HIV prevention interventions for men who have sex with men

Question

What recent evidence exists regarding effective HIV prevention interventions for men who have sex with men in high-income countries (publication date 2021–2025)?

Key Take-Home Messages

- HIV prevention interventions for men who have sex with men can be classified into the following categories: individual, couple-based, or group behavioural interventions; and provider-based or structural-level interventions. Each of these categories includes a variety of interventions, and their effectiveness has been examined in numerous studies.
- Interventions that improve pre-exposure prophylaxis (PrEP) initiation, adherence, persistence, or engagement can be the most effective for HIV prevention among men who have sex with men, as PrEP has been demonstrated to be a consistently effective strategy to reduce HIV incidence (1).
- Digital health interventions, such as those that utilize telehealth or mobile apps, may increase PrEP access and convenience (2–5). Studies examining mobile apps to improve PrEP adherence have shown mixed results (6–12).
- Digital interventions may also reduce sexual risk behaviours among men who have sex with men (13, 14).
- There are few HIV prevention interventions developed for and tailored to racialized men who have sex with men (15–17). Furthermore, there is limited research on intervention strategies to increase access to HIV prevention interventions for Black men who have sex with men in the Canadian context (15).

Rapid Response: Evidence into Action

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- Interventions utilizing in-person peer support plus digital tools may encourage engagement in PrEP care among racialized men who have sex with men (2, 3).
- Nurse-led PrEP appears to be an appropriate PrEP delivery strategy in studies conducted in Ottawa (18, 19) and Toronto (20).
- Some interventions have adapted the PrEP care cascade into a partial or fully remote model of care; while utility has been demonstrated in some studies, overall findings are mixed (21–24).
- Interventions need to ensure that the impact of systems of oppression and power in health care do not place marginalized communities at greater risk of negative health outcomes (25).

The Issue and Why it's Important

Men who have sex with men are disproportionately impacted by HIV: at the end of 2022, men who have sex with men represented approximately half (50.8%) of people living with HIV in Canada (26). Although gay, bisexual and other men who have sex with men (aged 15 and older) represent only about 3.5% of the Canadian population, this group accounted for 38.4% of all new HIV infections in 2022 (26, 27).

In Canada, African, Caribbean, and Black men and Indigenous men experience a disproportionately high burden of new HIV infections (28). Although national estimates of HIV incidence among racial minorities in Canada are not available (29) due to variations in reporting practices across provinces and territories (30), provincial surveillance data from Ontario demonstrates these disparities (31). For example, in Ontario in 2023, people who reported their ethnicity as Black accounted for the largest proportion of first-time HIV diagnoses (37.8%) (31).

These disparities continue to exist despite the expansion of effective HIV prevention interventions, such as HIV pre-exposure prophylaxis (PrEP), whereby HIV-negative individuals use antiretroviral medications prior to HIV exposure to prevent transmission (32). PrEP is approximately 99% effective at preventing HIV acquisition during sex when taken as prescribed (33, 34). Ongoing research continues to affirm the safety and efficacy of PrEP: two recent systematic reviews concluded that PrEP is safe and effective at preventing HIV among men who have sex with men (1, 35). Furthermore, PrEP has been described as "...the most accessible and well-established biomedical [HIV prevention] intervention available in Canada" (15).

However, recent data from the I'm Ready study—a nationwide HIV

References

1. Sewell J, Fakoya I, Lampe FC, Howarth A, Phillips A, Burns F, et al. Effectiveness of interventions aimed at reducing HIV acquisition and transmission among gay and bisexual men who have sex with men (GBMSM) in high income settings: A systematic review. PLoS ONE. 2022;17(10):e0276209.
2. Dangerfield DT, Anderson JN. A scripted, PrEP-using peer change agent improves perceived risk for HIV and willingness to accept referrals quickly among Black sexual minority men: Preliminary findings from POSSIBLE. AIDS and Behavior. 2024;28(6):2156–65.
3. Schrode KM, Edwards GG, Moghanian B, Weiss RE, Reback CJ, McWells C, et al. Randomized controlled trial testing an HIV/STI prevention intervention among people leaving incarceration who were assigned male at birth, have sex with men and a substance use disorder. AIDS and Behavior. 2025;10:10.
4. Chan PA, Nunn A, van den Berg JJ, Cormier K, Sowemimo-Coker G, Napoleon SC, et al. A randomized trial of a brief behavioral intervention for PrEP uptake among men who have sex with men at increased risk for HIV infection. Journal of Acquired Immune Deficiency Syndromes. 2021;87(3):937–43.

testing study that also assessed PrEP awareness and uptake among Canadian cisgender men—found evidence that racial disparities in PrEP exist:

- Black men who identified as gay or bisexual were less likely to be aware of PrEP than White men who identified as gay or bisexual;
- Black men were less likely to be on PrEP compared to White men; and
- Indigenous men were less likely to be aware of PrEP compared to White men (28).

Research continues to support the importance of PrEP access among men who have sex with men who belong to a racial minority: a study from Fenway Health in Boston, a community health centre that specializes in care for sexual and gender minorities, found that modest increases in PrEP initiation in Black and Latino men who have sex with men could result in meaningful reductions in HIV incidence in the overall population of men who have sex with men (36).

Interestingly, the emergence of biomedical HIV prevention strategies (such as PrEP) appears to have coincided with a decline in condom use among men who have sex with men (37). While researchers suggest that a decline in condom use in this population could be attributed to "safer sex fatigue" caused by longstanding condom-based prevention messaging, others suggest that biomedical interventions like PrEP are a significant factor influencing condom use (37).

While both condoms and PrEP are effective in preventing HIV, simultaneous use offers the most comprehensive sexual health protection (38): PrEP does not protect against other sexually transmitted infections (STIs) (38, 39), whereas condoms can provide protection against gonorrhea and chlamydia (40, 41). Although both gonorrhea and chlamydia can be cured with antibiotics, infection with either STI can increase the amount of HIV in the genital and rectal fluids, thereby elevating the risk of HIV transmission (42, 43). Studies have found that infection with gonorrhea and/or chlamydia impacts HIV transmission (44, 45); in particular, a study from England found that rectal gonorrhea was a strong predictor of increased HIV risk among men who have sex with men (46), while a U.S. study attributed about 10% of HIV infections among men who have sex with men to prevalent gonorrhea or chlamydia infection (47).

Targeting men who have sex with men diagnosed with chlamydia or gonorrhea may be an important entry point for PrEP uptake: a modelling study based on data from Baltimore found that providing PrEP to men who have sex with men with a chlamydia and/or gonorrhea diagnosis is nearly twice as efficient compared to

5. Teixeira da Silva D, Bouris A, Ramachandran A, Blocker O, Davis B, Harris J, et al. Embedding a linkage to preexposure prophylaxis care intervention in a social network strategy and partner notification services: Results from a pilot randomized controlled trial. Journal of Acquired Immune Deficiency Syndromes. 2021;86(2):191–9.
6. Mitchell JT, Burns CM, Atkinson B, Cottrell M, Frye JK, McKellar MS, et al. Feasibility, acceptability, and preliminary efficacy of a gamified mobile health contingency management intervention for PrEP adherence among Black MSM. AIDS and Behavior. 2022;26(10):3311–24.
7. Hightow-Weidman LB, Rainer C, Schader L, Rosso MT, Benkeser D, Cottrell M, et al. Prepared, Protected, EmPowered (P3): Primary results of a randomized controlled trial use a social networking, gamification, and coaching app to promote pre-exposure prophylaxis (PrEP) adherence for sexual and gender minority youth living in the United States. AIDS and Behavior. 2025;29(2):652–63.
8. Van den Elshout MA, Hoornenborg E, Achterbergh RC, Coyer L, Anderson PL, Davidovich U, et al. Improving adherence to daily preexposure prophylaxis among MSM in Amsterdam by providing feedback via a mobile application. AIDS. 2021;35(11):1823–34.
9. Weitzman PF, Zhou Y, Kogelman L, Rodarte S, Vicente SR, Levkoff SE. mHealth for pre-exposure prophylaxis adherence by young adult men who have sex with men. mHealth. 2021;7:44.

randomly providing PrEP among eligible men who have sex with men (48). Furthermore, a recent retrospective chart review conducted at four clinical sites in Ontario found that among men who have sex with men, a prior diagnosis of gonorrhea, chlamydia, and/or syphilis served as an objective indicator of increased risk for HIV acquisition (49). These findings offer support for the Canadian PrEP guidelines, which strongly recommend PrEP for men who have sex with men who report condomless anal intercourse in the last six months and a diagnosis of a bacterial STI in the past 12 months (49, 50).

Evidently, effective strategies are needed to prevent HIV transmission among men who have sex with men, especially for populations disproportionately impacted by HIV such as African, Caribbean, and Black men who have sex with men. This review summarizes literature published between 2021 and 2025 on HIV prevention interventions for men who have sex with men.

The HIV prevention interventions included in this review were primarily designed for HIV-negative men who have sex with men. Thus, we included interventions targeting the following outcomes among HIV-negative men who have sex with men: HIV incidence, STI incidence, engagement in the PrEP care cascade (e.g. increased PrEP adherence), and reductions in sexual risk behaviours (e.g. decreased condomless anal intercourse).

The focus of this review is not on HIV prevention interventions among men who have sex with men living with HIV. While there is a need for these types of interventions—such as those that improve adherence to antiretroviral therapy (ART) (51)—improving ART adherence as a measure of prevention is beyond the scope of this review. Of note, this review does include a few interventions among HIV serodiscordant couples where the outcomes are improved ART adherence for the sexual partner who is living with HIV.

