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## Explaining Racial and Ethnic Disparities in Antiretroviral Therapy Adherence and Viral Suppression among U.S. Men Who Have Sex with Men

Deesha PATEL, MPH<sup>1</sup>, Linda BEER, PhD<sup>1</sup>, Xin YUAN, MD, MS<sup>2</sup>, Yunfeng TIE, PhD<sup>1</sup>, Amy R. BAUGHER, MPH<sup>1</sup>, William L. JEFFRIES IV, PhD<sup>1</sup>, Andre DAILEY, MSPH<sup>1</sup>, Kirk D. HENNY, PhD<sup>1</sup>, Medical Monitoring Project

<sup>1</sup>Division of HIV Prevention, National Center for HIV, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, GA;

<sup>2</sup>DLH Corporation, Atlanta, GA

### Abstract

**Objective:** To identify factors—including social determinants of health (SDOH)—that explain racial/ethnic disparities in antiretroviral therapy (ART) adherence and sustained viral suppression (SVS) among U.S. men who have sex with men (MSM) with HIV.

**Design:** We used weighted data from 2017–2021 cycles of the Medical Monitoring Project.

**Methods:** Among MSM taking ART, we calculated prevalence differences (PDs) with 95% confidence intervals (CIs) of ART adherence (100% ART adherence, past 30 days) and SVS (all viral loads in past 12 months <200 copies/mL or undetectable) for Black MSM (BMSM) and Hispanic/Latino MSM (HMSM) compared with White MSM (WMSM). Using forward stepwise selection, we calculated adjusted PDs with 95% CIs to examine if controlling for selected variables reduced PDs.

**Results:** After adjusting for age, any unmet service need, federal poverty level (FPL), food insecurity, homelessness, time since HIV diagnosis, gap in health coverage, and education, the BMSM/WMSM PD for ART adherence reduced from –16.9 to –8.2 (51.5%). For SVS, the BMSM/WMSM PD reduced from –8.3 to –3.6 (56.6%) after adjusting for ART adherence, age, homelessness, food insecurity, gap in health coverage, FPL, any unmet service need, time since diagnosis, and ER visit(s). The HMSM/WMSM PD for ART adherence reduced from –9.3 to –2.9 (68.8%) after adjusting for age and FPL. The unadjusted HMSM/WMSM PD for SVS was not statistically significant.

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**CORRESPONDING AUTHOR:** Deesha Patel, MPH; 1600 Clifton Rd, MS H24-5, Atlanta, GA 30329; Fax: 404-639-2007; dpatel3@cdc.gov.

**DISCLAIMERS:** The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Earlier years of data were presented at the International Association of Providers of AIDS Care (IAPAC) Adherence 2022 conference; Washington, DC; November 8, 2022.

**Conclusions:** Adjusting for SDOH and other factors greatly reduced racial/ethnic disparities in ART adherence and SVS. Addressing these factors—particularly among BMSM—could substantially improve health equity among MSM with HIV.

### Keywords

HIV; antiretroviral therapy; viral suppression; MSM; disparities

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## INTRODUCTION

HIV disproportionately affects specific populations in the United States, including gay, bisexual, and other men who have sex with men (collectively referred to as MSM) and racial/ethnic minorities [1]. In 2021, Black/African American (hereafter referred to as Black) MSM (37%) and Hispanic/Latino MSM (33%) comprised a higher proportion of HIV diagnoses compared with White MSM (24%) [1]. Black and Hispanic/Latino MSM have reported lower antiretroviral therapy (ART) adherence and have had lower prevalence of viral suppression compared with White MSM [2].

HIV outcomes (e.g., diagnoses, linkage to HIV medical care, viral suppression) vary by social determinants of health (SDOH) [3], which are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life [4].

The objective of this manuscript was to examine which SDOH—along with selected demographic, behavioral, and clinical characteristics—may explain racial/ethnic disparities in ART adherence and sustained viral suppression (SVS) among U.S. Black, Hispanic/Latino, and White MSM with diagnosed HIV.

