




# Disclosure of HIV Serostatus and Pre-exposure Prophylaxis Use on Internet Hookup Sites Among Men Who have Sex with Men

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## Abstract

Men who have sex with men (MSM) who use websites and smartphone applications to meet sexual partners (“hookup sites”) may be at increased HIV risk. Many sites provide profile options to disclose HIV status and pre-exposure prophylaxis (PrEP) use. Little is known about the acceptability of disclosure options which may guide sexual decision-making. We evaluated 104 MSM presenting to a publicly-funded STD clinic. Most (86%) had met a partner online in the last 12 months; 55 and 27% reported using the HIV and PrEP disclosure options, respectively. White MSM were less likely to disclose HIV status than MSM of color (46% vs 74%,  $p < 0.05$ ). Fifty-three percent of men were more likely to contact a potential partner who disclosed being HIV-negative, and 48% were more likely to do so if the person disclosed being on PrEP. Future HIV prevention approaches should promote disclosure options among MSM meeting partners online.

**Keywords** MSM · HIV · Online · Disclosure · PrEP

## Introduction

In the United States, HIV continues to disproportionately impact gay, bisexual and other men who have sex with men (MSM) [1, 2]. Pre-exposure prophylaxis (PrEP) is a daily oral medication (emtricitabine/tenofovir disoproxil fumarate) that is highly effective in preventing HIV infection among MSM [3]. Interest in PrEP has been high among MSM [4], and uptake is increasing [5]. Current challenges to successful PrEP implementation include suboptimal awareness, lack of access to health care, lack of insurance coverage, out-of-pocket costs, stigma, adherence, and retention in care [3, 6–10]. These barriers may be more pronounced among Black/African American and Hispanic/Latinx MSM. As PrEP implementation progresses, understanding how MSM disclose their PrEP use and how PrEP may affect

sexual decision-making is important to optimize HIV prevention approaches to addressing the HIV epidemic.

The increasing use of internet websites and geosocial networking (GSN) applications (“apps”) to meet sex partners, known as “hookup sites,” present an ideal opportunity to promote PrEP among MSM [11–13]. Since inception, the internet has provided a platform for MSM to engage other men for both social and sexual purposes, beginning with online chatrooms in the late 1990s [14]. Over time, studies have demonstrated that greater numbers of MSM are meeting their sexual partners online [14, 15]. This cumulated in the launch of Grindr in 2009, one of the most popular hookup sites/apps accessible on smartphone devices [12, 16]. Other commonly used hookup sites include Jack’d, Manhunt, Scruff, Adam4Adam/RADAR, and Black Gay Chat [11, 12]. Currently, a majority of MSM report using at least one hookup site to find sex partners [12, 16]. These hookup sites use geographic location to identify potential sex partners in the area and allow users to contact others within their network. As hookup sites have gained popularity, finding sex partners has become increasingly accessible. An outcome of widespread site use is increased frequency at which individuals meet anonymous sexual partners [11]. Hookup sites typically require users to populate profiles that include basic demographics such as age, gender, race,

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ethnicity, and relationship status, with an option to write in biographical information [12, 17]. Some hookup sites allow users to list their preferred sexual behaviors and sexual positions which may include condomless anal sex (CAS) or “barebacking” [18]. Based on geographic proximity and user profiles, men may also message potential partners.

HIV and PrEP disclosure options have also become popular additions to a user’s profile [19, 20]. While HIV status disclosure is a common feature on many apps, sites such as Grindr, Scruff, Manhunt, and Adam4Adam allow users to disclose “on PrEP” in their profile [12, 20]. Changing profile settings to display HIV and PrEP status may help individuals make informed decisions about sexual behaviors and condom use [19]. These disclosure options may serve as a way to reduce HIV risk among MSM. Men who choose to disclose preferences may reduce HIV risk through “serosorting,” where MSM limit HIV transmission by choosing partners for CAS based on concordant HIV status [21, 22].

Disclosing HIV and PrEP status through online hookup sites may also reduce stigma surrounding disclosure, and normalize discussions about sexuality and HIV status [12, 22, 23]. This may be especially salient for individuals who are HIV-positive [19, 20, 24]. Black/African American and Hispanic/Latinx MSM, who may already experience high internalized, social, and family-related stigma [25], may also find it easier to disclose their sexual preferences online [23]. Disclosure of HIV/PrEP status may be a way to empower many men to make informed sexual behavior choices. The goal of this study was to investigate current PrEP and HIV disclosure practices on hookup sites, and to understand how PrEP and HIV disclosure may influence behaviors.

