status on detectable viral load was significant ($\beta=0.16$; $p<.001$). MSMW status had a significant total effect on violence victimization ($\beta=0.17$; $p<.01$) and psychosocial state ($\beta=0.05$; $p<.05$). Violence victimization had a significant total effect on psychosocial state ($\beta=0.17$; $p<.001$), and significantly mediated the relationship between MSMW status and psychosocial state ($\beta=0.03$; $p<.05$). Psychosocial state was significantly associated with detectable viral load ($\beta=1.10$; $p<.05$) but did not contribute a significant indirect effect on the relationship between MSMW status and detectable viral load.

DISCUSSION

Our findings provide further evidence that, in the U.S., behaviorally bisexual men (MSMW) who are HIV-positive are less likely than men who have sex with men only (MSMO) who are HIV-positive to uptake biomedical care and secondary prevention. Differences between these groups were not small: MSMW were more than twice as likely to be HIV-positive-unaware; almost three times as likely to have never obtained HIV care; and 2.3 times as likely to be virally unsuppressed. These results align with other recent studies that show significant HIV-related health disparities among HIV-positive MSMW, including lower viral load suppression, higher rates of psychosocial co-morbidities, and poorer health outcomes.^{5,7,9,26} Our study adds valuable information to the literature by analyzing HIV care continuum disparities entirely within a population of Black MSM. Moreover, our findings that psychosocial co-morbidities (violence victimization, depression symptoms, and

substance use) contribute substantially to HIV care continuum disparities among Black, sexually active, HIV-positive MSMW provide important explanatory factors for these disparities and indicate potential areas for interventions intended to improve HIV-related health outcomes and reduce transmission risk in this population.

The majority (56.4%) of sexually active, HIV-positive Black MSMW in this sample reported being unaware of their HIV status. Black MSMW were 2.2-fold as likely as Black MSMO to be HIV-positive unaware, even though a substantial proportion of MSMO (38.3%) were also unaware of their HIV-positive status. Given HIV incidence rates of over 4% among Black MSM in general, and even higher rates among young Black MSM, these data underscore a profound need for the design, implementation, and evaluation of targeted, engaging, and routine HIV testing services for this population.^{19,27} Our findings also demonstrate that HIV care continuum outcomes are particularly disparate among men who both identify and behave bisexually, highlighting the need to more effectively target HIV prevention, testing, and care services for Black bisexual communities. In particular, it is essential that HIV testing and early HIV identification interventions be developed specifically for Black bisexual men. Culturally congruent interventions, built to acknowledge the barriers that biphobia, racism, and HIV stigma present to Black bisexual men's disclosure of same-gender sexual behavior to health care providers, are most likely to be effective in increasing their uptake of HIV testing.^{28,29}

Previous research on psychosocial health conditions among Black MSM (including those who are HIV-negative) sampled by POWER has found that MSMW experience significantly higher rates of violence victimization, depression symptoms, and polydrug use than MSMO.¹⁶ These disparities were explained in part by their relatively lower rates of gay community support; gay community support, in turn, was significantly associated with lower rates of sexuality disclosure to family, friends, and health care providers, among others.¹⁶ Previous research on HIV-positive MSM in general has found that psychosocial health disparities, including depression and polydrug use, are strongly associated with poorer ART adherence and viral load suppression.^{26,30} Social support, however, may modify the effects of psychosocial co-morbidities on HIV care outcomes, and may be particularly beneficial for HIV-positive MSMW, especially those who are Black.^{31,32} This study shows that the higher rates of physical assault victimization, intimate partner violence victimization, depression symptoms, and polydrug use experienced by HIV-positive Black MSMW are significant indirect contributors to their greater likelihood of being virally unsuppressed than HIV-positive Black MSMO. It is likely that social stigma particular to bisexual identity, bisexual behavior, and their intersection, coupled with few community opportunities for bisexuality-specific social support,³² creates conditions for violence to occur, for depression to develop, and for substance use to persist as a form of coping.¹¹

