



# Correlates of Engagement in HIV Care Among Transgender Women of Color in the United States of America

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## Abstract

HIV prevalence among transgender women of color (TWC) in the United States of America is high. We enrolled TWC living with HIV (N = 858) to evaluate 19 HIV care interventions. We examined factors associated with four outcomes at enrollment: linkage to care, ever being on antiretroviral treatment, retention in care and viral suppression. The sample was 49% Hispanic/Latino, 42% Black; average age was 37 years; 77% were ever linked to care, 36% were ever on treatment, 22% were retained in care, and 36% were virally suppressed. Current hormone use was significantly associated with linkage, retention, and viral suppression (all aORs > 1.5), providing evidence for gender-affirming care as an important facilitator of engagement in HIV care. Greater health care empowerment was significantly associated with greater odds of all outcomes (aORs between 1.19 and 1.37). These findings identify potential intervention targets to improve the provision of care and treatment for TWC living with HIV.

**Keywords** Transgender women · HIV · HIV treatment · Engagement in care · HIV care continuum

## Introduction

Recent research with transgender people (those with a gender identity different from the sex assigned at birth) in the United States of America (USA) has begun to reveal the size of the population and the prevailing health disparities compared to cisgender people, as well as within transgender communities by race and ethnicity. Estimates of the number of transgender adults significantly increased over the past decade, with one meta-analysis estimating 1 in every 250

adults, or almost 1 million Americans are transgender [1]. Compared with White respondents, higher percentages of people of color in the 2014 Behavioral Risk Factor Surveillance System (BRFSS) data identified themselves as transgender [2]. An earlier BRFSS study in Massachusetts found its transgender respondents were more likely to identify as Hispanic than White [3].

HIV disproportionately impacts transgender women in the USA, particularly those who are African American and Latina. A meta-analysis estimated HIV prevalence among transgender women to be 21.7%, and compared to cisgender adults, they were 34 times more likely to be living with HIV [4]. The most recent National HIV Surveillance Report (2018 Update) from the Centers for Disease Control and Prevention (CDC) included transgender persons for the first time, with the highest numbers of new HIV diagnoses from 2014 through 2018 among African American and Hispanic/Latinx transgender persons [5]. In 2016, the Ryan White HIV/AIDS Program (RWHAP) served 7166 self-identified transgender clients (1.3% of all clients) of whom 93% were transgender women. Among these transgender women, 88.8% were of color, including 54.4% African American and 29.2% Latina. Retention in care among transgender women living with HIV who were receiving RWHAP-funded

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medical care was similar to the overall national average (79.8% versus 81.7%), but viral suppression was lower among transgender women (79.4%) than the national average (84.9%) [6]. Among all RWHAP transgender clients, viral suppression was lower among younger age groups (20–24 years: 63.8%, 25–29 years: 71.4%), those with no health care coverage (74.3%) and those who were temporarily (71.9%) and unstably (67.1%) housed.

Numerous health and socioeconomic disparities have been well-documented among transgender persons in the USA, especially among those of color. One study using BRFSS data found that transgender persons were more likely than cisgender persons to be younger and report being in poor health, uninsured, unemployed, overweight, depressed and have unmet health care needs due to inability to pay [2]. The 2015 US Transgender Survey found that 38% of its Black respondents and 43% of its Latinx respondents were living in poverty [7]. As a safety net program, RWHAP is the payer of last resort, and thus serves many impoverished people with HIV who are uninsured or underinsured. The 2017 RWHAP Annual Data Report also noted that a higher percentage of its transgender clients (77.3%) were at or below 100% of the Federal Poverty Line, compared to cisgender female clients (72.1%) and cisgender male clients (58.9%).

