HHS Public Access

Author manuscript

AIDS Care. Author manuscript; available in PMC 2020 August 01.

Published in final edited form as:

AIDS Care. 2019 August ; 31(8): 965–972. doi:10.1080/09540121.2019.1612020.

Age matters: differences in correlates of self-reported HIV antiretroviral treatment adherence between older and younger Black men who have sex with men living with HIV

Matt G. Mutchler[a,b], **Laura M. Bogart**[c], **David J. Klein**[c], **Glenn J. Wagner**[c], **Ian A. Klinger**[a], **Keshav Tyagi**[b], and **Bryce McDavitt**[d]

[a]Department of Sociology, California State University, Dominguez Hills, Carson, USA

[b]Community-Based Research, AIDS Project Los Angeles, Los Angeles, USA

[c]RAND Corporation, Santa Monica, USA

[d]Department of Psychiatry and Behavioral Sciences, Keck School of Medicine of the University of Southern California, Los Angeles, USA

Abstract

Black men who have sex with men (BMSM) show lower levels of adherence to antiretroviral therapy (ART) for HIV medications than other racial/ethnic groups in the U.S. Yet, little is known about age differences in factors that predict ART adherence among BMSM. We combined data from two surveys of HIV-positive BMSM, resulting in 209 participants (130 aged 18-50 years; 79 aged 50 years or older). Multivariate linear regressions examined associations between baseline characteristics and adherence to HIV medications as well as interactions of baseline characteristics with age. The associations between trust in healthcare and doctor satisfaction ratings with higher adherence were stronger for older vs younger men ($p < .05$); the association between problem drinking and lower adherence was stronger among younger men ($p < .05$). Future research should examine how interventions may address these age-specific factors to improve ART adherence among BMSM living with HIV.

Keywords

HIV; Black men who have sex with men (BMSM); Antiretroviral Therapy (ART); ART Adherence; Age

Background

In the United States, Black Americans are disproportionately impacted by HIV. The rate of AIDS is three times higher among Black Americans than the rate for Hispanics/Latinos and ten times higher than among Whites (Centers for Disease Control and Prevention, 2017b). The population of people living with HIV is aging (Centers for Disease Control and

Corresponding Author: Matt G Mutchler, Department of Sociology, California State University, Dominguez Hills, 1000 E. Victoria Street, Carson, CA 90747, USA; mmutchler@csudh.edu.

Prevention, 2017a; Crepaz, Dong, Wang, Hernandez, & Hall, 2018). In Los Angeles County (LAC), the setting of the present study, 20% of the ~50,000 individuals living with HIV identify as Black/African American, with 45% of those being over the age of 50 (Division of HIV and STD Programs Los Angeles County Department of Public Health, 2016). For people living with HIV, antiretroviral therapy (ART) has the potential to dramatically improve health outcomes and reduce HIV transmission (Centers for Disease Control and Prevention, 2016). However, Black people living with HIV are less likely to be engaged in HIV care, receive ART, and adhere to ART long enough to be virally suppressed compared to other races/ethnicities (Centers for Disease Control and Prevention, 2012; Crepaz et al., 2018; Dailey, Johnson, & Wu, 2017; Simoni et al., 2012).

Research suggests that structural, healthcare system, interpersonal, and individual psychosocial factors affect HIV disparities (Kaufman, Cornish, Zimmerman, & Johnson, 2014). Among Black Americans, structural issues leading to disparities among Black Americans include incarceration, poverty, homelessness, and low education levels (Cunningham et al., 1999; Earnshaw, Bogart, Dovidio, & Williams, 2013; Rumptz et al., 2007; Williams & Mohammed, 2009). Healthcare system factors related to quality of and access to care may increase medical mistrust among Black Americans (Bogart et al., 2015, 2016; Bogart, Wagner, Galvan, & Banks, 2010; Bogart, Wagner, Galvan, & Klein, 2010; Earnshaw et al., 2013). Mistrust related to HIV's origin and treatment (HIV conspiracy beliefs) contributes to lower ART adherence among Black American men living with HIV (Bogart, Wagner, Galvan, & Banks, 2010).

One key individual-level factor associated with ART adherence is age (Barclay et al., 2007; Ghidei et al., 2013). A meta-analysis found that older age reduced risk for HIV treatment non-adherence by 27% (Ghidei et al., 2013). Among young BMSM living with HIV, higher HIV-related stigma/homophobia, higher community violence, marijuana/alcohol use, lower family acceptance/stigma, and lower perceived adherence self-efficacy are associated with lower ART adherence (Arnold, Rebchook, & Kegeles, 2014; Quinn, Voisin, Bouris, & Schneider, 2016; Voisin, Quinn, Kim, & Schneider, 2017). One study found cognitive functioning to be related to adherence among older individuals living with HIV (Hinkin et al., 2004), whereas another found that older individuals' neuropsychological functioning was not associated with adherence (Johnson, Heckman, Hansen, Kochman, & Sikkema, 2009).

