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Sexual Orientation, HIV Vulnerability-Enhancing Behaviors and HIV Status Neutral Care Among Black Cisgender Sexual Minority Men in the Deep South: The N2 Cohort Study

Redd Driver^{1,2,3}, John A. Schneider^{4,5,6,7}, DeMarc A. Hickson⁸, Liadh Timmins⁹, Russell A. Brewer⁴, William C. Goedel¹⁰, Dustin T. Duncan^{1,3}

¹HIV Center for Clinical and Behavioral Studies at New York State Psychiatric Institute and Columbia University, New York, NY, USA

²Department of Psychiatry, Columbia University, New York, NY, USA

³Department of Epidemiology, Columbia University Mailman School of Public Health, New York, NY, USA

⁴Department of Medicine, University of Chicago, Chicago, IL, USA

⁵Department of Public Health Sciences, University of Chicago, Chicago, IL, USA

⁶Chicago Center for HIV Elimination, University of Chicago, Chicago, IL, USA

⁷Crown School of Social Work, University of Chicago, Chicago, IL, USA

⁸Us Helping US, People Into Living, Inc, Washington, D.C., USA

⁹School of Psychology, Swansea University, Swansea, Wales, UK

¹⁰Department of Epidemiology, Brown University School of Public Health, Providence, RI, USA

Abstract

Black sexual minority men (SMM) in the Deep South are heavily impacted by HIV; yet studies fail to consider discordance across aspects of sexual orientation (i.e., identity, attraction, behavior) or how a lack of concordance enhances vulnerability to HIV. We sought to explore the overlap across aspects of sexual orientation and examine associations between each aspect and the number of sexual partners who engaged in HIV vulnerability-enhancing behaviors, and HIV prevention and care outcomes. A total of 204 Black SMM completed surveys, reporting their sexual identity, attraction, and behavior (i.e., sex with men only vs. sex with men and women), number of

[✉]Redd Driver, ld2996@cumc.columbia.edu.

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Ethical Approval Ethics approval for the present study was provided by the New York University Grossman School of Medicine's institutional review board. Columbia University Mailman School of Public Health's institutional review board provided ethical approval for secondary analysis.

Informed Consent All participants provided written informed consent to participate in all study activities.

condomless sex or transactional sex (e.g., buyers vs. sellers) partners in the past 6 months, and adherence to pre-exposure prophylaxis (PrEP) or antiretroviral therapy (ART) among users. Less than one in four participants (22.5%) reported overlap in same-sex sexual orientations, while 17.1% of bisexual men reported overlap across aspects. In multivariable models, differences were found in how aspects of sexual orientation were associated with the number of partners who bought or sold sex; as well as how often participants tested for HIV in the past 12 months. Results suggest different aspects of sexual orientation have implications for addressing HIV among Black SMM in the Deep South.

Resumen

Los hombres negros de minorías sexuales (SMM) en el Sur Profundo de los Estados Unidos se ven gravemente afectados por el VIH; sin embargo, los estudios no suelen considerar la discrepancia entre los diferentes aspectos de la orientación sexual (es decir, identidad, atracción, comportamiento) o cómo la falta de concordancia aumenta la vulnerabilidad al VIH. Buscamos explorar el grado de concordancia entre los aspectos de la orientación sexual y examinar las asociaciones entre cada aspecto y la cantidad de parejas sexuales que se involucraron en comportamientos que incrementan la vulnerabilidad al VIH y los resultados de la prevención y atención del VIH. Un total de 204 hombres negros de SMM completaron encuestas sobre su identidad sexual, atracción y comportamiento (es decir, sexo solo con hombres frente a hombres y mujeres), número de parejas sexuales sin condón o sexo transaccional (p. ej., compradores frente a vendedores) en los últimos seis meses, y la adherencia a la profilaxis previa a la exposición (PrEP) o la terapia antirretroviral (TAR) entre los que utilizan estas tecnologías médicas. Menos de uno de cada cuatro participantes (22.5%) reportaron concordancia entre los distintos aspectos de la orientación sexual, mientras que el 17.1% de los hombres bisexuales reportaron concordancia en todos los aspectos. Utilizando modelos multivariados, se encontraron diferencias en el grado de asociación entre los diferentes aspectos de la orientación sexual y el número de parejas que compraron o vendieron sexo, así como entre los distintos aspectos de la orientación sexual y la frecuencia con la que los participantes se hicieron la prueba del VIH en los últimos 12 meses. Los resultados sugieren que diferentes aspectos de la orientación sexual tienen implicaciones para abordar el VIH entre los SMM negros en el Sur Profundo.

Keywords

Sexual orientation; Black sexual minority men; HIV; Sexual health; Status neutral care

Introduction

In the United States (US) Deep South, the belt of southern states stretching from North Carolina to Texas, the HIV burden is among the highest in the world [1, 2]. The Department of Health and Human Services set forth guidelines for the Ending the HIV Epidemic (EHE) initiative in the US in 2019 [3]. The EHE initiative aims to reduce new HIV infections by 90% by 2030 through the scale up of key prevention and care strategies [3]. Yet, many parts of the Deep South with substantial concentrations of HIV infection remain under-resourced, limiting the success of achieving EHE goals [1]. In this region, HIV incidence among Black residents is eight times greater than for white residents [1]. Black SMM account

for nearly a third of new diagnoses in the region [1], a stark estimate given that Black SMM make up approximately 8.9% of the US population [4]. By contrast, HIV testing and uptake of evidence-based HIV prevention strategies including pre-exposure prophylaxis (PrEP) remains low among this population [1]. In 2020, Black SMM eligible for PrEP made up only 9% of PrEP users relative to white SMM at 66% [5]. Uptake and use of PrEP in the Deep South is also lower than in any other US region [1].

Because Black SMM are not a monolith, treating this population as homogeneous when addressing sexual orientation-related health risks and inequities such as HIV can negatively impact prevention and care efforts [6–9]. Shifting the trajectory of the HIV epidemic among Black SMM in the Deep South requires, in part, an understanding of the variation that exists between the cognitive (i.e., identity), affective (i.e., attraction) and behavioral (i.e., sex with men only versus sex with men and women) aspects of sexual orientation [10] to better inform strategies for meeting EHE goals. Studies among Black SMM demonstrate that men have different health needs depending on their sexual orientation, usually defined by sexual identity [11, 12]. The difference in health needs highlights the critical need for researchers to move past the overreliance on broad categories and focus on specific groups of SMM when addressing sexual-orientation related health issues [13]. Moving beyond overused, broad terms requires an understanding of the overlap in the different aspects of sexual orientation and how each aspect impacts sexual orientation-related health risks among SMM.

