Gender and Racial/Ethnic Disparities in HIV Care and Viral Suppression

Before Incarceration

BY

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THESIS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AIDS   Acquired Immunodeficiency Syndrome

ART   Antiretroviral Therapy

ASI   Addiction Severity Index

CD4   Cluster of Differentiation 4

GED   General Education Diploma

HIV   Human Immunodeficiency Virus

NH   Non-Hispanic

OR   Odds Ratio

PLWH   People Living with HIV

RNA   Ribonucleic Acid

US   United States

SUMMARY

In the US, HIV disproportionately affects people in jails and prisons (Maruschak and Bronson, 2017; Centers for Disease Control and Prevention, 2017c). While research examining HIV treatment engagement among incarcerated people living with HIV (PLWH) is limited, studies have shown that PLWH entering correctional facilities are less likely than those in the general population to engage in HIV care and attain viral suppression (Iroh et al., 2015). Furthermore, women and racial/ethnic minorities are significantly less likely than their male and White counterparts to access consistent HIV treatment prior to incarceration (Meyer et al., 2014; Stein et al., 2013).

Despite the interrelatedness of gender and racial/ethnic disparities (Stone, 2012), most studies examining HIV-related health inequities among PLWH in correctional facilities have focused on each of these constructs independently. The paucity of research that includes analyses stratified by both gender and race/ethnicity may mask important disparities among subsets of institutionalized PLWH. Given the demand for customized strategies to better engage the most vulnerable subsets of PLWH in high quality health care, a more nuanced understanding of cross-sectional gender and racial/ethnic differences in care engagement among PLWHA entering correctional facilities is needed.

The purpose of this study was 1) to jointly assess gender and racial/ethnic disparities in pre-incarceration HIV treatment utilization and viral suppression among jailed PLWH, and 2) to evaluate modifiable characteristics that account for such disparities. Overall, we found that racial/ethnic minority women were the least likely to engage in care relative to NH White men, though substantial disparities existed among NH Black men. NH Black men, Hispanic men, and NH Black women were all significantly less likely than NH White men to attain viral suppression upon jail entry. The factors most highly associated with disparity reductions in care utilization varied across gender-stratified racial/ethnic groups and outcomes. To our knowledge, this is the first study to assess cross-sectional gender and racial/ethnic disparities in HIV care among PLWH entering correctional facilities. The findings provide

useful information to plan for the provision of community- and jail-based medical and support services

for PLWH.

I. BACKGROUND AND STUDY AIMS

In the US, incarceration and HIV are often described as converging epidemics (Wohl et al., 2006; Beckwith et al., 2010). The US imprisons more of its residents, and specifically more women and girls, than any other nation in the world (Walmsley, 2015; 2017). Approximately 6.6 million people are currently under the supervision of the US adult criminal justice system (Kaeble and Cowhig, 2018). The disproportionate burden of HIV/AIDS in socially and economically disenfranchised populations, coupled with US crime policies that target these same sectors of society (e.g. through harsh sentencing for drug-related offenses), have contributed to a high prevalence of HIV in correctional settings, which is more than four-fold higher than the national prevalence (1,297 per 100,000 vs. 304 per 100,000, respectively) (Maruschak and Bronson, 2017; Centers for Disease Control and Prevention, 2017c). Approximately one in six people living with HIV (PLWH) passes through a correctional facility every year (Spaulding et al., 2009).

The disproportionate burden of incarceration and HIV is borne by racial/ethnic minorities, especially non-Hispanic (NH) Black communities. Overall, NH Blacks represent approximately 35% of persons incarcerated in jails and prisons and 44% of new HIV infections, despite comprising only 12% of the US population (Carson and Anderson, 2016; Minton and Zeng, 2016; Centers for Disease Control and Prevention, 2017c; Kaiser Family Foundation, 2018). Hispanics/Latinos (hereafter referred to as Hispanics), who compose roughly 18% of US residents, account for 19% of incarcerated people and 24% of new HIV cases (Kaiser Family Foundation, 2018; Carson and Anderson, 2016; Minton and Zeng, 2016; Centers for Disease Control and Prevention, 2017c). There are stark racial/ethnic disparities in HIV and incarceration among women, who represent approximately 9% of the incarcerated population and a growing share of persons in jails (15% in 2014, up from 11% in 2000) (Carson and Anderson, 2016; Minton and Zeng, 2016). Non-Hispanic Black and Hispanic women, while collectively representing only 29% of US females, comprise over three-quarters (77%) of women with HIV and are imprisoned at a rate

that is 2.0 and 1.3 times that of NH White women, respectively (Centers for Disease Control and Prevention, n.d.; Carson and Anderson, 2016).

As noted by numerous scholars, the high prevalence of HIV in correctional facilities highlights the unique suitability of jails and prisons as venues for HIV interventions (Meyer, 2011; Hammett et al., 2002; Glaser and Greifinger, 1993). However, in order to craft effective programs, more information is needed regarding the extent to which PLWH are engaged in HIV treatment as they enter correctional facilities. The most comprehensive analysis of this subject was conducted by Iroh and colleagues (2015), who generated estimates of engagement in the HIV care cascade among currently and formerly incarcerated PLWH based on a synthesis of existing data from US and Canadian studies. The prevalence of inmates engaged in care varied considerably across populations, and most studies were limited to single site analyses, rendering generalizations difficult (Iroh et al., 2015). They reported that on average, PLWH appear to have a lower likelihood of engaging in HIV care prior to/upon entering correctional facilities (56%, range: 42-78%) relative to PLWH in the general population (62%) (Iroh et al., 2015). The estimated proportion of PLWH entering correctional facilities with viral suppression was 21% (range: 1-31%), substantially lower than the national average (28%) (Iroh et al., 2015). The gap in viral suppression (relative to other aspects of the care cascade) has the most serious implications for public health given its influence on transmission risk. Individuals who achieve viral suppression virtually eliminate their risk of spreading the virus during sexual contact (Cohen et al., 2016), which is the most common mode of transmission in the US, accounting for 92% of HIV infections (Centers for Disease Control and Prevention, 2017c).

Disparities in HIV care among subsets of the correctional population are also poorly understood. One major unanswered question concerns the degree to which care engagement varies by gender. Single-site studies have reported that levels of linkage to care, antiretroviral therapy (ART) use, ART adherence, and viral suppression do not differ significantly between men and women in correctional

facilities (Beckwith et al., 2017; Meyer et al. 2015). However, among a large national cohort of HIV-infected jail detainees (the Enhancing Linkages to HIV Primary Care and Services in Jail Settings, or "EnhanceLink" cohort), women entering jails were significantly less likely than men to have a usual HIV health care provider (65% vs. 73%, p=0.01) and to take ART (33% vs. 49%, p<0.001) (Meyer et al., 2014). Studies based on this cohort also found that women were significantly less likely than men to adhere to ART; they reported taking fewer prescribed medications (61.4% vs. 69.7% of prescribed pills, respectively, p<0.05) (Williams et al., 2013) and were less likely to attain optimal levels of ART adherence prior to incarceration (18% vs. 29%, p=0.001) (Meyer et al., 2014). Furthermore, these differences persisted after incarcerated PLWH re-entered the community. Men were significantly more likely to maintain consistent HIV care at three months (OR=2.84, p<0.01) and six months post-release (OR=2.56, p<0.01) (Althoff et al., 2013).

Findings that indicate disproportionately low HIV care engagement among female inmates are often contrasted with national data, which suggest that HIV-positive women in the general population (compared to men) have similar probabilities of diagnosis (88% vs. 84%) and care linkage (64% vs. 61%), and only slightly lower levels of viral suppression (48% vs. 49%) (Centers for Disease Control and Prevention, 2017a). However, there is substantial evidence that major gender disparities in HIV care engagement persist among PLWH receiving community-based care. For example, a multi-site study in Chicago, IL found that HIV-infected women had significantly lower odds of linkage to care than men, adjusting for patient demographics and the timing of diagnosis (OR=0.58, 95% CI 0.44-0.78) (Almirol et al., 2018). One large clinic-based study in Nashville, TN assessing potential disparities in HIV treatment among PLWH in care found that women were less likely than their male counterparts to initiate ART (57% vs. 71%, p=0.01) and were more likely to die during the seven-year study period (HR=1.53, p=0.007), even after accounting for differences in ART use (Lemly et al., 2008). Nationally, female PLWH are more likely to die than their male counterparts (18.1 vs. 16.5 per 1,000 PLWH, respectively) despite

being diagnosed earlier in the course of illness (Centers for Disease Control and Prevention, 2017b). The differences documented in community care settings provide context for suboptimal care engagement among female PLWH who eventually become involved with the criminal justice system.

In addition to gender differences, significant racial/ethnic disparities in HIV care utilization persist. Nationally, NH Blacks and Hispanics are less likely than NH Whites to engage in all steps of the HIV care cascade (Centers for Disease Control and Prevention, 2017a). The clinic-based study in TN found that Black (vs. non-Black) patients presenting to care were slower to initiate ART (p<0.001) and were less likely to have had any exposure to ART prior to their first clinic visit (p<0.001) (Lemly et al., 2009). Similarly, among the EnhanceLink cohort, Blacks (vs. non-Blacks) entering jail were less likely to have health insurance (70% vs. 83%, p<0.001), report having a usual HIV health care provider (76% vs. 81%, p=0.003), and use ART (46% vs. 53%, p=0.07). They had a higher probability of uncontrolled viremia (69% vs. 60%, p<0.001) and advanced HIV (31% vs. 21%, p=0.006) (Stein et al., 2013).

Racial/ethnic disparities in care among HIV-infected women are perhaps most troubling considering that they face "triple jeopardy" as a result of their gender, race, and class (Richie, 2001). The Women's Interagency HIV Study found that Black women were twice as likely to not receive ART as White women, adjusting for potential confounding variables (OR=2.01) (Lillie-Blanton et al., 2010). Differences in care have been linked to a higher likelihood of premature death. For example, a simulation study based on data from the national HIV Research Network estimated that Black and Hispanic women had substantially greater survival losses from late initiation and early discontinuation of ART than NH White women (Losina et al., 2009).

Gender and racial/ethnic disparities in HIV care among correctional populations may be clarified by assessing variations in certain exposures associated with care engagement. Social and structural barriers to care, such as low levels of employment and education, homelessness, and substance abuse are endemic among PLWH who interface with the criminal justice system (Meyer et al., 2011;

Freudenberg and Heller, 2016; James, 2004). However, they are not distributed evenly. Women enter

jails with more social service needs (e.g. homelessness), chronic medical comorbidities, drug

dependence issues, psychiatric problems, and worse overall health (Freudenberg et al., 2007; Williams

et al., 2013; Binswanger et al., 2010; Heilbrun et al., 2008). Additionally, the majority of incarcerated

women have histories of physical and sexual abuse (James, 2004). These differences lend support to the

argument that women have distinct pathways to incarceration that are directly related to a lack of social

and economic resources (Meyer, 2015; Richie, 2001; Heilbrun et al., 2008; Bloom et al., 2003)—a claim

that is further underscored by the fact that 82% of women are in jails for property, drug, and public-

order offenses (James, 2004), while accounting for just 14% of violent offenders (Greenfeld and Snell,

1999). Racial differences in barriers to care engagement were evident among jail detainees in the

EnhanceLink cohort. Blacks were more likely than their non-Black counterparts to have been previously

incarcerated for two years or more (p=0.05), lack a high school degree (p=0.08), earn < $1,000 in the 30

days prior to incarceration (p=0.09), and abuse alcohol (p=0.05) (Stein et al., 2013). However, Blacks

were significantly less likely to report behavioral health issues, including intravenous drug use (p<0.001),

drug dependence (p=0.007), serious depression (p<0.001), or other severe psychiatric problems

(p<0.001) (Stein et al., 2013). It was unclear, based on the analysis, whether any of these factors varied

by Hispanic ethnicity, which was substantially more prevalent among non-Blacks (52%) than Blacks (9%)

(Stein et al., 2013).

