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SEXUAL HEALTH

Gay, bisexual, and queer men's confidence in the Undetectable equals Untransmittable HIV prevention message: longitudinal qualitative analysis of the sexual decision-making of pre-exposure prophylaxis users over time

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ABSTRACT

Background. Our objective was to understand what gay, bisexual, and queer men (GBQM) who had experience using pre-exposure prophylaxis (PrEP) thought about the 'Undetectable equals Untransmittable' (U=U) message and how it informed their sexual decision-making over time. **Methods.** We conducted annual longitudinal qualitative interviews (2020–22) with 17 current or former PrEP users as part of a mixed-methods implementation science study examining barriers and facilitators to PrEP awareness, access, and adherence. Over 3 years, 47 interviews were conducted with GBQM in Ontario, Canada. Interviews were transcribed verbatim and coded in NVivo following reflexive thematic analysis. **Results.** Participants' sexual health decision-making was informed by their confidence in biomedical HIV prevention and the person taking medication (i.e. themselves using PrEP versus a real/imagined person living with HIV (PLHIV)). Longitudinal narratives of U=U clustered around four overarching themes: (1) *U=U confidence* (i.e. increasing trust in U=U irrespective of their PrEP use); (2) *PrEP confidence* (i.e. accounts of self-reliance and PrEP as sufficient HIV protection); (3) *combination confidence* (i.e. trusting U=U and PrEP as a package); and (4) *partner confidence* (i.e. potential 'distrust' of U=U due to uncertainties about partners' medication adherence). Overall, men described increased sex with PLHIV over time, including some participants who, during earlier interviews, said they would 'never be comfortable' with serodifferent sexual partners. **Conclusions.** GBQM's use of PrEP shaped how they thought about U=U and sex with PLHIV. Although many GBQM embraced treatment as prevention/U=U as significant to their sexual lives, longitudinal analysis revealed its varied and uneven adoption across participants and time.

Keywords: Canada, gay, bisexual, and queer men, HIV prevention, longitudinal, pre-exposure prophylaxis (PrEP), qualitative, sexual behaviours, sexual decision-making, 'Undetectable equals Untransmittable' (U=U).

Introduction

'Undetectable equals Untransmittable' (U=U) is an HIV prevention message endorsed by community partners in over 100 countries worldwide,[1] as well as the World Health Organization.[2] Although the letters in the slogan's equation change according to linguistic contexts – for example, 'Indétectable=Intransmissible' (I=I) in French[3] – the core message is consistent: 'A person living with HIV who is on treatment and has an undetectable viral load cannot sexually transmit HIV'.[4] U=U was first launched as a campaign in 2016 and built on the legacy of 'Treatment as Prevention' (TasP), which was pioneered in Canada a decade earlier as both a publicly funded treatment policy and rhetorical strategy to communicate the population-level benefits of HIV treatment.[5–9] As the Prevention Access Campaign

describes it, 'TasP is the foundation for U=U . . . U=U builds upon TasP by indicating the level at which there is no risk of transmitting HIV sexually'.[4]

TasP and the U=U message join another significant biomedical advancement in HIV prevention: pre-exposure prophylaxis (PrEP). The Canadian guidelines on PrEP strongly recommend it for gay, bisexual, queer, and other men who have sex with men (GBQM) at a higher risk of HIV acquisition.[10] Although research has demonstrated heightened awareness of PrEP among GBQM in Montreal, Toronto, and Vancouver, only 25% of eligible men used this form of biomedical HIV prevention.[11] Several reasons were linked to GBQM not using PrEP, including low perceived risk for HIV acquisition, viewing PrEP as ineffective, not having a primary care doctor, and lack of medical insurance given the patchwork coverage that currently exists nationally.[11,12]

U=U has been widely supported by the scientific research community, with its evidentiary base coming from a series of large clinical studies over a decade.[7,9,13,14] As we describe elsewhere, 'these studies elucidate an evolution in scientific knowledge of the impacts of HIV undetectability for men who have sex with men, with evidence regarding male anal sex moving from qualified to definitive after the release of these most recent findings in 2018' (p. 1271).[15] However, as more than two decades of research have shown, the knowledge of the prevention benefits of HIV treatment is not new information for many GBQM living with HIV or their sexual partners.[16,17]