## METHODS

### Data Source

CDC's Medical Monitoring Project (MMP) produces nationally representative estimates of behavioral and clinical characteristics among U.S. adults with diagnosed HIV. Detailed MMP methods are found elsewhere [5]. Briefly, MMP first sampled 16 states and Puerto Rico from all U.S. states, the District of Columbia, and Puerto Rico. Second, annual simple random samples of adults with diagnosed HIV are drawn for each participating state/territory from the National HIV Surveillance System (NHSS), a census of U.S. persons with diagnosed HIV. For this analysis, we used data from the 2017–2021 MMP data collection cycles spanning June 2017 through May 2022; data were collected via phone or face-to-face interviews and medical record abstractions during June through the following May of each cycle year. State/territory response rates were 100% and ranged annually from 40–46% at the person level. Data were weighted based on probabilities of selection, adjusted for non-response, and post-stratified to NHSS population totals by sex, race/ethnicity, and age [5]. MMP is an ongoing public health surveillance activity; therefore, Institutional Review Board approval was not required by CDC, although two participating jurisdictions obtained

local institutional review board approval as per local requirements. Informed consent was given by all participants.

### Analytic population

We limited this analysis to Black, Hispanic/Latino, and White MSM who reported currently taking ART (N=9,047). Race, ethnicity, and MSM status were self-reported. Hispanic/Latino men could be of any race; Black and White men were categorized as such only if they indicated non-Hispanic ethnicity;. MSM was defined as cisgender men who reported sex with 1 cisgender men during the past 12 months or reported a gay or bisexual identity among those not sexually active.

### Measures

Outcome measures were ART adherence and SVS. ART adherence was defined as self-report of missing zero ART doses in the past 30 days. SVS was based on medical record abstraction and defined as all viral load measurements in the past 12 months documented undetectable or <200 copies/mL. Those with no medical record abstraction and those who had no viral loads documented were categorized as not having SVS.

Covariates were selected based on their association with outcomes in prior analyses [6–10]. No statistically significant correlations among covariates were found. Definitions of covariates are provided in table footnotes.

### Analytic Methods

We first estimated prevalence and associated 95% confidence intervals (CIs) of outcomes and covariates, overall and by race/ethnicity. We then assessed whether prevalence differences (PDs) in ART adherence and SVS by race/ethnicity (i.e., Black vs. White MSM, Hispanic/Latino vs. White MSM) might be explained by our covariates. White MSM were selected as the analytic referent given prior literature reporting better HIV outcomes among White compared with Black and Hispanic/Latino MSM [2]. We used multivariable modeling to determine whether PDs were attenuated with the inclusion of covariates. The first step in our modeling strategy was to assess which covariates were eligible for inclusion in multivariable models. Eligible candidates were those associated with race/ethnicity (see Table 1) and were also bivariate associated with the outcomes based on Rao–Scott  $\chi^2$  tests (see Supplementary Digital Content 1, <http://links.lww.com/QAD/D122>). Next, we used manual forward selection to build multivariable models assessing PDs between race/ethnicity and the outcomes, beginning with the covariate with the strongest bivariate association with the outcome based on the lowest p-value. Results at each step were compared with the unadjusted associations between race/ethnicity and the outcome, and covariates added one at a time until all candidate covariates were included or PD was no longer significant. Models yielded from each step are presented, along with percent changes to assess relative differences in point estimates of PDs between the adjusted and unadjusted models (i.e., degree to which incorporating covariates accounted for racial/ethnic disparities in outcomes). Models for SVS included ART adherence, a priori. Statistical significance for all tests was defined as  $p < 0.05$ . All analyses accounted for MMP's complex sample

design and weights and were conducted using survey procedures in SAS (version 9.4; SAS Institute) and SAS-callable SUDAAN (version 11.0.3; RTI International).

## RESULTS

### Sample Characteristics

Among Black, Hispanic/Latino, and White MSM who reported currently taking ART, 29.0% were Black, 26.7% were Hispanic/Latino, and 44.3% were White (Table 1). Compared with White MSM, Black and Hispanic/Latino MSM were more likely to be younger; live in households below the FPL; have hunger/food insecurity; be uninsured or have Ryan White HIV/AIDS Program (RWHAP) coverage only; have a gap in health coverage; have a high school diploma or less; experience homelessness; have history of forced sex or physical violence by an intimate partner; have 9 years since HIV diagnosis; and have any unmet need for ancillary services (Table 1). Black MSM were more likely to have had 1 ER visit or been incarcerated >24 hours than White MSM. Hispanic/Latino MSM were less likely to report health literacy and had a higher prevalence of binge drinking compared with White MSM.

