A Quantitative Intersectionality Analysis of HIV/STI Prevention and Healthcare Access Among Transgender and Nonbinary People

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Background: Transgender and nonbinary people experience substantial barriers to accessing healthcare, including prevention of HIV and other sexually transmitted infections (HIV/STI), due to structural inequities. We examined differences in insurance, HIV/STI prevalence, testing, and preexposure prophylaxis use among transgender and nonbinary people living in Washington State by race and ethnicity and gender.

Methods: We pooled data from five 2019–2021 Washington State HIV/STI surveillance data sources to obtain a large and diverse sample of 1648 transgender and nonbinary participants. We calculated the risk difference (RD) for each outcome and used Poisson regression to estimate a surrogate measure of additive interaction—attributable proportion (AP)—that measures the proportion of the excess prevalence of the outcome observed at the intersection of gendered and racialized experience, beyond that expected from gender or race and ethnicity alone.

Results: Participants reported overall high levels of poverty (29% incomes <$15,000 and 7% unstable housing). Certain groups, especially racial/ethnic minority transgender women, were disproportionately impacted by HIV/STIs (RDs from 20% to 43% and APs from 50% to 85%) and less likely to currently have insurance (RDs from 25% to 39% and APs from 74% to 93%) than that expected based on gendered or racialized experience alone.

Conclusions: Our findings highlight the heterogeneity in insurance access, HIV/STI positivity, and prevention utilization within transgender communities. We observed that a large proportion of increased HIV/STI prevalence among racial/ethnic minority transgender women was attributable to the intersection of gender and race and ethnicity. Our findings highlight the importance of trans-inclusive models of HIV/STI prevention that address multilevel barriers rooted in cissexism and structural racism.

Keywords: HIV prevention; Intersectionality; Statistical interaction; STI prevention; Transgender and nonbinary

(Epidemiology 2023;34: 827–837)

Transgender and nonbinary people experience substantial barriers to accessing healthcare, including tools for preventing HIV and sexually transmitted infections (STI). These barriers result from structural inequities rooted in cissexism, whereby trans and nonbinary people disproportionately experience socioeconomic disadvantages and discrimination and frequently lack access to trans-competent providers and insurance coverage.[1–4] Consequently, HIV/STI testing, pre-exposure prophylaxis (PrEP) uptake, antiretroviral therapy (ART) coverage, and viral suppression are low in trans and nonbinary communities relative to cisgender populations.[5–14] These same socio-structural inequities can also increase trans and nonbinary people's vulnerability to HIV/STI acquisition through decreased access to HIV/STI prevention tools and a higher prevalence of syndemic factors (e.g., unstable housing, sex work, and substance use).[15–17] A recent meta-analysis reported an HIV prevalence of 14% among transgender women and 3% among transgender men in the United States.[18] The same meta-analysis also estimated that 21% of transgender women and 29% of transgender men self-reported having a prior STI diagnosis.[18]

Submitted January 5, 2023; accepted July 24, 2023

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The results reported herein correspond to the specific aims of grant number F31AI152542 awarded to D.M.T. from the NIH National Institute of Allergy and Infectious Diseases. This work was also supported by the American Sexually Transmitted Diseases Association (ASTDA) and the Northwest Center for Public Health Practice at the University of Washington's School of Public Health.

The authors report no conflicts of interest.

Data access is provided and managed at the discretion of Public Health-Seattle & King County; visit https://kingcounty.gov/depts/health/data/data-request-service.aspx for more information regarding data inquiries. Computing code can be made available by request of the corresponding author.

SDC Supplemental digital content is available through direct URL citations in the HTML and PDF versions of this article (www.epidem.com).

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ISSN: 1044-3983/23/346-827837
DOI: 10.1097/EDE.0000000000001669

There are also racial inequities within trans and nonbinary populations, whereby ethnoracial minority trans and nonbinary people disproportionately experience discrimination in healthcare settings, structural barriers to care (e.g., financial and limited providers), and poor health outcomes (e.g., cardiovascular disease and depression).[19–28] Racial disparities in HIV prevalence among transgender women have been well documented. For example, 2019 National HIV Behavioral Surveillance (NHBS) Data collected across seven US cities revealed that HIV prevalence was highest among Native American (65%), Black (62%), and Hispanic/Latina (35%) transgender women, and lowest among White transgender women (17%).[29] Similarly, data from the National HIV Surveillance System suggests that there are large racial disparities in HIV diagnoses among transgender men: the majority of transgender men living with HIV were Black (41%) or Hispanic (26%), and 24% were White.[30] However, HIV/STI-related data for transgender men disaggregated by race/ethnicity remain relatively scarce, and data are virtually nonexistent for nonbinary people.[1,18,30,31]

This study applied quantitative intersectional methods to further examine differences in health insurance coverage, HIV/STI prevalence, and prevention utilization within trans and nonbinary communities. Our analysis leveraged data pooled from multiple Washington State HIV/STI surveillance data sources to describe the prevalence of these outcomes among trans and nonbinary participants by gender, race, and ethnicity.

METHODS

Theoretical and Methodologic Frameworks

This analysis is guided by the Intersectionality Research for Transgender Health Justice (IRTHJ) framework.[32] Drawing on theories of intersectionality and structural injustice, IRTHJ is a conceptual model that describes how interlocking structures of domination (e.g., cissexism, white supremacy, colonialism, and classism) are enacted through institutional systems and socio-structural practices to produce material and health inequities for transgender people. Intersectionality theory, which was originally coined in 1989 and developed as an analytic tool by Kimberlé Crenshaw and Patricia Hill Collins, grew out of Black feminist thought of the 19th and 20th centuries and has since traveled across numerous academic disciplines and social justice movements.[33–36] A central tenet of intersectionality is that social categories such as gender, race, and ethnicity are not independent but are instead interdependent and mutually constitutive. That is, intersectionality examines how macro-level systems of power and privilege jointly shape the experiences of individuals living at those intersections.[34] The concept of intersectionality stands in contrast to unidimensional or single-axis approaches, which assume that effects at an intersection of identities are more simply understood as the sum of their parts.

The present study is a descriptive intersectional analysis that focuses on understanding how health insurance, HIV/STI prevalence, testing, and PrEP use might vary for trans and nonbinary people across two axes: gender and race/ethnicity. Drawing upon McCall's framework for managing intersectional complexity, we characterize the present analysis as primarily intercategorical.[37] Intercategorical intersectional analyses explore whether meaningful inequities exist among already defined socially constructed groups or identities using methods of systematic comparison. This is to be contrasted with intracategorical approaches, which focus on a specific social group to reveal the complexity of lived experience within such group, and anticategorical approaches, which challenge or deconstruct social categorization altogether as too simplistic to capture the complexity of lived experience.