Treatment gaps among transgender people of color living with HIV are well documented; they experience greater discrimination than their White peers in accessing medical services, including transgender-related health care [8, 9]. These experiences can result in avoidance of health care due to anticipated stigma and discrimination, thus presenting a significant barrier to engaging and retaining transgender women in HIV care [10]. Discrimination, stigma, and experiences of transphobia have all been found to contribute to negative physical and mental health outcomes among transgender people, including those living with HIV [11, 12]. Substance use to cope with these experiences is common among transgender women [13] and has been found to contribute to poor health outcomes among people living with HIV [14]. Further, transgender people living with HIV may have concerns about disclosing their HIV status and/or transgender identity due to fear of stigma and discrimination [15]. Disclosure concerns due to stigma have been linked with poor HIV care and treatment outcomes across a range of populations [16, 17], while positive relationships between disclosure and social support have been associated with positive health outcomes [16].

Research has also demonstrated several facilitators to engagement in health care among transgender women living with HIV. Based on the Model of Gender Affirmation [18], it has been demonstrated that transgender women living with HIV are more likely to be virally suppressed if they receive services that are gender-affirming and their transition-related medical care, such as hormone provision, is co-housed with

their HIV care [19]. In addition to gender affirmation, health care empowerment [20], which is defined as being informed, committed, collaborative, and engaged in one's health care, was found to be important for viral suppression among transgender women [19]. Access to hormones has also been associated with better quality of life and mental health outcomes among transgender women [21, 22].

To identify effective interventions to address disparities in HIV outcomes among transgender women of color (TWC), in 2012 the Health Resources and Services Administration under its Special Projects of National Significance, funded a 5-year initiative titled Enhancing Engagement and Retention in Quality HIV Care for TWC. In this paper, we characterize the study's sample at baseline and, informed by the existing literature, determine the cross-sectional factors at baseline that were associated with the participants' engagement in HIV care, ever being on antiretroviral therapy (ART), retention in HIV care, and viral suppression.

## Methods

Nine demonstration projects (four at community sites and five at clinical sites) in four urban centers in the USA were selected to develop and implement innovative interventions to engage and retain TWC living with HIV, in HIV care. An additional organization was selected as the evaluation center and tasked with providing technical assistance to the demonstration projects and evaluating the interventions [23]. The demonstration sites designed their own recruitment strategies to reach and enroll participants in their interventions. These strategies included community outreach, networking, word-of-mouth, publicity materials such as booklets and fliers, and referrals from clinics and other service providers. To be eligible, one had to be living with HIV, be 18 years or older, be assigned male sex at birth, identify as transgender or female, and be fluent in English or Spanish. Enrolled individuals provided informed consent before participating in the study.

Before receiving the intervention, the participants visited the study site and completed a self-administered baseline survey in either English or Spanish that inquired about their HIV care and numerous psychosocial factors. The survey was implemented using the REDCap [24] web application. To compensate for their time, participants were paid between \$25 and \$50; the incentive differed by geographic area as well as the length of the survey, since some sites added their own local evaluation questions in addition to the multi-site evaluation questions. The study was approved by the local Institutional Review Board at each of the demonstration sites and at the evaluation center.

## Measures

Participants reported on demographic characteristics including: (a) age; (b) education (dichotomized for modelling into 0: less than college-level education and 1: some college education or higher); (c) income (dichotomized based on 2013 federal poverty guidelines [25] into 0: at or below the federal poverty threshold with annual incomes up to \$11,490 and 1: above the federal poverty threshold); and (d) health insurance (participants could select multiple types).

Race and ethnicity were recorded using two separate questions. For ethnicity, participants specified whether they were of Hispanic, Latino/a, or Spanish origin. For race, participants could choose multiple applicable categories from the fifteen provided. These included White, Black or African American or Afro-Caribbean, American Indian or Alaska Native, multiple Asian categories, multiple Pacific Islander categories and an ‘additional’ category (to capture other unlisted racial categories). The responses to ethnicity and race questions were combined to create six distinct race-ethnicity categories—(1) Hispanic, Latina, or of Spanish Origin, (2) Black, non-Hispanic, (3) American Indian or Alaska Native, non-Hispanic, (4) API, non-Hispanic, (5) Additional, non-Hispanic, and (6) Multiracial, non-Hispanic. For the purposes of the models presented here, this race-ethnicity information was dichotomized into two categories—Hispanic (category (1) of the race-ethnicity variable above) and non-Hispanic (all other categories of race-ethnicity).