What We Found

There are numerous HIV prevention interventions that include men who have sex with men published in the literature: we identified 18 systematic reviews and 49 intervention studies.

Our findings are summarized in three tables:

- **Table 1** includes review articles synthesizing evidence on HIV prevention interventions. All articles were published from 2021 onward, and at least 80% of included studies were conducted in high-income countries, as defined by the World Bank Country and Lending Groups Classification (52).

10. Liu AY, Laborde ND, Coleman K, Vittinghoff E, Gonzalez R, Wilde G, et al. DOT Diary: Developing a novel mobile app using artificial intelligence and an electronic sexual diary to measure and support PrEP adherence among young men who have sex with men. AIDS and Behavior. 2021;25(4):1001–12.
11. Buchbinder SP, Siegler AJ, Coleman K, Vittinghoff E, Wilde G, Lockard A, et al. Randomized controlled trial of automated directly observed therapy for measurement and support of PrEP adherence among young men who have sex with men. AIDS and Behavior. 2023;27(2):719–32.
12. Whiteley L, Craker L, Haubrick KK, Arnold T, Mena L, Olsen E, et al. The impact of a mobile gaming intervention to increase adherence to pre-exposure prophylaxis. AIDS and Behavior. 2021;25(6):1884–9.
13. Luo Q, Zhang Y, Wang W, Cui T, Li T. mHealth-based gamification interventions among men who have sex with men in the HIV prevention and care continuum: Systematic review and meta-analysis. JMIR mHealth and uHealth. 2024;12:e49509.
14. Melendez-Torres GJ, Meiksin R, Witzel TC, Weatherburn P, Falconer J, Bonell C. eHealth interventions to address HIV and other sexually transmitted infections, sexual risk behaviour, substance use, and mental ill-health in men who have sex with men: Systematic review and meta-analysis. JMIR Public Health Surveillance. 2022;8(4):e27061.

- **Table 2** and **Table 3** include primary studies examining HIV prevention interventions published since 2021 and conducted in high-income countries, as defined by the World Bank Country and Lending Groups Classification (52). In each study, at least 80% of the study population included men who have sex with men. **Table 2** includes behavioural interventions conducted at an individual level; **Table 3** includes interventions that are provider-based or structural.

We did not include reviews or interventions published before the year 2021; this is because a 2022 systematic review by Sewell *et al.* aimed to "…identify and describe recent studies evaluating the effectiveness of HIV prevention interventions for gay and bisexual men who have sex with men in high income countries" (1). The review conducted a literature search from 2013 to 2021 and included only randomized controlled trials (1). Accordingly, we sought to capture HIV prevention interventions among men who have sex with men that were published **after** the completion of Sewell *et al.*'s search (i.e. from 2021 onward). Additionally, unlike Sewell *et al.*, we did not restrict inclusion to randomized controlled trials and instead included non-randomized studies of interventions (e.g. pretest–posttest designs).

Overview of systematic reviews on HIV prevention interventions

All 18 review articles we identified are described in **Table 1**. Of these, 13 focused primarily on men who have sex with men (1, 13–17, 25, 53–58). The remaining five reviews examined PrEP interventions not exclusively among men who have sex with men, though most study populations consisted of men who have sex with men (59–63).

Only one review specifically examined all types of HIV prevention interventions among men who have sex with men in high-income settings (1). Sewell *et al.* identified five types of HIV prevention interventions in this population: one-to-one counselling, group interventions, online interventions, contingency management interventions for substance abuse, and HIV PrEP interventions (1). PrEP was the only intervention consistently effective at reducing HIV incidence; there was only some limited evidence that one-to-one counselling, group interventions, and online interventions (individual) could reduce HIV risk behaviours such as condomless anal intercourse (57).

The remaining 17 reviews did not broadly focus on HIV prevention interventions among men who have sex with men as Sewell *et al.* did; rather, the focus was either on a specific intervention delivery method (e.g. digital), a specific type of intervention (e.g. PrEP), or a certain population group (e.g. Latino men). Thus, the remaining 17 reviews were categorized as follows: *Digital health interventions*,

15. Demeke J, Djiadeu P, Yusuf A, Whitfield DL, Lightfoot D, Worku F, et al. HIV prevention and treatment interventions for Black men who have sex with men in Canada: Scoping systematic review. JMIR Public Health Surveillance. 2024;10:e40493.
16. Jaramillo J, Chavez JV, Larson ME, Harkness A. Peer-led adjunctive interventions for increasing the reach of HIV prevention and care interventions to Latino/x/e men who have sex with men: A scoping review. Current HIV/AIDS Reports. 2025;22(1):12.
17. Escarfuller SG, Mitchell JW, Sanchez M. HIV prevention intervention-related research with adult, sexual minority Hispanic men in the United States: A systematic review. Journal of Racial and Ethnic Health Disparities. 2024;11(4):1888–907.
18. Orser L, O'Byrne P. Multiple, active-offer referrals for HIV pre-exposure prophylaxis by nurses yields high uptake among gay, bisexual, and other men who have sex with men. International Journal of STD & AIDS. 2024;35(4):274–9.
19. O'Byrne P, Vandyk A, Orser L, Haines M. Nurse-led PrEP-RN clinic: A prospective cohort study exploring task-shifting HIV prevention to public health nurses. BMJ Open. 2021;11(1):e040817.

PrEP interventions, and **HIV prevention interventions among men who have sex with men of colour**. These categories are not mutually exclusive; a note has been made when a review can be categorized under one or more of these headings.

Digital health interventions

Four reviews examined digital health interventions for HIV prevention among men who have sex with men (13, 14, 53, 54). While these interventions appear to be feasible and acceptable, challenges persist in real-world implementation (54). There is some evidence that digital health interventions may impact sexual risk behaviours, but results are mixed (13, 14). Luo *et al.* found some evidence that digital gamification intervention improved HIV prevention outcomes: in their meta-analysis of two randomized controlled trials, authors found a 38% reduction in condomless anal sex acts among participants in the intervention group at 3-month follow-up (13). In a meta-analysis of six studies, Melendez-Torres *et al.* found that eHealth interventions significantly reduced sexual risk behaviours in the three months to one year of follow up; however, the quality of evidence was poor (14).

There is limited evidence suggesting digital health interventions impact outcomes across the PrEP care continuum (13, 54). In one meta-analysis of three randomized controlled trials, authors found a non-statistically significant effect of mHealth-based gamification interventions on PrEP adherence at 3-month follow-up (13). Du *et al.* sought to evaluate the effectiveness of digital health interventions in enhancing the PrEP care continuum among men who have sex with men (54). Their review identified one study that significantly increased PrEP referrals and appointment attendance, and another study that improved PrEP initiation rates; however, of the seven studies that aimed to promote PrEP adherence, only three showed a statistically significant effect (54).

One review examined the use of virtual avatar technology—digital self-representative agents controlled through an interactive electronic device—as a tool for HIV prevention (53). The review concluded that avatars can create a safe and engaging environment, allowing individuals to discuss sexual behaviours more openly and enabling the delivery of health information to populations at high risk for HIV acquisition (53).

The following section discusses two digital health interventions focused on PrEP that were not specifically targeted to men who have sex with men (59, 61).

20. Charest M, Sharma M, Chris A, Schnubb A, Knox DC, Wilton J, et al. Decentralizing PrEP delivery: Implementation and dissemination strategies to increase PrEP uptake among MSM in Toronto, Canada. PLoS ONE. 2021;16(3):e0248626.

21. Wai J, Wong A, Ovington N, Robinson P, Varma R. Changing the model of HIV PrEP delivery—Nurse-led telehealth in a metropolitan sexual health service: A retrospective analysis. Sexual Health. 2025;22:03.

22. Erenrich RK, Braun RA, Torres-Mendoza DM, Stevenson OL, Doan TP, Klausner JD. Effectiveness of PrEPTECH: Findings From a 180-day randomized controlled trial of a pre-exposure prophylaxis telehealth intervention. Journal of Acquired Immune Deficiency Syndromes. 2024;95(5):463–9.

23. Player MS, Cooper NA, Perkins S, Diaz VA. Evaluation of a telemedicine pilot program for the provision of HIV pre-exposure prophylaxis in the Southeastern United States. AIDS Care. 2022;34(12):1499–505.

24. Butts SA, Johnson AL, Doblecki-Lewis S. PrEP beyond the clinic: Evaluation of a home-based PrEP follow-up system among a cohort of predominantly Black and Latino men who have sex with men in South Florida. Journal of Acquired Immune Deficiency Syndromes. 2025;28:28.

PrEP interventions

Nine reviews focused on PrEP interventions (55–63).