Although we use individual-level data, the present analysis situates observed population-level patterns of inequities within systems of power and oppression and not as individual-level outcomes. Therefore, we consider race/ethnicity as a proxy for exposure to structural and individual experiences of racism,[38,39] and we use gender as a proxy for exposure to structural and individual experiences of sexism, cissexism, and anti-trans bias, as they may be experienced differently by transgender men, transgender women, nonbinary, and gender nonconforming people. This interpretation is consistent with IRTHJ and empirical data on experiences of discrimination and stigma among ethnoracial minority trans and nonbinary people.[4,17,23,25,26,40,41]

Last, in line with IRTHJ's call to center embodied knowledge, this analysis was conducted in collaboration with the Seattle Trans and Non-binary Sexual Health (STARS) Advisory Board, a community advisory group of nine trans and nonbinary people from the Seattle area that met every 1–2 months between February 2021 and July 2022. Advisory Board members guided all stages of the statistical analysis, including the choice of health outcomes and demographic groups to study, determining which intersectional group to use as the reference in the statistical models, the selection of measures of statistical interaction that were most interpretable and useful to members of the transgender community, interpretation of results, and writing and revising the article.

Data Sources and Study Population

Our study population includes trans and nonbinary people in Washington State (WA) who participated in one of five cross-sectional surveys conducted by Public Health – Seattle & King County (PHSKC) or who visited the PHSKC Sexual Health Clinic located in Seattle, WA.

PHSKC Pride Surveys

We used 3 years of data (2019, 2020, and 2021) from PHSKC's Pride Survey, an annual survey conducted for surveillance purposes through PHSKC's HIV/STD Program. The 2019 Pride Survey recruited participants in person during

two Pride events in Seattle. Participants were eligible if they lived in WA and either identified as trans and nonbinary and/or as men who have sex with men. Participants in the 2019 Pride Survey completed an anonymous paper survey and were given a small incentive (condoms, lubricant, and a $5 coffee gift card) after completing the survey. Due to the COVID-19 pandemic, the 2020 and 2021 Pride Surveys were conducted online through an anonymous REDCap survey and recruited participants through social media (Instagram, Facebook, and Twitter), virtual pride events, in-person COVID-19 vaccine clinics, and fliers. The inclusion criteria for the 2020 and 2021 Pride Surveys were expanded to include any LGBTQ+ people who lived in WA.

National HIV Behavioral Surveillance

The NHBS survey is coordinated by the Centers for Disease Control and Prevention (CDC) across 22 major metropolitan areas, including Seattle. Surveillance is conducted annually and rotates through different populations with a higher likelihood of HIV acquisition. We utilized Seattle site data from the first NHBS cycle conducted among transgender women and nonbinary people assigned male at birth (AMAB) in 2019, locally called Project FIRST. This study recruited participants using respondent-driven sampling and data were collected via an in-person interview.

PHSKC Sexual Health Clinic

The PHSKC Sexual Health Clinic in Seattle provides walk-in HIV/STI testing and treatment on a sliding fee basis. All new patients complete a computer-assisted self-interview, which includes information on demographics, HIV/STI history, and sexual behaviors. We utilized de-identified data from patients who attended the sexual health clinic from January 2019 through February 2020. For patients who had multiple clinic visits, we restricted our analysis to a patient's first visit during the study period.

Measures

All data sources used identical or similar questions to ascertain the following measures:

Gender Identity and Sex Assigned at Birth

All data sources used a validated trans-inclusive two-step question for ascertaining gender identity, which asks about both current gender and sex assigned at birth using two distinct questions. All surveys provided nonbinary and write-in response options, though these options differed slightly across surveys. Therefore, for this analysis, we use the term nonbinary as an umbrella term that includes participants who self-reported being nonbinary, genderqueer, gender nonconforming, and additional write-in identities. For our analyses, we consider the following groups of participants: transgender men, transgender women, nonbinary people AMAB, and nonbinary people assigned female at birth (AFAB). We chose to disaggregate nonbinary people by their sex assigned at birth due to prior research demonstrating differences in the epidemiology of HIV/STIs among nonbinary people by sex assigned at birth.[42]

Race/Ethnicity

Self-reported race/ethnicity categories included Asian, Black, Hispanic/Latinx, Native American/Alaska Native, Native Hawaiian/Pacific Islander (NHPI), and White. Participants who selected more than one race/ethnicity were included in multiple categories for descriptive statistics and statistical analyses.

Medical Insurance

We considered a binary outcome of whether participants were currently uninsured. This variable was not available in the data collected from the PHSKC Sexual Health Clinic.

HIV/STI prevalence.

We used a composite measure of HIV/STI positivity for individuals who self-reported being HIV positive and/or being diagnosed with a bacterial STI (i.e., chlamydia, gonorrhea, or syphilis) in the last 12 months.

HIV/STI Prevention-related Outcomes

We considered three binary outcome variables related to HIV/STI prevention utilization: (1) a composite measure of self-reported testing for HIV and/or bacterial STIs in the last 12 months; (2) ever discussing PrEP with a doctor or provider; and (3) self-reported current PrEP use. History of STI testing in the last 12 months is not available in data from PSHKC Sexual Health Clinic.

Analyses

We define groups (i.e., intersectional positions) based on self-reported gender and race/ethnicity. We selected White transgender men as the reference group. Typically, the choice of reference groups in quantitative intersectionality analysis aims to reflect intersectional positions with the greatest privilege or power. For the present study, however, it is important to acknowledge that transgender men do not represent the "least marginalized" or "most privileged" group. Rather, the choice of a reference group allows us to better understand differences within transgender communities. Through conversations with the STARS Advisory Board, choosing a reference group from within trans and nonbinary communities was preferred to comparing transgender people to a cisgender reference group—a common practice that often reifies cisgender normativity. Participants missing data on gender identity or race/ethnicity were excluded from the analysis.

We used methods to quantify differences in outcomes on an additive statistical scale, which is most consistent with the concept of intersectional multiplicativity.[43,44] Assessing differences on the additive scale allows statistical interaction to be translated into measures of excess prevalence, and is thus also the most relevant measure for assessing public health

impact. For each outcome, we calculated the risk difference (RD) for all groups relative to White transgender men using binomial regression with an identity link. For racial/ethnic minority transgender women and nonbinary participants (i.e., for groups with dual positional differences relative to the reference group of White transgender men), we also estimated surrogate measures of intersectional synergism or antagonism, namely, the attributable proportion (AP).[45] The AP estimates the proportion of the excess prevalence of the outcome observed at the intersection of gendered and racialized experience, beyond what would be expected from gender or race/ethnicity alone. We used Poisson regression with robust standard errors to estimate the AP. These two measures were chosen for their clear interpretability and utility for describing inequities.

We restricted the analyses of past-year HIV/STI testing to sexually active participants who reported any oral, vaginal, or anal sex in the past year. To be consistent with the CDC's 2021 updated clinical practice guidelines for identifying patients who should be prescribed PrEP or discuss PrEP with a provider, we restricted the analysis of current PrEP use to HIV-negative participants who reported any penetrative vaginal or anal sex in the past year. Analyses of HIV/STI positivity and medical insurance were conducted among all participants. All models were adjusted for participant age. For the AP, we estimated standard errors and 95% confidence intervals (CI) using the delta method. Mathematical details are presented in the supplemental content (eTable 1; http://links.lww.com/EDE/C68).[45,46] Last, we conducted sensitivity analyses excluding data from the PHSKC Sexual Health Clinic and the 2020 PHSKC Pride Survey, to determine whether our results were sensitive to the inclusion of different data sources.

All analyses were conducted in R statistical software. The University of Washington Institutional Review Board granted ethical approval.