Approximately 46.7% of MSM reported ART adherence, and 66.6% had SVS (Supplementary Table, <http://links.lww.com/QAD/D122>). All covariates were associated with ART adherence (all  $p<0.001$ ); all characteristics ( $p<0.05$ ) except health literacy, history of forced sex or physical violence by an intimate partner, and binge drinking were associated with SVS.

### Prevalence & Prevalence Differences in Treatment Outcomes

Over one-third (37.2% [95% CI: 34.3 – 40.1]) of Black MSM, 44.7% (95% CI: 42.4 – 47.1) of Hispanic/Latino MSM, and 54.1% (95% CI: 51.9 – 56.3) of White MSM reported ART adherence (Table 1; Supplementary Digital Content 2, <http://links.lww.com/QAD/D122>). The unadjusted PD for ART adherence between Black and White MSM was  $-16.9$  (95% CI:  $-20.2$  –  $-13.5$ ;  $p<0.0001$ ) (Table 2). The PD reduced by 51.5% to  $-8.2$  (95% CI:  $-11.6$  –  $-4.9$ ;  $p<0.0001$ ) after adjusting for age at interview, any unmet need for ancillary services, household income with respect to the FPL, hunger/food insecurity, homelessness, time since HIV diagnosis, gaps in health coverage, and educational attainment. The unadjusted PD for ART adherence between Hispanic/Latino and White MSM was  $-9.3$  (95% CI:  $-12.6$  –  $-6.0$ ;  $p<0.0001$ ). After adjusting for age at interview and household income with respect to the FPL, the PD decreased by 68.8% to  $-2.9$  (95% CI:  $-6.4$  –  $0.5$ ;  $p=0.092$ ) and was no longer significant.

Overall, 60.3% (95% CI: 57.6 – 63.1) of Black MSM, 70.0% (95% CI: 67.5–72.6) of Hispanic/Latino MSM, and 68.7% (95% CI: 65.8–71.5) of White MSM had SVS (Table 1; Supplementary Figure, <http://links.lww.com/QAD/D122>). The unadjusted PD for SVS between Black and White MSM was  $-8.3$  (95% CI  $-11.1$  –  $-5.6$ ;  $p<0.0001$ ) (Table 2). The PD reduced by 56.6% to  $-3.6$  (95% CI:  $-6.5$  –  $-0.7$ ;  $p=0.016$ ) after adjusting for ART adherence, age at interview, homelessness, hunger/food insecurity, gaps in health coverage, household income with respect to the FPL, any unmet ancillary service need, time since HIV

diagnosis, and having 1 ER visit(s). The unadjusted PD for SVS between Hispanic/Latino and White MSM was not statistically significant (1.4 [95% CI: -2.4 – 5.1];  $p=0.469$ ), and therefore no multivariable modeling was conducted.

## DISCUSSION

Among U.S. MSM with HIV taking ART, Black MSM had the lowest prevalence of ART adherence and SVS, White MSM had the highest prevalence of ART adherence, and Hispanic/Latino MSM had the highest prevalence of SVS (albeit not statistically significantly higher than White MSM). Adjusting for certain characteristics—including SDOH and demographic, behavioral, and clinical characteristics—greatly reduced the magnitude of disparities in ART adherence for Black MSM and Hispanic/Latino MSM compared with White MSM and in SVS for Black MSM compared with White MSM. Several SDOH helped to explain the disparities in treatment outcomes—primarily household poverty level, any unmet need for ancillary services, hunger or food insecurity, homelessness, and gaps in health coverage.

ART adherence is the first step toward achieving SVS [11]. Although evidence-based interventions addressing individual-level adherence challenges are important [12–13], our findings indicate that multilevel approaches to improving SDOH are also needed to ensure that persons with HIV (PWH) have support to successfully continue HIV treatment. At the healthcare system level, providers can work to understand patients' barriers to treatment [14–15] and help address those barriers. For example, providers could write 90-day instead of 30-day prescriptions to improve adherence [16] if patients have difficulties (e.g., lack of transportation access) [17] obtaining monthly prescriptions. Healthcare clinics may also implement anti-stigma and anti-discrimination interventions [18] given that MSM, racial/ethnic minorities, and persons living in poverty tend to report greater experiences of stigma and discrimination [18–21], which can affect trust in providers and subsequently adherence to treatment [19, 22–24].