## Methods

The study was conducted from 2016 to 2017 at the Rhode Island Sexually Transmitted Disease (STD) Clinic, the only publicly-funded STD clinic in the state. All MSM presenting for HIV/STD testing, which is roughly 35% of our clinic population, were offered participation with compensation for a one-time demographic and behavioral assessment. The assessment collected data on sociodemographic variables such as age, race, ethnicity, education, income, relationship status, and insurance status. Behavioral risk factors included substance use, transactional sex, internet use to meet sex partners, insertive and receptive anal sex behavior, condom use, and online HIV/PrEP disclosure practices. Men who met partners online were asked if they had used a hookup site that allowed them to display HIV or PrEP status on their profile. Those who responded yes were then asked whether or not they used this profile option, and if they did not, why not. Men were also asked about the likelihood that they would contact a partner for sex or use a condom

depending on what was displayed on their partner’s profile. We employed the following questions: *If the following appeared on someone’s profile, how much more or less likely would you be to contact them with the intent of having sex?* and *If the following appeared on someone’s profile, how much more or less likely would you be to use a condom for anal sex with this person?* We explored the following possible HIV/PrEP disclosure options on a profile: no information, HIV-positive, HIV-positive with an undetectable viral load, HIV-negative, or HIV-negative and on PrEP. Using a five-point Likert scale, the response options ranged from “less likely” to “more likely.”

Bivariate analyses were used to compare sociodemographic and behavioral variables of MSM who met partners online to those who did not. Multivariable logistic regression was used to compare sociodemographic and behavioral variables among those who did and did not use disclosure options. Chi square and Fisher’s exact tests distinguished categorical sociodemographic and risk behavior differences between groups. A two-sided *p* value of less than 0.05 was considered statistically significant. All statistical analyses were completed using R statistical software version 3.3.2 [26].

## Results

A total of 104 MSM participated in the demographic and behavioral assessment; 63% were 29 years of age or younger, and 33% identified as other than white. Most participants were insured (85%) and 64% had private insurance; 73% reported single as marital status and 6% reported being HIV-positive. Eighty-six percent ( $n=89$ ) of the sample had met at least one partner online in their lifetime. Men who met partners online were more likely to have more than five receptive anal partners in the past 12 months (33% vs 0% among men who had never met partners online,  $p<0.05$ ). No other demographic or behavioral variables were found to differ significantly between groups (Table 1).

Among MSM who met partners online, Fig. 1 displays HIV/PrEP disclosure practices. Eighty percent ( $n=71/89$ ) reported using a hookup site that allowed one to disclose their HIV or PrEP status. Of these, 55% ( $n=39/71$ ) used the status options on their individual profiles, which included “HIV positive,” “HIV negative,” “HIV negative, on PrEP,” or “HIV positive, undetectable.” Of the 45% ( $n=32/71$ ) who did not use the HIV disclosure option and had met partners online, the most common reason was “I prefer people to ask me” (34%;  $n=11/32$ ). Thirty-three percent ( $n=20/61$ ) of those who met partners online and used a hookup site that had a PrEP disclosure option reported using that option, “HIV negative, on PrEP.” The most common reason for not using the PrEP disclosure option was not taking PrEP (71%).

**Table 1** Demographic and behavioral characteristics of men who have sex with men recruited from a sexually transmitted disease clinic (N = 104)