Sexual Orientation in the Deep South

Sexual orientation refers to the enduring pattern of sexual or romantic desires for, and relationships with, people of particular gender identities [10]. Sexual orientation can be defined in terms of a person's sexual identity, sexual attraction, or sexual behavior. Viewed as an outcome of complex social, cultural and historical processes rooted in power dynamics [14], sexual identity does not necessarily align with other aspects of sexual orientation. Cultural expectations linked to the identity aspect of sexual orientation are suggested to impact identifying as a sexual minority in the Deep South [15]. Behavior, whether men have sex with men only or with both men and women, is another aspect of sexual orientation often used in sexual orientation-related health research. The use of the behavior aspect alone may obscure sexual health vulnerability. In investigations of sexual orientation-related health issues, using only behavior to define sexual orientation (1) assumes that sex is always defined as anal, which is not always the case among SMM [16] and (2) fails to consider the influence of social factors [13], such as the role that intersectional stigmas play in exacerbating sexual orientation-related health inequities among Black SMM [17]. Terminology such as “MSM” or men who have sex with men also stigmatizes the population as it communicates negative messages about men placed in the category and pathologizes behavior [13]. Sexual attraction is rarely assessed in investigations of Black SMM's sexual orientation-related health research. The lack of inclusion limits our understanding of the influence attraction may have on Black SMM's health.

For Black SMM in the Deep South, discordance among the different aspects of sexual orientation may be exacerbated by cultural expectations of sexuality. Consistent with the minority stress theory [18] and the intersectionality framework [19, 20], Black SMM in the

Deep South often contend with social and structural stressors resulting from co-constituted and interlocking power structures of oppression from outside the Black community [21], as well as within the Black community because of their multiple stigmatized identities [22]. Studies among Black SMM suggest several culturally influenced factors that are associated with sexual orientation including homophobia, biphobia, HIV-related stigma, religiosity, and gender expectations [2, 17, 23–25], which may be more pronounced in the southern United States [15]. In turn these stressors may influence micro-level factors including engaging in behaviors that enhance HIV vulnerability or concealing sexual orientation, which may impact access and uptake HIV prevention and care efforts [26].

Sexual Orientation-Related HIV Vulnerability Among Black SMM

Studies among SMM provide evidence of differences in HIV vulnerability based on sexual orientation. When assessing sexual orientation by identity, bisexual men are suggested to be uniquely vulnerable to HIV and other sexually transmitted infections (STIs) [7]. Among the numerous factors associated with this risk, stigma and discrimination are cited as playing a significant role [27], a finding consistent with the experience of minority stress [18]. Studies investigating associations between sexual orientation and HIV-related outcomes also suggest that bisexual men and men who report having sex with men and women, regardless of sexual identity, tend to have worse risk profiles and more health issues than other SMM, and are less likely to engage in practices that reduce HIV vulnerability [12, 28]. However, the limited prior research among Black bisexuals or men who have sex with men and women has primarily focused on studying these populations as potential vectors of HIV transmission [29, 30]; linking the spread of disease from SMM to women, while failing to investigate the unique health needs of these men [31]. Focusing blame on Black bisexual men or men who have sex with men and women for the spread of HIV among Black women obscures the focus of reducing HIV within both populations, hindering progress in meeting EHE goals. Studies highlight several factors including condomless sex, early sexual debut, transactional sex, and the risk profiles of their sex partners as impacting the sexual health of men who have sex with men and women, indicating the unique vulnerability to HIV among these men [31]. Thus, an understanding of the divergence in aspects of sexual orientation among Black SMM in under resourced areas of the Deep South can inform interventions to improve HIV prevention and care.

The Current Study

The present study sought to explore the divergence across three aspects of sexual orientation (i.e., identity, attraction, behavior) among Black SMM in the Deep South and to investigate potential associations between aspects of sexual orientation, the number of sexual partners with whom participants engaged in HIV vulnerability-enhancing behaviors (i.e., condomless sex, selling vs. buying transactional sex) and engagement in HIV prevention and care practices (e.g., HIV testing, PrEP and antiretroviral therapy (ART) adherence). Informed by the minority stress model [18], the intersectionality framework [19] and consistent with previous research [28, 32], we hypothesized that there are significant differences in the endorsement of sexual orientation across measures of identity, attraction and behavior among Black SMM in the Deep South. We also predicted that associations between sexual orientation and HIV-related outcomes would differ across aspects of sexual orientation. That

is, the identity aspect would demonstrate associations inconsistent with the attraction and behavior aspects of sexual orientation, primary for bisexual identity, attraction to men and women, and having sex with men and women.

Method

Data Collection

Data used in the present study are from the baseline wave of the Deep South sites of the Neighborhoods and Networks (N2) Cohort Study. N2 is a prospective longitudinal study of Black gay, bisexual, and other SMM in Chicago, IL, and the Deep South. The N2 study has been described in detail elsewhere [33]. Briefly, for the Deep South sites, data collection began in August 2018 in New Orleans, LA, October 2018 in Jackson, MS, and April 2019 in Baton Rouge, LA. Data collection across sites ended between September 2019 and February 2020. Inclusion criteria for participants at the Deep South sites included: (a) identifying as African American or Black; (b) assigned male sex at birth; (c) residing in the metropolitan statistical area (MSA) of each site; (d) reporting at least one sexual encounter with another man or a transgender woman in the past 12 months; (e) not planning to move from the MSA during the study period; and (f) aged 18 years and older. Those meeting the inclusion criteria who provided consent were enrolled into the study and assessed every 6 months over a 1-year follow-up period for a total of three assessments.

For each assessment, participants completed interviewer-administered audio computer-assisted surveys and were tested for bacterial STIs (i.e., syphilis, gonorrhea, chlamydia). Participants also received an HIV test, with pre- and post-test counseling, at baseline and during subsequent visits for those who previously tested negative. Participants testing positive for HIV or other STIs at any assessment were linked to appropriate care and support. Participants were compensated \$20 for each hour of study participation. Ethical approval for the study was obtained from the New York University Grossman School of Medicine's institutional review board. Columbia University Mailman School of Public Health's institutional review board provided ethical approval for secondary analysis.

The initial sample included 209 individuals. However, five participants who identified as either transgender or non-gender conforming were removed from the dataset given the low power to conduct meaningful analysis among these groups, resulting in a final sample of 204 Black cisgender SMM. Participants in New Orleans ($n = 139$) and Baton Rouge ($n = 19$) were recruited through service projects and events in partnership with a local community-based organization at each site, and by advertising the study through community partners providing services for Black SMM. For the Jackson site ($n = 46$), participants were primarily recruited from two cross-sectional studies: (1) the Minority AIDS Research Initiative 1.0 and (2) a study examining GPS-defined neighborhood contexts associated with drug use and HIV infection among Black SMM. Participants in Jackson were also recruited through service projects held by a partnering community-based organization.