RESULTS

Our analysis included 1648 trans and nonbinary participants, including 317 (19%) transgender men, 363 (22%) transgender women, 242 (15%) nonbinary people AMAB, and 726 (44%) nonbinary people AFAB (eTable 2; http://links.lww.com/EDE/C68). With respect to race/ethnicity, 143 (9%) of participants were Asian, 95 (6%) were Black, 177 (11%) were Hispanic/Latinx, 88 (5%) were Native American/Alaska Native, 67 (4%) were NHPI, and 1172 (71%) were White. Overall, 156 (9%) participants selected more than one race or ethnicity, and 137 (8%) participants were missing data for race/ethnicity.

The study population primarily included adults aged 25 years or older (n = 1176, 72%), whereas 448 (28%) participants were adolescents and young adults aged 13–24 years. Overall, 29% of participants were living close to or below the poverty line with annual incomes below $15,000, and 7% experienced unstable housing in the past year. Additional sociodemographic variables are reported in eTables 2 and 3; http://links.lww.com/EDE/C68.

Medical Insurance

Overall, 8% of participants were uninsured (range 0%–43% across groups; Figure 1). Relative to White transgender men, transgender women of color were more likely to be uninsured (16%–43%; RDs, 0.13–0.39; Table 1). From the AP, we observed there was intersectional synergism among Latinx, Native American, and NHPI transgender women. We estimated that 74% (95% CI = 47%, 102%) of the excess prevalence of being uninsured among Latinx transgender women, 77% (95% CI = 37%, 120%) among Native American, and 93% (95% CI = 81%, 100%) among NHPI was due to the intersection of racialized and gendered experience, beyond what would be expected from racialized and gendered experience alone.

HIV/STI Positivity

Transgender women (7%) and nonbinary people AMAB (7%) were most likely to be living with HIV. No transgender men and 2 (0.3%) nonbinary people AFAB self-reported living with HIV. Nonbinary people AMAB had the highest prevalence of past-year STIs (34%; eTable 3; http://links.lww.com/EDE/C68). Transgender men and transgender women had a similar prevalence of past-year STI diagnoses (16% and 15%, respectively), and nonbinary people AFAB had the lowest prevalence (6%). There were no differences in HIV prevalence by race/ethnicity among transgender men and nonbinary participants (eTable 4; http://links.lww.com/EDE/C68). However, among transgender women, HIV prevalence was highest among Black, Hispanic/Latinx, and NHPI women (28%, 15%, and 10%, respectively) and lowest among White and Asian women (3% and 0%, respectively). A similar pattern was observed for recent STI diagnoses among transgender women. (eTable 4; http://links.lww.com/EDE/C68 for disaggregated data on HIV, chlamydia, gonorrhea, and syphilis.)

Relative to White transgender men, HIV/STI positivity was highest among Black transgender men (RD, 0.16; Table 2), Black, Latinx, Native American, and NHPI transgender women (RD range 0.14–0.43), as well as among nonbinary people AMAB who were White, Asian, Black, and Latinx (RD range 0.27–0.46). From the AP, we estimated that 50% (95% CI = 7%, 93%) of the excess HIV/STI prevalence among Black, 67% (95% CI = 27%, 110%) among Latinx, 79% (95% CI = 46%–110%) among Native American, and 85% (95% CI = 67%–100%) among NHPI transgender women was due to the intersection of racialized and gendered experience.

HIV/STI Testing

Overall, 68% of all participants had ever tested for HIV. Among sexually active participants who reported any oral, vaginal, or anal sex in the past year, 45% had tested for HIV in the last year, and 43% had tested for STIs in the last

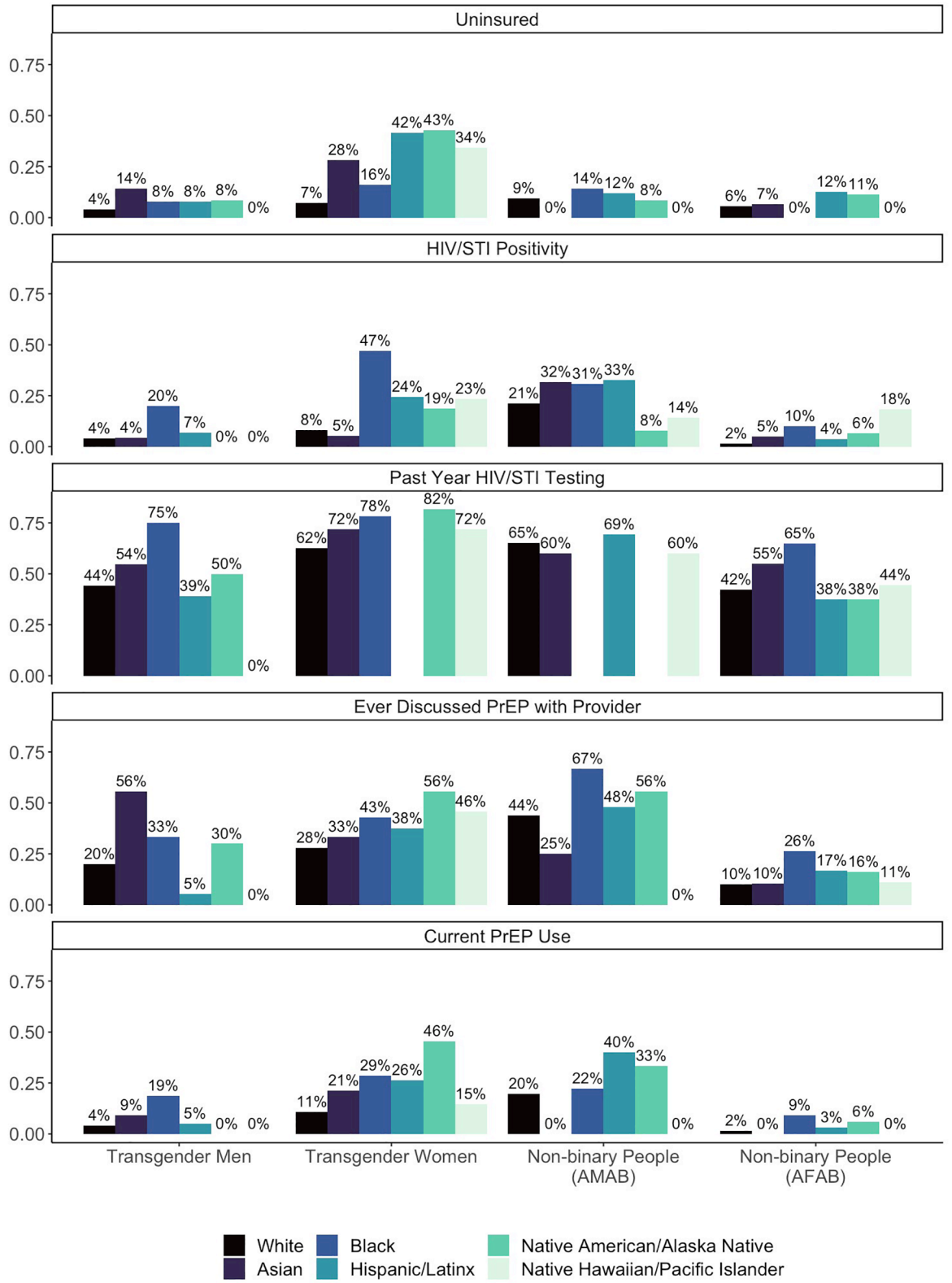

FIGURE 1. Medical insurance, HIV/STI positivity, testing and PrEP among transgender and nonbinary participants, Washington State, 2019–2022. AFAB indicates assigned female at birth; AMAB, assigned male at birth; PrEP, preexposure prophylaxis; STI, sexually transmitted infection.

