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Pre-exposure Prophylaxis (PrEP) Initiation Among Black and Latina Cisgender Women Receiving HIV Prevention Care Coordination Services in New York City

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Abstract

Black and Latina cisgender women are disproportionately impacted by HIV in the US. Although PrEP is effective at preventing HIV infection, uptake in this population remains low. The aim of the study was to examine sociodemographic, behavioral, clinical, and psychosocial factors associated with PrEP initiation (defined as receiving a PrEP prescription) among 565 cisgender women enrolled in an HIV prevention services coordination program in NYC from January 2017 to December 2019 who met HIV risk criteria for PrEP. Of these, 26% initiated PrEP. Latina women were significantly more likely than white women to have initiated PrEP (Latina: 29.7%; Black: 26.1%; White: 16.3%; Other: 7.4%). PrEP initiation was significantly associated with PrEP awareness, an annual income < \$20,000, being unstably housed, receiving benefits navigation services, and reporting non-injection drug use and/or a recent sexual relationship with an HIV-positive partner. The relatively low rate of PrEP initiation we observed suggests the need to increase PrEP access and uptake among women, particularly Black and Latina women who continue to be disproportionately at risk for HIV.

Keywords Black · Latina · Cisgender women · PrEP uptake · PrEP initiation · Pre-exposure prophylaxis

Introduction

Black and Latina cisgender women continue to be disproportionately affected by HIV in the US. In 2018, 19% of new HIV diagnoses were among cisgender women, the majority of whom were Black (57%) and Latina (18%) [1]. Although HIV pre-exposure prophylaxis (PrEP) represents an effective and promising HIV prevention strategy, uptake among cisgender women has remained low, especially those who

are Black and Latina. A study using longitudinal prescription data estimated that of 32,853 PrEP users for whom race/ethnicity data were available in 2016, 3.5% were women, and of these, less than half were Black or Latina (43.4%) [2]. Another study based on patient-level data from 82% of US retail pharmacies that dispensed PrEP from 2013 to 2016 found that women accounted for only 14% of PrEP users, and of these, 32% were Black or Latina [3].

Only a few studies to date have examined the sociodemographic, behavioral, clinical, and psychosocial characteristics associated with PrEP uptake among cisgender women in real-world clinical or community-based settings. In a sample of predominantly Black and Latinx cisgender women and transgender men who accessed sexual health services at a large hospital in Manhattan, New York, the majority of whom were Black or Latinx, Theodore et al. [4] found that older patients (mean age, 31.8 years) were more likely to start PrEP than their younger counterparts (mean age, 26.4 years) and the most common indication for PrEP was having a sexual partner living with HIV, for both patients who were eligible for PrEP (42%) and those who started PrEP (49%). Reason for clinic visit was significantly

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associated with PrEP uptake in patients who presented specifically for PrEP or post-exposure prophylaxis (PEP) were more likely to initiate PrEP. Among Black and Latina cisgender women who accessed services at a community-based, comprehensive sexual health clinic in the Bronx, New York, 4% were prescribed PrEP [5]. Further, Blackstock et al. found that the most common indication for PrEP was being in a known serodiscordant partnership and that there were no significant differences in age, race/ethnicity, or insurance status between women who were and were not prescribed PrEP. A qualitative study identified key facilitators of and barriers to PrEP uptake among predominantly heterosexual cisgender women prescribed PrEP at a sexual health clinic in the Bronx. Facilitators of PrEP uptake included positive interactions with informed and culturally competent clinical staff, access to a discreet and convenient clinic, and insurance coverage, while barriers included concerns about the out-of-pocket cost of PrEP and its safety [6].

The majority of studies on PrEP among cisgender women have examined correlates of attitudes towards PrEP, the intention to use PrEP, and/or PrEP acceptability. Such studies have found that sociodemographic characteristics, including African American race [7], Hispanic ethnicity [8], having an annual income less than \$50,000 [9], and younger age [9] were associated with the intention to use PrEP. While there is evidence that higher educational attainment is significantly associated with PrEP interest among cisgender women [10], other studies have found that lower educational attainment was associated with the intention to use PrEP [7, 9].

Studies have also found that HIV-related risk factors are associated with PrEP acceptability among cisgender women. In a sample of young Black cisgender women, Sales and Sheth [11] found that higher HIV risk index scores (based on items assessing recent condomless sex, exchange sex, vaginal sex with a partner released from jail/prison, having a partner who had vaginal sex with another woman, and intimate partner violence) were significantly associated with greater interest in PrEP. Other studies have found that having more lifetime sexual partners [7, 11, 12], exchanging sex for money or drugs [7, 13], and condomless sex [13] were associated with the willingness to use PrEP. Perceived behavioral risk for HIV or a sexually transmitted infection [9, 10], positive attitudes towards and awareness/use of PrEP among peers [8, 14], receipt of HIV testing [7, 15], and a healthcare provider's recommendation to use PrEP [7, 14] were also associated with interest in using PrEP. While there is evidence that intimate partner violence is associated with PrEP acceptability [16–18], other studies have found that there were no significant differences in the intention to use PrEP by intimate partner violence status [19].

Social and structural factors such as racism, sexism, and classism may act as barriers to PrEP access, particularly

among young Black women [20]. Medical racism has been cited by Black women as a key reason for distrusting the medical system and subsequently not choosing to use PrEP [21, 22]. Additionally, cost [21, 23, 24], stigma [21, 24], and lack of insurance [21, 24] have been identified as factors that may act as barriers to PrEP among women.