Measures

Sexual Orientation—Three aspects of sexual orientation were measured as participant variables: sexual identity, sexual attraction, and sexual behavior. We measured sexual identity with the following question “Do you think of yourself as:” with participants indicating their identity as either gay, bisexual, straight or other. Consistent with previous research [12] and due to a low number of participants identifying as straight or other, these categories were combined for all analyses.

To assess sexual attraction, participants responded to the following item, “People are different in their sexual attraction to other people. Which best describes your feelings?” Responses were provided on a five-point scale (1 = only attracted to females, 3 = equally attracted to males and females, 5 = only attracted to males). For analytic purposes, we recoded responses by combining the “only attracted to” and “mostly attracted to” responses resulting in two categories: attracted to males and equally attracted to both. Only eight participants fell into the category of “attracted to females” and were thus not included in analyses. This item was reverse coded to align with the other two sexual orientation variables (e.g., aligning the responses of identifying as gay, only having sex with men, and being attracted to men).

Sexual behavior was assessed using three items that asked about recent sexual behavior (i.e., previous 6 months) with cisgender men, and cisgender and transgender women (i.e., “In the past 6 months, have you had oral, anal or vaginal sex with a transgender woman, that is somebody assigned male at birth who identifies as female”). Participants provided “Yes” or “No” responses for these items. Responses were combined across items such that participants who reported only having sex with men were grouped as “sex with men only” while those who reported having sex with cisgender or transgender women were grouped as having “sex with men and women.” For the sexual attraction and sexual behavior variables, the category “women” includes both cisgender and transgender women.

HIV Vulnerability-Enhancing Behaviors—To examine associations between sexual orientation and sexual HIV vulnerability, we assessed the number of partners with whom participants engaged in condomless sex, selling sex, or buying sex in the previous 6 months. To assess condomless sex partners, participants reported the number of primary and casual cisgender men and women, and transgender women with whom they had anal or vaginal sex without a condom. Using 12 open response items in total, four items assessed condomless insertive and receptive sex with primary and casual male partners and four items assessed the number of transgender partners (e.g., “In the past 6 months, with how many male casual receptive partners were you ever the insertive partner or top during sex without a condom?”). Four items also assessed condomless anal or vaginal sex with primary and casual cisgender female sex partners.

To assess the number of sex partners who bought sex, participants indicated the number of primary and casual cisgender men and women, and transgender women from whom they accepted money, drugs, or other things in exchange for sex using 10 items (e.g., “Of your transgender female casual insertive partners in the past 6 months, how many gave you things like money or drugs in exchange for sex?”). Similarly, to examine the number of sex partners

who sold sex, participants reported the number and gender of partners with whom they exchanged money, goods, or services for sex using 10 items (e.g., “Of your male casual receptive partners in the past 6 months, how many did you give things like money or drugs in exchange for sex?”). For each behavior the respective items were summed to indicate the number of partners with whom participants had condomless sex, sold sex to, and bought sex from in the past 6 months.

HIV Testing Frequency—We assessed recent HIV testing history by first identifying participants who tested seronegative for HIV at baseline. We then used the following item “In the past 12 months, how many times have you been tested for HIV?” to assess HIV testing frequency. Responses were categorized into three groups: no test, tested one or two times, or tested three or more times.

PrEP, ART, and Status Neutral Medication Adherence—To assess biomedical HIV prevention and care adherence, participants first indicated whether they were currently using medication to prevent or treat HIV. HIV negative participants responded to the item “Are you currently taking medication to prevent HIV infection or PrEP? (“Yes” or “No”).” Participants who responded “Yes” then indicated their medication adherence with one item “When was the last time you missed taking any of your medications?” (1 = within past week, 7 = never skip medication doses). Similarly, participants living with HIV first reported whether they were currently taking ART “Are you currently taking medication to treat your HIV infection? (“Yes” or “No”). Those indicating “Yes” then self-reported their medication adherence using the same item above. To examine HIV status neutral medication adherence, we conducted analyses among all participants who responded “Yes” to either medication use item, assessing medication adherence among PrEP and ART users combined using the 7-point adherence measure.

Covariates—We collected sociodemographic data from participants including age in years, relationship status (coded as single vs in a relationship), income (coded as < \$20,000 vs. \$20,000), educational attainment (coded as less than high school graduate vs. high school graduate or higher), employment (coded as employed vs. unemployed) and housing instability. These covariates are consistent with previous N2 studies [28, 34].

Statistical Analysis—Participant characteristics for the full sample and by site were described using means, standard deviations, frequencies, and proportions as appropriate. To explore discordance in sexual orientation across measures of identity, attraction and behavior, similar to past research [32], we examined the proportion of overlap across all three constructs for Black SMM who identified as gay and those who identified as bisexual.

To investigate associations between each aspect of sexual orientation and the number of partners with whom participants engaged in HIV vulnerability-enhancing behaviors and their HIV testing frequency and biomedical prevention and care adherence, we first tested bivariate associations using sexual identity, sexual attraction (men only vs. men and women) and sexual behavior (sex with men only vs. sex with men and women) as participant variables. Poisson regressions were used to examine the number of sex partners across HIV vulnerability-enhancing behaviors and HIV testing frequency. Bivariate regression

models examined adherence among participants who reported using PrEP, or ART. We then tested multivariable models, which regressed each outcome on the different aspects of sexual orientation while controlling for individual-level covariates associated with HIV among Black SMM. To examine HIV status neutral medication adherence, we regressed the medication adherence measures on each aspect of sexual orientation for those who reported currently using PrEP or ART combined. In addition, we conducted exploratory analyses examining the association between sexual orientation and HIV vulnerability-enhancing behaviors while including PrEP and ART use as covariates. We also tested models that examined all three aspects of sexual orientation concomitantly for each outcome. Significance for all models was determined by a p-value of less than 0.05. We used SPSS version 26 for all analyses.

Results

Sociodemographic Characteristics, HIV Vulnerability-Enhancing Behaviors and Prevention and Care

Tables 1 and 2 provide sociodemographic and health characteristics for the full sample and for each respective site. The mean age of the sample was 33.4 years ($SD = 11.3$), 73.5% reported being single, and 70.1% reported having a cisgender male partner in the previous 6 months. A third of the sample (30.9%) reported being unhoused in the past 12 months. Most of the sample reported a gay identity (50.5%) and attaining at least some secondary education (53%). Less than half the sample (44.6%) was employed, and 59.7% reported earning less than \$20,000 annually.

