

The Pre-Exposure Prophylaxis Cascade in At-Risk Transgender Men Who Have Sex with Men in the United States

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Abstract

Purpose: This analysis was designed to characterize the pre-exposure prophylaxis (PrEP) cascade in a U.S. national sample of transgender men and trans masculine adults who have sex with cisgender men (trans MSM) at-risk for HIV acquisition.

Methods: From November to December 2017, 843 HIV-negative trans MSM self-reporting past-6-month receptive sex with a cisgender man were recruited via peer referrals, dating apps, listservs, and social media. A computer-assisted self-interview assessed demographics, health care, and the PrEP cascade. Descriptive statistics and multivariable regression models evaluated factors associated with PrEP uptake and persistence.

Results: Mean age was 28.1 years (standard deviation = 7.1); 4.8% were Black, 21.7% Latinx, and 25.6% another race/ethnicity. A total of 84.1% had heard of PrEP, with 67.3% reporting interest. More than half (55.2%) were PrEP indicated, of which 50.8% were PrEP naive. Approximately 1/4 (28.0%) reported PrEP use, of which 65.3% were PrEP persistent. PrEP modality preferences were injectable (51.2%), daily oral pill (22.1%), and anal gel/lube (14.6%). Reasons for PrEP noninterest were no HIV risk (68.5%), cost (24.2%), and side effects (20.1%). Surgical gender affirmation, no health care discrimination, and social media as a primary health information source were associated with increased odds of PrEP uptake and persistence (all $p < 0.05$). PrEP adherence difficulties were reported by 52.6%, due to busy/inconsistent schedule (53.1%), side effects (27.4%), and too many medical visits (11.6%).

Conclusion: PrEP uptake was modest among the trans MSM sampled, given prevalent HIV risk behaviors. The limited PrEP uptake in at-risk trans MSM suggests the need to develop culturally tailored community education and interventions.

Keywords: HIV prevention, MSM, PrEP, transgender

Introduction

TRANSGENDER MEN AND other trans masculine adults who have sex with men (trans MSM) are at-risk for HIV infection when they have condomless anal or frontal/vaginal intercourse with cisgender (cis) MSM partners or share needles for hormone or recreational drug injection.¹ Pre-exposure prophylaxis (PrEP) has been shown to be a safe and effective method of HIV prevention for cis MSM.^{2,3} However, data are limited on PrEP effectiveness and use in

trans MSM.^{4,5} Studies demonstrate high rates of condomless sex and suboptimal recent HIV testing behaviors among trans MSM.⁶⁻⁸ Information is needed about PrEP awareness, indications, uptake, and persistence in this at-risk MSM subgroup for service delivery planning.

The PrEP cascade is a heuristic framework utilized to understand steps or stages of PrEP care and implementation, from identifying individuals at highest risk of HIV acquisition to retaining individuals in PrEP care.^{9,10} To date, research applying the PrEP cascade framework to evaluate

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PrEP-related outcomes in trans MSM is scarce.⁴ The current study sought to fill this gap. In cis MSM, many factors impact PrEP cascade outcomes. For example, differences in PrEP uptake have been found by geographic region, age, race, ethnicity, and insurance.^{11–13} Perceived HIV risk, HIV testing history, sexual risk behaviors, and PrEP indications have also been associated with PrEP outcomes.^{13–17} In addition, psychosocial factors such as mental health challenges influence PrEP utilization behaviors.^{18,19}

For trans MSM, added factors warrant consideration in the PrEP cascade. A binary gender identity or a gay sexual orientation identity may each confer vulnerability due to pressures to conform to social norms surrounding gender roles (e.g., what it means to be a man) or sexual identity (e.g., what it means to be a gay man).²⁰ PrEP education programs for MSM have generally focused on cis MSM, leaving trans MSM with the impression that they might not be candidates for PrEP. Medical gender affirmation (e.g., hormones, surgeries) is linked with improved mental health functioning²¹; however, the association of these therapies with PrEP cascade outcomes is unknown. Stigma due to being gender minority and sexual minority is also an important concern for trans MSM in navigating sexual partnerships and with health care systems.²² Furthermore, understanding preferred sources of health information, such as online social media, will aid the design, implementation, and scale-up of future PrEP interventions for trans MSM.