New York City (NYC) represents a critical location to increase PrEP uptake among Black and Latina cisgender women. In 2019, 18.4% of new HIV infections in NYC were among women, 91.2% of whom were Black or Latina. The HIV diagnosis rate for Black women was 3.2 times higher than the rate for Latina women and over 11 times higher than the rates for White, Asian/Pacific Islander, and multiracial women [25]. Further, serial cross-sectional surveys of Black and Latina cisgender women living in NYC found that < 1.5% reported PrEP use in 2017 and 2018 [26]. The aim of this analysis was to examine the sociodemographic, behavioral, clinical, and psychosocial characteristics associated with PrEP initiation among Black and Latina cisgender women who were enrolled in an HIV prevention services coordination program in NYC. This study addresses a gap in the existing research on the correlates of PrEP use among women, particularly those who are Black and Latina. Understanding the characteristics of Black and Latina cisgender women who do and do not initiate PrEP is critical to developing and tailoring promotion strategies to increase PrEP uptake in these populations.

Methods

Data Source

This analysis is based on retrospective longitudinal data collected from HIV-negative individuals receiving HIV prevention care coordination services at six clinical agencies and two non-clinical community-based organizations in NYC. Beginning in 2016, the NYC Department of Health and Mental Hygiene (DOHMH) funded the Status Neutral Care Coordination (SNC) program as part of the New York State Ending the Epidemic initiative. The primary objective of SNC is to prevent new HIV infections by utilizing a client-centered patient navigation approach to connect HIV-negative individuals at high risk for HIV to PrEP and PEP, in addition to psychosocial and medical services. SNC also provides health education, entitlements/benefits navigation (including linkages to health insurance and patient assistance programs) and referrals and linkages to behavioral health care, medical care, and housing and food assistance to address barriers to PrEP uptake. Clients are recruited into SNC in a variety of ways, including through referrals from onsite HIV testing services and other community-based organizations. In the SNC service model, a client is

offered a referral to PrEP services if they have at least one HIV risk criterion and/or express interest in initiating PrEP. After a client receives a referral for PrEP care, program staff are responsible for facilitating the linkage to a PrEP provider and confirming whether or not the client attended the appointment and/or received a PrEP prescription (both of which are verified by either client or provider self-report). Clients are offered benefits navigation services if they are uninsured, or if their insurance does not cover PrEP prescription costs. SNC staff can also accompany clients to their PrEP appointment if they are experiencing significant structural and/or psychosocial barriers to connecting with care.

Sociodemographic, behavioral, clinical, and psychosocial information is collected during an intake assessment that is administered by a program staff member at the time an individual enrolls in SNC. All client-level and service utilization data are entered into the Electronic System for HIV/AIDS Reporting and Evaluation (eSHARE), which is a secure, web-based system for data reporting to the NYC DOHMH by funded HIV service provider agencies. This study was reviewed and approved by the NYC DOHMH Institutional Review Board.

Study Population

The inclusion criteria for this analysis were: (1) enrolling in SNC between January 2017 and December 2019; (2) completing an SNC intake assessment as of December 2019; and (3) self-reporting the following on the SNC intake: (a) female sex assigned at birth; (b) gender identity as “woman or girl”; (c) negative HIV status; (d) not currently being on PrEP; and (e) ≥ 1 HIV risk criteria for PrEP based on New York State guidelines [27] (a positive test result for a sexually transmitted infection in the past 12 months; condomless sex with ≥ 1 partner in the past 6 months; exchange sex in the past 6 months; having an HIV-positive or status-unknown sexual partner in the last 6 months; being in a sexual relationship with someone who is not virally suppressed in the last 6 months; injection drug use (IDU) in the past 6 months; crystal methamphetamine use in the past 6 months).

Measures

PrEP Initiation

PrEP initiation was defined as being referred by an SNC staff member for an appointment with a PrEP provider, attending the appointment, and receiving a PrEP prescription at that visit. The following groups of clients were categorized as not having initiated PrEP: (a) clients who were referred to a PrEP provider and attended the appointment, but did not receive a PrEP prescription; (b) clients who were referred to a PrEP

provider, but did not attend the PrEP appointment; and (c) clients who were not referred to a PrEP provider.

Sociodemographic, Behavioral, Clinical, and Psychosocial Characteristics

Sociodemographic characteristics included self-reported age, educational level attained ($<$ vs. \geq high school diploma/General Equivalency Diploma), annual individual income ($<$ vs. \geq \$20,000), health insurance status (insured vs. uninsured), and housing status (unstable housed [defined as being incarcerated or homeless or living in an emergency shelter, single room occupancy hotel or other hotel/motel, someone else's home, couch surfing, in-patient care, or institutionalized, i.e., jail, in-patient facility] vs. stably housed [defined as having a room, apartment, or house that you rent, or having an apartment or house that you own]). Behavioral characteristics included self-reported recent (defined as the past 6 months) IDU (injecting drugs not prescribed by a medical provider), non-IDU (crack/cocaine, heroin, crystal methamphetamine, club drug, and/or recreational prescription drug use), exchange sex (exchanging sex for drugs, money, food, or shelter), sexual relationship with an HIV-positive partner, sexual partners (having had cisgender male partners only, cisgender female partners only, or both cisgender male and female partners), and/or condomless sex. One clinical characteristic included a self-reported diagnosis of a sexually transmitted infection in the past 12 months. Psychosocial characteristics included PrEP awareness (a “yes” response to the following question: “*Pre-exposure prophylaxis or PrEP is a daily pill taken to prevent HIV. Have you ever heard of PrEP?*”) and receiving benefits navigation services (receiving ≥ 1 service to assist with obtaining health insurance or other support to cover the cost of PrEP).

Statistical Analysis

Frequencies were used to describe the sociodemographic, behavioral, clinical, and psychosocial characteristics of the sample. To assess the association between each characteristic and PrEP initiation, we used logistic regression to estimate odds ratios (OR) and 95% confidence intervals (CI). Cells containing a value of zero were replaced with 0.5 per the Haldane-Anscombe correction method. [28, 29]. Results are presented for the overall sample and are also stratified by race/ethnicity (Black women, Latina women). All data were analyzed using SAS statistical software version 9.4 (SAS Institute Inc., Cary, NC).