## Outcome Variables

We modelled the following four measures of HIV care engagement in the present analyses.

### Linkage to HIV Primary Care

This binary variable recorded whether participants had reported ever being linked to HIV primary care, including in the past, prior to their participation in this study (0: No, 1: Yes).

### Treatment for HIV

This binary variable recorded whether participants had reported ever taking ART, including in the past, prior to their participation in this study (0: No, 1: Yes).

### Retention in HIV Care

Participants were categorized as being retained in care if they reported at least one HIV primary care visit in each of the two preceding 6-month periods. This was a binary variable (0: Not retained in care, 1: Retained in care).

## Viral Suppression

Participants were categorized as being virally suppressed if their viral load had been tested in the previous 6 months and their last test result was < 200 copies/ml. Thus, viral suppression was a binary variable (1: virally suppressed; 0: not virally suppressed).

## Explanatory Variables

For each outcome, we explored an expansive pool of potential explanatory variables informed by the existing literature on transgender people and HIV care and treatment outcomes. Broadly, this pool can be grouped into: mental health, substance use (drugs and alcohol), structural factors (including housing and financial instability), stigma (disclosure of transgender and HIV status) and discrimination (in healthcare, employment, shelter), transphobia (including violence/victimization), gender affirmation (including hormone use, psychological gender affirmation, and importance of pronouns—including use by health care providers), health care empowerment, social support and demographic (age, race-ethnicity and education). The following are the explanatory variables that stayed in one or more of the four final models.

Disclosure of HIV status was captured using the single item ‘Who have you told that you have HIV?’ Participants could check one or more of the categories: no one, one or more sex partners, one or more trans friends, one or more non-trans friends, one or more family members, other. This information was used to create a binary variable [0: did not disclose HIV status to anyone, 1: disclosed HIV status to at least one (group of) person(s)].

Disclosure of transgender identity was captured using the single item ‘Who have you told about your transgender identity?’ Participants could check one or more of the categories: no one, one or more sex partners, one or more trans friends, one or more non-trans friends, one or more family members, other. This information was used to create a binary variable [0: did not disclose transgender identity to anyone, 1: disclosed transgender identity to at least one (group of) person(s)].

*Homelessness* in the past 6 months was recorded using the single item ‘In the past 6 months, how often have you been homeless or temporarily or unstably housed? This can include staying with others, even for one night if you had no other place to stay.’ Response options were: never, rarely, sometimes, often. This response was used to create a binary variable for housing status in the past six months (0: stably housed, 1: homeless or unstably housed).

*Missed HIV care appointments* due to lack of transportation was recorded using the single item ‘In the past 12 months, how often did you miss an appointment for HIV

care because you didn't have a way to get to your provider (i.e., no transportation)?' Response options were: never, rarely, sometimes, fairly often, most of the time, always. This response was used to create a binary variable for missed care appointments in the past year (0: no missed HIV care appointments due to lack of transportation, 1: at least one missed HIV care appointment due to lack of transportation).

*Experiences of discrimination* in the past 6 months due to being transgender were recorded using 5-items adapted from a 6-item measure [8]. Two of those sources of discrimination are included in the present findings—denial of job and denial of housing. The response options ranged from 0 (Never) to 4 (Many times); responses were dichotomized into 0 (Never) and 1 (At least once) mirroring the strategy used by the authors of the original measure. Sample item: 'How many times in the last 6 months have you been denied a job you applied for because you are transgender?'

*Healthcare empowerment* was measured using the 4-item ICCE (informed, committed, collaborative, engaged) subscale of the Health Care Empowerment Inventory [26]. The Likert type response options ranged from 1 (Strongly disagree) to 5 (Strongly agree). The scale was scored by calculating the mean of the four items with higher scale scores indicating greater healthcare empowerment. Sample item: 'I try to get my health care providers to listen to my preferences for my treatment'.

*Lifetime experiences of transphobia* were recorded using a 5-item measure [27] adapted from the Schedule of Racist Events [28]. The Likert type response options ranged from 1 (Never) to 6 (All of the time). The scale scores were dichotomized for use in the models [0: Never experienced transphobia; 1: Experienced transphobia in the past]. Sample item: 'How many times in your entire life have you been hit, shoved, or beaten up because you are transgender?'