TABLE 1. Intersectionality Analysis of Medical Insurance among Transgender and Nonbinary People in Washington State, 2019–2021

		Uninsured		
	N	n (%)	RD (95% CI)	AP (95% CI)
Overall	1442	121 (8)		
Transgender men				
White [ref]	251	10 (4)	ref	
Asian	21	3 (14)	0.10 (−0.05, 0.25)	
Black	13	1 (8)	0.04 (−0.11, 0.18)	
Latinx	26	2 (8)	0.04 (−0.07, 0.15)	
Native American/Alaska Native	12	1 (8)	0.05 (−0.11, 0.20)	
Native Hawaiian/Pacific Islander	2	0 (0)	−0.03 (−0.06, −0.01)	
Transgender women				
White	205	15 (7)	−0.07 (−0.46, 0.32)	
Asian	32	9 (28)	0.25 (0.09, 0.40)	0.44 (−0.16, 1.1)
Black	25	4 (16)	0.13 (−0.02, 0.27)	0.33 (−0.75, 1.4)
Latinx	41	17 (42)	0.38 (0.23, 0.54)	0.74 (0.47, 1.02)
Native American/Alaska Native	14	6 (43)	0.39 (0.13, 0.65)	0.77 (0.37, 1.2)
Native Hawaiian/Pacific Islander	44	15 (34)	0.31 (0.16, 0.45)	0.93 (0.81, 1.0)
Nonbinary AMAB				
White	128	12 (10)	−0.27 (−0.62, 0.07)	
Asian	16	0 (0)	−0.03 (−0.06, −0.01)	NA
Black	7	1 (14)	0.11 (−0.15, 0.37)	0.07 (−2.3, 2.5)
Latinx	33	4 (12)	0.09 (−0.03, 0.20)	−0.03 (−1.6, 1.6)
Native American/Alaska Native	12	1 (8)	0.05 (−0.11, 0.21)	−0.72 (−6.4, 5.0)
Native Hawaiian/Pacific Islander	7	0 (0)	−0.03 (−0.06, −0.01)	NA
Nonbinary AFAB				
White	587	33 (6)	−0.16 (−0.52, 0.21)	
Asian	61	4 (7)	0.03 (−0.04, 0.09)	−1.4 (−4.6, 1.8)
Black	25	0 (0)	−0.04 (−0.06, −0.01)	NA
Latinx	48	6 (13)	0.09 (−0.01, 0.19)	0.23 (−0.68, 1.1)
Native American/Alaska Native	44	5 (12)	0.08 (−0.02, 0.18)	0.13 (−1.5, 1.8)
Native Hawaiian/Pacific Islander	11	0 (0)	−0.04 (−0.06, −0.01)	NA

This table excludes data collected from the Public Health-Seattle & King County Sexual Health Clinic, which did not collect data on medical insurance. Measures of RD and AP are adjusted for participant age. The reference for group is White transgender men.

AFAB indicates assigned female at birth; AMAB, assigned male at birth; AP, attributable proportion; CI, confidence interval; RD, risk difference.

year. Past-year HIV/STI testing was highest among Black transgender men (75%; RD, 0.33; and Table 3), all transgender women of color (72%–88%; RD range, 0.31–0.46), as well as among Black, Latinx, and Native American/Alaska Native nonbinary people AMAB (69%–100%; RD range, 0.25–0.60). However, we only observed intersectional synergism in past-year HIV/STI testing for several of these groups. Specifically, we estimated that 41% (95% CI = 13%–69%) of the higher prevalence of past-year HIV/STI testing among Latinx and 74% (95% CI = 58%–89%) among NHPI transgender women was due to the intersection of racialized and gendered experience.

Pre-exposure prophylaxis

Overall, 84% of all participants had ever heard of PrEP. Among HIV-negative participants who reported any penetrative vaginal or anal sex in the past year, 21% had ever discussed PrEP with a provider (range 0%–67% across groups; Figure 1). Compared with White transgender men, a higher proportion of Asian transgender men had ever discussed PrEP with a provider (56%; RD, 0.37; Table 4). There were also higher proportions of transgender women of color (RD range, 16%–36%) as well as Black, Latinx, and Native American/Alaska Native nonbinary people AMAB (RD range, 27%–36%; Table 4) who had ever discussed PrEP with their provider. Latinx transgender men (5%) and nonbinary people AFAB overall (12%) were least likely to have ever discussed PrEP with a provider. From the AP, we estimated that 66% (95% CI = 25%, 110%) of the higher prevalence of ever discussing PrEP among Latinx and 83% (95% CI = 61 %, 110%) among NHPI transgender women was due to the intersection of racialized and gendered experience.

Among HIV-negative participants who reported any penetrative vaginal or anal sex in the past year, 8% reported

TABLE 2. Intersectionality Analysis of HIV/STI Positivity among Transgender and nonbinary People in Washington State, 2019–2021

		HIV/STI Positivity[a]		
	N	n (%)	RD (95% CI)	AP (95% CI)
Overall	1648	135 (8)		
Transgender men				
White [ref]	267	11 (4)	Ref	
Asian	23	1 (4)	−0.01 (−0.09, 0.08)	
Black	20	4 (20)	0.16 (−0.02, 0.34)	
Latinx	29	2 (7)	0.03 (−0.07, 0.13)	
Native American/Alaska Native	13	0 (0)	−0.04 (−0.07, −0.02)	
Native Hawaiian/Pacific Islander	2	0 (0)	−0.03 (−0.06, −0.01)	
Transgender women				
White	240	20 (8)	0.02 (0.00, 0.03)	
Asian	37	2 (5)	0.02 (−0.06, 0.10)	−0.51 (−3.1, 2.0)
Black	32	15 (47)	0.43 (0.25, 0.60)	0.50 (0.07, 0.93)
Latinx	53	13 (25)	0.21 (0.10, 0.33)	0.67 (0.27, 1.1)
Native American/Alaska Native	16	3 (19)	0.14 (−0.05, 0.34)	0.79 (0.46, 1.1)
Native Hawaiian/Pacific Islander	47	11 (23)	0.20 (0.08, 0.32)	0.85 (0.67, 1.0)
Nonbinary AMAB				
White	183	39 (21)	0.46 (0.14, 0.79)	
Asian	22	7 (32)	0.29 (0.09, 0.48)	0.36 (−0.35, 1.1)
Black	13	4 (31)	0.27 (0.02, 0.52)	−0.18 (−2.7, 2.3)
Latinx	43	14 (33)	0.29 (0.15, 0.43)	0.29 (−0.83, 1.4)
Native American/Alaska Native	13	1 (8)	0.04 (−0.11, 0.19)	−1.3 (−3.9, 1.4)
Native Hawaiian/Pacific Islander	7	1 (14)	0.11 (−0.15, 0.37)	−0.12 (−1.4, 1.2)
Nonbinary AFAB				
White	623	10 (2)	0.01 (0.00, 0.02)	
Asian	61	3 (5)	0.01 (−0.05, 0.07)	0.74 (0.29, 1.2)
Black	30	3 (10)	0.05 (−0.05, 0.16)	−0.79 (−1.4, −0.15)
Latinx	52	2 (4)	0.00 (−0.05, 0.06)	−0.12 (−1.2, 1.0)
Native American/Alaska Native	46	3 (7)	0.02 (−0.05, 0.10)	1.4 (1.3, 1.6)
Native Hawaiian/Pacific Islander	11	2 (18)	0.14 (−0.08, 0.37)	1.1 (1.1, 1.2)