Results

A total of 2,631 clients were enrolled in SNC from January 2017 to December 2019, 25.3% ($n = 665$) of whom identified as cisgender women. Of these, 85.0% ($n = 565$) met one or more HIV risk criteria for PrEP. We excluded 100 cisgender women who did not meet at least one HIV risk criterion for PrEP from the analysis. Among these women, only two initiated PrEP.

A large proportion of women in the sample were age 39 years or younger (64%), Latina or Black (79%), insured (83%), and/or stably housed (67%). More than half of the clients had a high school/General Equivalency Diploma or higher level of education (68%), and a little less than half had an annual income under \$20,000 (45%). The majority of clients reported condomless sex in the past 6 months (94%), and a high proportion reported that they were unaware of PrEP (63%; Table 1).

Among clients who met at least one HIV risk criteria for PrEP, 26% ($n = 145$) initiated PrEP. Clients who were Latina (vs. white; OR 2.2, 95% CI 1.2, 4.1), unstably housed (OR 1.7; 95% CI 1.1, 2.5), and aware of PrEP (OR 5.2, 95% CI 3.5, 7.8) were significantly more likely to initiate PrEP. We also found that clients who received benefits navigation services (OR > 1000.0, 95% CI 75.1, > 1000.0) and/or reported an annual income < \$20,000 (OR 2.3, 95% CI 1.2, 4.2) or did not report their annual income (OR 2.0, 95% CI 1.1, 3.8) were significantly more likely to initiate PrEP. HIV risk characteristics including recent IDU (OR 26.6, 95% CI 3.3, 215.5), recent non-IDU (OR 2.4, 95% CI 1.4, 4.1), and/or having a recent sexual relationship with an HIV-positive partner (OR 4.3, 95% CI 2.6, 7.2) were significantly associated with PrEP initiation (Table 2).

Analyses were stratified by race/ethnicity (Black and Latina; Table 2). Among Black women ($N = 180$), being aware of PrEP (OR 2.5, 95% CI 1.3, 4.9), having received benefits navigation services (OR 521.4, 95% CI 30.9, > 1000.0), and/or having a recent sexual relationship with an HIV-positive partner (OR 2.4, 95% CI 1.1, 5.3) were significantly associated with PrEP initiation. Among Latina women ($N = 266$), PrEP initiation was significantly associated with being unstably housed (OR 2.1, 95% CI 1.2, 3.6), aware of PrEP (OR 6.1, 95% CI 3.5, 10.9), and having received benefits navigation services (OR 651.3, 95% CI 39.5, > 1000.0). HIV risk characteristics including recent IDU (OR 24.3, 95% CI 1.3, 459.1), recent non-IDU (OR 2.9, 95% CI 1.3, 6.6), and a recent sexual relationship with an HIV-positive partner (OR 7.6, 95% CI 3.3, 17.5) were significantly associated with PrEP initiation among Latina women. Also, Latina women who reported only having cisgender male sexual partners were significantly

less likely than those who reported only cisgender female partners to initiate PrEP (OR 0.3, 95% CI 0.1, 0.9).

Discussion

The current study examined the sociodemographic, behavioral, clinical, and psychosocial characteristics associated with PrEP initiation among Black and Latina cisgender women enrolled in an HIV prevention services coordination program in NYC. Among the women who met at least one HIV risk criterion for PrEP according to New York State guidelines (85% of cisgender women enrolled in SNC during the period of interest), we found that only 26% initiated PrEP. During the same time period, 70% of clients in SNC who were men who have sex with men and met one or more HIV risk criteria for PrEP initiated PrEP, underscoring the substantial room to increase PrEP uptake among cisgender women.

PrEP initiation, however, was also not equally distributed by race/ethnicity in our sample. We found that Latina women initiated PrEP at significantly higher rates than White women (29.7% vs. 16.3%). This finding is consistent with those from previous studies that found Latina women had greater intentions to use PrEP compared to non-Latina White women and non-Latina women overall [8, 30, 31]. In another study of women in NYC who were prescribed PrEP, Latina women also had higher PrEP uptake rates compared to non-Latina women [32]. Although all of the clients in our sample met at least one HIV risk criterion for PrEP, White women may have lower rates of PrEP initiation compared to Black and Latina women because they are generally at much lower risk for HIV infection. Social and structural factors that are pervasive in the US such as racism, sexism, and gender wage gaps may act as barriers to PrEP access and contribute to the persistently high HIV incidence rates among Black and Latina cisgender women [17].

Some prior studies have reported low PrEP initiation rates among cisgender women in sexual health and HIV testing clinics (< 10%) [5, 32–34], with two exceptions. In a sample of predominantly Black and Latinx men and women who received HIV testing services at a health center in Houston, Texas, Flash et al. [35] found that 20.1% of cisgender women had initiated PrEP. A study at a large hospital in NYC reported PrEP was initiated by 71.9% of a sample of sexual health services clients, the majority of whom were Black or Latina women. A high proportion of these clients reported the reason for their clinic visit was to obtain PrEP (82%) [4].

The high rate of PrEP initiation we observed in this study relative to those from previous studies may be attributed to the availability of comprehensive services in SNC to assist clients with accessing PrEP. For example, we found that

