



# The Impact of Pre-Exposure Prophylaxis on Sexual Communication and Sexual Behavior of Urban Gay and Bisexual Men

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## Abstract

Pre-exposure prophylaxis (PrEP) has altered the public health landscape for gay, bisexual, and other men who have sex with men (GBM) by significantly increasing protection against HIV infection. Early epidemiologic data showed GBM generally used PrEP as prescribed, i.e., as an additional protective tool over and above barrier protection, although subsequent reports have been equivocal. Irrespective of population-level trends, some GBM appear to have reevaluated their HIV risk tolerance and changed their interactions with sex partners. Scant published data have focused on factors that influence PrEP-using GBM's decisions about sexual behavior—including condom use as well as sex with HIV-positive partners—and sexual communication practices. Thus, in this study, we investigated those research concerns qualitatively via content analysis of individual interviews conducted with 103 GBM in New York City (*M* age 32.5 years, 50% White, 64% on PrEP > 6 months). Emergent themes reflect (1) participants' strong HIV knowledge; (2) changing GBM community norms about condom use on PrEP; (3) increased focus on risk tolerance with individual differences in post-PrEP condom use; (4) appreciation for routine sexually transmitted infection (STI) screening in PrEP care concomitant with some STI knowledge deficits; (5) decreased stigma concerning, and greater comfort with, HIV-positive sex partners; and (6) increased confidence discussing HIV status and condom use preferences with partners. Findings have implications for future research as well as for clinical practice, such as enhanced STI education and provider-initiated discussions about risk compensation, serosorting, and sexual communication skills.

**Keywords** Pre-exposure prophylaxis (PrEP) · Gay and bisexual men · HIV · Sexual communication · Sexual behavior · Sexual orientation

## Introduction

In the U.S., gay, bisexual, and other men who have sex with men (GBM) have been the group with the highest HIV incidence and prevalence since the early days of the epidemic (CDC, 2007,

2012b, 2016). After a decade-long plateau in HIV incidence at around 40,000 new infections per year, emerging data indicate an 8% decrease for the surveillance period between 2010 and 2015 (CDC, 2016; Sullivan et al., 2018). Although this is excellent news for prevention scientists, there were still more than 38,000 new infections in 2015, and decreases in new infections have been uneven across key populations—even increasing in certain demographic subgroups, such as adults aged 25–29 and Latino GBM (CDC, 2017).

HIV prevention interventions have primarily used behavior change techniques alone, as vaccine trials have proven ineffective (e.g., Hsu & O'Connell, 2017). Thus, the mainstay in the public health arsenal for GBM were fully behavioral interventions, designed primarily to promote barrier protection use for the highest risk sexual behavior (condomless anal sex; CAS) through increasing information, motivation, and behavioral skills to reduce risk (e.g., Pantalone, Puckett, & Gunn, 2016).

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Behavioral interventions helped to decrease rates of new HIV infections. However, they appeared to have reached their maximum utility and proved unable to reduce HIV incidence further without integrating adjunctive biological prevention methods. There was no clear path forward in HIV prevention science, until the groundbreaking evidence for the use of Truvada<sup>®</sup> (emtricitabine and tenofovir disoproxil fumarate; FTC/TDF), a once-daily oral antiretroviral medication taken as pre-exposure prophylaxis (PrEP; Anderson et al., 2012).

PrEP shows efficacy in preventing HIV acquisition for a range of populations and contexts, including GBM, heterosexual men and women, transgender women, serodiscordant couples, and injecting drug users in North America, Africa, and Asia (e.g., Celum & Baeten, 2012). In fact, when taken consistently, PrEP has shown > 90% efficacy for preventing sexual transmission of HIV, and has been FDA-approved for HIV prevention infection since 2012 (CDC, 2012a). Notably, the protective ability of PrEP decreases at lower adherence. Level of protection appears to be correlated with the concentration of the medication detectable in blood samples (Donnell et al., 2014). Standard dosing is one pill once per day, although researchers are investigating the adherence versus protection balance via various forms of non-daily dosing in real-life (Molina et al., 2015) and modeling studies (Dimetrov, Mâsse, & Donnell, 2016).

PrEP protects against HIV but not against other sexually transmitted infections (STIs). Therefore, the FDA and CDC recommend PrEP as an “additional prevention tool” that is “part of a comprehensive package of prevention services,” including barrier protection (CDC, 2012a). Early data about PrEP-using GBM indicated that the men planned to use barrier protection, with PrEP as a secondary defense against infection (e.g., Holt et al., 2012). However, there is a concern that these data were influenced strongly by socially desirable responding. The more recent published literature on risk compensation—increased behavioral risk (e.g., CAS) as a result of the biomedical protection PrEP affords its users—has been equivocal.

Some providers have reported that their patients are eschewing condoms for anal sex and using PrEP as a primary form of protection rather than an adjunctive strategy, as prescribed (e.g., Oldenburg et al., 2018). Several research groups are pursuing relevant questions with their existing cohorts. In one longitudinal study of young GBM followed for 18 months (Newcomb, Moran, Feinstein, Forscher, & Mustanski, 2018), authors found higher rates of engagement in CAS for partnerships occurring in the context of PrEP use (vs. not on PrEP). More concerning is that the participants taking PrEP who reported the highest rates of receptive CAS also reported suboptimal adherence, leaving those men at increased risk of HIV acquisition (vs. those with greater adherence). Overall, however, worries regarding poor adherence and risk compensation are mitigated by data indicating that current PrEP users were not 100% condom users anyway, suggesting that PrEP is

protecting the GBM in substantial need of additional prevention strategies (Golub, Kowalczyk, Weinberger, & Parsons, 2010; Grov, Rendina, Whitfield, Ventuneac, & Parsons, 2016). PrEP is helpful but not a panacea; structural barriers continue to exert an impact, supported by findings, for example, that PrEP has been particularly under-prescribed to people of color (CDC, 2018a).

The question about the extent to which PrEP users are engaging in CAS appears to have contributed to the controversy surrounding its use. Because CAS has been connected with the spread of HIV and other STIs, individuals who engage in condomless sex can experience sexual behavior stigma (Golub, 2018; Stahlman, Hargreaves, Sprague, Stangl, & Baral, 2017). In one sample of 264 White and Black GBM and transgender women who have sex with men, 37% participants did not know about PrEP and 56% were not interested in using PrEP (Eaton et al., 2017). A significant minority of that sample (23%) endorsed the belief that PrEP was for individuals who were “promiscuous,” and—for all demographic groups investigated—reporting this belief was associated with a lack of interest in using PrEP (Eaton et al., 2017). Not unlike the 1960s controversy surrounding birth control use, many also associate PrEP use with promiscuity, leading to the labeling of PrEP users as “Truvada whores,” which has great potential to undermine PrEP effectiveness—as stigma could dissuade prospective users from approaching a provider about PrEP or deter providers from prescribing PrEP (Calabrese & Underhill, 2015; Pawson & Grov, 2018). Systemic influences of this stigma are also concerning, with Michael Weinstein, President of the AIDS Healthcare Foundation, publicly calling Truvada a “party drug” rather than acknowledging its powerful role as an HIV prevention tool (Crary, 2014). To address the challenges of systemic and interpersonal stigma, and to improve our ability to minimize the spread of HIV and other STIs in sexually active GBM, it is essential to gather more information on the open question of how PrEP use impacts sexual risk behavior.

In addition to the need for more quantitative data about the associations between PrEP use and GBM’s sexual behavior, it is important to know qualitatively how GBM PrEP users make decisions about their sexual behavior. Decision-making about sexual behavior is inherently complex, because it comprises both individual decision-making regarding one’s own risk, and communication and negotiation with a partner about behavioral intentions (Grov, Rendina, Moody, Ventuneac, & Parsons, 2015). Past studies have begun to shed light on factors influencing GBM’s condom use choices, including personal concerns (e.g., perceived lack of pleasure from condoms, fear of STIs), relationship features (e.g., length, level of trust), contextual influences (e.g., condom availability), and peer norms regarding use (e.g., Mustanski, DuBois, Prescott, & Ybarra, 2014). However, we know less about how PrEP use influences decision-making, especially with regard to decisions about having sex with HIV-positive partners. Hojilla et al. (2016) provided

preliminary insights via an analysis of notes from counselors working with 26 participants in a PrEP demonstration project. Authors found that participant condom use depended on factors including perceived riskiness of partners, relationship status, and personal factors (e.g., substance use), and that PrEP use reduced concerns about having sex with HIV-positive partners. In addition, participants cited PrEP use as a complement to existing risk reduction strategies, rather than a replacement. However, as recognized by the authors, these notes did not provide in-depth or direct access to the participants and, given the context, the notes may have been subject to the same social desirability bias.