Measures of RD and AP are adjusted for participant age. The reference for group is White transgender men.
[a]Defined as participants who self-reported having a bacterial STI (e.g. chlamydia, gonorrhea, syphilis) in the last 12 months or who self-reported being HIV positive.
AFAB indicates assigned female at birth; AMAB, assigned male at birth; AP, attributable proportion; CI, confidence interval; RD, risk difference; STI, sexually transmitted infection.

current PrEP use (range 0%–46% across groups). Current PrEP use was lowest among non-Black transgender men (5%) and nonbinary people AFAB (2%). Current PrEP use was highest among Black transgender men (19%; RD, 0.14), transgender women of color (21%–46%; RD range, 0.17–0.42) as well as White, Black, Latinx, and Native American nonbinary people AMAB (20%–40%; RD, 0.18–0.36). Relative to White transgender men, we estimated that 58% (95% CI = 7%, 110%) of the higher prevalence of current PrEP use among Latinx transgender women and 89% (95% CI = 75%, 100%) among Native American/Alaska Native transgender women, as well as 58% (95% CI = 9%, 110%) of the higher prevalence of current PrEP use among Latinx and 54% (95% CI = 14%, 94%) of Native American nonbinary people AMAB was due to the intersection of racialized and gendered experience.

All sensitivity analyses obtained comparable results (eTable 5; http://links.lww.com/EDE/C68).

DISCUSSION

Structural racism and cissexism are ubiquitous forces enacted at multiple social and institutional levels and produce socioeconomic inequity and adverse health outcomes for transgender people. In this study, we used intercategorical quantitative intersectionality methods to demonstrate the differential impacts of racialized and gendered experiences on HIV/STI positivity and healthcare access, including HIV/STI prevention, for trans and nonbinary people in WA. We observed high levels of poverty and structural barriers to accessing healthcare among all trans and nonbinary participants. However, we observed that certain groups, especially transgender women of color, were disproportionately uninsured and impacted by HIV/STIs, more than what would have been expected based on gender or race/ethnicity alone. We also observed heterogeneity in HIV/STI prevention utilization, with the lowest levels

TABLE 3. Intersectionality Analysis of HIV/STI Testing among Transgender and Non-binary People in Washington State, 2019–2021

		Past Year HIV/STI Testing[a]		
	N	n (%)	RD (95% CI)	AP (95% CI)
Overall	1006	517 (51)		
Transgender men				
White [ref]	168	74 (44)	Ref	
Asian	11	6 (55)	0.06 (−0.24, 0.36)	
Black	8	6 (75)	0.33 (0.03, 0.63)	
Latinx	18	7 (39)	−0.09 (−0.33, 0.15)	
Native American/Alaska Native	8	4 (50)	0.09 (−0.27, 0.45)	
Native Hawaiian/Pacific Islander	1	0 (0)	−0.38 (−0.46, −0.30)	
Transgender women				
White	136	85 (65)	0.46 (−0.10, 1.0)	
Asian	25	18 (72)	0.31 (0.11, 0.51)	0.05 (−0.41, 0.51)
Black	23	18 (78)	0.36 (0.19, 0.54)	−0.22 (−0.69, 0.25)
Latinx	34	30 (88)	0.46 (0.32, 0.60)	0.41 (0.13, 0.69)
Native American/Alaska Native	11	9 (82)	0.37 (0.12, 0.62)	0.08 (−0.47, 0.63)
Native Hawaiian/Pacific Islander	39	28 (72)	0.33 (0.16, 0.49)	0.74 (0.58, 0.89)
Nonbinary AMAB				
White	95	62 (65)	0.37 (−0.29, 1.0)	
Asian	10	6 (60)	0.22 (−0.09, 0.54)	−0.13 (−0.88, 0.62)
Black	6	6 (100)	0.60 (0.51, 0.69)	0.04 (−0.31, 0.39)
Latinx	26	18 (69)	0.25 (0.07, 0.44)	0.14 (−0.29, 0.57)
Native American/Alaska Native	8	7 (88)	0.46 (0.22, 0.70)	0.15 (−0.35, 0.66)
Native Hawaiian/Pacific Islander	5	3 (60)	0.22 (−0.22, 0.66)	0.63 (0.34, 0.91)
Nonbinary AFAB				
White	401	169 (42)	0.03 (−0.54, 0.60)	
Asian	40	22 (55)	0.12 (−0.05, 0.29)	0.12 (−0.30, 0.53)
Black	20	13 (65)	0.21 (−0.01, 0.43)	−0.20 (−0.68, 0.27)
Latinx	32	12 (38)	−0.07 (−0.25, 0.11)	0.03 (−0.59, 0.66)
Native American/Alaska Native	32	12 (38)	−0.05 (−0.23, 0.12)	−0.41 (−1.3, 0.49)
Native Hawaiian/Pacific Islander	9	4 (44)	−0.01 (−0.32, 0.30)	1.0 (0.72, 1.3)

Measures of RD and AP are adjusted for participant age. The reference for group is White transgender men.

[a]Restricted to sexually active participants who reported any oral, vaginal, or anal sex in the past 12 month. Excludes data collected from the Public Health-Seattle & King County Sexual Health Clinic, which did not collect data on STI testing.

AFAB indicates assigned female at birth; AMAB, assigned male at birth; AP, attributable proportion; CI, confidence interval; RD, risk difference; STI, sexually transmitted infection.

of HIV/STI testing and PrEP access among transgender men and nonbinary people AFAB.

Specifically, transgender women and nonbinary people AMAB who were Black, Latinx, Native American, and NHPI were more likely to be uninsured. We estimated that a large proportion of these inequities among transgender women of color—over 70%—was explained by intersectional synergism; that is, it was higher than what would have been expected from racialized and/or gendered experiences of cissexism alone. This is consistent with prior research that found that Black and Hispanic transgender people are more likely to report financial barriers to healthcare compared with White transgender people.[19,21] Our findings are also consistent with prior studies, which found large disparities in insurance access for Hispanic transgender adults.[19,21]

We also observed that a large proportion (50%–85%) of the higher HIV/STI prevalence among transgender women of color was explained by intersectional synergism of racialized and gendered experience. However, this also corresponded with high levels of past-year HIV/STI testing and PrEP use among HIV-negative racial/ethnic minority transgender women. Nonbinary people AMAB who were White, Asian, Black, and Latinx also had a high prevalence of self-reported HIV/STI positivity, testing, and PrEP use; but there was no empirical evidence that the prevalence was higher than what would be expected from the individual (e.g., non-synergistic) contributions of racialized and/or gendered experience.