Despite the interrelatedness of gender and racial/ethnic disparities (Stone, 2012), most studies

examining HIV-related health inequities among PLWH in correctional systems have focused on each of

these constructs independently. The paucity of research that includes analyses stratified by both gender

and race/ethnicity may mask important disparities among subsets of institutionalized PLWH. This is

plausible not only because the distribution of race/ethnicity in the US incarcerated population varies by

gender (Binswanger et al., 2010), but also because women of different racial/ethnic groups do not have

identical profiles with respect to many social determinants of health. Studies have shown that HIV-positive NH Black and Hispanic women encounter greater challenges to accessing medical and social services (Skarbinski et al., 2015), fare worse with respect to educational attainment, health insurance access, and employment (Geter et al., 2018), and are more likely to abuse drugs and alcohol than their NH White counterparts (Tillerson, 2008). Significant racial/ethnic disparities among women exist not only with respect to ART use (Geter et al., 2018), but also virologic response to ART, with NH Black women experiencing the worst viral load outcomes (Geter et al., 2018; McFall et al., 2013).

The few published studies of disparities in HIV care engagement that include analyses jointly stratified by gender and race/ethnicity have uncovered important differences between and within gender groups that would not have been identified by assessing each of these constructs alone. Overall, they suggest that racial/ethnic minority women are the most likely to experience poor HIV treatment outcomes. Beer and colleagues (2016) examined cross-sectional gender and racial/ethnic disparities in ART use and viral suppression using national surveillance data. They found that compared to NH White men, Hispanic men were approximately equally likely to use ART (94% and 93%, respectively, p=0.61), while NH Black men (89%, p<0.001), NH White women (88%, p<0.001), Hispanic women (88%, p=0.004), and NH Black women (87%, p<0.001) were significantly less likely to use ART. While all groups were significantly less likely to achieve viral suppression relative to NH White men (69%), the disparities among NH White women (62%, p=0.005) and Hispanic men (61%, p<0.001) were less pronounced than those observed among Hispanic women (58%, p<0.001), NH Black women (55%, p<0.001), and NH Black men (52%, p<0.001). Another study assessing gender and racial disparities in HIV outcomes found that compared to White men, White women were significantly more likely to initiate ART (HR=1.42, 95% CI=1.01-1.99, p=0.04), while non-White women and men were 45% and 20% less likely to initiate ART, respectively (HR=0.55, 95% CI 0.36-0.83, p=0.004; HR=0.80, 95% CI 0.68-0.93, p=0.005). Morbidity was particularly high among non-White women, who were significantly more likely than any other gender-

stratified racial group to have a CD4 count < 200 cells/μL (p<0.001) and to experience an HIV-related

(p<0.001) or AIDS-defining illness (p=0.007) during the study period (Meditz et al., 2011).

In addition to quantifying cross-sectional gender and racial/ethnic disparities in care, this

emerging body of literature suggests that the factors that influence differences in HIV care utilization

and virologic response to ART differ by gender and race (Beer et al., 2016; McFall et al., 2013; Ortego et

al., 2012). For example, one study demonstrated that the proportion of virologic failure associated with

low income was substantially higher in Hispanic and NH Black women (PAF=49% and PAF=38%,

respectively) than among NH White women (PAF=16%). Lacking health insurance was associated with

virologic failure only among NH White and Hispanic women (PAF=13% and PAF=22%, respectively),

while depressive symptoms predicted virologic failure in NH Black women only (PAF=17%) (McFall et al.,

2013). Other research suggests that while differences in ART use explain most of the disparity in viral

suppression between NH White women and NH White men, strategies addressing factors such as

poverty, education, health insurance status, and incarceration are likely required to reduce differences

in other groups (Beer et al., 2016). Despite accounting for a wide range of social and economic

characteristics, the disparity in ART use and viral suppression persisted in NH Black men (relative to NH

White men), suggesting that other factors (e.g. ART regimen or care setting) may mediate the

relationship.

While these studies have improved our understanding of gender and racial/ethnic disparities in

HIV treatment within the general population, there is a need for similarly detailed information focused

on PLWH who interface with the correctional system. The objective of this study is to take a first step in

that direction by shedding light on how gender and race/ethnicity intersect to influence disparities in

HIV care engagement and viral suppression among PLWH entering correctional facilities, and the degree

to which such disparities can be explained by modifiable factors. Our overarching hypothesis was that

racial/ethnic minority women would be the least likely to engage in HIV care. The analysis that we pursued to achieve this research objective has two primary aims, described below.

Aim 1: Evaluate cross-sectional gender and racial/ethnic disparities in pre-incarceration HIV treatment use and viral suppression among diagnosed PLWH participating in a 10-site study of HIV-positive jail detainees (the EnhanceLink Initiative.)

Aim 2: Assess modifiable characteristics that account for cross-sectional gender and racial/ethnic disparities in pre-incarceration HIV treatment use and viral suppression among diagnosed PLWH participating in the EnhanceLink Initiative.

II. METHODS

A.   **Study Population**

The data for this study come from baseline interviews conducted for the purpose of the

EnhanceLink Initiative, a multi-site Special Project of National Significance funded by the Health

Resources and Services Administration that was conducted in ten US demonstration sites from 2007 to

2012. The primary aim of the study was to evaluate interventions that link HIV-positive jail detainees

with community-based medical and support services after release. A total of 1,270 incarcerated adult (≥

18 years old) men and women were enrolled in the study. Baseline data, which covered the index

incarceration and the time period immediately preceding incarceration, were collected via in-person

interviews, medical chart review, and staff reports regarding services provided to study participants.

The sample used for analysis was limited to participants who reported knowing that they were

HIV positive prior to incarceration (n=1,171). Those who did not have complete data on gender (n=5),

race (n=17), or Hispanic ethnicity (n=17) were excluded. Additionally, we excluded participants who

reported a racial identity other than Black or White and who self-identified as non-Hispanic (n=26), as

the size of this stratum was too small for meaningful analysis. The resulting sample was 1,106,

representing 87% of all study participants.

B.   **Conceptual Model**

A conceptual model for the relationship between gender by race/ethnicity (the primary

exposure) and the four outcomes of interest—having no HIV health care provider (i.e. no linkage to

care), no ART use, optimal ART adherence, and viral suppression—is presented in Figure 1. Potential

confounders and mediators were selected based on existing literature. Potential mediating variables

were then organized into three conceptual domains according to the Behavioral Model for Health Care

Utilization (Andersen, 1995), which asserts that one's use of health care services depends on

predisposing factors, enabling resources, and need factors. The model is applied broadly as a theoretical

framework for analyzing factors that predict health service utilization and has been adapted for

incarcerated populations with HIV (Chen et al., 2013; Althoff et al., 2013).
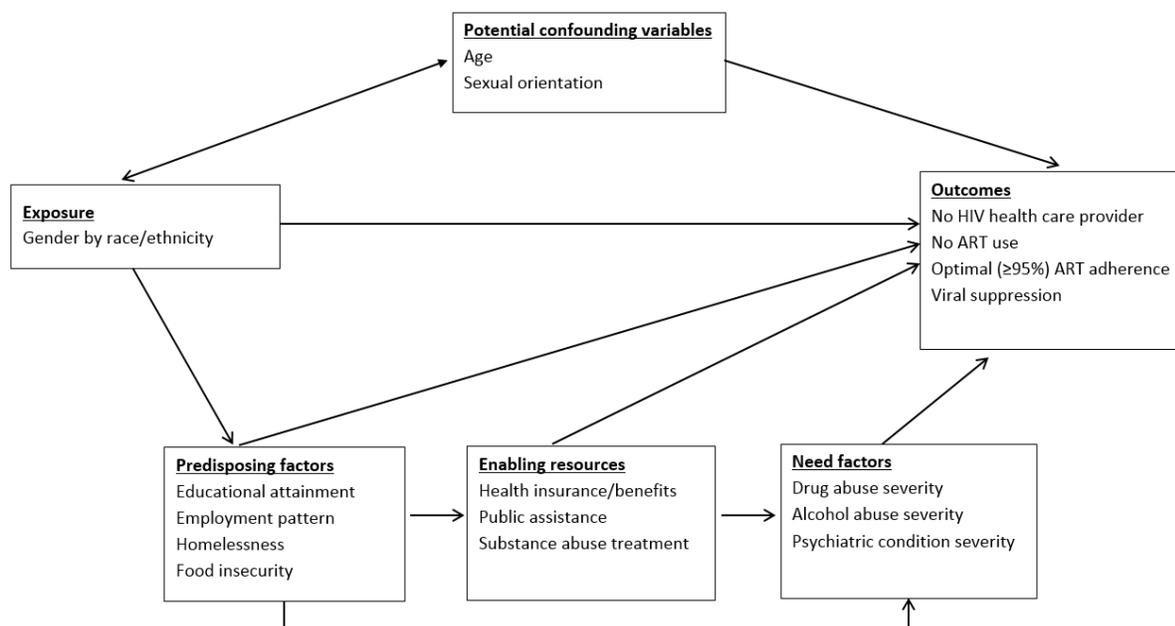
Figure 1. Conceptual model for the relationship between gender by race/ethnicity and HIV treatment outcomes, accounting for potential confounding and mediating variables

C.   Assessment of Primary Exposure

The exposure variable was created by combining information on gender, race, and Hispanic

ethnicity, all of which were based on self-identification. For gender, male-to-female transgender

participants were categorized as female (n=21), and female-to-male transgender participants were

classified as male (n=1). Based on the values of each of these variables, exposure status was classified as

NH White male, NH Black male, Hispanic male, NH White female, NH Black female, or Hispanic female.

D.   Assessment of Outcomes

The outcomes of interest included 1) lacking a usual HIV health care provider, 2) no ART use, 3) optimal ART adherence, and 4) viral suppression. Participants were considered to have no usual HIV health care provider if they reported that they did not have a usual health care provider or place where they got HIV care during the 30 days prior to incarceration. No ART use was assigned if participants reported that they did not take any HIV medications during the seven days before incarceration. In order to create the most reliable measure of optimal ART adherence, we combined two measures of ART use. Participants were classified as attaining optimal ART adherence if they reported taking HIV medications during the seven days before incarceration (i.e. they were coded "0" for the no ART use outcome) *and* reported taking ≥ 95% of prescribed HIV medications during the same time frame. Finally, viral suppression was defined as HIV-1 RNA < 400 copies/ml. For each participant, the viral load value that was measured most closely to (but ≤ 90 days before or after) the jail intake date was used for analysis. In the case of a tie (n=1), the measurement taken prior to jail entry was used.