We aim to better understand decision-making about sexual risk in the context of protection from PrEP. Specifically, in this study, we investigate how PrEP-using GBM make decisions about condom use for anal sex, how they discuss HIV status and condom use with sex partners, and how they perceive and make decisions about sex with HIV-positive partners.

## Method

### Participants

The current study consists of data taken from the baseline visit of the *PrEP & Me* study, a prospective study evaluating PrEP adherence in 104 GBM in New York City. The audio recording for one interview was lost prior to transcription, leaving an analytic sample of 103. We used targeted sampling (Watters & Biernacki, 1989) from November 2015 to November 2016, focusing advertising and preliminary screening in GBM-concentrated neighborhoods and GBM-dense settings (e.g., gay bars, pride events, LGBT community venues). Additionally, we implemented a digital recruitment strategy, focusing on GBM-focused networking websites, apps, and social media platforms. Each digital advertisement directed potential participants to a secure online survey that assessed preliminary eligibility criteria. GBM deemed preliminarily eligible (across screening settings) were asked to provide contact information for a subsequent telephone-based screening with study staff; based on information gathered in the latter screening step, eligible individuals were scheduled for a face-to-face assessment at the study's research office. All participants provided informed consent before any study procedures were conducted.

Eligibility criteria required participants to (1) be 18 years or older, (2) be a cisgender man, (3) identify as gay, bisexual, queer, or another sexual minority identity, (4) have been prescribed PrEP for > 30 days by a healthcare provider (i.e., not via a research study), (5) reside in the New York City area (to allow participation in the in-person interview), and (6) have access to the internet such that they could complete online components of the study (to meet a different study aim, described elsewhere). One goal of the quantitative phase of the study (described

elsewhere and not central to the present analyses) was to determine if club drug use was associated with PrEP adherence. Thus, approximately 50% of the sample self-reported the use of ketamine, MDMA/ecstasy, GHB, cocaine, or methamphetamine in the past 30 days. To assure that participants were currently taking PrEP, each provided proof of their active prescription by bringing their pills and pill bottle with their name and the date printed on it.

### Procedure

Study visits included computer-based quantitative data collection as well as 1:1 audio-recorded, semi-structured interviews (30–45 min). Participants were compensated \$40 for the study visit. The initial interview guide was developed by the research team and was subsequently refined via feedback from community representatives and consulting researchers external to the study. The interview guide covered a variety of PrEP-related topics, including open-ended questions regarding the present study's aims: "Now that you are on PrEP...how have conversations around HIV with your sex partners changed?...how have your perceptions of having sex with those who are HIV-positive changed, if at all?...how do you make decisions about when to use a condom and when not to use a condom for anal sex?"

### Analytic Plan

All interviews were transcribed verbatim, and transcripts were independently verified against the original audio file by a second team member. We conducted analyses using a team-based approach and guided by the theory and methods of conventional content analysis (Hsieh & Shannon, 2005). We selected this method for its strength in describing phenomena for which existing research or theory is limited. The coding team was led by the first author, and the coding was completed by the third, fourth, and fifth authors. In terms of social locations, the coders and authors comprise doctoral students and faculty members in clinical psychology, social work, and public health, all with extensive expertise in sexual minority health disparities, and most of whom have extensive experience in behavioral aspects of the HIV epidemic.

Data analytic methods for content analysis are inductive, beginning with researchers reading a subset of transcripts several times and highlighting repeating ideas. We organized these initial codes into a written codebook, discussing the nuances of potential code labels to create a shared understanding. We iteratively grouped related codes into categories. Independently, team members piloted the draft codebook to analyze batches of transcripts and confer about suggested codes until the group felt collective confidence in the coders' and codebook's reliability. We then coded all of the transcripts using this frame. Coders tracked data via the qualitative data management

program NVIVO and met regularly to resolve discrepancies (Hill, Thompson, & Williams, 1997).

Over time, the focus of coding meetings shifted from discussing specific codes and their hierarchical organization to how the most robust themes applied to our research questions. Themes followed closely from the major categories identified in the data. To enhance the trustworthiness of the analysis, we used multiple sources of triangulation—multiple coders, multiple readings, and iterative consensual agreement (Patton, 2002). The research team met regularly for peer debriefings to review and discuss the emergent themes, modifying and refining them following our group deliberations. Our iterative process ensures that the themes reflect the data, with all team members agreeing with the final themes (Lincoln & Guba, 1985).

## Results

### Participant Characteristics

Participants reported mean age at the time of interview was 32.5 years (SD 8.7) and nearly all (96.1%) identified as gay/queer/homosexual (hereafter “gay” for brevity), with the remainder as bisexual or another sexual minority label. Fifty-two (50.5%) participants identified as White, 12 (11.7%) as Black, 9 (8.7%) as multiracial, and 3 (2.9%) as “other.” Ethnically, 27 (26.2%) identified as Latino. Most participants had completed at least some college (94.2%) and were currently employed (81.6%). The majority (61.2%) of participants reported that they were single, followed by dating (34%) and married (4.8%). The length of time participants reported being on PrEP varied; 15 (14.4%) reported having taken PrEP for 1–3 months, 24 (23.1%) for 3–6 months, 27 (26%) for 6–12 months, 28 (26.9%) for 1–2 years, and 10 (9.6%) for > 2 years. Most (61%) participants had missed a dose of PrEP in the previous 90 days and the average number of missed doses in the 30 days prior to interview was 1.6 (SD 3.0).

### Qualitative Findings

One-on-one interviews conducted with urban, PrEP-using GBM revealed a range of information they viewed as important to their sexual decision-making processes, and a range of reactions to the protective power of PrEP. We present the themes, below, and any of the repeating ideas that comprise them (lettered), with exemplar quotes which are, themselves, labeled with the participant’s demographic information. See Table 1.

**Theme 1: The men are generally knowledgeable about the science of HIV and behavioral risk reduction.** Although it was not an explicit question in the interview, participants spontaneously displayed extensive knowledge about HIV risk that they shared in responding to other interview questions. For example, some of the advanced insights that participants

shared included reference to HIV being difficult to control with a vaccine because of the properties of a retrovirus, and the knowledge that HIV transmission risk is increased when the number of partners is higher (vs. number of sex acts) and via increased infectivity of HIV-positive partners with a detectable viral load. GBM described a strong knowledge of PrEP, including the need for daily dosing to maintain blood levels above the threshold of viral suppression, and the potential for liver toxicity as a side effect. Some men were knowledgeable about recent research reports of relevance, i.e., about the IPERGAY study results on intermittent PrEP dosing (Molina et al., 2015), and recent news reports, including a highly publicized case of seroconversion with a medication-resistant strain of HIV due to PrEP treatment failure (Knox, Anderson, Harrigan, & Tan, 2017). As one participant noted:

I think with the studies that have come out showing that you can use it intermittently, you know, “I missed a day, I still have enough in my system”—it should be fine, I’ll wait to take it tomorrow. (White gay man, age 37)

Overall, participants spoke with confidence about highly nuanced health education content, and provided examples of how they used this knowledge to inform their sexual decision-making.

**Theme 2: The men describe the post-PrEP era as a revolution for GBM as sexual beings, including positive and negative changes in community norms that influence own and others’ sexual behaviors.** It was in the context of relatively advanced knowledge that participants reported on their personal decision-making processes about condom use, and the shifting community norms about condom use in the context of PrEP in which they make those decisions. Participants were thoughtful about the impact of PrEP, positive and negative, on GBM communities. One repeating idea was (a) a perceived decrease in collective HIV acquisition risk for GBM overall, given the dissemination of PrEP and expectations that it would continue to be prescribed more. As one man said:

It actually was a really interesting experience, I think. To be such an early adopter, you really get to see the community form around PrEP that didn’t exist. There were people who were on it online, there were people who were curious about it and would ask about it. It was really this organic, grassroots kind of thing—it was...something special to see it form around PrEP. (White gay man, age 32)

Many participants described PrEP as “empowering and unlike anything that’s come before it” (White gay man, age 30). Other men described (b) mixed or negative evaluations of PrEP’s impact on GBM communities.