Examining HIV vulnerability-enhancing behaviors and prevention and care practices of the sample, 79.1% of the sample reported engaging in condomless sex in the past 6 months. For transactional sex, 16.6% of the sample reported buying sex, while 20.2% reported selling sex over the previous 6 months. Seventy-four percent of the sample tested negative for HIV at baseline, with 44.8% of participants reporting testing three or more times in the previous 12 months. Among HIV negative participants, 13.2% reported currently using PrEP. A quarter of the sample (25.9%) reported living with HIV, of which 97.9% reported current ART use.

Overlap Across Aspects of Sexual Orientation

Figures 1 and 2 provide a visual presentation of the overlap across measures of sexual orientation for participants who reported a gay or bisexual sexual identity respectively. Across the sample, only 22.5% reported a gay identity along with same-sex sexual attraction and engaging in sex with men only. An additional 24% reported same-sex attraction and engaging in sex with men only but did not identify as gay. Among bisexual men, only 17.1% reported a bisexual identity, being sexually attracted to men and women and engaging in sex with men and women. An additional 22.5% reported being attracted to men and women and engaging in sex with men and women but did not identify as bisexual.

Association Between Sexual Orientation and HIV Vulnerability-Enhancing Behaviors

In bivariate Poisson regression models, we found significant associations across all three aspects of sexual orientation and the number of condomless sex partners. When assessed by

sexual identity, those who identified as bisexual reported a greater number of condomless sex partners PR = 1.85, 95% CI [1.49, 2.30], $p < 0.001$ relative to those who identified as gay. For sexual attraction, those attracted to both men and women reported a greater number of condomless sex partners PR = 1.60, 95% CI [1.25, 2.06], $p < 0.001$ relative to men who were attracted to men only. Similarly, participants who reported having sex with men and women reported a greater proportion of condomless sex partners PR = 1.84, 95% CI [1.51, 2.26], $p < 0.001$ relative to men who had sex with men only. Bivariate associations were also found between measures of sexual orientation and the number of transactional sex partners. Specifically, identifying as bisexual, PR = 2.46, 95% CI [1.57, 3.86], $p < 0.001$, straight/other, PR = 2.36, 95% CI [1.34, 4.13], $p = 0.003$, or reporting engaging in sex with both men and women, PR = 2.33, 95% CI [1.58, 3.44], $p < 0.001$, was associated with having more partners who sold sex to participants. Participants who reported being attracted to both men and women reported having fewer sex partners who bought sex in the previous 6 months PR = 0.43, 95% CI [0.31, 0.58], $p < 0.001$.

Table 3 provides the results of multivariable Poisson regression models testing associations between each aspect of sexual orientation individually and the number of partners with whom participants engaged in each HIV vulnerability-enhancing behavior adjusted for age, education, employment, income, relationship status, and housing instability. Bisexual identity aPR = 1.67, 95% CI [1.23, 2.25], $p < 0.001$, engaging in sex with men and women aPR = 1.36, 95% CI [1.02, 1.81], $p = 0.04$, and reporting attraction to both men and women aPR = 1.54, 95% CI [1.12, 2.11], $p = 0.01$ were each associated with having more condomless sex partners in the previous 6 months. Identity and attraction were associated with the number of sex partners who sold sex to participants in the past 6 months. Bisexual identity aPR = 2.75, 95% CI [1.27, 5.98], $p < 0.001$, or identifying as straight/other aPR = 9.82, 95% CI [3.99, 24.18], $p = 0.01$ were associated with having more partners who sold sex to participants in the past 6 month relative to men who identified as gay. However, reporting attraction to both men and women was associated with having fewer partners who sold sex to participants in the past 6 months aPR = 0.47, 95% CI [0.25, 0.88], $p = 0.02$. All three measure of sexual orientation were associated with the number of partners who bought sex from participants in the past 6 months. Here bisexual identity was associated with having fewer partners who bought sex aPR = 0.28, 95% CI [0.18, 0.43], $p < 0.001$, while identifying as straight or other was associated with having more partners who bought sex in the past 6 months aPR = 3.12, 95% CI [1.57, 6.21], $p = 0.001$. Engaging in sex with men and women aPR = 0.46, 95% CI [0.30, 0.71], $p < 0.001$, or reporting attraction to both men and women aPR = 0.17, 95% CI [0.11, 0.26], $p < 0.001$ were associated with having fewer partners who bought sex from participants in the past 6 months.

Association Between Sexual Orientation and HIV Prevention and Care Behaviors

In bivariate regression models, we found significant associations among two aspects of sexual orientation (i.e., sexual identity and sexual behavior) and HIV testing frequency over the previous 12 months. Identifying as straight or other PR = 1.52, 95% CI [1.19, 1.93], $p < 0.001$ was associated with testing for HIV more often, while engaging in sex with men and women was associated with less frequent testing PR = 0.63, 95% CI [0.49, 0.79], $p < 0.001$. No significant associations were found for PrEP adherence among Black SMM not living

with HIV, ART adherence among Black SMM with HIV, or when examining medication adherence among participants using PrEP or ART combined.

Table 4 displays multivariable associations between each aspect of sexual orientation and HIV testing frequency, PrEP adherence, ART adherence, and status neutral medication adherence. Here, bisexual identity aPR = 1.46, 95% CI [1.14, 1.87], $p = 0.002$ or identifying as straight/other aPR = 1.98, 95% CI [1.45, 2.72], $p < 0.001$ was associated with testing for HIV more often in the past 12 months relative to participants who identified as gay. However, reporting having sex with both men and women was associated with testing for HIV less frequently over the past 12 months aPR = 0.66, 95% CI [0.49, 0.90], $p = 0.01$. We did not find significant associations for any measures of sexual orientation and PrEP adherence among HIV negative participants, ART adherence among participants with HIV, or when examining status neutral medication adherence across those on PrEP or ART combined.

Exploratory Analyses

When controlling for ART use, identifying as bisexual was associated with having more condomless sex partners aPR = 5.30, 95% CI [1.83, 15.35], $p = 0.002$. No other multivariable model controlling for PrEP or ART use yielded significant findings. Models testing all three aspects of sexual orientation concomitantly produced findings consistent with our primary analyses for partners selling or buying sex. Identifying as bisexual aPR = 14.18, 95% CI [4.07, 49.49], $p < 0.001$ or straight/other aPR = 22.47, 95% CI [7.98, 63.42], $p = 0.002$ was associated with having more partners who sold sex to participants. Reporting attraction to both men and women was associated with having fewer partners that sold sex to participants aPR = 0.08, 95% CI [0.03, 0.27], $p < 0.001$. Regarding the number of partners who bought sex from participants, identifying as straight/other was associated with more partners buying sex aPR = 4.24, 95% CI [2.07, 8.68], $p < 0.001$. Reporting attraction to both men and women was associated with having fewer partners who bought sex from participants aPR = 0.18, 95% CI [0.09, 0.36], $p < 0.001$. Finally, straight/other identity was associated with testing for HIV more often aPR = 2.91, 95% CI [2.02, 4.20], $p < 0.001$, while reporting attraction to both men and women was associated with testing less often aPR = 0.66, 95% CI [0.49, 0.89], $p = 0.01$.

