

Understanding Structural Barriers to Accessing HIV Testing and Prevention Services Among Black Men Who Have Sex with Men (BMSM) in the United States

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Abstract Structural-level factors have contributed to the substantial disproportionate rates of HIV among Black men who have sex with men (BMSM) in the United States. Despite insufficient HIV testing patterns, however, there is a void in research investigating the relationship between structural factors and access to HIV testing and prevention services among BMSM. Building on previous scholarly work and incorporating a dynamic social systems conceptual framework, we conducted a comprehensive review of the literature on structural barriers to HIV testing and prevention services among BMSM across four domains: healthcare, stigma and discrimination, incarceration, and poverty. We found that BMSM experience inadequate access to culturally competent services, stigma and discrimination that impede access to services, a deficiency of services in correctional institutions, and limited services in areas where BMSM live. Structural interventions that eliminate barriers to HIV testing and prevention services

and provide BMSM with core skills to navigate complex systems are needed.

Keywords Black men who have sex with men · HIV · HIV testing · Structural barriers · Healthcare services · Stigma · Incarceration · Poverty · Prevention

Introduction

High HIV infection rates among Black men who have sex with men (BMSM) in the United States (US) remain a major public health crisis. A 2008 surveillance study in 21 cities estimated HIV prevalence among BMSM to be 28 %, compared with 18 % among Latino men who have sex with men (MSM) and 16 % among non-Latino White MSM [1]. A more recent study of BMSM in six US cities reported an HIV prevalence of 21 % [2] and a yearly HIV incidence rate of 3.0 % [3]. While the generalizability of these results is limited, they underscore the severity of the epidemic among subpopulations of BMSM in highly populated urban areas. In 2010, an estimated 134,746 of BMSM in the US were living with diagnosed HIV infection, and BMSM accounted for more than 20 % of total new infections [4]. Rates of new infections among BMSM, aged 13–30, have been particularly alarming, with yearly incidence estimates ranging from 5.1 to 6.4 % [3–5]. Although rates of new HIV infections remained stable from 2006 to 2009 among other racial and ethnic groups of MSM aged 13–29, there was a 48 % increase in new HIV infections among young BMSM during this time period [1, 6].

Structural-level factors, which include the socio-economic and -cultural contexts of communities, have contributed to the high burden of HIV among BMSM. Based on the work of Latkin et al. [7], structural factors can be

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defined as forces that work outside the individual and beyond the individual's control to foster or impede health or health behaviors, and they often distally impact health outcomes in diffuse and indefinite ways. Although a multiplicity of factors contribute to each individual's risk of HIV infection, there is a growing body of literature recognizing that structural-level factors have served a primary role in shaping the epidemic [5, 7–23]. For example, Peterson and Jones [13] described the effects of structural factors—including stigma, racism, barriers to healthcare, and incarceration—on HIV risk among BMSM, and discussed the need for structural interventions to reduce HIV-related racial disparities. Mays et al. [16] provided recommendations to move the HIV prevention research agenda for BMSM toward a social/interpersonal focus that addresses social-structural barriers contributing to HIV infection. More recently, Millett et al. [12] discussed the inability to eliminate disparities in HIV infection among BMSM without addressing structural barriers such as low income, incarceration, unemployment, and low education.

Building on this formative research, Latkin et al. introduced a dynamic social systems theoretical model that provides a framework for better understanding the complex processes by which structural factors drive the elevated rates of HIV infection among BMSM. Emphasizing the social nature of structural factors within the scope of HIV prevention research, the authors' model conceptualizes structural factors across three core dimensions encompassing: (1) resources, (2) social influence and control factors, and (3) contextual factors [7]. Resources involve economic, social, cultural, and infrastructural resources (e.g., staffing and equipment at HIV testing sites), and can also include scientific knowledge and technological innovations related to HIV prevention (e.g., research on rapid HIV testing technologies). Social influence and control factors include non-institutionally sanctioned social influence (e.g., social norms) as well as institutionally sanctioned social influence (e.g., decision rules to recommend HIV testing to certain individuals). Resources and social influence can be considered forms of power, and they operate through contextual factors, including the structure of social relationships (e.g., relationships between clients and staff at HIV testing sites) and geographic, spatial, or social boundaries (e.g., local availability of HIV testing sites) [7]. Each element in the model can influence and be influenced by other elements, reflecting the interdependent and dynamic nature of structural factors. Furthermore, each of the dimensions of structural factors can operate on macro (i.e., socio-political, economic, and cultural contexts and the social institutions that shape social organizations with the broadest reach), meso (i.e., systems within more immediate institutions in which individuals and groups are involved), and micro (i.e., immediate social and physical

contexts in which interactions among individuals and small groups take place) levels of society [7]. Specific structural factors may function at a variety of levels, depending on the perspective and specific question of the observer [7]. Given that structural factors are correlates of HIV risk among BMSM [8, 12, 13], employing this model to conceptualize structural factors across these multi-level structural dimensions provides for a systematic and theoretically grounded approach to investigate the complex processes underlying their substantial contribution to the disproportionate HIV infection rates among BMSM. Since HIV prevention research examining the mechanisms by which structural factors impede prevention efforts for BMSM is understudied, a more comprehensive review rooted in this dynamic social systems model is warranted.

Moreover, a major limitation of the growing body of HIV prevention research investigating structural factors among BMSM involves the lack of focus on barriers to accessing HIV testing and HIV prevention services [24]. BMSM report irregular HIV testing patterns [10, 25] despite recommendations issued by the CDC that sexually active MSM should be tested at least once annually and that high-risk MSM be tested every 3–6 months [26]. Only 67 % of HIV-negative BMSM in one study were tested for HIV in the last 2 years [27] and only 52 % in another study were tested in the last year [28]. Other findings highlight the heterogeneity of HIV testing patterns among BMSM [29]. HIV-infected BMSM are also less likely than other HIV-infected MSM to be aware of their positive serostatus [10, 30–32]. One study reported that 59 % of HIV-infected BMSM in 21 cities were unaware of their positive serostatus [1], and another study reported that 14.5 % of BMSM who had been tested for HIV in the past 12 months were unaware that they were HIV-positive, compared with 6.7 % of Latino MSM and 3.0 % of non-Latino White MSM [32]. Being unaware of one's own positive HIV status increases the likelihood of HIV transmission risk behaviors [33], which may partially explain the higher HIV prevalence among sexual networks of BMSM [13, 19, 30, 34–36]. Compared to HIV-infected non-Latino White MSM, HIV-infected BMSM are also less likely to attain viral suppression and a high CD4 count [12] and more likely to have sexually transmitted co-infections [10–12, 37], both of which increase the risk of HIV transmission [38, 39]. Since limited healthcare access and other structural factors are associated with HIV infection risk among BMSM [8, 12, 13], these findings point to a potential relationship between structural factors and the use of HIV testing and prevention services [i.e., HIV counseling, HIV education, and the provision of pre-exposure prophylaxis (PrEP) or post-exposure prophylaxis (PEP)]. For instance, BMSM who are unable to access optimal healthcare services in their communities may experience barriers to

getting tested, learning their HIV status, receiving pre- and post-test HIV counseling, and consequently altering behaviors to prevent HIV acquisition or transmission. While formative research has investigated the risk of HIV infection associated with healthcare access, racism, homophobia, stigma, incarceration, low income, unemployment, and low education [8, 12, 13, 16], the roles of these structural factors as barriers to HIV testing and prevention services among BMSM are unclear.

Building on previous scholarly work and incorporating a dynamic social systems conceptual framework, we conducted a review of the literature on structural barriers to accessing HIV testing and prevention services among BMSM across the domains of healthcare, stigma and discrimination, incarceration, and poverty. Notwithstanding varied or unclear definitions of structural factors across the body of literature pertaining to BMSM, this paper utilizes the definition and conceptual framework developed by Latkin et al. in reviewing articles, regardless of how authors defined or conceptualized structural factors. Furthermore, while structural factors may also act as facilitators to accessing HIV testing and prevention services—particularly as related to resiliency factors (e.g., social support, spirituality) [40–42]—for the scope of this paper we only assessed their roles as barriers to services. Given the strong focus of HIV prevention research among BMSM on structural factors as barriers to services, this review attempts to draw on the available literature to identify strategic points of intervention to provide BMSM with core skills to overcome barriers to services. Though literature on resiliency factors among BMSM is more limited, this is also a crucial area of future investigation. Through critical examination of articles using this conceptual framework, this review aims to describe the roles of healthcare, stigma and discrimination, incarceration, and poverty as structural barriers to HIV testing and prevention services among BMSM.

