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Low awareness and use of Pre-Exposure Prophylaxis in a diverse online sample of men who have sex with men in New York City

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Oral pre-exposure prophylaxis (PrEP) with emtricitabine-tenofovir has been shown to be highly effective in preventing HIV acquisition by individuals at high risk, especially men who have sex with men (MSM; Grant et al., 2010; McCormack et al., 2016; Molina et al., 2015). Research exploring knowledge, attitudes, beliefs and use of PrEP is in a formative stage and evolving. Prior studies have found MSM to be interested in using PrEP, with greater awareness and use associated with older age and higher education. (Bauermeister, Meanley, Pingel, Soler, & Harper, 2013; Mimiaga, Case, Johnson, Safren, & Mayer, 2009). At the same time, MSM report concerns about insurance coverage, medication dosages, and possible side effects (Golub, Gamarel, Rendina, Surace, & Lelutiu-Weinberger, 2013; Krakower et al., 2012; Mustanski, Johnson, Garofalo, Ryan, & Birkett, 2013).

Young MSM (YMSM) between the ages of 18 and 29 are at highest risk of HIV infection and, therefore, may stand to benefit most from PrEP use (Halkitis et al., 2011). MSM in New York City, and particularly Black and Latino YMSM, continue to experience high rates of new HIV infections and are a group for whom PrEP may be helpful in addition to other prevention interventions (Centers for Disease Control and Prevention, 2010; Chu et al.,

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Disclosures

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2011; Pathela et al., 2011). However, limited information exists regarding PrEP awareness and use in New York City MSM, especially those who are young and of racial and ethnic minority. The few available studies reported low levels of PrEP awareness or use but were conducted prior to FDA approval of emtricitabine-tenofovir for PrEP (Golub et al., 2013; Mehta et al., 2011; Rucinski et al., 2013). Studies conducted post-FDA approval that found increasing rates of awareness, but low overall use, had samples comprised largely of older, White, and more educated individuals. We therefore conducted a brief online survey to explore PrEP awareness and use among MSM in New York City, with a focus on Black and Latino YMSM, groups most at risk for HIV.

Methods

Setting and Participants

We recruited MSM who used a popular MSM-specific geosocial-networking smartphone application in the Bronx, New York. The Bronx is comprised of more than 90% racial and ethnic minorities (primarily Black and Latino), is the poorest borough in New York City, and has an HIV prevalence of 1.8% to more than 3% (HIV Epidemiology and Field Services Program, 2015). Because we were recruiting on an MSM specific application, our only inclusion criteria were being at least 16 years of age, having had anal sex in the previous year, and consenting to participate.

Recruitment and Participants

We used similar methods to those described by others to recruit participants (Goedel, Halkitis, Greene, Hickson, & Duncan, 2016; Rendina, Jimenez, Grov, Ventuneac, & Parsons, 2014). During a 48-hour period in September 2013, we used broadcast and banner advertisements, displayed to users when opening the application in the Bronx, NY. Participants could then click through to a Web-based survey. The initial survey page had screening questions and detailed information about the study, followed by an informed consent or assent (for those younger than 18). The survey was anonymous and, to help avoid duplicate or false responses, we did not provide any incentives and limited responses to one per IP address (Zhang, Bi, Hiller, & Lv, 2008). The Albert Einstein College of Medicine's Institutional Review Board approved the study.

Measures

Items on the survey included self-reported demographics, HIV testing history, future HIV testing intentions, condom use at last sexual intercourse, PrEP awareness (*Before today, had you heard about PrEP – i.e., pre-exposure prophylaxis, medicine taken by mouth BEFORE sex as protection against HIV?*), and history of PrEP use (*Have you ever taken PrEP before?*). The brief survey had 13 items and took on average 3 minutes to complete.

Analysis

The primary outcome of interest was PrEP awareness. We conducted bivariate analysis using logistic regression to determine associations between PrEP awareness and demographics, HIV testing history, and condom use. We then conducted multivariate logistic regression to identify correlates of PrEP awareness, using a backward-stepwise elimination approach and

included race/ethnicity in the models as this was a primary independent variable of interest. Given the low number of PrEP users, we provide descriptive characteristics of those individuals. We used Stata 13.1 (College Station, TX) for all analyses.

Results

Sample Characteristics

The survey was accessed by 809 individuals, of whom 302 provided informed consent and 270 completed the survey (33.3% completion rate). The majority of participants (67%) identified their race or ethnicity as non-White, the median age was 30 years, with about half the participants ($n = 126$, 48%) being between the ages of 18 and 29 (Table 1). Most participants identified as male, with one person identifying as gender-queer and another as transgender.