*Depression* in the previous week was measured using a 10-item short form of the Center for Epidemiological Studies Depression (CES-D) scale [29, 30]. The Likert type response options ranged from 0 (Rarely or none of the time [less than 1 day]) to 3 [Most or all of the time (5–7 days)]. The scale scores were dichotomized for use in the models (0: score less than 10, not depressed; 1: score of 10 or greater, depressed) [31]. Sample item: 'During the past week, I felt that everything I did was an effort.'

*Hormone use* in the past 6 months was recorded as a binary variable (0: Did not use hormones; 1: Used hormones).

*Sex work for financing necessities* in the past 6 months was assessed by the single item 'In the past 6 months, have you exchanged sex for money, drugs, food, clothes, a place to stay, or other things that you need?' Response options were binary (0: No, 1: Yes).

*Incarceration* in the past 6 months was assessed by the single item 'In the past 6 months, were you ever in juvenile

detention (juvie), jail, or prison?' Response options were binary (0: No, 1: Yes).

*Financial insecurity* in the past 6 months was assessed using the single item 'In the last 6 months, how many of those months did you run out of money for your basic necessities?' Responses were dichotomized for analyses (0: Did not run out of money for basic necessities, 1: Ran out of money for basic necessities in at least one of the past 6 months).

## Data Analysis

First, we generated the descriptive statistics for the overall sample as well as separately for the participants in the 'yes' category for each outcome variable. These analyses were conducted using SAS Version 9.4 software (Copyright 2002–2012, SAS Institute Inc. Cary, NC). Next, as outlined in the Measures section above, based on existing literature we selected a large group of available constructs from the study to be used as input to the construction of the multivariable models. For each outcome, we constructed the multivariable model using manual backward selection [32]. We performed multiple logistic regression in Mplus Version 8.4 software [33] using maximum likelihood estimation with standard errors that are robust to non-normality (Mplus estimator = MLR). This estimator also has the capability to handle missing values across different variables and include cases with partial data in the analysis under the missing at random (MAR) assumption. At each successive run of a model, we fixed to zero the coefficient of the independent variable demonstrating the largest p-value above 0.05 and repeated this process until we arrived at a model where every remaining independent variable was statistically significant ( $p < 0.05$ ). For each model, we report the adjusted odds ratios for each independent variable, their 95% confidence interval and the p-value.

## Results

Between December 2013 and August 2016, the nine demonstration sites recruited 858 TWC living with HIV to participate in the interventions. Detailed sample demographic information is presented in Table 1. Almost half (49%) were of Hispanic, Latina or Spanish origin and 42% were Black. The average age was 37 years. The education level of 40% of the participants was below high school and three quarters reported an annual income below the federal poverty level. The majority (54%) had public health insurance but 9% had no health insurance. Seventy seven percent of participants reported ever being linked to HIV care, 36% were ever on ART, 22% were found to be retained in HIV care and 36% were virally suppressed.

**Table 1** Characteristics of overall sample and of subsamples of participants who reported positive outcomes along the continuum of HIV care