Methods

We searched two online databases (*PubMed* and *Scopus*) for peer-reviewed literature on structural barriers to HIV testing and prevention services among BMSM. We conducted the search in several stages using a comprehensive set of relevant key words and Medical Subject Heading, MeSH terms (“Appendix 1” section). First, we searched for articles pertaining to Black populations and cross-referenced those with articles pertaining to sexual identity or behavior applicable to MSM. Next, we cross-referenced these results with articles obtained from five additional searches. Four of the additional searches obtained articles related to each of four domains corresponding with

structural factors that have been researched in the literature: (1) healthcare, (2) stigma and discrimination, (3) incarceration, and (4) poverty. The remaining, additional search cross-referenced articles on HIV and those related to structural factors in general. Excluding duplicates, the search returned a total of 1,019 articles. We used the following criteria to determine which articles would be included in this review: (1) articles written in English, (2) articles published before 7 June 2013, (3) articles that reported quantitative or qualitative data collected from a sample or subsample of BMSM in the US, and (4) articles that reported data on exposures or outcomes related to structural factors. We also reviewed articles meeting inclusion criteria that were cited as references within these articles. In total, we reviewed 98 articles and extracted information across each of the four aforementioned domains.

Results

Healthcare

Access to Healthcare Services

There is insufficient evidence to determine the extent to which economic and infrastructural resources affect access to healthcare services among BMSM. One study that assessed types of insurance coverage among BMSM, which operates as a structural factor across macro and meso levels of economic resources (Table 1), found that 79.2 % reported coverage by public insurance, 20.8 % reported coverage by private insurance, and 4.6 % reported no insurance coverage [27]. However, these results have limited generalizability due to the use of a modified respondent-driven sampling method. By contrast, 19.0 % of Blacks in the US, compared with 11.1 % of non-Latino Whites, reported not having health insurance coverage in 2012 [43]. Demonstrating that HIV-positive BMSM face particular challenges to acquiring health insurance, two studies found that HIV-positive BMSM were less likely than HIV-positive MSM of other races/ethnicities to report having health insurance [12] and less likely than HIV-negative BMSM to report having health insurance or a primary healthcare provider [44]. Furthermore, a qualitative study conducted among different subgroups of Black men—which included a focus group consisting of solely BMSM—provides some evidence that BMSM have experienced barriers to accessing healthcare services related to meso-level economic resources required for visits and inadequate micro-level infrastructural resources of healthcare facilities [45] (Table 1). All groups identified high perceived costs and low perceived benefits of healthcare

Table 1 Structural barriers to HIV testing and prevention services among BMSM

Structural dimension [7]	Key findings
Material resources and allocations	<p><i>Many BMSM lack health insurance coverage.</i> One study found that 4.6 % of BMSM reported no insurance coverage [27], but its results have limited generalizability. The percentage without health insurance may be more similar to the 19.0 % of Blacks in the US that report not having health insurance coverage [43]. HIV-positive BMSM report less insurance coverage compared to HIV-positive MSM of other races/ethnicities [12]</p> <p><i>Some BMSM report high perceived costs and low perceived benefits of healthcare visits.</i> Due to the high costs of quality medical care combined with the expense of taking time from work for visits, primary healthcare is viewed by some as optional except in cases of urgent medical need [45]</p> <p><i>HIV testing and prevention services are not widely accessible in correctional facilities.</i> Rates of incarceration among BMSM are disproportionately high. Despite HIV prevalence rates that are approximately five times greater in prisons, only 20 states test all inmates for HIV at admission or while in prison, and only three states test them upon release [147]. In one state, only 31 % of male prisoners received a voluntary HIV test upon admission and many inmates were unaware of their status [148]. The provision of HIV prevention services including instructor-led educational modules, peer education programs, and HIV prevention case management is inconsistent [146, 149, 150]. Prisoners also experience a lack of condom availability [151], as only two state prison systems and five city/county jail systems in the US make condoms available to male inmates [152, 153]</p>
Science and technology	N/A
Informal social influences	<p><i>BMSM experience racism and homophobia during visits with healthcare and HIV prevention service providers.</i> Many physicians express negative attitudes toward MSM [49, 50]. HIV prevention service providers' attitudes toward BMSM are affected by ambivalent or negative beliefs that pervade the general community, and BMSM who cannot access nonjudgmental, comfortable testing environments are less likely to use HIV testing [14, 109, 112]</p> <p><i>BMSM experience barriers to disclosing sexual behavior to healthcare providers.</i> Having expressed concerns pertaining to issues of confidentiality, discrimination, comfort, distrust, and conspiracy beliefs [55–60], BMSM are less likely than other MSM to disclose their sexual behavior or identity to healthcare providers [53, 61, 62]. Demonstrating the importance of an open and supportive patient–provider relationship, MSM who disclose their sexual behavior to their healthcare provider are more likely to discuss HIV/AIDS, disclose their HIV status, accurately report unprotected anal intercourse, and get tested [44, 53, 62]</p> <p><i>Experiences of stigma and discrimination in the general community are associated with negative mental health outcomes, which can hinder BMSM from accessing HIV prevention services.</i> Stigma and discrimination can result in negative mental health outcomes, including depression and lower self-esteem [90, 96, 101, 112, 125, 126], and poor mental health can inhibit BMSM from voluntarily using HIV testing and prevention services [60, 90, 111, 112]. One study found that experiences of homophobia and racism in Black and LGBT communities, respectively, may lead to a psychological displacement that decreases the use of services and negatively affects open communication with healthcare providers [60]. Two studies found that racism and homophobia hindered the motivation of BMSM to access HIV prevention information [111, 112], and another found that those who had a less positive self-identification of being Black and gay reported lower HIV prevention self-efficacy [90]</p> <p><i>Voluntary HIV testing is stigmatized.</i> Voluntary HIV testing and use of HIV prevention services often involve the disclosure of stigmatized sexual behavior, such as having same-sex, anonymous, or multiple sexual partners [114–116], which can impede BMSM from using these services [58, 110]. If BMSM are perceived to be HIV-positive, they may experience stigma due to HIV status [101, 117–121], sometimes leading to a fear of diagnosis and further hindering the use of prevention services [58]</p>
Formal social control mechanisms	<p><i>Many healthcare providers lack cultural competency related to sexual identities of BMSM.</i> Many healthcare providers lack awareness of sexual identities and behaviors and fail to recognize the importance of discussing sexual health with patients as a routine component of medical care [51–54]. Among MSM in one study who had healthcare providers who were aware of their sexual behavior, only 59 % had received recommendations for HIV testing [53]</p>
Social interconnectedness	<p><i>Experiences of stigma and discrimination operate as barriers to HIV testing and prevention services through relationships and social interactions with healthcare providers and members of social networks</i></p>
Settings	<p><i>BMSM live in areas with the lowest density of HIV prevention services.</i> One study found that HIV prevention services in one city were located primarily in areas most affected by HIV in the earlier years of the epidemic, with a deficiency of services in Black communities where most young BMSM lived and reported the highest rates of unprotected anal intercourse [154]</p>

BMSM Black men who have sex with men, MSM men who have sex with men

visits as reasons for accessing healthcare more frequently for urgent health concerns as opposed to preventive care [45]. Primary healthcare may be viewed by some as

optional, except in cases of urgent medical need, due to the high expense of quality medical care combined with the expense of taking time from work for visits [45]. However,