The objective of this study was to characterize the PrEP cascade in a national sample of trans MSM in the United States and examine factors associated with PrEP to characterize the PrEP cascade and product preferences in a national sample of trans MSM in the United States and examine factors associated with PrEP uptake and persistence, and product preferences.

Methods

Participants and procedures

A U.S. national sample of 857 trans MSM was recruited and completed an online one-time computer-assisted self-interview survey from November to December 2017. Non-probability sampling methods were used for recruitment (e.g., peer referral, dating apps, listservs, and other social media). Eligibility criteria for participation were as follows: ages 18 years or older, assigned female sex at birth, current gender identity on the trans masculine spectrum, English-speaking, and self-reporting receptive anal or frontal/vaginal sex, with or without a condom, with a cisgender male sex partner in the past 6 months. Trans MSM living with HIV ($n = 14$; 1.6% of the sample) were excluded from this PrEP analysis. All study activities were approved by the Fenway Health Institutional Review Board (FWA00000145). Written consent was waived to preserve anonymity. Participants reviewed an electronic informed consent page and agreed to participate before completing the survey. Additional study details can be found elsewhere.²³

Survey measures

The survey included source questions from the U.S. Behavioral Risk Factor Surveillance System²⁴ and previous transgender research.²⁵ Geographic region was assessed via self-reported zip code and coded as Northeast, Midwest,

South, West, or Other/Unknown Geography. Age group was assessed continuously and coded as 18–24, 25–29, 30–39, and 40–60 years. Race was assessed by asking participants to describe their race or ethnic background and was coded as White, Black, and other (Asian, Pacific Islander, American Indian/Alaskan, Multiracial, other). Ethnicity was coded as Latinx or not Latinx. Education was assessed as low (<high school diploma/some college) or high (4-year college degree, graduate degree).

Participants were asked to select the response that best described their current gender identity. Binary gender identity was coded as binary (male, man, transgender man, female-to-male, trans man, man of transgender experience) or nonbinary (trans masculine, gender queer, gender nonconforming, nonbinary, agender, bigender, other gender). Participants were asked to describe their sexual orientation identity and responses were coded as gay (gay, homosexual, same-gender attraction) or other (bisexual, queer, pansexual, other). A series of items were asked about medical gender affirmation, including lifetime hormone use (testosterone use) and a list of surgical interventions (e.g., chest, genital). Participants were coded as having had any surgery, top surgery (those indicating chest surgery, e.g., mastectomy, chest reconstruction), lower surgery (those indicating genital surgery, e.g., metoidioplasty, phalloplasty), or no surgery.

HIV acquisition sexual risk behavior was assessed by asking participants separate questions about whether or not they had engaged in condomless receptive anal and frontal sex with a male partner in the last 6 months. PrEP indications (yes, no) were evaluated by applying the adapted Centers for Disease Control and Prevention criteria.²⁶ Access to health services was queried, including questions about health insurance (public, private, or none) and lifetime and past 6-month HIV testing history (coded as ever tested, tested in the last 6 months, or never tested). PrEP cascade variables were assessed, including PrEP awareness, interest, uptake, side effects, reasons for non-use, adherence, persistence, and product preferences.^{9,10}

Psychosocial factors were measured including substance use in the last 6 months, coded as alcohol, drugs, both alcohol and drugs, neither.²⁷ Psychological distress in the last 30 days was evaluated using the validated Kessler-6, which asked participants to rate the frequency with which they felt different symptoms (e.g., “nervous,” “hopeless,” “worthless”) on a scale from 0 (none of the time) to 4 (most of the time). Scores ranged from 0 to 24 and were grouped into quartiles based on the sample distribution as no distress, low, moderate, or high distress.²⁸ Experiencing stigma in the context of sex with a cisgender male in the last 6 months was measured using a four-item scale designed and validated specifically for the study population.²⁹ Items pertained to gender nonaffirmation in the context of a sexual encounter with a cisgender male, such as being referred to with the incorrect pronouns/misgendered during sex and dealing with a sex partner questioning his own sexual orientation after having sex. Responses ranged from 1 (never) to 4 (many times) and were summed (theoretical range from 4 to 16), then grouped into quartiles based on sample distribution as none, low, moderate, or high stigma. Lifetime discrimination in health care was asked and coded as any discrimination or none.³⁰ Participants were asked about their primary source of health information, which was coded as online social media or another source.