	Overall (N=858)		Linkage Ever linked to care 660 (76.9%)		Treatment Ever on ART 311 (36.3%)		Retention Retained in care 192 (22.4%)		Viral suppression Tested in past 6 m & virally suppressed 309 (36.0%)	
	n	%	n	%	n	%	n	%	n	%
Demographic information:										
Age in yrs—mean (SD)	37.3	(10.8)	38.4	(10.8)	39.1	(11.1)	40.2	(10.5)	39.3	(10.9)
Race-ethnicity										
Hispanic, Latina, or of Spanish origin	417	(48.6)	344	(82.5)	162	(38.9)	123	(29.5)	176	(42.2)
Black, non-Hispanic	364	(42.4)	261	(71.7)	126	(34.6)	55	(15.1)	113	(31.0)
American Indian or Alaska Native, non-Hispanic	9	(1.1)	6	(66.7)	5	(55.6)	3	(33.3)	2	(22.2)
API, non-Hispanic	14	(1.6)	10	(71.4)	3	(21.4)	3	(21.4)	6	(42.9)
Additional, non-Hispanic	11	(1.3)	8	(72.7)	4	(36.4)	2	(18.2)	1	(9.1)
Multiracial, non-Hispanic	28	(3.3)	23	(82.1)	8	(28.6)	4	(14.3)	10	(35.7)
No response	15	(1.8)	8	(53.3)	3	(20.0)	2	(13.3)	1	(6.7)
Education										
Less than grade 12	346	(40.3)	277	(80.1)	128	(37.0)	83	(24.0)	118	(34.1)
Grade 12 or GED	291	(33.9)	206	(70.8)	100	(34.4)	50	(17.2)	92	(31.6)
At least some college	195	(22.7)	159	(81.5)	77	(39.5)	55	(28.2)	93	(47.7)
No response	26	(3.0)	18	(69.2)	6	(23.1)	4	(15.4)	6	(23.1)
Annual Income <sup>b</sup>										
\$11,490 or less	647	(75.4)	521	(80.5)	250	(38.6)	152	(23.5)	251	(38.8)
Greater than \$11,490	53	(6.2)	42	(79.3)	25	(47.2)	18	(34.0)	24	(45.3)
No response	158	(18.4)	97	(61.4)	36	(22.8)	22	(13.9)	34	(21.5)
Insurance <sup>a</sup>										
Public	463	(54.0)	388	(83.8)	182	(39.3)	107	(23.1)	191	(41.3)
ADAP	187	(21.8)	172	(92.0)	89	(47.6)	65	(34.8)	94	(50.3)
ACA, private, other	115	(13.4)	90	(78.3)	51	(44.4)	34	(29.6)	43	(37.4)
No insurance	74	(8.6)	34	(46.0)	12	(16.2)	7	(9.5)	8	(10.8)
No response	90	(10.5)	39	(43.3)	9	(10.0)	9	(10.0)	12	(13.3)
Explanatory variables:										
Ever experienced transphobia	745	(86.8)	593	(79.6)	293	(39.3)	179	(24.0)	286	(38.4)
Disclosed HIV status	536	(62.5)	445	(83.0)	234	(43.7)	141	(26.3)	226	(42.2)
Disclosed transgender identity	576	(67.1)	467	(81.1)	245	(42.5)	150	(26.0)	238	(41.3)
Incarcerated in past 6 m	83	(9.7)	54	(65.1)	26	(31.3)	12	(14.5)	20	(24.1)
Homeless in past 6 m	352	(41.0)	264	(75)	140	(40.0)	62	(17.6)	94	(26.7)
Faced financial insecurity in past 6 m	560	(65.3)	448	(80.0)	207	(37.0)	137	(24.5)	204	(36.4)
Taken hormones in past 6 m	397	(46.3)	355	(84.4)	160	(40.3)	121	(30.5)	187	(47.1)
Missed care appointment due to lack of transportation in past 12 m	202	(23.5)	168	(83.1)	80	(39.6)	40	(19.8)	59	(29.2)
Exchanged sex for necessities in past 6 m	330	(38.5)	245	(74.2)	132	(40.0)	54	(16.4)	113	(34.2)
Gender-based discrimination for job	302	(35.2)	244	(80.8)	112	(37.1)	66	(21.9)	123	(40.7)
Gender-based discrimination for housing/shelter	283	(33.0)	216	(76.3)	115	(40.6)	51	(18.0)	88	(31.1)
Significant depression	449	(52.3)	359	(80)	178	(39.6)	108	(24.1)	171	(38.1)
Healthcare empowerment—mean (SD)	3.9	(1.1)	4.0	(1.1)	4.0	(1.0)	4.2	(0.9)	4.1	(0.9)

While the percentages under the overall column are those of the entire sample (N=858), all other percentages in the table use the 'n' in the first data column on the respective row, as the denominator