Table 1 Characteristics of cisgender women receiving HIV prevention care coordination service in New York City (January 2017–December 2019; N = 565)

	n (%) [*]
Sociodemographic characteristics	
Race/ethnicity	
Latina	266 (47.1)
Black	180 (31.9)
Other	27 (4.8)
White	86 (15.2)
Age	
< 30	193 (34.2)
30–39	170 (30.1)
40–49	89 (15.8)
50–59	79 (14.0)
60+	20 (3.5)
Education level	
≥ High school/GED	383 (67.8)
< High school/GED	161 (28.5)
Annual income	
≥ \$20,000	98 (17.3)
< \$20,000	256 (45.3)
Missing	211 (37.3)
Insurance status	
Insured	468 (82.8)
Uninsured	93 (16.5)
Housing status ^a	
Stable	377 (66.7)
Unstable	180 (31.9)
Behavioral characteristics	
Injection drug use (past 6 months)	
No	363 (64.2)
Yes	9 (1.6)
Missing	193 (34.2)
Non-injection drug use (past 6 months) ^b	
No	501 (88.7)
Yes	64 (11.3)
Exchange sex (past 6 months)	
No	493 (87.3)
Yes	54 (9.6)
Sexual relationship with an HIV-positive partner (past 6 months)	
No	489 (86.5)
Yes	76 (13.5)
Recent sexual partners (past 6 months)	
Cisgender women only	21 (3.7)
Cisgender men only	476 (84.2)
Cisgender women and men	48 (8.5)
Condomless sex (past 6 months)	
No	13 (2.3)
Yes	530 (93.8)
Clinical characteristic	
Sexually transmitted infection diagnosis (past 12 months)	
No	487 (86.2)
Yes	60 (10.6)
Psychosocial characteristics	

Table 1 (continued)

	n (%) [*]
Heard of PrEP	
No	355 (62.8)
Yes	204 (36.1)
Received benefits navigation services	
No	337 (59.6)
Yes	225 (39.8)

GED general equivalency diploma

^{*}Column %

^aUnstable housing was defined as being incarcerated or homeless or living in an emergency shelter, single room occupancy hotel or other hotel/motel, someone else's home, couch surfing, in-patient care, or institutionalized (i.e., jail, in-patient facility)

^bDrug use was defined as reporting cocaine/crack, club drugs (GHB, ecstasy, poppers/nitrate inhalants, ketamine/special K, mushrooms, acid), crystal meth, heroin, and/or recreational prescription drug use in the past 6 months

64% of clients who received benefits navigation services had initiated PrEP, which may illustrate the role SNC services had in supporting PrEP uptake. SNC clients also frequently engage in comprehensive services prior to initiating PrEP that may address barriers to doing so, such as competing priorities (e.g., housing instability, food insecurity) that may take precedence over engaging in HIV prevention behaviors [36].

We found that there was a significant association between being unstably housed and PrEP initiation. This relationship was significant for Latina women in the stratified analysis, but not for Black women. The direction of association we found between housing status and PrEP initiation was unexpected, as unstable housing has been identified as a potential barrier to PrEP uptake [6, 37, 38]. However, the client-centered service coordination approach SNC employs may have facilitated greater access to PrEP among cisgender women who were unstably housed, perhaps by linking these clients to housing services. We also found that there was a significant association between having a recent sexual relationship with an HIV-positive partner and PrEP initiation. This result was also significant for Latina women in the stratified analysis. This finding is promising because it suggests that women who are at a higher risk for HIV are seeking and initiating PrEP, which is consistent with the results of prior studies [4, 5]. Future studies should explore the specific facilitators of using PrEP in the context of a serodiscordant relationship among Latina women.

We found that 36% of clients in our sample were aware of PrEP. We also found that greater PrEP awareness was significantly associated with PrEP initiation in the analyses for both the overall and stratified samples. Together, these findings underscore the importance of ensuring Black and Latina women are aware of PrEP. A systematic review of PrEP implementation among women in the US found that PrEP awareness was low across 14 studies, ranging from 0 to

33% [39]. The lower proportions of PrEP awareness identified in some of the studies included in this review may be attributed to data that were collected a few years before the Food and Drug Administration approval of PrEP in 2012. Our finding that higher proportions of Black and Latina women were aware of PrEP compared to those from previous studies may be explained by the time and location of our study, specifically the initiatives that have been implemented in NYC to promote PrEP use among women. For example, the *PlaySure Network* was initiated by the NYC DOHMH in 2016 as an ongoing campaign and partnership between clinical and non-clinical providers aiming to increase access to HIV testing, PrEP and PEP [40]. In 2018, the NYC DOHMH launched *Living Sure*, a citywide, sex-positive campaign that promotes HIV prevention medication, including PrEP, to cisgender women, with a particular focus on Black and Latina women [41]. Sexual health clinics represent another avenue for NYC residents to receive low to no-cost HIV prevention and care services, including PrEP care.

The high proportion of clients who reported engaging in high-risk sexual behaviors (e.g., condomless sex) but did not initiate PrEP (75%) is concerning, because it suggests that programs and outreach strategies may not be reaching cisgender women who most need PrEP. This finding may be explained by the barriers to PrEP uptake experienced by Black and Latina cisgender women, which may include mistrust of medical providers and the health care system [31, 37, 42, 43], the costs associated with PrEP [31, 37], PrEP-related stigma [9, 31, 37, 42], and concerns about side effects [31, 37, 42]. Further research on barriers to PrEP among cisgender women, especially those who are Black and Latina, is needed to create effective interventions to increase PrEP uptake in these populations.

The results of this study should be considered in the context of several limitations. First, all the behavioral data used in this analysis were based on self-report, which may have

Table 2 Comparison of sociodemographic, behavioral, clinical, and psychosocial characteristics of Black and Latina cisgender women receiving HIV prevention care coordination service in New York City by PrEP prescription status (January 2017–December 2019)