Discussion

To date, most research on Black SMM's HIV vulnerability as well as their HIV prevention and care practices has examined this population as a homogenous group. However, attempting to address sexual orientation-related health disparities in this manner fails to account for the unique differences and needs of SMM based on sexual orientation (e.g., gay vs. bisexual). By not accounting for the varying degree of overlap in different aspects of sexual orientation, research overlooks the potential influence such differences have on HIV-related outcomes. In the present study, we explored the degree of overlap across three aspects of sexual orientation (e.g., sexual identity, sexual attraction, sexual behavior) among Black SMM in the Deep South. We also examined associations between aspects of sexual orientation and the number of partners with whom participants reported engaging in

HIV vulnerability-enhancing behaviors, as well as their HIV prevention and care practices. We found that only a small proportion of Black SMM who identified as either gay or bisexual reported overlap in their sexual identity, sexual attraction, and sexual behavior. Consistent with the intersectionality framework [19], the high level of divergence across aspects of sexual orientation among Black SMM in the Deep South who identify as gay or bisexual may reflect the influence of oppressive intersecting macrolevel stigmas (e.g., racism, homophobia, biphobia) on aspects of sexual orientation and efforts to counter some of the stigma experienced by these men, which may be pronounced in the Deep South. The low level of overlap across measures of sexual orientation is consistent with and helps to contextualize qualitative intersectional studies among Black SMM. These studies highlight the concealment of aspects of sexual orientation (e.g., sexual identity) to avoid stigma and discrimination, hindering engagement in health care broadly and HIV prevention and care in particular [24]. Assessing multiple aspects of sexual orientation allows for a better understanding of how Black SMM in this region define their sexual orientation, and how discordance across aspects of sexual orientation shapes HIV vulnerability and prevention and care efforts.

In multivariable models testing associations between sexual orientation and the number of partners with whom participants engaged in HIV vulnerability-enhancing behaviors, we found consistency in associations between aspects of sexual orientation and the number of condomless sex partners in the past 6 months. Here bisexual identity, having sex with men and women, and being attracted to men and women were all positively associated with having more condomless sex partners. We did find support for our hypothesis when examining transactional sex. While sexual identity was associated with having more partners who sold sex to participants, sexual attraction was associated with having fewer partners who sold sex to participants in the past 6 months. Differences were also found in associations both within and across aspects of sexual orientation for the number of partners who bought sex from participants. Men who did not identify as gay or bisexual reported having more partners who bought sex, while bisexual identity, having sex with men and women, and reporting attraction to both men and women were associated with having fewer partners who bought sex from participants. These findings are consistent with previous studies examining transactional sex among Black SMM in the Deep South, which suggest differences in the preference for and engagement in condomless and transactional sex among Black SMM depending on their sexual orientation [35]. Prior studies have also identified differences between SMM who buy sex versus those who sell sex, suggesting that sociocultural influences impact the purchase of sex [36]. For Black SMM who identify as bisexual in the Deep South, the higher prevalence of partners from whom sex is purchased may be indicative of the experience of intersecting stigmas internal and external to the Black community [17]. That is, Black men who identify as bisexual, have sex with men and women or who are attracted to both men and women are suggested to face what Watson et al. (2022) coin as a “triple jeopardy” as they face oppression in the form of racism, homophobia, and biphobia in and outside of the Black community. This triple jeopardy in turn likely impacts sexual orientation-related outcomes that uniquely enhance HIV vulnerability for these men. Future research should examine the relationship between

multiple levels of stigma, aspects of sexual orientation, and sexual behaviors that enhance vulnerability to HIV.

Among the HIV prevention and care outcomes, we found significant associations only between sexual orientation and HIV testing frequency. Here the identity aspect was associated with testing for HIV more often for non-gay identified men, a finding contrary to other studies among SMM [31, 37]. Non-gay identified SSM in this region might be keenly aware of their elevated vulnerability to HIV, which may motivate their higher rates of HIV testing. The higher rate of HIV testing may also indicate a response from prior research and lay beliefs that perpetuate the notion of Black SMM being bridges for HIV transmission to women [30, 38]. The higher rate of testing seen when examining sexual identity may also highlight concerns that some non-gay identified SMM hold of potentially having to disclose an HIV seropositive status [39], which may bring their sexual orientation into question. However, engaging in sex with men and women was associated with testing less often in the past 12 months. Thus, how sexual orientation is operationalized in research studies has implications for informing or developing interventions to increase access and uptake of HIV testing.

Our findings suggest that an immediate implication of observational and interventional work should be to comprehensively examine sexual orientation, not just examining one or two measures in HIV-related research among Black SMM populations in the Deep South. Comprehensively examining sexual orientation will provide a clear picture of the impact of sexual identity, sexual attraction, as well as sexual behavior on HIV-related outcomes. Not only do these findings indicate differences among subgroups of Black SMM but also highlight how different aspects of sexual orientation are linked to behaviors, a finding that is often obscured when investigating the significance of HIV vulnerability-enhancing behaviors and prevention and care efforts among this population. Our findings are consistent with previous studies examining different aspects of sexual orientation among Black SMM [30, 41]. A recent study examining the combined effects of sexual behavior and sexual identity on oral PrEP use among cisgender Black SMM found differences in PrEP use and discontinuation of PrEP by Black SMM based on the combination of the two aspects of sexual orientation (e.g., bisexual men who have sex with men and women vs. bisexual men who only have sex with men) [28]. Another study among Black SMM found differences in the rates of physical assault, disclosure of sexual orientation, and community support when identity and behavior were combined to explore nuisances within the overarching category of SMM [40]. Thus, as EHE efforts continue, collecting data on identity, attraction, and behavior among samples of SMM would allow researchers to identify uniquely vulnerable subgroups that are being missed in current HIV prevention efforts, including perhaps also among Hispanic and Asian SMM. Identifying unique subgroups and developing tailored programs and health services that address the multilevel factors that enhance HIV vulnerability as it relates to that subgroup may help move the needle in achieving EHE goals among a priority population.