Table 2 Studies of healthcare and HIV services in BMSM

Authors, references	Locations	Study samples	Study design	Key findings
Behel et al. [28]	Baltimore, Dallas, Los Angeles, New York City	Analyses were conducted for 458 Black and 906 White MSM	Cross-sectional	<p>(1) There were no differences between BMSM and White MSM in use of a HCP, visiting a HCP five or more times since the age of 20, previously testing for HIV, testing for HIV five or more times, and testing for HIV in the past 12 months</p> <p>(2) BMSM were more likely than White MSM to receive any (AOR = 2.2, 95 % CI [1.42, 3.26]) or all (AOR = 2.5, 95 % CI [1.72, 3.71]) of five HIV prevention services at their HCP and to be satisfied with the services they received (AOR = 1.7, 95 % CI [1.14, 2.65])</p> <p>(3) BMSM were more likely than White MSM to report testing for HIV at health departments ($p = 0.0419$) and hospitals ($p < 0.0001$), and were equally as likely to report testing at a private MD compared to all other testing facilities ($p = 0.8535$)</p> <p>(4) Compared with White MSM, BMSM were more likely to increase the frequency of asking their partners' HIV status ($p < 0.0001$) and to report decreasing their number of different sex partners as a result of their last HIV counseling and testing experience ($p = 0.0003$)</p> <p>(5) HIV-positive unaware BMSM were as likely as White MSM to report having tested HIV-negative in the past year ($p = 0.9976$), and among those who had tested, BMSM were more likely to report that their counselor explained HIV/AIDS ($p = 0.03$), asked about condom use ($p = 0.03$), talked about risk reduction ($p = 0.02$), talked about retesting ($p = 0.02$), and discussed talking to their partner about test results ($p = 0.04$)</p>
Bernstein et al. [62]	New York City	452 MSM in NHBS	Cross-sectional	<p>(1) BMSM were less likely than White MSM to have disclosed their sexuality to their HCP (AOR = 0.28, 95 % CI [0.14, 0.53])</p> <p>(2) MSM who had ever been tested for HIV were more likely to have disclosed their sexuality to their HCP (AOR = 2.10, 95 % CI [1.01, 4.38])</p>
CDC [32]	21 Cities	7,271 MSM in NHBS who did not previously test positive for HIV	Cross-sectional	<p>61 % (95 % CI [58, 63]) of BMSM reported testing for HIV in the last 12 months, and the proportion of those who reported testing in the last 12 months did not differ by race/ethnicity</p>
Dombrowski et al. [84]	King County, WA	501 Previously diagnosed HIV-positive MSM	Cohort	BMSM were as likely to be on ART as White MSM (RR = 1.05, 95 % CI [0.77, 1.45])
Dorell et al. [44]	Jackson, MS	30 HIV-positive and 95 HIV-negative young BMSM	Case-control	<p>(1) HIV-positive cases were more likely than HIV-negative controls to report not having health insurance (OR = 2.5, 95 % CI [1.1, 5.8]), but there were no differences in the type of health insurance reported</p> <p>(2) HIV-positive cases were more likely to report not having a primary HCP (OR = 6.4, 95 % CI [2.4, 17.1]), not receiving advice on HIV or STD prevention or testing (OR = 5.4, 95 % CI [1.3, 21.5]), and disclosing sexual identity to a HCP (OR = 7.0, 95 % CI [1.6, 29.3])</p> <p>(3) Lacking a primary HCP (AOR = 4.5, 95 % CI [1.4, 14.7]) and not disclosing sexual identity to a HCP (AOR = 8.6, 95 % CI [0.8, 40.0]) were associated with HIV infection</p>

Table 2 continued

Authors, references	Locations	Study samples	Study design	Key findings
Fuqua et al. [74]	San Francisco, CA	256 BMSM	Cross-sectional with some follow-up	(1) 23 % of HIV-positive BMSM were unaware of their infection (2) 27 % of newly diagnosed BMSM returned for their confirmatory HIV test result despite follow-up reminder phone calls, which underscores the challenges of linkage to care
Halkitis et al. [80]	New York City	456 HIV-positive MSM	Cross-sectional	BMSM were less likely to be on ART than White or Latino MSM ($p < 0.005$), but there were no differences across race/ethnicity in CD4 count, viral load, access to insurance, or source of HIV medical care
Halkitis et al. [79]	New York City	300 HIV-positive MSM	Cohort	At baseline, BMSM had lower treatment adherence than MSM of other races and ethnicities ($p < 0.0001$), and adherence remained relatively stable over time
Hall et al. [77]	13 States or cities	100,375 HIV-positive people	Cohort	BMSM were less likely to be engaged in continuous care (41.4 %) or established in care after HIV diagnosis (54.5 %) compared with Hispanic/Latino (48.4 and 70.6 %, respectively) and White MSM (50.7 and 74.8 %, respectively)
Hightow-Weidman et al. [83]	Bronx, Rochester, Chapel Hill, Chicago, Detroit, Houston, Los Angeles, Oakland	155 HIV-positive young racial/ethnic minority MSM	Cohort	There were no differences between BMSM and Latino MSM in having a baseline CD4 count ≤ 350 ($p = 0.311$) or in starting ART ($p = 0.992$)
Hightow-Weidman et al. [75]	Bronx, Rochester, Chapel Hill, Chicago, Detroit, Houston, Los Angeles, Oakland	363 HIV-positive young racial/ethnic minority MSM	Cohort	Retention in care for 1 year was lower for BMSM (79.9 %) than for Latino MSM (96.2 %; $p = 0.006$)
Jones et al. [172]	Nashville, TN	4 BMSM who are sex workers	Qualitative	Participants discussed qualities of HCPs, such as trustworthiness and lack of judgment, that impact their utilization of outreach services. They also discussed the challenges of interacting with a non-responsive service system from a relatively powerless perspective
Lechuga et al. [173]	Milwaukee, WI	633 MSM	Cross-sectional	Higher proportions of Black (78.3 %) and Latino (77.6 %) MSM compared to White MSM (48.9 %) reported receiving an HIV test in the last 12 months (no p value reported)
Mackellar et al. [31]	Baltimore, Dallas, Los Angeles, Miami, New York City, Seattle	439 MSM with unrecognized HIV infection in NHBS	Cross-sectional	HIV-positive BMSM were not significantly more likely than HIV-positive White MSM to report delayed testing (AOR = 1.6, 95 % CI [0.9, 2.9])
Magnus et al. [61]	Washington, DC	500 MSM in NHBS, including 178 BMSM	Cross-sectional	BMSM were less likely than other MSM to have health insurance ($p < 0.05$), to have been tested for HIV ($p < 0.05$), and to have disclosed MSM status to HCPs ($p < 0.01$)
Malebranche et al. [60]	New York State and Atlanta, GA	81 BMSM	Qualitative	The internalization of experiences of racial and sexual discrimination and negative encounters with medical institutions impact healthcare utilization, HIV testing, communication with HCPs, and medication adherence

Table 2 continued

Authors, references	Locations	Study samples	Study design	Key findings
Martinez and Hosek [57]	Chicago, IL	Six non-gay-identified young BMSM	Qualitative	Participants reported that it is difficult to trust HCPs with information pertaining to their sexual behaviors. Only through the development of trusting relationships with their HCPs would they reveal accurate information regarding their sexual behaviors
McKirnan et al. [174]	Chicago, IL	871 MSM	Cross-sectional	BMSM were more likely than White MSM to report limited healthcare access (AOR = 1.33, $p < 0.001$)
Millett et al. [11]	National	Black and White MSM	Meta-analysis	There was no difference between BMSM and White MSM in lifetime HIV testing (OR = 0.66, 95 % CI [0.34, 1.30])
Millett et al. [12]	National	MSM who participated in 174 US studies	Meta-analysis	(1) Among HIV-negative MSM, BMSM were as likely as other MSM to have health insurance (OR = 0.86, 95 % CI [0.52, 1.43]) and have received a lifetime HIV test (OR = 0.84, 95 % CI [0.63, 1.12]), but were more likely than White MSM to have received an HIV test in the past year (OR = 1.51, 95 % CI [1.11, 2.05]), to have received repeat HIV testing (OR = 1.49, 95 % CI [1.29, 1.73]), to have undiagnosed HIV infection (OR = 6.38, 95 % CI [4.33, 9.39]), and to have used PEP/PrEP (OR = 1.99, 95 % CI [1.32, 3.00]) (2) Among HIV-positive MSM, BMSM were less likely than other MSM to initiate cART (OR = 0.40, 95 % CI [0.26, 0.62]), have health insurance (OR = 0.47, 95 % CI [0.29, 0.77]), have a high CD4 count (OR = 0.49, 95 % CI [0.34, 0.71]), and be virally suppressed (OR = 0.51, 95 % CI [0.31, 0.83])
Mimiaga et al. [27]	Boston, MA	197 BMSM	Cross-sectional	(1) 33 % of HIV-negative BMSM had not been tested for HIV in the last 2 years (2) Not having received an HIV test in the last 2 years was associated with lower likelihoods of visiting a HCP in the last 12 months (RR = 0.39, 95 % CI [0.11, 0.55]) and having a HCP recommend HIV testing at their last visit (ARR = 0.26, 95 % CI [0.04, 0.67])
Namin et al. [58]	New York City	29 BMSM	Qualitative	Perceptions of lack of anonymity, breach of confidentiality, and lower reliability of rapid HIV tests compared to standard blood-draw tests were identified as barriers to HIV testing
Nelson et al. [72]	Seattle, WA	77 Newly diagnosed HIV-positive MSM	Cross-sectional	(1) HIV-positive BMSM were more likely than other HIV-positive MSM to be delayed testers, defined as having been diagnosed with HIV 1 year or more after HIV infection ($p < 0.01$) (2) HIV-positive BMSM were more likely to be delayed testers than non-delayed testers (AOR = 17.2, 95 % CI [1.8, 166])
Oh et al. [82]	Baltimore, Chicago, Pittsburgh, Los Angeles	1,102 Black, Hispanic, and White HIV-positive MSM	Cohort	BMSM were more likely than White MSM to report less than 100 % ART adherence (AOR = 1.37, 95 % CI [1.05, 1.79])