ADAP AIDS Drug Assistance Program, ACA (insurance through) Affordable Care Act

<sup>a</sup>Respondents could check multiple categories. 'Public' includes Medicare, Medicaid, Ryan White, Other public insurance

<sup>b</sup>Categorization based on 2013 federal poverty level



An overwhelming majority of participants (87%) had experienced transphobia in their lives. Sixty three percent had disclosed their HIV status and 46% had taken hormones in the previous 6 months. Financial insecurity (65%), recent homelessness (41%), sex work to finance necessities (39%), denial of employment due to identifying as transgender (35%), and denial of housing due to identifying as transgender (33%) were reported by substantial proportions of the sample. The mean score on health care empowerment was high at 3.9 (range: 1–5).

The sample characteristics of those who reported each of the outcome variables are also in Table 1. For instance, among the Hispanic participants, 83% had been ever linked

to HIV care, 39% were ever treated, 30% were currently retained in care, and 42% were virally suppressed. In comparison, these percentages among Black women were 72%, 35%, 15% and 31% respectively.

The multivariable model created by the model selection process for each of the outcomes is reported in Table 2. Linkage to HIV primary care was positively associated with each of its explanatory variables except incarceration. Being older (aOR = 1.04,  $p < 0.001$ ), being Latina/Hispanic (aOR = 1.56,  $p = 0.01$ ), having disclosed one's HIV status (aOR = 2.14,  $p < 0.001$ ), having greater health care empowerment (aOR = 1.33,  $p < 0.001$ ) and taking hormones (aOR = 1.50,  $p = 0.04$ ) were all associated with greater odds

**Table 2** Multivariable models of outcomes along the HIV care continuum

Explanatory variable	Adjusted odds Ratio (aOR)	95% Confidence Interval of aOR	p-value
<b>Outcome: linkage (ever linked to care)</b>			
Taken hormones (in the past 6 months)	1.50	(1.02, 2.21)	0.04
Health care empowerment	1.33	(1.15, 1.55)	<0.001
Incarceration (in the past 6 months)	0.45	(0.27, 0.75)	<0.001
Disclosed HIV status	2.14	(1.42, 3.25)	<0.001
Age	1.04	(1.02, 1.06)	<0.001
Hispanic	1.56	(1.1, 2.23)	0.01
<b>Outcome: treatment (ever on ART)</b>			
Health care empowerment	1.19	(1.04, 1.37)	0.013
Ever experienced transphobia	2.57	(1.18, 5.62)	0.018
Disclosed HIV status	1.74	(1.19, 2.54)	0.004
Age	1.02	(1.01, 1.03)	0.003
Financially insecure (in the past 6 months)	0.69	(0.48, 0.98)	0.038
<b>Outcome: retained in care</b>			
Taken hormones (in the past 6 months)	2.04	(1.42, 2.94)	<0.001
Health care empowerment	1.36	(1.13, 1.64)	0.001
Denied housing/ shelter due to transgender identity (in last 6 months)	0.55	(0.37, 0.83)	0.004
Exchanged sex for money, food, shelter, drugs, etc. (in the past 6 months)	0.60	(0.40, 0.88)	0.01
Disclosed HIV status	1.80	(1.11, 2.90)	0.016
Age	1.02	(1.01, 1.04)	0.004
Hispanic	2.13	(1.50, 3.04)	<0.001
Depression	1.51	(1.03, 2.23)	0.035
<b>Outcome: viral suppression</b>			
Taken hormones (in the past 6 months)	1.89	(1.36, 2.61)	<0.001
Health care empowerment	1.37	(1.17, 1.61)	<0.001
Denied job due to transgender identity (in last 6 months)	1.54	(1.04, 2.28)	0.031
Denied housing/shelter due to transgender identity (in last 6 months)	0.59	(0.39, 0.91)	0.016
Depression	1.44	(1.03, 2.02)	0.034
Missed HIV care appointment due to lack of transportation in the past 12 months	0.56	(0.38, 0.85)	0.006
Homeless or temporarily or unstably housed (in the past 6 months)	0.52	(0.36, 0.75)	<0.001
Disclosed transgender identity	2.28	(1.40, 3.74)	0.001
Age	1.02	(1.00, 1.03)	0.029
Hispanic	1.46	(1.06, 2.01)	0.021
Education (some college or higher)	1.90	(1.32, 2.73)	<0.001

of being linked to care while being incarcerated was associated with lower odds (aOR = 0.45,  $p < 0.001$ ) of being linked to care.