Of these nine reviews on PrEP interventions, four were primarily focused on men who have sex with men (55–58). Wang *et al.* described interventions in the U.S. that aimed to improve PrEP uptake and adherence among men who have sex with men; authors reported that text message–based interventions have the potential to retain men who have sex with men in PrEP care (56). In addition, authors highlighted the use of peer-based approaches in PrEP interventions for men who have sex with men of colour as an important strategy, as these reduced PrEP-related stigma, increased trust in PrEP care, and motivated conformity to peer norms/behaviours, such as promoting PrEP initiation and adherence (56). Kudrati *et al.* identified social media-based campaigns aimed at increasing PrEP awareness and uptake among young Black and Latinx men who have sex with men and women; authors concluded that social media and mobile technologies represent a promising platform for promoting PrEP awareness due to broad reach, accessibility, affordability, and usability (57). Additionally, it appears that social media platforms can be leveraged to disseminate information about PrEP that is appropriate and engaging to specific audiences (57). Kamitani *et al.* described the characteristics and effectiveness of digital PrEP interventions, reporting that all included studies demonstrated improved PrEP adherence in intervention arms compared with control groups or pre-intervention data (58). One study also noted improved retention in PrEP care (58). Authors concluded that digital interventions can deliver counselling and behavioural risk reduction support between in-person PrEP care visits (58). Guimarães *et al.* identified demand creation strategies (i.e. strategies to increase awareness and demand of a product or service) and retention strategies to improve PrEP persistence among men who have sex with men and transgender women (55). Findings suggested that offering PrEP through both strategies can reach and retain large numbers of men who have sex with men and transgender women (55).

Five other reviews broadly focused on PrEP interventions, but most study participants were men who have sex with men (59–63). One 2021 systematic review summarized recent interventions aimed at improving PrEP adherence; authors identified a need for more robust evidence, as only four of 20 included studies were randomized controlled trials (62). A 2023 systematic review concluded that delivery of PrEP services outside of the traditional care system—for example, by pharmacist prescribers—showed promise for applicability, and could increase PrEP access (63). A 2024 systematic review identified characteristics of best practices for PrEP interventions, and found that generally, interventions with a longer duration and two-way messaging in digital interventions may improve PrEP outcomes (60). The two remaining PrEP-focused reviews specifically examined digital interventions (59, 61).

25. Phillips G, 2nd, McCuskey D, Ruprecht MM, Curry CW, Felt D. Structural interventions for HIV prevention and care among U.S. men who have sex with men: A systematic review of evidence, gaps, and future priorities. AIDS and Behavior. 2021;25(9):2907–19.

26. Public Health Agency of Canada. Canada's progress towards ending the HIV epidemic 2022. 2024. Available from: https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/diseases-conditions/canada-progress-towards-ending-hiv-epidemic-2022/canada-progress-towards-ending-hiv-epidemic-2022.pdf Accessed October 21, 2025.

27. Sorge J, Colyer S, Cox J, Kroch A, Lachowsky N, Popovic N, et al. Estimation of the population size of gay, bisexual and other men who have sex with men in Canada, 2020. Canada Communicable Disease Report. 2023;49(11–12):465.

28. Ajiboye W, Tharao W, Owino M, Soje L, Tian JM, Ly A, et al. Racial disparities in HIV pre-exposure prophylaxis (PrEP) awareness and uptake among white, Black, and Indigenous men in Canada: Analysis of data from the I'm Ready national HIV self-testing study. Canadian Journal of Public Health. 2025;116(2):243–53.

A meta-analysis of eight randomized controlled trials found that digital communication interventions had a modest improvement on PrEP adherence at 12 week follow-up; authors suggested that this result could be due low engagement resulting from repetitive, non-personalized content (59). The second review was on digital interventions that addressed stigma to improve PrEP-related outcomes; authors found that a lack of standardized measures of stigma across studies limited the ability to make conclusions regarding how stigma reduction can facilitate PrEP use (61).

HIV prevention interventions among men who have sex with men of colour

Five identified reviews focused on HIV prevention interventions among racial minorities of men who have sex with men (15–17, 25, 57). Of these five, only one focused specifically on Black men who have sex with men (15).

Demeke *et al.* (2024) sought to identify interventions relevant to the HIV prevention and care cascade for Black men who have sex with men in Canada (15). Authors found that condoms were the most accessible intervention, and that community-based initiatives that distribute condoms in places frequented by Black men who have sex with men (e.g. bathhouses, Pride events, barbershops) may increase condom accessibility (15). A main finding of this review was that no PrEP delivery strategies in Canada that target Black men who have sex with men exist despite PrEP being the most accessible and well-established HIV prevention intervention in Canada (15). To develop and implement interventions that effectively improve engagement across the PrEP care cascade among Black men who have sex with men in Canada, further research is needed on PrEP awareness, acceptance, and retention in care (15). It is worth noting that Kudrati *et al.* (mentioned in the previous section under PrEP interventions) suggested that social media platforms can be used to increase PrEP awareness, uptake, and adherence among young Black men who have sex with men (57).

A review on HIV prevention interventions for sexual minority Hispanic men in the U.S. identified two studies that reported on PrEP outcomes; one intervention improved PrEP adherence, while the other improved PrEP screening and referral rates (17). Neither PrEP study addressed culturally-specific barriers to PrEP-related care (17). Four studies on condom use reported mixed findings, with two showing significant improvements and two showing no significant change (17). Authors note community engagement was an important element of all included studies; however, the inclusion of cultural factors varied considerably: only two studies integrated the concepts of *machismo* and *familismo* (two common values present in Hispanic cultures) into intervention materials (17).

29. Challacombe L. The epidemiology of HIV in Canada. 2026. Available from: https://www.catie.ca/sites/default/files/2026-01/fs-epi-hiv-en-012026.pdf Accessed January 12, 2026.

30. Public Health Agency of Canada. HIV in Canada: Surveillance report to 2022. 2024. Available from: https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/diseases-conditions/hiv-canada-surveillance-report-december-31-2022/hiv-in-canada-surveillance-report-to-december-31-2022-en.pdf Accessed: October 27, 2025.

31. OHESI. HIV diagnoses in Ontario, 2023. 2025. Available from: https://www.ohesi.ca/wp-content/uploads/2021/12/HIV_diagnoses_in_Ontario_2023_11-4-2025.pdf Accessed November 27, 2025.

32. Godfrey-Faussett P, Frescura L, Abdool Karim Q, Clayton M, Ghys PD (on behalf of the 2025 prevention targets working group). HIV prevention for the next decade: Appropriate, person-centred, prioritised, effective, combination prevention. PLoS Medicine. 2022;19(9):e1004102.

33. Centers for Disease Control and Prevention. Let's stop HIV together: PrEP. 2025. Available from: https://www.cdc.gov/stophivtogether/hiv-prevention/prep.html Accessed October 29, 2025.

One review mapped existing evidence on peer-led interventions to increase the reach of HIV testing, treatment, and PrEP among Latino men who have sex with men (16). Of the 17 unique interventions identified, less than half were tailored for Latino men who have sex with men (16). Authors identified two types of cultural tailoring: surface-level, where culturally appropriate language, images, and symbols were used, and deep-level, where intervention content, strategy, or delivery methods were aligned with the cultural context and values of the target population (16). Few studies employed either surface- or deep-level cultural tailoring (16).

One review examined structural HIV prevention interventions among Black and Latinx men who have sex with men in the U.S.; however, authors were only able to identify two interventions (25). Authors concluded that interdisciplinary direct service approaches for specific populations with supportive programming (such as health and social service navigation, case management, education, job coordination, housing, safe space creation) have some merit (25). Furthermore, high-level policy and organizational processes in areas of higher HIV prevalence (such as HIV testing laws, linkages between detention centres and HIV testing, sexual diversity training programs for public health officials) resulted in service connectivity in target communities, improved health and economic outcomes, and established community infrastructure (25). However, authors do note evaluation constraints when assessing efficacy (25). Nonetheless, designing interventions with structural considerations is important, as interventions only focused on behaviour change at the individual level can neglect the impact of systematic oppression and power, thereby placing marginalized communities at a greater risk of negative health outcomes (25).

Though we only identified five studies focused on racial subgroups of men who have sex with men, a common theme in several of the reviews included in **Table 1** is the lack of targeted and culturally tailored behavioural interventions for subpopulations of men who have sex with men (1, 15–17, 25, 54, 56, 60). This is especially the case for PrEP interventions: Demeke *et al.* found no PrEP delivery strategies for Black men who have sex with men in Canada (15) and Escarfuller *et al.* found no PrEP interventions that addressed culturally-specific barriers to PrEP-related care for adult, sexual minority Hispanic men (17). Du *et al.* suggested that future research on digital health interventions that promote PrEP should focus on trials that have culturally sensitive strategies (54). Both Phillips *et al.* and Wang *et al.* describe the lack of structural-level interventions for men who have sex with men of colour (25, 56). Wang *et al.* also note the absence of interventions delivered to health care providers to improve the clinical experiences of men who have sex with men of colour (56). Finally, Kamitani *et al.*'s 2024 review notes a lack of best practices for increasing PrEP use and persistence among Black individuals (60).

34. Grov C, Westmoreland DA, D'Angelo AB, Pantalone DW. How has HIV pre-exposure prophylaxis changed sex? A review of research in a new era of bio-behavioural HIV prevention. Journal of Sex Research. 2021;58(7):891–913.

35. Murchu EO, Marshall L, Teljeur C, Harrington P, Hayes C, Moran P, et al. Oral pre-exposure prophylaxis (PrEP) to prevent HIV: A systematic review and meta-analysis of clinical effectiveness, safety, adherence and risk compensation in all populations. BMJ Open. 2022;12(5):e048478.

36. Sewak A, Lodi S, Li X, Shu D, Wen L, Mayer KH, et al. Causal effects of stochastic PrEP interventions on HIV incidence among men who have sex with men. American Journal of Epidemiology. 2024;193(1):6–16.

