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HIV Among Black Men Who Have Sex with Men (MSM) in the United States: A Review of the Literature

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Abstract In 2006, Millett published a seminal literature review that examined 12 hypotheses to explain the high rates of HIV among black MSM. This paper augments Millett's article by reviewing the recent literature on behavioral, biomedical, structural, social contextual, psychosocial, and social network factors that affect HIV rates among black MSM. We searched three databases: *PubMed*, *Scopus*, and *Google Scholar*. First we searched all articles that included black or African American and MSM and HIV. We then searched the following terms for each area: behavioral (drug use during sex, crack cocaine use, and serosorting); biomedical (circumcision, STDs, and STIs); structural (access to care, HIV care, ART, HAART, patient-provider communication, HIV quality of care); social contextual (stigma, discrimination, internalized homophobia, internalized heterosexism, medical mistrust, social isolation, and incarceration); psychosocial (peer support and mental health); and social network (sexual mixing, partner characteristics, and social networks) factors. We identified 39 articles to include in this review. We found inconclusive evidence that incarceration, stigma, discrimination, social isolation, mental health disparities, or social networks explain the elevated rates of HIV among black MSM. We found evidence that the differences in rates of HIV between black and white MSM may be explained by differences in STIs, undiagnosed seropositivity, access to care and treatment services, and use of HAART. There is an overwhelming need for HIV testing, linkage to care, retention in care, and adherence programs for black MSM.

Keywords Black men who have sex with men · HIV/AIDS · HIV · Men who have sex with men · Health disparity

Introduction

Black men who have sex with men (MSM) are heavily affected by the HIV/AIDS epidemic in the United States. The HIV prevalence among non-Hispanic black MSM is estimated by the Centers for Disease Control and Prevention (CDC) to be 28 % compared to 18 % for Hispanic MSM and 16 % for non-Hispanic white MSM [1]. More than half (59 %) of black MSM who are HIV-seropositive are not aware of their infection [1] and therefore are not accessing HIV care and treatment or aware of their ability of transmit HIV to others. Black MSM account for approximately 35 % of new HIV infections among all MSM compared to 46 % for white MSM and 19 % for Hispanic MSM. HIV incidence among young black MSM is of particular concern. Forty-eight percent of new infections among MSM aged 13–29 years were among black MSM [2].

There is a growing body of literature that examines the elevated rates of HIV among black MSM. In 2006, Millett published a seminal literature review that examined 12 hypotheses to explain the high rates of HIV among black MSM. This review concluded that the disparities in HIV

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could not be explained by high-risk sexual behavior, a lack of disclosure of sexual identity, or drug use. He found insufficient or conflicting evidence in research that examined: genetic susceptibility, circumcision, duration of infectiousness, HIV status of partners, incarceration and anal douching. Millett found that differences in HIV rates could be partially explained by high prevalence of sexually transmitted diseases (STDs) and unrecognized infection among black MSM. A 2007 meta-analysis by Millett quantified many of the conclusions from his 2006 review. The meta-analysis found that compared to white MSM, black MSM reported less substance use, fewer sex partners, and were less likely to be on ART. Black MSM were more likely to have a STDs. The meta-analysis found no differences by race in unprotected anal intercourse, commercial sex work, HIV testing history, or sex with a known HIV-positive partner [3].

This paper augments Millett's 2006 and 2007 articles by reviewing the current literature on behavioral, biomedical, structural, social contextual, psychosocial, and social network factors that affect HIV rates among black MSM. The paper examines the status of the current research in each of these six areas and will make recommendations for future research. The paper also provides up-dates on the 12 hypotheses put forward by Millett by examining new research in these areas and explores the following topics not covered in Millett's 2006 and 2007 papers: serosorting, quality of HIV care, stigma and discrimination, peer support, mental health, and social networks. This review aims to answer the question "What factors help to explain elevated rates of HIV among black MSM in the United States?"

Methods

We searched three databases: *PubMed*, *Scopus*, and *Google Scholar*. We did the literature review in two stages. First we searched all articles that included black or African American and MSM and HIV. This electronic database search resulted in a large number of articles (over 4,000). We then limited these articles to include only studies that focused on our six areas of inquiry. We searched the following terms for each area: behavioral (drug use during sex, crack cocaine use, and serosorting); biomedical (circumcision, STDS, and STIs); structural (access to care, HIV care, ART, HAART, patient-provider communication, HIV quality of care); social contextual (stigma, discrimination, internalized homophobia, internalized heterosexism, medical mistrust, social isolation, and incarceration); psychosocial (peer support and mental health); and social network (sexual mixing, partner characteristics, and social networks) factors. At this stage, many articles were excluded based on their titles and/or abstract because they were irrelevant to our review. Based on title and abstract, we identified 71 articles which we assessed for eligibility. Of these 71, 39 were included in our review. We focused primarily on studies published after 2006 to avoid repetition and redundancy. However, we included literature published prior to 2006 when it was necessary to provide an accurate and complete assessment and when focusing on a topic area not covered by Millett's literature reviews. (Of the 39 articles included in the review, seven were published before 2006.) We excluded studies that were not conducted in the United States, Europe, or Australia because of potential cultural differences between study populations. We also excluded dissertations, editorials, letters, and commentaries. Data from each article were extracted, organized into summary tables to highlight study population, sample size, study design, and key findings. All but three studies included in this review were quantitative. For quantitative studies, we included results from bivariate analyses but emphasized multivariate analyses when available (Table 1).