Table 2 continued

Authors, references	Locations	Study samples	Study design	Key findings
Oster et al. [81]	21 Cities	8,166 Black and White MSM in NHBS	Cross-sectional	<p>(1) Among newly diagnosed HIV-positive MSM, there were no significant differences between BMSM and White MSM in health insurance ($p = 0.10$), seeing a HCP in the last 12 months ($p = 0.73$), being tested for HIV in the past 12 months ($p = 0.23$), and number of times tested in the past 2 years ($p = 0.52$), but BMSM were more likely than White MSM to have been offered an HIV test by a HCP ($p < 0.0001$)</p> <p>(2) Among previously diagnosed HIV-positive MSM, BMSM were less likely than White MSM to report having health insurance ($p = 0.02$), having been seen by a HCP within 3 months of diagnosis ($p = 0.02$), and being on ART at the time of interview ($p < 0.0003$). BMSM were as likely as White MSM to have been seen by a HCP for HIV infection within the past 6 months ($p = 0.13$)</p>
Petroll and Mosack [53]	Milwaukee, WI	271 MSM	Cross-sectional	<p>(1) BMSM were less likely than White MSM to have PCPs who were aware of their sexual orientation ($p = 0.015$)</p> <p>(2) Participants with female ($p = 0.032$), gay ($p = 0.001$), or younger ($p = 0.047$) PCPs were more likely to have disclosed their sexual orientation</p> <p>(3) PCP knowledge of sexual orientation was associated with higher likelihoods that PCPs recommended HIV testing ($p = 0.0001$) and that participants had been tested for HIV ($p = 0.0001$)</p>
Pierce et al. [154]	Chicago, IL	788 Young BMSM	Ecologic, cross-sectional	Areas in which young BMSM reside typically have low HIV service densities
Saleh et al. [109]	Northern California	21 Black MSMW and 21 service providers	Qualitative	<p>(1) Non-gay-identified Black MSMW can challenge assumptions of HCPs about sexual behavior and sexual identity</p> <p>(2) Attitudes of HCPs toward Black MSMW can be affected by ambivalent or negative beliefs that pervade the general community</p> <p>(3) Black MSMW may experience anxiety about disclosing same-sex behaviors to counselors, and they need safe and nonjudgmental spaces that offer HIV risk reduction</p>
Schneider et al. [175]	Chicago, IL	204 HIV-negative and HIV-positive BMSM	Cross-sectional	<p>(1) BMSM had high utilization of HIV Health Centers (45.9–70.3 %), but high-risk HIV-negative participants affiliated most with HIV Health Centers that offered only treatment services</p> <p>(2) BMSM who are in the same age group, who have the same HIV status, and who have similarly sized social networks are more likely to use the same health centers as each other (no p-values reported)</p>
Scott et al. [176]	San Francisco, CA	440 White, Latino, and Black MSM in NHBS	Cross-sectional	There were no differences in testing for HIV in the last 12 months ($p = 0.71$), receiving condoms in the last 12 months ($p = 0.55$), or utilizing any HIV prevention service ($p = 0.36$) among Black, Latino, and White MSM

Table 2 continued

Authors, references	Locations	Study samples	Study design	Key findings
Traeger et al. [76]	Boston, MA	503 HIV-positive MSM in primary care	Cohort	BMSM were more likely than White MSM to be non-adherent to HIV medical appointments over 12 months (AOR = 3.00, 95 % CI [1.50, 5.99])
Wheeler [69]	San Francisco, CA	50 HIV-positive BMSM	Qualitative	ART adherence is influenced by the relationship between the patient and HCP, and being able to be open and honest with HCPs is important

BMSM Black men who have sex with men, *MSM* men who have sex with men, *HCP* healthcare provider, *AOR* adjusted odds ratio, *CI* confidence interval, *NHBS* National HIV Behavioral Surveillance, *OR* odds ratio, *STD* sexually transmitted disease, *ART* antiretroviral therapy, *PEP* post-exposure prophylaxis, *PrEP* pre-exposure prophylaxis, *cART* combination antiretroviral therapy, *RR* relative risk, *ARR* adjusted relative risk, *PCP* primary care provider, *MSMW* men who have sex with men and women

while further research is needed that focuses on the relationship between resources available to BMSM and their use of services, access to general healthcare services does not necessarily yield receipt of HIV testing and prevention services [46, 47]. One study among BMSM found a positive association between having health insurance and being unaware of one's HIV-positive status, suggesting that other factors such as stigma, fear of diagnosis, and perceived quality of services may serve more significant roles as barriers to learning one's status [48] (Table 2).

Cultural Competency of Healthcare Services

BMSM experience barriers to accessing HIV testing and prevention services within micro-level informal and formal social influence dimensions related to the inadequate provision of culturally competent healthcare services (Table 1). Supportive social norms surrounding male-to-male sexual behavior as well as formal cultural competency of healthcare providers are critical for fostering positive relationships between providers and BMSM that facilitate access to HIV testing and prevention services at healthcare visits. Homophobia among physicians has decreased in recent years; however, research has shown that many physicians still express negative attitudes toward MSM [49, 50]. Many healthcare providers lack awareness of sexual identities and behaviors, and fail to recognize the importance of discussing sexual health with patients as a routine component of medical care [51–54]. Having expressed concerns pertaining to issues of confidentiality, discrimination, comfort, distrust, and conspiracy beliefs [55–60], BMSM are less likely than other MSM to disclose their sexual behavior or identity to healthcare providers [53, 61, 62]. Demonstrating the importance of an open and supportive patient-provider relationship for facilitating access to HIV testing and prevention services, MSM who disclosed their sexual behavior to their healthcare provider were more likely to discuss HIV, disclose their HIV status, accurately report unprotected anal intercourse (UAI), and obtain testing [44, 53, 62]. BMSM whose healthcare provider recommended HIV testing were more likely to have been tested in the last 2 years [63]. However, BMSM who disclose their sexual behavior to their healthcare providers may still fail to receive HIV prevention services. Among MSM in one study who had healthcare providers who were aware of their sexual behavior, only 59 % had received recommendations for HIV testing [53]. Moreover, among the 71.4 % of MSM who reported that their primary care provider was aware of their sexual orientation, 70.1 % reported having disclosed their sexual orientation without being asked, 13.8 % disclosed after the primary care provider asked, and 13.9 % believed their primary care provider correctly assumed their sexual orientation [53]. Those

who are less comfortable discussing their sexual behavior may not disclose unless their healthcare provider actively inquires [53] (Table 2).