Further, these findings highlight the critical need to shift research among SMM away from focusing on all encompassing groups that obscure the unique sexual orientational-related health vulnerability and needs of the various subgroups under the umbrella of MSM or

SMM. While broad categories are beneficial for understanding early investigations of sexual orientation-related health problems such as the ongoing HIV epidemic, the continuation and overuse of categories such as SMM, or worse MSM, is a failure on the part of public health researchers to adequately address sexual orientation-related health risks among SMM populations. Given the growing body of research that shows HIV vulnerability differs based on the sexual orientation of Black SMM, and SMM in general, a continued focus on SMM as opposed to unique groups of SMM adds to the inability to make substantive progress in reducing the spread of HIV among Black men in the US or in achieving EHE goals. Deconstructing overarching categories would also prove beneficial for addressing HIV vulnerability among other racial and ethnic groups heavily impacted by HIV, including Hispanic or Latinx SMM, who also experience inequities in HIV prevention and care. HIV vulnerability may be lessened by the use of biomedical HIV prevention and care options. However, as seen in the present sample, uptake, and use of such strategies, primarily use of PrEP, remains low. In multivariable analyses no measure of sexual orientation was associated with PrEP, ART or status neutral HIV medication adherence, contrary to findings from previous studies [28]. The lack of associations in the present study may reflect the impact of sexual orientation on health-related outcomes among Black SMM in the Deep South relative to Black SMM in other regions of the US. However, the lack of significant associations is likely due to the small number of participants who reported current PrEP use, limiting the necessary power needed to detect significant associations.

Limitations

Several limitations should be considered when interpreting the findings of the present study. First, the cross-sectional study design precludes the ability to make causal inferences or account for changes in sexual orientation metrics such as identity, which can change over time. Future research should examine direct relationships as well as potential changes in aspects of sexual orientation [41] utilizing a longitudinal design. Second, data collection occurred among Black SMM recruited using convenience sampling methods who reside in the MSA of three cities in the US Deep South; thus, data are not representative of all Black SMM. Results may not generalize to Black SMM in other geographic locations or SMM of different racial or cultural backgrounds. Third, because data was collected via self-report through interview-administered questionnaires, social desirability may have influenced responses to sensitive topics including the outcomes under study. Fourth, due to limited power we were unable to make comparisons of Black SMM across sites or conduct meaningful analyses among some subsamples (e.g., participants who identified as heterosexual, who endorse being mostly or completely attracted to women, PrEP and ART use). Fifth, there is a possibility of residual confounding given that we only controlled for individual-level factors associated with HIV in multivariable models. Future studies should aim to control for network-level and structural factors when examining associations between sexual orientation and HIV-related outcomes. Finally, due to the number of analyses conducted there is an increased possibility that results include a Type 1 error. Future studies should seek to replicate our findings in larger samples of Black cisgender gay, bisexual, and other men who report have sex with men or are attracted to men.

Conclusion

How Black SMM in the Deep South define their sexual orientation may increase, or decrease, vulnerability to HIV and engagement in HIV testing. More research is warranted to better understand how different aspects of sexual orientation among Black SMM impacts their health and wellbeing.

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Data Availability

Data, material and code used in this study are available from the corresponding author upon request.

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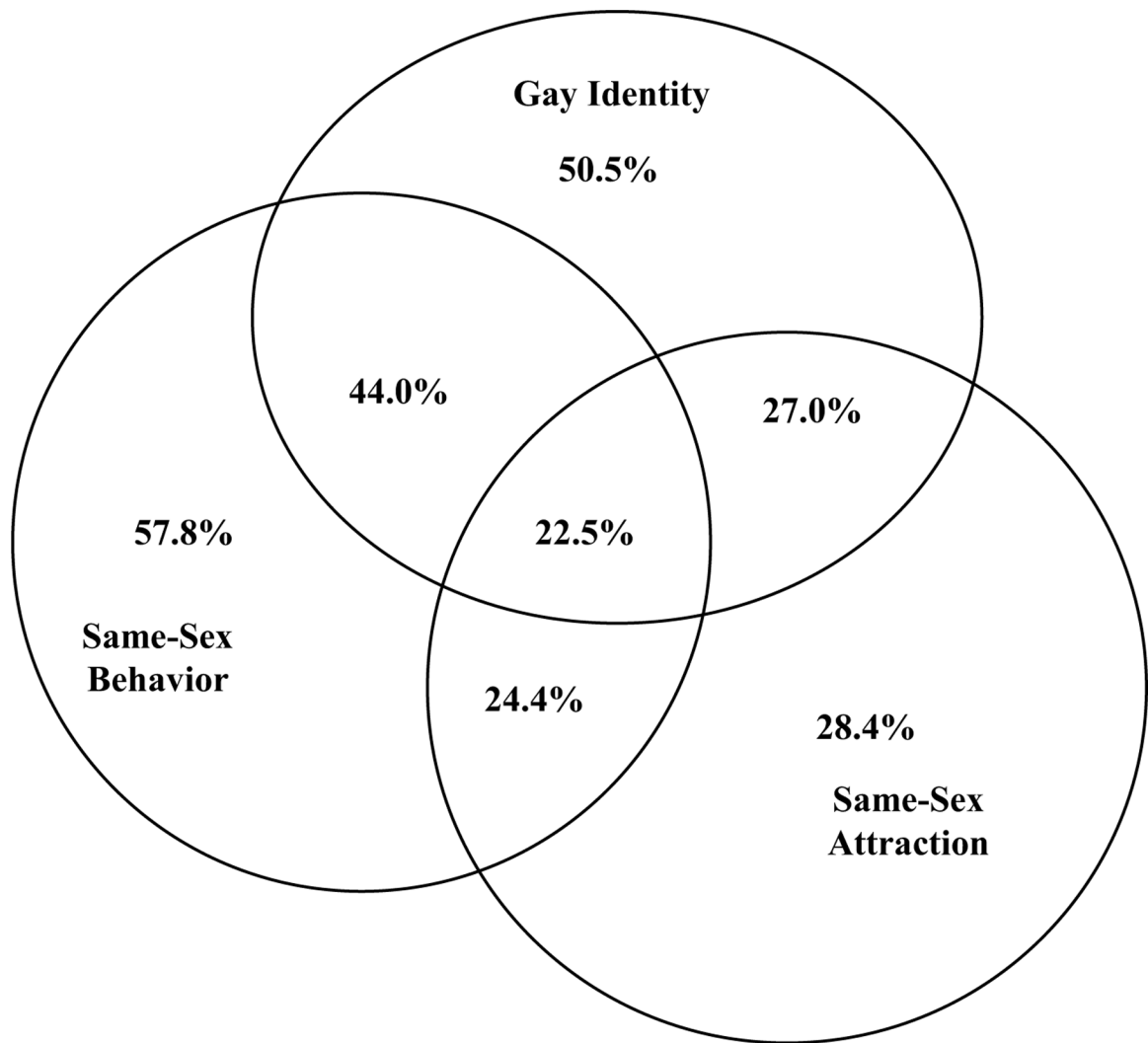


Fig. 1.
Venn diagram of the overlap between gay identity, same-sex sexual behavior, and same-sex sexual attraction among cisgender Black sexual minority men