Results

Behavioral Factors

Millett's 2006 literature review found that high-risk sexual behavior and substance abuse could not explain the high rates of HIV among black MSM [4]. Recent research confirms these findings [3, 5]. However, Millett's review noted the need for further research on substance use during sex. A recent study suggests that lower-income black MSM were more likely to use crack during sex and less likely to use methamphetamine during sex compared to lower-income non-Hispanic white MSM [6]. We found three studies that assessed substance use during sex among samples of black MSM. Tieu et al. [7] found that HIV-positive black MSM were more likely to use substances at last sex than HIV-negative men (48.8 vs. 22.0 %, $p \leq 0.0001$). A study of black MSM in Boston found that drug use during sex was associated with unprotected anal sex [8, 9]. Millett found that undiagnosed seropositive black MSM were more likely than uninfected black MSM to have used alcohol or drugs during most recent unprotected anal intercourse (UAI) with a male partner (35.2 vs. 24.2 %, $p \leq 0.05$) but that drug or alcohol use during UAI was not associated with unrecognized HIV infection among a sample of black MSM [10]. Thus, initial research suggests that substance use during sex does not explain the disparity in HIV by race. Additional research is needed to confirm these findings. Future research needs to ask about specific substances to understand differences by race.

Table 1 Studies of black MSM and HIV risk

First author, year	Location	Data collection method	Sampling design	Sample	N total sample (N black)	Major findings
Behavioral factors						
HIV sexual risk behaviors						
Ober et al. [6]	Los Angeles	ACASI	Respondent driven sampling	MSM	779 (397)	1. Black MSM more likely to use crack during sex than MSM of other races [AOR: 0.04 (0.012–0.12) white vs. black]
Mimiaga et al. [8]	Boston	Interviewer administered questionnaire; HIV test: OraQuick Advance with Western Blot confirmation	Respondent driven sampling	Black MSM	197	1. Use of alcohol or drugs during last sex associated with unprotected anal intercourse (UAI) (AOR = 4.04, $p = 0.01$)
Magnus et al. [5, 94]	DC	Interviewer administered questionnaire; HIV test: OraQuick Advance with Western Blot confirmation	Venue based sampling	MSM	500 (178)	1. Compared to non-black, black MSM had fewer male sex partners ($p < .01$), were less likely to engage in intentional UAI ($p < .01$), and were more likely to use condoms at last anal sex ($p < 0.001$)
Tieu et al. [32]	New York City	ACASI	Convenience sample/DISH study	Black MSM	328	1. HIV seropositive black MSM more likely to use substances at last sex than HIV seronegative black MSM (48.8 vs. 22.0 %, $p < 0.0001$)
Mimiaga et al. [9]	Massachusetts	Interviewer administered questionnaire	Respondent driven sampling	Black MSM	197	1. 33 % of sample reported monthly stimulant use during sex for the past year 2. UAI with a casual male partner associated with regular stimulant use [AOR 7.81 (1.46–41.68, $p = 0.02$)]
Eaton et al. [16]	Atlanta	NA	Venue based sampling	HIV negative MSM	549 (180)	1. Black MSM more likely to report unprotected receptive intercourse (URI) (mean 0.23) and UAI (mean 0.33) sex with a HIV unknown status partner compared to white MSM (mean 0.11; mean 0.14, $p < 0.05$) 2. White MSM more likely to report URI (mean 0.97) and unprotected insertive intercourse (UII) (mean 0.78) anal sex with HIV negative partners compared to black MSM (mean 0.54; mean 0.55, $p < 0.01$)
Marks et al. [15]	New York, Philadelphia, Los Angeles	ACASI; HIV test: OraQuick Advance with Western Blot confirmation	Respondent driven sampling	MSM of color	724 (337)	1. Among self-reported HIV negative black MSM: Of those who engaged in UAI, 39.2 % did so only when knew that their partners were negative (serosorting) 2. Self-reported HIV negative Latino MSM more likely to serosort than black MSM (39.2 vs. 64.1 %) 3. Serosorters had significantly lower prevalence of HIV compared to non-serosorters [AOR 2.54 (1.14–5.68] 4. Among self-reported HIV negative black MSM, MSM who did not limit UAI to negative partners (non-serosorters) 3.21 (1.32–7.77) times more likely to be HIV positive than those who used condoms consistently in adjusted analyses