Over the past 6 years, U=U has been incorporated into public health messaging, community position statements, and some physician communications with patients in Canada.[18–21] However, awareness of the prevention benefits of TasP and U=U, and willingness to rely on this message in one's everyday sexual lives, is not uniform for all GBQM.[15,22–24] A Vancouver study in 2012–16 found that 64.2% of HIV-negative and unknown status GBQM reported being 'unaware' and 29.7% being 'skeptical' about TasP's preventive benefits.[23] Despite broad dissemination of U=U messaging, research in Canada has shown an uneven adoption of the U=U message by both GBQM sexual health service users and providers, including the hesitancy of some members of both groups of stakeholders to adopt or promote 'zero risk' HIV messaging.[15,25]

Outside of the Canadian context, research on U=U awareness in the US found that approximately 70% of young GBQM (aged 18–25 years) reported familiarity with the concept, and >80% expressed endorsement of U=U as somewhat or completely accurate.[24] The authors attributed this increased awareness and confidence with U=U to PrEP rollout, specifically for younger GBQM who had experience using PrEP.[24] Similarly, a study in New York found that GBQM currently using PrEP were more likely to perceive TasP as effective than those who have never used PrEP (50.8% vs 27.6%).[26] These results echo findings from another US study, which found that being on PrEP was a significant factor for believing in the accuracy of U=U.[27] These quantitative studies suggest that trust in the concept of U=U varies among HIV-negative and unknown status GBQM, but that PrEP use has positively influenced an increased belief and adoption of U=U messaging.

Brown and Di Feliciantonio argue that taken together, TasP, HIV undetectability, and PrEP have 'completely reshaped the experience of living with HIV, as well as the meanings of 'risk' and 'safety' in relation to sexual practices, leading to new forms of pleasure and sociality' (p. 100)[28] for many GBQM who have access to these modalities of HIV treatment and prevention. Indeed, some have argued that PrEP use has reduced HIV stigma and led, at least in part, to new sexual possibilities and a biomedical bridging of the HIV 'serodivide'.[29–31] However, limited qualitative research has longitudinally examined what people who use PrEP think about U=U and its significance in their everyday sexual lives. Our objective was to understand what GBQM who had experience using PrEP thought about U=U and how it informed their sexual decision-making over time.

Methods

Study setting

Analysis for this paper is based on annual longitudinal interviews conducted with GBQM who had experience using PrEP at baseline and were interviewed three times between 2020 and 2022.[32] In-depth qualitative interviews explored men's accounts of accessing PrEP and their sexual decision-making over time. Data were collected as part of the PrEP Implemention Project (PRIMP), an ongoing mixed methods implementation science study with the overarching objective of understanding how to better deliver PrEP to GBQM in Ontario and British Columbia, Canada.[33–35]

Eligibility and recruitment

To be eligible, participants had to be aged at least 19 years, HIV-negative, sexually active, and identify as gay, bisexual, queer, or a man who has sex with men. Participants were recruited with a range of PrEP experience (i.e. currently using PrEP, previously used PrEP, not using and never used PrEP). A recruitment website and poster outlining the study's objectives were shared over email and social media. These recruitment tools linked to an eligibility screener, used to ensure diversity of participants based on age, race and ethnicity, gender and sexual identities, PrEP usage history, and city of residence.

Data collection

An interview guide was developed with a community advisory board comprising stakeholders from GBQM agencies and HIV

service organizations (see Supplementary Material File 1). The interview guide included questions on PrEP usage history, sexual practices, and perspectives on the U=U message. Due to public health restrictions during the coronavirus disease 2019 (COVID-19) pandemic in Ontario, all interviews were conducted online via Zoom. Interviews lasted between 30 and 90 min, were audio recorded and transcribed verbatim. Participants who completed all three interviews received a total of $150CAD honorarium ($30CAD for the first interview, $50CAD for the second interview, and $70CAD for the third interview). The first round of interviews was conducted between March 2020 and July 2020 (T1), the second round between June and September 2021 (T2), and the third completed between March and May 2022 (T3). Interviews were conducted by a PhD-trained qualitative sociologist who identifies as a member of the queer community.

Across the three time points, all participants were asked if PrEP has affected their decision to have sex with people living with HIV. Participants were also probed about their awareness of the prevention benefits of undetectable viral load and if PrEP has affected the significance of the U=U to them. A total of 17 participants reported that they were current or former PrEP users during their baseline interview and are included in this analysis. In total, 14 of these 17 participants completed all interviews, two of them completed two interviews, and one of them was interviewed once. A total of 47 interviews were conducted.