E.   Assessment of Covariates

Variable construction was based on a priori knowledge or a data-driven approach. Potential confounding variables included age and sexual orientation. Age at jail intake was treated continuously and calculated based on the difference (in years) between each participant's date of birth and the jail intake date. We chose the midpoint of the year (June) and month (15) in order to assign a birth date for participants whose year of birth was recorded but for whom the month and/or day of birth was missing. Sexual orientation was classified as either 1) homosexual or bisexual or 2) heterosexual/straight.

Monthly income was calculated based on the amount of money earned in the 30 days before incarceration and included the following sources of income: 1) employment, 2) unemployment compensation, 3) public assistance, 4) pension, benefits, or social security, 5) mate, family, or friends, and 6) illegal methods (e.g. sex work). The length of time that elapsed since HIV diagnosis was treated

dichotomously as > 2 years or ≤ 2 years. Relationship status was classified as 1) married or in a committed relationship (which combined "married," "in a committed relationship and living together," and "in a committed relationship but not living together"); 2) divorced, widowed, or separated (originally three separate response items); or 3) single.

Potential predisposing factors included education, employment, homelessness, and food insecurity. Education and employment were selected to represent socioeconomic status rather than income, as the income variable had a substantially larger percentage of missing values (6.4%). Employment was based on the best description of the participant's employment pattern over the three years leading up to incarceration and was classified as either 1) unemployed or 2) employed (which encompassed "employed full time," "employed part time, regular hours," "employed part time, irregular hours/day work,"), retired/disabled, living in a controlled environment, or in school. Education was analyzed as having (or not having) completed at least a high school degree or General Educational Diploma (GED). Participants were deemed homeless if they either considered themselves to be homeless or slept in a shelter, on the streets, or in a public space during the 30 days prior to incarceration, which aligns with previously published definitions of homelessness (Chen et al., 2013). Finally, participants were classified as experiencing food insecurity if they responded affirmatively to a question asking whether there were two or more days during the 30 days before jail intake that they "didn't get anything, or barely anything, to eat."

All potential enabling resources, which included health insurance, public assistance, and substance abuse treatment, were analyzed dichotomously. Participants were classified as having health insurance if they reported that they had "some health insurance or benefits to pay for all or part of their medical care or medications" upon jail intake. They were considered to have had public assistance if they reported receiving any amount of public aid in the 30 days before incarceration. Participants were asked to report the number of days that they received outpatient treatment for alcohol or drug abuse

during this time same frame, and were classified as having engaged in substance abuse treatment if they reported receiving treatment on at least one day.

Potential need factors included severe drug abuse, severe alcohol abuse, and severe psychiatric issues, and each was analyzed dichotomously. First, the Addiction Severity Index (ASI) composite score for drug use, alcohol use, and psychiatric status was calculated for each participant using previously published scoring methods (McGahan et al., 1986). These scores were then compared against previously established cut-points to classify participants exhibiting "severe" issues in each of these areas (McLellan et al., 2006; Drymalski and Nunley, 2016). Severe drug abuse or severe alcohol abuse was considered to be present if the respective ASI composite score was greater than or equal to the mean composite score observed among a nationally representative sample of over 3,000 persons receiving inpatient substance abuse treatment (McLellan et al., 2006). The presence of severe psychiatric issues was defined as an ASI psychiatric composite score that met or exceeded a previously published threshold found to effectively predict psychiatric hospital admissions (Drymalski and Nunley, 2016).

F.   Missing Data

1.   Primary Exposure

As described previously, the primary exposure was created by combining information on gender, race, and Hispanic ethnicity. Participants were excluded from the sample if they had no information for gender (n=5), race (n=17), or Hispanic ethnicity (n=17). Participants were classified as non-Hispanic if they responded "I don't know/Refused" when asked whether they were of Latino(a) or Hispanic/Spanish ethnicity or origin (n=4).

2.   Outcomes

A conservative approach to treating missing data for all outcomes of interest was taken in order to prevent misclassification. Participants who responded "I don't know/Refused" when asked whether they had a usual health care provider or place where they got HIV care (n=3) or whether they

were taking ART during the seven days before the index incarceration (n=3) were classified as missing. One viral load measurement that was dated outside the range of possible dates was coded as missing; additionally, two viral load measurements with clear data entry errors (e.g. where the year "2010" was recorded as "3010") were re-coded and analyzed. After making these changes, viral load measurements obtained > 90 days before or after the jail intake date were treated as missing (n=102). While missing data was minimal with respect to linkage to care (<1%), there was a considerable amount of missing data for ART use (15.7%), optimal ART adherence (16.3%), and viral suppression (30.7%).

3. **Covariates**

An equally conservative method was used to treat missing values for all covariates with the exception of age. As previously described, age was calculated by subtracting participants' date of birth from the jail intake date. Only the month and year of birth were recorded, thus the day of birth was coded as 15 for all participants. If the month of birth was missing but year of birth was available, the month was coded as 6 representing June (n=15). For sexual orientation, "refused" (n=1) and "other" (n=18) responses were treated as missing. Similarly, for education, food insecurity, health insurance coverage, and relationship status, "I don't know/Refused" responses were treated as missing (n=1, n=4, n=7, and n=1, respectively). For the number of months that elapsed since HIV diagnosis, "unknown" responses were classified as missing (n=99). There was a minimal amount of missing data for most covariates (≤ 2%). Exceptions included the ASI psychiatric composite score, drug use composite score, and alcohol use composite score, all of which had a considerable amount of missing observations (5.9%, 6.2%, and 9.6%, respectively). The presence of at least one chronic medical condition other than HIV, monthly income, and the number of months that elapsed since HIV diagnosis were missing for 3.3%, 6.5%, and 16.1% of observations, respectively; however, none these variables were included in the conceptual model.

G.   **Statistical Analysis**

All analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC). First, we performed univariate analysis on all variables, which included box plots and histograms for continuous variables and frequency tables for categorical variables. Differences in the distribution of study variables between gender-stratified racial/ethnic groups and NH White men were tested using logistic regression and the t-test for dichotomous and continuous variables, respectively. We also assessed bivariate associations between all potential confounding and mediating variables included in the conceptual model and the four outcomes of interest. Throughout the bivariate analysis, associations that met an alpha level of $p < 0.05$ were considered statistically significant.

We then performed multivariable logistic regression to assess differences in the four outcomes between NH White men and other gender-stratified racial/ethnic groups, accounting for potential confounding and mediating variables. We selected NH White men as the reference group because they were likely to exhibit the highest level of health care utilization and viral suppression, and the levels observed among this group are theoretically attainable among other gender-stratified racial/ethnic groups. A total of four nested models were examined for each of the outcomes. First, we tested a model that adjusted for potential confounding variables: age and sexual orientation (Model 1). Model 2 further accounted for predisposing factors (education, employment, food insecurity, and homelessness); Model 3 further accounted for enabling resources (health insurance, public assistance, and substance abuse treatment), and Model 4 further accounted for need factors (ASI composite scores for the drug use, alcohol use, and psychiatric subscales). The results of the model that controlled for potential confounding variables (Model 1) were used as the basis for judging whether a disparity in the outcome existed among each gender-stratified racial/ethnic group relative to NH White men. Throughout the multivariable analysis, associations that met an alpha level of $p < 0.05$ were considered statistically significant.

We then assessed the proportion of the disparity explained by including each additional conceptual domain (Models 2-4), using the formulas below (Rosenstock et al., 2014). For odds ratios (ORs) < 1, the inverse of the OR (i.e. 1/OR) was used when applying these formulas (Szklo and Nieto, 2014).

Predisposing factors: (OR(Model 1) – OR(Model 2)) / (OR(Model 1) – 1)

Enabling resources: (OR(Model 2) – OR(Model 3)) / (OR(Model 2) – 1)

Need factors: (OR(Model 3) – OR(Model 4)) / (OR(Model 3) – 1)

The predisposing factors, enabling resources, and need factors added to the model for each exposure-outcome relationship was determined by manual backward selection. Each conceptual category was assessed independently. For example, all variables in the predisposing factors domain (education, employment, homelessness, and food insecurity) were added to the model collectively. The predictor with the largest non-significant p-value was dropped from the model, in decreasing order, based on an alpha level of $p < 0.2$. This procedure was repeated for enabling resources and need factors.

III. RESULTS

A.   Bivariate Analysis

1.   Differences in Study Variables by Gender-stratified Racial/Ethnic Group

The distribution of all study variables across gender-stratified racial/ethnic groups is presented in Table I. NH Black men comprised 40.9% of the sample; the second and third most represented groups were Hispanic men and NH Black women, who composed 19.4% and 18.3% of the sample, respectively. Approximately 21% of the sample considered themselves homosexual or bisexual. The mean age was 43 years (SD=8.7).

A variety of social and economic challenges were in evidence. Fifty-percent of participants did not complete at least a high school degree/GED. Approximately 63% were mostly unemployed during the three years before incarceration. Income earned from all sources during the 30 days before incarceration varied considerably, with a median of $605 (SD=$2,634). A substantial proportion of participants reported food insecurity (37.4%) and homelessness (38.3%). Two-thirds (66.7%) of participants had received public assistance in the 30 days leading up to incarceration.

Comorbid conditions were also prevalent. Approximately 77% and 28% of the study population met criteria for severe drug abuse and severe alcohol abuse, respectively, though only 20.1% reported receiving substance abuse treatment. Approximately 52% had severe psychiatric issues.

Despite facing many socioeconomic barriers to accessing health care, a large majority (77.6%) had health insurance at jail intake and reported knowing their HIV status for more than two years (90.6%). There were also relatively high levels of HIV treatment engagement, including linkage to an HIV health care provider or usual source of care (76.0%), ART use (57.1%), and optimal ART adherence (31.8%). Nearly a third (31.3%) was virally suppressed upon jail entry.