Table 1 continued

First author, year	Location	Data collection method	Sampling design	Sample	N total sample (N black)	Major findings
Millett et al. [10]	New York, Philadelphia, Los Angeles	ACASI; HIV test: OraQuick Advance with Western Blot confirmation	Respondent driven sampling	MSM of color	1,208 (597)	1. Undiagnosed seropositive black MSM more likely than uninfected black MSM to have used alcohol or drugs during most recent UAI (35.2 vs. 24.2 %, $p < 0.05$)
Biological factors						
Circumcision						
Millett et al. [3, 27]	New York, Philadelphia, Los Angeles	ACASI; HIV test: OraQuick Advance	Respondent driven sampling	MSM of color	2,245 (1,154)	1. Circumcision status not association with prevalent HIV infection among black (AOR 1.23 (0.87–1.74) or Latino men (AOR 1.10 (0.73–1.66)
						2. Circumcision not associated with HIV infection among men who engaged only in UIA
Sexually transmitted diseases						
CDC [28]	National	Data extraction from lab reports	Census of surveillance	MSM	143,478 visits	1. Median syphilis seroreactivity 7 % whites, 14 % blacks, and 11 % Hispanics
Su et al. [30]	National	Data extraction from case reports	Census of surveillance	MSM	8,151 (3,433)	1. Absolute increases in rates of syphilis among black MSM were 8 times the absolute increase in rate among white MSM.
Cohen et al. [29]	California	Data extraction from lab reports	Census of surveillance	MSM	2,862 (260)	1. In multivariate analyses, black race associated with repeat syphilis infection (OR 1.84, CI 1.12–3.04)
Pathela et al. [31]	New York City	Data extraction from STD surveillance registry	Census of surveillance	MSM	499 (NA)	1. Syphilis rates highest among black MSM (2,375.9/100,000)
Tieu et al. [32]	NYC	ACASI; HIV test: OraQuick	Convenience sample	Black MSM	328	1. Among black MSM, MSM who were HIV seropositive (28.3 %) more likely to report a recent STD than MSM who were HIV seronegative (12.2 %), $p = 0.0007$
Structural factors						
Health care access						
Pierce et al. [36]	Chicago	Census data for GIS and interviewer administered questionnaire	Census, surveillance, and venue based sampling	MSM 15–25	788 (NA)	1. Areas where black MSM reside typically have low HIV service densities
						2. HIV prevalence clusters spatially but HIV services for MSM are randomly distributed
						3. 12 zip codes where black MSM reside have no HIV prevention services for MSM
Magnus et al. [5, 94]	DC	Interviewer administered questionnaire; HIV test: OraQuick Advance with Western Blot confirmation	Venue-based sampling	MSM	500 (178)	1. Black MSM and white MSM equally likely to have seen a health care provider in the past 12 months (82.6 vs. 86.5 %) and to have been offered an HIV test (56.5 vs. 60.5 %)
Oster et al. [37, 105]	National	Interviewer administered questionnaire; HIV test: conventional lab test or a rapid test followed by a confirmation test	Venue based sampling	MSM	5,183 (2,270)	1. Black MSM significantly more likely to have been offered a HIV test by a provider compared to white MSM (57 vs. 32 %, $p < 0.0001$)
CDC [38]	National	Interviewer administered questionnaire	Venue based sampling	MSM	7,271 (1,674)	1. 61 % black, 60 % Hispanic, and 62 % white MSM tested for HIV in the past 12 months

Table 1 continued

First author, year	Location	Sampling design	Data collection method	Sample	N total sample (N black)	Major findings
Hall et al. [39]	National	33 states participating in surveillance	HIV surveillance from confidential name-based reporting systems	MSM	62,045 (NA)	1. Black MSM more likely to have CD4 <50 at AIDS diagnosis (24.1 % white, 34.4 % black, 27.8 % Hispanic) 2. Black MSM significantly less like to be alive 3 years after AIDS diagnosis (80.6 %) compared to white MSM (84.5 %)
HAART and adherence						
Oster et al. [37, 105]	National	Venue based sampling	Interviewer administered questionnaire; HIV test: conventional lab test or a rapid test followed by a confirmation test	MSM	5,183 (2,270)	1. Black MSM previously diagnosed with HIV were significantly less likely to have seen a provider for HIV care within three months of their HIV diagnosis (69 vs. 78 %, $p = 0.01$) and less likely to be on ART (57 vs. 71 %, $p = 0.0003$) than white MSM.
Dombrowski et al. [45]	King County, WA	Convenience sample	Extraction from electronic records	MSM	768 (53)	1. Black MSM and white MSM equally likely to be on ART (57 vs. 55 %)
Oh et al. [51]	Baltimore, Chicago, Pittsburgh, and Los Angeles	Sub-sample from ongoing prospective cohort study	Interviewer administered questionnaire	MSM	1,120 (289)	1. Black MSM more likely to be non-adherent than white MSM [AOR 1.37 (1.05–1.79), $p = 0.020$]
Quality of HIV care: patient provider dynamics and medical mistrust						
Hutchinson et al. [65]	Detroit, Oakland, Baltimore, and San Francisco	Convenience sample	Self-administered survey	MSM	696 (244)	1. Black MSM more likely than white MSM to agree with conspiracy beliefs [OR 3.3 (1.9–5.7)]
Siegel and Raveis [66]	New York City	Representative case method	One-on-one unstructured interviews and structured interviews	Seropositive minority MSM	93 (46)	1. Black MSM reported more critical and distrustful attitudes towards physicians than Puerto Rican men
Malebranche et al. [67]	New York City	Purposive sampling	Focus groups	Black MSM	81	1. Black MSM reported negative encounters with medical institutions and that these events influenced healthcare utilization, HIV testing, communication and adherence.
Saleh et al. [68]	Northern California	Purposive sampling	Focus groups and individual in-depth interviews	Black MSMW (men who have sex with men and women) and black service providers	21 MSMW; 21 service providers	1. MSMW who do not identify as gay challenge service providers beliefs about identify 2. service providers beliefs about MSMW are impacted by negative beliefs that are held by the general community 3. MSMW need safe non-judgmental HIV services
Social contextual factors						
Stigma and discrimination						
Siegel and Epstein [79]	New York City	Convenience sample with quota sampling	Self-administered questionnaire	Seropositive gay men	114 (48)	1. Black men (mean 15.5) reported significantly higher scores than white men (mean 11.75, $p < 0.05$) on the gay lifestyles hassles scale
Jones et al. [76]	North Carolina	Convenience sample	Interviewer administered survey & self-administered	Black MSM between the ages of 18-30	252	1. Discrimination based on race [OR 0.64 (0.37–1.11)] and sexual minority status [OR 1.20 (0.72–1.99)] not associated with UAI
Radcliffe et al. [80]	Northeast US	Convenience sample	Interviewer administered questionnaire	Seropositive black MSM	40	1. HIV stigma associated with unprotected sex while high or drunk (−0.03, $p < 0.05$)