	Met Partners online in Rhode Island in the last 12 months (N = 104)				Used HIV disclosure options (N = 71)			
	Total n (%)	Yes n (%)	No n (%)	Fisher's exact test p-value	Total n (%)	Yes n (%)	No n (%)	Fisher's exact test p-value
Total	104 (100)	89 (86)	15 (14)		71 (100)	39 (55)	32 (45)	
Age				0.77				0.38
13–19 years	11 (11)	10 (11)	1 (7)		8 (11)	3 (8)	5 (16)	
20–29 years	55 (53)	48 (54)	7 (47)		36 (51)	19 (49)	17 (53)	
30–39 years	20 (19)	16 (18)	4 (27)		15 (21)	11 (28)	4 (13)	
40–49 years	10 (10)	9 (10)	1 (7)		7 (10)	3 (8)	4 (13)	
50 years or older	8 (8)	6 (7)	2 (13)		4 (6)	3 (8)	2 (6)	
Race				0.40				<b>0.015</b>
White	70 (67)	61 (69)	9 (60)		48 (68)	22 (56)	26 (81)	
Black or African American	10 (10)	7 (8)	3 (20)		7 (10)	3 (8)	4 (13)	
Asian	5 (5)	5 (6)	0 (0)		4 (6)	3 (8)	1 (3)	
Other	19 (18)	16 (18)	3 (20)		12 (17)	11 (28)	1 (3)	
Ethnicity				0.42				0.081
Hispanic/Latino	14 (13)	11 (12)	3 (20)		8 (11)	8 (21)	0 (0)	
Non-Hispanic/Latino	90 (87)	78 (88)	12 (80)		63 (89)	31 (79)	32 (100)	
Sexual orientation				1.0				0.40
Homosexual or gay	86 (83)	73 (82)	13 (87)		60 (85)	31 (79)	29 (91)	
Bisexual	17 (16)	15 (17)	2 (13)		10 (14)	7 (18)	3 (9)	
Other	1 (1)	1 (1)	0 (0)		1 (1)	1 (3)	0 (0)	
Relationship status				0.65				0.87
Single	76 (73)	66 (74)	10 (67)		57 (80)	30 (77)	27 (84)	
In a relationship/married	26 (25)	21 (24)	5 (33)		13 (18)	8 (21)	5 (16)	
Divorced/other	2 (1)	2 (2)	0 (0)		1 (1)	1 (2)	0 (0)	
Education level				0.097				0.44
High school diploma or less	13 (13)	11 (12)	2 (13)		7 (10)	5 (13)	2 (6)	
Some college	39 (38)	37 (42)	2 (13)		29 (41)	13 (33)	16 (50)	
College	34 (33)	28 (31)	6 (40)		25 (35)	16 (41)	9 (28)	
Graduate school	18 (17)	13 (15)	5 (33)		10 (14)	5 (13)	5 (16)	
Income				0.56				0.36 <sup>b</sup>
Less than \$12,000	33 (32)	28 (31)	5 (33)		22 (31)	10 (26)	12 (38)	
\$12,000–\$29,999	19 (18)	17 (19)	2 (13)		11 (16)	5 (13)	6 (19)	
\$30,000–\$59,999	34 (33)	27 (30)	7 (47)		23 (32)	16 (41)	7 (22)	
\$60,000 or greater	18 (17)	17 (19)	1 (7)		15 (21)	8 (21)	7 (22)	
Insurance status				0.94				0.37
None	16 (15)	14 (16)	2 (13)		8 (11)	3 (8)	5 (16)	
Private	67 (64)	56 (63)	11 (73)		49 (69)	26 (67)	23 (72)	
Public	19 (18)	17 (19)	2 (13)		12 (17)	9 (23)	3 (9)	
Yes, other	2 (2)	2 (2)	0 (0)		2 (3)	1 (3)	1 (3)	
HIV status				1.0				0.79
Positive	6 (6)	5 (6)	1 (7)		5 (7)	2 (5)	3 (9)	
Negative	91 (88)	78 (88)	13 (87)		60 (85)	34 (87)	26 (81)	
Missing	7 (7)	6 (7)	1 (7)		6 (8)	3 (8)	3 (9)	
Receptive anal sex partners, last 12 months				<b>0.009</b>				0.91 <sup>b</sup>
≤ 5 partners	75 (72)	60 (67)	15 (100)		45 (63)	24 (62)	21 (66)	
> 5 partners	29 (28)	29 (33)	0 (0)		26 (37)	15 (38)	11 (34)	

**Table 1** (continued)

	Met Partners online in Rhode Island in the last 12 months (N = 104)				Used HIV disclosure options (N = 71)			
	Total n (%)	Yes n (%)	No n (%)	Fisher's exact test p-value	Total n (%)	Yes n (%)	No n (%)	Fisher's exact test p-value
Always use condom	24 (23)	18 (20)	6 (40)	0.11	14 (20)	7 (18)	7 (22)	0.91 <sup>b</sup>
Drug use Poppers, last 12 months	35 (34)	33 (37)	2 (13)	0.08	30 (42)	14 (36)	16 (50)	0.34 <sup>b</sup>
Other drugs <sup>a</sup> , last 12 months	22 (21)	20 (22)	2 (13)	0.73	19 (27)	9 (23)	19 (31)	0.61 <sup>b</sup>
Crystal meth, ever use	9 (9)	8 (9)	1 (7)	1.0	7 (10)	4 (10)	3 (9)	1.0
Injection drugs, ever use	7 (7)	7 (100)	0 (0)	0.59	7 (10)	4 (10)	3 (9)	1.0