Research is lacking comparing ART adherence predictors among younger to older BMSM living with HIV. We compared predictors of ART adherence between younger (under 50) and older (50 or older) BMSM living with HIV. Results may help to tailor future interventions to address age-related factors pertaining to ART adherence.

Data and Methods

Research Design, Sampling and Data Collection

To understand potential reasons for disparities in ART adherence by age among BMSM, we combined baseline data from two studies (Project Mednet, conducted August 2010-September 2012 and Project Rise, conducted April 2013-September 2015) of BMSM living

with HIV in LAC, resulting in 209 participants (124 from Mednet, 85 from Rise; 130 aged 18-50 years; 79 aged 50 years or older). Participants were eligible for these studies if they self-identified as Black or African American, were HIV-positive, and were at least 18 years-old. We restricted the analysis to all male participants who reported ever having sex with men.

Participants were recruited via flyers and in-person contacts at clinics and AIDS service organizations, and through media advertisements (e.g., radio, public transit, newspaper) throughout LAC, California. All interviews were conducted in a confidential space at an AIDS service organization. Prior to data collection, participants provided written informed consent and signed a Health Insurance Portability and Accountability Act (HIPAA) form for release of medical record information. Both studies were approved by the RAND Corporation and California State University, Dominguez Hills IRBs. A Certificate of Confidentiality was obtained from the National Institutes of Health. The survey was administered via computer-assisted self-interviews at baseline of both studies. Participants received $30 as reimbursement for their time.

Measures

Socio-demographic Characteristics—We collected data on participants' level of education (dichotomized as graduated high school vs. did not), income (dichotomized as less than $10,000 vs. greater than or equal to $10,000), incarceration history (i.e., whether or not they had been placed in the criminal justice system in the last three months), housing status (dichotomized as stable vs. not stable housing), and months since HIV diagnosis. We measured age by asking participants for their date of birth and deriving age from current date.

HIV-related Medical Mistrust/Trust—Perceived ART efficacy was measured with an 8-item scale adapted from prior research (Siegel, Karus, & Schrimshaw, 2000) (α = .74; sample item: "Taking HIV medication is a good idea even if one doesn't have symptoms"; response options were 1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Somewhat Agree, 4 = Strongly Agree). Trust in healthcare was measured using two questions from the HIV Cost and Services Utilization Study (London, Foote-Ardah, Fleishman, & Shapiro, 2003) (RAND Corporation, n.d.): "How much do you trust your doctor or clinic to offer you high quality medical care for your HIV?" and "How much do you trust your doctor or clinic to put your health above all other concerns?" (with response options from 0, Completely to 4, Not at All) (α = .91). Ratings of care ("What number would you use to rate the medical care you received for your HIV in the past 12 months?") and of doctor ("What number would you use to rate the doctor you saw most often for your HIV in the past 12 months?"), from 0, Worst Possible to 10, Best Possible, were drawn from the Consumer Assessment of Health Plans Study, which found high reliability (α = .93 and α = .88, respectively) (Hargraves, Hays, & Cleary, 2003) . The average of the HIV conspiracy beliefs scale was calculated (α = .88; sample item: "There is a cure for AIDS, but it is being withheld from the poor"; response options 1, Strongly Disagree to 5, Strongly Agree) (Bogart, Wagner, Galvan, & Banks, 2010).

Other Psychosocial and Interpersonal Factors—We assessed several additional psychosocial and interpersonal variables via validated measures that have been shown to be significantly associated with ART adherence: mental health and substance use, including depression (PHQ-9) (Kroenke, Spitzer, & Williams, 2001), problem alcohol use (Rapid Alcohol Screen Test) (Cherpitel, 2002), and stimulant substance use (any crack, powder cocaine, and/or speed/methamphetamine use in the last 30 days (Carrico, 2011; Mimiaga et al., 2010; Socias & Milloy, 2018; Vu, Maher, & Zablotska, 2015); adapted from the Addiction Severity Index) (McLellan et al., 1985). We also measured internalized stigma (Kalichman et al., 2009), (average score. Internalized AIDS-Related Stigma Scale; $\alpha = .88$); and social support (average score, MOS social support survey; $\alpha = .88$) (Sherbourne & Stewart, 1991).

Antiretroviral Medication Adherence—To measure ART adherence, participants were asked to estimate the percentage of prescribed HIV medication that they took in the last month (Simoni et al., 2006), from 0, I Took None to 100, I Took Every Dose. Participants were categorized as adherent if their adherence was >= 85%, based on prior research suggesting clinically significant effects at this level (Bangsberg, 2006; Kobin & Sheth, 2011; Shuter, Sarlo, Kanmaz, Rode, & Zingman, 2007).