TABLE 1. DESCRIPTIVE CHARACTERISTICS OF TRANS MSM SAMPLED BY PrEP UPTAKE AND LOGISTIC REGRESSION MODELS OF PrEP UPTAKE IN TRANS MSM WHO REPORTED HAVING HEARD OF PrEP (N=709)

Characteristic	Among all HIV-negative trans MSM (N=843)		PrEP uptake (among HIV-negative trans MSM who reported knowing about [having heard of] PrEP) (N=709)				Crude models and adjusted multivariable model	
	Total sample		PrEP uptake (N=236)		No PrEP uptake (N=473)		OR (95% CI)	aOR (95% CI)
	n	%	n	%	n	%		
Geographic location								
Northeast	165	19.57	48	20.34	94	19.87	1.29 (0.69–2.42)	1.02 (0.51–2.04)
Midwest	121	14.35	27	11.44	71	15.01	Ref.	Ref.
South	206	24.44	56	23.73	122	25.79	1.18 (0.66–2.12)	0.94 (0.49–1.83)
West	188	22.30	58	24.58	96	20.30	1.58 (0.86–2.90)	0.95 (0.46–1.97)
Other/unknown geography	163	19.34	47	19.92	90	19.03	1.35 (0.72–2.52)	1.14 (0.54–2.44)
Age group (years)								
18–24	271	32.15	31	13.14	183	38.69	Ref.	Ref.
25–29	280	33.21	94	39.83	142	30.02	3.96 (2.26–6.93)	3.40 (1.71–6.76)
30–39	241	28.59	96	40.68	116	24.52	4.95 (2.99–8.20)	3.29 (1.69–6.39)
40–60	51	6.05	15	6.35	32	6.77	2.79 (1.35–5.80)	1.97 (0.83–4.69)
Race								
White	587	69.63	182	77.12	315	66.60	2.06 (0.89–4.77)	3.58 (1.28–10.00)
Black	40	4.75	8	3.39	27	5.71	Ref.	Ref.
Other	216	25.62	46	19.49	131	27.70	1.24 (0.51–3.02)	2.32 (0.74–7.23)
Ethnicity								
Latinx	183	21.71	70	29.66	75	15.86	2.24 (1.50–3.34)	3.00 (1.80–5.00)
Not Latinx	660	78.29	166	70.34	398	84.14	Ref.	Ref.
Education								
High	315	37.37	100	42.37	186	39.32	1.12 (0.80–1.59)	1.00 (0.62–1.60)
Low	528	62.63	136	57.63	287	60.68	Ref.	Ref.
Gender identity								
Binary	732	86.83	217	91.95	397	83.93	2.20 (1.27–3.80)	1.70 (0.90–3.20)
Nonbinary	111	13.17	19	8.05	76	16.07	Ref.	Ref.
Sexual orientation								
Gay	276	32.74	119	50.42	107	22.62	3.48 (2.41–5.04)	2.23 (1.39–3.58)
Other	567	67.26	117	49.58	366	77.38	Ref.	Ref.
Medical affirmation^{a,b}								
Testosterone use	696	82.56	211	89.41	399	84.36	1.56 (0.86–2.84)	—
Any surgery	473	56.11	178	75.42	245	51.80	2.86 (1.95–4.19)	2.28 (1.42–3.65)
Top surgery	411	48.75	152	64.41	226	47.78	1.98 (1.33–2.93)	—
Lower surgery	168	19.93	96	40.68	50	10.57	5.81 (3.84–8.79)	—
Health insurance								
Public	262	31.08	102	43.22	109	23.04	3.02 (1.76–5.18)	2.30 (1.21–4.36)
Private	414	49.11	101	42.80	259	54.76	1.26 (0.70–2.27)	1.13 (0.57–2.26)
None	167	19.81	33	13.98	105	22.20	Ref.	Ref.
HIV tested^b								
Ever	672	79.72	193	81.78	404	85.41	0.77 (0.50–1.20)	—
Last 6 months	666	79.00	190	80.51	402	84.99	1.10 (0.79–1.54)	—
Never	171	20.28	43	18.22	69	14.59	Ref.	—
PrEP indicated, last 6 months								
Yes	465	55.16	162	68.64	236	49.89	2.20 (1.46–3.32)	2.72 (1.52–4.88)
No	378	44.84	74	31.36	237	50.11	Ref.	Ref.
Substance use, last 6 months								
Alcohol	169	20.05	64	27.12	78	16.49	3.51 (0.84–14.63)	—
Drugs	66	7.83	15	6.36	39	8.25	1.63 (0.36–7.46)	—
Both alcohol and drugs	561	66.55	152	64.41	334	70.61	1.96 (0.47–8.19)	—
Neither	47	5.57	5	2.12	22	4.65	Ref.	—