Bold values indicate a two-sided p-value of less than 0.05 which was considered statistically significant

Percentages may not add up to 100% due to rounding

<sup>a</sup>Defined as any non-popper, non-marijuana use in the past 12 months (i.e., use of bath salts, crystal meth, GHB, ecstasy, LSD, heroin, Special K, crack cocaine, or other)

<sup>b</sup>Denotes that a Chi square test was performed

Notably, there was not an option to display “HIV negative, not on PrEP.” White MSM were less likely to disclose HIV status than MSM of color (46% of white MSM disclosed, vs 74% of MSM of color,  $p < 0.05$ , Table 1). In the multivariable regression, age, race, and number of receptive anal sex partners were not significantly associated with HIV/PrEP disclosure.

We explored how HIV/PrEP disclosure was associated with likelihood of contacting a potential partner online and using a condom with that partner (Figs. 2, 3). When no information was displayed on a potential partner's profile, 63% ( $n = 56/89$ ) responded that it would make no difference in their likelihood of contacting that individual with the intent of having sex. Eighty percent ( $n = 71/89$ ) said they would be less likely to contact someone if they were HIV-positive; 57% ( $n = 51/89$ ) would still be less likely to contact an HIV-positive person, even if their profile indicated they were undetectable. Fifty-two percent ( $n = 46/89$ ) of MSM reported being more likely to contact an individual who reported being HIV-negative and 47% ( $n = 42/89$ ) said they were more likely to contact if a person was on PrEP, with 43% ( $n = 38/89$ ) indicating it made no difference.

Sixty-one percent ( $n = 54/89$ ) of MSM said they would be more likely to use a condom for anal sex with a person who did not disclose their HIV status or their PrEP use. With potential partners who display that they are HIV-positive on their profile, 60% ( $n = 53/89$ ) of participants said they would be more likely to use a condom with that individual, and similarly, for potential partners who were HIV-positive but undetectable, 56% ( $n = 50/89$ ) of participants said they would be more likely to use a condom. For HIV-negative individuals, 46% ( $n = 39/89$ ) reported it would make no difference, and if on PrEP, 40% ( $n = 36/89$ ) said it would make no difference.

## Discussion

This is among the first studies to explore HIV/PrEP disclosure use among MSM who meet partners online and examine how disclosure may inform sexual decision-making and sexual partner choices. Most of the MSM presenting for HIV/STD screening had met partners online (86%), supporting similar studies that found frequent use of hookup sites among MSM [3, 4, 14]. MSM were more likely to contact HIV-negative individuals and those on PrEP than individuals who were HIV-positive or displayed no information on their profile. However, only 38% of men used HIV disclosure options on hookup sites and only 19% used the PrEP disclosure option. These results can inform future public health approaches and interventions to improve HIV/PrEP disclosure use among MSM meeting partners on online hookup sites.

Disclosure of HIV status has been found to encourage safer sex practices and prevent new HIV infections [27]. MSM who meet partners online are more likely to engage in risky sexual behaviors, such as CAS and sex with anonymous partners [28], and disclosure options on these sites may be useful in helping MSM make safer sex decisions. In a previous study, MSM who reported engaging in CAS with an online partner reported doing so because the partner had disclosed on their profile that they had an undetectable viral load or that they were on PrEP [20]. PrEP use indicates that a potential partner is likely HIV-negative and uses a medication protective against HIV, leading to a reduced risk of HIV transmission. Seventy-three percent of the sample reported that they did not disclose PrEP status because they are not taking PrEP. The PrEP disclosure option was less frequently used due to the lack of an option for “not on PrEP” on most hookup sites at the time participants were surveyed.