37. Klassen BJ, Fulcher K, Chown SA, Armstrong HL, Hogg RS, Moore DM, et al. "Condoms are… like public transit. It's something you want everyone else to take": Perceptions and use of condoms among HIV negative gay men in Vancouver, Canada in the era of biomedical and seroadaptive prevention. BMC Public Health. 2019;19(1):120.

38. Calabrese SK, Underhill K, Mayer KH. HIV preexposure prophylaxis and condomless sex: Disentangling personal values from public health priorities. American Journal of Public Health. 2017;107(10):1572–6.

Primary studies: Behavioural HIV prevention interventions

A vast array of HIV prevention interventions for men who have sex with men have been tested in randomized controlled trials and in longitudinal studies across various settings. We identified 34 studies; detailed information about these studies is provided in **Table 2**. All included studies were published in 2021 or later, and were conducted in high-income countries as defined by the World Bank Country and Lending Groups Classification (52). At least 80% of the study population were men who have sex with men.

The interventions are classified according into three categories: *individual*, *couple-based*, or *group interventions*. Within each category, interventions that had an outcome in the PrEP care cascade are discussed first.

Individual interventions

Several interventions utilized websites, mobile apps, text messaging, and in-person counselling sessions at the individual level to support engagement across the PrEP care cascade and encourage other HIV prevention practices (e.g. condom use).

Three different studies examined mobile apps that sought to impact PrEP initiation among young men who have sex with men; no app demonstrated a statistically significant impact (64–66). HealthMindr-PrEP is a smartphone app developed to increase HIV prevention via PrEP initiation; in addition to having resources on HIV and STI testing, the app includes a Frequently Asked Questions (FAQ) about PrEP, a PrEP self-assessment, and a PrEP provider locator (64). Though PrEP initiation was higher among participants in the intervention arm compared to control, results were not statistically significant (64). The MyChoices and LYNX apps included several HIV prevention features, including a GPS-enabled map with HIV testing locations and PrEP providers (65, 66). The initial MyChoices study did not observe an increase in PrEP uptake (66), and a three-arm study examining both MyChoices and LYNX found that while participants using the apps had higher rates of PrEP initiation compared to control, the differences compared to the control group were not statistically significant (65).

One unique intervention that also relied on smartphones was an audio drama in podcast format developed for Asian-born men who have sex with men living in Australia (67). The six-episode podcast is about the PrEP journey of an Asian-born man new to Australia (67). No significant difference in PrEP initiation was observed (67).

Two interventions utilized mobile apps and in-person peer-mentoring sessions to increase engagement in PrEP care (2, 3). The POSSIBLE intervention, conducted among Black sexual minority

39. Stewart J, Baeten JM. HIV pre-exposure prophylaxis and sexually transmitted infections: Intersection and opportunity. Nature Reviews Urology. 2022;19(1):7–15.

40. Baker J. A paradigm shift away from condoms: Focusing STI prevention on evidence-based interventions. Journal of the American Academy of Physician Associates. 2023;36(7):6–7.

41. Centers for Disease Control and Prevention. Condom use: An overview. 2024. Available from: https://www.cdc.gov/condom-use/index.html Accessed October 31, 2025.

42. Miller D. Gonorrhea. 2023. Available from: https://www.catie.ca/sites/default/files/2023-05/fs-sti-gonorrhea-03292023-en2.pdf Accessed Oct 31, 2025.

43. Miller D. Chlamydia. 2023. Available from: https://www.catie.ca/sites/default/files/2023-04/fs-sti-chlamydia-03292023-en.pdf Accessed October 31, 2025.

44. Katz DA, Dombrowski JC, Bell TR, Kerani RP, Golden MR. HIV incidence among men who have sex with men after diagnosis with sexually transmitted infections. Sexually Transmitted Diseases. 2016;43(4):249–54.

45. Bernstein KT, Marcus JL, Nieri G, Philip SS, Klausner JD. Rectal gonorrhea and chlamydia reinfection is associated with increased risk of HIV seroconversion. Journal of Acquired Immune Deficiency Syndromes. 2010;53(4):537–43.

men, sought to increase perceived HIV risk among Black men who have sex with men: across two in-person peer sessions, participants were encouraged to consider their sexual behaviours and were referred to PrEP care if interested (2). Between visits, participants could self-monitor their sexual behaviours on an app called PrEPme (2). An improvement in perceived HIV risk was observed; additionally, 64% of participants were willing to be referred to PrEP care and 45% made a PrEP appointment (2). Similarly, MEPS is a multi-component intervention which sought to support HIV prevention among men who have sex with men with a substance use disorder who were leaving jail (3). MEPS included tailored sessions with a peer mentor, financial incentives for engaging in health-promotion activities, and use of an app to search for providers, track incentive earnings, and save scheduled appointments (3). Most participants in the study identified as Hispanic or Latino, or Black (3). Participants in the MEPS intervention were significantly more likely to be using PrEP compared to the control condition (3).

Two interventions used in-person or telehealth (i.e. over-the-phone) counselling sessions to support linkage to PrEP care (4, 5). PrEPare-to-Start used brief motivational interviewing to promote PrEP uptake among men who have sex with men presenting for STI testing who had not previously used PrEP (4). Those in the intervention arm were significantly more likely to attend a clinical appointment for PrEP and accept a PrEP prescription (4). PS-PrEP utilized network referral services (e.g. partner notification) to identify Black individuals in HIV transmission networks who could benefit from PrEP; in a 60-minute face-to-face session with a social worker, an individualized linkage-to-PrEP care plan was created (5). Individuals in the intervention arm were significantly more likely to be linked to PrEP care and initiate PrEP (5). Lastly, a third peer-based counselling intervention—initially designed to be conducted in-person—switched to a remote format due to the COVID-19 pandemic restrictions (68). Focused on Latinx immigrant sexual minority men, the Listos intervention offered peer counselling to encourage HIV and STI testing and PrEP uptake; mail-in HIV and STI test kits were provided (68). Compared to the control group, more participants in the intervention group felt motivated to use PrEP (68).

Several mobile apps targeted improving PrEP adherence, but outcomes were mixed (6–12). mSMART, a gamified contingency management app, improved PrEP adherence in a small sample of Black participants (6). The P3/P3+ app utilized gamification, medication tracking, and social engagement to improve PrEP adherence; receipt of P3/P3+ was associated with increased PrEP adherence (7). AMPrEP added additional features (e.g. visual displays of self-recorded adherence, alarm function for pill reminders) to improve PrEP adherence; no improvement among individuals with poor adherence was observed (8). The Dot app offered pill reminders plus text messaging to encourage PrEP adherence; PrEP adherence increased from baseline to post-intervention (9). The DOT Diary

46. Donnell D, Zewdie K, Ratna N, Miller V, Saunders JM, Gill ON, et al. Association between rectal gonorrhoea and HIV incidence in men who have sex with men: A meta-analysis. Sexually Transmitted Infections. 2022;98(7):492–6.

47. Jeb J, Weiss K, Mermin J, Dietz P, Rosenberg E, Gift T. Proportion of incident HIV cases among men who have sex with men attributable to gonorrhea and chlamydia: A modeling analysis. Sexually Transmitted Diseases. 2019;46(6):357–63.

48. Kasaie P, Schumacher CM, Jennings JM, Berry SA, Tuddenham SA, Shah MS, et al. Gonorrhoea and chlamydia diagnosis as an entry point for HIV pre-exposure prophylaxis: A modelling study. BMJ Open. 2019;9(3):e023453.

49. Kroch A, Gogolishvili D, O'Brien K, Orser L, Woodward K, Tharao W, et al. The evolving HIV epidemic in Ontario, Canada: A retrospective analysis of new HIV diagnoses to identify subpopulations with persistent risk of HIV transmission. Canadian Journal of Public Health. 2025:1–10.

50. Tan DH, Hull MW, Yoong D, Tremblay C, O'byrne P, Thomas R, et al. Canadian guideline on HIV pre-exposure prophylaxis and nonoccupational postexposure prophylaxis. Canadian Medical Association Journal. 2017;189(47):e1448–E58.

app (not related to the aforementioned Dot app) is an automated directly-observed therapy platform configured for monitoring and supporting PrEP use paired with an electronic sexual health diary and automated text messages for when a PrEP dose is late or missed (10). The pilot trial of this app found that the app was highly acceptable, with 84% of participants reporting that the app helped with taking PrEP (10). However, a larger randomized controlled trial found no significant difference in the proportion of participants with detectable PrEP drug levels between the intervention and control arms (11). Finally, Viral Combat, a gamified app that encouraged PrEP adherence and healthy behaviours, was shown to improve PrEP adherence in a study sample comprised of primarily young Black/African American participants (12).

Two studies examined the use of websites plus text messaging to improve PrEP adherence, but neither had an impact on this outcome (69, 70). PrEP iT!, a website optimized for mobile devices (i.e. not an app), was designed to support PrEP adherence and education; participants could also receive text messages reminders for adherence and healthcare appointments (70). Though there was no overall effect of PrEP iT! on adherence, authors suggest it is viable as an adherence support tool (70). Game Plan for PrEP collected behavioural information and offered motivation and a tailored support plan for participants to reduce sexual risk and problematic drinking, with the option of receiving text messages to assess weekly PrEP adherence, sexual risk behaviour, and alcohol use (69). Authors found no strong evidence that the intervention improved PrEP persistence or adherence, or reduced condomless anal sex acts (69).