(continued)

TABLE 1. (CONTINUED)

Characteristic	Among all HIV-negative trans MSM (N = 843)		PrEP uptake (among HIV-negative trans MSM who reported knowing about [having heard of] PrEP) (N = 709)				Crude models and adjusted multivariable model	
	Total sample		PrEP uptake (N = 236)		No PrEP uptake (N = 473)		OR (95% CI)	aOR (95% CI)
	n	%	n	%	n	%		
Psychological distress								
No distress	147	17.44	54	22.88	69	14.59	2.06 (1.15–3.68)	—
Low levels of distress	297	35.23	81	34.32	173	36.58	1.24 (0.74–2.06)	—
Moderate levels of distress	232	27.52	63	26.69	130	27.48	1.29 (0.78–2.14)	—
High levels of distress	167	19.81	38	16.10	101	21.35	Ref.	—
Cisgender male sexual partner stigma								
None	188	22.30	53	22.46	118	24.95	Ref.	Ref.
Low	280	33.21	73	30.93	171	36.15	0.95 (0.62–1.46)	1.28 (0.71–2.29)
Moderate	258	30.60	72	30.51	137	28.96	1.17 (0.70–1.95)	1.55 (0.76–3.13)
High	117	13.89	38	16.10	47	9.94	1.79 (1.04–3.08)	2.00 (0.89–4.51)
Discrimination in health care								
Any	719	85.29	187	79.24	424	89.64	Ref.	Ref.
None	124	14.71	49	20.76	49	10.36	2.27 (1.46–3.54)	2.62 (1.31–5.24)
Primary source of health information								
Other	606	71.89	143	60.59	362	76.53	Ref.	Ref.
Social media	237	28.11	93	39.41	111	23.47	2.09 (1.48–2.95)	1.90 (1.23–2.93)
HIV acquisition sexual risk behavior, last 6 months ^b								
Condomless receptive anal sex	294	34.87	119	50.42	132	27.91	2.64 (1.88–3.72)	—
Condomless receptive frontal sex	461	54.69	154	65.25	238	50.32	1.85 (1.31–2.61)	—

Bold indicates statistical significance at the alpha 0.05 level.

^aMedical affirmation: the surgery variable was operationalized as binary (surgery yes/no) for the final multivariable model of PrEP uptake to assess the overall association of any surgery with PrEP uptake.

^bTotal does not sum to 100% because response options were not mutually exclusive.

aOR, adjusted odds ratio; CI, confidence interval; MSM, men who have sex with men; OR, odds ratio; PrEP, pre-exposure prophylaxis.

Statistical analyses

Missing data on all survey items used to measure the PrEP cascade and statistical predictors exceeded 10.0%. All analyses were conducted on multiply imputed data (five data sets) obtained via multiple imputation by chained equations with random forests in R. Pooled statistics were obtained by combining estimates from each data set into a single parameter estimate using appropriate methodology (PROC MIANALYZE in SAS). Descriptive statistics were used to characterize the sample. Logistic regression models were fit with PrEP uptake (yes/no) and PrEP persistence (yes/no) as outcome variables. Bivariate models were followed by multivariable models. A single multivariable model was fit for PrEP uptake. The denominator for the PrEP outcome was HIV-negative trans MSM who had ever heard of PrEP ($n = 709$). For PrEP persistence, separate multivariable models were fit, adjusted for geographic location only, to ensure model convergence. These models were restricted to HIV-negative trans MSM who reported having heard of PrEP and had ever taken PrEP ($n = 236$).

Results

Sociodemographic and clinical characteristics

Table 1 presents sample characteristics overall and stratified by PrEP uptake. Table 2 displays the sample stratified by PrEP persistence. The mean age was 28.1 years (standard deviation = 7.1 years) and 4.8% were Black, 21.7% Latinx,

25.6% another race/ethnicity. A total of 86.8% endorsed a binary gender identity (e.g., man, male, trans man). One-third (32.7%) identified as gay. The majority had medically affirmed their gender: 82.6% testosterone, 56.1% surgery (48.8% chest, 19.9% genital).