**Table 1** Themes and subthemes

Theme	Subtheme
<b>Theme 1:</b> The men are generally knowledgeable about the science of HIV and behavioral risk reduction	
<b>Theme 2:</b> The men describe the post-PrEP era as a revolution for GBM as sexual beings, including positive and negative changes in community norms that influence their own and others' sexual behaviors	<p>(2a) a perceived decrease in collective HIV acquisition risk for GBM overall</p> <p>(2b) mixed or negative evaluations of PrEP's impact on GBM communities</p> <p>(2c) a strong internalized stigma against condomless sex</p> <p>(2d) relief that they and their partners could acknowledge more publicly the kinds of sexual behavior that they desired</p>
<b>Theme 3:</b> Men reported a range of cognitive, affective, and behavioral responses to the additional protection afforded by PrEP. Universally, men described PrEP-taking as leading them to reconsider their decision-making about condom use and clarify their risk limits, whether or not they changed them post-PrEP	<p>(3a) PrEP allows them to assert control of their HIV risk outside of their behavior within a given sexual encounter</p> <p>(3b) men reported nearly all possible combinations of pre-post PrEP condom use, e.g., no changes because they always use them, no changes because they never use them, using them less because of the increased protection of PrEP, etc.</p> <p>(3c) increased willingness to engage in sexual experimentation</p>
<b>Theme 4:</b> GBM acknowledged that engagement in PrEP-protected condomless sex carries a significant STI risk, and expressed gratitude for the routine STI screening accompanying PrEP care. However, men reported variable reactions to that risk, minimized the impact of viral STIs on their health, and appeared less knowledgeable about STIs versus HIV	<p>(4a) the risk calculus for condomless sex versus STI risk was favorable</p> <p>(4b) the experience of being diagnosed and treated for STIs was upsetting</p> <p>(4c) STIs are easily treated</p> <p>(4d) PrEP does not protect against STIs and it the increase in condomless sex that facilitates STI incidence is frustrating</p> <p>(4e) men extolled the benefits of routine medical provider visits with STI testing</p> <p>(4f) no participants expressed an understanding that active STIs increase biological risk for HIV acquisition</p>
<b>Theme 5:</b> Irrespective of their personal condom use preferences, PrEP-using GBM reported more comfort interacting sexually with HIV-positive partners. Men expressed appreciation for the reduction in fear of HIV infection and greater sense of connection heralded by PrEP	<p>(5a) less anxiety during and after their sexual encounters with HIV-positive partners</p> <p>(5b) ongoing hesitance about having sex with HIV-positive men, and a preference for HIV-negative men</p> <p>(5c) no changes to their behavior toward HIV-positive partners, in that they were always open to HIV-positive sexual partners</p> <p>(5d) describe PrEP's benefit to their sexual satisfaction in serodiscordant relationships</p>
<b>Theme 6:</b> PrEP-taking GBM feel increased confidence in discussing HIV status with sex partners when needed, and perceive HIV-positive GBM to be more willing to honestly disclose their status	<p>(6a) feel more comfortable discussing their HIV status with sex partners</p> <p>(6b) obviated the need for them to talk about HIV status at all</p> <p>(6c) perceived their HIV-positive partners and potential partners as feeling less stigmatized and, thus, more open to disclosing their true status</p>

I know for some guys, they'll like misinterpret what it's meant for. "Oh, I'm on PrEP, so I don't need to use a condom." You still should but, I don't know, I just get that feeling from some people that [PrEP] is an excuse not to use condoms—but I don't think that's what it's for. (White gay man, age 34)

Many men's comments about their and others' experiences with PrEP (c) reflected a strong internalized stigma against condomless sex which, for the 30 years of the epidemic before PrEP, was regarded as the ultimate HIV risk behavior, and the

primary target of HIV prevention interventions across populations. One man shared:

People my age, it was just drummed into us, "Use condoms, use condoms, use condoms." They don't want to let that go...[and] any deviation from that makes them uncomfortable... We were conditioned to use condoms [laughs]. (Black gay man, age 46)

The condomless sex stigma appeared as stereotypes about PrEP users, such as, "If you want to take PrEP, you're just a cumdump-whore who is disgusting" (White gay man, age 32) or "a vector for STIs" (Multiracial Latino gay man, age 48).

Given that stigma, it is unsurprising that conflict would arise between those internalized and affectively-laden messages and the knowledge that PrEP is strongly protective against HIV infection. As one participant shared, “I think the fact that, after years of torture, thinking you’re gonna die because you have sex and equating sex with death, [PrEP is] a really positive thing for gay men’s sex or, you know, everybody now” (White gay man, age 46).

Men noted (d) relief that they and their partners could acknowledge more publicly the kinds of sexual behavior that they had long desired, but that had been so stigmatized: “People were excited...[to] be more honest about the sex they were having, and not feel bad about it, like not feel shame or guilt about the kind of sex that they wanted to have” (White gay man, age 30).

**Theme 3: Men reported a range of cognitive, affective, and behavioral responses to the additional protection afforded by PrEP. Universally, men described PrEP-taking as leading them to reconsider their decision-making about condom use and clarify their risk limits, whether or not they changed them post-PrEP.** Participants described a variety of factors that they consider in making decisions about condom use for themselves, and about insistence on condom use by their sexual partners. A common repeating idea was the insight that (a) PrEP allows them to assert control of their HIV risk outside of their behavior within a given sexual encounter. As one man shared:

For me, [taking PrEP] was, for the first time, a way that I could actively protect myself with it all being my responsibility—and not being dependent on someone else telling me what they were doing in terms of protecting their selves or their status. So, it was a way for me to take the other person out of the equation almost entirely, and put all the responsibility on me...in terms of keeping myself protected. (White gay man, age 33)

Some participants described asking partners about their PrEP status, although what seemed like the stronger inclination was not to bother, since the men were aware that they were protected against HIV acquisition because of their own PrEP-taking. As one participant shared, “I still ask them, “Are you HIV-negative?” You know, I don’t always ask about PrEP. I’m not really concerned about them being on PrEP as much as I’m [laughs], you know, that I’m on PrEP” (White gay man, age 49).

Men described (b) all possible combinations of pre-post PrEP condom use, e.g., no changes because they always use them, no changes because they never use them, using them less because of the increased protection of PrEP, etc. For some men, the most important factor in condom use decisions when taking PrEP was regularity of contact with a given partner; one man stated, “New people [or] people that I [only] see every so often, you gotta strap up” (Black bisexual man, age 21), and another said “I would

have to be in a relationship with someone for quite a long while before I [would stop using condoms]...so it hasn’t changed [in practice, because I’m not in a long-term relationship]...I would say the only change is that that [condomless sex] is now a possibility” (Black gay man, age 46). Some men insisted on condom use when engaging in receptive anal sex (“the few times [I’ve insisted on a condom] it’s been when the other person that was using [the condom] fucked me” [White Latino gay man, age 32]), or of relinquishing responsibility to the insertive partner (“It was always up to the top” [White gay man, age 33]). Some men described that, as the insertive partner, they were comfortable with the risk associated with condom non-use even before taking PrEP, such that their behavior did not change even though their HIV risk decreased:

I would expect that it won’t change my frequency of condom use that much just because, if I’m the insertive partner, I don’t use a condom, and during oral sex I don’t use a condom. Whereas, if I’m the receptive partner, I pretty much always do use a condom and I think, in all likelihood, that would remain my preference. However, I can see the instance if an insertive partner really didn’t want to use one, I could see at least being more open to agreeing with that decision if I’m on PrEP. (White gay man, age 46)

GBM have long extolled the relational benefits of condomless sex, in addition to the enhanced physical sensations. One participant eloquently shared this sentiment:

It’s really, it feels great having sex without a condom, without having to worry about HIV. I feel like it’s more intimate. It’s just, it feels nicer!...like you’re closer with the person that you’re having sex with...[and] not having to worry about contracting HIV is great. It’s wonderful! It’s very liberating as a gay man. (White gay man, age 26)

Some participants reporting an increase in sexual risk behavior described ambivalence, such that they required time and reflection to reconcile their actions with their sense of comfort and the shifting community norms for GBM on PrEP:

I think it gave me a license to be more promiscuous. And I’m not fully comfortable with being as promiscuous as I’ve been. I’m not comfortable emotionally being as promiscuous as I have been and...this is probably not something that some of the HIV groups want to hear, but it gave me license to have more sex and to have more condomless sex too. (Multiracial Latino gay man, age 48)

In addition to making decisions based on a desire for increased sexual pleasure and symbolic closeness, many participants described (c) an increased willingness to engage in sexual experimentation. For example, one participant shared that he has become more open to engaging in receptive anal sex with or without a condom, depending on his relationship with

the partner. In addition, he noted: “I would never have gone to like orgies or sex parties if I didn’t feel like I was completely protected from HIV” (Asian gay man, age 30). Finally, it appears as though associations between PrEP and sexual risk limits are a developmental process, increasing or decreasing risk over time:

At first, it didn’t really change my behavior at all. And then, I think, as I became more comfortable with taking it, and as I learned more about it—and as more friends and everyone went on it, and also a whole lot more studies came out and papers came out from different studies, I think—I just became more convinced that it was working at least as good as condoms. And so, if I was okay with just having sex with just condoms, I should be okay with having sex with just PrEP. (White gay man, age 37)

As has been described in other reports in more detail (e.g., Storholm, Volk, Marcus, Silverberg, & Satre, 2017), many of the substance using participants noted that, although they prefer to use condoms when they are not under the influence, being drunk or high was a context in which they had condomless sex: “There will be the occasional weekend where it’s sort of like a party weekend... and I’ll get out of control and I will forget [to take PrEP], which seems ironic because it’s probably when I need it the most” (White gay man, age 32).