Two studies examined the utility of text-messaging systems to support PrEP adherence (71, 72). iTAB, conducted among stimulant-using men who have sex with men, delivered daily personalized prompts via text to take PrEP; participants were to respond if they did or did not (72). Near-perfect PrEP adherence was higher among individuals receiving the intervention (72). The AMMI study broadly examined how HIV prevention (e.g. PrEP, PEP, condom use) among adolescents at-risk for HIV could be supported via text messaging only, text messaging plus peer support, text messaging plus peer coaching, or a combination of all three approaches (72). Across all four arms, the participants were mainly non-White: 40% of the sample was among Black/African American men and 29% was among Hispanic men (71). While no change was observed in PrEP adherence, PrEP uptake increased over time among participants who received AMMI plus peer support and coaching (i.e. a combination of all three approaches) compared with AMMI alone (71).

One unique study found an incremental increase in PrEP adherence through use of Proteus Discover, a digital monitoring PrEP adherence system (73). The system has three interacting components: an ingestible sensor tablet coencapsulated with the drug (i.e. PrEP), an adhesive wearable patch, and a wireless network

51. Whiteley LB, Olsen EM, Haubrick KK, Odoom E, Tarantino N, Brown LK. A review of interventions to enhance HIV medication adherence. Current HIV/AIDS Reports. 2021;18(5):443–57.

52. World Bank Group. World Bank country and lending groups. 2025. Available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups Accessed November 3, 2025.

53. Portillo OGA, Fletcher JB, Young LE, Klausner JD. Virtual avatars as a new tool for human immunodeficiency virus prevention among men who have sex with men: A narrative review. mHealth. 2023;9(29).

54. Du J, Jin G, Zhang H, Don O, Shi H, Wang S, et al. Effectiveness of digital health interventions in promoting the pre-exposure prophylaxis (PrEP) care continuum among men who have sex with men: A systematic review of randomized controlled trials. Current HIV/AIDS Reports. 2025;22(1):25.

55. Guimaraes NS, Magno L, Monteiro GMB, Ramos ICN, de Castro CT, Aranha-Rossi TR, et al. Demand creation and retention strategies for oral pre-exposure prophylaxis for HIV prevention among men who have sex with men and transgender women: A systematic review and meta-analysis. BMC Infectious Diseases. 2023;23(1):793.

(73). Once the tablet with the sensor is swallowed, stomach fluids generate a signal which is translated in real-time to the patch, and an event is registered on the mobile app (73). Weekly automated text messages of estimated HIV risk reduction based on confirmed drug ingestion events were also sent (73). While authors reported an incremental increase in PrEP adherence among Proteus Discover users, the majority of participants had issues with the wearable adhesive patch (73).

One intervention, C4 (Client-Centred Care Coordination), focused on supporting PrEP initiation and adherence among Black men who have sex with men (74). C4 included counselling sessions and care coordination, delivered using an anti-racism lens (74). Unlike the aforementioned studies, C4 had no digital component; all sessions were delivered in-person across the duration of the study (52 weeks) (74). A substantial proportion of the men made progress towards their PrEP adherence goals (75); as a result, annualized HIV incidence was lower among those who initiated PrEP compared to those who did not initiate PrEP, though this difference was not statistically significant (74). Findings suggest that C4 can be successfully implemented in resource constrained communities (76).

Two mobile apps focused broadly on HIV prevention (77, 78). The MyPEEPS app used psychoeducational and skill-building modules to reduce sexual risk; a reduction in the number of condomless anal intercourse acts in the intervention group (compared to the delayed intervention group) was observed (77). The M-Cubed app targeted HIV prevention and care behaviours among men who have sex with men living with and without HIV (78). Messages and videos were tailored to participants based on HIV status and risk; authors found an increased prevalence of PrEP use among high-risk participants (78).

We identified two online sexual health curriculums delivered through websites (79, 80). SMART Sex Ed offered comprehensive HIV prevention education across four modules; content was geared specifically towards sexual minority men (80). The intervention increased perceived candidacy to start PrEP (e.g. belief that PrEP is "right for me"), confidence to start using PrEP, and use of PrEP (80). Keep It Up! is a module-based educational intervention designed for young sexual minority men that promotes HIV prevention behaviours; both PrEP uptake and adherence increased post-intervention (79).

Couple-based interventions

We identified three interventions that focused on HIV prevention among HIV serodiscordant couples (81–84). Stronger Together is an in-person counselling intervention that combines Couples' HIV Testing and Counselling (CHTC) and medication adherence counselling for HIV serodiscordant couples; together, couples

56. Wang Y, Mitchell JW, Zhang C, Liu Y. Evidence and implication of interventions across various socioecological levels to address pre-exposure prophylaxis uptake and adherence among men who have sex with men in the United States: A systematic review. AIDS Research & Therapy. 2022;19(1):28.

57. Kudrati SZ, Hayashi K, Taggart T. Social media & PrEP: A systematic review of social media campaigns to increase PrEP awareness & uptake among young Black and Latinx MSM and women. AIDS and Behavior. 2021;25(12):4225–34.

58. Kamitani E, Peng Y, Hopkins D, Higa DH, Mullins MM. A community guide systematic review: Digital HIV pre-exposure prophylaxis interventions. American Journal of Preventive Medicine. 2024;67(2):303–10.

59. Brisson J, Apedaile D, Castro-Arteaga M, Perez-Brumer A. Assessing the impact of digital communication tools on oral PrEP adherence: A systematic review and meta-analysis. AIDS and Behavior. 2025;29(10):3324–34.

60. Kamitani E, Higa DH, Crepaz N, Wichser M, Mullins MM. Identifying best practices for increasing HIV PrEP use and persistence in the United States: A systematic review. AIDS and Behavior. 2024;28(7):2340–9.

61. Lee JJ, Li Verdugo J, Xiao AY, Vo K. Digital interventions to enhance PrEP uptake and adherence through stigma reduction. Current HIV/AIDS Reports. 2023;20(6):458–69.

create a joint prevention plan (84). Participants randomized to the intervention arm had significantly greater odds of being prescribed and taking ART over time, and significantly lower odds of missing a dose of ART in the past 30 days (84). Another in-person counselling intervention for couples is 2GETHER, which focused on relationship education and HIV prevention (81). In both the intervention group and the highly active control groups, condomless anal sex and STIs decreased; a non-significant increase in PrEP use was also observed (81). 2GETHER was also delivered in a videoconferencing format; relative to control, intervention participants had lower odds of rectal STIs (chlamydia or gonorrhea) and reported fewer condomless anal sex acts (82). Project Nexus is a telehealth-delivered CHTC and home-based HIV-testing intervention among mainly HIV-negative male couples; couples in the intervention arm had significantly greater odds of reporting a safer sexual agreement, lower odds of reporting discordant sexual agreements, and a significantly lower odds of reporting breaking their sexual agreement (83).

Group-based interventions

Two group interventions were identified (85, 86). PrEPChicago is a network intervention for young Black men who have sex with men aimed at developing PrEP knowledge and building skills around PrEP communication (85). Participants were trained at a half-day workshop and received booster telephone calls post-workshop to motivate their peers to make a PrEP appointment via PrEP clinics or via a citywide "PrEPline" that refers clients to PrEP care (85). Authors found that the intervention was successful in generating PrEP referrals and linking individuals to first PrEP appointments (85). We Are Family is an intervention targeting individuals in the house ball and gay family communities; the intervention consisted of an in-person group session on HIV prevention (e.g. PrEP, HIV testing) and other sexual health topics, community events, a mobile health app, and a dedicated service provider (86). No significant changes in the PrEP care cascade were observed from pre-test to post-test (86).

Primary studies: Provider-based or structural-level HIV prevention interventions

Table 3 includes 15 HIV prevention interventions that are provider-based or at the structural level. At least 80% of the study population are men who have sex with men. All included studies were published in 2021 or later, and conducted in high-income countries as defined by the World Bank Country and Lending Groups Classification (52). No studies focusing on general HIV-prevention were identified; all focused on PrEP care except for two that focused on post-exposure prophylaxis (PEP).

62. Garrison LE, Haberer JE. Pre-exposure prophylaxis uptake, adherence, and persistence: A narrative review of interventions in the U.S. American Journal of Preventative Medicine. 2021;61(5 Suppl 1):S73–S86.

63. Kamitani E, Mizuno Y, DeLuca JB, Collins Jr CB. Systematic review of alternative HIV preexposure prophylaxis care delivery models to improve preexposure prophylaxis services. AIDS. 2023;37(10):1593–602.

64. Jones J, Schneider I, Valencia R, Jenness SM, Butler G, Castel AD, et al. Randomized controlled trial of a HIV prevention app to increase pre-exposure prophylaxis uptake among gay and bisexual men who have sex with men in the United States: The HealthMindr PrEP study. Journal of Acquired Immune Deficiency Syndromes. 2025;19:19.

65. Biello KB, Mayer KH, Scott H, Valente PK, Hill-Rorie J, Buchbinder S, et al. The effects of MyChoices and LYNX mobile apps on HIV testing and pre-exposure prophylaxis use by young U.S. sexual minority men: Results from national randomized controlled trial. JMIR Public Health Surveillance. 2025;11:e63428.

66. Biello KB, Daddario SR, Hill-Rorie J, Futterman D, Sullivan PS, Hightow-Weidman L, et al. Uptake and acceptability of MyChoices: Results of a pilot RCT of a mobile app designed to increase HIV testing and PrEP uptake among young American MSM. AIDS and Behavior. 2022;26(12):3981–90.