At the community level, coordination of HIV and ancillary services programs have a role in addressing SDOH among PWH [15, 25–27]. For example, housing services could offer linkage and engagement to HIV care services. Conversely, mobile care and treatment centers could offer linkage to housing services, nutrition programs, and other ancillary services. At the policy level, expanding RWHAP coverage could improve access to HIV care and ancillary services for a greater proportion of PWH [9, 27–28]. Moreover, expansion of Medicaid and the Affordable Care Act could increase access to health insurance and therefore coverage of medical visits and medications [28]. Finally, implementing public health and medical policies that end structural racism (i.e., the laws, policies, institutional practices, and entrenched norms that perpetuate widespread unfair treatment of racial/ethnic minorities [29]) is essential, given that structural racism underlies many of the SDOH that drive racial/ethnic disparities in HIV [30].

Although the magnitude of disparities in treatment outcomes between Black MSM and White MSM was reduced, disparities remained after adjusting for SDOH, demographic, and behavioral and clinical characteristics. This indicates that there are other factors or

characteristics that we were unable to account for in our analysis, such as differences in ART regimen, stigma, discrimination, and racism. Other limitations include that causality cannot be assumed due to the cross-sectional design, potential biases due to self-reported data, and that ART adherence was based on a self-reported dichotomized measure of 100% vs. <100% 30-day adherence; however, this measure is practical for large-scale data collection and has been shown to be highly correlated with viral suppression [31].

## Conclusion

Adjusting for SDOH and other characteristics greatly reduced racial/ethnic disparities in ART adherence and SVS among MSM with diagnosed HIV. Addressing these factors could substantially improve health equity among MSM. However, to eliminate disparities, more efforts are needed to understand and address other factors that contribute to the remaining disparities in treatment outcomes.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## CONFLICTS OF INTEREST AND SOURCES OF FUNDING:

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**Table 1.**

Prevalence of Clinical Outcomes and Selected Demographic Characteristics, Social Determinants of Health, and Behavioral and Clinical Characteristics among Black/African American and Hispanic/Latino Men Who Have Sex with Men (MSM) versus White MSM—MSM with Diagnosed HIV Taking Antiretroviral Therapy (ART), Medical Monitoring Project, United States, 2017–2021