Analysis

Data analysis included reflexive thematic coding using NVivo 12 (Lumivero, Denver, CO, USA)to identify changes and assess PrEP impacts; analysis occurred after each interview round and included both deductive and inductive codes.[24] Our approach to *reflexive* thematic analysis emphasised 'the importance of the researcher's subjectivity as analytic resource, and their reflexive engagement with theory, data and interpretation' (p. 330).[36] The initial rounds of coding and longitudinal interpretation of transcripts were conducted by the first three authors (all PhD-trained qualitative sociologists), and subsequently shared with the entire author team for feedback. Our larger team drew from their diverse disciplinary backgrounds (e.g. medical sociology, social work, epidemiology, and medicine); all team members also reflexively engaged with their multiple positions as HIV researchers and/or HIV treatment and care providers, as well as members of the queer community.

After the three rounds of interviews, a subsequent longitudinal analysis was conducted, informed by a recurrent approach with a focus on themes and changes over time across the entire data sample.[25] For this analysis, we organised each theme corresponding to U=U and sexual decision-making from the first-round analysis into chronological order and looked for patterns of differences and similarities between each time point.[26] This method allowed us to compare themes across participants and time points, building on previous qualitative longitudinal research experience on the emergence of 'undetectable' identities over time among people living with HIV.[14] Pseudonyms are used throughout to trace narratives across three time points.

Ethical approval

Ethics approval was provided by the Research Ethics Boards of the University of Toronto and Unity Health Toronto.

Results

The mean age of men at their first interview was 34 (range: 22–41) years. Seven participants self-identified as White (41%), four as East Asian or Southeast Asian (24%), two as Middle Eastern (12%), two as Black (12%), one as Latino (6%) and one as South Asian (6%). Fifteen men described themselves as gay (88%) and two as both bisexual and queer (12%). Sixteen participants identified as cisgender and one as a transgender male. At the time of the baseline interview, 13 participants were living in Toronto (76%) and four in Ottawa, Ontario (24%). Out of the 17 participants, 11 were on PrEP at the time of the baseline interview. Six men reported having experienced using PrEP before their interview, but stopped because of changes in their sexual activities (especially during the COVID-19 pandemic), shifts in relationship status (e.g. becoming monogamous), and loss of private health insurance (due to employment changes).

We uncovered varied and evolving perspectives on the role of biomedical HIV prevention in sexual decision-making for GBQM who had experience using PrEP. Notably, all participants had heard of the U=U message prior to their baseline interview; however, the depth of this HIV prevention science knowledge differed in our sample, as did the extent to which U=U informed sexual decision-making over time.

U=U confidence: increasing trust in the U=U message over time irrespective of PrEP use

Some participants understood U=U as a reliable and accurate framing of HIV transmission risk. These men explained that a partner's undetectable viral load meant that HIV could not be sexually transmitted to them irrespective of their PrEP use. However, these attitudes were not always a given.

Jacob expressed uncertainty around the U=U message during his early interviews. For example, in 2021, he described his 'anxiety' despite understanding the scientific 'logic' of the message: 'I had anxiety about it, but logically, I knew that if they're treated, then there's no way for it [HIV] to be transmissible' (20s, White, T2). In this same interview, he explained that his anxiety was rooted in the social stigma surrounding HIV: 'Anxiety about it because of social stigma from the past, but logical understanding that it can't be

transmitted if treated.' During his third interview in 2022, however, he expressed that his anxiety around U=U had significantly decreased. Notably, he explained that his increased confidence with the U=U message was not related to his PrEP use because he had stopped using PrEP in 2022. Jacob instead pointed to U=U becoming 'normalised' over time:

> As time goes on and it becomes more normalised in the discussion of how people with HIV are now essentially taking drugs that make it completely undetectable, I think I definitely would feel more comfortable with [having sex with people living with HIV]. I know there was a period of time where the idea of [having sex with PLWH] was anxiety-inducing. But I think it's a lot less anxiety-inducing the more [U=U] becomes normalised in our conversations. (T3)

Amir's confidence in U=U also changed over time, despite starting PrEP in 2018 and continuing PrEP daily throughout the interview series. Notably, during his first interview in 2020, he expressed uncertainty about the durability of undetectability:

> It would always be a concern of mine, what if he goes detectable for like a week, or a month because it happens sometimes. It's like you're gambling to a certain extent even if science says otherwise. (20s, Middle Eastern, T1)

Amir described a reasonable concern about the limitation of U=U as a strategy, especially in cases where adherence to antiretrovirals (ARTs) might be interrupted. However, for Amir, his use of PrEP had given him the confidence to engage in sexual relations with people living with HIV: 'Before I was on PrEP, I did not think I could be in a relationship with somebody who was HIV-positive' (T1). He also later described in 2021 that his knowledge and understanding of U=U coincided with his PrEP initiation: 'It was an acquired knowledge that happened about the same time, [when] I started taking PrEP. At the same time, I learned about U equals U' (T2).