Access to PrEP and PEP

While no studies were identified that investigated barriers to access of antiretroviral therapy (ART) medications as PrEP or PEP to prevent HIV infection among BMSM, research that investigates how structural factors may limit access to PrEP or PEP is needed. PrEP has been found to be partially efficacious among MSM [64], and based on results from an online survey in 2010, BMSM were more willing than non-Latino White MSM to use PrEP for HIV prevention purposes [65]. A meta-analysis also found that BMSM were more likely than non-Latino White MSM to use PEP or PrEP [12], though the analysis included results from studies conducted prior to approval of ART as PrEP by the US Food and Drug Administration. There are challenges to PrEP implementation among MSM, however, related to the limited willingness of physicians to prescribe PrEP, inadequate effectiveness and cultural competency of messages about PrEP, and high costs to individuals [66]. In addition, psychosocial issues (e.g., substance use, housing/shelter, intimate partner violence) can impede successful PrEP adherence among BMSM [67]. To better understand these complexities, future studies should examine how structural factors affect access and adherence to PrEP and PEP among BMSM.

Treatment as Prevention

There are also barriers to treatment and care services among HIV-positive BMSM. While these are distinct from barriers to prevention services, they increase the virulence among sexual networks of BMSM and consequently increase the likelihood of HIV transmission [38], indirectly serving as a barrier to HIV prevention among this population. Since BMSM are more likely to have sexual partners who are Black, more effective treatment and care services may help decrease HIV transmission among the sexual networks of Black communities [30]. Similar to barriers to services experienced by HIV-negative BMSM, self-reported barriers to ART adherence and retention in care among HIV-positive BMSM include medical miscommunication, low levels of healthcare provider cultural competency, mistrust, embarrassment, racism, and sexual prejudice [60, 68–71], encompassing informal and formal social influence structural dimensions on micro-level structures of society (Table 1). Research has found that HIV-positive BMSM were more likely than other HIV-positive MSM to be delayed testers [72, 73], and in an HIV testing program that used respondent-driven sampling to

recruit BMSM, only 27 % of newly diagnosed men returned to receive their confirmatory test results and discuss referrals to care [74]. While it is possible that men already had a healthcare provider that they chose to go to for follow-up, the authors hypothesized that they may have been psychologically unready to receive confirmation of their HIV-positive status, serving as a barrier in linkage to care [74]. Consistent with such challenges, studies have found that BMSM were less likely to be retained in HIV care compared to non-Latino White MSM [75–77] and less likely than other MSM to be virally suppressed 1 year after diagnosis [78]. However, there is inconsistent evidence that HIV-positive BMSM have lower ART adherence than other HIV-positive MSM. Four studies found lower adherence among BMSM compared to other MSM [79–82], yet two other studies found no differences by race/ethnicity among MSM [83, 84] (Table 2).

Stigma and Discrimination

Based on interconnected social inequalities that exist on meso and micro structural levels of society, experiences of stigma and discrimination due to race [15, 17, 85–97] and sexual orientation [15, 22, 86, 92, 96, 98–104] among BMSM are significant barriers to HIV testing and prevention services within the structural dimension of informal social influence and control (Table 1). Consistent with studies that have found that stigma and discrimination are correlates of HIV risk among BMSM [105–108] (Table 3), there is strong evidence that experiences of stigma and discrimination due to race and sexual orientation—operating through social interactions at healthcare visits and within social networks—negatively affect access to HIV testing and prevention services among this population [14, 22, 58, 60, 109–112]. Such experiences may involve overt forms of discrimination as well as micro-aggressions, which are defined as brief, commonplace, often unintentional, daily verbal, behavioral, and environmental affronts directed at people of color and other disenfranchised groups [113]. BMSM across multiple studies have indicated perceptions of racism and homophobia during visits to healthcare providers and were less likely to use HIV prevention services if they were unable to access non-judgmental, comfortable healthcare environments [14, 22, 109]. Voluntary HIV testing and use of HIV prevention services often involve the disclosure of stigmatized sexual behavior, such as having same-sex, anonymous, or multiple sexual partners [114–116], which can also impede BMSM from using these services [58, 110]. If BMSM are HIV-positive or perceived to be HIV-positive, they may also experience stigma due to HIV status [101, 117–121], sometimes leading to a fear of diagnosis and further hindering the use of prevention services [58]. Additionally,

Table 3 Studies of stigma or discrimination and HIV risk in BMSM

Authors, references	Locations	Study samples	Study design	Prevalence of experiences of stigma or discrimination	Key findings
Ayala et al. [105]	Los Angeles County, New York City, Philadelphia	1,154 Black and 1,081 Latino MSM in the Brothers y Hermanos study	Cross-sectional	N/A	BMSM who engaged in serodiscordant or unknown-status UAI reported higher mean scores for experiences of racism ($p = 0.003$) and homophobia ($p < 0.001$) than BMSM who did not engage in serodiscordant or unknown-status UAI, and these associations were mediated by potentially risky situations
Bogart et al. [177]	Los Angeles, CA	181 HIV-positive BMSM and 167 HIV-positive Latino MSM	Cross-sectional (baseline data used from a cohort study)	Among BMSM, 53 % experienced racial discrimination, 45 % experience discrimination due to HIV-status, and 44 % experienced discrimination due to sexual orientation in the last year	(1) Black participants who experienced greater racial discrimination were less likely to have a high CD4 cell count (AOR = 0.7, 95 % CI [0.5, 0.9]) and an undetectable viral load (AOR = 0.8, 95 % CI [0.6, 1.0]), and were more likely to visit the emergency department (AOR = 1.3, 95 % CI [1.0, 1.7]) (2) Sexual orientation discrimination was associated with higher CD4 cell counts (AOR = 1.5, 95 % CI [1.0, 2.2]) (3) No effects were significant for HIV serostatus discrimination (4) The combined effects of three types of discrimination due to race, sexual orientation, and HIV-status predicted greater AIDS symptoms, defined as the number of 14 AIDS-related symptoms (e.g., diarrhea, fever) experienced for at least 2 weeks in the past 3 months ($p < 0.01$)
Bogart et al. [99]	Los Angeles, CA	152 HIV-positive BMSM	Cohort	Over 6 months, 38 % experienced discrimination due to HIV serostatus, 40 % experienced discrimination due to race/ethnicity, and 33 % experienced discrimination due to sexual orientation	Experiences of racial discrimination, but not discrimination due to sexual orientation or HIV status, were associated with ART nonadherence over a 6-month follow-up period ($p < 0.01$), and those who experienced high levels of discrimination had worse ART adherence than did those who experienced low levels of racial discrimination or no racial discrimination

Table 3 continued

Authors, references	Locations	Study samples	Study design	Prevalence of stigma or discrimination	Key findings
Dillon and Basu [22]	National	Black and Latino MSM from 12 qualitative studies	Qualitative meta-analysis	N/A	BMSM reported that stigma surrounding MSM and HIV/AIDS led to a decreased likelihood of discussing sexual practices and HIV prevention with family, friends, and sexual partners. BMSM also reported avoidance of HIV prevention services due to distrust
Fields et al. [108]	Los Angeles, CA	131 HIV-positive BMSM	Cross-sectional	Of the 60 % who experienced any interpersonal trauma, 47 % attributed at least one trauma experience to being gay, 17 % to race, and 9 % to HIV serostatus	Experiencing discrimination-related trauma was associated with UAI with any male partner (AOR = 2.44, 95 % CI [1.05, 5.71]) and UAI with an HIV-positive male partner (AOR = 3.49, 95 % CI [1.42, 8.61])
Jeffries et al. [106]	New York City, Philadelphia	1,154 BMSM in the Brothers y Hermanos study	Cross-sectional	In the past 12 months, 9–13 % were hit or beaten up due to homophobia, 34–39 % were treated rudely or unfairly, 36–41 % were made fun of or called names, 35–45 % had to act more manly than usual to be accepted, and 39–41 % felt uncomfortable in a crowd of heterosexual Black people	(1) Among men not previously diagnosed with HIV infection, medium-level (AOR = 1.71, 95 % CI [1.06, 2.52]) and high-level homophobic experiences (AOR = 1.71, 95 % CI [0.95, 3.08]) compared to no homophobic experiences were associated with UAI (2) Among men who knew they were HIV-infected, low-level (AOR = 2.77, 95 % CI [1.39, 5.54]), medium-level (AOR = 2.83, 95 % CI [1.61, 4.98]), and high-level (AOR = 2.48, 95 % CI [1.09, 5.65]) homophobic experiences compared to no homophobic experiences were associated with transmission risk behavior