	Overall sample (N = 565)				Black women (N = 180)				Latina women (N = 266)			
	Did not receive PrEP prescription (n = 420)	Received PrEP prescription (n = 145)	OR (95% CI)		Did not receive PrEP prescription (n = 133)	Received PrEP prescription (n = 47)	OR (95% CI)		Did not receive PrEP prescription (n = 187)	Received PrEP prescription (n = 79)	OR (95% CI)	
	n (%)	n (%)			n (%)	n (%)			n (%)	n (%)		
Sociodemographic characteristics												
Race/ethnicity												
White	72 (83.7)	14 (16.3)	Ref		–	–	–		187 (70.3)	79 (29.7)	–	
Latina	187 (70.3)	79 (29.7)	2.2 (1.2, 4.1)		133 (73.9)	47 (26.1)	–		–	–	–	
Black	133 (73.9)	47 (26.1)	1.8 (0.9, 3.5)		–	–	–		–	–	–	
Other	25 (92.6)	2 (7.4)	0.4 (0.1, 1.9)		–	–	–		–	–	–	
Age												
<30	146 (75.6)	47 (24.4)	Ref		47 (73.4)	17 (26.6)	Ref		65 (74.7)	22 (25.3)	Ref	
30–39	122 (71.8)	48 (28.2)	1.2 (0.8, 2.0)		32 (74.4)	11 (25.6)	1.0 (0.4, 2.3)		57 (64.8)	31 (35.2)	1.6 (0.8, 3.1)	
40–49	62 (69.7)	27 (30.3)	1.8 (0.8, 2.4)		20 (74.1)	7 (25.9)	1.0 (0.4, 2.7)		28 (63.6)	16 (36.4)	1.7 (0.8, 3.7)	
50–59	62 (78.5)	17 (21.5)	0.9 (0.5, 1.6)		24 (72.7)	9 (27.3)	1.0 (0.4, 2.7)		24 (77.4)	7 (22.6)	0.9 (0.3, 2.3)	
60+	14 (70.0)	6 (30.0)	1.3 (0.5, 3.7)		4 (57.1)	3 (42.9)	2.1 (0.4, 10.2)		6 (66.7)	3 (33.3)	1.5 (0.3, 6.4)	
Education level												
≥ High school/GED	292 (76.2)	91 (23.8)	Ref		95 (75.4)	31 (24.6)	Ref		113 (71.1)	46 (28.9)	Ref	
< High school/GED	116 (72.0)	45 (28.0)	0.8 (0.5, 1.2)		33 (70.2)	14 (29.8)	1.3 (0.6, 2.7)		68 (70.8)	28 (29.2)	1.0 (0.6, 1.8)	
Annual income												
≥ \$20,000	83 (84.7)	15 (15.3)	Ref		23 (85.2)	4 (14.8)	Ref		32 (80.0)	8 (20.0)	Ref	
< \$20,000	182 (71.1)	74 (28.9)	2.3 (1.2, 4.2)		57 (73.1)	21 (26.9)	0.5 (0.2, 1.5)		91 (67.9)	43 (32.1)	0.5 (0.2, 1.3)	
Missing	155 (73.5)	56 (26.5)	2.0 (1.1, 3.8)		53 (70.7)	22 (29.3)	1.1 (0.6, 2.3)		64 (69.6)	28 (30.4)	0.9 (0.5, 1.6)	
Insurance status												
Insured	345 (73.7)	123 (26.3)	Ref		113 (73.4)	41 (26.6)	Ref		148 (68.8)	67 (31.2)	Ref	
Uninsured	72 (77.4)	21 (22.6)	0.8 (0.5, 1.4)		17 (73.9)	6 (26.1)	1.0 (0.4, 2.6)		39 (76.5)	12 (23.5)	0.7 (0.3, 1.4)	
Housing status^a												
Stable	292 (77.5)	85 (22.5)	Ref		86 (74.8)	29 (25.2)	Ref		133 (75.1)	44 (24.9)	Ref	
Unstable	121 (67.2)	59 (32.8)	1.7 (1.1, 2.5)		45 (71.4)	18 (28.6)	1.2 (0.6, 2.4)		51 (59.3)	35 (40.7)	2.1 (1.2, 3.6)	
Behavioral characteristics												
Injection drug use (past 6 months)												
No	279 (76.9)	84 (23.1)	Ref		82 (75.2)	27 (24.8)	Ref		133 (73.1)	49 (26.9)	Ref	
Yes	1 (11.1)	8 (88.9)	26.6 (3.3, 215.5)		0 (0.0)	0 (0.0)	–		0 (0.0)	4 (100.0)	24.3 (1.3, 459.1)**	
Missing	140 (72.5)	53 (27.5)	1.7 (0.8, 1.9)		51 (71.8)	20 (28.2)	1.2 (0.6, 2.3)		54 (67.5)	26 (32.5)	1.3 (0.7, 2.3)	

Table 2 (continued)