Sexual and HIV Testing Behaviors

The majority of participants (87%) reported men as their only sexual partners within the past 2 years and only 57% reported using condoms at the last sexual encounter (Table 1). Most respondents ($n = 245$, 91%) reported ever being tested for HIV with the majority (52%) being tested within the past 6 months, and almost two-thirds (62%) received their last test at a medical clinic or hospital (Table 1).

Awareness of PrEP

Overall, 34% of respondents ($n = 93$) indicated awareness of PrEP. Of those participants who were aware of PrEP, 92% (86/93) had ever had an HIV test and 56% (52/93) had received an HIV test within the past 6 months. By race/ethnicity, 40% of non-Hispanic Whites, 28% of non-Hispanic Blacks, and 28% of Hispanics were aware of PrEP ($p = 0.26$). Among YMSM (under 30 years of age), 27.5% ($n = 33$) were aware of PrEP versus 40% ($n = 60$) of those ages 30 and older ($p = 0.017$).

In bivariate analysis, PrEP awareness was significantly associated with older age and receiving the last HIV test at community-based organizations (CBOs; Table 2). There was a nonsignificant trend in Blacks ($p = 0.14$) and Hispanics ($p = 0.058$) being less aware of PrEP than Whites. No other measured characteristic correlated with PrEP awareness. In multivariate analysis, older age and HIV testing location remained associated with greater PrEP awareness, but race/ethnicity did not (Table 2).

Use of PrEP

Only 6 respondents reported having ever used PrEP. This represented 2% of the overall sample and 6% of those aware of PrEP. Users had a median age of 30 and ranged from 25 to 48 years. Two PrEP users identified as non-Hispanic White, two as Hispanic, one as non-Hispanic Black, and one as Asian. All identified as male, only one participant reported having non-male partners, and the majority of PrEP users ($n = 4$) reported using a condom at last sexual intercourse.

Discussion

We accessed an ethnically/racially diverse sample of MSM using a geo-social mobile networking application in a high HIV-prevalence area of New York City. The majority of our respondents were unaware of PrEP and only six reported ever using PrEP. While PrEP awareness was independently associated with older age and the location of last HIV test, we did not observe differences by race or ethnicity, condom use at last sexual encounter, or other measured characteristics.

Compared to other studies reporting on PrEP awareness in New York City MSM, which recruited using different approaches (in-person, bars, bathhouses, or via MSM specific Internet websites) and conducted prior to (Mantell et al., 2014; Rucinski et al., 2013) or after FDA approval of PrEP (Grov, Rendina, Whitfield, Ventuneac, & Parsons, 2016), rates of PrEP awareness were similar to that in our sample, ranging from 28% to 38.8%. Our findings may not be that surprising, given that this study was conducted just over 1 year after FDA approval of PrEP and the average time for new health care innovations to become widely known and adopted can be considerably long, as a more recent study of PrEP use in Black MSM found continued minimal awareness and thus stalled uptake (Eaton, Driffin, Bauermeister, Smith, & Conway-Washington, 2015). However, more recent studies in New York City MSM have found increasing rates of PrEP awareness, ranging from 65.5%–85.5% (Goedel, Halkitis, Greene, & Duncan, 2016; Strauss et al., 2016), suggesting influence of the ongoing intensive PrEP awareness campaigns by the city and state departments of health (Bellafante, 2015; New York State Department of Health, 2015) as well as numerous CBOs. These types of multi-pronged campaigns may be what is needed to help increase PrEP knowledge, a prerequisite for adoption in populations at risk of HIV.

We found that PrEP awareness was associated with HIV testing at CBOs rather than in clinical settings, which has not been previously reported. Our findings may be indicative of CBOs as important venues for both HIV testing and dissemination of HIV prevention information for MSM and, therefore, important targets for PrEP uptake interventions. Additionally, CBOs have been recruitment sites for many PrEP studies in New York City, and individuals testing at CBOs may thus have had more exposure to PrEP information. Our findings also suggest that health care providers are not universally having conversations about PrEP with MSM patients. This may be due to low provider PrEP knowledge (Smith, Mendoza, Stryker, & Rose, 2016; Tripathi, Ogbuanu, Monger, Gibson, & Duffus, 2012; White, Mimiaga, Krakower, & Mayer, 2012), lack of comfort prescribing PrEP (Krakower & Mayer, 2012), or concerns about risk compensation, resistance development, or adherence (Tellalian, Maznavi, Bredeek, & Hardy, 2013). Providers may also be unaware of their patients' sexual practices due to discomfort with sexual-health assessments or patients' discomfort disclosing same-sex behaviors (Bernstein et al., 2008), resulting in missed opportunities for appropriate health evaluations including counseling on PrEP. But regardless of the exact causes, our findings suggest a role for health care providers to counsel about PrEP, including conducting non-judgmental sexual health assessments.