Analytical Strategies—Descriptive statistics were computed for all variables. Fisher's exact tests for dichotomous characteristics and t-tests for continuous characteristics were used to test for age differences within the sample, and for differences between the two data sources (Rise vs. Mednet). Bivariate tests were conducted to identify significant associations between participant characteristics and self-reported HIV treatment adherence. Multivariate linear regressions were constructed from characteristics that were significantly associated ($p < .05$) with adherence in bivariate analysis overall or for either age group, dropping highly correlated predictors ($r > .50$). These multivariate linear regressions were used to examine associations between baseline characteristics and adherence to HIV medications, as well as interactions of baseline characteristics with age. All analyses were performed using SAS v9.4. All models controlled for data source, which was not significant for any model.

Results

Descriptive Characteristics

Table 1 shows descriptive characteristics of the sample. A smaller percentage of older participants were of low income ($p < .05$) and a larger percentage reported stable housing ($p < .01$). Older participants reported a significantly longer duration of time since HIV diagnosis ($p < .001$) and greater ART adherence ($p < .05$). A smaller percentage of older participants showed depression symptoms ($p < .01$). In tests comparing the Rise and Mednet samples (not tabled), Rise participants were more likely to be low-income than Mednet participants (72% vs. 55%, $p = .01$), and gave lower care ratings to their care [mean (SD) = 7.9 (2.3) vs. 9.0 (1.3), $p < .001$], and doctor [mean (SD) = 8.2 (2.4) vs. 9.0 (1.7), $p = .008$] ratings. The two samples were not significantly different ($p < .05$) on any of the other characteristics shown in Table 1, including age.

Bivariate Tests

Table 2 presents bivariate tests for association of participant characteristics with self-reported adherence for younger participants (under age 50), older participants (50 years-old and older), and overall, as well as interactions by age. Overall, low income ($p < .05$), depression ($p < .001$), stimulant substance use ($p < .05$), problem alcohol use ($p < .001$), and internalized HIV stigma ($p < .001$) were significantly associated with lower self-reported ART adherence. Moreover, higher perceived ART efficacy ($p < .01$), trust in healthcare ($p < .05$), care ratings ($p < .001$), and social support ($p < .05$) were associated with higher self-reported ART adherence ($p < .05$); a greater number of months since HIV diagnosis and higher ratings of doctor were marginally significant predictors of self-reported ART adherence ($p < .10$).

In terms of age differences, depression ($p < .01$), problem alcohol use ($p < .001$), and internalized stigma ($p < .001$) remained as significant predictors of lower self-reported adherence among the younger sample; low income, stimulant substance use, perceived ART efficacy, and social support marginally predicted self-reported adherence among the younger sample ($p < .10$). Within the older sample, none of the socio-demographic characteristics or mental health factors were significantly associated with self-reported ART adherence. However, all of the trust-related scales and ratings of care were significantly associated with self-reported ART adherence among the older participants (i.e., perceived ART efficacy, $p < .001$; trust in healthcare, $p < .01$; care ratings, $p < .001$; doctor ratings, $p < .001$; and HIV conspiracy beliefs, $p < .05$). Similar to the younger participants, greater social support was marginally associated with self-reported ART adherence ($p < .10$).

Evaluating Predictors of ART Adherence by Age among BMSM

Multivariate linear regressions including the full sample were used to examine associations between adherence to HIV medications (ART) and characteristics that were significantly associated ($p < .05$) with ART adherence in bivariate analysis overall or for either age group, as well as interactions of key characteristics with age (see Table 3). Rating of care was not included in multivariate models due to collinearity with doctor rating ($r = .65$). In the base model (which did not include interactions with age), low income ($p < .01$), stimulant use ($p < .05$), problem alcohol use ($p < .01$), and internalized HIV stigma ($p < .01$) predicted lower ART adherence; perceived ART efficacy ($p < .001$) predicted better ART adherence. In models where interactions were added one at a time to the base model, the interactions between age and trust in healthcare ($p < .05$), doctor ratings ($p < .01$), and problem drinking ($p < .05$) were all significant. Specifically, the associations of trust in healthcare and doctor ratings with higher ART adherence were significantly stronger among older men; and the association between problem drinking and lower ART adherence was significantly stronger among younger BMSM living with HIV.

Discussion

Our study is among the first to explore how self-reported ART adherence varies between younger and older BMSM. Since more people are living longer with HIV (Centers for Disease Control and Prevention, 2016), it is important that we understand how to address

ART adherence throughout the life course of Black Americans living with HIV. In the present study, low income, stimulant use, problematic alcohol use, and internalized HIV stigma predicted reduced ART adherence, whereas perceived ART efficacy and ratings of care predicted increased ART adherence. These findings confirm the importance of addressing these factors with BMSM in general. Consistent with prior research, low income remained a strong predictor of non-adherence across analyses (Cunningham et al., 1999), and stimulant use and problem alcohol use were predictors of non-adherence in multivariate models (Hinkin et al., 2004; Quinn et al., 2016; Voisin et al., 2017). Problem alcohol use was a significant predictor of non-adherence in all of the models, but it also interacted with age, producing a stronger effect among younger men.