Provider-based HIV prevention interventions

Several interventions examined nurse-led PrEP strategies (18-20, 87). An ongoing service at a sexual health clinic in Ottawa, PrEP-RN is the first PrEP service in Canada entirely provided by registered nurses and nurse practitioners (19). Focusing on task-shifting PrEP to nurses, PrEP-RN involves identification of individuals at elevated risk of HIV acquisition and their referral to the PrEP-RN clinic for rapid initiation of PrEP (18, 19). Due to the nature of PrEP-RN, some individuals are offered PrEP multiple times; authors found that this may yield increased PrEP acceptance (18). Another Canadian study, based in Toronto, supports the utility of a nurse-led PrEP program (20). When participants were given the choice to present a PrEP information card to their primary care physician (with a link to a Continuing Medical Education module) or to obtain PrEP in a nurse-led strategy at participating clinics, nurse-led PrEP delivery was preferred by most patients (20). Finally, one small case series study in the U.S. among Black men who have sex with men who received PrEP care in a nurse-led PrEP strategy had increased PrEP knowledge and adherence (87).

Two studies from the U.S. examined the role of PrEP navigators in the PrEP care cascade among predominantly Black participants (88, 89). As part of the THRIVE demonstration project which involved the provision of comprehensive HIV prevention services at seven U.S. sites, navigators were used to support PrEP care; authors found that men who have sex with men who used navigation services were 16 times more likely to be linked to PrEP compared to those who did not use navigation (88). However, of the men who have sex with men who used navigation across all seven sites, Black men were 21% less likely to link to PrEP compared to White men (88). Navigation for PrEP Persistence, an intervention specifically designed for Black men who have sex with men, found that participants in the intervention condition (i.e. a single patient navigation session and biweekly check-ins) were more likely to pick up their initial PrEP prescription and be retained in care at three and six months (89). One study among ten U.S. clinics evaluated the efficacy of a panel management intervention using PrEP coordinators and a web-based PrEP management tool; authors found that the number of PrEP prescriptions significantly increased pre- to post-intervention (90).

Structural-level HIV prevention interventions

Several structural interventions focused on a model of care for PrEP that was either partially or entirely remote (21-24). TelePrEP is an intervention from the U.S. that enrolled men who have sex with men who were interested in and eligible for PrEP care; before all three remote "video visits" (baseline, three-month, six-month), participants completed laboratory testing in-person at the referring AIDS service organization (23). Self-reported adherence to PrEP remained "high" at 60–70% throughout the program, and the majority

67. Tieosapjaroen W, Phillips TR, Chow EPF, Fairley CK, Istiko SN, Wu J, et al. Using online media to increase the awareness of uptake of preexposure prophylaxis for HIV among Asian-born men who have sex with men living in Australia: An open-label randomized controlled trial. Open Forum Infectious Diseases. 2025;12(7):ofaf321.

68. Lee JJ, Robles G, Leyva Vera CA, Orellana ER, Graham SM, Nguyen AM, et al. A peer-based intervention to increase HIV and sexually transmitted infection testing among Latinx immigrant sexual minority men in the US Pacific Northwest: Pilot randomized controlled trial conducted during the COVID-19 pandemic. JMIR Formative Research. 2023;7:e45871.

69. Wray TB, Chan PA, Kahler CW, Ocean EM, Nittas V. Pilot randomized controlled trial of Game Plan for PrEP: A brief, web and text message intervention to help sexual minority men adhere to PrEP and reduce their alcohol use. AIDS and Behavior. 2024;28(4):1356–69.

70. Horvath KJ, Helm JL, Black A, Chase GE, Ma J, Klaphake J, et al. A pilot randomized controlled trial of an mHealth intervention to improve PrEP adherence among young sexual minority men. AIDS and Behavior. 2024;28(8):2804–20.

of patients reported being satisfied with the model of care (23). An entirely remote PrEP model of care from the U.S. is PrEPTECH, an online platform that manages all aspects of PrEP initiation including PrEP education, ordering of a free home testing kit, medical intake questionnaire, issuing of a PrEP prescription if indicated, and a questionnaire on side effects completed 30 days post-prescription (22). Compared to control, initiation of PrEP was significantly higher for those in the PrEPTECH arm (22). Similarly, HB-PrEP in the U.S. utilized a home-based specimen collection kit and replaced three in-person quarterly visits with remote assessments; the fourth session occurred in-person (24). However, authors observed decreased completion rates in PrEP care, with participants citing discomfort with self-collection and other logistical challenges (24). Finally, TelePrEP in Australia (not to be confused with the aforementioned TelePrEP intervention from the U.S.) is a model of care where nurses educate, clinically assess, order tests, and manage PrEP initiation and follow-up remotely; this program targets overseas-born men who have sex with men who may have issues in accessing PrEP (21). Close to half of all appointments resulted in PrEP initiation or re-initiation, and more than half resulted in PrEP continuation (21).

Two U.S. studies examined intervention implemented at the clinic level to screen individuals for PrEP eligibility (91, 92). Project SLIP developed and tested a PrEP screening tool at two clinics (92). To implement the tool, staff received an educational training session and then, over the course of 12 months, the tool was implemented into clinic workflow (92). Compared to the preceding 12 months, PrEP referrals increased (92). Another clinic implemented an electronic health record–based HIV risk prediction model to improve PrEP provision (91). Providers received prompts to discuss HIV prevention and PrEP before appointments with high-risk patients; a nonsignificant increase in initiation of PrEP care in the intervention arm was observed (91).

One U.K. study examined advanced provision of a five-day pack of PEP (called HOME PEPSE) to be initiated following potential exposure to HIV (93). Authors found that HOME PEPSE reduced the time from exposure to first-dose of PEP by more than 21 hours (93). This significantly improves the efficacy of PEP and provides an option for people declining PrEP (93). A similar concept of PEP-In-Pocket (PIP) implies proactively identifying individuals with low-frequency exposures (vast majority of them men who have sex with men) and giving them a prescription for PEP medications to self-initiate in case of high-risk exposures (94). Evaluation of this strategy in a prospective observational study at two hospital-based clinics in Toronto found PIP to be a feasible option for appropriately selected individuals at modest risk of HIV acquisition (94).

71. Swendeman D, Rotheram-Borus MJ, Arnold EM, Fernandez MI, Comulada WS, Lee SJ, et al. Optimal strategies to improve uptake of and adherence to HIV prevention among young people at risk for HIV acquisition in the USA (ATN 149): A randomised, controlled, factorial trial. The Lancet. 2024;6(3):e187–e200.

72. Serrano VB, Moore DJ, Morris S, Tang B, Liao A, Hoenigl M, et al. Efficacy of daily text messaging to support adherence to HIV pre-exposure prophylaxis (PrEP) among stimulant-using men who have sex with men. Substance Use & Misuse. 2023;58(3):465–9.

73. Brothers J, Hosek S, Keckler K, Anderson PL, Xiong D, Liu H, et al. The ATEAM study: Advances in technology to enhance PrEP adherence monitoring (ATEAM) among young men who have sex with men. Clinical and Translational Science. 2022;15(12):2947–57.

74. Wheeler DP, Fields SD, Beauchamp G, Chen YQ, Emel LM, Hightow□ Weidman L, et al. Pre□ exposure prophylaxis initiation and adherence among Black men who have sex with men (MSM) in three US cities: Results from the HPTN 073 study. Journal of the International AIDS Society. 2019;22(2):e25223.

Factors That May Impact Local Applicability

The term men who have sex with men as used in this review is broad; it includes those who identify as gay or bisexual, as well as those who identify as heterosexual but have sex with other men. Therefore, this term may not accurately reflect the experiences of specific subgroups within the broader population of men who have sex with men. Furthermore, while some primary studies included transgender individuals in their study populations, these individuals were a considerable minority and not well represented in our included studies; thus, the overall findings presented in these studies are not representative of transgender people.

The majority of interventions described in **Tables 2** and **3** were conducted outside of Canada and may not be generalizable in the Canadian context. For example, differences in provincial PrEP coverage, PrEP provider scope of practice, and health system organization may limit the applicability of these findings.

AMSTAR 2 assessment (**Table 1**) revealed low or critically low overall confidence in the results of most included systematic reviews. Therefore, findings from these reviews should be viewed with caution.

What We Did

We searched Medline (including Ovid MEDLINE® and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations) using text term HIV in titles or abstracts AND terms (homosexual* or bisexual* or gay or MSM or gbMSM or men who have sex with or male couple*) in titles or abstracts AND terms (prevent* or PrEP or pre-exposure prophylaxis or preexposure prophylaxis) in titles or abstracts. Review articles were required to include at least 80% of studies from the high income countries as defined by the World Bank Country and Lending Groups Classification. Primary studies were included only if they were conducted in high-income countries and if their study population was composed of at least 80% men who have sex with men. The Prevention Research Synthesis HIV Compendium of Best Practices of the U.S. Centers for Disease Control and Prevention and the Synthesized HIV/AIDS Research Evidence (SHARE) database were also searched. Searches were conducted on October 7, 2025 and results limited to articles published in English since 2021. Reference lists of identified articles were also searched. The searches yielded 2,241 references, from which 95 were included.

75. Nelson LE, Wilton L, Whitfield DL, Williams GC, Mayer KH, Komarek A, et al. Client-Centered Care Coordination (C4) for HIV/STI Prevention: A theoretical, conceptual, and methodological overview–HIV Prevention Trials Network (HPTN) 073. Sexual Research and Social Policy. 2022;19(3):1365–82.