Nearly one-third (31.1%) had public insurance, 49.1% private, and 19.8% no health insurance. Overall, 20.3% had never been tested for HIV in their lifetime, and 21.0% had not been tested for HIV in the last 6 months. Past 6-month HIV risk behavior, condomless receptive sex with a cis male partner, was reported by 34.9% for anal sex and 54.7% for frontal/vaginal sex. Experiencing stigma in the last 6 months in the context of an interaction with a cisgender male sexual partner was reported by 77.7%. Lifetime discrimination in health care was reported by 85.3%.

The PrEP cascade

The PrEP cascade in this sample of trans MSM is shown in Figure 1.

PrEP awareness and interest. PrEP awareness was high, with 84.1% (709/843) having heard of PrEP. Of those, 67.3% reported interest in PrEP as a daily oral pill.

PrEP uptake. Overall, 28.0% (236/843) of HIV-negative trans MSM had taken PrEP, 18.3% (154/843) were currently on PrEP, and 9.7% (82/843) had stopped taking PrEP. Thus,

TABLE 2. DESCRIPTIVE CHARACTERISTICS AND LOGISTIC REGRESSION MODELS OF PrEP PERSISTENCE IN TRANS MSM WHO REPORTED HAVING HEARD OF PrEP AND EVER TAKEN PrEP (N=236)

Characteristic	<i>PrEP persistence (among HIV-negative trans MSM who reported knowing about [having heard of] PrEP and ever taken PrEP) (N=236)</i>					
	<i>PrEP persistence (N=154)</i>		<i>No PrEP persistence (N=82)</i>		<i>Crude and geographically adjusted multivariable models</i>	
	n	%	n	%	OR (95% CI)	aOR (95% CI)
Geographic location						
Northeast	34	22.08	12	14.63	2.10 (0.91–4.85)	a
Midwest	20	12.99	8	9.76	1.98 (0.70–5.61)	a
South	31	20.13	25	30.49	Ref.	a
West	42	27.27	17	20.73	1.97 (0.88–4.41)	a
Other/unknown geography	27	17.53	20	24.39	1.10 (0.46–2.60)	a
Age group (years)						
18–24	16	10.39	15	18.29	1.14 (0.32–4.10)	1.16 (0.32–4.28)
25–29	70	45.45	25	30.49	2.89 (0.92–9.09)	2.84 (0.84–9.56)
30–39	61	39.61	34	41.46	1.81 (0.58–5.71)	1.78 (0.54–5.88)
40–60	7	4.55	8	9.76	Ref.	Ref.
Race						
White	118	76.62	64	78.05	Ref.	Ref.
Black	7	4.55	1	1.22	3.52 (0.41–30.09)	4.10 (0.47–36.14)
Other	29	18.83	17	20.73	0.93 (0.43–2.01)	0.97 (0.45–2.10)
Ethnicity						
Latinx	42	27.27	28	34.15	1.44 (0.80–2.60)	1.24 (0.66–2.34)
Not Latinx	112	72.73	54	65.85	Ref.	Ref.
Education						
High	74	48.05	26	31.71	1.96 (1.10–3.51)	1.80 (0.98–3.30)
Low	80	51.95	56	68.29	Ref.	Ref.
Gender identity						
Binary	143	92.86	74	90.24	1.56 (0.56–4.37)	1.39 (0.49–3.98)
Nonbinary	11	7.14	8	9.76	Ref.	Ref.
Sexual orientation						
Gay	69	44.81	34	41.46	1.73 (0.99–3.02)	1.76 (0.99–3.10)
Other	85	55.19	48	58.54	Ref.	Ref.
Medical affirmation ^b						
Testosterone use	140	90.91	71	86.59	1.39 (0.53–3.64)	1.34 (0.51–3.53)
Any surgery	125	81.17	53	64.63	2.22 (1.16–4.25)	2.13 (1.09–4.16)
Top surgery	108	70.13	43	52.44	2.06 (0.88–4.79)	1.97 (0.81–4.78)
Lower surgery	74	48.05	23	28.05	2.39 (1.12–5.11)	2.57 (1.15–5.71)
Health insurance						
Public	64	41.56	38	46.34	1.29 (0.49–3.39)	1.23 (0.45–3.37)
Private	72	46.75	30	36.59	1.86 (0.65–5.32)	1.74 (0.60–5.06)
None	18	11.69	14	17.07	Ref.	Ref.
HIV tested ^b						
Ever	129	83.77	64	78.05	1.43 (0.71–2.89)	1.31 (0.65–2.65)
Last 6 months	89	57.79	45	54.88	1.11 (0.62–1.98)	1.03 (0.56–1.88)
Never	25	16.23	18	21.95	Ref.	Ref.
PrEP indicated, last 6 months						
Yes	100	64.94	62	75.61	0.58 (0.30–1.13)	0.55 (0.27–1.12)
No	54	35.06	20	24.39	Ref.	Ref.
Substance use, last 6 months						
Alcohol	51	33.12	12	14.63	2.84 (1.38–5.84)	2.63 (1.27–5.47)
Drugs	9	5.84	6	7.32	1.09 (0.30–4.03)	0.99 (0.26–3.73)
Both alcohol and drugs	90	58.44	62	75.61	Ref.	Ref.
Neither	4	2.60	2	2.44	—	—