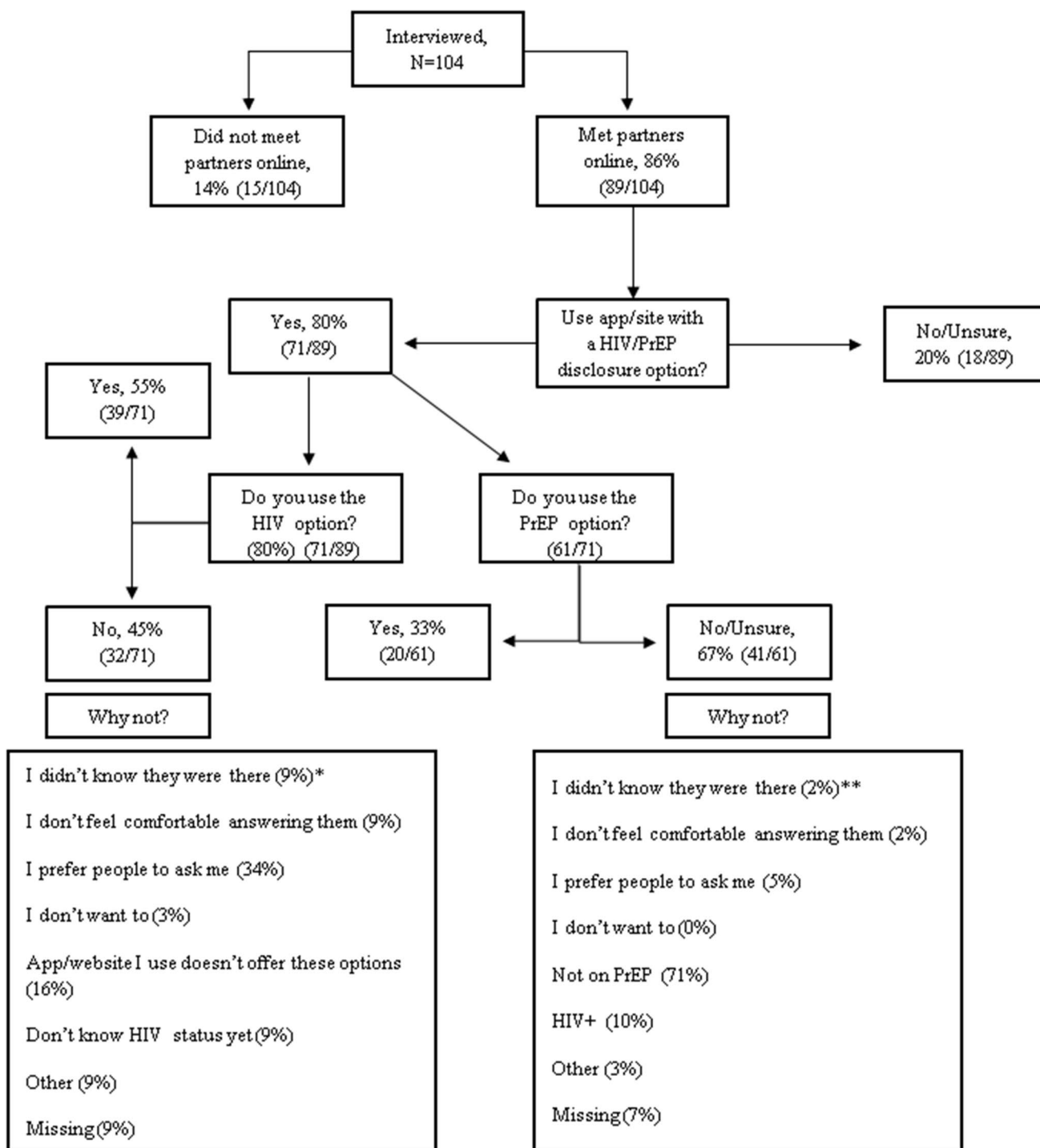


Fig. 1 Disclosure of HIV/pre-exposure prophylaxis on internet hookup sites among men who have sex with men

Providing the option to display one’s PrEP status, whether on PrEP or not, may help reduce HIV risk among MSM who meet partners online.

More than half of participants who met partners online reported that they disclose their HIV status, whether it be HIV-positive or HIV-negative. Among those who did not

disclose, the most commonly cited reason was that people prefer to discuss their HIV status in person (34%). Hookup sites with disclosure options may help individuals make informed decisions about their sexual health, as men may choose to avoid CAS with HIV-positive partners who are not on antiretrovirals and have a detectable viral load. More

**Fig. 2** Disclosure options and potential sex partners (N = 89). The percentages represent the number of men who would be more or less likely to contact another man with the intent of having sex if the following information appeared on that person's profile

47%	43%	9%	1%	On PrEP
2%	63%	34%	1%	No Information
52%	44%	3%	1%	HIV Negative
2%	16%	80%	2%	HIV Positive
11%	29%	57%	2%	Undetectable Viral Load
More Likely	No Difference	Less Likely	Missing	

**Fig. 3** Disclosure options and condom use (N = 89). The percentages represent the number of men who would be more or less likely to use condoms with a man met online if the following information appeared on that person's profile