Consistent with previous literature on people living with HIV (Barclay et al., 2007; Ghidei et al., 2013; Hinkin et al., 2004), younger BMSM reported lower ART adherence. Thus, non-adherence may be one contributor to higher rates of HIV infection in this population (Maulsby et al., 2014). Previous literature similarly found that alcohol use was associated with lower ART adherence among young BMSM (Voisin et al., 2017) ages 16-29. Young BMSM may use alcohol to confront shame, stigma, and inhibition when exploring their sexual desires and identities (Mutchler, McDavitt, & Gordon, 2014). Therefore, it may be helpful to support younger BMSM who are living with HIV in their developmental journeys, as this could help them rely less on alcohol, and improve their HIV treatment outcomes.

Associations between medical mistrust and non-adherence to ART were stronger among older BMSM. Previous literature has also found that medical mistrust is related to ART adherence among Black Americans (Bogart, Wagner, Galvan, & Banks, 2010; Dale, Bogart, Wagner, Galvan, & Klein, 2016). Medical mistrust may also be related to stigma and discrimination among African Americans (Armstrong et al., 2008; Bogart & Thorburn, 2005; Earnshaw et al., 2013) and may have a stronger influence on older BMSM, who may be more likely to have experienced or directly know others (e.g., family members) who experienced structural discrimination in healthcare, such as unequal treatment, segregation, or medical experimentation. Older BMSM may also recall when earlier HIV treatments such as AZT were promoted as effective treatments for HIV (AZT was not very effective and caused serious side effects), and thus be more likely to mistrust new treatments and medical information about HIV. Members of this generation may also recall instances of medical and research ethical violations such as the Tuskegee syphilis study, in which researchers withheld treatment for Black/African American men suffering from syphilis (Jones, 1981). Borrowing from political generations theory (Mannheim, 1952), older and younger BMSM may be comprised of distinct age groups shaped by particular social contexts in which they form various perspectives and beliefs such as mistrust toward medical providers. The finding that mistrust has less impact on younger BMSM's adherence offers hope that the detrimental impact of medical mistrust may be fading with time.

There may be other explanations for the age interactions in our sample. Perhaps, providers interact with older patients differently than younger patients which may explain the strong effects of medical mistrust among older BMSM living with HIV. Another explanation may be found in socio-demographic and health-related differences between younger and older BMSM living with HIV. Younger BMSM were more likely to report low income and

unstable housing, and a shorter amount of time since HIV diagnosis. Thus, younger BMSM may have a lower level of experience with the healthcare system, due to lower access to care, which reduces their opportunity to interact with providers.

Our study suggests that it may be especially important to promote trust in healthcare and advocate for communication with providers among older BMSM living with HIV, since these factors were more strongly related to ART adherence for this population. Many older Black gay and bisexual men have lived through profound generational traumas from multiple sides, including not only cultural homophobia and racism, but also the grievous loss of loved ones throughout the AIDS crisis. HIV treatment adherence interventions designed for Black Americans need to build bridges and trust between clients and providers to ensure better healthcare and health outcomes (Mutchler et al., 2011). This should entail not only addressing the mistrust beliefs of BMSM living with HIV, but also intervening on how providers approach mistrust, helping them recognize it as a self-protective response to historical bias and mistreatment—albeit one that can impede patients from gaining the full benefits of treatment.

Limitations and Future Directions

Data were self-reported and thus, may be subject to social biases. Convenience sampling was used and the findings may not be generalizable to the population of BMSM living with HIV. Our analysis did not account for all factors (e.g., cognitive functioning) found in previous studies to be associated with ART adherence among older BMSM living with HIV. For some measures, a few items were used from larger scales in order to reduce survey fatigue, but these items did have high reliability in our study.

Future interventions to improve HIV treatment adherence among BMSM need to take into account differences in adherence by age within the population. While HIV treatment adherence interventions should address factors predicting adherence among BMSM living with HIV in general (e.g., poverty, substance use, stigma), unique factors related to ART adherence among younger BMSM versus older BMSM should also be considered. Interventions may need to be tailored to address factors such as problem drinking among younger BMSM and medical mistrust among older BMSM. Future research should examine how interventions may address these age-specific factors to improve ART adherence and thus, reduce critical health disparities in care and health outcomes found among people living with HIV.

Acknowledgments

Funding: The National Institutes of Health (NIH R01 MD003964), (NIH R01MD006058), and (NIH P30MH058107). The content is soltely the responsibility of the authors and does not necessarily represent the official views of the NIH.

References

Armstrong K, McMurphy S, Dean LT, Micco E, Putt M, Hughes Halbert C, … Shea JA (2008). Differences in the patterns of health care system distrust between blacks and whites. J Gen Intern Med, 23(6), 827–833. [PubMed: 18299939]

Arnold EA, Rebchook GM, & Kegeles SM (2014). "Triply cursed": racism, homophobia and HIV-related stigma are barriers to regular HIV testing, treatment adherence and disclosure among young Black gay men. Culture, Health & Sexuality, 16(6), 710–722.