Though few interventions for bisexual men, including those who are Black, were designed and evaluated during the first 30 years of the HIV/AIDS epidemic, in recent years promising pilot interventions have been evaluated and shown to be effective in reducing HIV-related risk behavior among Black MSMW.^{28,33,34} However, there remains a lack of rigorously evaluated interventions designed specifically to assist sexually active, HIV-positive, Black MSMW in navigating the HIV care continuum, which are essential in the Treatment as

Prevention (TasP) era. Furthermore, interventions intended to reduce social stigma (e.g., biphobia) among bisexual men, the theoretical distal cause of HIV-related health disparities, have not yet been implemented and evaluated, nor have interventions been designed and fielded on any broad scale that attempt to reduce psychosocial health disparities such as depression, polydrug use, and violence victimization that are implicated in poorer HIV-related outcomes among behaviorally bisexual men, including those who are Black. In addition, our findings related to income differences between MSMW and MSMO provide further evidence that bisexually-behaving men face socioeconomic disparities. To date, researchers have suggested pathways for income-related disparities among bisexual males, including lower school attachment³⁵ and higher rates of school-related violence,³⁶ which confer structural barriers to educational attainment that may lead to lower income in adulthood.³⁷ We note that income was an independent predictor of viral load in our models and recommend that interventions remediating sequelae of structural stigma, such as education, employment, and health care access, may help remediate HIV care continuum disparities among Black bisexual men.

Our results are subject to limitations. First, our sampling strategy was chiefly one of convenience, limited to men who attended Black Gay Pride events, and thus may not generally represent the population of HIV-positive, sexually active Black MSM in the U.S. Second, we did not make additional efforts to sample bisexual men; it is likely that some bisexual men who are less affiliated with predominately gay social scenes (such as those who are heterosexually-identified) were not well represented in this sample. Third, our HIV care continuum measures, including self-reported HIV-positive status, HIV care uptake, and viral load suppression, were not confirmed by additional onsite testing or medical records extraction, national or state HIV/AIDS surveillance systems, or viral load testing, respectively; due to social desirability bias, our reliance on self-report likely overestimates the extent of the sample that has received HIV care and is virally suppressed. These factors also increase the likelihood that our sample overestimates the true extent of those who are HIV-positive-unaware; our approach attempted to mitigate this limitation by assessing HIV care, ART uptake, and viral load outcomes only for those participants identifying as HIV-positive aware. Because our results related to HIV care uptake, ART uptake, and viral suppression are subject to substantial information and recall biases, these findings should be interpreted with caution. Finally, because this was a serial cross-sectional sample rather than a prospective cohort study, we were unable to examine the mediating effect of psychosocial co-morbidities temporally on the relationship between bisexual behavior and viral load suppression.

Since the beginning of the epidemic, men who have sex with men have disproportionately borne the burden of HIV in the United States. This trend continues today, with significant disparities for Black MSM in incidence, prevalence, and care outcomes. Even more marginalized are Black MSMW, who experience greater stigma and barriers to HIV prevention, testing, and care. Our findings, showing that a higher burden of psychosocial co-morbidities help explain HIV care continuum disparities among Black MSMW, have significant implications for HIV care continuum strategies and highlight the urgent need for dedicated intervention development across HIV testing and care for this population. Additionally, these findings illuminate that to some extent Black MSMW may be driving

overall disparities in HIV care outcomes among HIV-positive Black MSM. Reducing stigma and advancing the care continuum to reach those who are most marginalized is necessary in reducing disparities and the impact this disease has on the lives of Black MSM and the communities in which they live.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Total and indirect path coefficients between bisexual behavior, psychosocial morbidity, socioeconomic status, and detectable viral load among HIV-positive aware men in POWER, 2014—2106 (n=720).

***= $p < .001$; **= $p < .01$; *= $p < .05$; $t = p < .10$. Solid lines represent significant total effects pathways at $p < .05$. Dashed lines represent marginally significant total effects pathways at $p < .10$. Plain text represents total effects path coefficients; italicized text represents indirect effects path coefficients. Pathways show beta-coefficients and observed information matrix standard errors (parenthesized). Effects for covariates (age, year, city, Hispanic ethnicity, socioeconomic status) suppressed from figure for interpretability. SRMR=.027.