Table 3 continued

Authors, references	Locations	Study samples	Study design	Prevalence of stigma or discrimination	Key findings
Malebranche et al. [107]	Atlanta, GA	456 BMSM in the Brothers United Study	Cross-sectional	43.9 % Reported experiences of discrimination because of being gay	(1) Men who experienced discrimination because of being gay were more likely than those who had not experienced discrimination for being gay to report UIAI (AOR = 1.6, 95 % CI [1.0, 2.6]) and URAI (AOR = 1.6, 95 % CI [1.0, 2.6]) with men, although the association between discrimination and URAI was marginally insignificant (2) Higher gender role conflict did not predict UIAI (OR = 1.1, 95 % CI [0.9, 1.4]) or URAI (OR = 1.1, 95 % CI [0.8, 1.4]) with men, but predicted UV/UIAI with women among bisexually active participants (OR = 2.0, 95 % CI [1.0, 3.9]) Greater internalized HIV stigma was associated with less HIV status disclosure to participants' last sexual partner (AOR = 0.49, $p < 0.05$) and to family members ($p < 0.05$)
Overstreet et al. [178]	Atlanta, GA	156 HIV-positive BMSM	Cross-sectional	N/A	(1) BMSM who endorsed higher levels of sexual minority stigma engaged in less UIAI ($p < 0.01$) (2) BMSM who endorsed more HIV stigma engaged in less UIAI ($p < 0.05$) but more URAI ($p < 0.01$), and engaged in more UIAI while high or intoxicated ($p < 0.05$)
Radcliffe et al. [98]	Philadelphia, PA	40 HIV-positive young BMSM	Cross-sectional	90 % Endorsed stigma related to their nonheterosexual status, 88 % endorsed stigma related to their HIV status, and 78 % endorsed both sexual minority stigma and HIV stigma	(1) HIV-positive men reported lower levels of internalized homonegativity compared to HIV-negative men ($p = 0.006$) (2) Being HIV-positive was not significantly associated with experiences of homophobia
Robinson et al. [158]	Boston, Minneapolis–St. Paul	217 HIV-positive and 302 HIV-negative BMSM	Case-control	N/A	Among BMSM, MSM stigma and HIV-related stigma were not significantly associated with retention in HIV care
Wohl et al. [179]	Los Angeles County, CA	398 HIV-positive Latino and Black MSM and women	Cross-sectional	N/A	

BMSM Black men who have sex with men, MSM men who have sex with men, UIAI unprotected anal intercourse, AOR adjusted odds ratio, CI confidence interval, ART antiretroviral therapy, UIAI unprotected insertive anal intercourse, URAI unprotected receptive anal intercourse, OR odds ratio, UVI unprotected vaginal intercourse

Blacks are more disapproving of homosexuality than Whites, even after controlling for religious and educational differences, which promotes internalized homophobia and may inhibit BMSM from adopting HIV testing behaviors [122–124]. Experiences of stigma and discrimination among BMSM have consistently been associated with negative mental health outcomes, including depression and lower self-esteem [90, 96, 101, 112, 125, 126], and studies have found that poor mental health—which is associated with HIV infection [127–132]—can contribute to the inadequate use of HIV testing and prevention services among this population [60, 90, 111, 112]. One study found that experiences of homophobia and racism in Black and LGBT communities, respectively, may lead to a psychological displacement that decreases the use of services and negatively affects open communication with healthcare providers [60]. Two studies found that racism and homophobia hindered the motivation of BMSM to access HIV prevention information [111, 112], and another study found that those who had a less positive self-identification of being Black and gay reported lower HIV prevention self-efficacy [90] (Table 3). In order to expand access to HIV testing and prevention services among BMSM, it is critical to address stigma and discrimination due to race, sexual orientation, and perceived HIV status on a structural level.

Incarceration

Incarceration acts as a major structural barrier to HIV testing and prevention services for BMSM across meso-level dimensions of resources and social influence and control factors (Table 1). The rates of incarceration among Black men [133, 134] and BMSM [12, 61, 110, 135–138] are highly disproportionate compared to rates among men and MSM, respectively, both of other races/ethnicities. Additionally, the HIV prevalence is approximately five times higher in prisons than in the general population [139, 140]. Despite research indicating that high HIV prevalence rates in correctional institutions may result primarily from transmission occurring prior to incarceration [141] and limited evidence of an association between incarceration and increased HIV risk among BMSM [20, 61, 81, 110, 142–144] (Table 4), incarcerated settings are an important venue for the provision of comprehensive HIV testing, prevention, and education services. Previously incarcerated individuals often return to communities lacking preventive health information and skills, appropriate medical services, and other necessary forms of support [145]. There is also some evidence that HIV prevention case management and peer education programs have decreased risk behaviors and increased HIV knowledge among participants, though research on HIV prevention interventions in correctional settings is scarce [145, 146]. Despite the high HIV

prevalence in prisons, only 20 states test all inmates for HIV at admission or while in prison, and only three states test them upon release [147]. In one state, only 31 % of male prisoners received a voluntary HIV test upon admission and many inmates were unaware of their status [148]. Prisons in certain states do offer services including instructor-led educational modules, peer education programs, and HIV prevention case management, but they are inconsistent [146, 149, 150]. Prisoners also experience a lack of condom availability [151], as only two state prison systems and five city/county jail systems in the US make condoms available to male inmates [152, 153]. Among Black men in one study who reported having anal intercourse while incarcerated, 90 % reported never using a condom during anal sex while incarcerated compared with 42 % who reported never using a condom during anal sex while not incarcerated [143]. Taken together, these studies demonstrate that improving the completeness and consistency of HIV testing and prevention services in correctional facilities represents a salient structural-level opportunity to expand services to more BMSM.

Poverty

The effect of poverty on access to HIV testing and prevention services among BMSM is complex and not well understood. The unbalanced geographic distribution of services can act as a structural barrier to services within the meso-level dimension of settings (Table 1), as one study found that areas of a city where young BMSM lived and reported the highest rates of UAI also had the lowest densities of HIV prevention services [154]. While services were located primarily in areas most affected by HIV in the earlier years of the epidemic, there was a deficiency of services in Black communities despite a higher HIV prevalence in those areas of the city [154]. There is a void in research examining the potential relationship between socioeconomic status (SES) and access to HIV testing and prevention services among BMSM. Given that BMSM face economic and social challenges related to the unequal geographic allocation of resources, high levels of unemployment, the spatial concentration of violent crime, and disproportionate placement in the lowest-performing schools [155–157], this is a particularly critical area of investigation. Although no articles were identified that discussed the relationship between SES and access to HIV prevention services among BMSM, studies among BMSM have found inconsistent evidence that poverty is associated with a greater risk of HIV infection [44, 48, 74, 105, 110, 158] (Table 5). However, their analyses have generally used arbitrary categorizations of self-reported income that have differed across studies and may account for some of the disparate results. A positive association between low