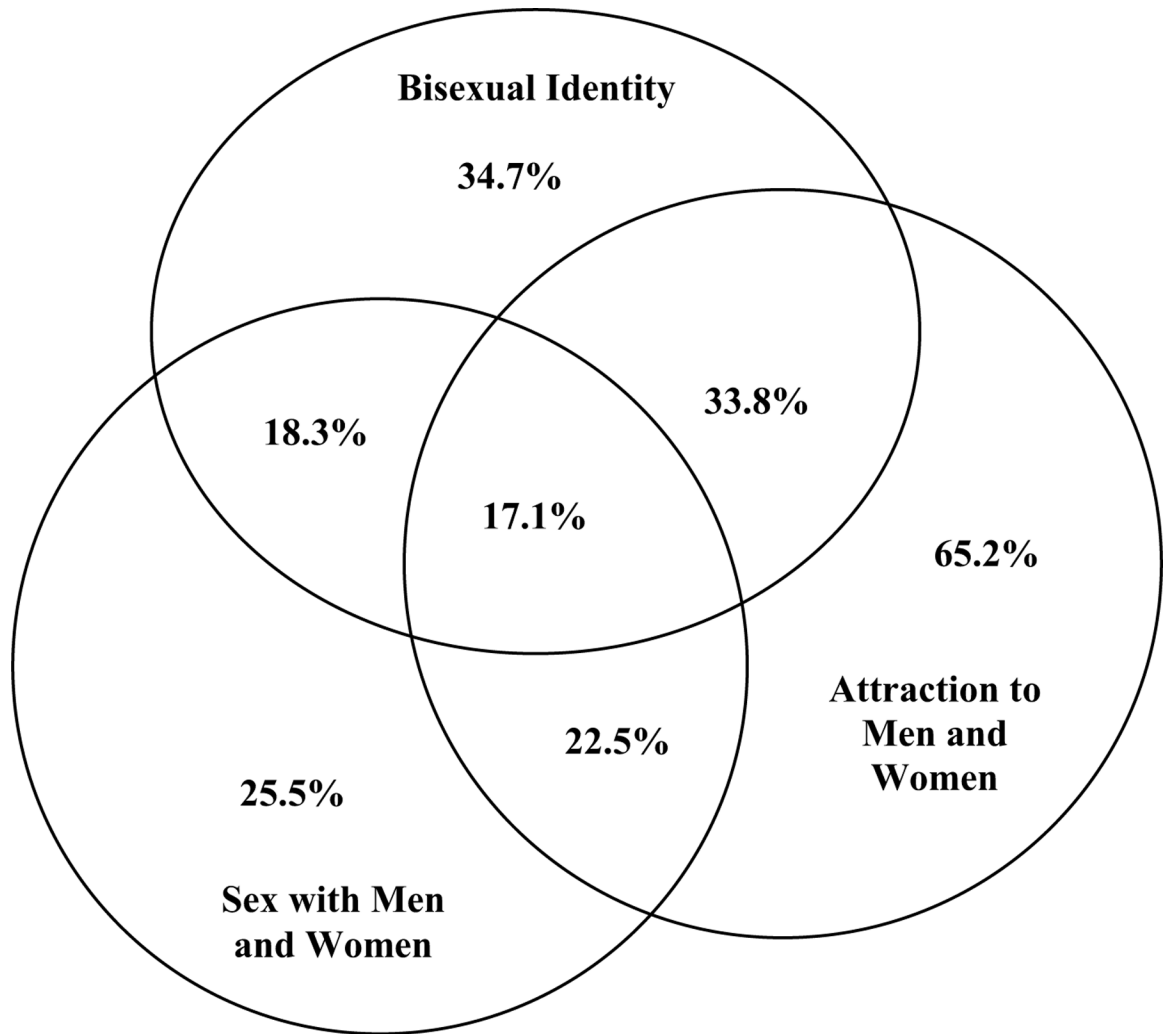


Fig. 2. Venn diagram of the overlap between bisexual identity, sex with men and women, and attraction to men and women among cisgender Black sexual minority men

Table 1
Sociodemographic characteristics at baseline among cisgender Black gay, bisexual, and other sexual minority men of the Deep South sites of the N2 Cohort Study

	Total		New Orleans		Baton Rouge		Jackson	
	n	%	n	%	n	%	n	%
Total participants	204		139		19		46	
Age range (M, SD)	18–65	(33.4; 11.3)	18–65	(35.8; 12.1)	19–37	(29.4; 5.6)	20–35	(25.4; 3.7)
Education								
Some high school	44	22.0	41	29.5	1	5.3	2	4.3
High school	52	25.0	34	24.5	6	31.6	12	26.1
Some secondary education	61	30.0	43	30.9	6	31.6	12	26.1
Associate degree	24	12.0	11	7.9	3	15.8	10	21.7
Bachelor's degree or higher	23	11.0	10	7.2	3	15.8	10	21.7
Student status								
Current student	46	22.8	22	15.8	6	31.6	18	39.1
Employment status								
Employed	91	44.6	40	28.8	14	73.7	37	80.4
Annual income								
< \$20,000	92	59.7	70	71.4	7	41.2	15	38.5
\$20,000	62	40.3	28	28.6	10	58.8	24	61.5
Housing ^{a,b}								
Unhoused	63	30.9	57	41.0	3	15.8	3	6.5
Live alone	68	33.3	52	37.4	4	21.1	12	26.1
Roommates or friends	38	18.6	23	16.5	4	21.1	11	23.9
Parents/relatives	56	27.5	31	22.3	6	31.6	19	41.3
Live with partner	13	6.4	6	4.3	4	21.1	3	6.5
Others	29	14.2	27	19.4	1	5.3	1	2.2
Sexual orientation								
Gay	102	50.5	58	42.0	15	78.9	29	64.4
Bisexual	70	34.7	58	42.0	2	10.5	10	22.2
Straight	18	8.9	16	11.6	0	0.0	2	4.4

	Total		New Orleans		Baton Rouge		Jackson	
	n	%	n	%	n	%	n	%
Other	12	5.9	6	4.3	2	10.5	4	8.9
Sexual attraction								
Men only	58	28.4	29	20.9	11	57.9	18	39.1
Men and women	133	65.2	100	71.9	8	42.1	25	54.3
Women only	8	3.9	7	5.0	0	0	1	2.2
Previous sexual partners past 6 months ^b								
Cisgender men	143	70.1	88	63.3	19	100	36	78.3
Cisgender women	37	18.1	34	24.5	1	5.3	2	4.3
Transgender women	22	10.8	21	15.1	0	0.0	1	2.2
Current relationship status								
Not in a relationship	150	73.5	106	76.3	13	68.4	31	67.4
Relationship with a man	40	19.6	20	14.4	6	31.6	14	30.4
Relationship with a woman ^c	11	5.4	10	7.2	0	0.0	1	2.2
Relationship with multiple partners	1	0.5	0	0	0	0.0	1	2.2