Last, there were inequities in PrEP access among trans and nonbinary participants. Among all participants who reported any penetrative vaginal or anal sex in the past year, only one in five had ever discussed PrEP with a provider. This points to missed opportunities for providers to discuss PrEP with trans and nonbinary patients, especially with nonbinary

TABLE 4. Intersectionality Analysis for PrEP Access among HIV-negative Transgender and nonbinary People in Washington State, 2019–2021

	Ever Discussed PrEP with a Provider[a,b]				Current PrEP Use[a]			
	N	n (%)	RD (95% CI)	AP (95% CI)	N	n (%)	RD (95% CI)	AP (95% CI)
Overall	948	203 (21)			1085	90 (8.3)		
Transgender men								
White [ref]	164	33 (20)	Ref		175	7 (4)	ref	
Asian	9	5 (56)	0.37 (0.04, 0.71)		11	1 (9)	0.05 (−0.12, 0.23)	
Black	9	3 (33)	0.13 (−0.18, 0.45)		16	3 (19)	0.14 (−0.05, 0.34)	
Latinx	19	1 (5)	−0.16 (−0.28, −0.04)		20	1 (5)	0.02 (−0.08, 0.12)	
Native American/Alaska Native	10	3 (30)	0.10 (−0.19, 0.39)		11	0 (0)	−0.04 (−0.07, −0.01)	
Native Hawaiian/Pacific Islander	1	0 (0)	−0.19 (−0.26, −0.13)		1	0 (0)	−0.05 (−0.08, −0.01)	
Transgender women								
White	132	37 (28)	0.46 (−0.10, 1.0)		148	16 (11)	0.46 (−0.10, 1.0)	
Asian	24	8 (33)	0.16 (−0.04, 0.36)	−0.95 (−2. 5, 0.55)	28	6 (21)	0.17 (0.02, 0.33)	0.21 (−0.86, 1.3)
Black	21	9 (43)	0.23 (0.01, 0.45)	0.03 (−0.87, 0.94)	21	6 (29)	0.24 (0.05, 0.44)	0.15 (−0.75, 1.0)
Latinx	32	12 (38)	0.17 (−0.01, 0.35)	0.66 (0.25, 1.1)	34	9 (27)	0.23 (0.07, 0.38)	0.58 (0.07, 1.1)
Native American/Alaska Native	9	5 (56)	0.36 (0.02, 0.69)	0.29 (−0.40, 0.98)	11	5 (46)	0.42 (0.12, 0.72)	0.89 (0.75, 1.0)
Native Hawaiian/Pacific Islander	35	16 (46)	0.26 (0.08, 0.44)	0.83 (0.61, 1.1)	34	5 (15)	0.10 (−0.02, 0.23)	0.52 (−0.06, 1.1)
Nonbinary AMAB								
White	82	36 (44)	0.37 (−0.29, 1.0)		127	25 (20)	0.37 (−0.29, 1.0)	
Asian	8	2 (25)	0.08 (−0.23, 0.39)	−2.2 (−7.5, 3.1)	10	0 (0)	−0.05 (−0.08, −0.01)	NA
Black	6	4 (67)	0.47 (0.09, 0.85)	0.14 (−0.83, 1.1)	9	2 (22)	0.18 (−0.09, 0.45)	−0.53 (−3.7, 2.6)
Latinx	25	12 (48)	0.27 (0.07, 0.48)	0.42 (−0.02, 0.87)	35	14 (40)	0.36 (0.20, 0.53)	0.58 (0.09, 1.1)
Native American/Alaska Native	9	5 (56)	0.36 (0.03, 0.69)	0.02 (−1.0, 1.1)	9	3 (33)	0.29 (−0.02, 0.60)	0.54 (0.14, 0.94)
Native Hawaiian/Pacific Islander	5	0 (0)	−0.19 (−0.26, −0.13)	NA	5	0 (0)	−0.05 (−0.08, −0.01)	NA
Nonbinary AFAB								
White	376	38 (10)	0.03 (−0.54, 0.60)		404	6 (2)	0.03 (−0.54, 0.60)	
Asian	38	4 (11)	−0.07 (−0.19, 0.04)	−3.4 (−5.7, −1.0)	38	0 (0)	−0.04 (−0.07, −0.01)	NA
Black	19	5 (26)	0.06 (−0.14, 0.27)	0.12 (−0.48, 0.72)	22	2 (9)	0.05 (−0.07, 0.18)	−0.68 (−1.3, −0.10)
Latinx	30	5 (17)	−0.04 (−0.19, 0.11)	1.4 (1.0, 1.7)	33	1 (3)	−0.01 (−0.07, 0.06)	−0.01 (−1.4, 1.3)
Native American/Alaska Native	31	5 (16)	−0.03 (−0.18, 0.11)	−0.25 (−1.2, 0.71)	33	2 (6)	0.02 (−0.07, 0.11)	1.5 (1.4, 1.7)
Native Hawaiian/Pacific Islander	9	1 (11)	−0.09 (−0.30, 0.12)	1.9 (1.3, 2.5)	9	0 (0)	−0.04 (−0.07, −0.01)	NA

Measures of RD and AP are adjusted for participant age. The reference for group is White transgender men.
[a]Restricted to participants who reported any penetrative vaginal or anal sex in the past 12 month.
[b]Excludes data collected from the Public Health-Seattle & King County Sexual Health Clinic, which did not collect these data.
AFAB indicates assigned female at birth; AMAB, assigned male at birth; AP, attributable proportion; CI, confidence interval; RD, risk difference; PrEP, preexposure prophylaxis.

people AFAB and White, Latinx, and NHPI transgender men. Current PrEP use ranged from >40% among Native American transgender women and Latinx nonbinary people AMAB to <10% among most subgroups defined by gender and race/ethnicity. Notably, the prevalence of current PrEP use among transgender men in our sample (5%) was much lower than what has been reported in other studies (18%–22%).[47,48]

Strengths and Limitations

Quantitative methods for evaluating intersectionality in epidemiologic research are an important emerging field in public health.[43,49] Our approach using fixed-effects regression with interaction terms has several strengths, including the estimation of surrogate measures of additive interaction that directly map onto intersectionality concepts. Importantly, these measures were easily understandable by community members, and therefore, useful for community-engaged research approaches. However, alternative methods, such as intersectional multilevel analysis of individual heterogeneity,[50–52] have recently been demonstrated to be more efficient and parsimonious with smaller sample sizes and would not have required us to specify a reference group.[53]

Quantitative intersectionality analyses require large sample sizes, which has historically been a barrier to conducting transgender health research. This study obtained a sufficiently large and diverse sample of trans and nonbinary people by pooling data from multiple existing HIV/STI surveillance data sources. Thus, a strength of the present analysis is our ability to present disaggregated data for nonbinary people, and for racial groups for whom data are not typically disaggregated in transgender health research due to small sample sizes—namely data for Native American/Alaska Native and NHPI participants. Nonetheless, some groups defined by gender and race/ethnicity still had relatively small samples of 10 or fewer for several outcomes (i.e., Black, Native American, and NHPI transgender men and nonbinary people AMAB).

Therefore, it is likely that at least some of the observed heterogeneity is due to instability in our estimates due to smaller sample sizes.