Finally, there were several notable racial/ethnic differences within gender groups. Among females, Hispanic women (vs. NH White and NH Black women, respectively) were the most likely to be

TABLE I. SELECTED CHARACTERISTICS OF THE SAMPLE AT JAIL INTAKE, OVERALL AND BY GENDER-STRATIFIED RACIAL/ETHNIC GROUP (N=1,106)

	Total Sample N=1,106 N (%)	NHW Women[a] N=67 (6.1) N (%)	NHB Women[b] N=202 (18.3) N (%)	Hispanic Women N=63 (5.7) N (%)	NHW Men[a] N=108 (9.8) N (%)	NHB Men[b] N=452 (40.9) N (%)	Hispanic Men N=214 (19.4) N (%)
Demographic factors							
Mean years of age at jail intake (sd)	43.3 (8.7)	40.3 (8.6)	42.4 (7.8)	41.6 (7.1)	42.8 (8.6)	44.5 (9.1)	43.3 (8.6)
Homosexual or bisexual	224 (20.7)	17 (25.8)	39 (19.9)	18 (31.6)	30 (27.8)	99 (22.2)	21 (9.9)
Had food insecurity[c]	411 (37.4)	31 (46.3)	85 (42.7)	21 (33.3)	47 (43.9)	155 (34.4)	72 (34.0)
Homeless[c]	421 (38.3)	27 (41.5)	93 (46.0)	28 (45.2)	39 (36.5)	170 (37.9)	64 (30.1)
Attained ≥ HS degree/GED	549 (50.0)	35 (53.9)	77 (38.3)	19 (30.2)	71 (66.4)	261 (58.1)	86 (40.2)
Unemployed[d]	695 (63.3)	42 (64.6)	138 (68.7)	44 (71.0)	46 (43.0)	277 (61.6)	148 (69.5)
Median monthly income[c] (sd)	$605 ($2,634)	$682 ($1414)	$706 ($4,215)	$650 ($5,351)	$793 ($2,286)	$575 ($1,419)	$600 ($1,949)
Relationship status							
Married/in committed relationship	343 (31.1)	26 (38.8)	75 (37.3)	20 (31.8)	26 (24.3)	111 (24.6)	85 (39.7)
Divorced/widowed/separated	145 (13.1)	17 (25.4)	20 (10.0)	8 (12.7)	20 (18.7)	55 (12.2)	25 (11.7)
Single	616 (55.8)	24 (35.8)	106 (52.7)	35 (55.6)	61 (57.0)	286 (63.3)	104 (48.6)
Received public assistance[c]	724 (66.7)	42 (66.7)	133 (66.8)	45 (72.6)	57 (53.8)	287 (64.2)	160 (76.6)
Had health insurance	852 (77.6)	52 (77.6)	140 (69.7)	56 (90.3)	88 (81.5)	328 (73.5)	188 (87.9)
Received substance abuse treatment[c]	219 (20.1)	10 (16.1)	31 (15.4)	12 (19.4)	20 (19.4)	70 (15.6)	76 (35.7)
Co-occurring conditions							
Severe drug abuse	794 (76.6)	51 (86.4)	147 (78.2)	56 (90.3)	73 (72.3)	302 (70.7)	165 (82.5)
Severe alcohol abuse	281 (28.1)	16 (27.6)	49 (26.5)	15 (26.3)	32 (33.0)	128 (31.8)	41 (20.4)
Severe psychiatric issues	539 (51.8)	50 (80.7)	121 (62.1)	36 (59.0)	57 (57.6)	188 (44.2)	87 (43.7)
Outcomes							
Lacked an HIV provider	264 (24.0)	15 (22.7)	67 (33.5)	15 (23.8)	17 (15.7)	116 (25.7)	34 (16.0)
No ART use[e]	400 (42.9)	28 (54.9)	90 (54.9)	32 (60.4)	30 (31.9)	157 (41.9)	63 (32.3)
Optimal ART adherence[e]	294 (31.8)	11 (22.0)	40 (24.7)	10 (18.9)	36 (38.7)	125 (33.4)	72 (37.1)
Viral suppression	240 (31.3)	15 (39.5)	45 (28.0)	19 (38.8)	29 (47.5)	86 (28.4)	46 (29.9)

[a]NHW=Non-Hispanic White.
[b]NHB=Non-Hispanic Black.
[c]Reporting period covered the 30 days leading up to incarceration.
[d]Reporting period covered the 3 years leading up to incarceration.
[e]Reporting period covered the 7 days leading up to incarceration.

homosexual or bisexual (31.6% vs. 25.8% and 19.9%), report severe drug abuse (90.3% vs. 86.4% and

78.2%), have health insurance (90.3% vs. 77.6% and 69.7%), and receive public assistance (72.6% vs.

66.7% and 66.8%). NH White women (vs. NH Black and Hispanic women, respectively) were the most

likely to have completed at least a high school education/GED (53.9% vs. 38.3% and 30.2%), report food

insecurity (46.3% vs. 42.7% and 33.3%), and have severe psychiatric issues (80.7% vs. 62.1% and 59.0%).

Among males, NH White men (vs. NH Black and Hispanic men, respectively) were the most likely to be

homosexual or bisexual (27.8% vs. 22.2% and 9.9%), report food insecurity (43.9% vs. 34.4% and 34.0%),

complete at least a high school degree/GED (66.4% vs. 58.1% and 40.2%), and experience severe

psychiatric issues (57.6% vs. 44.2% and 43.7%), and were the least likely to be unemployed (43.0% vs.

61.6% and 69.5%). Hispanic men (vs. NH White and NH Black men, respectively) were the most likely to

have health insurance (87.9% vs. 81.5% and 73.5%), receive public assistance (76.6% vs. 53.8% and

64.2%), have a severe drug abuse problem (82.5% vs. 72.3% and 70.7%), and engage in substance abuse

treatment (35.7% vs. 19.4% and 15.6%).

A comparison of variables included in the conceptual model between each gender-stratified

racial/ethnic group and NH White men is provided in Table II. Differences that reached statistical

significance ($p<0.05$) are summarized below, organized by gender-stratified racial/ethnic group.

a. **NH White Women**

Non-Hispanic White women had significantly greater odds of unemployment ($p=0.006$),

severe drug abuse ($p=0.04$), severe psychiatric issues ($p=0.003$), and no ART use ($p=0.007$), and lower

odds of optimal ART adherence ($p=0.04$).

b. **NH Black Women**

Non-Hispanic Black women had significantly greater odds of unemployment ($p<0.0001$),

public assistance receipt ($p=0.03$), lacking an HIV health care provider ($p=0.0009$), and no ART use

TABLE II. COMPARISON OF STUDY VARIABLES AT JAIL INTAKE BETWEEN GENDER-STRATIFIED RACIAL/ETHNIC GROUPS AND NH WHITE MEN (REFERENCE) (N=1,106)

PART A

| | *Potential confounders* | | *Potential predisposing factors* | | | | *Potential enabling resources* | | |
	Mean age t-test p-value	Homosexual/ bisexual OR (95% CI)	Attained ≥ HS degree/GED OR (95% CI)	Had food insecurity[a] OR (95% CI)	Was homeless[a] OR (95% CI)	Was unemployed[b] OR (95% CI)	Received public assistance[a] OR (95% CI)	Had health insurance OR (95% CI)	Received substance abuse treatment[a] OR (95% CI)
NHW women[c]	0.08	0.9 (0.5-1.8)	0.6 (0.3-1.1)	1.1 (0.6-2.0)	1.2 (0.7-2.3)	2.4 (1.3-4.6)**	1.7 (0.9-3.3)	0.8 (0.4-1.7)	0.8 (0.3, 1.8)
NHB women[d]	0.68	0.6 (0.4-1.1)	0.3 (0.2-0.5)**	1.0 (0.6-1.5)	1.5 (0.9-2.4)	2.9 (1.8-4.7)**	1.7 (1.1-2.8)*	0.5 (0.3-0.9)*	0.8 (0.4, 1.4)
Hispanic women	0.36	1.2 (0.6-2.4)	0.2 (0.1-0.4)**	0.6 (0.3-1.2)	1.4 (0.8-2.7)	3.2 (1.7-6.3)**	2.3 (1.2-4.5)*	2.1 (0.8-5.6)	1.0 (0.4, 2.2)
NHB men[d]	0.08	0.7 (0.5-1.2)	0.7 (0.5-1.1)	0.7 (0.4-1.0)	1.1 (0.7-1.6)	2.1 (1.4-3.3)**	1.5 (1.0-2.4)*	0.6 (0.4-1.1)	0.8 (0.4, 1.3)
Hispanic men	0.60	0.3 (0.2-0.5)**	0.3 (0.2-0.6)**	0.7 (0.4-1.1)	0.7 (0.5-1.2)	3.0 (1.9-4.9)**	2.8 (1.7-4.6)**	1.6 (0.9-3.1)	2.3 (1.3, 4.0)**
NHW men[c]	--	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

PART B

| | *Need factors* | | | *Study outcomes* | | | |
	Severe drug abuse[a] OR (95% CI)	Severe alcohol abuse[a] OR (95% CI)	Severe psych issues[a] OR (95% CI)	Lacked an HIV provider OR (95% CI)	No ART use[e] OR (95% CI)	Optimal ART adherence[e] OR (95% CI)	Viral Suppression OR (95% CI)
NHW women[c]	2.4 (1.0, 5.8)*	0.8 (0.4, 1.6)	3.1 (1.5, 6.5)**	1.6 (0.7, 3.4)	2.6 (1.3, 5.2)**	0.4 (0.2, 1.0)*	0.7 (0.3, 1.6)
NHB women[d]	1.4 (0.8, 2.4)	0.7 (0.4, 1.2)	1.2 (0.7, 2.0)	2.7 (1.5, 4.9)**	2.6 (1.5, 4.4)**	0.5 (0.3, 0.9)*	0.4 (0.2, 0.8)**
Hispanic women	3.6 (1.4, 9.2)**	0.7 (0.4, 1.5)	1.1 (0.6, 2.0)	1.7 (0.8, 3.6)	3.3 (1.6, 6.6)**	0.4 (0.2, 0.8)*	0.7 (0.3, 1.5)
NHB men[d]	0.9 (0.6, 1.5)	0.9 (0.6, 1.5)	0.6 (0.4, 0.9)*	1.8 (1.1, 3.2)*	1.5 (1.0, 2.5)	0.8 (0.5, 1.3)	0.4 (0.2, 0.8)**
Hispanic men	1.8 (1.0, 3.2)*	0.5 (0.3, 0.9)*	0.6 (0.4, 0.9)*	1.0 (0.5, 1.9)	1.0 (0.6, 1.7)	0.9 (0.6, 1.6)	0.5 (0.3, 0.9)*
NHW men[c]	1.0	1.0	1.0	1.0	1.0	1.0	1.0

*Statistically significant at p < 0.05.
**Statistically significant at p < 0.01.
[a]Reporting period covered the 30 days leading up to incarceration.
[b]Reporting period covered the 3 years leading up to incarceration.
[c]NHW=Non-Hispanic White.
[d]NHB=Non-Hispanic Black.
[e]Reporting period covered the 7 days leading up to incarceration.

(p=0.0004). They had lower odds of attaining at least a high school degree/GED (p<0.0001), having health insurance (p=0.02), optimal ART adherence (p=0.02), and viral suppression (p=0.006).

c. Hispanic Women

Hispanic women had significantly greater odds of unemployment (p=0.0005), public aid receipt (p=0.02), severe drug abuse (p=0.006), and no ART use (p=0.0008). They had lower odds of attaining at least a high school degree/GED (p<0.0001) and optimal ART adherence (p=0.01).

d. NH Black Men

Non-Hispanic Black men had significantly greater odds of unemployment (p=0.0005), public aid receipt (p=0.046), and lacking an HIV health care provider (p=0.03). They had lower odds of experiencing severe psychiatric issues (p=0.02) and attaining viral suppression (p=0.003).

e. Hispanic Men

Hispanic men had significantly greater odds of unemployment (p<0.0001), public aid receipt (p<0.0001), substance abuse treatment (p=0.003), and severe drug abuse (p=0.04). They had lower odds of being homosexual or bisexual (p<0.0001), attaining at least a high school degree/GED (p<0.0001), experiencing severe alcohol abuse (p=0.02) or severe psychiatric issues (p=0.02), and viral suppression (p=0.01).