30%	40%	25%	4%	On PrEP
61%	30%	7%	2%	No Information
29%	46%	24%	1%	HIV Negative
60%	13%	4%	22%	HIV Positive
56%	17%	10%	17%	Undetectable Viral Load
More Likely	No Difference	Less Likely	Missing	

than half (60%) of the study sample reported they would be more likely to use condoms with a partner if he disclosed an HIV positive status on his profile, affirming that HIV disclosure options can promote condom use. However, when HIV-positive MSM disclose their status online they may be subjecting themselves to external stigma and sexual rejection, as evidenced by the 80% of MSM who responded that they would be less likely to contact another man for sex if HIV-positive status appeared on his profile. Our findings demonstrate that MSM who meet partners online may find disclosure a useful and important practice when seeking sexual partners. However, many men do not use these options, potentially due to stigma concerns. Our study supports previous research and provides additional insights on the decision-making process related to HIV/PrEP disclosure among MSM who meet partners online. However, the outcomes of using these disclosure options are still largely unknown and warrant further evaluation.

Race was also significantly associated with disclosing HIV/PrEP status online. MSM of color (74%) were more likely to disclose their status on their online profiles. The reasons for these findings are unclear but may be attributed to the higher risk of HIV transmission in communities of color, especially among Black/African American MSM. In contrast, previous research found that Black/African American MSM had higher levels of stigma and were less likely to disclose HIV status to potential partners [25]. This may be a consequence of increased stigma and racial bias toward Black/African American men resulting in stereotypes related to HIV risk [29]. Despite this, hookup sites may make disclosure less stigmatizing for MSM of color because the fear of face-to-face discussion is eliminated through online disclosure [20]. Further research is needed to understand

the relationship between race and disclosure, as well as the barriers to disclosure confronted by MSM of color which include stigmatization and racialized stereotypes of HIV risk.

We found that individuals who meet partners online are more likely to have multiple receptive anal sex encounters in the past year than individuals who do not. This corroborates findings from other studies that show MSM who meet partners online report a higher average number of sexual partners [19, 30]. Studies also indicate that MSM who meet partners online represent a significant high-risk population. Public health efforts to reach this population have been hampered by the high-cost of advertising [12]. Additionally, successful public health efforts rely on hookup sites having advertising policies that are amenable and not cost-prohibitive to public health messaging [12]. Recently, many sites have improved their HIV prevention efforts. In addition to HIV and PrEP disclosure options, some hookup sites offer free or low-cost advertisements for public health agencies. Scruff, for example, has started the Benevolads Program, which allows nonprofits to create and post free advertisements [31]. While these efforts have advanced access to HIV prevention campaigns, cost and hookup site policies still limit the ability for outreach on hookup sites.

The study has several limitations. The study was performed at the only publically funded STD clinic in Rhode Island, and men enrolling in the study may represent a group at higher risk for HIV compared to the general population. As men were seeking sexual health services at the time of participation, their active utilization of healthcare may imply an increased self-efficacy to disclose sexual practices. The sample size of the study also had limited power to detect smaller differences in demographic and behavioral variables



in both bivariate and multivariable analyses. Participant interviews relied on self-reported behaviors, which may be subject to social desirability bias. This may also be the case with reporting their own HIV/PrEP disclosure on sites/apps, whether it be recalling their usage or accuracy regarding disclosure practices. In addition, between the end of the study period and the publication of results, company policies on hookup sites may have changed. Nevertheless, evaluating the widespread use of online hookup sites among MSM provides beneficial insight into the utilization of HIV/PrEP disclosure options online, the frequency in which users engage in high-risk sexual behaviors like CAS, and the overall HIV risk among MSM who meet partners online.

Hookup sites are widely used by MSM to meet sexual partners and may increase HIV transmission. Many hookup sites allow users the option to disclose their HIV/PrEP status to potential partners. However, the majority of MSM who use hookup sites do not use these features. Encouraging hookup app users to use these features might involve promoting sexual health education and knowledge about PrEP. Such efforts could take place through educational intervention in clinic settings or through the apps themselves, such as through a feature in the app that would communicate important sexual health information, including descriptions of the disclosure options. Additionally, making these options available on more sites has the potential to grant agency in sexual health among its users and may encourage MSM to use them. Future research is needed to determine how disclosure options may affect sexual decision-making and risk behaviors.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Research Involving Human Participants** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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