Amir explained his increased U=U confidence in 2021: 'So even if I stopped taking PrEP, I would still have condomless sex with people who are undetectable because I know they can't transmit it to others' (T2). In 2022, Amir reiterated that he 'understand[s] the concept of U equals U' and had now started having sex with a man living with HIV – a 'friend with benefits who is undetectable' (T3).

PrEP confidence: accounts of self-reliance and PrEP as sufficient HIV protection

Some participants expressed that they understood PrEP alone to be sufficient to protect them from HIV, regardless of their partner's HIV serostatus or viral load status. That is, a partner's undetectable status was not necessary for them to feel safe given the efficacy of PrEP at preventing HIV transmission. For example, Ren described that although he has not engaged in sexual relations with people living with HIV that he knows of, if he were 'in a situation where a sexual partner has told me that they were HIV-positive, I would [not] mind as long as I'm on PrEP' (20s, East Asian, T1).

In his subsequent interviews in 2021 and 2022, Ren reported that although he still had not 'knowingly' engaged in any sexual activity with people living with HIV, qualifying that – 'It's not like I'm serosorting or anything' – he now felt 'more comfortable with the idea' in the future because he was using PrEP (T3). This is consistent with what Koester *et al.*[29] have described as a loosening/relaxation of HIV phobia as PrEP users imagine new sexual possibilities. Of course, it is unknown if, and to what extent, (unconscious) bias may be at play. Clearly, Ren did not want to be perceived as engaging in the potentially stigmatising practice of serosorting and explained that he knew PrEP was effective and kept him HIV-negative regardless of a partner's serostatus. For Ren, throughout his interviews, taking PrEP meant taking personal 'responsibility' for reducing his risk of acquiring HIV; he repeatedly framed himself as self-reliant and his PrEP use as taking 'control' over the uncertainty of HIV transmission.

Thomas maintained that his sexual partner's serostatus and viral load were irrelevant 'because I've always just assumed that everyone is [HIV] positive.' He continued, 'I've always just been more about my own precautions more so than putting it on someone else' (40s, Black, T2). Throughout his second and third interviews, Thomas described that his PrEP use alone was enough to protect him against HIV transmission without relying on somebody else's undetectable viral load and other safety practices.

Some participants described their shifting relationship with PrEP over time. For example, Manuel said he stopped using PrEP due to the COVID-19 pandemic, associated lockdowns, and less sexual activity[32] and briefly resumed using it for 5–7 weeks in 2021; he stopped again in early 2022 before resuming use prior to his third interview (30s, Latino). Due to his inconsistent PrEP use, Manuel explained during his second interview that one's undetectable viral load was 'something I would think twice [about] despite all of the knowledge and everything around undetectable and whatnot' (T2). Manuel said that because he was not on PrEP, he was not comfortable having sex with someone living with HIV, regardless of their viral load and what he knew about the U=U message – 'Since I'm not on [PrEP], [having sex with someone living with HIV] would be something that I wouldn't consider' (T2).

Connecting to the narratives of Ren and Thomas above, during his third interview, Manuel insisted that considering other people's serostatus or viral load was insignificant in his sexual decision-making, as long as he was using PrEP: 'If they happened to be [HIV] positive and I didn't know, they didn't disclose it, or we didn't talk about it, or they lied, it

didn't matter. I was doing my share [taking PrEP] from my side' (T3).