Overall, participants tended to report either no changes or relatively minor increases in risk (provided they were highly adherent to PrEP), accompanied by a substantial decrease in their anxiety about the consequences of their behavior. As one participant stated:

For me, it’s been very freeing in that regard. I haven’t gone out and had more sex or, for any intents and purposes, different kinds of sex than I was having beforehand—but there’s this anxiety that’s not there. (White gay man, age 33).

**Theme 4: GBM acknowledged that engagement in PrEP-protected condomless sex carries a significant STI risk, and expressed gratitude for the routine STI screening accompanying PrEP care. However, men reported variable reactions to that risk, minimized the impact of STIs on their health, and appeared less knowledgeable about STIs versus HIV.** Nearly all participants acknowledged the increased STI risk that accompanies reductions in condom use and, for many GBM, changed PrEP-community norms and increased comfort expanding their personal sexual risk limits. For some men, (a) the risk calculus for condomless sex versus STI risk was favorable: “I’ve encountered other STIs before. They’re curable. And I’m sure that if I used a condom, I wouldn’t have caught it” (White gay man, age 26). For other men, (b) the experience of being diagnosed and treated for STIs was upsetting:

[Now that I’m on PrEP]...I’d have sex with random people, and sometimes—like 7–8 months ago, when I first

started—I was just randomly having sex with people and then my doctor would call and be like, “Oh you’ve tested positive for anal gonorrhea.” I’m like, “What’s anal gonorrhea?”—“You tested positive for syphilis.” I’m like, “OK, wow!” (Black Latino gay man, age 30)

Many men expressed the sentiment that (c) STIs are easily treated: “Let me get a shot and two pills and I’ll be fine” (American Indian/Alaskan Native Latino gay man, age 27). Some men described contracting multiple STIs using language reflecting their evaluation of these infections as surprising and a nuisance:

So, I have gotten a lot more STIs. I would say, like, an obscene amount! It really freaking pisses me off ‘cause I’m not that big of a slut, and I just don’t understand how it happens all the time. (White gay man, age 28)

Also, many men stated emphatically their knowledge that (d) PrEP does not protect against STIs and, simultaneously, expressed frustration about the increase in condomless sex that facilitates STI incidence. As one participant noted: “I’m acutely aware that you don’t want to create a situation where you’re exposing yourself to other sexually transmitted diseases and, you know, making [yourself] a petri dish of diseases that could become potentially drug resistant” (Multiracial Latino gay man, age 41). Another said: “I try to discourage other folks from thinking that it’s a silver bullet. ‘Cause I’m not in that crowd that wants to engage in more raw sex because I’m on PrEP” (Black gay man, age 28). Almost universally, men (e) extolled the benefits of routine medical provider visits with STI testing:

Before this, I wasn’t getting tested for every other STD on a regular basis unless I had some kind of symptom... I wasn’t going in and saying, “Hey, would you test me for syphilis and gonorrhea and chlamydia?”... But now I’m regularly tested, so I feel much more confident that... I’m not passing along anything. (White gay man, age 43)

Some men made comments indicating their knowledge about both bacterial (curable) and viral (treatable) infections, although others did not differentiate, i.e., speaking about STIs as a monolithic entity. Notably, (f) no participants expressed an understanding that active STIs increase the biological risk for HIV acquisition.

**Theme 5: Irrespective of their personal condom use preferences, PrEP-using GBM reported more comfort interacting sexually with HIV-positive partners. Men expressed appreciation for the reduction in fear of HIV infection and greater sense of connection heralded by PrEP.** Many participants expressed (a) less anxiety during and after their sexual encounters with HIV-positive partners, a greater openness to having sex with HIV-positive GBM than before starting PrEP, or a willingness to tolerate riskier behaviors—because they are more protected and also because they have a better

understanding of the biology of HIV transmission risk through conversations with healthcare providers. As one man shared:

It's allowed me to become more intimate with men who are HIV positive in ways that I wouldn't have considered before going on PrEP. I bottom for positive men now. I wouldn't have done that before I was on PrEP. (White Latino gay man, age 32)

One participant described the knowledge that underpins his decision-making about having sex with HIV-positive partners:

I think that being on PrEP has helped me understand a little bit more how...HIV transmission works and, so, being on PrEP has taken out the stigma a little bit, of just exchanging an encounter or perhaps becoming involved with someone who is HIV-positive. If you can see that someone is taking care of themselves and they are disciplined about their medication and going to their appointments... then why not? (White Latino gay man, age 35)

Some men described (b) an ongoing hesitance about having sex with HIV-positive men, and a preference for HIV-negative men: "I'm still hesitant to hook-up with someone who is positive... it's not judgmental, but it's my own fear and my own inability to let go of what's ingrained in me for years" (White gay man, age 36). Those participants typically acknowledged the low-to-zero biological risk of acquiring HIV from an HIV-positive partner, even if they engaged in condomless sex, because of the protection afforded by PrEP. Other participants described (c) no changes to their behavior toward HIV-positive partners, in that they were always open to them as sexual partners:

I've never really, as long as they're undetectable, never really had negative connotation about it because, actually, if you're taking treatment as prevention once you have HIV, then your chances of giving it someone are super-low, so I just treat it like anyone else, like, wear a condom and don't cum inside me. (White gay man, age 23)

Several men reported being in serodiscordant primary partnerships and described (d) the benefits of PrEP to their sexual satisfaction in serodiscordant relationships: "I have a partner of a year and a half and we have an open relationship. He's positive. I got on PrEP because he was positive, to protect myself and now we don't use condoms any more. It's much more fulfilling sexually" (White Latino gay man, age 36).

**Theme 6: PrEP-taking GBM feel increased confidence in discussing HIV status with sex partners when needed, and perceive HIV-positive GBM to be more willing to honestly disclose their status.** Many men described that being on PrEP (a) has helped them to feel more comfortable discussing their HIV status with sex partners. Some men described having pushed themselves to have those conversations before taking PrEP, but noted that the conversations are much easier post-PrEP. Men reported that, when they disclose and learn in

response that a potential partner is also on PrEP, they interpret that information positively: "I'm thinking that person is more together and responsible and everything, and that probably means that we're gonna enjoy the sex more [laughs]" (Black gay man, age 46). The decreased anxiety about HIV acquisition when taking PrEP led some men to feel more relaxed about HIV status discussions that, previously, would have been more formal. In one participant's words:

...about the person [I was talking about earlier], it was like, I was inside him and I said, "By the way, I'm on PrEP!" and then he said, "Oh yeah, I am too!" So, I mean, that's kind of, I think the change is it's more of an after-thought to disclose. (White gay man, age 36)

One factor that seems to drive this comfort in discussing status is a decreased anxiety about the HIV-negative men being put in a position in which they would feel the need to reject an HIV-positive partner because of the fear of HIV acquisition, or to have to be more assertive about condom use or other behavioral risk reduction strategies with another putatively HIV-negative partner.

I think it's easier now to say something about your HIV status now that PrEP is around, whether you're positive or negative or you don't know, because [I] have this added layer of protection, while before it was like the elephant in the room... It's funny, I think I'm more willing to disclose now. (White gay man, age 36)

For other GBM, being on PrEP has (b) obviated the need for them to talk about HIV status at all, given the added level of protection afforded by PrEP. As one man says, "You know, I don't always ask about PrEP—I'm not really concerned about them being on PrEP as much as I am that I'm on PrEP" (White gay man, age 49).