2. Associations Between Potential Confounders and Mediators with Outcomes

The bivariate association between potential confounding and mediating variables and the four outcomes of interest are presented in Table III. Associations that reached statistical significance (p<0.05), organized by outcome measure, were as follows.

a. No HIV Health Care Provider

Participants who lacked a usual HIV health care provider upon jail intake were significantly younger than those who had a usual source of care (41.0 vs. 44.1, respectively, p<0.0001). They had significantly greater odds of food insecurity (p=0.0002), homelessness (p<0.0001), and severe

TABLE III. BIVARIATE ASSOCIATIONS BETWEEN POTENTIAL CONFOUNDING AND MEDIATING VARIABLES WITH STUDY OUTCOMES AT JAIL INTAKE
(N=1,106)

	Lacked an HIV provider	No ART use[a]	Optimal ART adherence[a]	Viral suppression
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Potential confounders				
Mean age at jail intake	41.0 vs. 44.1 (ref.)**	42.4 vs. 45.2 (ref.)**	45.1 vs. 43.5 (ref.)**	44.7 vs. 43.5 (ref.)
Homosexual/bisexual	0.8 (0.6-1.1)	1.1 (0.8-1.5)	1.0 (0.7-1.5)	0.9 (0.6-1.3)
Predisposing factors				
Attained ≥ HS degree/GED	0.8 (0.6-1.0)	0.7 (0.5-0.9)**	1.2 (0.9-1.6)	0.8 (0.6-1.1)
Had food insecurity[b]	1.7 (1.3-2.2)**	2.2 (1.7-2.9)**	0.5 (0.4-0.7)**	0.9 (0.7-1.3)
Was homeless[b]	2.8 (2.1-3.7)**	2.3 (1.8-3.0)**	0.4 (0.3-0.6)**	0.9 (0.6-1.2)
Was unemployed[c]	1.1 (0.9-1.5)	1.1 (0.8-1.4)	0.6 (0.4-0.8)**	0.7 (0.5-1.0)*
Enabling resources				
Received public assistance[b]	0.4 (0.3-0.5)**	0.8 (0.6-1.0)	1.2 (0.9-1.6)	1.0 (0.7-1.4)
Had health insurance	0.1 (0.1-0.2)**	0.3 (0.2-0.4)**	3.3 (2.1-5.1)**	2.2 (1.4-3.5)**
Received substance abuse treatment[b]	0.3 (0.2-0.4)**	0.4 (0.3-0.6)**	1.5 (1.1-2.1)*	1.3 (0.9-1.9)
Need factors				
Had severe drug abuse[b]	1.0 (0.7-1.4)	1.7 (1.2-2.4)**	0.5 (0.3-0.7)**	1.3 (0.8-1.8)
Had severe alcohol abuse[b]	1.7 (1.3-2.4)**	1.5 (1.1-2.0)*	0.5 (0.4-0.7)**	1.2 (0.9-1.8)
Had severe psychiatric issues abuse[b]	1.0 (0.8-1.3)	1.2 (0.9-1.6)	1.0 (0.8-1.3)	1.9 (1.4-2.6)**

*Statistically significant at p < 0.05.
**Statistically significant at p < 0.01.
[a]Reporting period covered the 7 days leading up to incarceration.
[b]Reporting period covered the 30 days leading up to incarceration.
[c]Reporting period covered the 3 years leading up to incarceration.

alcohol abuse (p=0.0004), and lower odds of public assistance receipt (p<0.0001), health insurance

(p<0.0001), and substance abuse treatment (p<0.0001).

b. No ART Use

Individuals reporting no ART use were significantly younger than those who used ART

(42.4 vs. 45.2, respectively, p<0.0001). They had significantly greater odds of food insecurity (p<0.0001),

homelessness (p<0.0001), severe drug abuse (p=0.001), and severe alcohol abuse (p=0.01), and lower

odds of high school degree/GED attainment (p=0.009), health insurance (p<0.0001), and substance

abuse treatment (p<0.0001).

c. Optimal ART Adherence

Participants who reported optimal ART adherence in the seven days prior to

incarceration were significantly older than those who were non-adherent (45.1 vs. 43.5, respectively,

p=0.006). They had significantly greater odds of having health insurance (p<0.0001) and engaging in

substance abuse treatment (p=0.01). They had lower odds of food insecurity (p<0.0001), homelessness

(p<0.0001), unemployment (p=0.0002), severe drug abuse (p<0.0001), and severe alcohol abuse

(p=0.0001).

d. Viral Suppression

Participants who were virally suppressed upon incarceration had significantly higher

odds of having health insurance (p=0.0003) and severe psychiatric issues (p=0.0001) than those who had

not attained viral suppression. They had lower odds of unemployment (p=0.04).

B. Multivariable Analysis

1. Association Between Gender by Race/Ethnicity and Lacking an HIV Health Care Provider

Logistic regression results for the association between gender by race/ethnicity and lacking

a usual HIV health care provider are displayed in Table IV. Controlling for age and sexual orientation

(Model 1), all subgroups except for Hispanic men were more likely to lack an HIV health care provider

TABLE IV. COMPARISON OF LACKING AN HIV HEALTH CARE PROVIDER AT JAIL INTAKE BETWEEN GENDER-STRATIFIED RACIAL/ETHNIC GROUPS AND NH WHITE MEN (REFERENCE), ACCOUNTING FOR POTENTIAL CONFOUNDING AND MEDIATING VARIABLES

	Model 1[a] OR (95% CI) (N=1,057)	Model 2[b] OR (95% CI) (N=1,042)	Model 3[c] OR (95% CI) (N=1,013)	Model 4[d] OR (95% CI) (N=926)
Gender by race/ethnicity				
NH Black men	1.9 (1.1-3.3)*	1.9 (1.0-3.3)*	1.6 (0.8-3.1)	1.8 (0.9-3.7)
Hispanic men	0.9 (0.5-1.8)	1.0 (0.5-1.9)	1.5 (0.7-3.1)	1.7 (0.8-3.8)
NH White women	1.5 (0.7-3.4)	1.5 (0.6-3.4)	1.7 (0.7-4.5)	1.8 (0.7-5.0)
NH Black women	2.7 (1.5-5.0)**	2.4 (1.3-4.6)**	2.4 (1.2-4.9)*	2.9 (1.3-6.1)**
Hispanic women	1.8 (0.8-4.1)	1.6 (0.7-3.6)	2.6 (1.0-6.5)*	2.9 (1.1-7.6)*
NH White men	1.0	1.0	1.0	1.0
Potential confounders				
Age at intake	1.0 (0.9-1.0)**	1.0 (0.9-1.0)**	1.0 (1.0-1.0)**	1.0 (1.0-1.0)
Homosexual/bisexual	0.6 (0.4-0.8)**	0.6 (0.4-0.9)**	0.5 (0.3-0.8)*	0.6 (0.4-0.9)*
Predisposing factors				
Attained ≥ HS degree/GED		0.9 (0.7-1.2)	0.9 (0.6-1.2)	0.9 (0.6-1.2)
Was homeless[e]		2.6 (1.9-3.5)**	2.0 (1.4-2.7)**	2.0 (1.4-2.8)**
Enabling resources				
Received public assistance[e]			0.7 (0.5-1.0)*	0.6 (0.4-0.9)*
Had health insurance			0.2 (0.1-0.3)**	0.2 (0.1-0.3)**
Received substance abuse treatment[e]			0.3 (0.2-0.6)**	0.3 (0.2-0.5)**
Need factors				
Had severe alcohol abuse[e]				1.4 (1.0-2.0)

*Statistically significant at p < 0.05.
**Statistically significant at p < 0.01.
[a]Accounts for age and sexual orientation.
[b]Accounts for age, sexual orientation, educational attainment, and homelessness.
[c]Accounts for age, sexual orientation, educational attainment, homelessness, public assistance, health insurance, and substance abuse treatment.
[d]Accounts for age, sexual orientation, educational attainment, homelessness, public assistance, health insurance, substance abuse treatment, and severe alcohol abuse.
[e]Reporting period covered the 30 days leading up to incarceration.

than NH White men. The greatest disparities were observed among NH Black women (OR=2.7, 95% CI 1.5-5.0, p=0.001) and NH Black men (OR=1.9, 95% CI 1.1-3.3, p=0.03). Non-significant associations were observed among Hispanic women (OR=1.8, 95% CI 0.8-4.1, p=0.14) and NH White women (OR=1.5, 95% CI 0.7-3.4, p=0.32).

Potential predisposing factors that met criteria for inclusion (educational attainment and homelessness) were added to the model (Model 2). This conceptual domain accounted for approximately 25% of the disparity in the outcome among Hispanic women (OR=1.6, 95% CI 0.7-3.6, p=0.31) and 18% of the difference in NH Black women (OR=2.4, 95% CI 1.3-4.6, p=0.006).

All potential enabling resources (health insurance, public assistance, substance abuse treatment) met inclusion criteria and were added to the model (Model 3). After accounting for this domain, the relative odds of lacking a provider increased substantially among Hispanic women (OR=2.6, 95% CI 1.0-6.5, p=0.04) and Hispanic men (OR=1.5, 95% CI 0.7-3.1, p=0.32). This change reflects the protective effect of enabling resources, which were utilized more commonly among Hispanics (both male and female) compared to NH White men (Table I). On the other hand, enabling resources accounted for 33% reduction of the disparity among NH Black men, rendering the difference statistically insignificant (OR=1.6, 95% CI 0.8-3.1, p=0.16) (Table IV).

Finally, the potential need factor that met inclusion criteria (severe alcohol abuse) was added to the model (Model 4). Accounting for need factors resulted in an increase in the relative odds of the outcome in all gender-stratified racial/ethnic groups, which can be attributed to the disproportionately high prevalence of alcohol abuse among NH White men compared to other gender-stratified racial/ethnic groups (Table I).