	Overall sample (N = 565)			Black women (N = 180)			Latina women (N = 266)		
	Did not receive PrEP (n = 420)	Received PrEP prescription (n = 145)	OR (95% CI)	Did not receive PrEP prescription (n = 133)	Received PrEP prescription (n = 47)	OR (95% CI)	Did not receive PrEP prescription (n = 187)	Received PrEP prescription (n = 79)	OR (95% CI)
	n (%) ^a	n (%) ^a		n (%) ^a	n (%) ^a		n (%) ^a	n (%) ^a	
Non-injection drug use (past 6 months) ^b									
No	383 (76.4)	118 (23.6)	Ref	122 (74.8)	41 (25.2)	Ref	175 (72.6)	66 (27.4)	Ref
Yes	37 (57.8)	27 (42.2)	2.4 (1.4, 4.1)	11 (64.7)	6 (35.3)	1.6 (0.6, 4.7)	12 (48.0)	13 (52.0)	2.9 (1.3, 6.6)
Exchange sex (past 6 months)									
No	372 (75.5)	121 (24.5)	Ref	115 (73.7)	41 (26.3)	Ref	167 (70.8)	69 (29.2)	Ref
Yes	35 (64.8)	19 (35.2)	1.7 (0.9, 3.0)	11 (64.7)	6 (35.3)	0.7 (0.3, 1.6)	16 (69.6)	7 (30.4)	1.2 (0.7, 2.2)
Sexual relationship with an HIV-positive partner (past 6 months)									
No	385 (78.7)	104 (21.3)	Ref	113 (77.4)	33 (22.6)	Ref	178 (75.7)	57 (24.3)	Ref
Yes	35 (46.1)	41 (53.9)	4.3 (2.6, 7.2)	20 (58.8)	14 (41.2)	2.4 (1.1, 5.3)	9 (29.0)	22 (71.0)	7.6 (3.3, 17.5)
Recent sexual partners (past 6 months)									
Cisgender women only	15 (71.4)	6 (28.6)	Ref	70 (100.0)	0 (0.0)	Ref	5 (45.5)	6 (54.5)	Ref
Cisgender men only	368 (77.3)	108 (22.7)	0.7 (0.3, 1.9)	105 (72.9)	39 (27.1)	5.6 (0.3, 122.3)**	170 (75.6)	55 (24.4)	0.3 (0.1, 0.9)
Cisgender women and men	24 (50.0)	24 (50.0)	2.5 (0.8, 7.6)	12 (63.2)	7 (36.8)	9.0 (0.4, 220.1)**	9 (39.1)	14 (60.9)	1.3 (0.3, 5.6)
Condomless sex (past 6 months)									
No	8 (61.5)	5 (38.5)	Ref	3 (75.0)	1 (25.0)	Ref	4 (66.7)	2 (33.3)	Ref
Yes	398 (75.1)	132 (24.9)	0.5 (0.2, 1.7)	121 (72.9)	45 (27.1)	1.1 (0.1, 11.0)	179 (71.0)	73 (29.0)	0.8 (0.2, 4.6)
Clinical characteristic									
Sexually transmitted infection diagnosis (past 12 months)									
No	364 (74.7)	123 (25.3)	Ref	117 (74.1)	41 (25.9)	Ref	158 (69.9)	68 (30.1)	Ref
Yes	41 (68.3)	19 (31.7)	1.4 (0.8, 2.5)	12 (70.6)	5 (29.4)	1.2 (0.4, 3.6)	25 (71.4)	10 (28.6)	0.9 (0.4, 2.0)
Psychosocial characteristics									
Heard of PrEP									

Table 2 (continued)

	Overall sample (N = 565)				Black women (N = 180)				Latina women (N = 266)			
	Did not receive PrEP (n = 420)	Received PrEP pre- scription (n = 145)	OR (95% CI)		Did not receive PrEP (n = 133)	Received PrEP prescription (n = 47)	OR (95% CI)		Did not receive PrEP (n = 187)	Received PrEP prescription (n = 79)	OR (95% CI)	
	n (%) [*]				n (%) [*]				n (%) [*]			
No	305 (85.9)	50 (14.1)	Ref		86 (81.1)	20 (18.9)	Ref		140 (83.8)	27 (16.2)	Ref	
Yes	110 (53.9)	94 (46.1)	5.2 (3.5, 7.8)		45 (63.4)	26 (36.6)	2.5 (1.3, 4.9)		44 (45.8)	52 (54.2)	6.1 (3.5, 10.9)	
Received benefits navi- gation services												
No	337 (100.0)	0 (0.0)	Ref		112 (100.0)	0 (0.0)	Ref		149 (100.0)	0 (0.0)	Ref	
Yes	80 (35.6)	145 (64.4)	> 1000.0 (75.1, > 1000.0)**		20 (29.9)	47 (70.01)	521.4 (30.9, > 1000.0)**		36 (31.3)	79 (68.7)	651.3 (39.5, > 1000.0)**	

Bolded odds ratios and confidence intervals represent statistically significant findings

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^{*}Row percentages

^{**}Haldane-Anscombe correction used to correct for empty cells in bivariate analyses

^aUnstable housing was defined as being incarcerated or homeless or living in an emergency shelter, single room occupancy hotel or other hotel/motel, someone else's home, couch surfing, in-patient care, or institutionalized (i.e., jail, in-patient facility)

^bDrug use was defined as reporting cocaine/crack, club drugs (GHB, ecstasy, poppers/nitrate inhalants, ketamine/special K, mushrooms, acid), crystal meth, heroin, and/or recreational prescription drug use in the past 6 months

resulted in an underestimation of the proportion of cisgender women who met at least one HIV risk criterion for PrEP. Second, there is the possibility that limiting analyses of PrEP initiation to only women who met local guidelines for PrEP may have excluded others who may have benefited from PrEP [44]. However, of the 100 women excluded from this analysis because they did not meet one or more HIV risk criteria for PrEP, only two initiated PrEP, which may indicate that our sample comprised cisgender women in SNC who would most benefit from PrEP. Third, the program does not collect data on other psychosocial characteristics that may be significantly associated with PrEP initiation. For example, prior studies have found that perceived HIV risk and the anticipation of stereotyping and/or disapproval from others for using PrEP were significantly associated with interest in using PrEP [9, 10]. Fourth, we found that IDU and receiving benefits navigation were significantly associated with PrEP initiation; however, the effect estimates and confidence intervals were too large and therefore significantly impacted the precision of their association with PrEP initiation. Finally, the results of this study would not be generalizable to Black and Latina cisgender women outside of NYC.

Our analysis found that a relatively high percentage of Black and Latina cisgender women who met at least one HIV risk criterion for PrEP initiated PrEP, compared to findings from previous studies on PrEP initiation among women [5, 26, 32, 33, 35]. However, PrEP in our sample is still lower than desired. PrEP promotion strategies, including PrEP education for women and providers, should be scaled up, as increasing awareness and knowledge of PrEP has the potential to increase interest and acceptability [37, 42, 45]. Future studies should examine how individual, provider-level, and structural factors influence PrEP uptake among Black and Latina cisgender women, to inform the development of PrEP promotion and adherence interventions for these populations.

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Author Contributions JC developed the research question, designed, and conducted the analyses, and led the writing. MF supervised the study, contributed to the writing, and critically revised the article. NM contributed to the study design and assisted with the analyses. GG contributed to the writing and critically revised the article. SH contributed to the study design and the conceptualization of key measures. OB critically revised the article.

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Declarations

Conflicts of interest The authors have not disclosed any competing interests.