Ryan described that although he could not always trust that partners were undetectable, his PrEP use allowed him to have confidence in being protected against HIV transmission regardless of a partner's viral load:

> Prior to me being on PrEP, I was more likely to be the certain person who would serotype match [serosort] and be really cautious. Even with people who claimed that they had no viral load because I don't necessarily always trust what people say. But now that I'm taking care of my own stuff, I can trust me. (30s, White, T2)

In contrast to the participants above who expressed confidence in PrEP as sufficient for HIV prevention, Jordan articulated his preferred 'combination prevention' strategy was being on PrEP continuously and using condoms with all partners because neither HIV status nor viral load status was reliable when coming from sexual partners: 'I feel like, there's no guarantee [that] it's gonna be an honest answer [when people disclose their HIV status], you know?' (20s, Black, T2). Viral load – and U=U messaging – was not relevant to Jordan's sexual decision-making. During his third interview, he reiterated that 'I would feel comfortable using a condom' and having sex, as long as I was on PrEP.'

Combination confidence: trusting U=U and PrEP as a package

For some participants, their trust in the U=U message was bolstered by their confidence in PrEP as an effective tool to prevent HIV transmission. They had what we term *combination confidence*. For example, in 2021, Matthew explained that although he felt that 'the evidence around U equals U is pretty solid,' his confidence in what the U=U message meant for his sex life was dependent on his PrEP use: 'I mean, I would be lying if I said that PrEP didn't make me feel more secure in preventing HIV transmission' (30s, White, T2). Matthew described that his belief was reinforced in 2022 under a circumstance in which he was engaging in a sexual relationship with a man whose viral load was undetectable:

> One of my current partners is actually undetectable. It's nice to feel like he can be undetectable, and also, I can be on PrEP, so we're doubly safe. (T3)

The discursive bundling of two complementary biomedical HIV technologies – U=U or treatment as Prevention and PrEP – as what 'safe' sex looked like, was further highlighted by Logan. He shared that due to his PrEP use, he was 'certainly less concerned about [sex with] HIV positive [men] as long as they're undetectable' (20s, White, T1). Although during his second interview Logan did not report knowingly engaging in sex with someone living with HIV, he nonetheless expressed confidence in the idea of U=U:

> I haven't come across making that decision yet [having sex with someone living with HIV]. I would feel safe either way [due to PrEP]. But, I think I would feel safer and only act on it if they were undetectable. (T2)

In 2022, he further described his trust in the U=U message and that he had begun having sex with some people living with HIV who were undetectable: 'If somebody has an undetectable viral load, they're in a better position than I am in terms of risk, so I don't discriminate against them' (T3). In Logan's opinion, those with undetectable viral loads posed less risk for HIV transmission. Yet, Logan also emphasised that this confidence in the prevention benefits of HIV treatment depended on his PrEP use: 'even if they previously would have told me 'I'm undetectable', I would assume that that is not safe enough. But now that I'm on PrEP, absolutely, it is safe enough' (T3).

Hunter's confidence in the U=U message also grew from his first interview. He explained that although he had not knowingly engaged in sex with a person living with HIV, he would be open to this and was 'not concerned' about HIV transmission as long as both of them were 'on medication':

> If I [were] to start dating someone who was [HIV] positive, for me, they would have to be on medication because I just don't see why they wouldn't be. And I would also maintain to be on medication [PrEP]. (30s, White, T3)

Partner confidence: evolving accounts of sexual decision-making and trusting partners who convey their undetectable HIV status

Echoing multiple narratives above, some participants described the lack of confidence they had in the U=U message and knowingly having sex with someone living with HIV. In these three final examples, our participants described a lack of trust in the medication 'adherence' of partners living with HIV. In all cases, participants described having sex with people living with HIV, although they did not specifically express their confidence with U=U, PrEP, or a combination of these strategies as explored above. Notably, mistrust in pill taking/adherence concerning the medication people living with HIV were taking was discussed, as opposed to questioning a partner's PrEP adherence.

Aadesh, who has been using PrEP since 2017 and continued to take PrEP throughout the three interview time points, spoke about his doubts and anxiety about having sex with someone living with HIV, their medication adherence, and the untransmissible message. In 2021, Aadesh described his reluctance to incorporate the U=U message into his sexual decision-making:

Ideally, if I had a choice, I wouldn't pick that [having sex with people living with HIV]. [Even] after I was on PrEP and all that [. . .]. I definitely know [about U=U], so now I'm okay with it. But still, in my head, 1% isn't 100%. I don't know exactly. It might be like 0.1%. (40s, South Asian, T2)

In 2022, however, Aadesh explained that he recently had condomless sex with someone living with HIV:

> Generally, there's no one regularly that I know who [is living with HIV and I have sex with regularly]. But [I hooked up with] one person recently. We started off with a condom, but they said they were undetectable, so we didn't use a condom. (T3)

Aadesh went on to express some 'regret' in this decision: 'I wish I didn't. Not because of the HIV [but] because I didn't know them enough' (T3).