Table 1 continued

First author, year	Location	Data collection method	Sampling design	Sample	N total sample (N black)	Major findings
Mimiaga et al. [8]	Boston	Interviewer administered questionnaire; HIV test: OraQuick Advance with Western Blot confirmation	Respondent driven sampling	Black MSM	197	1. Social isolation associated with serodiscordant unprotected anal sex [AOR 4.23 (1.13–15.71), p < 0.03]
Incarceration						
Magnus et al. [5, 94]	DC	Interviewer administered questionnaire; HIV test: OraQuick Advance with Western Blot confirmation	Venue based sampling	MSM	500 (178)	1. Black MSM more likely than white MSM to have been incarcerated (25.5 vs. 11.2 %, p < 0.01) 2. Incarceration not associated with being confirmed HIV positive, newly diagnosed HIV positive or unprotected anal intercourse at last sex.
Oster et al. [37, 105]	National	Interviewer administered questionnaire; HIV test: conventional lab test or a rapid test followed by a confirmation test	Venue based sampling	MSM	5,183 MSM (2,270)	1. No association between incarceration and HIV [AOR 0.8 (0.6–1.2)]
Psychosocial factors						
Peer support						
Bakeman and Peterson [86]	Atlanta	Interviewer administered questionnaire	Venue based sampling	Black MSM	849	1. Strong peer norms associated with less frequent risky behavior [OR 0.36 (0.26–0.49) p = 0.00]
Jones et al. [76]	North Carolina	Interviewer administered survey & self-administered	Convenience sample	Black MSM	252	1. Less favorable peer norms associated UII [OR 2.39 (1.51–3.78)] and URI [OR 2.04 (1.32–3.16)]
Carlos et al. [85]	New York, Philadelphia, Los Angeles	ACASI; HIV test: OraQuick Advance with Western Blot confirmation	Respondent driven sampling	Latino and Black MSM	2,235 (816)	1. Among black MSM: 1. Low peer support for condom use associated with UAI with casual partners [AOR 2.30 (1.80–2.93)]
Lauby et al. [87]	New York, Philadelphia, Los Angeles	ACASI; HIV test: OraQuick Advance with Western Blot confirmation	Respondent driven sampling	Latino and Black MSM	1,286 MSM who gave a self-report of being HIV seronegative (618)	1. High score on the supportive relationship index associated with testing HIV positive (AOR 0.68 (0.52–0.89)
Mental health						
Myers and Durvasula [91]	Los Angeles	Interviewer administered questionnaire and ELISA HIV test with Western Blot confirmation	Community sample	Black MSM	234	1. HIV seropositivity not associated with psychiatric risk
Richardson et al. [92]	United States	Interviewer administered questionnaire; blood and urine tests	Convenience sample	Black MSM	243	1. Serostatus and depression not significantly associated
Reisner et al. [93]	Massachusetts	Interviewer administered questionnaire and rapid HIV antibody test	Respondent driven sampling	Black MSM	197	1. Serodiscordant anal sex with a non-main partner associated with (a) clinically significant depressive symptoms [AOR 2.90 (2.02–14.19)] and (b) moderate depressive symptoms among black MSM [AOR 9.86 (1.51–64.61)]

Table 1 continued

First author, year	Location	Data collection method	Sampling design	Sample	N total sample (N black)	Major findings
Sexual identity and disclosure of same sex behavior						
Millett et al. [10]	New York, Philadelphia, Los Angeles	ACASI; HIV test: OraQuick Advance with Western Blot confirmation	Respondent driven sampling	MSM of color	1,208 (597)	1. Among black MSM, being HIV positive unaware associated with sexual identity (65.7 % gay vs. 25.7 % bisexual vs. 8.6 % heterosexual)
Bernstein et al. [98]	New York City	Interviewer administered questionnaire	Venue based sampling	MSM	452 (95)	1. Black MSM less likely to have disclosed same sex attraction to health care provider compared to white MSM [AOR 0.28 (0.14–0.53)]
Social network factors						
Oster et al. [37, 105]	Mississippi	Extraction from surveillance records & self-administered survey	Census of all eligible	Black MSM	110	1. Having a non-black partner not associated with HIV [OR 1.3 (0.3–4.9)]
Millett et al. [10]	New York, Philadelphia, Los Angeles	ACASI; HIV test: OraQuick Advance with Western Blot confirmation	Respondent driven sampling	MSM of color	1,208 (597)	1. Most recent UAI with a black male partner not associated with unrecognized HIV infection in multivariate analyses
Mangus et al. [5, 94]	DC	Interviewer administered questionnaire; HIV test: OraQuick Advance with Western Blot confirmation	Venue based sampling	MSM	500 (178)	1. Having an older partner not associated with HIV positivity among black MSM [AOR 0.72 (0.41–1.28)]
Maulsby et al. [106]	Baltimore, MD	Interviewer administered questionnaire; HIV test: ELISA with Western Blot	Venue based sampling	MSM	399 (282)	1. Among, men who have sex with men only, having a black partner was associated with undiagnosed seropositivity [APR 1.96 (1.25–3.08), p = 0.0033]
Heckman et al. [108]	Milwaukee, WA	Self-administered questionnaire	Convenience sample	MSM	253 (79)	1. No difference between in white and black MSM in awareness of most recent partner's HIV serostatus (53 vs. 49 %)
Harawa et al. [109]	7 US urban centers	Interviewer administered questionnaire and blood draw for HIV testing	Venue based sample	MSM	2,745 (814)	1. Black MSM (17.3 %) less likely than white MSM (20.6 %) to have partners of unknown HIV status
Joseph et al. [107]	New York, Philadelphia, Los Angeles	Interviewer administered questionnaire; HIV test: conventional lab test or a rapid test followed by a confirmation test	Respondent driven sampling	MSM of color	723 (172)	1. Partner age associated with unrecognized HIV infection [AOR 2.51 (1.18–5.34)]
Oster et al. [37, 105]	National	Interviewer administered questionnaire; HIV test: conventional lab test or a rapid test followed by a confirmation test	Venue based sampling	MSM	5,183 (2,270)	1. Among newly diagnosed HIV seropositive MSM, black MSM more likely to have partners with unknown HIV status (53 vs. 41 %) compared to white. 2. In multivariate analyses, having a partner with an unknown HIV status associated with HIV [AOR 1.4 (1.1–1.7)]