2. **Association Between Gender by Race/Ethnicity and No ART Use**

Logistic regression results for the association between gender by race/ethnicity and no ART use are displayed in Table V. Controlling for age and sexual orientation (Model 1), all gender-stratified

TABLE V. COMPARISON OF NO ART USE AT JAIL INTAKE BETWEEN GENDER-STRATIFIED RACIAL/ETHNIC GROUPS AND NH WHITE MEN (REFERENCE), ACCOUNTING FOR POTENTIAL CONFOUNDING AND MEDIATING VARIABLES

	Model 1[a] OR (95% CI) (N=901)	Model 2[b] OR (95% CI) (N=883)	Model 3[c] OR (95% CI) (N=861)	Model 4[d] OR (95% CI) (N=752)
Gender by race/ethnicity				
NH Black men	1.6 (1.0-2.6)	1.7 (1.0-2.9)*	1.5 (0.9-2.6)	1.5 (0.8-2.7)
Hispanic men	1.0 (0.6-1.8)	1.1 (0.6-1.9)	1.2 (0.7-2.2)	1.2 (0.6-2.4)
NH White women	2.4 (1.1-4.9)*	2.3 (1.1-5.0)*	2.3 (1.0-5.2)*	2.3 (0.9-5.5)
NH Black women	2.5 (1.4-4.2)**	2.6 (1.5-4.5)**	2.3 (1.2-4.1)**	2.2 (1.1-4.2)*
Hispanic women	3.4 (1.6-7.1)**	3.3 (1.5-7.1)**	3.3 (1.5-7.4)**	3.0 (1.3-7.1)*
NH White men	1.0	1.0	1.0	1.0
Potential confounders				
Age at intake	1.0 (0.9-1.0)**	1.0 (0.9-1.0)**	1.0 (1.0-1.0)**	1.0 (1.0-1.0)**
Homosexual/bisexual	0.8 (0.6-1.2)	0.9 (0.6-1.3)	0.9 (0.6-1.3)	0.9 (0.6-1.4)
Predisposing factors				
Attained ≥ HS degree/GED		0.8 (0.6-1.1)	0.8 (0.6-1.1)	0.8 (0.6-1.1)
Was homeless[e]		1.7 (1.2-2.3)**	1.4 (1.0-2.0)*	1.3 (0.9-1.9)
Had food insecurity[e]		1.8 (1.3-2.4)**	1.7 (1.2-2.3)**	1.5 (1.0-2.1)*
Enabling resources				
Received public assistance[e]			1.2 (0.8-1.7)	1.1 (0.8-1.6)
Had health insurance			0.3 (0.2-0.5)**	0.3 (0.2-0.5)**
Received substance abuse treatment[e]			0.6 (0.4-0.8)**	0.5 (0.3-0.8)**
Need factors				
Had severe drug abuse[e]				1.7 (1.2-2.6)**
Had severe alcohol abuse[e]				1.1 (0.8-1.5)

*Statistically significant at p < 0.05.
**Statistically significant at p < 0.01.
[a]Accounts for age and sexual orientation.
[b]Accounts for age, sexual orientation, educational attainment, homelessness, and food insecurity.
[c]Accounts for age, sexual orientation, educational attainment, homelessness, food insecurity, public assistance, health insurance, and substance abuse treatment.
[d]Accounts for age, sexual orientation, educational attainment, homelessness, food insecurity, public assistance, health insurance, substance abuse treatment, severe drug abuse, and severe alcohol abuse.
[e]Reporting period covered the 30 days leading up to incarceration.

racial/ethnic groups except Hispanic men were more likely to report no ART use than NH White men.

The greatest gap in ART use was observed among Hispanic women (OR=3.4, 95% CI 1.6-7.1, p=0.002), followed by NH Black women (OR=2.5, 95% CI 1.4-4.2, p=0.001) and NH White women (OR=2.4, 95% CI 1.1-4.9, p=0.02). There was a non-significant difference among NH Black men (OR=1.6, 95% CI 1.0-2.6, p=0.06).

Potential predisposing factors that met inclusion criteria (educational attainment, homelessness, and food insecurity) were added to the model (Model 2). However, accounting for this conceptual domain did not elicit meaningful changes in any gender-stratified racial/ethnic group.

All potential enabling resources (health insurance, public assistance, substance abuse treatment) met inclusion criteria and were added to the model (Model 3). Enabling resources accounted for 29% and 19% of the disparity in ART use among NH Black men (OR=1.5, 95% CI 0.9-2.6, p=0.11) and NH Black women (OR=2.3, 95% CI 1.2-4.1, p=0.007), respectively.

Finally, potential need factors meeting criteria for inclusion (severe drug abuse and severe alcohol abuse) were added to the model (Model 4). Need factors accounted for 13% of the difference in the outcome among Hispanic women (OR=3.0, 95% CI 1.3-7.1, p=0.01).

3. <u>**Association Between Gender by Race/Ethnicity and Optimal ART Adherence**</u>

Logistic regression results for the association between gender by race/ethnicity and optimal ART adherence are displayed in Table VI. Adjusting for age and sexual orientation (Model 1), women of all racial/ethnic groups had 50-60% lower odds of attaining optimal ART adherence prior to incarceration relative to NH White men. Consistent with the findings of the ART use model, the disparity in ART adherence was greatest among Hispanic women (OR=0.4, 95% CI 0.2-0.9, p=0.03) and NH Black women (OR= 0.5, 95% CI 0.3-0.9, p=0.03), while the difference among White women failed to reach statistical significance (OR=0.5, 95% CI 0.2-1.2, p=0.11). Non-Hispanic Black men had approximately 20% lower odds of adherence compared to NH White men (OR=0.8, 95% CI 0.5-1.2, p=0.29).

TABLE VI. COMPARISON OF OPTIMAL ART ADHERENCE AT JAIL INTAKE BETWEEN GENDER-STRATIFIED RACIAL/ETHNIC GROUPS AND NH WHITE MEN (REFERENCE), ACCOUNTING FOR POTENTIAL CONFOUNDING AND MEDIATING VARIABLES

	Model 1[a] OR (95% CI) (N=895)	Model 2[b] OR (95% CI) (N=875)	Model 3[c] OR (95% CI) (N=862)	Model 4[d] OR (95% CI) (N=713)
Gender by race/ethnicity				
NH Black men	0.8 (0.5-1.2)	0.8 (0.5-1.3)	0.9 (0.6-1.5)	1.0 (0.5-1.8)
Hispanic men	1.0 (0.6-1.6)	1.0 (0.6-1.8)	1.0 (0.6-1.8)	1.1 (0.6-2.0)
NH White women	0.5 (0.2-1.2)	0.5 (0.2-1.2)	0.6 (0.2-1.4)	0.6 (0.2-1.7)
NH Black women	0.5 (0.3-0.9)*	0.6 (0.3-1.0)	0.7 (0.4-1.2)	0.6 (0.3-1.2)
Hispanic women	0.4 (0.2-0.9)*	0.4 (0.2-1.1)	0.5 (0.2-1.2)	0.6 (0.2-1.5)
NH White men	1.0	1.0	1.0	1.0
Potential confounders				
Age at intake	1.0 (1.0-1.0)**	1.0 (1.0-1.0)*	1.0 (1.0-1.0)*	1.0 (1.0-1.0)
Homosexual/bisexual	1.2 (0.9-1.8)	1.3 (0.9-1.9)	1.3 (0.8-1.9)	1.3 (0.8-2.1)
Predisposing factors				
Was homeless[e]		0.6 (0.4-0.8)**	0.7 (0.5-0.9)*	0.7 (0.5-1.0)*
Had food insecurity[e]		0.7 (0.5-0.9)*	0.7 (0.5-1.0)*	0.7 (0.5-1.0)
Was unemployed[f]		0.6 (0.4-0.8)**	0.5 (0.4-0.7)**	0.6 (0.4-0.8)**
Enabling resources				
Had health insurance		2.7 (1.7-4.5)**	3.2 (1.8-5.7)**	2.7 (1.7-4.5)**
Received substance abuse treatment[e]		1.3 (0.9-1.9)	1.6 (1.1-2.4)*	1.3 (0.9-1.9)
Need factors				
Had severe drug abuse[e]				0.5 (0.3-0.8)**
Had severe alcohol abuse[e]				0.6 (0.4-0.9)**
Had severe psychiatric issues[e]				1.5 (1.0-2.2)*

*Statistically significant at p < 0.05.
**Statistically significant at p < 0.01.
[a]Accounts for age and sexual orientation.
[b]Accounts for age, sexual orientation, homelessness, food insecurity, and unemployment.
[c]Accounts for age, sexual orientation, homelessness, food insecurity, unemployment, health insurance, and substance abuse treatment.
[d]Accounts for age, sexual orientation, homelessness, food insecurity, unemployment, health insurance, substance abuse treatment, severe drug abuse, severe alcohol abuse, and severe psychiatric issues.
[e]Reporting period covered the 30 days leading up to incarceration.
[f]Reporting period covered the 3 years leading up to incarceration.

Potential predisposing factors that met inclusion criteria (homelessness, food insecurity, and employment) were added to the model (Model 2). Predisposing factors accounted for 33% of the disparity in ART adherence among NH Black women, rendering the difference insignificant (OR=0.6, 95% CI 0.3-1.0, p=0.07).

Potential enabling resources that satisfied inclusion criteria (health insurance and substance abuse treatment) were added to the model (Model 3). This conceptual category accounted for 56% of the disparity among NH Black men (OR=0.9, 95% CI 0.6-1.5, p=0.75), 36% of the difference among NH Black women (OR=0.7, 95% CI 0.4-1.2, p=0.19), and 33% of the disparity in both Hispanic women (OR=0.5, 95% CI 0.2-1.2, p=0.10) and NH White women (OR=0.6, 95% CI 0.2-1.4, p=0.23).

Finally, potential need factors that met inclusion criteria (severe drug abuse, severe alcohol abuse, and severe psychiatric issues) were added to the model (Model 4), which accounted for a further 33% of the disparity in ART adherence among Hispanic women (OR=0.6, 95% CI 0.2-1.5, p=0.28).

4. **Association Between Gender by Race/Ethnicity and Viral Suppression**

Logistic regression results for the association between gender by race/ethnicity and viral suppression are displayed in Table VII. Controlling for age and sexual orientation (Model 1), NH Black men, NH Black women, and Hispanic men had 50-60% lower odds of viral suppression upon incarceration compared to NH White men. The difference was greatest among NH Black men (OR=0.4, 95% CI 0.2-0.8, p=0.003), followed by NH Black women (OR=0.5, 95% CI 0.2-0.8, p=0.01), and Hispanic men (OR=0.5, 95% CI 0.2-0.9, p=0.01). Hispanic women had approximately 30% lower odds of viral suppression (OR=0.7, 95% CI 0.3-1.4, p=0.29).

Potential predisposing factors that met inclusion criteria (educational attainment and employment) were added to the model (Model 2). However, accounting for this conceptual domain did not elicit meaningful changes in any gender-stratified racial/ethnic group.

TABLE VII. COMPARISON OF VIRAL SUPPRESSION AT JAIL INTAKE BETWEEN GENDER-STRATIFIED RACIAL/ETHNIC GROUPS AND NH WHITE MEN (REFERENCE), ACCOUNTING FOR POTENTIAL CONFOUNDING AND MEDIATING VARIABLES

	Model 1[a] OR (95% CI) (N=743)	Model 2[b] OR (95% CI) (N=737)	Model 3[c] OR (95% CI) (N=727)	Model 4[d] OR (95% CI) (N=694)
Gender by race/ethnicity				
NH Black men	0.4 (0.2-0.8)**	0.4 (0.2-0.8)**	0.5 (0.3-0.8)*	0.5 (0.3-0.9)*
Hispanic men	0.5 (0.2-0.9)*	0.4 (0.2-0.8)*	0.5 (0.2-0.9)*	0.5 (0.3-1.0)*
NH White women	0.9 (0.4-2.0)	0.8 (0.3-2.0)	0.9 (0.4-2.2)	0.8 (0.3-2.0)
NH Black women	0.5 (0.2-0.8)*	0.4 (0.2-0.8)**	0.5 (0.3-1.0)*	0.5 (0.2-0.9)*
Hispanic women	0.7 (0.3-1.4)	0.6 (0.3-1.3)	0.6 (0.3-1.4)	0.5 (0.2-1.2)
NH White men	1.0	1.0	1.0	1.0
Potential confounders				
Age at intake	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)
Homosexual/bisexual	0.9 (0.6-1.3)	0.9 (0.6-1.4)	0.9 (0.6-1.4)	0.8 (0.5-1.2)
Predisposing factors				
Attained ≥ HS degree/GED		0.7 (0.5-1.0)*	0.7 (0.5-1.0)**	0.8 (0.6-1.1)
Was unemployed[e]		0.7 (0.5-1.0)*	0.7 (0.5-1.0)*	0.8 (0.5-1.1)
Enabling resources				
Received public assistance[f]			0.8 (0.5-1.1)	0.8 (0.5-1.2)
Had health insurance			2.3 (1.4-3.7)**	2.3 (1.4-3.8)**
Need factors				
Had severe psychiatric issues[f]				1.9 (1.3-2.6)**

*Statistically significant at p < 0.05.
**Statistically significant at p < 0.01.
[a]Accounts for age and sexual orientation.
[b]Accounts for age, sexual orientation, educational attainment, and unemployment.
[c]Accounts for age, sexual orientation, educational attainment, unemployment, public assistance, and health insurance.
[d]Accounts for age, sexual orientation, educational attainment, unemployment, public assistance, health insurance, and severe psychiatric issues.
[e]Reporting period covered the 3 years leading up to incarceration.
[f]Reporting period covered the 30 days leading up to incarceration.