	Black/African American MSM		Hispanic/Latino MSM		White MSM		BMSM – WMSM PD <sup>a</sup>	HMSM – WMSM PD <sup>a</sup>
<b>Total (n, weighted row %<sup>b</sup>)</b>	2,606	29.0 (25.7–32.3)	2,347	26.7 (23.6–29.8)	4,094	44.3 (41.3–47.3)	--	--
	n	% <sup>b</sup> (95% CI)	n	% <sup>b</sup> (95% CI)	n	% <sup>b</sup> (95% CI)	% <sup>b</sup> (95% CI)	% <sup>b</sup> (95% CI)
<b>Outcomes (n, weighted column %<sup>b</sup>)</b>								
ART Adherence <sup>c</sup>	951	37.2 (34.3 – 40.1)	1,049	44.7(42.4 – 47.1)	2,191	54.1(51.9 – 56.3)	-16.9 <sup>*</sup> (-20.2 – -13.5)	-9.3 <sup>*</sup> (-12.6 – -6.0)
SVS <sup>d</sup>	1,645	60.3(57.6 – 63.1)	1,729	70.0(67.5–72.6)	3,022	68.7(65.8 – 71.5)	-8.3 <sup>*</sup> (- 11.1 – -5.6)	1.4(-2.4 – 5.1)
<b>Characteristic<sup>e</sup>(n, weighted column %<sup>b</sup>)</b>								
<b>Age at interview (years)</b>								
18–29	475	18.2(16.2 – 20.3)	300	11.5(10.0 – 13.0)	123	3.8(3.0 – 4.6)	14.4 <sup>*</sup> (12.4 – 16.5)	7.7 <sup>*</sup> (6.0 – 9.3)
30–39	685	27.6 (25.4 – 29.8)	597	24.8 (22.6 – 26.9)	479	12.7 (11.6 – 13.8)	14.9 <sup>*</sup> (12.3 – 17.4)	12.1 <sup>*</sup> (9.8 – 14.3)
40–49	505	18.9 (17.3 – 20.6)	562	25.4 (23.2 – 27.6)	704	17.4 (16.0 – 18.8)	1.5 (-0.7 – 3.7)	8.0 <sup>*</sup> (5.3 – 10.6)
>50	941	35.3 (32.6 – 37.9)	888	38.4 (35.4 – 41.3)	2,788	66.1 (64.4 – 67.8)	-30.8 <sup>*</sup> (-34.0 – -27.6)	-27.7 <sup>*</sup> (-31.0 – -24.5)
<b>Household income with respect to the federal poverty level<sup>f</sup></b>								
<100%	735	29.9 (27.3 – 32.4)	681	30.7 (27.7 – 33.6)	721	19.1 (17.7 – 20.5)	10.8 <sup>*</sup> (7.8 – 13.8)	11.6 <sup>*</sup> (8.4 – 14.8)
100–138%	262	11.6 (10.0 – 13.2)	280	13.1 (11.5 – 14.6)	332	8.6 (7.6 – 9.6)	3.0 <sup>*</sup> (1.1 – 4.9)	4.5 <sup>*</sup> (2.6 – 6.3)
139–399%	1,058	43.7 (40.8 – 46.6)	886	41.3 (38.7 – 43.9)	1,582	40.6 (38.7 – 42.6)	3.0 (-0.5 – 6.6)	0.6 (-2.5 – 3.8)
400%	348	14.8 (13.0 – 16.7)	318	15.0 (12.6 – 17.3)	1,297	31.1 (29.7 – 33.6)	-16.8 <sup>*</sup> (-19.3 – -14.3)	-16.7 <sup>*</sup> (-19.6 – -13.8)
<b>Hunger/food insecurity<sup>g</sup></b>	511	19.0 (16.9 – 21.0)	422	17.3 (15.6 – 19.1)	439	11.8 (10.5 – 13.1)	7.2 <sup>*</sup> (5.1 – 9.3)	5.6 <sup>*</sup> (3.4 – 7.8)
<b>Health insurance/coverage</b>								
Any private insurance	1,132	45.1 (42.4 – 47.8)	964	41.0 (38.4 – 43.6)	2,325	55.8 (53.7 – 57.8)	-10.7 <sup>*</sup> (-13.6 – -7.7)	-14.7 <sup>*</sup> (-18.3 – -11.2)
Public insurance only <sup>h</sup>	1,135	42.0 (38.4 – 45.6)	1,037	43.7 (40.0 – 47.5)	1,607	40.5 (38.2 – 42.7)	1.5 (-2.1 – 5.1)	3.2 (-1.2 – 7.7)
Uninsured or RWHP coverage only	313	12.9 (10.6 – 15.2)	322	15.2 (12.7 – 17.8)	132	3.8 (2.8 – 4.7)	9.2 <sup>*</sup> (7.0 – 11.3)	11.5 <sup>*</sup> (9.0 – 14.0)