Table 4 Studies of incarceration and HIV risk in BMSM

Authors, references	Locations	Study samples	Study design	Prevalence or incidence of incarceration	Key findings
Brewer et al. [142]	Boston, Atlanta, Los Angeles, New York City, San Francisco, Washington, DC	1,278 BMSM in HPTN 061 study	Cohort	The estimated annualized incarceration incidence was 35 % per 100 person-years	There was no association between incarceration during study follow-up and incident HIV infection (AHR = 1.69, 95 % CI [0.64, 4.44])
Brewer et al. [135]	Boston, Atlanta, Los Angeles, New York City, San Francisco, Washington, DC	1,553 BMSM in HPTN 061 study	Cross-sectional	60.0 % Reported a history of incarceration	Incarceration history was not associated with having two or more male partners (AOR = 1.13, 95 % CI [0.84, 1.51]) or URAI with any male partner (AOR = 0.89, 95 % CI [0.71, 1.12]) in the 6 months prior to enrollment
Bland et al. [20]	Boston, MA	197 BMSM	Cross-sectional	51 % Reported a lifetime history of incarceration and 46 % of those reported ≥ 90 days in jail or prison the last time they were incarcerated	(1) Incarceration for < 90 days was associated with UAI with a male partner in last 12 months (AOR = 3.09, 95 % CI [1.34, 7.14]), UAI with three or more male partners in last 12 months (AOR = 2.55, 95 % CI [1.09, 5.97]), and UAI with the most recent male sex partner (AOR = 2.32, 95 % CI [1.03, 5.19]) (2) Incarceration for ≥ 90 days was associated with unprotected vaginal or anal sex with a female partner in last 12 months (AOR = 2.46, 95 % CI [1.01, 5.99])
CDC [144]	Georgia	88 Male inmates who seroconverted during incarceration and 88 controls matched by sentence length and time already served	Case-control	N/A	HIV seroconversion during incarceration was associated with any male-male sex in prison (AOR = 10.1, 95 % CI [3.0, 54.9]) and Black race (AOR = 3.7, 95 % CI [1.1, 16.7])
Jones et al. [110]	Three North Carolina cities	252 BMSM	Cross-sectional	7.5 % had spent time in jail or prison during the past 2 months	Men who were incarcerated in the last 2 months were significantly more likely to report UJAI than those who were not incarcerated in the last 2 months (OR = 2.64, 95 % CI [1.03, 6.78])
Magnus et al. [61]	Washington, DC	500 MSM in NHBS including 178 BMSM	Cross-sectional	Among BMSM, 25.5 % reported having ever been to jail, prison, or juvenile detention	Among BMSM, incarceration was not associated with being confirmed HIV-positive (AOR = 1.34, 95 % CI [0.79, 2.25])
Oster et al. [81]	21 Metropolitan statistical areas	5,183 Black and White MSM not previously diagnosed with HIV infection in NHBS	Cross-sectional	N/A	Incarceration in the past 12 months was not associated with HIV infection (AOR = 0.8, 95 % CI [0.6, 1.2]), suggesting that it does not explain the disparity in HIV infection between BMSM and White MSM

Table 4 continued

Authors, references	Locations	Study samples	Study design	Prevalence or incidence of incarceration	Key findings
Wohl et al. [143]	Los Angeles County, CA	305 HIV-positive Black men, of ages 20–49, and 305 neighborhood controls, frequency-matched by age	Case-control	54.4 % had a history of incarceration in a jail, detention center, or prison between 1978 and first positive HIV test result (or that of the control's matched case)	<p>(1) After controlling for anal sex while not incarcerated, there was no association between anal sex during incarceration and HIV infection (AOR = 1.1, 95 % CI [0.6, 2.2])</p> <p>(2) Among men with a history of incarceration, the percentage reporting anal sex with men outside of incarceration (45 %) was greater than those reporting anal sex while incarcerated (16 %)</p> <p>(3) Increased time in jail or prison was associated with less HIV infection ($p = 0.001$)</p>

BMSM Black men who have sex with men, *HPTN* HIV Prevention Trials Network, *AHR* adjusted hazard ratio, *CI* confidence interval, *AOR* adjusted odds ratio, *URAI* unprotected receptive anal intercourse, *UAI* unprotected anal intercourse, *MSM*, men who have sex with men, *NHBS* National HIV Behavioral Surveillance

income and HIV risk was reported by two studies [158, 159], one of which found that having an income less than \$15,000 was one of the best predictors of UAI [159]. Others found non-significant associations between low income and HIV infection [44], financial hardship and UAI [105], and unemployment and UAI [110]. More rigorous research aiming to better understand the effects of poverty—and those of its intersectional nature with race, gender, and sexuality [160]—on access to services and risk of HIV infection among BMSM is needed. As the impact of poverty on access to HIV testing and prevention services among BMSM is complex, future research should consider specific mechanisms by which low SES may impede access to services, potentially involving the locations of HIV prevention service providers, convenience of available forms of transportation, physical layout of facilities, and exposure to community violence.

Discussion

The overarching objective of this research based on a critical review of the literature was to better understand how structural factors act as barriers to accessing HIV testing and prevention services among BMSM. The findings from this review provide compelling evidence that a novel approach to designing HIV prevention interventions that reflects the structural contexts in which BMSM access services is needed. Our analysis provides relevant findings pertaining to the complex processes by which structural factors are, in fact, related to individual testing behaviors and use of prevention services. In addition to aiming to reduce sexual risk behaviors, interventions for BMSM on a structural level ought to focus on the development and implementation of culturally congruent strategies that would eliminate barriers to accessing HIV testing and prevention services and equip BMSM with the knowledge, skills, and tools to navigate complex systems that may not meet their needs. Structural interventions that have been developed for other populations [161–165] can also be adopted for implementation with BMSM.

In using the dynamic social systems model developed by Latkin et al. [7] to conceptualize the roles of structural factors as barriers to HIV testing and prevention services, three major themes emerged that underscore the strong social nature of structural barriers to services among BMSM. First, non-supportive relationships with healthcare providers within micro-level informal and formal social influence and control dimensions can impede access to services, as experiences of racism and homophobia during visits with healthcare providers limit the receipt of comprehensive HIV testing and prevention services [14, 109, 112]. Positive patient–provider relationships are critical for

Table 5 Studies of poverty and HIV risk in BMSM

Authors, references	Locations	Study samples	Study design	Prevalence of poverty	Key findings
Ayala et al. [105]	Los Angeles County, New York City, Philadelphia	1,154 Black and 1,081 Latino MSM	Cross-sectional	Among BMSM, 35 % had an annual income <\$5,000, 24 % had one between \$5,000 and 9,999, and 24 % had one between \$10,000 and 19,999	Among BMSM, financial hardship—as measured by how often a participant had run out of money for basic needs in the last 12 months—was not associated with UAI with a serodiscordant or serostatus-unknown partner ($p = 0.45$)
Dorell et al. [44]	Jackson, MS	30 HIV-positive and 95 HIV-negative BMSM	Case-control	Among HIV-positive BMSM, 17 % had a monthly income <\$1,500. Among HIV-negative BMSM, 37 % had a monthly income <\$1,500	No significant association was found between income level and HIV-status (OR = 2.8, 95 % CI [0.9, 10.1])
Fuqua et al. [74]	San Francisco, CA	256 BMSM	Cross-sectional	60.9 % had an income between \$0 and 10,000 and 18.8 % had one between \$10,001 and 20,000 (RDS weighted percents)	(1) Compared to BMSM with an income between \$0 and 10,000, having an income between \$10,001 and 20,000 was associated with HIV-positive status (AOR = 2.58, 95 % CI [1.16, 5.73]). A positive association between having an income between \$20,001 and 30,000 and HIV-positive status was marginally insignificant (AOR = 2.82, 95 % CI [0.98, 8.15]) and no association was found between having an income of at least \$30,001 and HIV-positive status (AOR = 0.49, 95 % CI [0.15, 1.6]) (2) Currently being homeless was associated with a lower risk of HIV infection (AOR = 0.37, 95 % CI [0.16–0.83])
Millett et al. [48]	New York, Philadelphia, Los Angeles	597 Black and 611 Hispanic MSM	Cross-sectional	Among HIV-positive unaware BMSM, 24.5 % had a gross personal income <\$5,000, 24.5 % had one between \$5,000 and 9,999, and 28.4 % had one between \$10,000 and 19,999. Among HIV-negative BMSM, 42.4 % had a gross personal income <\$5,000, 19.3 % had one between \$5,000 and 9,999, and 15.1 % had one between \$10,000 and 19,999	Among BMSM, HIV-positive unaware men were more likely than HIV-negative men to have a gross personal income between \$5,000 and 9,999 (AOR = 2.75, 95 % CI [1.18, 6.41]) or between \$10,000 and 19,999 (AOR = 3.72, 95 % CI [1.58, 8.78]) compared to <\$5,000, but not >\$20,000 compared to <\$5,000 (AOR = 2.20, 95 % CI [0.90, 5.41])
Mutchler et al. [180]	Los Angeles County, CA	50 Black, 50 Latino, and 50 White HIV-positive MSMW	Cross-sectional	Among Black MSMW, 32 % had an annual income <\$8,240	Among Black HIV-positive MSMW, annual household income was not associated with UAI with a male partner without disclosure of HIV-status in the last 5 years (OR = 0.9, 95 % CI [0.3, 2.8])