Bangsberg DR (2006). Less than 95% adherence to nonnucleoside reverse-transcriptase inhibitor therapy can lead to viral suppression. Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America, 43(7), 939–941. [PubMed: 16941380]

Barclay TR, Hinkin CH, Castellon SA, Mason KI, Reinhard MJ, Marion SD, … Durvasula RS (2007). Age-associated predictors of medication adherence in HIV-positive adults: health beliefs, self-efficacy, and neurocognitive status. Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association, 26(1), 40–49.

Bogart LM, & Thorburn S (2005). Are HIV/AIDS conspiracy beliefs a barrier to HIV prevention among African Americans? Journal of Acquired Immune Deficiency Syndromes (1999), 38(2), 213–218. [PubMed: 15671808]

Bogart LM, Wagner GJ, Galvan FH, & Banks D (2010). Conspiracy beliefs about HIV are related to antiretroviral treatment nonadherence among african american men with HIV. Journal of Acquired Immune Deficiency Syndromes (1999), 53(5), 648–655. [PubMed: 19952767]

Bogart LM, Wagner GJ, Galvan FH, & Klein DJ (2010). Longitudinal relationships between antiretroviral treatment adherence and discrimination due to HIV-serostatus, race, and sexual orientation among African-American men with HIV. Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine, 40(2), 184–190. [PubMed: 20552416]

Bogart LM, Wagner GJ, Green HD, Mutchler MG, Klein DJ, & McDavitt B (2015). Social Network Characteristics Moderate the Association Between Stigmatizing Attributions About HIV and Non-adherence Among Black Americans Living with HIV: a Longitudinal Assessment. Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine, 49(6), 865–872. [PubMed: 26296702]

Bogart LM, Wagner GJ, Green HD, Mutchler MG, Klein DJ, McDavitt B, … Hilliard CL (2016). Medical mistrust among social network members may contribute to antiretroviral treatment nonadherence in African Americans living with HIV. Social Science & Medicine (1982), 164, 133–140.

Carrico AW (2011). Substance use and HIV disease progression in the HAART era: Implications for the primary prevention of HIV. Life Sciences, 88(21-22), 940–947. 10.1016/j.lfs.2010.10.002 [PubMed: 20934437]

Centers for Disease Control and Prevention. (2012). HIV in the United States: The Stages of Care. Retrieved April 10, 2018, from https://www.cdc.gov/hiv/pdf/research_mmp_stagesofcare.pdf

Centers for Disease Control and Prevention. (2016). HIV Treatment. Retrieved April 10, 2018, from https://www.cdc.gov/actagainstaids/campaigns/hivtreatmentworks/stayincare/treatment.html

Centers for Disease Control and Prevention. (2017a). HIV Among Gay and Bisexual Men. Retrieved April 10, 2018, from https://www.cdc.gov/hiv/group/msm/index.html

Centers for Disease Control and Prevention. (2017b). HIV Surveillance Report, 2016. Retrieved April 10, 2018, from https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-2016-vol-28.pdf

Cherpitel CJ (2002). Screening for alcohol problems in the U.S. general population: comparison of the CAGE, RAPS4, and RAPS4-QF by gender, ethnicity, and service utilization. Rapid Alcohol Problems Screen. Alcoholism, Clinical and Experimental Research, 26(11), 1686–1691.

Crepaz N, Dong X, Wang X, Hernandez AL, & Hall HI (2018). Racial and Ethnic Disparities in Sustained Viral Suppression and Transmission Risk Potential Among Persons Receiving HIV Care - United States, 2014. Morbidity and Mortality Weekly Report (MMWR), 67(4), 113–118. 10.15585/mmwr.mm6704a2 [PubMed: 29389918]

Cunningham WE, Andersen RM, Katz MH, Stein MD, Turner BJ, Crystal S, … Shapiro MF (1999). The impact of competing subsistence needs and barriers on access to medical care for persons with human immunodeficiency virus receiving care in the United States. Medical Care, 37(12), 1270–1281. 10.1097/00005650-199912000-00010 [PubMed: 10599608]

Dailey AF, Johnson AS, & Wu B (2017). HIV Care Outcomes Among Blacks with Diagnosed HIV — United States, 2014. Morbidity and Mortality Weekly Report (MMWR), 66(4), 97–103. 10.15585/mmwr.mm6604a2 [PubMed: 28151924]

Dale SK, Bogart LM, Wagner GJ, Galvan FH, & Klein DJ (2016). Medical mistrust is related to lower longitudinal medication adherence among African-American males with HIV. Journal of Health Psychology, 21(7), 1311–1321. [PubMed: 25293970]

Division of HIV and STD Programs Los Angeles County Department of Public Health. (2016). 2014 Annual HIV/STD Surveillance Report. Retrieved April 10, 2018, from http://publichealth.lacounty.gov/dhsp/Reports/HIV-STDsurveillanceReport2014.pdf