Next, potential enabling resources that satisfied criteria for inclusion (public assistance and health insurance) were added to the model (Model 3). Enabling resources accounted for 33% of the disparity in viral suppression among NH Black men (OR=0.5, 95% CI 0.3-0.8, p=0.01), Hispanic men (OR=0.5, 95% CI 0.2-0.9, p=0.02), and NH Black women (OR=0.5, 95% CI 0.3-1.0, p=0.04).

Finally, the potential need factor meeting inclusion criteria (severe psychiatric issues) was added to the model (Model 4), resulting in no notable changes.

IV. DISCUSSION

Overall, we found evidence to support the hypothesis that racial/ethnic minority women

entering jails have the lowest odds of accessing HIV care prior to incarceration relative to NH White

men. Since jail detention represents a crucial window of opportunity to engage PLWH in care (Iroh et al.,

2015), this finding demonstrates the need for more effective programs and services tailored for

racial/ethnic minority women who enter the US criminal justice system—an institution that has long

overlooked the unique characteristics of female offenders and traditionally viewed programs and

practices designed for male inmates as the norm (Belknap, 1996; Beckwith et al., 2017; Richie, 2001;

Covington and Bloom, 2006; Heilbrun et al., 2008; Bloom et al., 2003).

While NH Black women were consistently among the groups with the least desirable outcomes,

the other gender-stratified racial/ethnic groups found to exhibit the greatest vulnerability varied

somewhat across the four outcome measures. The disparity in having an HIV health care provider

(linkage to care) was most prominent among NH Black women, while inequities in ART use and

adherence were greatest among Hispanic women. Our findings partially align with previous research

reporting similar levels of ART use in NH White and Hispanic males receiving community-based

treatment for HIV (Beer et al., 2016). However, whereas Beer and colleagues (2016) reported similar

levels of ART use across all other gender-stratified racial/ethnic groups, our data reveled that female jail

detainees were markedly less likely than men (of any race/ethnicity) to access and adhere to ART.

Furthermore, the disparity in ART use among Hispanic women relative to NH White men was

substantially greater than differences observed in NH Black and NH White women.

While disparities in HIV care were most severe among racial/ethnic minority women, we also

observed substantially lower treatment utilization among NH Black men relative to NH White men. For

example, the disparity in linkage to care among NH Black men was similar in magnitude to that of

Hispanic women. Additionally, while NH Black men were more likely than women (of any race/ethnicity)

to use ART and report optimal adherence, they were substantially less likely to engage in these aspects of HIV care relative to NH White men. Black men also were the least likely to be virally suppressed upon incarceration (closely followed by NH Black women and Hispanic men.) This finding corroborates previous research highlighting larger differences in viral load outcomes among NH Black men and women (relative to NH White men) than among other gender-stratified racial/ethnic groups (Beer et al., 2016; McFall et al., 2013). However, in contrast to prior research of the general population, we found that levels of viral suppression in Hispanic men entering jails approximated that of NH Black men.

In addition to documenting cross-sectional gender and racial/ethnic disparities in HIV care, we identified factors that partially accounted for disparities in linkage to an HIV provider, ART use, and ART adherence in certain groups. The conceptual domains that most effectively explained differences in care utilization varied by gender-stratified racial/ethnic group and across outcomes, aligning with previous research (Beer, 2016; McFall, 2013; Ortego, 2012). For example, we found that modest reductions in the disparity in linkage to care among Hispanic and NH Black women may be attained by addressing predisposing factors. Given the particularly strong association between homelessness and linkage to care, and the disproportionately high prevalence of homelessness among NH Black and Hispanic women, better access to stable housing may promote more equitable levels of access to HIV primary care in these groups. On the other hand, we found that the gap in linkage to care among NH Black men (relative to NH White men) may be mitigated by facilitating improving access to enabling resources— especially health insurance coverage, which was highly associated with the outcome and disproportionately low in NH Black men.

This study also highlights the influence of socioeconomic and behavioral factors on ART utilization. Need factors (specifically severe drug abuse) accounted for a notable reduction in the disparity in ART use and adherence among Hispanic women, a group that exhibited an extremely high prevalence of drug abuse. Collectively, these results suggest that interventions designed to improve

consistent ART use in Hispanic women who are at risk of interfacing with the criminal justice system may

be enhanced with integrating services to address substance abuse issues. Alternatively, the disparity in

ART use and adherence among NH Black and NH White women was most influenced by enabling

resources, suggesting that improving access to similar resources (especially health insurance coverage)

may be needed in order for these groups to achieve more equitable levels of ART utilization.

It is important to note that accounting for any individual conceptual domain (predisposing

factors, enabling resources, or need factors) had a relatively modest impact on the disparities we

observed; many of the disparities in HIV care utilization that we documented persisted in the full model.

Hence, while these findings can be used to inform the design and implementation of more effective,

customized interventions to reduce gender and racial/ethnic disparities in institutionalized populations,

multi-pronged approaches are likely needed in order to achieve more equitable HIV treatment

outcomes. For example, we found that while predisposing factors accounted for approximately 33% of

the disparity in ART adherence among NH Black women, the combination of predisposing factors and

enabling resources accounted for roughly 57% of the difference. Similarly, while accounting for either

enabling resources or need factors accounted for an approximately 33% reduction in the disparity in ART

adherence among Hispanic women, approximately 56% of the difference in the outcome could be

explained by the combined effect of these two conceptual domains. These findings lend support for a

multi-sector approach to addressing social determinants of health inequities, wherein programs and

services are designed to address multiple social or economic needs rather than focusing on any

particular social determinant (Pruitt et al., 2018).

Consistent with the HIV utilization models, none of the conceptual domains that we assessed

adequately explained disparities in viral suppression, which is a topic ripe for further study. The disparity

in viral suppression declined by 33% among NH Black men, Hispanic men, and NH Black women after

accounting for enabling resources, yet the disparity in the outcome remained statistically significant for

each of the these groups in the final model. For NH Black men and women, it is plausible that

disproportionately low levels of viral suppression may be partially attributable to lower levels of care

linkage and consistent ART use. However, the reasons underlying the difference among Hispanic men

are less clear. Hispanic men were as likely as NH White men to engage in HIV care prior to incarceration

and had a markedly better profile with respect to several social determinants of health; they were

substantially more likely to have health insurance and receive public aid, and were less likely to

experience food insecurity and homelessness. These findings are contrary to national data indicating

that Hispanics are less likely than non-Hispanics to be insured throughout the life course (Kirby and

Kaneda, 2010) and significantly more likely than NH Whites to experience homelessness (Fusaro et al.,

2018). Though it was not feasible to assess with available data, Hispanic men in this sample may have

presented to care later in the course of illness compared to other gender-stratified racial/ethnic groups,

which is supported by previous research highlighting HIV care delays and premature death among

Hispanic men with HIV (Losina et al., 2009). It is also in line with national data indicating that Hispanics

are more likely than NH Whites to be diagnosed with HIV late in the course of illness (Centers for

Disease Control and Prevention, 2017b) and to skip needed medical care due to cost concerns

(Dominguez et al., 2015).

V. STRENGTHS AND LIMITATIONS

To our knowledge, this is the first study to assess cross-sectional gender and racial/ethnic disparities in HIV care among PLWH entering correctional facilities. Research assessing engagement in HIV care among PLWH who interface with the US criminal justice system is limited. Furthermore, much of the literature on disparities in HIV treatment and clinical outcomes have assessed gender and race/ethnicity as independent constructs, despite their interrelatedness, due in part to sample size constraints that prohibit the examination of gender-stratified racial/ethnic groups. Because of the scale and geographic diversity of the EnhanceLink cohort, this study permitted joint stratification (by gender and race/ethnicity), and also offers reasonable generalizability to the broader population of incarcerated PLWH in urban areas. Additionally, it is worth noting that while many previous studies have assessed HIV care engagement among all PLWH (diagnosed and undiagnosed), we focused our analysis on people with known HIV infection, and thus may have more accurately quantified the influence of modifiable factors (other than awareness one's HIV status) on HIV care utilization and viral suppression.

In addition to these strengths, our analysis has several limitations. The observational, cross-sectional nature of the data limits our ability to draw causal inferences. However, because we conceptualize gender and race/ethnicity as manifestations of social and political forces, we argue that our primary exposure determines access to resources that enable one's ability to cope with the consequences of HIV, and hence can be viewed as a root cause of health disparities (Link and Phelan, 1995). It is also worth noting that while the method we used to analyze the influence of each conceptual domain (predisposing factors, enabling resources, and need factors) mimicked a causal pathway to facilitate the ease of interpreting nested models, a causal association among predisposing factors, enabling resources, and need factors (from left to right) is unlikely to exist.

Many variables that we used for analysis, including three outcome measures (lacking an HIV healthcare provider, no ART use, and ART adherence) were self-reported by participants. While it has

been noted that self-reported HIV care engagement information is not always reliable when compared to chart review (Castel et al., 2015), other studies have suggested that on average, self-reported health utilization information from patients with HIV has acceptable validity (Weissman et al., 1996). Because we focused on a subset of participants with known HIV infection (and thus may have been more aware of their need for medical care), it is possible that participants felt compelled to over-report treatment use. Furthermore, baseline data were collected during incarceration but cover the pre-incarceration period (ranging from the time of incarceration to three years prior), and thus are susceptible to recall bias. There is no evidence that these biases, if present, differed by gender-stratified racial/ethnic group, and hence the likelihood that the results were significantly affected are minimal. Finally, bias may have been introduced by classifying transgender individuals as male or female based on self-identification given the differing risk profiles of transgender and cisgender individuals, though recent research suggests that transgender and cisgender PLWH in correctional facilities have relatively similar levels of HIV care engagement (Beckwith et al., 2018).