OR odds ratio, AOR adjusted odds ratio, NA not available

Serosorting is limiting unprotected sex to partners of the same serostatus and strategic positioning is assuming either the insertive or receptive role during unprotected sex based on HIV status. The effectiveness of these harm-reduction techniques is widely contested. Research has shown that both HIV-negative and HIV-positive MSM guess their partners status which would undermine a protective effect [11]. While several studies suggest that serosorting offers limited protection from HIV [11–13], others have concluded that serosorting [14, 15] and strategic positioning [15] might be effective. A study of self-reported HIV-negative black and Latino men found that the odds of testing HIV-positive were significantly higher among men who did not limit unprotected anal sex to HIV-negative partners compared to men who only reported HIV- negative partners (serosorters) and that black MSM were less likely to serosort than Latino men [15]. Research suggests that black MSM are less likely to have unprotected anal sex with presumed HIV-negative men, more likely to report UAI with partners of unknown HIV status, and less likely to endorse serosorting beliefs compared to white MSM [16]. Together this research suggests that black MSM are less likely to serosort than white MSM. Given inconclusive evidence around the effectiveness of serosorting, it is unclear if this difference could help to explain racial disparities in HIV.

Biomedical Factors

Circumcision

The results from three randomized control trials in Africa of heterosexual couples suggest that adult male circumcision reduces HIV acquisition for the insertive male partner [17–19]. The applicability of these results to MSM is being explored. A meta-analysis of 15 studies published in 2008 found an insignificant protective effect among MSM who primarily engaged in insertive intercourse and concluded that there was insufficient evidence that male circumcision protects against HIV infection or other STDs [20]. A review conducted in 2010 found weak and inconclusive evidence that circumcision reduces HIV and STDs among MSM [21]. A third review conducted in 2011 found that the pooled effect estimate for HIV acquisition from 20 studies was not statistically significant [OR 0.86 (95 % CI 0.70–1.06)]. However, a sub-group analysis of seven studies found significant effects for men reporting an insertive role [OR 0.27 (95 % CI 0.17–0.44)] and no effects for men in the receptive role [OR 1.02 (95 % CI 0.63–2.29)] [22].

Several US studies suggest that blacks are historically less likely to be circumcised than whites [23–25]. However, hospital data from the past decade suggests that black and white newborns are equally likely to be circumcised [26]. We found one study that looked at circumcision status and HIV among minority MSM. The study found that black MSM were more likely to be circumcised than Latino MSM, circumcision was not protective against HIV overall and that this relationship did not differ by sexual position [27].

The research on the preventative effective of circumcision does not suggest that the preventative effect of circumcision would be strong enough to curb the epidemic among MSM. Research on circumcision among black MSM is scarce but does not support the hypothesis that differences in rates of circumcision could help explain the high rates of HIV among black MSM.

Sexually Transmitted Diseases

There is strong biological evidence that having a STD increases risk for acquisition and transmission of HIV. STDs increase susceptibility to HIV infection through ulcers and inflammation and increase transmission through viral shedding [28]. There is substantial evidence that black MSM are more likely than white MSM to have STDs [28–31]. In addition, HIV-positive black MSM are more likely to report a recent STD than HIV-negative black MSM [32]. The trends in STD prevalence by race observed by Millett in 2006 and 2007 are still apparent and help to explain the persistently elevated rates of HIV among black MSM.

Structural Factors

Access to Health Care

One possible explanation for the elevated HIV prevalence among black MSM is lower quality health care. While several studies published before 2006 indicated no differences among MSM by race in hospitalization, emergency room (ER) visits, inpatient visits, source of HIV medical care, perceived ability to access HIV medication, or insurance [33–35]. A Chicago-based study found that areas where black MSM reside typically have low HIV service densities and that while HIV prevalence clusters spatially, HIV services do not. These findings point to lower availability of HIV prevention services for black MSM [36].

However, black and white MSM are equally likely to have been seen by a health care provider in the past 12 months [5] and are equally likely or more likely to have been offered an HIV test by their health care provider [5, 37]. Black MSM and white MSM also are equally likely to have been tested for HIV. CDC surveillance indicates that in the past year 61 % of black, 60 % of Hispanic, and 62 % of white MSM were tested for HIV [38]. Despite similar proportions of testing, black MSM had lower CD4 counts

at AIDS diagnosis than MSM of other races and shorter survival times [39].

HIV Care and Treatment

Recent research shows that use of antiretroviral therapy (ART) prevents the sexual transmission of HIV among heterosexual HIV-serodiscordant couples [40–44]. Therefore access to ART is important not only for the health and wellbeing of the HIV-positive individual but also for HIV prevention. Both Millett's 2006 and 2007 articles found that black MSM are less likely to be on ART than white MSM [3, 4]. A recent study confirmed this, finding that black MSM were less likely than white MSM to have been to a health care provider for their HIV infection within 3 months of diagnosis and to be on ART [37]. However, a study of HIV-positive MSM attending an STD clinic in Washington from 2004 to 2008 found that black and white MSM were equally likely to be on ART in multivariate analyses [45].