Earnshaw VA, Bogart LM, Dovidio JF, & Williams DR (2013). Stigma and racial/ethnic HIV disparities: moving toward resilience. The American Psychologist, 68(4), 225–236. [PubMed: 23688090]

Ghidei L, Simone MJ, Salow MJ, Zimmerman KM, Paquin AM, Skarf LM, … Rudolph JL (2013). Aging, antiretrovirals, and adherence: a meta analysis of adherence among older HIV-infected individuals. Drugs & Aging, 30(10), 809–819. [PubMed: 23959913]

Hargraves JL, Hays RD, & Cleary PD (2003). Psychometric properties of the Consumer Assessment of Health Plans Study (CAHPS) 2.0 adult core survey. Health Services Research, 38(6 Pt 1), 1509–1527. [PubMed: 14727785]

Hinkin CH, Hardy DJ, Mason KI, Castellon SA, Durvasula RS, Lam MN, & Stefaniak M (2004). Medication adherence in HIV-infected adults: effect of patient age, cognitive status, and substance abuse. AIDS (London, England), 18 Suppl 1, S19–25.

Johnson CJ, Heckman TG, Hansen NB, Kochman A, & Sikkema KJ (2009). Adherence to antiretroviral medication in older adults living with HIV/AIDS: a comparison of alternative models. AIDS Care, 21(5), 541–551. [PubMed: 19444661]

Jones JH (1981). Bad Blood: The Tuskegee Syphilis Experiment. New York: The Free Press.

Kalichman SC, Simbayi LC, Cloete A, Mthembu PP, Mkhonta RN, & Ginindza T (2009). Measuring AIDS stigmas in people living with HIV/AIDS: the Internalized AIDS-Related Stigma Scale. AIDS Care, 21(1), 87–93. [PubMed: 19085224]

Kaufman MR, Cornish F, Zimmerman RS, & Johnson BT (2014). Health behavior change models for HIV prevention and AIDS care: Practical recommendations for a multi-level approach. Journal of Acquired Immune Deficiency Syndromes, 66 Suppl 3, S250–258. 10.1097/QAI.0000000000000236 [PubMed: 25007194]

Kobin AB, & Sheth NU (2011). Levels of adherence required for virologic suppression among newer antiretroviral medications. The Annals of Pharmacotherapy, 45(3), 372–379. [PubMed: 21386024]

Kroenke K, Spitzer R, & Williams W (2001). The PHQ-9: validity of a brief depression severity measure. Journal of General Internal Medicine, 16(9), 606–613. [PubMed: 11556941]

London AS, Foote-Ardah CE, Fleishman JA, & Shapiro MF (2003). Use of alternative therapists among people in care for HIV in the United States. American Journal of Public Health, 93(6), 980–987. [PubMed: 12773365]

Mannheim K (1952). The Problem of Generations In Paul Kecskemeti, Essays on the Sociology of Knowledge. New York: Oxford University Press.

Maulsby C, Millett G, Lindsey K, Kelley R, Johnson K, Montoya D, & Holtgrave D (2014). HIV among Black men who have sex with men (MSM) in the United States: a review of the literature. AIDS and Behavior, 18(1), 10–25. [PubMed: 23620241]

McLellan AT, Luborsky L, Cacciola J, Griffith J, Evans F, Barr HL, & O'Brien CP (1985). New Data from the Addiction Severity Index Reliability and Validity in Three Centers. The Journal of Nervous and Mental Disease, 173(7), 412–423. 10.1097/00005053-198507000-00005 [PubMed: 4009158]

Mimiaga MJ, Reisner SL, Fontaine Y, Bland SE, Driscoll MA, Isenberg D, … Mayer KH (2010). Walking the line: Stimulant use during sex and HIV risk behavior among Black urban MSM. Drug and Alcohol Dependence, 110(1-2), 30–37. 10.1016/j.drugalcdep.2010.01.017 [PubMed: 20334986]

Mutchler MG, McDavitt B, & Gordon KK (2014). “Becoming bold”: alcohol use and sexual exploration among Black and Latino young men who have sex with men (YMSM). Journal of Sex Research, 51(6), 696–710. [PubMed: 23730733]

Mutchler MG, Wagner G, Cowgill BO, McKay T, Risley B, & Bogart LM (2011). Improving HIV/AIDS care through treatment advocacy: going beyond client education to empowerment by facilitating client-provider relationships. AIDS Care, 23(1), 79–90. [PubMed: 21218280]

Quinn K, Voisin DR, Bouris A, & Schneider J (2016). Psychological distress, drug use, sexual risks and medication adherence among young HIV-positive Black men who have sex with men: exposure to community violence matters. AIDS Care, 28(7), 866–872. [PubMed: 26917328]

RAND Corporation. (n.d.). HIV Cost and Services Utilization Study (HCSUS). Retrieved April 8, 2019, from https://www.rand.org/health-care/projects/hcsus.html