Another repeating idea was that these HIV-negative participants (c) perceived their HIV-positive partners and potential partners as feeling less stigmatized and, thus, more open to disclosing their true status. As one man shared:

Honestly, it seems like guys are a lot more willing to be honest, now that I tell them I'm on PrEP—because they know that, even if they're HIV-positive, they don't have to lie about it because I'm PrEP so, odds are, I'm not gonna make it a deal breaker anymore. (White gay man, age 27)

## Discussion

Our study findings contribute to a growing literature on individual sexual behavior among GBM in the era of PrEP. Specifically, we sought to investigate (1) how PrEP-using GBM make decisions about condom use for anal sex, (2) how they discuss HIV status and condom use with sex partners, and (3) how



they perceive and make decisions about sex with HIV-positive partners. Our work provides important insights on the potential impact of PrEP on GBM sexual health and community cohesion via improved understanding of the internal psychological processes that guide GBM's sexual decisions and, thus, their behaviors (Golub, 2014).

### PrEP Use, Condoms for Anal Sex and STIs

Whether PrEP users engage in risk compensation, as well as the relative threat risk compensation does or does not pose, has been debated in the literature since PrEP was first introduced (Blumenthal & Haubrich, 2014; Kelly, 2018; Marcus et al., 2013). GBM in our sample described shifting community norms about condom use in the era of PrEP. Our data add nuance to this conversation through close examination of participants' narratives regarding sexual decision-making given the protection from HIV acquisition afforded by PrEP. Many participants described no changes to their behavior. Some noted increased frequency of sex, increased number of sexual partners, openness to new types of sexual activity, or openness to new types of sexual partners. These alterations in sexual behavior were coupled with a major decrease in anxiety (Hojilla et al., 2016).

Our results should be interpreted in the context of health behavior theories that guide behavioral interventions for condom use. A central tenet of the Health Belief Model (Janz & Becker, 1984), for example, is perceived susceptibility, which refers to one's perception of the chances of contracting a health disease or condition (Witte, 1992). Men in our sample displayed advanced knowledge regarding their protection from HIV given PrEP's efficacy, indicating that in the context of PrEP, GBM's perceived vulnerability to HIV acquisition is decreased. Similarly, research on the Information-Motivation-Behavioral Skills Model (Fisher, Fisher, & Harman, 2003) has posited that anxiety about contracting HIV may be a motivator for condom use, although findings in this area are mixed (e.g., Brown, DiClemente, & Park, 1992). Some participants described being conditioned to use condoms out of fear of HIV acquisition, which invokes a large literature on the message framing for encouraging condom use. Authors of a meta-analysis of the short- and long-term outcomes of HIV prevention interventions (Earl & Albarracín, 2007) concluded that, "inducing fear is not an effective way to promote HIV-relevant learning or condom use." This work raises important questions about how to frame the benefits of consistent condom use in the context of PrEP, as fear-based messaging regarding STI transmission is likely to be ineffective. Future research should further investigate PrEP's benefits to overall sexual health among GBM by alleviating anxiety associated with HIV acquisition.

Despite PrEP's effectiveness in preventing HIV acquisition, it does not protect against other STIs (CDC, 2018c). Our

participants were impressively knowledgeable about the benefits of PrEP in preventing HIV, displaying fluency in nuances about viral load and infectivity and lowered protection in the context of suboptimal adherence (Groves et al., 2018). Participants acknowledged STI risk in the context of condomless sex; overall, however, their knowledge on this topic was significantly less advanced. GBM expressed frustration about infection with bacterial STIs and low-level anxiety about infection with viral STIs, and some demonstrated an understanding about the differences in prognosis between the two—although others described STIs as a monolithic entity. Surprisingly, though, no participants drew an explicit connection between active STIs and increased HIV risk, even in the context of PrEP. It has been long-known that STIs exert an increased biological risk for HIV acquisition, mediated by several pathways including, for example, increased white blood cell activity at the site of infection and a disruption of the mucosal barriers to infection (e.g., Fleming & Wasserheit, 1999). Basic research should be conducted to better understand the pharmacodynamics of PrEP in relation to STI infection and any resultant reductions in PrEP effectiveness, especially in the context of intermittent dosing.

Limited knowledge regarding the connection between bacterial STIs and consequences for individual health and overall effectiveness of PrEP is of concern. STI incidence is increasing across the United States (CDC, 2018b), and medication-resistant gonorrhea presents particular challenges for public health (Unemo & Nicholas, 2012). Although some studies have demonstrated increased STI acquisition among PrEP users (Kojima, Davey, & Klausner, 2016), some have not (Parsons, Rendina, Whitfield, & Groves, 2018), and this continues as a topic of debate among public health scholars (Harawa et al., 2017). In fact, some modeling studies suggest that PrEP uptake and routine sexual health screening could lead to sustained decreases in chlamydia and gonorrhea incidence in the long-term (Jenness et al., 2017). A recent study of primary care providers demonstrated their limited knowledge of STI screening guidelines and PrEP, even among those reporting GBM-specific training (Walker, Friderici, & Skiest, 2017). Our data bolster previous work suggesting the need for increased provider training and patient education regarding STIs as a co-factor in HIV transmission and reinforcing the importance of regular STI screening for PrEP users, and for skills building around sexual health communication.

### Discussions About HIV Status and Condom Use with Sex Partners

Our finding that PrEP use facilitates conversations about HIV is relatively novel and warrants further empirical attention. GBM reported that being on PrEP increased their comfort and confidence in initiating and participating in more nuanced conversations about HIV with sexual partners, as the consequences of those conversations were less likely to lead to one partner rejecting the other partner based on serostatus. Participants discussed

taking PrEP as an indication of self-respect and responsibility, a stance that may counteract the ‘Truvada whore’ stigma, which persists despite counter-narratives of sexual responsibility (Calabrese & Underhill, 2015; Pawson & Grov, 2018). PrEP users as popular-opinion leaders may be effective in destigmatizing PrEP and increasing PrEP uptake among GBM.

There is a robust literature demonstrating the link between sexual health communication and condom use. In a meta-analysis, Noar, Carlyle, and Cole (2006) synthesized findings from 53 studies published in 27 journals and found large effects between explicit communication about condoms and sexual history and actual condom use. A subsequent meta-analysis showed similar results, with effect sizes tied to direct conversation about condom use superseding those tied to sexual history (Widman, Noar, Choukas-Bradley, & Francis, 2014). Although some participants described communication with sexual partners about HIV status and their own PrEP use, few described explicit conversations regarding condoms or about partners’ PrEP use or HIV status. This, coupled with frustrations regarding increased STIs among participants, suggests that providers and public health professionals may wish to encourage direct communication regarding condom use and STI prevention in the context of PrEP. Such conversations may benefit from use of a “gain” frame instead of a “loss” frame, which appears to be more effective when targeting health prevention behaviors (Rothman, Bartels, Wlaschin, & Salovey, 2006).

The timing of sexual health communication is also crucial. Although our data do not speak to how participants knew if their partners were using PrEP, or if they were HIV-positive (and virally suppressed), we can surmise that these conversations did not always take place prior to the initiation of sex—given that some participants described conversations about PrEP use after intercourse had already begun. Men living with HIV may face numerous barriers to disclosing their serostatus (Serovich, Mason, Bautista, & Toviessi, 2006) and disclosure of HIV-positive serostatus to all partners has been negatively associated with increasing numbers of sexual partners (Sullivan, 2005). Some participants described PrEP use as an empowering way of protecting themselves from HIV acquisition independent of their partners’ behaviors. Prior research has described tools to encourage sexual communication among gay men in social spaces where such communication can be challenging (Grov, Cruz, & Parsons, 2014). Online partner seeking applications (e.g., *Grindr*, *Scruff*, *Hornet*) have begun to incorporate PrEP use and HIV viral suppression as fields that users can identify in their profiles, which may facilitate sexual communication between partners met via those platforms prior to meeting for sex (Tharret, 2016). Future behavioral interventions for PrEP use may incorporate content on sexual health communication skills on a variety of topics that may improve health outcomes, including PrEP adherence, HIV medication adherence, and condom use for STI prevention.