(continued)

TABLE 2. (CONTINUED)

PrEP persistence (among HIV-negative trans MSM who reported knowing about [having heard of] PrEP and ever taken PrEP) (N=236)

Characteristic	PrEP persistence (N=154)		No PrEP persistence (N=82)		Crude and geographically adjusted multivariable models	
	n	%	n	%	OR (95% CI)	aOR (95% CI)
Psychological distress						
No distress	43	27.92	10	12.20	3.49 (1.30–9.38)	3.40 (1.23–9.45)
Low levels of distress	51	33.12	30	36.59	1.42 (0.63–3.21)	1.43 (0.63–3.26)
Moderate levels of distress	39	25.32	25	30.49	1.27 (0.55–2.89)	1.25 (0.53–2.92)
High levels of distress	21	13.64	17	20.73	Ref.	Ref.
Cisgender male sexual partner stigma						
None	44	28.57	8	9.76	3.85 (1.33–11.15)	3.90 (1.30–11.69)
Low	43	27.92	31	37.80	1.03 (0.45–2.34)	1.04 (0.47–2.39)
Moderate	45	29.22	27	32.93	1.17 (0.47–2.94)	1.23 (0.49–3.13)
High	22	14.29	16	19.51	Ref.	Ref.
Discrimination in health care						
Any	108	70.13	78	95.12	Ref.	Ref.
None	46	29.87	4	4.88	10.82 (2.62–44.71)	11.78 (2.73–50.82)
Primary source of health information						
Other	85	55.19	58	70.73	Ref.	Ref.
Social media	69	44.81	24	29.27	1.94 (1.05–3.59)	1.93 (1.02–3.67)
HIV acquisition sexual risk behavior, last 6 months ^b						
Condomless receptive anal sex	78	50.65	41	50.00	1.01 (0.49–2.07)	1.00 (0.49–2.05)
Condomless receptive frontal sex	98	63.64	56	68.29	0.81 (0.37–1.76)	0.79 (0.36–1.73)

Bold indicates statistical significance at the alpha 0.05-level.

^aGeographic location was adjusted for in each model of PrEP persistence; thus, no single-parameter estimates are presented in the aOR (95% CI) column for geographic location.

^bTotal does not sum to 100% because response options were not mutually exclusive.

65.3% (154/236) of those who had ever taken PrEP were PrEP persistent (currently taking PrEP), but they were a minority of the men who met PrEP indications (see below). PrEP was most often obtained from a primary care provider (61.4%), followed by a sexual partner (19.9%), STI clinic (9.5%), OB/GYN (9.4%), another source (8.5%), or an endocrinologist (5.5%).

PrEP indications. Approximately half (55.2%; 465/843) of the sample had one or more PrEP indications, of which 50.8% (236/465) had never taken PrEP. The most common reasons why trans MSM were not interested in PrEP were feeling they are not at risk (68.5%), being concerned about cost (24.2%), concerned about side effects (20.1%), and concerned about interference with hormones (14.6%).