Rumptz MH, Tobias C, Rajabiun S, Bradford J, Cabral H, Young R, & Cunningham WE (2007). Factors associated with engaging socially marginalized HIV-positive persons in primary care. AIDS Patient Care and STDs, 21 Suppl 1, S30–9. [PubMed: 17563288]

Sherbourne CD, & Stewart AL (1991). The MOS social support survey. Social Science and Medicine, 32(6), 705–714. 10.1016/0277-9536(91)90150-B [PubMed: 2035047]

Shuter J, Sarlo JA, Kanmaz TJ, Rode RA, & Zingman BS (2007). HIV-infected patients receiving lopinavir/ritonavir-based antiretroviral therapy achieve high rates of virologic suppression despite adherence rates less than 95%. Journal of Acquired Immune Deficiency Syndromes (1999), 45(1), 4–8. [PubMed: 17460469]

Siegel K, Karus D, & Schrimshaw EW (2000). Racial differences in attitudes toward protease inhibitors among older HIV-infected men. AIDS Care, 12(4), 423–434. 10.1080/09540120050123828 [PubMed: 11091775]

Simoni JM, Huh D, Wilson IB, Shen J, Goggin K, Reynolds NR, … Liu H (2012). Racial/Ethnic disparities in ART adherence in the United States: findings from the MACH14 study. Journal of Acquired Immune Deficiency Syndromes (1999), 60(5), 466–472. [PubMed: 22595873]

Simoni JM, Kurth AE, Pearson CR, Pantalone DW, Merrill JO, & Frick PA (2006). Self-report measures of antiretroviral therapy adherence: A review with recommendations for HIV research and clinical management. AIDS and Behavior, 10(3), 227–245. [PubMed: 16783535]

Socias ME, & Milloy M (2018). Substance Use and Adherence to Antiretroviral Therapy: What Is Known and What Is Unknown. Current Infectious Disease Reports, 20(9), 36. [PubMed: 30066113]

Voisin DR, Quinn K, Kim DH, & Schneider J (2017). A Longitudinal Analysis of Antiretroviral Adherence Among Young Black Men Who Have Sex With Men. The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 60(4), 411–416. [PubMed: 28043754]

Vu N, Maher L, & Zablotska I (2015). Amphetamine-type stimulants and HIV infection among men who have sex with men: implications on HIV research and prevention from a systematic review and meta-analysis. Journal of the International AIDS Society, 18(1), 19273. [PubMed: 25609214]

Williams DR, & Mohammed SA (2009). Discrimination and racial disparities in health: evidence and needed research. Journal of Behavioral Medicine, 32(1), 20–47. [PubMed: 19030981]

Table 1:

Descriptive Characteristics of the Sample

	% or Mean (SD)		
Characteristic	**Overall N=209**	**Under 50 N=130**	**50 and older N=79**
Socio-Demographics:			
Low Education (less than HS grad)	15.3	17.7	11.4
Low Income (less than 10K annual income)	61.7	68.5	50.6 *
Incarceration past 3 months	7.2	8.5	5.1
Stable Housing [a]	67.0	59.2	79.7 *
Months Since HIV Diagnosis	174 (102)	138 (88)	233 (97) ***
Mental Health:			
Depression	21.6	27.9	11.4 *
Stimulant Substance Use	25.5	25.6	25.3
Problem Alcohol Use	34.2	36.2	30.7
Internalized HIV Stigma (1-5)	2.75 (1.16)	2.86 (1.18)	2.58 (1.11) +
Trust/Mistrust:			
Perceived ART Efficacy (1-4)	3.29 (0.51)	3.32 (0.45)	3.23 (0.60)
Trust in Healthcare (0-4)	3.40 (0.87)	3.38 (0.90)	3.44 (0.83)
Ratings of Care (0-10)	8.55 (1.84)	8.46 (1.92)	8.70 (1.71)
Ratings of Doctor (0-10)	8.66 (2.02)	8.68 (1.94)	8.62 (2.16)
Agreement with HIV Conspiracy Beliefs (1-5)	2.56 (0.87)	2.59 (0.83)	2.52 (0.94)
Social Support (1-5)	3.22 (1.13)	3.24 (1.11)	3.18 (1.16)
Self-reported Adherence in past month (%)	83.32 (22.51)	80.67 (24.20)	87.67 (18.78) *

Note: Data were missing for some characteristics, ranging from n=0 to n=7 (3%).

[a] Stable housing includes rent or own home or apartment or publicly subsidized housing.