Studies suggest that blacks are less likely than whites to adhere to ART [46, 47] or to be retained in care [48]. In his review, Millett found the research on ART adherence to be inconclusive. For example, a study by Halkitis et al. [33] of MSM in New York City and San Francisco found no difference in adherence by race while analyses of the Multicenter AIDS Cohort Study (MACS) found that blacks were less likely to be adherent [49, 50]. Recent analysis of the MACS data from 2002 to 2006 found that black MSM were more likely to be non-adherent than white MSM [AOR 1.37 (95 % CI: 1.05–1.79) $p = 0.020$] [51]. The study also found that among black MSM increased cost of personal expenditure for prescription medication, financial difficulty meeting expenses, crack use, and having a new skin rash were associated with not adhering to ART [51].

In summary, HIV-positive black MSM might be less likely to access care and treatment services, to be on HAART, and to be adherent to HAART and this could help to explain disparities in HIV prevalence by race. Additional research is needed to understand barriers to care and treatment among black MSM and to further investigate differences in retention and adherence by race.

Quality of HIV Care: Patient Provider Dynamics and Medical Mistrust

Negative encounters within medical institutions and interpersonal barriers might help to explain poorer outcomes of HIV care among black MSM. Medical mistrust is high among African American populations [52–54] and is a barrier to accessing HIV care and treatment services [55, 56]. Trust in physicians is associated with HIV-related outpatient clinic visits, fewer ER visits, acceptance of

ART, increased use of ART, and ART adherence [55–58]. The quality of patient-provider relationships is associated with greater receipt of ART, ART adherence, and viral suppression [59–61]. Racial concordance between patient and provider influences perceived quality of care, receipt of preventative care [62] and time of receipt of HIV therapy [63]. However, the role that trust and provider relationships plays in explaining differences in HIV by race is not clear. A recent study found that while patient provider cultural differences are negatively associated with perceived quality of care and trust, these factors did not account for racial/ethnic disparities in HIV care [64].

The research on patient provider dynamics and medical distrust among black MSM is limited. Medical distrust among black MSM appears to be high [65–67] and influences health care utilization, HIV testing, patient-provider communication and ART adherence [66]. A recent study of black men who have sex with men and women found that service providers' attitudes towards black MSMW are affected by negative beliefs towards bisexual behavior. These findings underscore the need for black MSMW to have access to safe and non-judgmental HIV services [68].

Research on black MSMs' experiences within the HIV medical system is limited. More research is needed in this area to (a) better understand the relationship between medical distrust and HIV rates among black MSM and (b) to better understand and address barriers to black MSMs' use of care and treatment services.

Social Contextual Factors

Stigma and Discrimination

Non-stigmatizing attitudes towards same-sex behavior are important for HIV reduction. Research has found that same-sex partnership laws, including same-sex marriage, led to statistically significant reductions in syphilis [69]. A United States-based study found that tolerance for same-sex behavior was associated with lower HIV rates and found evidence that this was due to more low-risk men entering the pool of partners and a decrease in risk behaviors [70].

Stigma undermines the health of MSM. Stigma limits access to health care and health insurance; contributes to poor mental health, stress, and social isolation; affects the ability to have long-term stable relationships; and contributes to substance use, risky sex, and suicide [71]. The effect of stigma might be particularly acute for black MSM because they face multiple forms of discrimination, including discrimination due to race, sexual orientation, gender identity and HIV status. In addition, many black MSM are exposed to heterosexist community and familial norms [72–74]. A study of US attitudes towards

homosexuality found blacks were 1.15 times as likely to report that homosexuality was always wrong as whites and that black MSM were twice as likely to report that homosexuality was always wrong compared to white MSM (57.1 vs. 26.8 %, $p = 0.003$) [75]. A study of discrimination among black MSM found that 30.6 % reported discrimination based on race, 39.0 % felt discrimination based on sexual orientation, and 28 % reported that their family did not approve of their same-sex behavior [76].

While there is a strong theoretical framework to support the hypothesis that increased exposure to stigma and discrimination is associated with HIV risk among black MSM [77, 78], we located a small number of studies that quantified this relationship. A 1996 study found that black men reported higher frequency and cumulative severity of life-style hassles than white men and that HIV- positive gay minority men were more prone to psychological stress than white HIV positive MSM [79]. A small number of studies have assessed the relationship between stigma and HIV risk behavior. A study of young black men found no association between discrimination and unprotected insertive or receptive anal intercourse [76]. A study of HIV positive young black MSM found that individuals exposed to higher levels of HIV stigma reported more unprotected sex while under the influence of alcohol or drugs [80] (Table 1).

Internalized heterosexism has been defined as the internalization of negative messages about homosexuality [81] while internalized homophobia as been defined as the internalization of society's homophobic attitudes [82]. In the literature these similar constructs have been referred to jointly as internalized heterosexism/internalized homophobia and abbreviated as IH [81]. A literature review of the effect of IH on HIV risk behavior among MSM was inconclusive. The review identified studies that support a relationship between IH and HIV risk behavior as well as studies that found no relationship or an inverse relationship [81]. Newcomb found that the study of IH suffers from methodological challenges such as a wide variation in operationalization of IH and his meta-analysis of 31 studies of IH and risky sexual behavior found a small to moderate effect size [82]. The majority of current research on IH has focused on non-minority samples and more research is needed to understand if IH impacts HIV risk among black MSM [81, 82].