	Black/African American MSM		Hispanic/Latino MSM		White MSM		BMSM – WMSM PD <sup>a</sup>	HMSM – WMSM PD <sup>a</sup>
<b>Gap in health coverage<sup>i</sup></b>	336	13.5 (11.9 – 15.2)	264	11.4 (9.6 – 13.3)	323	7.5 (6.5 – 8.6)	6.0* (4.2 – 7.8)	3.9* (1.9 – 5.9)
<b>Had 1 ER visits</b>	1,104	41.5 (39.1 – 43.9)	714	35.1 (33.0 – 37.3)	1,340	32.9 (31.2 – 34.6)	8.6* (5.9 – 11.4)	2.2 (0.3 – 4.8)
<b>Educational attainment</b>								
Less than high school	176	6.7 (5.6 – 7.7)	271	12.3 (10.4 – 14.1)	97	2.3 (1.8 – 2.8)	4.4* (3.3 – 5.4)	9.9* (8.0 – 11.8)
High school diploma or GED	654	25.0 (23.0 – 27.0)	477	19.9 (17.9 – 22.0)	636	16.8 (15.4 – 18.2)	8.2* (6.0 – 10.4)	3.1* (0.5 – 5.7)
More than high school	1,774	68.3 (66.2 – 70.5)	1,597	67.8 (65.0 – 70.6)	3,359	80.9 (79.4 – 82.4)	-12.5* (-14.9 – -10.1)	-13.1* (-16.4 – -9.7)
<b>Health literacy<sup>j</sup></b>								
Low confidence	449	17.3 (15.3 – 19.2)	597	25.3 (23.2 – 27.4)	611	15.8 (14.3 – 17.3)	1.5 (-1.1 – 4.0)	9.6* (6.9 – 12.2)
High confidence	2,157	82.7 (80.8 – 84.7)	1,749	74.7 (72.6 – 76.9)	3,748	84.4 (82.7 – 85.7)	-1.5 (-4.0 – 1.1)	-9.6* (-12.2 – -6.9)
<b>Homelessness<sup>k</sup></b>	278	9.9 (8.3 – 11.4)	161	6.4 (5.2 – 7.5)	172	4.5 (3.6 – 5.4)	5.4* (3.7 – 7.1)	1.9* (0.5 – 3.2)
<b>Incarcerated &gt;24 hours<sup>l</sup></b>	107	4.0 (3.1 – 4.9)	53	2.4 (1.6 – 3.1)	77	2.4 (1.8 – 3.0)	1.6* (0.6 – 2.6)	0.0 (-1.0 – 1.1)
<b>History of forced sex or physical violence by an intimate partner<sup>m</sup></b>	791	30.6 (28.6 – 32.5)	771	33.7 (31.3 – 36.0)	1,535	38.4 (36.4 – 40.4)	-7.9* (-10.7 – -5.1)	-4.8* (-7.8 – -1.8)
<b>Injection or noninjection drug use<sup>n</sup></b>	1,170	45.0 (42.1 – 47.9)	914	37.9 (35.5 – 40.4)	1,987	47.5 (44.7 – 50.4)	-2.5 (-6.4 – 1.4)	-9.6* (-13.5 – -5.7)
<b>Binge drinking (past 30 days)<sup>o</sup></b>	478	18.1 (16.2 – 20.1)	546	22.0 (20.0 – 24.0)	695	16.3 (15.1 – 17.4)	1.9 (-0.2 – 4.0)	5.7* (3.4 – 8.0)
<b>Symptoms of major or other depression (past 2 weeks)<sup>p</sup></b>	366	13.6 (12.1 – 15.0)	364	14.6 (13.0 – 16.2)	646	16.4 (15.0 – 17.9)	-2.9* (-5.0 – 0.8)	1.9 (-3.9 – 0.2)
<b>Symptoms of moderate or severe anxiety (past 2 weeks)<sup>q</sup></b>	356	13.2 (11.4 – 15.0)	318	12.8 (11.2 – 14.3)	640	17.0 (15.4 – 18.5)	-3.7* (-6.1 – -1.4)	-4.2* (-6.4 – -2.0)
<b>Time since HIV diagnosis (years)</b>								
<5 years	502	19.8 (17.6 – 22.0)	507	20.8 (18.9 – 22.6)	418	11.4 (10.2 – 12.5)	8.4* (6.0 – 10.8)	9.4* (7.3 – 11.5)
5–9 years	619	23.8 (21.8 – 25.8)	540	22.0 (20.2 – 23.8)	614	15.6 (14.2 – 16.9)	8.2* (5.9 – 10.6)	6.4* (4.3 – 8.6)
10 years	1,481	56.4 (54.2 – 58.7)	1,295	57.2 (55.1 – 59.4)	3,055	73.1 (71.4 – 74.7)	-16.6* (-18.5 – -13.1)	-15.8* (-18.5 – -13.1)
<b>HIV care engagement<sup>r</sup></b>	2,025	77.5 (75.6 – 79.4)	1,898	81.3 (78.7 – 83.8)	3,189	77.8 (76.0 – 79.7)	-0.4 (-2.9 – 2.2)	3.4* (0.5 – 6.3)
<b>Any unmet need for ancillary services<sup>s</sup></b>	1,267	49.3 (46.4 – 53.6)	1,031	43.0 (40.7 – 45.3)	1,436	36.4 (34.1 – 38.7)	12.8* (9.1 – 16.5)	6.6* (3.4 – 9.7)

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ART = antiretroviral therapy; SVS = sustained viral suppression; BMSM = Black/African American men who have sex with men; HMSM = Hispanic/Latino men who have sex with men; WMSM = white men who have sex with men; PD = prevalence difference; RWHP = Ryan White HIV/AIDS Program; ER = emergency room; GED = general education development; -- = not applicable

\*  
p<0.01

<sup>a</sup>WMSM as the referent group

<sup>b</sup>Data weighted to adjust for individual nonresponse and poststratified to known population totals by age, race/ethnicity, and sex from National HIV Surveillance System