Being older (aOR = 1.02,  $p = 0.003$ ), having disclosed one's HIV status (aOR = 1.74,  $p = 0.004$ ), having greater health care empowerment (aOR = 1.19,  $p < 0.013$ ) and past experience of transphobia (aOR = 2.57,  $p = 0.018$ ) were all associated with greater odds of ever having been treated for HIV as indicated by being on ART. Financial insecurity was associated with lower odds of ever having received treatment for HIV (aOR = 0.69,  $p < 0.038$ ).

The explanatory variables for retention in HIV care demonstrated a mix of positive and negative associations with the outcome. Being older (aOR = 1.02,  $p = 0.004$ ), being Latina/Hispanic (aOR = 2.13,  $p < 0.001$ ), having disclosed one's HIV status (aOR = 1.80,  $p = 0.016$ ), taking hormones (aOR = 2.04,  $p < 0.001$ ), being depressed (aOR = 1.51,  $p = 0.035$ ), and having greater health care empowerment (aOR = 1.36,  $p = 0.001$ ) were all associated with greater odds of being retained in care. Of note, those who reported taking hormones in the past 6 months were twice as likely to be retained in care compared to those who had not taken hormones. Factors associated with lower odds of retention in care were gender-based discrimination in obtaining housing and shelter (aOR = 0.55,  $p = 0.004$ ) and engaging in exchange sex to pay for necessities in the past 6 months (aOR = 0.60,  $p = 0.01$ ).

The explanatory variables for viral suppression also demonstrated a mix of positive and negative associations with the outcome. Being older (aOR = 1.02,  $p = 0.029$ ), being Latina/Hispanic (aOR = 1.46,  $p = 0.021$ ), having some college education (aOR = 1.90,  $p < 0.001$ ), having disclosed one's transgender identity (aOR = 2.28,  $p = 0.001$ ), taking hormones (aOR = 1.89,  $p < 0.001$ ), and having greater health care empowerment (aOR = 1.37,  $p < 0.001$ ) were all associated with greater odds of being virally suppressed. Further, those who faced gender-based discrimination in obtaining a job in the past 6 months (aOR = 1.54,  $p = 0.031$ ), as well as those who were depressed (aOR = 1.44,  $p = 0.034$ ), had greater odds of being virally suppressed. In contrast, facing gender-based discrimination in obtaining housing and shelter (aOR = 0.59,  $p = 0.016$ ), being homeless or unstably housed (aOR = 0.52,  $p < 0.001$ ), and missing medical appointments due to lack of transportation (aOR = 0.56,  $p = 0.006$ ) were associated with lower odds of being virally suppressed.

## Discussion

Our sample of TWC living with HIV was composed of a larger percentage of Latinas (49%) than African Americans (42%). While African American transgender women are

estimated to be living with HIV at higher rates than Latina transgender women [34], our sample's racial/ethnicity composition reflects the larger Latinx population in the US (18.1%) compared with African Americans (13.4%) [35]. Additionally, CDC recently noted that new HIV diagnoses increased among Hispanic/Latino transgender people from 2014 to 2018, while remaining stable among White and African American transgender persons [5].

Retention in HIV care and viral suppression at baseline were significantly lower in our sample compared with national RWHAP figures. Only 22% in our study were retained in care, compared with 78.4–79.8% nationally among transgender women living with HIV in RWHAP from 2014 to 2016. Viral suppression was 36% among our participants, compared with 73.9%–79% among transgender women during the same period in RWHAP. In our sample, younger, African American transgender women were less likely to be retained along the HIV care continuum. This finding is consistent with other studies that have found that young transgender women and other young people of color living with HIV are less likely to be retained in HIV care than older adults [36, 37]. While research has documented that the population living with HIV is aging due to the advent of highly effective treatments, little of this research has focused specifically on transgender populations. Some health concerns for transgender people aging with HIV include multimorbidity (having multiple chronic conditions) and polypharmacy (needing five or more medications) [38].