Some men talked about the significance of the U=U message to their sex lives and not about their personal PrEP use, and how much they 'trusted' a (potential) sexual partner who was living with HIV to be taking the medication regularly. Their skepticism was not in the science behind U=U in general, but rather in the men they were considering having sex with. For example, during their first interviews, Christopher and Hoang both expressed a lack of confidence in the medication adherence of sexual partners, which is why they said they were not comfortable having sex with people living with HIV even if they said they were undetectable:

> Although I know that some people are undetectable if I don't know them and I don't know their regular practices for taking medication [. . .], it's like, 'I'm undetectable.' Okay, cool, you can tell me that, but [. . .] if I don't know you and I don't trust you, I don't know if I want to go on your word for it. (Christopher, 30s, White, T1)

> I find that my mindset is if you try and sort through a good conversation with a person, they're usually upfront. So, they don't really wanna screw you over. And the people who I perceive not to care, I try to stay away from them because I don't know what their compliance to their medication is. (Hoang, 40s, Southeast Asian, T1)

During their third interviews in 2022, both Christopher and Hoang described increased comfort in having sex with people living with HIV:

> If I've had sex with people who are positive, it's not because it was necessarily planned. It's more like, 'Oh, you're positive!' Sure, right? Like it happened twice over the last year that I've ended up sleeping with someone that was positive but was undetectable. So again, not really worried. (Christopher, T3)

> I have had both insertive and receptive, so both ends, with people who are undetectable. So, I am at peace with it. I guess I have no problem with it. (Hoang, T3)

The narrative of the 'non-adherent' person living with HIV was not present in these third interviews for Christopher and Hoang. This appears to be a shift from earlier interviews, and the phrasing of being 'not really worried' and 'I guess I have no problem with it' at T3 is notable.

Discussion

Although all participants we interviewed were aware of the U=U message at baseline, their varied levels of confidence in the prevention benefits of HIV medication as both TasP/U=U and PrEP shaped how they incorporated the U=U message in their everyday sexual lives over time. Queer communities invented 'safer sex', and the U=U message is part of a legacy of communicating the multiple health and HIV prevention benefits of viral suppression.[37] Bernays *et al.* argue:

> the value of TasP and U=U as slogans reflects the ongoing powerful influence of community advocacy in shaping the aspirational course of global HIV policy in the pursuit of the 'elimination' of AIDS. The subsequent appeal of these slogans rests in part in their capacity to produce powerful possibilities about how HIV risk can be managed and controlled. Although predicated on universal opportunity, the extent to which they are feasible under current conditions across communities is much more fractured (p. 3).[38]

For some participants, we saw a notable change in their U=U confidence over time, including men (such as Amir) who at baseline said that trusting U=U and having sex with someone living with HIV would 'always be a concern' to his interview 2 years later when he described having sex with a partner who was undetectable and being confident that HIV was not sexually transmissible due to his partner's undetectable status regardless of his PrEP use.

Other participants also emphasised that their increased confidence in U=U was related to the normalisation of U=U within HIV prevention discourses and greater awareness among gay, bisexual, and queer communities. These men discussed that this mainstreaming of the U=U message has reduced anxiety and stigma concerning sex with people living with HIV. However, as Grov *et al.* have underscored, PrEP use is 'not a singular behaviour' but rather a 'proxy for a host of experiences' (p. 894),[39] including engagement with the healthcare system that may increase health knowledge. Opportunities for increased sexual health literacy are needed for diverse communities in and beyond GBQM, including HIV-negative people not using PrEP who may have less sexual healthcare engagement and U=U knowledge. Public health

policymakers should continue supporting community organisations to increase awareness about the preventive benefits of U=U and other biomedical prevention technologies including PrEP.

Although some participants said that U=U, in conjunction with PrEP, was enough to protect them from HIV, others said PrEP alone was sufficient, regardless of their partner's serostatus or viral load. Participants who expressed confidence in U=U *only if they used PrEP* suggested that they did not completely trust U=U or biomedical HIV prevention outside of their direct use. In a few cases, this lack of trust was rooted in questioning the science (e.g. *could sex with a person living with HIV really pose 'zero' risk*?); however, it was often the perceived lack of medication adherence of PLHIV that was stated as the reason they could not be reliant on U=U (e.g. *can I really trust they are taking their meds*?).