Table 1

Sociodemographics and psychosocial comorbidities among sexually active, Black HIV-positive MSMW and MSMO in POWER, 2014–2016 (n=1229).

		MSMW (196)	MSMO (1033)	Chi-square
Sociodemographics				
Income <\$10,000		61 (32.1%)	208 (20.3%)	12.98 ***
Age >40		51 (26.6%)	219 (21.3%)	2.64
Hispanic ethnicity		6 (3.1%)	35 (3.4%)	0.05
Education				12.06 ^f
	Never attended school	7 (3.6%)	26 (2.5%)	
	8 th grade or less	5 (2.6%)	15 (1.5%)	
	Some high school	10 (5.2%)	30 (2.9%)	
	High school degree/GED	53 (27.3%)	209 (20.3%)	
	Some college/technical degree/associate's degree	64 (33.0%)	417 (40.6%)	
	Bachelor's degree	42 (21.6%)	233 (22.7%)	
	Graduate school	13 (6.7%)	98 (9.5%)	
City				7.05
	Philadelphia, PA	32 (16.3%)	122 (11.8%)	
	Houston, TX	45 (23.0%)	249 (24.1%)	
	Washington, D.C.	32 (16.3%)	208 (20.1%)	
	Detroit, MI	35 (17.9%)	143 (13.8%)	
	Atlanta, GA	47 (24.0%)	290 (28.1%)	
	Memphis, TN	5 (2.6%)	21 (2.0%)	
Year				3.23
	2014	55 (28.1%)	358 (34.7%)	
	2015	73 (37.2%)	353 (34.2%)	
	2016	68 (34.7%)	322 (31.2%)	
Sexual identity				171.15 ***
	Gay	97 (49.5%)	938 (90.8%)	
	Straight	2 (1.0%)	4 (0.4%)	
	Bisexual	93 (47.4%)	81 (7.8%)	
	Other	4 (2.0%)	10 (1.0%)	
Psychosocial morbidities				
Intimate partner violence		66 (33.7%)	182 (17.7%)	26.21 ***
Physically assaulted		55 (28.1%)	163 (15.8%)	16.86 ***
Depression symptoms		63 (32.5%)	256 (25.0%)	4.75 *
Polydrug use		31 (15.8%)	80 (7.8%)	12.99 ***

=p<.001;

**
=p<.01;

*
=p<.05;

^t_{=p}<.10. Fisher's exact test was used in categories where cell counts<5; corresponding values shown.

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Table 2

Multivariable logistic regressions showing adjusted odds ratios (aOR) of Black HIV-positive MSMW and MSMO across the HIV care continuum, POWER study (2014—2016).

HIV care continuum	HIV positive MSM	MSMW (196)	MSMO (1033)	aOR (95% CI)
HIV-positive unaware		110 (56.4%)	395 (38.3%)	2.17 (1.58, 3.00)
	HIV-positive aware MSM	MSMW (85)	MSMO (635)	
	Never in care	6 (7.1%)	21 (3.3%)	2.74 (1.05, 7.16)
	Not currently in care	8 (9.4%)	36 (5.7%)	1.98 (0.87, 4.48)
	Not on ART	8 (10.3%)	53 (8.7%)	1.20 (0.51, 2.79)
	Not virally suppressed	23 (31.5%)	90 (15.5%)	2.34 (1.31, 4.19)

Adjusted for Hispanic ethnicity, income, city, year, age 40.

Bold aOR values indicate significance at $p < .05$.

Table 3

Total and indirect path coefficients and standard errors in pathways between bisexual behavior and detectable viral load among HIV-positive aware Black MSM in the POWER study, 2014—2016 (n=720).

Pathways to reporting detectable viral load			
Predictors and covariates	Total effects		Indirect effects in model adjusting for mediator (psychosocial morbidities)
	β (SE β)	p	β (SE β)
MSMW	0.16 (0.05)	0.001	0.02 (0.01)
			0.013
			12.9% (6.7%, 14.5%)

Model adjusted for year, city, socioeconomic status, Hispanic ethnicity, and age 40. SRMR=.027.