One potential result of low levels of tolerance and high levels of stigma and discrimination is social isolation. Social isolation may affect HIV risk behavior. A study of black MSM in Massachusetts found that social isolation was positivity associated with unprotected sex with a serodiscordant partner [8]. To summarize, there is a strong theoretical basis for a relationship between stigma, discrimination and HIV among black MSM. However, we found only a few articles that quantitatively assessed the effect of stigma and several of these studies had very modest effect sizes. The current research on IH is inconclusive and suffers from methodological shortcomings. IH is a distal construct that includes multiple dimensions. This provides challenges for measurement and operationalization. Measures should be validated and tested for cultural appropriateness. There is a need for studies that assess the intersection of multiple types of stigma on HIV and on the use of care and treatment services among black MSM.

Incarceration

In his 2006 review article, Millett concluded that there was insufficient evidence with regard to the role that incarceration might play explaining high rates of HIV among black MSM. While he found evidence that black MSM were more likely to have been incarcerated than MSM of other races, he only located one article which tested the association between incarceration and HIV among black MSM and this study did not support the hypothesis that incarceration increased risk for HIV [83]. We found three recent articles that were relevant. A study of MSM using national surveillance data found that incarceration was not associated with HIV infection in a mixed race sample [37]. A study by Mangus et al. [5] found that black MSM were more likely than MSM of other races to have ever been to jail, prison, or a detention center but that, among black MSM, having ever been to jail, prison, or juvenile detention was not associated with HIV seropositivity. A CDC study of HIV transmission among male inmates of a state prison in Georgia found that black race was associated with seroconversion during incarceration [84]. However, this study was not limited to MSM. Additional studies are needed among black MSM to assess the relationship between incarceration and HIV.

Psychosocial Factors

Peer Support

Studies of peer support among black MSM suggest strong peer norms for condoms use and that supportive peer norms for condom use predict less-frequent risky behavior [76, 85, 86]. The Brothers Y Hermanos study found that MSM with more supportive relationships had lower odds of testing HIV-positive and that this relationship was partially explained by a greater likelihood of being tested for HIV and a lower likelihood of engaging in risky sexual behaviors [87]. Additional resiliency research is needed to identify strengths and assets of black MSM, such as supportive relationships and peer support for condom use, to inform interventions that aim to reduce the HIV burden among black MSM.

Mental Health

Mental health factors, including depression, disproportionately affect black MSM [88, 89]. An exploratory study of the mental health of black MSM concluded that heterosexist and homophobic expectations of sexual orientation and norms of hegemonic masculinity (male behavior that is patriarchal and characterized by aggressiveness and strength) negatively affect the mental well being of black MSM [90]. However, research from the 1990s suggests that among black MSM depression is not related to HIV serostatus [91, 92]. We found no recent studies that assessed the relationship between mental health and HIV and only one study that looked at mental health and sexual risk behavior among black MSM. The study found that depressive symptoms were associated with serodiscordant unprotected anal sex with a casual male partner and having a recent STD in the past year [93]. Thus, research suggests that depression is elevated among black MSM and that depression may be related to HIV risk behaviors in this population. However, it is not clear that mental health plays a role in explaining HIV disparities.

Sexual Identity and Disclosure of Same Sex Behavior

Research has found that black MSM are less likely than MSM of other races to disclose their same-sex behaviors to others [94] or to identify as gay or homosexual [37, 85, 95]. HIV infection is more likely among MSM who identify as gay compared to MSM who identify as non-gay [96, 97]. This relationship may be true for black MSM as well. An analysis of black MSM found that undiagnosed seropositive men were more likely to be gay-identified than to be non-gay identified [10].

Research also suggests that minority MSM are less likely to disclose their same-sex behavior to their health care providers [98]. MSM who disclose same-sex behavior to a health care provider are more likely to be tested for HIV [98–100]. However, research does not suggest that a lower level of disclosure to health care providers among black MSM compared to MSM of other races has translated into differences in frequency of HIV testing by race [4].

Network Factors

The social networks of black MSM might help to explain the elevated HIV prevalence in this population. For example, researchers have speculated that high background prevalence of HIV, high rates of undiagnosed seropositivity, and high rates of STDs within racially assortative sexual networks of black MSM might allow for rapid transmission of HIV. Social network studies of heterosexuals have found

that where initial prevalence of disease was high, assortative mixing by race increased disease within that racial group [101]. Several studies have found that black MSM are more likely to have partners who are also black [102–104] which suggests a high level of racial assortative mixing within this group. However, the role sexual networks play in HIV among black MSM is not clear. A study of black young men in Mississippi found no association between partner race and HIV infection [105]. A recent study by Millett found that UAI with a black partner was not associated with unrecognized HIV infection among black MSM [10]. However, a study by Maulsby found that among a mixed-race sample of men who have sex with men only, having an black male partner was associated with increased risk for undiagnosed seropositivity [106]. Research suggest high levels of assortative mixing by race among black MSM but current research is inconclusive as to the contribution of partner race in explaining elevated rates of HIV among black MSM.

Another sexual mixing pattern that might explain elevated rates of HIV among black MSM is disassortative mixing by age. If younger black MSM are engaging in unprotected sex with older MSM, a population with an elevated HIV prevalence, this could lead to an increase in HIV risk for younger MSM. A DC-based study found that having an older partner was not associated with HIV positivity among black MSM or white MSM [5]. A study of CDC surveillance data found that black and white MSM with newly diagnosed HIV infection did not differ in age of most recent partner and that age of partner was not associated with newly diagnosed HIV among a mixed race sample [37]. A study of young black MSM found that men with partners older than 25 years were at increased risk for HIV infection [AOR 5.5 (95 % CI: 1.8–17.3)] [105]. A study of black and Latino MSM aged 18–35 years found that having a partner that was at least 4 years older increased odds of having an unrecognized infection (AOR 2.51, 95 % CI 1.18–5.34) [107]. Two studies support the hypothesis that partnerships with older men might help to explain elevated rates of HIV among black MSM [105, 107] and two studies do not support this hypothesis [5, 37]. Additional research is needed in this area.