For example, Logan noted that a sexual partner having an undetectable viral load was 'not safe enough' but that PrEP provided him 'absolute' safety. For these participants, despite the combination of two modes of biomedical prevention, one appeared to be more trustworthy than the other – *the one they were in control of* (*PrEP*). For other GBQM, their confidence in U=U was linked to trusting their partners to be responsible for adhering to their HIV treatment. Trusting others to be 'responsible' suggests that these men put the onus of HIV prevention on PLWH. In contrast, others showed trust in themselves being accountable for adhering to their own PrEP regimen, conveying individualised responsibility and a 'self-protection' rationality.[40,41] Long-acting HIV treatment and PrEP modalities may serve to further alter how people experience HIV treatment and/or prevention and how they think about the treatment adherence of themselves and others. It is possible that injectables could make some people less skeptical about the adherence of others and bolster U=U confidence. Notably, many of our participants identified increased adherence as a significant perceived advantage to injectable PrEP.[35]

The effectiveness of HIV biomedical prevention is not simply determined by their scientific efficacy, but by the complex relationship between individuals across serostatus, social norms, practices, and institutions.[42] Our results highlight how two HIV prevention technologies (TasP/U=U and PrEP) are encountered in real life and how GBQM differentially integrate them into their sexual practices. In some cases, TasP/U=U and PrEP were understood to complement each other. In other cases, one was conceptualised as 'enough' for HIV prevention. Although many embraced TasP/U=U and/or PrEP alone or in combination to make safe, pleasurable, condomless sex with PLHIV possible, some men highlighted that condoms remained an important part of their HIV prevention package. These different relationships to HIV biomedical prevention demonstrate 'how medical technologies are enculturated' (p. 370)[43] and how GBQM continue to (re) evaluate information about varied prevention modalities to sustain 'safer sex' in the era of biomedicalised HIV prevention.[44]

The potential unintended consequences of promoting the promise of U=U in ways that individualise responsibility and valorise undetectability as an achievement also requires further attention.

Limitations

Our study is subject to limitations. Although the longitudinal design enabled us to trace narrative accounts over time, our sample size is relatively modest and our analysis focused on PrEP-experienced GBQM living in urban areas of Ontario, Canada, with the majority living in Toronto. More research with diverse cisgender women, transgender populations, and heterosexual men is needed to better appreciate the role of PrEP and U=U in sexual decision-making for these populations, including barriers in access to sexual health information and technologies.[39] Social desirability may have informed how some GBQM storied their accounts of sex with people living with HIV (i.e. not wanting to be perceived as having stigmatising attitudes and behaviours, including serosorting). This analysis was also limited by focusing on HIV-negative people in order to understand the relationship between one's PrEP use and the significance of U=U. It is necessary for U=U research to centre the needs, experiences, and perspectives of people who are living with HIV, to understand their shifting social and sexual realities, including evolving experiences of HIV-related stigma. We have previously published research drawing on longitudinal narratives of GBQM living with HIV to understand processes of decision-making over time related to sex, stigma, treatment initiation, viral load, pleasure, and undetectability as an emergent identity,[37] and argue that more work related to U=U messaging is needed among intersectional communities of people living with HIV.

Conclusion

To our knowledge, this is the first longitudinal qualitative analysis in Canada to examine GBQM's shifting relationships to biomedical HIV prevention messages and perspectives on U=U. Our examination of U=U messaging builds on a rich social science tradition of explicating the context-dependent nature of sexual decision-making for GBQM, including how biomedicine reshapes sexual identities and possibilities across HIV serostatus. Although many GBQM who had experience using PrEP embraced U=U as significant to their sexual lives, our longitudinal analysis revealed its varied and uneven adoption across participants and time. Structural barriers to accessing both HIV treatment and prevention medication remain in Canada and require social and political action to redress persistent access inequities. The 'third U' of U=U – *universal* access to medication for people living with HIV

and broader attention to the social determinants of health – must be a central and sustained focus of any efforts to promote and adapt U=U messaging in ways that are meaningful for diverse communities.[45]

Supplementary material

Supplementary material is available online.

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Data availability. The full qualitative transcripts that support this study cannot be publicly shared due to ethical or privacy reasons. Questions may be directed to the corresponding author.

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