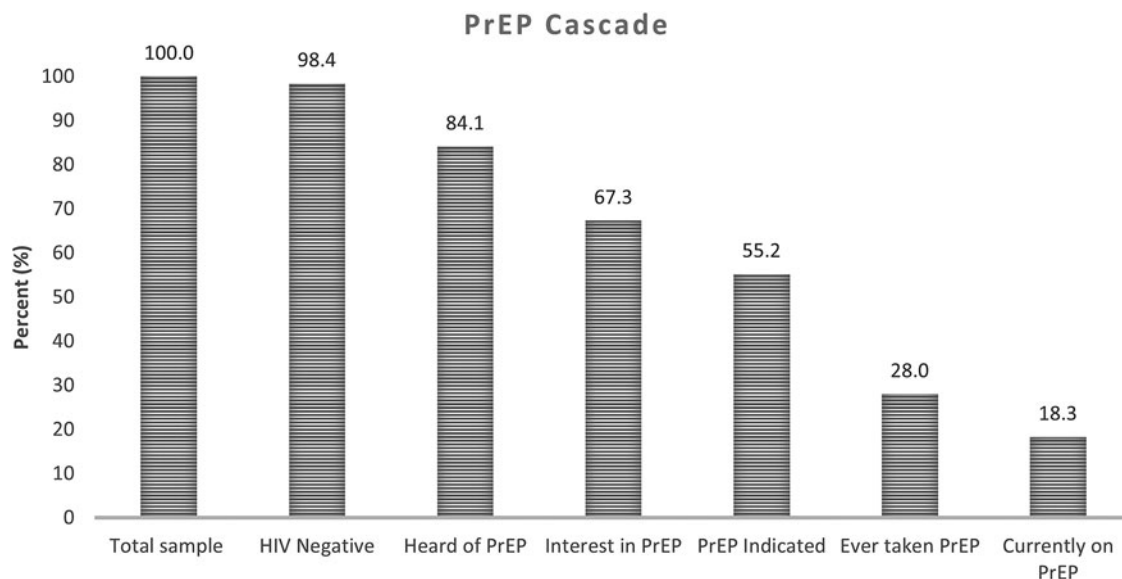


FIG. 1. The pre-exposure prophylaxis cascade in transgender men who have sex with men (n=857).

PrEP adherence. Among trans MSM who had taken PrEP ($n=236$), 52.6% reported adherence difficulties. Reasons for suboptimal adherence were as follows: being busy or having an inconsistent schedule (53.1%), reporting side effects (27.4%), too many medical visits (11.6%), and being worried PrEP may cause harm (11.4%). Side effects reported by trans MSM who had ever taken PrEP were as follows: diarrhea (34.4%), abdominal discomfort/bloating (29.1%), weight loss (26.0%), bone density (21.6%), and nausea (20.7%).

Interest in other PrEP modalities. Trans MSM were asked about other PrEP modalities and were “very” or “somewhat” interested in injectable PrEP (70.0%), blood transfusions with antibodies (54.8%), anal gel/lube (39.6%), and anal douche (31.8%). When asked to rank their preferred PrEP method, they preferred injectable PrEP (51.2%), PrEP as a daily oral pill (22.1%), anal gel/lube (14.6%), blood transfusions with antibodies (9.1%), and anal douche (3.0%).

Logistic regression models: PrEP uptake and PrEP persistence

Results from multivariable logistic regression models are shown in Table 1 for PrEP uptake and Table 2 for PrEP persistence.

PrEP uptake. Factors associated with increased odds of PrEP uptake were being aged 25–29 years and 30–39 years (vs. aged 18–24 years), being White (vs. Black), being Latinx (vs. not), identifying as gay (vs. another sexual identity), having had surgical medical affirmation (vs. none), having public health insurance (vs. no insurance), being PrEP indicated in the last 6 months (vs. not), never having experienced discrimination in health care (vs. discrimination), and using social media as the primary source of health information (vs. some other source) (all $p < 0.05$).

PrEP persistence. Elevated odds of PrEP persistence were statistically predicted by having had a surgical medical affirmation (vs. not), alcohol use (vs. not), not having any psychological distress (vs. high distress), not experiencing any cisgender male partner stigma (vs. high stigma), never having experienced discrimination in health care (vs. discrimination), and using social media as the primary source of health information (vs. another source) (all $p < 0.05$).