<sup>c</sup>Self-report of missing zero ART doses in the past 30 days

<sup>d</sup>All viral load measurements in the past 12 months documented undetectable or <200 copies/mL based on medical record abstraction

<sup>e</sup>All variables measured over the past 12 months and self-reported during interview except where otherwise noted

<sup>f</sup>Based on the U.S. Department of Health and Human Services poverty guidelines that corresponded to the calendar year for which income was asked

<sup>g</sup>Ever being hungry because there wasn't enough money for food

<sup>h</sup>Medicaid, Medicare, TRICARE or CHAMPUS/CHAMPVA, Veterans Administration, or other public insurance

<sup>i</sup>Not having health insurance or coverage at any timepoint

<sup>j</sup>Confidence in filling out medical forms; "high confidence" was defined as responding "extremely" or "quite a bit" and "low confidence" as "somewhat," "a little bit," or "not at all."

<sup>k</sup>Living on the street, in a shelter, in a single room occupancy hotel, or in a car

<sup>l</sup>Based on number of different times in jail, detention, or prison for longer than 24 hours

<sup>m</sup>Ever experiencing forced sex (defined as being threatened with harm or physically forced to have unwanted vaginal, anal, or oral sex) or intimate partner violence (defined as ever having been slapped, punched, shoved, kicked, choked, or otherwise physically hurt by a romantic or sexual partner)

<sup>n</sup>Non-injection drug use defined as using any drugs that may have been smoked, snorted, inhaled, or ingested; injection drug use defined as any drugs that were injected for non-medical purposes. In 2021, vaping marijuana was included as an option for non-injection drug use.

<sup>o</sup>Having 4 alcoholic beverages in a single sitting on at least 1 day during the 30 days before the interview

<sup>p</sup>Responses to the items on the PHQ-8 were used to define "major depression" and "other depression" according to criteria from the DSM-IV. "Major depression" was defined as having at least 5 symptoms of depression; "other depression" was defined as having 2-4 symptoms of depression. The PHQ-8 classification "other depression" comprises the DSM-IV categories of dysthymia and depressive disorder, not otherwise specified, which includes minor or subthreshold depression.

<sup>q</sup>Responses to the GAD-7 were used to define "mild anxiety," "moderate anxiety," and "severe anxiety," according to criteria from the DSM-IV. "Severe anxiety" was defined as having a score of 15 and "moderate anxiety" was defined as having a score of 10-14.

<sup>r</sup>Having received at least two elements of outpatient HIV care at least 90 days apart; captured from medical record abstraction

<sup>s</sup>Needing but not receiving one or more ancillary services. Ancillary services include of HIV case management services, medicine through Ryan White/AIDS Assistance Drug Program (ADAP), antiretroviral therapy (ART) adherence support services, patient navigation services, HIV peer support, dental care, mental health services, drug or alcohol counseling or treatment, Supplemental Nutrition Assistance Program (SNAP) or Special Supplemental Nutrition Program for Woman, Infants, and Children (WIC), transportation assistance, meal or food services, shelter or housing services

**Table 2.**

Unadjusted and Adjusted Prevalence Differences of Clinical Outcomes among Black and Hispanic/Latino Men Who Have Sex with Men (MSM) versus White MSM—MSM with Diagnosed HIV Taking Antiretroviral Therapy (ART), Medical Monitoring Project, United States, 2017–2021