Our findings should also be interpreted in light of the following limitations. The data uses four convenience samples and one clinical sample and therefore may be limited in its generalizability. In particular, 8% of participants declined to report a race/ethnicity and were not included in our analyses. In addition, the 2019 Pride Survey was conducted in person at Pride events in Seattle and is likely to be unrepresentative of the overall transgender population. Although the 2020 and 2021 Pride surveys were conducted online and had a significantly broader geographic and demographic reach, the majority of transgender participants were White and assigned female at birth. In addition, because these data sources were primarily used for local HIV/STI surveillance, they did not systematically collect data on topics that were important to the lived experiences of transgender people or their unique barriers to accessing care, such as experiences of discrimination and access to gender-affirming care. Some of these studies, such as the NHBS and 2021 Pride Study, did collect data on some trans-specific topics, but they were not collected using consistent enough measures or with sufficiently large sample sizes with which to conduct intersectional analyses.

In addition, we relied on self-report for past-year HIV/STI, past-year STI diagnosis, and HIV status, which are all vulnerable to recall and social desirability bias. Finally, although we hypothesize there are few overlapping participants across data sources, we have no way of verifying that the samples are independent. However, sensitivity analyses in which we excluded each data source obtained comparable results to our primary analysis.

Conclusions

Intersectional research with trans and nonbinary populations is important for identifying and addressing inequities among communities that live at these intersections. Our study highlights how quantitative intersectionality methods can also reveal heterogeneity in healthcare access and HIV/STI prevention utilization within trans and nonbinary communities by gender and race/ethnicity. Importantly, we identified inequities in HIV/STI testing, current PrEP use, and missed opportunities for providers to discuss PrEP within trans and nonbinary communities. These findings highlight the need to expand access to trans-inclusive models[7,54–56] of HIV/STI prevention and PrEP delivery that address multilevel barriers rooted in cissexism and structural racism.

ACKNOWLEDGMENTS

The Seattle Trans and Non-binary Sexual Health (STARS) Advisory Board includes the following individuals: Aleks Martin, Atlas Fernandez, Bennie Gross, Billy Caracciolo, Brian Minalga, Nicole Lynn Perry, Sayen Lentini, and William B. Heberling, as well as those who wish to remain anonymous. The authors also thank Drs. R. Scott McClelland, Sari Reisner, Dobromir Dimitriov, and the HIV Outcomes, Prevention, and Epidemiology (HOPE) group at Fred Hutch for their support of this project.

REFERENCES

1. James SE, Herman JL, Rankin S, Keisling M, Mottet L, Anafi M. *The Report of the 2015 U.S. Transgender Survey*. National Center for Transgender Equality; 2016.
2. Bauer GR, Hammond R, Travers R, Kaay M, Hohenadel KM, Boyce M. "I don't think this is theoretical; this is our lives": how erasure impacts health care for transgender people. *J Assoc Nurses AIDS Care*. 2009;20:348–361.
3. Jaffee KD, Shires DA, Stroumsa D. Discrimination and delayed health care among transgender women and men. *Med Care*. 2016;54:1010–1016.
4. Kcomt L, Gorey KM, Barrett BJ, McCabe SE. Healthcare avoidance due to anticipated discrimination among transgender people: a call to create trans-affirmative environments. *SSM Popul Health*. 2020;11:100608.
5. Wilson EC, Turner CM, Arayasirikul S, et al. Disparities in the PrEP continuum for trans women compared to MSM in San Francisco, California: results from population-based cross-sectional behavioural surveillance studies. *J Int AIDS Soc*. 2020;23:e25539.
6. Rowniak S, Ong-Flaherty C, Selix N, Kowell N. Attitudes, Beliefs, and Barriers to PrEP among trans men. *AIDS Educ Prev*. 2017;29:302–314.
7. Sevelius JM, Deutsch MB, Grant R. The future of PrEP among transgender women: the critical role of gender affirmation in research and clinical practices. *J Int AIDS Soc*. 2016;19:21105.
8. Santos GM, Wilson EC, Rapues J, Macias O, Packer T, Raymond HF. HIV treatment cascade among transgender women in a San Francisco respondent driven sampling study. *Sex Transm Infect*. 2014;90:430–433.
9. Lemons A, Beer L, Finlayson T, McCree DH, Lentine D, Shouse RL; Medical Monitoring Project. Characteristics of HIV-Positive transgender men receiving medical care: United States, 2009-2014. *Am J Public Health*. 2018;108:128–130.
10. Garnett M, Hirsch-Moverman Y, Franks J, Hayes-Larson E, El-Sadr WM, Mannheimer S. Limited awareness of pre-exposure prophylaxis among black men who have sex with men and transgender women in New York City. *AIDS Care*. 2018;30:9–17.
11. D'Avanzo PA, Bass SB, Brajuha J, et al. Medical mistrust and PrEP perceptions among transgender women: a cluster analysis. *Behav Med*. 2019;45:143–152.
12. Becasen JS, Morris JD, Denard CL, Mullins MM, Kota KK, Higa DH. HIV care outcomes among transgender persons with HIV infection in the United States, 2006–2021. *AIDS*. 2022;36:305–315.
13. Sevelius JM, Poteat T, Luhur WE, Reisner SL, Meyer IH. HIV Testing and PrEP use in a national probability sample of sexually active transgender people in the United States. *JAIDS J Acquir Immune Defic Syndr*. 2020;84:437–442.
14. Klein PW, Psihopaidas D, Xavier J, Cohen SM. HIV-related outcome disparities between transgender women living with HIV and cisgender people living with HIV served by the Health Resources and Services Administration's Ryan White HIV/AIDS program: a retrospective study. *PLoS Med*. 2020;17:e1003125.
15. Sevelius JM. Gender affirmation: a framework for conceptualizing risk behavior among transgender women of color. *Sex Roles*. 2013;68:675–689.
16. Glick JL, Lopez A, Pollock M, Theall KP. Housing insecurity and intersecting social determinants of health among transgender people in the USA: a targeted ethnography. *Int J Transgend Health*. 2020;21:337–349.
17. Lett E, Asabor EN, Tran N, et al. Sexual behaviors associated with HIV transmission among transgender and gender diverse young adults: the intersectional role of racism and transphobia. *AIDS Behav*. 2022;26:3713–3725.
18. Becasen JS, Denard CL, Mullins MM, Higa DH, Sipe TA. Estimating the prevalence of HIV and sexual behaviors among the US transgender population: a systematic review and meta-analysis, 2006–2017. *Am J Public Health*. 2018;109:e1–e8.