Discussion

Although research documents that trans MSM are at-risk for HIV acquisition,^{31,32} this group often gets ignored when it comes to HIV prevention. In this U.S. national sample of trans MSM, PrEP uptake was limited considering the high prevalence of HIV risk behaviors. Although 55.2% of trans MSM reported PrEP indications, the majority were not using PrEP, suggesting that further research, intervention development, and community education are needed to enhance uptake. However, the study found that trans MSM with PrEP indications were more likely to use PrEP than others, highlighting that PrEP may be reaching some trans MSM who need it most. The results support full inclusion of trans MSM in biomedical HIV prevention efforts, including re-

search on long-acting injectable PrEP and other new modalities, which were endorsed by approximately half of the sample.

Three overlapping factors were associated with both PrEP uptake and persistence in regression models. First, not reporting discrimination in health care was associated with PrEP care engagement. Discrimination in health care can have long-term impacts on health care utilization for transgender people.³⁰ More than 8 in 10 trans MSM in this sample indicated that they experienced enacted stigma in health care. It is therefore vital to consider discrimination and stigma-reduction in PrEP care provision for this population. National educational resources are available to train clinicians in the provision of culturally responsive care.³³

Second, trans MSM with any surgical gender affirmation were more likely to report PrEP use and continuation than those without. Medical and surgical gender affirmation improves mental health functioning, including gender dysphoria.²¹ Thus, surgically affirmed trans MSM may engage in health behaviors, such as PrEP to prevent HIV infection, to protect their bodies that now feel comfortable to them. Furthermore, trans MSM with surgery, compared with those without surgery, may access different MSM spaces and partnership pools, perhaps MSM networks with more supportive norms surrounding PrEP use, which may support uptake, or with higher HIV rates which may confer increased vulnerability for HIV acquisition. In addition, this finding may reflect the targeted marketing of PrEP to MSM and the masculine gendering of PrEP to male consumers. PrEP may be perceived of as both socially acceptable and gender-affirming for trans MSM, particularly those who have undergone medical and surgical gender affirmation. Last, this finding suggests the importance of linking PrEP and gender affirmation for trans MSM. PrEP care delivery models for trans MSM may benefit from PrEP providers linking patients to gender-affirming services and trans health providers offering comprehensive PrEP care.

Third, trans MSM who used online social media as their primary source of health information were more likely to report both PrEP uptake and persistence relative to those who utilized other information sources. The internet and online spaces are important resources for transgender people.^{34,35} This finding demonstrates the potential power of social media as a health outreach tool and the key role it may play in HIV prevention for trans MSM in the era of biobehavioral prevention. Additional research is needed to assess social media exposure and engagement for service delivery.

Limitations

Limitations of this study are the convenience sampling method. PrEP use was higher than anticipated, which may partly be a function of recruitment methods (e.g., recruitment included outreach to HIV prevention listservs). This may also be the reason why trans MSM who endorsed online social media as their primary source of health information had higher odds of PrEP uptake and persistence than those who did not. Another limitation pertains to the relatively low proportion of Black participants in the sample. This could be the result of the nonprobability sampling methods utilized in this study or to other factors that could influence participation, such as stigma. Future research that overcomes this

limitation is warranted, including studies that oversample racial/ethnic minority communities. All data are self-report; future research would benefit from gathering biospecimens (e.g., dried blood spots for PrEP adherence). It is not known whether trans MSM experienced discrimination in health care due to their gender identity, sexual orientation, or some other factor. Additional representative data are needed to characterize the PrEP cascade in the trans MSM population (e.g., barriers and facilitators to PrEP uptake, longitudinal studies modeling the PrEP cascade in trans MSM).

Conclusion

PrEP uptake was modest in this U.S. national study of trans MSM, despite that more than half of those sampled were PrEP indicated and HIV acquisition risk sexual behaviors were highly prevalent. In addition, trans MSM experience multiple HIV-related vulnerabilities due to being both a gender minority and a sexual minority. Findings from this research can be used to design, tailor, and implement HIV prevention research, programming, and services for trans MSM. Evidence-based interventions are needed that incorporate culturally specific vulnerabilities, such as stigma in health care, medical gender affirmation, and social media, to improve PrEP cascade outcomes for trans MSM.

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Authors' Contributions

S.L.R. conceptualized the study, oversaw data acquisition, data analysis, and interpretation, drafted sections of the article, and revised it critically for important intellectual content. C.S.M. conducted data analysis and interpretation and drafted sections of the article. A.A. and D.J.P. implemented data collection, conducted a literature review, interpreted findings, and drafted sections of the article. K.H.M. revised the work critically for important intellectual content. All authors reviewed and approved the article before submission.

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