Black/African American MSM – White MSM Adjusted Prevalence Differences (PDs) <sup>d</sup>							
ART Adherence <sup>b</sup>				Sustained Viral Suppression <sup>c</sup>			
	PD (95% CI)	P-value	Relative Change from Unadjusted PD (%)		PD (95% CI)	P-value	Relative Change from Unadjusted PD (%)
Model <sup>d</sup> : ART adherence = racial/ethnic groups	-16.9 (-20.2 – -13.5)	<0.0001	--	Model <sup>d</sup> : SVS = racial/ethnic groups	-8.3 (-11.1 – -5.6)	<0.0001	--
After adjusting for the following <sup>e</sup> :				After adjusting for the following <sup>e</sup> :			
Age	-11.6 (-15.0 – -8.3)	<0.0001	↓31.4	ART adherence <sup>f</sup>	-7.1 (-9.9 – -4.2)	<0.0001	↓14.5
Age + any unmet need for ancillary services	-10.1 (-13.4 – -6.8)	<0.0001	↓40.2	ART adherence + age	-5.1 (-8.0 – -2.2)	<0.001	↓38.6
Age + any unmet need for ancillary services + FPL	-8.9 (-12.3 – -5.6)	<0.0001	↓47.3	ART adherence + age + homelessness	-4.4 (-7.4 – -1.4)	0.004	↓47.0
Age + any unmet need for ancillary services + FPL + hunger/food insecurity	-9.0 (-12.3 – -5.7)	<0.0001	↓46.7	ART adherence + age + homelessness + hunger/food insecurity	-4.3 (-10.7 – -5.1)	0.004	↓48.2
Age + any unmet need for ancillary services + FPL + hunger/food insecurity + homelessness	-8.8 (-12.1 – -5.5)	<0.0001	↓47.9	ART adherence + age + homelessness + hunger/food insecurity + gap in health coverage	-3.9 (-6.9 – -0.9)	0.011	↓53.0
Age + any unmet need for ancillary services + FPL + hunger/food insecurity + homelessness + time since HIV diagnosis	-8.5 (-11.8 – -5.2)	<0.0001	↓49.7	ART adherence + age + homelessness + hunger/food insecurity + gap in health coverage + FPL	-3.8 (-6.7 – -0.8)	0.013	↓54.2
Age + any unmet need for ancillary services + FPL + hunger/food insecurity + homelessness + time since HIV diagnosis + gap in health coverage	-8.4 (-11.7 – -5.1)	<0.0001	↓50.3	ART adherence + age + homelessness + hunger/food insecurity + gap in health coverage + FPL + any unmet need for ancillary services	-3.7 (-6.7 – -0.8)	0.014	↓55.4
Age + any unmet need for ancillary services + FPL + hunger/food insecurity + homelessness + time since HIV diagnosis + gap in health coverage + educational attainment	-8.2 (-11.6 – -4.9)	<0.0001	↓51.5	ART adherence + age + homelessness + hunger/food insecurity + gap in health coverage + FPL + any unmet need for ancillary services + time since HIV diagnosis	-3.7 (-6.6 – -0.8)	0.013	↓55.4
				ART adherence + age + homelessness + hunger/food insecurity + gap in health coverage +	-3.6 (-6.5 – -0.7)	0.016	↓56.6

				FPL + any unmet need for ancillary services + time since HIV diagnosis + 1 ER visit			
<b>Hispanic/Latino MSM – White MSM Adjusted Prevalence Differences (PDs)<sup>a</sup></b>							
<i>ART Adherence<sup>b</sup></i>				<i>Sustained Viral Suppression<sup>c</sup></i>			
	<i>PD (95% CI)</i>	<i>P-value</i>	<i>Relative Change from Unadjusted PD (%)</i>		<i>PD (95% CI)</i>	<i>P-value</i>	<i>Relative Change from Unadjusted PD (%)</i>
Model <sup>d</sup> : ART adherence = racial/ethnic groups	-9.3 (-12.6 – -6.0)	<0.0001	--	Model <sup>d,g</sup> : SVS = racial/ethnic groups	1.4 (-2.4 – 5.1)	0.469	--
After adjusting for the following <sup>e</sup> :							
Age	-5.1 (-8.4 – -1.9)	<0.0001	↓45.2				
Age + FPL	-2.9 (-6.4 – -0.5)	0.092	↓68.8				

MSM = men who have sex with men; PD = prevalence difference; ART = antiretroviral therapy; SVS = sustained viral suppression; FPL = household income with respect to federal poverty level; -- = not applicable

<sup>a</sup>Prevalence differences are based on differences between mean predicted marginals between Black/African American or Hispanic/Latino MSM compared with White MSM

<sup>b</sup>Self-report of missing zero ART doses in the past 30 days

<sup>c</sup>All viral load measurements in the past 12 months documented undetectable or <200 copies/mL based on medical record abstraction

<sup>d</sup>Initial unadjusted models to compute prevalence differences between Black/African American or Hispanic/Latino MSM and White MSM

<sup>e</sup>Multivariate models after adjusting for selected characteristics. Additional models describe the variables added to the initial model and the resulting prevalence differences after adjusting for additional covariates to the model.

<sup>f</sup>Sustained viral suppression model adjusted for ART adherence a priori

<sup>g</sup>Multivariate models not conducted since unadjusted prevalence difference was not statistically significant