Table 5 continued

Authors, references	Locations	Study samples	Study design	Prevalence of poverty	Key findings
Myers et al. [159]	Los Angeles County, CA	502 Black men including 235 MSM and MSMW in the African American Health Project	Cross-sectional	The mean annual household income was \$17,300 and 31.6 % were employed full- or part-time	Among HIV-positive and HIV-negative BMSM and Black MSMW, one of the best predictors of risky sexual behavior was having an income less than \$15,000 per year, which was associated with a 46.6 % increase in risky behavior (defined as a composite measure of number of sexual partners, sex while incarcerated, condom use in monogamous relationships versus condom use with multiple partners, exchange of sex for money or drugs, and sex under the influence of alcohol or drugs) ($p = 0.0004$)
Robinson et al. [158]	Boston, Minneapolis–St. Paul	217 HIV-positive and 302 HIV-negative BMSM	Case-control	Among HIV-positive BMSM, 58 % were living in poverty. Among HIV-negative BMSM, 45 % were living in poverty	(1) HIV-positive BMSM were more likely to be living below the poverty level than HIV-negative MSM, but the results were marginally insignificant (AOR = 1.7, 95 % CI [1.0, 3.0]) (2) HIV-positive BMSM were not significantly more likely than HIV-negative BMSM to be unemployed (AOR = 1.8, 95 % CI [0.9, 3.5]) or classified as student/retired/other (AOR = 0.8, 95 % CI [0.2, 2.8]) than being employed

BMSM Black men who have sex with men, *MSM* men who have sex with men, *UAI* unprotected anal intercourse, *OR* odds ratio, *CI* confidence interval, *RDS* respondent-driven sampling, *AOR* adjusted odds ratio, *MSMW* men who have sex with men and women

the provision of HIV prevention services by healthcare providers, which has been found to decrease risk behaviors [166, 167], increase HIV testing [51, 52, 62, 168], increase condom use, increase frequency of asking a sexual partner's HIV status, and decrease the number of sexual partners [28]. Many healthcare providers lack cultural competency for working with patients of diverse sexual identities, and fail to recognize the importance of discussing sexual health with patients as a routine component of medical care [51–54]. More comprehensive training of healthcare providers that encourages a proactive, client-centered, and nonjudgmental approach to HIV counseling and screening regardless of how patients identify or present themselves is needed to facilitate a better understanding of how HIV prevention fits into patients' life priorities [53, 62, 169]. In 2013, the US Preventive Services Task Force updated its 2005 recommendation statement on screening for HIV to include all adolescents and adults aged 15–65—not only those who are known to be at increased risk for HIV infection—which may contribute to an increase in HIV testing among BMSM at healthcare visits [170].

Second, non-supportive relationships with members of social networks within micro-level informal social influence structures can also impede BMSM from accessing services. A lack of social support—often associated with experiences of stigma and discrimination from family, friends, and other community members due to sexual orientation, race, and/or perceived HIV status—can lead to negative mental health outcomes that hinder BMSM from accessing services [60, 90, 111, 112]. Experiences of stigma and discrimination diminish the motivation of BMSM to access HIV prevention information [111, 112] and lower their HIV prevention self-efficacy [90]. Testing for HIV is also stigmatized among social networks of BMSM, which can inhibit men from using these services [58, 110].

Third, many BMSM lack access to healthcare services due to insufficient economic and infrastructural resources. While the percentage of BMSM who lack health insurance coverage is unclear, it may be similar to the 19.0 % of Blacks in the US that reported not having health insurance coverage in 2012 [43]. With the full implementation of the *Patient Protection and Affordable Care Act* in January 2014, however, expanded and enhanced health insurance coverage may increase access to HIV prevention and care services among BMSM. As a result of this law, preventive care including HIV screening and counseling must be covered by insurance premiums and most insurance plans are unable to increase costs or refuse coverage to an individual as a result of a pre-existing health condition, including HIV infection [171]. Regardless of insurance status, there is some evidence that BMSM have reported high perceived costs and low perceived benefits of

healthcare visits as barriers to accessing services [45]. While HIV clinics and community-based testing (e.g., mobile HIV testing vans) offer alternative options for accessing HIV testing and prevention services, no studies were identified that assessed the use of such services by BMSM. Additionally, a disproportionate number of BMSM have recurring contact with the prison system, where men experience a lack of condom availability [151] and incomplete and inconsistent access to HIV prevention services [146, 149, 150]. Improving services in correctional facilities represents a salient structural-level opportunity to expand testing and prevention to this population. Innovative ways to make HIV testing more accessible to BMSM in clinical, non-clinical, and outreach venues are needed [44].

This review should be interpreted in the context of several limitations. Many of the studies reviewed were cross-sectional, so temporality and causality could not be determined. However, this limitation is most relevant to studies that assessed the risk of HIV infection associated with various structural factors. Studies that provided findings most pertinent to understanding the roles of structural factors as barriers to HIV testing and prevention services were generally qualitative studies, meta-analyses, and other studies that offered descriptive statistics. In addition, many of the studies collected data using self-reporting methods and their results may have been affected by misclassification and/or social desirability bias. There was also significant variability in geographic location and sampling schemes across study populations; thus, the generalizability of findings is limited. We hope that this review may lead to a more complete and rigorous investigation of the roles of structural factors as barriers to HIV testing and prevention services. While most quantitative findings were based on multivariable analyses, some analyses did not adjust for all possible correlates and some findings were based on bivariate analyses. Moreover, our findings may have been influenced by publication bias in that we relied on two core databases for our literature search and this review was limited by the available literature. However, the literature search returned a large quantity of results, and to minimize the number of pertinent articles that could be neglected, we also reviewed relevant articles that were cited as references within all papers that met inclusion criteria. Our search included limited search terms, though they were of a broad scope and we did not limit our review to articles that focused solely on HIV.

Despite these limitations, our findings provide critical implications for future HIV prevention research and the development of innovative and culturally grounded structural interventions focusing on improving access to HIV testing and prevention services for BMSM. To our knowledge, this is the first paper to fully consider the role of structural factors as barriers to HIV testing and

prevention services among BMSM, and our findings underscore the significant need for future studies to conduct more rigorous investigation into the roles of structural factors as barriers to services. These findings are also a call for the development of targeted interventions at the structural level that will reduce barriers to HIV testing and prevention services and provide BMSM with the knowledge, skills, and tools to more readily and consistently access available services in their communities.

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Appendix 1

We searched titles and abstracts of articles in *PubMed* and *Scopus* for the search terms listed below corresponding to each search domain. An asterisk (*) represents the truncation symbol in *PubMed* and *Scopus*. We also searched for articles in *PubMed* using MeSH terms, which are indicated by a dagger (†).

Black “Black”, “African American”, “African continental ancestry group”†, “African Americans”†.

MSM “homosex*”, “bisex*”, “men who have sex with men”, “MSM”, “MSMW”, “BMSM”, “gay”, “homosexuality, male”†, “bisexuality”†.

Healthcare “healthcare”, “care”, “access”, “communication”, “adher*”, “retention”, “retain*”, “utilization”, “testing”, “providers”, “engag*”, “cultural competency”, “cART”, “ART”, “HAART”, “antiretroviral”, “health services”, “health center”, “insurance”, “health services accessibility”†, “healthcare disparities”†, “patient acceptance of healthcare”†, “health knowledge, attitudes, practice”†, “community health services”†, “health insurance”†, “health promotion”†.

Stigma and discrimination “stigma*”, “homophobia”, “sexual prejudice”, “shame”, “HIV-related discrimination”, “negative beliefs”, “social bias”, “heterosex*”, “racis*”, “discriminat*”, “prejudic*”, “minority stress”, “prejudice”†, “self concept”†, “social perception”†, “stereotyping”†, “social support”†, “social control”†, “social isolation”†, “stress, psychological”†.

Incarceration “incarceration”, “prison*”, “jail”, “prisoners”†.

Poverty “poverty”, “income”, “employ*”, “unemploy*”, “SES”, “socioeconomic”, “sociodemographic”, “socioeconomic factors”†, “risk factors”†, “poverty”†, “unemployment”†, “income”†.

HIV “HIV”, “AIDS”, “HIV infections”†.

Structural factors “barriers”, “disparities”, “determinants”, “social factors”, “environmental factors”, “structural*”, “demographic”, “health status disparities”†, “sexual behavior/statistics and numerical data”†.

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