Ethical Approval This project was reviewed and approved by the Institutional Review Board at the New York City Department of Health and Mental Hygiene.

Consent to Participate A waiver of consent was obtained as this study was based on a secondary data analysis.

Consent for Publication Not applicable.

References

- Centers for Disease Control and Prevention. *HIV surveillance report, 2018 (updated)*. Available from: <http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Accessed 30 Sep 2021.
- Huang YA, Zhu WK, Smith DW, Harris N, Hoover K. HIV pre-exposure prophylaxis, by race and ethnicity—United States, 2014–2016. *MMWR Morb Mortal Wkly Rep*. 2018;67(41):1147–50.
- Bush S, Rawlings K, Magnuson D, Martin P, Lugo-Torres O, Mera-Giler R. Utilization of emtricitabine/tenofovir (FTC/TDF) for HIV pre-exposure prophylaxis in the United States by gender (2013–1Q2016) International Congress of Drug Therapy in HIV Infection. Glasgow, UK. Abs O314. 2016
- Theodore DA, Zucker J, Carnevale C, et al. Pre-exposure prophylaxis use among predominantly African American and Hispanic women at risk for HIV acquisition in New York City. *J Assoc Nurses AIDS Care*. 2020;31(1):110–4.
- Blackstock OJ, Patel VV, Felsen U, Park C, Jain S. Pre-exposure prophylaxis prescribing and retention in care among heterosexual women at a community-based comprehensive sexual health clinic. *AIDS Care*. 2017;29(7):866–9.
- Park CJ, Taylor TN, Gutierrez NR, Zingman BS, Blackstock OJ. Pathways to HIV pre-exposure prophylaxis among women prescribed PrEP at an urban sexual health clinic. *J Assoc Nurses AIDS Care*. 2019;30(3):321–9.
- Wingood GM, Dunkle K, Camp C, et al. Racial differences and correlates of potential adoption of preexposure prophylaxis. *J Acquir Immune Defic Syndr*. 2013;63(Suppl 1):S95–101.
- Willie TC, Stockman JK, Keene DE, Calabrese SK, Alexander KA, Kershaw TS. Social networks and its impact on women's awareness, interest, and uptake of HIV pre-exposure prophylaxis (PrEP): implications for women experiencing intimate partner violence. *J Acquir Immune Defic Syndr*. 2019;80(4):386–93.
- Calabrese SK, Dovidio JF, Tekeste M, et al. HIV pre-exposure prophylaxis stigma as a multidimensional barrier to uptake among women who attend planned parenthood. *J Acquir Immune Defic Syndr*. 2018;79(1):46–53.
- Sales JM, Sheth AN. Associations among perceived HIV risk, behavioral risk and interest in PrEP among black women in the Southern US. *AIDS Behav*. 2018;23(7):1871–6.
- Carley T, Siewert E, Naresh A. Interest in pre-exposure prophylaxis (PrEP) for HIV is limited among women in a general obstetrics and gynecology setting. *AIDS Behav*. 2019;23(10):2741–8.
- Nwogwugwu C, Hossain M, Bronner Y, Ogbolu Y. Examining the health belief model risk factors on PrEP use among