If black MSM are more likely to have partners of unknown or positive HIV status than white MSM this might help to explain differences in HIV rates by race. White and black MSM are equally likely to have sex with a known HIV-positive partner (0.77, 95 % CI 0.34–1.74) [3]. A small number of articles have looked at difference by race in having a partner of unknown HIV status. One study found no differences by race in likelihood of having a partner of unknown HIV status [108] and a second found that black MSM were less likely than white MSM to have partners of unknown HIV status [109]. A third recent study found that among newly diagnosed HIV-positive MSM,

black MSM were more likely than white MSM to report that their last partners had an unknown HIV status (53 vs. 41 %) and less likely to report having HIV positive partners (5 vs. 10 %). In multivariate analyses, having a partner with a positive HIV status [AOR 1.9 (95 % CI: 1.2–3.0)] and having a partner with an unknown HIV status [AOR 1.4 (95 % CI: 1.1–1.7)] were positively associated with newly diagnosed HIV infection [37]. Thus, research in this area is inconclusive and additional research is needed to understand if having a partner with unknown HIV status contributes to the disparity in HIV by race.

Discussion

To better understand the factors that contribute to increased rates of HIV among black MSM, this review assessed the status of the current literature in six areas. Current research confirms Millett's findings that the elevated rates of HIV among black MSM cannot be explained by differences in HIV risk behavior [5]. In addition, circumcision does not appear to play a role in differences in HIV by race [27].

Like Millett, we found that research in the area of incarceration was inconclusive and that additional research is needed to understand if incarceration affects HIV status among black MSM. Additional research is also needed to better understand the social impacts of incarceration among black MSM and how incarceration affects the sexual networks of black MSM. Our review found a need for further research in the related areas of stigma, discrimination, social isolation, and mental health. Areas for future inquiry include teasing out the potential roles of social isolation and mental distress as mechanisms through which stigma affects health and wellbeing.

Peer support for condom use decreases the likelihood of HIV sexual risk behavior among black MSM [76, 85–87]. This represents an area of strength. Though there is abundant evidence of resilience among MSM, most HIV scientific literature focuses on deficits [110]. There is a need for studies among black MSM to identify the resiliencies that are most effective at combating HIV so that interventions can be tailored to promote these strengths. Rates of STDs and rates of undiagnosed HIV seropositivity continue to be higher among black MSM [28–31, 111]. In addition, black MSM who are aware of their HIV infection are less likely to be on HAART [33, 37, 112, 113]. These three factors increase risk for HIV transmission [28, 114–116] and help to explain why we see higher rates of HIV among black MSM when compared to white MSM.

Evidence with regard to differences by race in retention in HIV care and non-adherence are inconclusive. Additional research is needed to determine if retention in HIV care and non-adherence differ by race and to identify

factors associated with HAART use, adherence and retention among black MSM. Medical mistrust and patient provider dynamics impact HIV care and treatment. Additional research is needed to understand how these factors affect HIV testing, treatment and adherence among black MSM.

There is a compelling public health need for STD and HIV programs for black MSM. Improved access and linkage to STD screening and treatment is necessary to reduce STD incidence among black MSM. There is an urgent need for HIV programs that identify, link, and retain HIV-positive black MSM who are not in care into high-quality HIV care and treatment. To be successful programs must address the external root causes of delayed HIV care and dropping out of care, such as homelessness, joblessness, substance abuse, mental health, stigma, and discrimination based on race, gender, and/or sexual orientation. If black MSM are going to be successfully linked and retained in HIV care and treatment, interpersonal barriers to quality HIV care must also be addressed by ensuring that HIV care providers are culturally competent [63, 64, 67, 68].

There has been much speculation that some of the difference in HIV rates by race can be explained by differences in social networks. Our review looked at three characteristics of partners that could impact HIV transmission at the network level: race of partner, age of partner and partner HIV status. We found that evidence on the role partner characteristics play in explaining HIV disparities by race to be inconclusive.

This review has many limitations. First, it does not include meta-analyses to test specific hypotheses. Second, though we included findings from multivariate analyses wherever possible, in some cases we were limited to bivariate findings. Third, the number of studies that looked at HIV as an outcome was limited and thus our review also included analysis of studies that assessed the relationship between our factors of interest and HIV sexual risk behaviors. Fourth, we searched three data bases using a discrete list of terms. Searching other databases and using other terms might have identified additional studies which could have been included in this literature review.

Finally, the studies included in this review face a variety of methodological shortcomings which impact the quality of the data reviewed. The majority of the studies included in this review were cross-sectional and therefore temporality and causality could not be inferred. The studies reviewed used a variety of sampling strategies. Studies that used convenience samples are subject to the greatest amount of selection bias and limited generalizability. Studies employing venue-based and respondent driven sampling (RDS) strategies are also subject to potential biases. With RDS the non-random selection of seeds could

affect the characteristics of the study population. With venue-based sampling, venues and participants are randomly selected but the study population is only generalizable to individuals attending venues similar to the ones sampled. The majority of studies gathered behavioral data via self-report which is subject to social desirability bias, especially when the study is interviewer-administered rather than computer-assisted. In addition, many of the studies reviewed had small sample sizes of black MSM which could limit the type of analyses conducted and increase Type II errors.

Despite these limitations, we feel that our findings are important for future research. Black MSM are one of the populations most affected by HIV and additional research is needed to better understand factors that contribute to this disparity. High rates of undiagnosed seropositivity, STDs, and decreased access to and use of HIV care and treatment place black MSM at greater risk. Culturally competent HIV and STD testing and treatment programs are needed for black MSM.

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