## Perceptions About Having Sex with HIV-Positive Partners

Our participants also offered interesting insights regarding conversations about the practice of serosorting. Serosorting refers to “individuals, regardless of their HIV status, engag[ing] in sexual risks only with those partners who they believe to be seroconcordant” (Parsons et al., 2005, p. S14). In our study, PrEP users generally expressed increased willingness to have sex with HIV-positive partners, or at least less anxiety associated with it. Participants shared interesting perspectives on a decreased ‘divide’ between HIV-positive and HIV-negative men, noting that PrEP has the potential to create more of a shared sense of sexual community among GBM. Since the FDA approved PrEP in 2012, there have been major community efforts to increase PrEP awareness and uptake (Liu et al., 2014). These campaigns, such as #PLAYSURE (New York City) and #PrEP’dAF (Los Angeles), rely on messaging about sex without fear of HIV transmission for both HIV-negative and HIV-positive men. Increasingly, conversations about PrEP have entered sexual partner seeking spaces for GBM online (Newcomb, Mongrella, Weis, McMillen, & Mustanski, 2016). Numerous social networking apps, a primary venue for sexual partner seeking among GBM, have incorporated features that allow users to display their HIV-status and PrEP use. HIV stigma and the accompanying fears of rejection are a well-documented barrier to HIV disclosure (Smith, Rossetto, & Peterson, 2008); this phenomenon has been observed on social networking apps, specifically (Holloway et al., 2017). Other qualitative studies have noted the importance of PrEP messaging in GBM’s social spaces as a way to promote conversations about PrEP (Patten, LeBlanc, Jackson, & Adam, 2016), and other work has documented the role of PrEP in strengthening emotional bonds in serodiscordant partnerships (Ware et al., 2012). Further quantitative research should focus on the role of PrEP in reducing community-level HIV stigma and promoting community cohesion from the perspective of both HIV-negative and HIV-positive GBM.

Negotiated safety refers to the “strategy of dispensing with condoms within HIV-seronegative concordant regular sexual relationships under certain conditions” (Kippax et al., 1997, p. 191). Participants in main partner relationships discussed PrEP use resulting in loosening of “rules” within open relationships. HIV risk among gay men often occurs in the context of relationships (Mitchell, Harvey, Champeau, & Seal, 2012), and broken relationship agreements have been associated with increased risk for HIV (Gomez et al., 2012). This topic warrants further attention in the era of PrEP. Qualitative studies with male–male couples have helped researchers understand relationship agreements among GBM prior to the introduction of PrEP (Hoff & Beougher, 2010); further research is needed to replicate and extend this work in the context of PrEP. In addition, quantitative studies with male–male couples that

employ dyadic data analyses to evaluate the impact of PrEP use on individual- and partner-level sexual behaviors may shed further insights into the ways that PrEP impacts relationship dynamics, allows couples to expand their sexual repertoires, and minimizes risk of HIV acquisition if relationship agreements are broken.

## Limitations

Study findings should be interpreted in light of methodologic limitations. Although the sample for this qualitative study was very large compared to other qualitative work on PrEP use (Hojilla et al., 2016; Young, Flowers, & McDaid, 2014a), a longitudinal design would be needed to demonstrate causal associations between PrEP use and sexual communication or behavior. All qualitative data are limited by social desirability bias and the limits of the participant's individual understanding and insight, and cross-sectional designs are limited by reliance on retrospective accounts of participants' experiences. The limitation of self-report is particularly relevant with regard to PrEP adherence, which should be measured using more objective measures in future research (Abaasa et al., 2018). Participants were all PrEP users in New York City in 2015–2016, which is unique as an urban area, and thus our findings may reflect previous but not current community norms. Also, half of the sample comprised active substance users, which is likely an over-representation of that experience compared to a community sample.

## Conclusions

Despite limitations, this study provides important insights into future directions for clinical and community-based interventions for PrEP users. Clinicians prescribing PrEP should be aware of potential changes in sexual dynamics that may occur in the context of PrEP use at the individual- and partnership-level. Providers should encourage regular STI screening per CDC guidelines (CDC, 2018c), and be prepared to offer PrEP-taking GBM education on STI-HIV risk links, strategies for mitigating STI acquisition, and the importance of rapid STI treatment post-diagnosis. At the community level, public health departments may wish to explore the possibility of peer-driven PrEP education interventions that utilize existing PrEP users as champions for this HIV prevention strategy within their social networks. Previous peer-led interventions among GBM, including those implemented via social media (Young et al., 2014b), may help to increase PrEP uptake among GBM.

This study also offers important future directions for researchers who study sexual behavior among GBM. Additional work is needed on the impact of PrEP on male–male couples. Some research has highlighted motivators and barriers for PrEP use among serodiscordant couples (Brooks et al., 2011), and more work is needed to understand in greater depth how PrEP

influences sexual decision-making in seroconcordant couples, especially for men in open relationships who have negotiated agreements about extra-dyadic sexual contact. In addition, community-level research that focuses on the role of PrEP in reducing HIV stigma and increasing community cohesion is warranted. HIV stigma has a negative impact on the mental health and well-being of GBM living with HIV (Courtenay-Quirk, C., Wolitski, R. J., Parsons, J. T., Gomez, C. A., & Seropositive Urban Men's Study Team, 2006), and emerging research has begun to address how PrEP may “bridge the serodivide” among HIV-negative and HIV-positive GBM (Koester et al., 2018). More research is needed in understanding the impact of PrEP on GBM communities over time as PrEP use becomes more commonplace.

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## Compliance with Ethical Standards

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

**Ethical Approval** All procedures were continuously approved by the institutional review board of the City University of New York.

**Informed Consent** All participants provided informed consent before the start of any study procedures.

## References

- Abaasa, A., Hendrix, C., Gandhi, M., Anderson, P., Kamali, A., Kibengo, F., & Haberer, J. E. (2018). Utility of different adherence measures for PrEP: Patterns and incremental value. *AIDS and Behavior*, 22, 1165–1173. <https://doi.org/10.1007/s10461-017-1951-y>.
- Anderson, P. L., Glidden, D. V., Liu, A., Buchbinder, S., Lama, J. R., Guanira, J. V., & Veloso, V. G. (2012). Emtricitabine-tenofovir concentrations and pre-exposure prophylaxis efficacy in men who have sex with men. *Science Translational Medicine*, 4(151), 151ra125.
- Blumenthal, J., & Haubrich, R. (2014). Risk compensation in PrEP: An old debate emerges yet again. *The Virtual Mentor*, 16(11), 909–915.
- Brooks, R. A., Kaplan, R. L., Lieber, E., Landovitz, R. J., Lee, S. J., & Leibowitz, A. A. (2011). Motivators, concerns, and barriers to adoption of pre-exposure prophylaxis for HIV prevention among