A number of other data-related limitations need to be considered. For example, there was a substantial amount of missing data for several variables—most notably, ART use and adherence and viral suppression. Particularly with respect to viral suppression, it is conceivable that participants with complete data (whose viral load was measured within 90 days of incarceration) were more likely than those with incomplete data to have received some level of health care before incarceration and thus were more likely to be virally suppressed. While this may have resulted in an inflated estimate of viral suppression in the sample overall, we have no reason to believe that misclassification differed across gender-stratified racial/ethnic groups. Additionally, the sample size represents an important limitation. Stratifying the sample by both gender and race/ethnicity resulted in suboptimal cell sizes in some cases, which may have introduced random error and influenced the reliability of the multivariable analysis. We believe that the specific information generated by jointly stratifying the sample outweighed these risks.

Data were collected between 2007 and 2012, several years before we conducted this analysis. While these data may not totally reflect HIV care engagement among incarcerated populations today, it is unlikely that major changes have occurred. While marked improvements have been made in viral suppression nationally since the time of the study (Centers for Disease Control and Prevention, 2017a), the health of inmates and health care in many US correctional facilities remains poor (Gibson and Phillips, 2016). Only six states formally require quality monitoring of prison-based health care services (The Pew Charitable Trusts, 2017). There is also scarce evidence that inequities in HIV care engagement and viral suppression among jailed populations have changed during this time frame.

Finally, we did not assess pre-incarceration CD4 count, which may have partially confounded the relationship between the exposure and ART use outcomes. During the time of the study, clinical guidelines recommended ART for HIV-infected individuals with no history of ART and CD4 $\leq$ 350 cells/mm^3. A CD4 count measured $\leq$ 90 days within jail intake was available for the majority of participants. However, among participants for whom data was available, 81% of CD4 count measurements that would have been used for analysis were obtained after jail intake. Furthermore, CD4 counts measured after incarceration were substantially higher than those obtained prior to jail intake, potentially reflecting the impact of jail-based interventions to promote ART use. While the omission of this variable is notable, we found that differences in CD4 count did not vary considerably between gender-stratified racial/ethnic groups.

VI. CONCLUSIONS

HIV disproportionately affects people in correctional facilities, who achieve lower levels of viral suppression than the general population. Previous studies have examined the independent influence of gender and race/ethnicity on HIV care engagement among PLWH who interface with the criminal justice system. Overall, they demonstrate that women and racial/ethnic minorities are less likely than their male and White counterparts to access HIV care, and furthermore, that the factors associated with care engagement vary by gender and race/ethnicity. There is a need for more effective, customized intervention strategies for improving HIV outcomes among PLWH who encounter the criminal justice system. Hence, a more nuanced understanding of cross-sectional gender and racial/ethnic differences in care engagement (and their associated factors) in this population is needed.

The aims of this study were two-fold: 1) to jointly assess gender and racial/ethnic disparities in pre-incarceration HIV treatment use and viral suppression among jailed PLWH, and 2) to assess modifiable characteristics that accounted for such disparities. Overall, we found that racial/ethnic minority women were the least likely to engage in care relative to NH White men, though substantial disparities also existed among NH Black men. NH Black men, Hispanic men, and NH Black women were all significantly less likely than NH White men to be virally suppressed at jail intake. The factors most highly associated with disparity reductions in care utilization varied by subgroup and the outcome assessed. However, health insurance coverage, substance abuse, and housing emerged as prominent factors, highlighting priority areas for intervention development and policy advocacy.

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Williams, C. T., Kim, S., Meyer, J., Spaulding, A., Teixeira, P., Avery, A, … Ouellet, L. J. (2013). Gender differences in baseline health, needs at release, and predictors of care engagement among HIV-positive clients leaving jail. *AIDS and Behavior, 17*(Suppl 2), S195-202.

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VITA

JOCELYN VAUGHN, MA

EDUCATION

University of Illinois at Chicago (Chicago, IL)   **May 2019 (anticipated)**
Master of Science, Epidemiology
Thesis: Gender and Racial/Ethnic Disparities in HIV Care and Viral Suppression Before Incarceration
Advisor: Dr. Caryn Peterson

Loyola University (Chicago, IL)   **May 2011**
Master of Arts, Spanish
Advisor: Dr. Alrick Knight

Miami University (Oxford, OH)   **May 2006**
Bachelor of Arts, Psychology

PROFESSIONAL EXPERIENCE

Vizient, Inc. (Chicago, IL)   **May 2012-present**
Senior Project Manager, Vizient Research Institute (September 2015-present)
- Design and manage quantitative research studies focused on issues affecting the quality and affordability of health care delivery in the US
- Perform analyses of secondary data and contribute to technical research reports for health system members and academic audiences, ensuring that study findings are translated into actionable insights
- Synthesize scholarly literature to inform the development of new projects

Project Manager, Quality Research, promoted from Member Support Specialist (May 2012-August 2015)
- Designed and managed multi-site applied health services research projects aimed to improve the quality of care delivered to patients with serious illness
- Played a lead role in the development of all data collection tools and procedures, analytic plans, and study manuscripts
- Presented research findings to internal business units, health system members, and at national conferences

Loyola University Cuba Program (Chicago, IL)   **June 2009-September 2011**
Program Manager, promoted from Graduate Assistant
- Developed, implemented, and continuously adapted a US Agency for International Development (USAID)-funded program to enhance the quality and accessibility of health care delivered by Cuban NGOs
- Prepared and presented progress reports for USAID, the US Department of State, and Loyola University to ensure that program developments and the evolution of the local political situation were communicated effectively

Feinberg School of Medicine, Northwestern University (Chicago, IL)   June 2006-May 2009
Lead Research Study Coordinator
- Managed all field operations and IRB certification for multiple federally funded research programs focused on behavioral risk factors for cancer
- Assisted the Principal Investigator in designing data collection instruments, developing new interventions, and writing manuscripts and grants to continue the next phase of research

TEACHING EXPERIENCE

University of Illinois at Chicago (Chicago, IL)   **August-December 2017**
Graduate Teaching Assistant, Department of Epidemiology & Biostatistics, Drs. Caryn Peterson and Sreenivas Konda
- Provided assistance for an *Analytic and Research Methods* course serving approximately 70 graduate students
- Delivered one lecture, held weekly in-person office hours, graded homework and exams, and assisted students with questions via email

Loyola University (Chicago, IL)
May-June 2010
Graduate Teaching Assistant, Department of Education, Dr. Michael Maher
- Developed curriculum and provided in-person instruction for the quantitative research component of an *Introduction to Research Methods* course serving 7 graduate students

ACADEMIC RESEARCH

MS Thesis   **In progress**
University of Illinois at Chicago (Chicago, IL)
- Led the formative stages of research, including developing the theoretical rationale and conceptualization for the project
- Designed and performed a multivariable regression and mediation analysis to examine disparities in HIV treatment utilization and viral suppression, as well as factors associated with such disparities, based on a national cohort of HIV-infected jail detainees

PUBLICATIONS

Vaughn, J., & Herbener, V. (in preparation). A snapshot of advance care planning services under Medicare reimbursement.

Szekendi, M. K., **Vaughn, J.,** McLaughlin, E., Mulvenon, C., Porter-Williamson, K., Sydenstricker, C., & Williamson, M. (2018). Integrating palliative care to promote earlier conversations and to increase the skill and comfort of non-palliative care clinicians: Lessons learned from an interventional field trial. *American Journal of Hospice and Palliative Medicine, 35*(1), 132-137.

Szekendi, M. K., **Vaughn, J.,** Lal, A., Ouchi, K., & Williams, M. V. (2016). The prevalence of inpatients at 33 U.S. hospitals appropriate for and receiving referral to palliative care. *Journal of Palliative Medicine*, *19*(4), 360-367*.*

Perez, B., Szekendi, M. K., Taylor-Clark, K**., Vaughn, J.**, & Susman, K. (2016). Advancing a culture of health: Population health programs in place at essential hospitals and academic medical centers (2012-2014). *Journal for Healthcare Quality*, *38*(2), 66-75.

Spring, B., Schneider, K., McFadden, H. G., **Vaughn, J.**, Kozak, A. T., Smith, M., … Jones, D. L. (2012). Multiple behavior changes in diet and activity: A randomized controlled trial using mobile technology. *Archives of Internal Medicine*, *172*(10), 789-796.

Spring, B., Schneider, K., McFadden, H. G., **Vaughn, J.**, Kozak, A. T., Smith, M., … Hedeker, D. (2010). Make Better Choices (MBC): Study design of a randomized controlled trial testing optimal technology-supported change in multiple diet and physical activity risk behaviors *BMC Public Health*, 10, 586.

Spring, B., Cook, J., Appelhans, B., Maloney, A., Richmond, M., **Vaughn, J.**, … Hedeker, D. (2007). Nicotine effects on affective response in depression-prone smokers. *Psychopharmacology*, 196(3), 461-471.

PRESENTATIONS

Vaughn, J., Borkar, S. Johnson, M., & Chepp, J. (2018, November). Acculturation and the prevalence of chronic kidney disease in Latino adults. Poster presented at the American Public Health Association Annual Meeting, San Diego, CA.

Vaughn, J., & Szekendi, M. K. (2017, February). Gaps in the use of palliative care in U.S. hospitals. Oral presentation delivered at the Annual Assembly of the American Academy of Hospice and Palliative Medicine and the Hospice and Palliative Nurses Association, Phoenix, AZ.

Szekendi, M. K., & **Vaughn, J.** (2015, December). Gaps in the use of palliative care in U.S. hospitals. Poster presented at the Institute for Healthcare Improvement's National Forum, Orlando, FL.

Szekendi, M. K., & **Vaughn, J.** (2015, November). The prevalence of inpatients at U.S. academic medical centers who are appropriate for palliative care referral. Poster presented at the Center to Advance Palliative Care's National Seminar, San Antonio, TX.

Russell, S. W., Pictor, A., **Vaughn, J.**, McFadden, H. G., Neville, K., Spring, B., & Friedman, R. (2010, April). Feasibility of an automated telephone system for behavior change. Poster presented at the Society of Behavioral Medicine's Annual Meeting & Scientific Sessions, Seattle, WA.

Duncan, J. M., Spring, B., Janke, A. E., Kozak, A. T., McFadden, H. G., & **Vaughn, J.** (2009, April). PDA+ pilot study: A technological adjunct for a weight loss intervention with veterans. Poster presented at the Society of Behavioral Medicine's Annual Meeting, Montreal, Quebec.

Spring, B., Maloney, A., Appelhans, B. M., **Vaughn, J.**, Vanderveen, J., & Hedeker, D. (2007, February). Smoking a de-nicotinized cigarette blunts emotional response to positive mood induction by previously depressed smokers. Oral presentation delivered at the Society for Research on Nicotine and Tobacco's Annual Meeting, Austin, TX.

SKILLS

Programming: SAS | Stata
Applications: Microsoft Office (Word, PowerPoint, Excel) | Salesforce
Languages: Spanish (intermediate speaking, advanced reading and writing)

AWARDS AND DISTINCTIONS

Merit Award (full tuition award)   **2009-2011**
Loyola University (Chicago, IL)

Alpha Sigma Nu (The Honor Society of Jesuit Colleges and Universities)   **2010**
Loyola University (Chicago, IL)

Sigma Delta Pi (National Collegiate Hispanic Honor Society)   **2005-2006**
Miami University (Oxford, OH)

Dean's List of Distinguished Students   **2003-2006**
Miami University (Oxford, OH)

PROFESSIONAL MEMBERSHIPS

American Public Health Association   **2018-present**