76. Whitfield DL, Nelson LE, Komarek A, Turner D, Ni Z, Boyd DT, et al. Implementation of Client-Centered Care Coordination for HIV prevention with Black men who have sex with men: Activities, personnel costs, and outcomes–HPTN 073. Journal of Racial and Ethnic Health Disparities. 2023;10(1):183–92.

77. Schnall R, Kuhns LM, Pearson C, Batey DS, Bruce J, Hidalgo MA, et al. Efficacy of MyPEEPS Mobile, an HIV prevention intervention using mobile technology on reducing sexual risk among same-sex attracted adolescent males: A randomized clinical trial. Journal of the American Medical Association Network. 2022;5(9):e2231853.

78. Sullivan PS, Stephenson R, Hirshfield S, Mehta CC, Zahn R, Bauermeister JA, et al. Behavioral efficacy of a sexual health mobile app for men who have sex with men: Randomized controlled trial of Mobile Messaging for Men. Journal of Medical Internet Research. 2022;24(2):e34574.

79. Mustanski B, Benbow N, Macapagal K, Li D, Madkins K, Saber R, et al. Comparing implementation and effectiveness outcomes for two implementation strategies of the Keep It Up! digital HIV prevention program: A type 3 hybrid effectiveness-implementation trial. AIDS and Behavior. 2025;19:19.

80. Mustanski B, Saber R, Macapagal K, Matson M, Laber E, Rodrgiuez-Diaz C, et al. Effectiveness of the SMART Sex Ed program among 13–18 year old English and Spanish speaking adolescent men who have sex with men. AIDS and Behavior. 2023;27(2):733–44.

81. Newcomb ME, Swann G, Addington EL, Macapagal K, Moskowitz JT, Sarno EL, et al. Randomized controlled trial of a relationship education and HIV prevention program for young male couples: Biomedical and behavioral outcomes. Health Psychology. 2025;44(3):297–309.

82. Newcomb ME, Swann G, Macapagal K, Sarno EL, Whitton SW, Mustanski B. Biomedical and behavioral outcomes of 2GETHER: A randomized controlled trial of a telehealth HIV prevention program for young male couples. Journal of Consulting and Clinical Psychology. 2023;91(9):505–20.

83. Stephenson R, Sullivan SP, Mitchell JW, Johnson BA, Sullvian PS. Efficacy of a telehealth delivered couples' HIV counseling and testing (CHTC) intervention to improve formation and adherence to safe sexual agreements among male couples in the US: Results from a randomized control trial. AIDS and Behavior. 2022;26(8):2813–24.

84. Stephenson R, Garofalo R, Sullivan PS, Hidalgo MA, Bazzi AR, Hoehnle S, et al. Stronger Together: Results from a randomized controlled efficacy trial of a dyadic intervention to improve engagement in HIV care among serodiscordant male couples in three US cities. AIDS and Behavior. 2021;25(8):2369–81.

85. Schneider JA, Young L, Ramachandran A, Michaels S, Cohen H, Robinson I, et al. A pragmatic randomized controlled trial to increase PrEP uptake for HIV prevention: 55-week results from PrEPChicago. Journal of Acquired Immune Deficiency Syndromes. 2021;86(1):31–7.

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87. Cornelius JB, Gunn LH, Dalton C, Davis B. Nurse practitioner model of care for the initiation of pre-exposure prophylaxis: A case series study. Nursing Open. 2023;10(2):1135–43.

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Table 1. Reviews examining HIV prevention interventions among men who have sex with men, published between 2021–2025

Author & year of publication	Evidence synthesis focus	Year of last search	Location of included studies*	Key findings related to interventions and/or services among MSM	Rating of overall confidence in the results of the review appraised with AMSTAR 2‡ (95)
Phillips II *et al.*, 2021 (25)	To assess the status of structural interventions for HIV prevention among Black and Latinx MSM	2019	n=2 U.S. (n=2)	• A widespread lack of HIV-focused structural interventions for Black and Latinx MSM in the U.S. exists • There is evidence supporting population-specific approaches to HIV prevention, including structural level interventions for MSM, such as multilevel, interdisciplinary direct service approaches for Black MSM, or high-level policy and organizational processes (coalition-based community mobilization efforts) • Interventions that target and seek to ameliorate or eliminate structural stigma have the potential to lead to improvements in HIV outcomes among Black and Latinx MSM	Critically low
Kudrati *et al.*, 2021 (57)	To identify literature that presents or evaluates the use of social media and/or communications campaigns to increase PrEP awareness among young Black and Latinx MSM and women	2020	n=8 U.S. (n=8)	• Social media platforms can be leveraged to share and disseminate information about PrEP in ways that are appropriate and engaging to specific audiences	Critically low
Garrison *et al.*, 2021 (62)	To review effective interventions aimed at improving PrEP adherence in the U.S.	2020	n=20 U.S. (n=20)	• Nine studies focused on MSM • Strategies to include PrEP adherence included behaviour-change interventions, technology-based interventions, and alternative delivery strategies (e.g. pharmacy-based PrEP) • Generally, the quality of evidence for PrEP adherence interventions is low	Critically low
Wang *et al.*, 2022 (56)	The objective of this systematic review is to synthesize and evaluate interventions aimed to improve PrEP uptake and adherence among MSM in the U.S.	2021	n=47 U.S. (n=47)	• Compared to venue-based interventions, technologically delivered PrEP interventions are convenient, cost-effective, and may overcome system-level barriers to PrEP care • App-based interventions include extensive information on PrEP to improve participants' awareness of PrEP and build behavioral skills to use PrEP • Text-message interventions have the potential to impact retention in PrEP care • Use of peers in PrEP interventions for MSM of colour was highlighted as an important strategy, reducing PrEP-related stigma and facilitating trust in PrEP care • Few interventions at the structural level exist	Critically low
Melendez-Torres *et al.*, 2022 (14)	To review the evidence for the effectiveness of eHealth interventions in addressing HIV/STIs, sexual risk behaviour, substance use, and mental health among MSM	2020	n=16, including: U.S. (n=12) Sweden (n=1) The Netherlands (n=1)	• The meta-analysis of six studies, with 3 months to 1 year of follow-up, suggested eHealth interventions can have a significant impact on reducing sexual risk behaviours; however, the overall quality of evidence was poor	High
Sewell *et al.*, 2022 (1)	To identify and describe recent studies evaluating the effectiveness of HIV prevention interventions for MSM	2021	n=39, including: U.S. (n=30) UK (n=2) Canada (n=1) Multi-country (n=4)	• Included studies assessed at least one of these four outcomes: HIV incidence, STI incidence, condomless anal intercourse, and number of partners • Five intervention types were identified: one-to-one counselling, group interventions, online interventions, contingency management interventions for substance abuse, and HIV PrEP interventions • There is some evidence that one-to-one counselling, group interventions, and online interventions (individual) could reduce HIV risk behaviours • PrEP was the only intervention consistently effective at reducing HIV incidence	Low
Portillo *et al.*, 2023 (53)	To evaluate the strengths and limitations of avatar technology as a tool for HIV prevention among MSM	2022	n=11, including: U.S. (n=9)	• Avatars may promote the dissemination of health information to populations at high risk of HIV acquisition • Avatars may provide a medium for participants to reflect on and disclose their sexual behaviours	Critically low
Kamitani *et al.*, 2023 (63)	To identify types, evidence, and study gaps of alternative HIV PrEP care delivery models	2022	n=16, including: U.S. (n=12) Canada (n=1) Australia (n=1)	• PrEP access, care, and delivery could be increased by expanding PrEP care providers (e.g. pharmacists), settings of PrEP care (e.g. telehealth), and laboratory screening (e.g. mail-in testing)	Moderate

Table 1 (continued). Reviews examining HIV prevention interventions among men who have sex with men, published between 2021–2025