- African-American women ages 20–44. *J Natl Black Nurses Assoc.* 2019;30(2):18–25.
13. Garfinkel DB, Alexander KA, McDonald-Mosley R, Willie TC, Decker MR. Predictors of HIV-related risk perception and PrEP acceptability among young adult female family planning patients. *AIDS Care.* 2016;29(6):751–8.
14. Rubtsova A, Wingood G, Dunkle K, Camp C, DiClemente R. Young adult women and correlates of potential adoption of pre-exposure prophylaxis (PrEP): results of a national survey. *Curr HIV Res.* 2014;11(7):543–8.
15. Mangum LC, Craddock JB, Whitfield DL. Associations in preventive sexual health service utilization and pre-exposure prophylaxis (PrEP) interest among young black women in the United States. *AIDS Care.* 2018;2021:1–7.
16. Willie TC, Stockman JK, Overstreet NM, Kershaw TS. Examining the impact of intimate partner violence type and timing on pre-exposure prophylaxis awareness, interest, and coercion. *AIDS Behav.* 2017;22(4):1190–200.
17. Villalba K, Jean-Gilles M, Rosenberg R, et al. Understanding the impact of intimate partner violence type and timing on pre-exposure prophylaxis knowledge, acceptability, sexual behavior, and gender roles among women of color. *J Interpers Violence.* 2021. <https://doi.org/10.1177/08862605211001468>.
18. Braksmajer A, Leblanc NM, El-Bassel N, Urban MA, McMahon JM. Feasibility and acceptability of pre-exposure prophylaxis use among women in violent relationships. *AIDS Care.* 2018;31(4):475–80.
19. Willie TC, Keene DE, Stockman JK, Alexander KA, Calabrese SK, Kershaw TS. Intimate partner violence influences women's engagement in the early stages of the HIV pre-exposure prophylaxis (PrEP) care continuum: using doubly robust estimation. *AIDS Behav.* 2019;24(2):560–7.
20. Mayer KH, Agwu A, Malebranche D. Barriers to the wider use of pre-exposure prophylaxis in the United States: a narrative review. *Adv Ther.* 2020;37(5):1778–811.
21. D'Angelo AB, Davis Ewart LN, Koken J, Bimbi D, Brown JT, Grov C. Barriers and facilitators to pre-exposure prophylaxis uptake among black women: a qualitative analysis guided by a socioecological model. *J Assoc Nurses AIDS Care.* 2021;32(4):481–94.
22. Nydegger LA, Dickson-Gomez J, Ko KT. A longitudinal, qualitative exploration of perceived HIV risk, healthcare experiences, and social support as facilitators and barriers to PrEP adoption among black women. *AIDS Behav.* 2020;25(2):582–91.
23. Bond KT, Gunn A, Williams P, Leonard NR. Using an intersectional framework to understand the challenges of adopting pre-exposure prophylaxis (PrEP) among young adult black women. *Sex Res Soc Policy.* 2022;19:180–93.
24. Teitelman AM, Tieu H-V, Flores D, et al. Individual, social and structural factors influencing PrEP uptake among cisgender women: a theory-informed elicitation study. *AIDS Care.* 2021. <https://doi.org/10.1080/09540121.2021.1894319>.
25. New York City Department of Health and Mental Hygiene. HIV surveillance report, 2019. Available from: <https://www1.nyc.gov/site/doh/data/data-sets/hiv-aids-surveillance-and-epidemiology-reports.page#surv>. Accessed 15 Jan 2020.
26. Garrestson M. NYC Department of Health & Mental Hygiene. (2012–2018). Sexual Health Survey. Presented at: New York City Department of Health and Mental Hygiene; 2019.
27. New York State Department of Health AIDS Institute. PrEP to prevent HIV and promote sexual health. New York: New York State Department of Health; 2020. Available from: https://www.hivguidelines.org/prep-for-prevention/prep/#tab_2. Accessed 29 Oct 2020.
28. Ruxton GD, Neuhäuser M. Review of alternative approaches to calculation of a confidence interval for the odds ratio of a 2×2 contingency table. *Methods Ecol Evol.* 2012;4(1):9–13.
29. Weber F, Knapp G, Ickstadt K, Kundt G, Glass A. Zero-cell corrections in random-effects meta-analyses. *Res Synth Methods.* 2020;11(6):913–9.
30. Willie TC, Kershaw TS, Blackstock O, et al. Racial and ethnic differences in women's HIV risk and attitudes towards pre-exposure prophylaxis (PrEP) in the context of the substance use, violence, and depression syndemic. *AIDS Care.* 2020;33(2):219–28.
31. Hirschhorn LR, Brown RN, Friedman EE, et al. Black cisgender women's PrEP knowledge, attitudes, preferences, and experience in Chicago. *J Acquir Immune Defic Syndr.* 2020;84:497–507.
32. Bien CH, Patel VV, Blackstock OJ, Felsen UR. Reaching key populations: PrEP uptake in an urban health care system in the Bronx, New York. *AIDS Behav.* 2016;21(5):1309–14.
33. Kwakwa HA, Bessias S, Sturgis D, et al. Engaging United States Black communities in HIV pre-exposure prophylaxis: analysis of a PrEP engagement cascade. *J Natl Med Assoc.* 2018;110(5):480–5.
34. Raifman JR, Schwartz SR, Sosnowy CD, et al. Brief report: pre-exposure prophylaxis awareness and use among cisgender women at a sexually transmitted disease clinic. *J Acquir Immune Defic Syndr.* 2019;80(1):36–9.
35. Flash C, Adegboyega O, Yu X, et al. Correlates of linkage to HIV preexposure prophylaxis among HIV-testing clients. *J Acquir Immune Defic Syndr.* 2018;77(4):365–72.
36. Walters SM, Platt J, Anakaraonye A, et al. Considerations for the design of pre-exposure prophylaxis (PrEP) interventions for women: lessons learned from the implementation of a novel prep intervention. *AIDS Behav.* 2021;25:3987–99.
37. Auerbach JD, Kinsky S, Brown G, Charles V. Knowledge, attitudes, and likelihood of pre-exposure prophylaxis (PrEP) use among US women at risk of acquiring HIV. *AIDS Patient Care STDS.* 2015;29(2):102–10.
38. Qin Y, Price C, Rutledge R, Puglisi L, Madden LM, Meyer JP. Women's decision-making about PrEP for HIV prevention in drug treatment contexts. *J Int Assoc Provid AIDS Care.* 2020;19:232595821990009.
39. Bradley E, Forsberg K, Betts JE, et al. Factors affecting pre-exposure prophylaxis implementation for women in the United States: a systematic review. *J Womens Health.* 2019;28(9):1272–85.
40. New York City Department of Health and Mental Hygiene. PlaySure network for HIV prevention. Available from: <https://www1.nyc.gov/site/doh/providers/resources/playsure-network.page>. Accessed 22 Sept 2021.
41. New York City Department of Health and Mental Hygiene. Health department launches city's first-ever campaign promoting HIV prevention medication among women. [press release]. New York City NYC DOHMH [Internet]. 2018; Available from: [https://www1.nyc.gov/site/doh/about/press/pr2018/pr017-18.page_!!NLFQgXoFfo8MMQ!-2bFSLleY-K-jIAkDWv9572s3gWDy4Pnu-9c9CHTRDxhRSHyNej_L9ZOKD0XktYot4nJ3I8\\$](https://www1.nyc.gov/site/doh/about/press/pr2018/pr017-18.page_!!NLFQgXoFfo8MMQ!-2bFSLleY-K-jIAkDWv9572s3gWDy4Pnu-9c9CHTRDxhRSHyNej_L9ZOKD0XktYot4nJ3I8$). Accessed 22 Sept 2021.
42. Bond KT, Gunn AJ. Perceived advantages and disadvantages of using pre-exposure prophylaxis (PrEP) among sexually active black women: an exploratory study. *J Black Sex Relatsh.* 2016;3(1):1–24.
43. Tekeste M, Hull S, Dovidio JF, et al. Differences in medical mistrust between Black and White women: implications for patient–provider communication about PrEP. *AIDS Behav.* 2018;23(7):1737–48.
44. Calabrese SK, Willie TC, Galvao RW, et al. Current US guidelines for prescribing HIV pre-exposure prophylaxis (PrEP) disqualify many women who are at risk and motivated to use PrEP. *J Acquir Immune Defic Syndr.* 2019;81(4):395–405.
45. Collier KL, Colarossi LG, Sanders K. Raising awareness of pre-exposure prophylaxis (PrEP) among women in New York City: community and provider perspectives. *J Health Commun.* 2017;22(3):183–9.