- gay and bisexual men in HIV-serodiscordant male relationships. *AIDS Care*, 23(9), 1136–1145.
- Brown, L. K., Diclemente, R. J., & Park, T. (1992). Predictors of condom use in sexually active adolescents. *Journal of Adolescent Health*, 13(8), 651–657.
- Calabrese, S. K., & Underhill, K. (2015). How stigma surrounding the use of HIV pre-exposure prophylaxis undermines prevention and pleasure: A call to destigmatize “Truvada whores”. *American Journal of Public Health*, 105(10), 1960–1964. <https://doi.org/10.2105/AJPH.2015.302816>.
- Celum, C., & Baeten, J. (2012). Tenofovir-based pre-exposure prophylaxis for HIV prevention: Evidence and evolving questions. *Current Opinion in Infectious Diseases*, 25(1), 51–57. <https://doi.org/10.1097/QCO.0b013e32834ef5ef>.
- Centers for Disease Control and Prevention. (2007). *HIV/AIDS Surveillance report: Cases of HIV infection and AIDS in the United States and dependent areas, 2005*. Retrieved from <https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-2005-vol-17.pdf>.
- Centers for Disease Control and Prevention. (2012a). *CDC statement on FDA approval of drug for HIV prevention*. Retrieved from <https://www.cdc.gov/nchhstp/newsroom/2012/fda-approvesdrugstatement.html>.
- Centers for Disease Control and Prevention. (2012b). *HIV Surveillance report: Diagnoses of HIV infection and AIDS in the United States and dependent areas, 2010*. Retrieved from <https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-2010-vol-22.pdf>.
- Centers for Disease Control and Prevention. (2016). *HIV surveillance report: Diagnoses of HIV infection in the United States and dependent areas, 2015*. Retrieved from <https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-2015-vol-27.pdf>.
- Centers for Disease Control and Prevention. (2017). *HIV surveillance report: Diagnoses of HIV infection in the United States and dependent areas, 2016*. Retrieved from <https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-2016-vol-28.pdf>.
- Centers for Disease Control and Prevention. (2018a). *HIV prevention pill not reaching most Americans who could benefit—Especially people of color*. Retrieved from <https://www.cdc.gov/nchhstp/newsroom/2018/croi-2018-PrEP-press-release.html>.
- Centers for Disease Control and Prevention. (2018b). *Sexually transmitted disease surveillance 2017*. Retrieved from [https://www.cdc.gov/std/stats/17/2017-STD-Surveillance-Report\\_CDC-clearance-9.10.18.pdf](https://www.cdc.gov/std/stats/17/2017-STD-Surveillance-Report_CDC-clearance-9.10.18.pdf).
- Centers for Disease Control and Prevention. (2018c). *U.S. Public Health Service: Preexposure prophylaxis for the prevention of HIV infection in the United States—2017 update: A clinical practice guideline*. Retrieved from <https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2017.pdf>.
- Courtenay-Quirk, C., Wolitski, R. J., Parsons, J. T., Gomez, C. A., & Seropositive Urban Men’s Study Team. (2006). Is HIV/AIDS stigma dividing the gay community? Perceptions of HIV-positive men who have sex with men. *AIDS Education & Prevention*, 18(1), 56–67.
- Cravy, D. (2014). Gay men divided over use of HIV prevention drug. *Associated Press News*. Retrieved from <https://apnews.com/c1442585f57b421abe7cc6b0c4f96141>.
- Dimotrov, D., Mäse, B., & Donnell, D. (2016). PrEP adherence patterns strongly affect individual HIV risk and observed efficacy in randomized clinical trials. *Journal of Acquired Immune Deficiency Syndromes*, 72(4), 444–451. <https://doi.org/10.1097/qai.0000000000000993>.
- Donnell, D., Baeten, J. M., Bumpus, N. N., Brantley, J., Bangsberg, D. R., Haberer, J. E., & Celum, C. (2014). HIV protective efficacy and correlates of tenofovir blood concentrations in a clinical trial of PrEP for HIV prevention. *Journal of Acquired Immune Deficiency Syndromes*, 66(3), 340–348. <https://doi.org/10.1097/qai.0000000000000172>.
- Earl, A., & Albarraçin, D. (2007). Nature, decay, and spiraling of the effects of fear-inducing arguments and HIV counseling and testing: A meta-analysis of the short- and long-term outcomes of HIV-prevention interventions. *Health Psychology*, 26(4), 496–506.
- Eaton, L. A., Kalichman, S. C., Price, D., Finneran, S., Allen, A., & Maksud, J. (2017). Stigma and conspiracy beliefs related to pre-exposure prophylaxis (PrEP) and interest in using PrEP among black and white men and transgender women who have sex with men. *AIDS and Behavior*, 21(5), 1236–1246. <https://doi.org/10.1007/s10461-017-1690-0>.
- Fisher, W. A., Fisher, J. D., & Harman, J. (2003). The information–motivation–behavioral skills model: A general social psychological approach to understanding and promoting health behavior. In J. Suls & K. A. Wallston (Eds.), *Social psychological foundations of health and illness* (pp. 82–106). Malden, MA: Blackwell Publishing.
- Fleming, D. T., & Wasserheit, J. N. (1999). From epidemiological synergy to public health policy and practice: The contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sexually Transmitted Infections*, 75(1), 3–17.
- Golub, S. A. (2014). Tensions between the epidemiology and psychology of HIV risk: Implications for pre-exposure prophylaxis. *AIDS and Behavior*, 18(9), 1686–1693.
- Golub, S. A. (2018). PrEP stigma: Implicit and explicit drivers of disparity. *Current HIV/AIDS Reports*, 15(2), 190–197. <https://doi.org/10.1007/s11904-018-0385-0>.
- Golub, S. A., Kowalczyk, W., Weinberger, C. L., & Parsons, J. T. (2010). Preexposure prophylaxis and predicted condom use among high-risk men who have sex with men. *Journal of Acquired Immune Deficiency Syndromes*, 54(5), 548–555. <https://doi.org/10.1097/QAI.0b013e3181e19a54>.
- Gomez, A. M., Beougher, S. C., Chakravarty, D., Neilands, T. B., Mandic, C. G., Darbes, L. A., & Hoff, C. C. (2012). Relationship dynamics as predictors of broken agreements about outside sexual partners: Implications for HIV prevention among gay couples. *AIDS and Behavior*, 16(6), 1584–1588.
- Grov, C., Cruz, J., & Parsons, J. T. (2014). Men who have sex with men’s attitudes toward using color-coded wristbands to facilitate sexual communication at sex parties. *Sexuality Research and Social Policy*, 11(1), 11–19.
- Grov, C., D’Angelo, A. B., Flynn, A. W., Lopez-Rios, J., Pantalone, D. W., Holloway, I. W., & Parsons, J. T. (2018). How do gay and bisexual men make up for missed PrEP doses, and what impact does missing a dose have on their subsequent sexual behavior? *AIDS Education and Prevention*, 30(4), 275–286.
- Grov, C., Rendina, H. J., Moody, R. L., Ventuneac, A., & Parsons, J. T. (2015). HIV serosorting, status disclosure, and strategic positioning among highly sexually active gay and bisexual men. *AIDS Patient Care and STDs*, 29, 559–568. <https://doi.org/10.1089/apc.2015.0126>.
- Grov, C., Rendina, H. J., Whitfield, T. H. F., Ventuneac, A., & Parsons, J. T. (2016). Changes in familiarity with and willingness to take PrEP: Results from a longitudinal study of gay and bisexual men. *LGBT Health*, 3, 252–257. <https://doi.org/10.1089/lgbt.2015.0123>.
- Harawa, N. T., Holloway, I. W., Leibowitz, A., Weiss, R., Gildner, J., Landovitz, R. J., & Shoptaw, S. (2017). Serious concerns regarding a meta-analysis of preexposure prophylaxis use and STI acquisition. *AIDS*, 31(5), 739–740.