^aIn the previous 12 months

^bNon-exclusive categories

^cIncludes cisgender and transgender women

Table 2
 HIV Vulnerability-Enhancing Behaviors and HIV prevention and care practices at baseline among cisgender Black gay, bisexual, and other sexual minority men of the Deep South sites of the N2 Cohort Study

	Total		New Orleans		Baton Rouge		Jackson	
	n	%	n	%	n	%	n	%
Total participants	204		139		19		46	
HIV status								
HIV negative	143	74.1	102	76.1	10	55.6	31	75.6
HIV positive	50	25.9	32	23.9	8	44.4	10	24.4
HIV testing ^a								
No test	25	12.9	18	13.7	2	10.5	5	11.4
One or two times	82	42.3	58	44.3	10	52.6	14	31.8
Three or more times	87	44.8	55	42.0	7	36.8	25	56.8
PrEP use ^{b,c}								
Never taken	103	74.1	84	86.6	7	70.0	12	37.5
Previously taken	36	25.9	13	13.4	3	30.0	20	62.5
Currently taking	27	13.2	10	7.2	3	15.8	14	70.0
ART use ^{e,d}								
Never taken	1	2.1	1	0.7	0	0.0	0	0.0
Previously taken	47	97.9	30	21.6	7	36.8	10	21.7
Currently taking	46	22.5	29	20.9	7	36.8	10	21.7
PrEP adherence ^{e,i}								
Always/almost always take medication	15	57.7	3	30.0	3	100.0	9	69.2
Sometimes forget to take medication	3	11.5	3	30.0	0	0.0	0	0.0
Often forget to take medication	8	30.8	4	40.0	0	0.0	4	30.8
ART adherence ^{f,i}								
Always/almost always take medication	21	46.7	15	53.6	3	42.9	3	30.0
Sometimes forget to take medication	6	13.3	1	3.6	1	14.3	4	40.0
Often forget to take medication	18	40.0	12	42.9	3	42.9	3	30.0

Status neutral adherence^j

	Total		New Orleans		Baton Rouge		Jackson	
	n	%	n	%	n	%	n	%
Always/almost always take medication	36	50.7	18	47.4	6	60.0	12	52.2
Sometimes forget to take medication	9	12.7	4	10.5	1	10.0	4	17.4
Often forget to take medication	26	36.6	16	42.1	3	30.0	7	30.4
Recent condom use ^{g,h}								
Consistent condom use	34	20.9	18	16.5	4	21.1	12	34.3
Inconsistent condom use	129	79.1	91	83.5	15	78.9	23	65.7
Transactional sex								
Bought sex	27	16.6	23	21.1	3	15.8	1	2.2
Sold sex	33	20.2	28	25.7	3	15.8	2	5.7

^aIn the previous 12 months

^bAmong HIV negative participants

^cNon-exclusive categories, never taken and previously taken account for full sample of participants

^dAmong participants with HIV

^eAmong HIV negative participants currently using PrEP

^fAmong participants with HIV on ART

^g'Recent' defined as 6 months prior to participation

^h'Consistent' condom use refers to always using condoms during anal or vaginal sex with partners of any gender, excluding participants with no recent anal or vaginal sex

ⁱAdherence totals are smaller than current use totals due to missing data for the adherence measure

Table 3

Associations between sexual orientation and the number of sex partners engaging in HIV vulnerability-enhancing behaviors among cisgender Black SMM residing in the Deep South

	Multivariable analyses								
	Number of condomless sex partners in past 6 months (n = 108)			Number of partners who sold sex to participants in past 6 months (n = 108)			Number of partners who bought sex from participants in past 6 months (n = 106)		
	PR	95% CI	p	PR	95% CI	p	PR	95% CI	p
Sexual identity									
Gay	REF			REF			REF		
Bisexual	1.67	1.23, 2.25	< 0.001	2.75	1.27, 5.98	< 0.001	0.28	0.18, 0.43	< 0.001
Straight/other	1.23	0.74, 2.05	0.43	9.82	3.99, 24.18	0.01	3.12	1.57, 6.21	0.001
Sexual behavior									
SMO	REF			REF			REF		
SMW	1.36	1.02, 1.82	0.04	1.40	0.79, 2.49	0.26	0.45	0.30, 0.71	< 0.001
Sexual attraction									
Men	REF			REF			REF		
Both equally	1.54	1.12, 2.11	0.01	0.47	0.25, 0.88	0.02	0.17	0.11, 0.26	< 0.001

Bold values indicate statistical significance of less than .05

Both equally = attraction to both men and women

PR = prevalence ratio. SMO = sex with men only. SMW = sex with men and women

Table 4

Associations between sexual orientation and HIV testing, PrEP, ART, and status neutral medication adherence among cisgender Black SMM residing in the Deep South

Multivariable analyses												
HIV testing frequency ^a (n = 98)		PrEP adherence ^b (n = 26)		ART adherence ^c (n = 45)		Status neutral adherence ^{b,c} (n = 71)						
PR	95% CI	p	b	95% CI	p	b	95% CI	p	b	95% CI	p	
Sexual identity												
Gay	REF		REF		REF		REF		REF			
Bisexual	1.46	1.14, 1.87	0.002	- 2.61	- 7.49, 2.26	0.26	3.38	- 0.49, 7.24	0.08	1.11	- 1.14, 3.37	0.33
Straight/other	1.98	1.45, 2.72	< 0.001	- 5.63	- 16.17, 4.90	0.26	- 2.21	- 5.94, 1.52	0.23	- 2.58	- 5.67, 0.50	0.10
Sexual behavior												
SMO	REF		REF		REF		REF		REF			
SMW	0.66	0.49, 0.90	0.01	- 0.93	- 6.90, 5.03	0.72	2.91	- 3.69, 9.52	0.37	0.86	- 2.58, 4.29	0.62
Sexual attraction												
Men	REF		REF		REF		REF		REF			
Both equally	1.02	0.79, 1.31	0.91	- 0.94	- 4.32, 2.43	0.55	0.56	- 1.72, 2.84	0.62	0.17	- 1.43, 1.77	0.83

Bold values indicate statistical significance of less than .05

^a Among Black SMM not living with HIV

^b Among Black SMM taking PrEP

^c Among Black SMM taking ART

Status neutral adherence = PrEP and ART users combined. PR = prevalence ratio. *b* = unstandardized coefficients. SMO = sex with men only. SMW = sex with men and women. Both equally = attraction to both men and women