Consistent with other studies of PrEP awareness (Bauermeister et al., 2013; Eaton et al., 2015; Strauss et al., 2016), older age in our sample was associated with greater PrEP

awareness, which could be attributed to a number of factors including potentially higher education levels, having increased concerns about health, and/or increased access to health care and current health information. This finding highlighted the uneven dissemination of HIV prevention information, especially to younger MSM and addressing this gap will be critical to prevent further exacerbation of HIV disparities by age. Social media and geo-social networking applications are likely efficient dissemination tools for health information to younger and racial/ethnic minority MSM and warrant further exploration (Patel, Masyukova, Sutton, & Horvath, 2016).

There are several important limitations in this study. First, we used a convenience sample from a single mobile dating application, which may not be representative of all MSM in the Bronx, and findings may not be generalizable to other MSM communities. However, we found similar rates of PrEP awareness in other studies in New York City using different recruitment approaches (Groß et al., 2016; Mantell et al., 2014; Rucinski et al., 2013). Additionally, a prior in-person survey of Bronx MSM found widespread use of social media, with individuals using online dating applications having higher rates of risk behaviors (Patel et al., 2016), suggesting we reached a population that could benefit from PrEP. Second, our survey was designed to be extremely brief to increase participation rates; we were thus unable to capture additional covariates of interest. Finally, we used self-reported measures, which could result in misclassification, but because responses were anonymous, answers may have had higher accuracy.

In conclusion, our study demonstrated low PrEP awareness and use in a diverse online sample of MSM, with uneven dissemination to YMSM and likely missed opportunities for PrEP education and counseling in clinical settings. Ongoing efforts need to better understand and address the gap between PrEP awareness and use. Finally, for PrEP to have a meaningful impact in the control of the HIV epidemic and in reducing disparities, we need more effective interventions to support PrEP uptake in groups at high risk of HIV infection, especially YMSM.

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Table 1**Participant Characteristics**

Characteristic*	n (%)
Overall	270 (100)
Median Age (IQR) in years	30 (25–40)
16–24	57 (21)
25–29	63 (23)
30	150 (56)
Race/ethnicity	
White, non-Hispanic	88 (33)
Black, non-Hispanic	57 (21)
Hispanic	98 (37)
Other	27 (9)
HIV testing, ever	
No	25 (9)
Yes	245 (91)
HIV testing, last test	
< 6 months	125 (52)
7–12 months	43 (18)
> 12 months	74 (30)
HIV testing intention, in next 3 months	
Not likely	86 (32)
Likely or very likely	184 (68)
HIV testing, location	
Clinic or Hospital	150 (62)
Community-based organization	63 (26)
Other	28 (12)
Condom use at last sexual encounter	
No	111 (43)
Yes	146 (57)
Gender	
Male	262 (99)
Genderqueer or Transgender	2 (1)
Gender of sexual partners in past year	
Men	228 (87)
Men and women	19 (7)
Men and/or women and/or transgender	14 (6)
Aware of PrEP	93 (34)
Use of PrEP	6 (2)

Note.

* Not all categories add up to 270, due to item non-response. Reported percents were calculated based on total number of responses for a given item. PrEP = pre-exposure prophylaxis; IQR = interquartile range.

Table 2

Correlates of PrEP Awareness

Characteristic	OR (95% CI)	aOR (95% CI)
Age Group, in years		
16–24	Reference	Reference
25–29	4.12 (1.57–10.85) **	3.95 (1.46–10.70) **
30	3.97 (1.66–9.53) **	3.79 (1.53–9.41) **
Race/ethnicity		
White, non-Hispanic	Reference	Reference
Black, non-Hispanic	0.59 (0.29–1.19)	0.65 (0.27–1.60)
Hispanic	0.51 (0.26–1.02)	0.70 (0.32–1.53)
Other	1.08 (0.43–2.71)	1.21 (0.50–2.90)
HIV testing, ever		
No	Reference	-
Yes	2.48 (0.98–6.26)	-
HIV testing, last test		
< 6 months	Reference	-
7–12 months	0.85 (0.38–1.90)	-
> 12 months	0.73 (0.38–1.39)	-
HIV testing, in next 3 months		
Not likely	Reference	-
Likely or Very Likely	1.03 (0.61–1.76)	-
HIV testing, location		
Clinic or Hospital	Reference	Reference
Community-based organization	1.97 (1.07–3.63) *	2.03 (1.04–3.97) *
Other	1.45 (0.63–3.35)	1.53 (0.64–3.62)
Condom use at last sexual experience		
No	Reference	-
Yes	0.84 (0.48–1.46)	-

Note.

* $p < 0.05$.

** $p < 0.01$;

OR: odds ratio, CI: confidence interval, aOR: adjusted odds ratio.