+ p < .10

* p < .05,

** p < .01,

*** p < .001 for comparison of under 50 vs. 50 and older.

Table 2:

Bivariate Predictors of Self-Reported ART Adherence Overall and by Age

	Overall N=209 b (se)	Under 50 N=130 b (se)	50 and older N=79 b (se)
Socio-Demographics:			
Low Education	2.47 (4.32)	4.09 (5.58)	1.66 (6.64)
Low Income	−8.15 (3.20)*	−8.79 (4.69)+	−5.36 (4.18)
Recent incarceration	−4.34 (6.02)	−4.30 (7.73)	−3.03 (9.80)
Stable Housing	2.85 (3.32)	0.40 (4.40)	4.22 (5.23)
Months Since HIV Dx	0.03 (0.02)+	0.03 (0.02)	−0.01 (0.02)
Mental Health:			
Depression	−12.66 (3.71)***	−12.40 (4.65)**	−8.05 (6.84)
Stimulant Use	−8.80 (3.54)*	−9.38 (4.85)+	−7.74 (4.80)
Problem Alcohol Use b	−11.59 (3.24)***	−16.71 (4.26)***	−0.99 (4.76)
Internalized HIV Stigma	−5.44 (1.30)***	−6.67 (1.72)***	−2.24 (1.93)
Trust/Mistrust:			
Perceived Art Efficacy	9.83 (2.96)**	9.05 (4.68)+	11.89 (3.26)***
Trust in Healthcare a	3.96 (1.79)*	1.80 (2.42)	7.78 (2.41)**
Ratings of Care b	2.91 (0.86)***	1.74 (1.14)	5.11 (1.18)***
Ratings of Doctor c	1.36 (0.78)+	−0.41 (1.13)	3.77 (0.90)***
HIV Conspiracy Beliefs b	−1.39 (1.79)	1.88 (2.58)	−5.17 (2.19)*
Social Support	3.42 (1.36)*	3.60 (1.90)+	3.54 (1.80)+

Note: Data were missing for some characteristics, ranging from n=0 to n=7 (3%). In such cases missing data were imputed with the overall mean.

All 'bivariate' tests controlled for data source (*Rise* vs. *Mednet*)

+ p < .10

* p < .05,

** p < .01,

*** p < .001 for bivariate association with adherence.

a p < .10

b p < .05

c p < .01 for interaction with age, i.e., the effect of covariate on adherence differs for older vs. younger subjects.

Table 3:

Multivariate models predicting self-reported ART adherence with interactions by age

	Multivariate Model, main effects only b (se)	**Multivariate Model with healthcare trust by age interaction b (se)**	**Multivariate Model with ratings of doctor by age interaction b (se)**	**Multivariate Model with problem drinking by age interaction b (se)**	**Multivariate Model with HIV conspiracy beliefs by age interaction b (se)**
Socio-Demographics:					
Age 50 $^{+}$	4.50 (3.01)	−21.90 (12.30) $^{+}$	−34.20 (12.45) **	−0.63 (3.68)	16.34 (9.04) $^{+}$
Low Income	−8.19 (3.00) **	−7.81 (2.97) **	−7.84 (2.93) **	−8.29 (2.96) **	−8.28 (2.99) **
Mental Health:					
Depression	−3.16 (3.81)	−3.17 (3.78)	−3.11 (3.73)	−3.40 (3.77)	−3.24 (3.81)
Stimulant Use	−8.18 (3.36) *	−8.49 (3.33) *	−8.42 (3.28) *	−7.48 (3.33) *	−7.56 (3.38) *
Problem Alcohol Use	−8.39 (3.11) **	−8.96 (3.09) **	−9.43 (3.06) **	−13.64 (3.79) ***	−7.88 (3.13) *
Internalized HIV Stigma	−3.78 (1.34) **	−3.86 (1.32) **	−3.48 (1.31) **	−3.96 (1.32) **	−3.91 (1.34) **
Trust/Mistrust:					
Perceived Art Efficacy	9.97 (2.91) ***	9.65 (2.89) ***	9.98 (2.85) ***	9.68 (2.88) ***	10.06 (2.91) ***
Trust in Healthcare	1.59 (2.17)	−0.59 (2.37)	1.92 (2.13)	1.35 (2.15)	1.31 (2.18)
Ratings of Doctor	−0.02 (0.94)	−0.31 (0.94)	−1.94 (1.10) $^{+}$	−0.20 (0.93)	−0.15 (0.94)
HIV Conspiracy beliefs	1.80 (1.72)	2.55 (1.74)	2.88 (1.72)	1.18 (1.72)	3.79 (2.24) $^{+}$
Social Support	0.50 (1.37)	0.77 (1.36)	0.51 (1.34)	0.62 (1.36)	0.46 (1.37)
Interactions:					
Trust in Healthcare by Age		7.73 (3.49) *			
Ratings of Doctor by Age			4.49 (1.40) **		
Problem Drinking by Age				15.20 (6.40) *	
HIV Conspiracy beliefs by Age					−4.65 (3.35)

Note: Data were missing for some characteristics, ranging from n=0 to n=7 (3%). In such cases missing data were imputed with the overall mean. All models controlled for data source (*Rise* vs. *Mednet*), which was not significant for any model.

$^{+}$ p < .10,

* p <. 05,

** p < .01,

*** p < .001.