- Hill, C. E., Thompson, B. J., & Williams, E. N. (1997). A guide to conducting consensual qualitative research. *The Counseling Psychologist, 25*(4), 517–572.
- Hoff, C. C., & Beougher, S. C. (2010). Sexual agreements among gay male couples. *Archives of Sexual Behavior, 39*(3), 774–787.
- Hojilla, J. C., Koester, K. A., Cohen, S. E., Buchbinder, S., Ladzekpo, D., Matheson, T., & Liu, A. Y. (2016). Sexual behavior, risk compensation, and HIV prevention strategies among participants in the San Francisco PrEP demonstration project: A qualitative analysis of counseling notes. *AIDS and Behavior, 20*(7), 1461–1469.
- Holloway, I. W., Winder, T. J., Lea, C. H., III, Tan, D., Boyd, D., & Novak, D. (2017). Technology use and preferences for mobile phone-based HIV prevention and treatment among black young men who have sex with men: Exploratory research. *JMIR mHealth and uHealth, 5*(4), e46. <https://doi.org/10.2196/mhealth.6436>.
- Holt, M., Murphy, D. A., Callander, D., Ellard, J., Rosengarten, M., Kippax, S. C., & de Wit, J. B. (2012). Willingness to use HIV pre-exposure prophylaxis and the likelihood of decreased condom use are both associated with unprotected anal intercourse and the perceived likelihood of becoming HIV positive among Australian gay and bisexual men. *Sexually Transmitted Infections, 88*(4), 258–263.
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277–1288.
- Hsu, D. C., & O’Connell, R. J. (2017). Progress in HIV vaccine development. *Human Vaccines & Immunotherapeutics, 13*(5), 1018–1030.
- Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. *Health Education Quarterly, 11*(1), 1–47.
- Jenness, S. M., Weiss, K., Goodreau, S. M., Gift, T., Chesson, H., Hoover, K. W., Smith, D. K., Sullivan, P., & Rosenberg, E. (2017). *STI incidence among MSM following HIV pre-exposure prophylaxis: A modeling study*. Poster presented at the Conference on Retroviruses and Opportunistic Infections, Seattle, WA.
- Kelly, P. W. (2018). The end of safe gay sex? *New York Times*. Retrieved from <https://www.nytimes.com/2018/06/26/opinion/gay-men-sex-condoms.html>.
- Kippax, S., Noble, J., Prestage, G., Crawford, J. M., Campbell, D., Baxter, D., & Cooper, D. (1997). Sexual negotiation in the AIDS era: Negotiated safety revisited. *AIDS, 11*(2), 191–197.
- Knox, D. C., Anderson, P. L., Harrigan, P. R., & Tan, D. H. (2017). Multidrug-resistant HIV-1 infection despite preexposure prophylaxis. *New England Journal of Medicine, 376*(5), 501–502.
- Koester, K. A., Erguera, X. A., Kang Dufour, M. S., Udoh, I., Burack, J. H., Grant, R. M., & Myers, J. J. (2018). “Losing the phobia:” Understanding how HIV pre-exposure prophylaxis facilitates bridging the serodivide among men who have sex with men. *Frontiers in Public Health, 6*, 250. <https://doi.org/10.3389/fpubh.2018.00250>.
- Kojima, N., Davey, D. J., & Klausner, J. D. (2016). Pre-exposure prophylaxis for HIV infection and new sexually transmitted infections among men who have sex with men. *AIDS, 30*(14), 2251–2252.
- Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Thousand Oaks, CA: Sage Publications.
- Liu, A., Cohen, S., Follansbee, S., Cohan, D., Weber, S., Sachdev, D., & Buchbinder, S. (2014). Early experiences implementing pre-exposure prophylaxis (PrEP) for HIV prevention in San Francisco. *PLoS Medicine, 11*(3), 1–6. <https://doi.org/10.1371/journal.pmed.1001613>.
- Marcus, J. L., Glidden, D. V., Mayer, K. H., Liu, A. Y., Buchbinder, S. P., Amico, K. R., & Grant, R. M. (2013). No evidence of sexual risk compensation in the iPrEx trial of daily oral HIV preexposure prophylaxis. *PLoS ONE, 8*(12), e81997. <https://doi.org/10.1371/journal.pone.0081997>
- Mitchell, J. W., Harvey, S. M., Champeau, D., & Seal, D. W. (2012). Relationship factors associated with HIV risk among a sample of gay male couples. *AIDS and Behavior, 16*(2), 404–411.
- Molina, J. M., Capitant, C., Spire, B., Pialoux, G., Cotte, L., Charreau, I., & Raffi, F. (2015). On-demand preexposure prophylaxis in men at high risk for HIV-1 infection. *New England Journal of Medicine, 373*(23), 2237–2246.
- Mustanski, B., DuBois, L. Z., Prescott, T. L., & Ybarra, M. L. (2014). A mixed-methods study of condom use and decision-making among adolescent gay and bisexual males. *AIDS and Behavior, 18*(10), 1955–1969.
- Newcomb, M. E., Mongrella, M. C., Weis, B., McMillen, S. J., & Mustanski, B. (2016). Partner disclosure of PrEP use and undetectable viral load on geosocial networking apps: Frequency of disclosure and decisions about condomless sex. *Journal of Acquired Immune Deficiency Syndromes, 71*(2), 200–206. <https://doi.org/10.1097/qai.0000000000000819>.
- Newcomb, M. E., Moran, K., Feinstein, B. A., Forscher, E., & Mustanski, B. (2018). Pre-Exposure Prophylaxis (PrEP) use and condomless anal sex: Evidence of risk compensation in a cohort of young men who have sex with men. *Journal of Acquired Immune Deficiency Syndromes, 77*(4), 358–364. <https://doi.org/10.1097/qai.0000000000001604>.
- Noar, S. M., Carlyle, K., & Cole, C. (2006). Why communication is crucial: Meta-analysis of the relationship between safer sexual communication and condom use. *Journal of Health Communication, 11*(4), 365–390.
- Oldenburg, C. E., Nunn, A. S., Montgomery, M., Almonte, A., Mena, L., Patel, R. R., & Chan, P. A. (2018). Behavioral changes following uptake of HIV pre-exposure prophylaxis among men who have sex with men in a clinical setting. *AIDS and Behavior, 22*(4), 1075–1079. <https://doi.org/10.1007/s10461-017-1701-1>.
- Pantalone, D. W., Puckett, J. A., & Gunn, H. A. (2016). Psychosocial factors and HIV prevention for gay, bisexual, and other men who have sex with men. *Social and Personality Psychology Compass, 2*(1), 109–122. <https://doi.org/10.1111/spc3.12234>.
- Parsons, J. T., Rendina, H. J., Whitfield, T. H. F., & Grov, C. (2018). *Changes in rectal STI incidence and behavioral HIV risk before, during, and after PrEP in a national sample of gay and bisexual men in the United States*. Paper presented at the International AIDS Conference, Amsterdam, Netherlands.
- Parsons, J. T., Schrimshaw, E. W., Wolitski, R. J., Halkitis, P. N., Purcell, D. W., Hoff, C. C., & Gómez, C. A. (2005). Sexual harm reduction practices of HIV-seropositive gay and bisexual men: Serosorting, strategic positioning, and withdrawal before ejaculation. *AIDS, 19*, S13–S25.
- Patten, S., LeBlanc, M. A., Jackson, E., & Adam, B. (2016). *The resonance project community report: Emerging biomedical discourses on HIV among gay men and their service providers*. Retrieved from <https://www.catie.ca/sites/default/files/Resonance%20Project-Full%20Report.pdf>.
- Patton, M. Q. (2002). Two decades of developments in qualitative inquiry: A personal, experiential perspective. *Qualitative Social Work, 1*(3), 261–283.
- Pawson, M., & Grov, C. (2018). ‘It’s just an excuse to slut around’: Gay and bisexual mens’ constructions of HIV preexposure prophylaxis (PrEP) as a social problem. *Sociology of Health & Illness, 40*, 1391–1403. <https://doi.org/10.1111/1467-9566.12765>.
- Rothman, A. J., Bartels, R. D., Wlaschin, J., & Salovey, P. (2006). The strategic use of gain- and loss-framed messages to promote healthy behavior: How theory can inform practice. *Journal of Communication, 56*(Suppl. 1), S202–S220.
- Serovich, J. M., Mason, T. L., Bautista, D., & Toviessi, P. (2006). Gay men’s report of regret of HIV disclosure to family, friends, and sex partners. *AIDS Education and Prevention, 18*(2), 132–138.
- Smith, R., Rossetto, K., & Peterson, B. L. (2008). A meta-analysis of disclosure of one’s HIV-positive status, stigma and social support. *AIDS Care, 20*(10), 1266–1275.

- Stahlman, S., Hargreaves, J. R., Sprague, L., Stangl, A. L., & Baral, S. D. (2017). Measuring sexual behavior stigma to inform effective HIV prevention and treatment programs for key populations. *JMIR Public Health and Surveillance*, 3(2), e23. <https://doi.org/10.2196/publichealth.7334>.
- Storholm, E. D., Volk, J. E., Marcus, J. L., Silverberg, M. J., & Satre, D. D. (2017). Risk perception, sexual behaviors, and PrEP adherence among substance-using men who have sex with men: A qualitative study. *Prevention Science*, 18(6), 737–747.
- Sullivan, K. M. (2005). Male self-disclosure of HIV-positive serostatus to sex partners: A review of the literature. *Journal of the Association of Nurses in AIDS Care*, 16(6), 33–47.
- Sullivan, P. S., Smith, D. K., Mera-Giler, R., Siddiqi, A., Gunnels, B., Harris, N., et al. (2018). *The impact of pre-exposure prophylaxis with TDF/FTC on HIV diagnoses, 2012–2016, United States*. Presentation at the International AIDS Conference, Amsterdam, Netherlands.
- Tharret, M. (2016). *Grindr adds new filters for HIV status, PrEP use*. Retrieved from <http://www.newnownext.com/grindr-hiv-prep-filter/11/2016/>.
- Unemo, M., & Nicholas, R. A. (2012). Emergence of multidrug-resistant, extensively drug-resistant and untreatable gonorrhoea. *Future Microbiology*, 7(12), 1401–1422.
- Walker, D., Friderici, J., & Skiest, D. (2017). Primary care providers have limited knowledge about STI screening and HIV PrEP in men who have sex with men. *Open Forum Infectious Diseases*, 4(1), S667. <https://doi.org/10.1093/ofid/ofx163.1779>.
- Ware, N. C., Wyatt, M. A., Haberer, J. E., Baeten, J. M., Kintu, A., Psaros, C., & Bangsberg, D. R. (2012). What's love got to do with it? Explaining adherence to oral antiretroviral pre-exposure prophylaxis (PrEP) for HIV serodiscordant couples. *Journal of Acquired Immune Deficiency Syndromes*, 59(5), 463–468.
- Watters, J. K., & Biernacki, P. (1989). Targeted sampling: Options and considerations for the study of hidden populations. *Social Problems*, 36, 416–430.
- Widman, L., Noar, S. M., Choukas-Bradley, S., & Francis, D. B. (2014). Adolescent sexual health communication and condom use: A meta-analysis. *Health Psychology*, 33(10), 1113–1124.
- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, 59(4), 329–349.
- Young, I., Flowers, P., & McDaid, L. M. (2014a). Barriers to uptake and use of pre-exposure prophylaxis (PrEP) among communities most affected by HIV in the UK: Findings from a qualitative study in Scotland. *British Medical Journal Open*, 4(11), e005717. <https://doi.org/10.1136/bmjopen-2014-005717>
- Young, S. D., Holloway, I., Jaganath, D., Rice, E., Westmoreland, D., & Coates, T. (2014b). Project HOPE: Online social network changes in an HIV prevention randomized controlled trial for African American and Latino men who have sex with men. *American Journal of Public Health*, 104(9), 1707–1712.

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