Current hormone use was associated with linkage, retention, and viral suppression, providing evidence for the HHS recommendation that access to this type of medical gender affirmation for transgender women who desire it can be an important facilitator for engagement in HIV care [39, 40]. Similarly, recent research that has found that TWC who were not currently using hormones were more likely to experience interruptions in HIV treatment [41]. Other research has found hormone use and utilization of transition-related medical care associated with important quality of life indicators [42], as well as health behaviors and outcomes, such as reduced suicidal ideation, binge drinking, and substance use [21].

Health care empowerment in our sample was relatively high, and was significantly and positively associated with all of the HIV care continuum outcomes, corroborating other findings that underscore its powerful impact on important health indicators among people living with HIV [19, 20, 43]. Interestingly, ever having experienced transphobia was positively related to ever being on ART. While initially a counterintuitive finding, it may be that the ability to identify and name experiences of discrimination is indicative of a certain type of resilience that is self-protective and enables people to seek health care despite having encountered transphobia. Similar to other studies on the relationship

between disclosure and positive health behaviors, disclosure of transgender identity and HIV status were important at several stages of the HIV care continuum in our sample. Health care empowerment, identifying experiences of transphobia, and disclosing one's transgender identity and HIV status all share common elements of empowerment that may facilitate engagement in health care.

Counterintuitively, depression was associated with increased likelihood of being retained in care and being virally suppressed. Not surprisingly, rates of depression were high in our sample, as people living with HIV and transgender women experience disproportionate rates of depression compared to the general population [20, 44]. It is not immediately clear why depression was found to be associated with increased retention and viral suppression. One recent study comparing transgender women to cisgender women and cisgender MSM found that despite higher odds of depression among transgender women, there were no significant differences between groups in terms of viral load [44]. The association between mental health indicators and HIV care continuum outcomes among transgender women should be explored further in future research.

Interventions that aim to improve HIV-related outcomes among TWC should consider focusing on critical instrumental types of support. As with RWHAP data, unstable housing, as well as transportation issues, were associated with poorer retention in care and lower odds of being virally suppressed in our sample. Gender-based discrimination in housing and shelter was negatively associated with retention in care and viral suppression. It is critical that efforts to improve the accessibility of shelters and stable housing for transgender people are ramped up in order to address inequities and improve health outcomes [45]. Other intervenable factors include access to hormones and gender-affirming medical care, building empowerment in health care, and disclosure support [42]. Care programs should consider ways they could provide additional support to patients who may experience difficulty linking to and staying in care, such as those who are younger, African American, and/or have been recently incarcerated. Linkage and retention programs may consider employing peers from these groups to improve engagement [46].

Further, it is critical that HIV surveillance systems consistently collect, monitor, and report trans-inclusive data so that we can fully understand and address the disparities in HIV health outcomes among TWC. The erasure of transgender people has prevented an effective response to the urgent need to address this smaller yet concentrated epidemic among TWC in the USA and elsewhere [47–49]. CDC's separation of transgender persons from cisgender men who have sex with men (MSM) in its most recent National HIV Surveillance Report is a most welcome step in this direction [5].

The cross-sectional data reported here precludes us from drawing conclusions about causality. Further, the data are from a non-representative sample of TWC from four large urban centers in the USA, and therefore may not be generalizable to a broader population of transgender women. To our knowledge, this study includes the largest sample of TWC living with HIV in the USA to date, making it a powerful contribution to our understanding of the status of, as well as barriers and facilitators to, this population's engagement along the HIV care continuum.

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**Data Availability** Available upon request.

**Code Availability** Available upon request.

## Declarations

**Conflict of interest** None to disclose.

**Ethical Approval** The study was approved by the local Institutional Review Board at each of the demonstration sites and at the evaluation center.

**Consent for Participants** All participants provided informed consent prior to participation.

**Consent for Publication** Not applicable.

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