19. Lett E, Dowshen NL, Baker KE. Intersectionality and health inequities for gender minority blacks in the U.S. *Am J Prev Med*. 2020;59:639–647.
20. Lett E, Abrams MP, Gold A, Fullerton FA, Everhart A. Ethnoracial inequities in access to gender-affirming mental health care and psychological distress among transgender adults. *Soc Psychiatry Psychiatr Epidemiol*. 2022;57:963–971.
21. Lett E, Asabor EN, Beltrán S, Dowshen N. Characterizing health inequities for the U.S. transgender hispanic population using the behavioral risk factor surveillance System. *Transgend Health*. 2021;6:275–283.
22. Walubita T, Beccia AL, Boama-Nyarko E, Ding EY, Ferrucci KA, Jesdale BM. Complicating narratives of sexual minority mental health: an intersectional analysis of frequent mental distress at the intersection of sexual orientation, gender identity, and race/ethnicity. *LGBT health*. 2022;9:161–168.
23. Agénor M, Geffen SR, Zubizarreta D, et al. Experiences of and resistance to multiple discrimination in health care settings among transmasculine people of color. *BMC Health Serv Res*. 2022;22:369.
24. Brown GR, Jones KT. Racial health disparities in a cohort of 5,135 transgender veterans. *J Racial Ethn Health Disparities*. 2014;1:257–266.
25. Kattari SK, Walls NE, Whitfield DL, Langenderfer-Magruder L. Racial and ethnic differences in experiences of discrimination in accessing health services among transgender people in the United States. *Int J Transgend*. 2015;16:68–79. doi:10.1080/15532739.2015.1064336.
26. Howard SD, Lee KL, Nathan AG, Wenger HC, Chin MH, Cook SC. Healthcare experiences of transgender people of color. *J Gen Intern Med*. 2019;34:2068–2074.
27. Ogunbajo A, Storholm ED, Ober AJ, et al. Multilevel barriers to HIV PrEP uptake and adherence among black and Hispanic/Latinx transgender women in Southern California. *AIDS Behav*. 2021;25:2301–2315.
28. Sherman ADF, Balthazar MS, Daniel G, et al. Barriers to accessing and engaging in healthcare as potential modifiers in the association between polyvictimization and mental health among black transgender women. *PLoS One*. 2022;17:e0269776.
29. Centers for Disease Control and Prevention. *HIV Infection, Risk, Prevention, and Testing Behaviors Among Transgender Women—National HIV Behavioral Surveillance, 7 U.S. Cities, 2019–2020*. HIV Surveillance Special Report 27; 2021.
30. Clark H, Babu AS, Wiewel EW, Opoku J, Crepaz N. Diagnosed HIV infection in transgender adults and adolescents: results from the national HIV surveillance system, 2009–2014. *AIDS Behav*. 2017;21:2774–2783.
31. Downing JM, Przedworski JM. Health of transgender adults in the U.S., 2014–2016. *Am J Prev Med*. 2018;55:336–344.
32. Wesp LM, Malcoe LH, Elliott A, Poteat T. Intersectionality research for transgender health justice: a theory-driven conceptual framework for structural analysis of transgender health inequities. *Transgend Health*. 2019;4:287–296.
33. Crenshaw K. Demarginalizing the intersection of race and sex: a black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *Univ Chic Leg Forum*. 1989;140:139–167.
34. Bowleg L. The problem with the phrase women and minorities: intersectionality-an important theoretical framework for public health. *Am J Public Health*. 2012;102:1267–1273.
35. Rice C, Harrison E, Friedman M. Doing Justice to Intersectionality in Research. *Cult Stud Crit Methodol*. 2019;19:409–420. doi:10.1177/1532708619829779.
36. Hill Collins P. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*. Routledge; 1990.
37. McCall L. The complexity of intersectionality. *Signs*. 2005;30:1771–1800.
38. Lett E, Asabor E, Beltrán S, Cannon AM, Arah OA. Conceptualizing, contextualizing, and operationalizing race in quantitative health sciences research. *Ann Fam Med*. 2022;20:157–163.
39. Boyd RW, Lindo EG, Weeks LD, McLemore MR. On racism: a new standard for publishing on racial health inequities. *Health Aff (Millwood)*. 2020. Available at: https://www.healthaffairs.org/do/10.1377/forefront.20200630.939347/.
40. Wesson P, Vittinghoff E, Turner C, Arayasirikul S, McFarland W, Wilson E. Intercategorical and intracategorical experiences of discrimination and HIV prevalence among transgender women in San Francisco, CA: a quantitative intersectionality analysis. *Am J Public Health*. 2021;111:446–456.
41. Millar K, Brooks CV. Double jeopardy: minority stress and the influence of transgender identity and race/ethnicity. *Int J Transgend Health*. 2021;23:133–148.
42. Tordoff DM, Dombrowski JC, Ramchandani MS, Barbee LA. Trans-inclusive sexual health questionnaire to improve human immunodeficiency Virus/Sexually Transmitted Infection (STI) care for transgender patients: anatomic site–specific STI prevalence and screening. *Clin Infect Dis*. 2022;76:e736–e743.
43. Guan A, Thomas M, Vittinghoff E, Bowleg L, Mangurian C, Wesson P. An investigation of quantitative methods for assessing intersectionality in health research: a systematic review. *SSM Popul Health*. 2021;16:100977.
44. Bauer GR. Incorporating intersectionality theory into population health research methodology: challenges and the potential to advance health equity. *Soc Sci Med*. 2014;110:10–17.
45. Jackson JW, Williams DR, VanderWeele TJ. Disparities at the intersection of marginalized groups. *Soc Psychiatry Psychiatr Epidemiol*. 2016;51:1349–1359.
46. Vanderweele TJ, Tchetgen Tchetgen EJ. Attributing effects to interactions. *Epidemiology*. 2014;25:711–722.
47. Reisner SL, Moore CS, Asquith A, et al. High risk and low uptake of pre-exposure prophylaxis to prevent HIV acquisition in a national online sample of transgender men who have sex with men in the United States. *J Int AIDS Soc*. 2019;22:e25391.
48. Reisner SL, Moore CS, Asquith A, Pardee DJ, Mayer KH. The pre-exposure prophylaxis cascade in at-risk transgender men who have sex with men in the United States. *LGBT Health*. 2021;8:116–124.
49. Bauer GR, Churchill SM, Mahendran M, Walwyn C, Lizotte D, Villa-Rueda AA. Intersectionality in quantitative research: a systematic review of its emergence and applications of theory and methods. *SSM Popul Health*. 2021;14:100798.
50. Evans CR, Williams DR, Onnela JP, Subramanian SV. A multilevel approach to modeling health inequalities at the intersection of multiple social identities. *Soc Sci Med*. 2018;203:64–73.
51. Evans CR, Leckie G, Merlo J. Multilevel versus single-level regression for the analysis of multilevel information: the case of quantitative intersectional analysis. *Soc Sci Med*. 2020;245:112499.
52. Merlo J. Multilevel analysis of individual heterogeneity and discriminatory accuracy (MAIHDA) within an intersectional framework. *Soc Sci Med*. 2018;203:74–80.
53. Mahendran M, Lizotte D, Bauer GR. Describing intersectional health outcomes: an evaluation of data analysis methods. *Epidemiology*. 2022;33:395–405.
54. Sevelius JM, Glidden DV, Deutsch M, et al. Uptake, retention, and adherence to Pre-exposure Prophylaxis (PrEP) in TRIUMPH: a Peer-Led PrEP demonstration project for transgender communities in Oakland and Sacramento, California. *J Acquir Immune Defic Syndr*. 2021;88:S27–S38.
55. Connolly MD, Dankerlui DN, Eljallad T, Dodard-Friedman I, Tang A, Joseph CLM. Outcomes of a PrEP demonstration project with LGBTQ youth in a community-based clinic setting with integrated gender-affirming care. *Transgend Health*. 2020;5:75–79.
56. Deutsch MB. Pre-Exposure prophylaxis in trans populations: providing gender-affirming prevention for trans people at high risk of acquiring HIV. *LGBT Health*. 2018;5:387–390.