Author & year of publication	Evidence synthesis focus	Year of last search	Location of included studies*	Key findings related to interventions and/or services among MSM	Rating of overall confidence in the results of the review appraised with AMSTAR 2‡ (95)
Guimarães *et al.*, 2023 (55)	To identify demand creation strategies and retention strategies to improve PrEP persistence	2022	n=46, including: U.S. (n=16) England (n=2) Switzerland (n=1) Multi-country (n=4)	• Offering PrEP through online demand creation and retention strategies can reach and retain a high number of men who have sex with men and transgender women	Low
Lee *et al.*, 2023 (61)	To examine current digital interventions addressing stigma to improve PrEP-related outcomes	No search strategy or year reported	n=5, including: U.S. (n=4)	• There was variability in the forms of stigma addressed by digital interventions • A lack of standardized stigma measures limits the ability to make conclusions about how stigma reduction can facilitate PrEP use in digital interventions	Critically low
Demeke *et al.*, 2024 (15)	To identify interventions relevant to the HIV prevention and care continuum for Black MSM in Canada	2020	n=19 Canada (n=19)	• There are few targeted interventions for Black MSM • There is limited research on intervention strategies to increase access to prevention interventions for Black MSM • No PrEP delivery strategies that target Black MSM exist • While Black community-based initiatives exist, they are limited by a lack of research to support scale-up to examine effectiveness	Critically low
Luo *et al.*, 2024 (13)	To summarize and evaluate research on the effectiveness of gamification on the HIV prevention and care continuum	2024	n=26, including: U.S. (n=19) Spain (n=1)	• Gamified digital interventions have been applied to various HIV outcomes including testing, condomless anal intercourse, PrEP uptake and adherence, PEP uptake, and ART adherence • Gamification may reduce the number of condomless anal intercourse acts and may improve PrEP adherence among MSM, but evidence is limited	Low
Escarfuller *et al.*, 2024 (17)	To describe what HIV prevention intervention-related research has been conducted in the U.S. among sexual minority Hispanic men	2022	n=15 U.S. (n=15)	• Two studies reported on PrEP outcomes: one intervention improved PrEP adherence, the other improved PrEP screening and referral rates • Four studies reported on condom use outcomes; results were mixed • Few studies incorporated common values present in Hispanic culture • HIV prevention interventions should be bolstered by integration of cultural factors	Critically low
Kamitani *et al.*, 2024 (60)	To summarize the characteristics of best practices for increasing PrEP use and persistence in the U.S.	2023	n=26 U.S. (n=26)	• Bi-directional messaging for digital-based PrEP interventions may help participants feel better supported • Longer intervention periods may allow more time for intervention exposure and thus facilitate behavioural change • Results for culturally tailored interventions to improve PrEP initiation/uptake for Black MSM are mixed	Critically low
Kamitani *et al.*, 2024 (58)	To identify digital health interventions with PrEP adherence outcomes	2023	n=9, including: U.S. (n=8) The Netherlands (n=1)	• All studies showed improved PrEP adherence • One study reported improvement in PrEP care retention • Three studies identified a reduction in sexual risk behaviours • Digital strategies can offer counselling and behavioural risk reduction support between in-person PrEP care visits	Low
Jaramillo *et al.*, 2025 (16)	To map existing evidence on peer-led interventions to increase the reach of HIV testing, treatment, and PrEP among Latino/x/e MSM	2022	n=23, including: U.S. (n=19)	• Of the 17 unique interventions, only 7 had some level of tailoring specifically for Latino/x/e MSM • Two types of cultural tailoring were identified: surface-level (culturally appropriate language, images, symbols, examples) and deep-level (modifying content, strategies, or delivery methods to align with the cultural context and values of the target population) • Most interventions were at the individual level	Critically low

Table 1 (continued). Reviews examining HIV prevention interventions among men who have sex with men, published between 2021–2025

Author & year of publication	Evidence synthesis focus	Year of last search	Location of included studies*	Key findings related to interventions and/or services among MSM	Rating of overall confidence in the results of the review appraised with AMSTAR 2‡ (95)
Brisson *et al.*, 2025 (59)	To evaluate the effect of digital communication tools on improving PrEP adherence	2025	n=10, including: U.S. (n=8)	• The meta-analysis of eight RCTs had a modest improvement on PrEP adherence 12 weeks post-intervention • Digital communication tools (mobile applications, text messaging, mobile games) appear to have a limited impact on improving PrEP adherence • Interventions tailored to individual needs that offer direct feedback in real-time may be necessary for improving PrEP adherence	Critically low
Du *et al.*, 2025 (54)	To evaluate the effectiveness of digital health interventions in enhancing the PrEP care continuum among MSM	2024	n=12, including: U.S. (n=10)	• Digital health interventions (mobile applications, text messaging, and social media platforms) appear to be feasible and acceptable, but challenges persist in real-world implementation such as low user engagement and variability in effectiveness • Few studies demonstrated statistically significant increases in PrEP use and adherence • Digital health interventions should be culturally sensitive, personalized, and prioritize privacy protection	High

ART: Antiretroviral therapy

MSM: Men who have sex with men

PrEP: Pre-exposure prophylaxis

RCT: Randomized controlled trial

*Only high-income jurisdictions listed

‡Rating overall confidence in the results of the review (95):

High: No or one non-critical weakness: the systematic review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest.

Moderate: More than one non-critical weakness: the systematic review has more than one weakness but no critical flaws. It may provide an accurate summary of the results of the available studies that were included in the review.

Low: One critical flaw with or without non-critical weaknesses: the review has a critical flaw and may not provide an accurate and comprehensive summary of the available studies that address the question of interest.

Critically low: More than one critical flaw with or without non-critical weaknesses: the review has more than one critical flaw and should not be relied on to provide an accurate and comprehensive summary of the available studies.

Table 2. Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
INDIVIDUAL INTERVENTIONS							
Biello *et al.*, 2022 (66) MyChoices *Mobile app*	U.S.	2018–2019	RCT	MyChoices is a theory-driven behavioural change mobile app to improve HIV testing and PrEP uptake. The app includes: • Sexual health information in varied formats (e.g. infographics, videos, web links) • Individualized, tailored HIV testing plans • Reminders for HIV/STI testing with geolocation-based notifications • GPS-enabled map with HIV testing locations and PrEP providers • Free home HIV/STI testing kits, condoms, and lubricant Control: Both study conditions received fact sheets on HIV testing and PrEP uptake, and had access to any services available as the standard of care at each study site	Young MSM (aged 15–24)	MSM (n=60) – Median age: 22 – Control (n=20) Intervention (n=40) – HIV status: HIV- – White, non-Hispanic (n=35) Hispanic/Latino (n=9) Asian, non-Hispanic (n=7) Black, non-Hispanic (n=3) Other/multiple (n=5) Declined to answer (n=1)	• No improvement in PrEP uptake
Biello *et al.*, 2025 (65) MyChoices *Mobile app* LYNX *Mobile app*	U.S.	2019–2022	RCT	• MyChoices mobile app previously described by Biello • , 2022 (66) • LYNX mobile app is guided by the information-motivation-behavioural skills model and includes: ✓ Personalized HIV risk score ✓ Sexual diary to track sexual partners and encounters ✓ Infographics summarizing sexual activities and partner types ✓ Bi-directional chat feature to answer questions and provide real-time assistance with PrEP ✓ Reminders for HIV/STI testing with geolocation-based notifications ✓ GPS-enabled map with HIV testing locations and PrEP providers ✓ Free home HIV/STI testing kits, condoms, and lubricant Control: Both study conditions received fact sheets on HIV testing and PrEP uptake, and had access to any services available as standard of care at each study site	Young MSM (aged 15–24)	MSM (n=381) – Mean age: 22 – Control (n=130) Intervention: MyChoices (n=124) Intervention: LYNX (n=127) – White (n=194) Black (n=67) Asian (n=34) Latino or Hispanic (n=67) Other or mixed (n=17)	• Both apps demonstrated a small but statistically nonsignificant impact on PrEP initiation
Jones *et al.*, 2025 (64) HealthMindr-PrEP *Mobile app*	U.S.	2020–2022	RCT	HealthMindr-PrEP is a mobile app with HIV prevention content specific to PrEP; the app includes: • FAQ on PrEP • PrEP self-assessment • PrEP provider locator • Ability to order condoms, lubricant, and HIV/STI self-test kits • Resources related to substance use and mental health • Personalized study timeline Control: Participants were only able to see the study timeline on the app	Young MSM (aged 18–34)	MSM (n=685) – Control (n=221) Intervention (n=437) – Non-Hispanic White 43.0% Black 23.6% Hispanic 21.6% Non-Hispanic Other or Multiple races 12.3%	• Statistically nonsignificant increase in PrEP initiation

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Tieosapjaroen *et al.*, 2025 (67) Hot Peach Tea *Podcast series*	Australia	2024	RCT	Hot Peach Tea is a community-based audio drama composed of 6 podcast-style episodes, each 5 minutes in length Control: Participants received a link to PrEP Access Now, the common approach suggested by clinicians to gain PrEP-related information, including how to initiate, purchase, and use PrEP in Australia with or without insurance	Asian-born MSM in Australia (aged 18+)	MSM (n=200) – Median age: 29 – Control (n=96) Intervention (n=104) – Asian (n=200)	• No change in PrEP initiation
Dangerfield *et al.*, 2024 (2) POSSIBLE *In-person peer support plus mobile app*	U.S.	2019–2021	Pretest–posttest design	POSSIBLE is a multicomponent intervention that includes peer sessions and use of an app to increase perceived HIV risk: • Two sessions with a peer change agent to discuss lifestyles, personal goals and values, HIV vulnerabilities, perceived risk for HIV, and relative PrEP interest • PrEP use was encouraged by the agent and interested individuals were referred to care at the end of each session • Between visits, participants self-monitored their sexual behaviours using a mobile app-based diary called PrEPme	Black MSM (aged 18+)	MSM (n=69) – Mean age: 33 – Black (n=69)	• Increase in perceived HIV risk • Increase in the number of PrEP appointments
Schrode *et al.*, 2025 (3) MEPS *In-person peer support and incentives plus mobile app*	U.S.	2019–2022	RCT	The MEPS (Mobile-Enhanced Prevention Support for People Leaving Jail) intervention is a tailored, multi-component six-month long intervention: • 14 peer sessions with peer mentor • Financial incentives earned by engaging in HIV/STI testing and prevention, substance use treatment, and other health-promoting activities • Geopass, a mobile app, provided an interface for searching for local providers, log appointments, review and update goals, and track incentive earnings Control: Standard of care, which included enrollment in jail-based substance use treatment and re-entry transition program	MSM leaving incarceration with a substance use disorder (aged 18–49)	Cisgender male (n=208) Transgender female (n=19) Gender non-conforming (n=9) Other (n=1) – Mean age: 34 – Control (n=103) MEPS (n=105) – Hispanic or Latino 42% Black or African American 26% White 21% Asian 2% American Indian or Alaska native 1% Native Hawaiian or Other Pacific Islander 1% Other 7%	• Increased PrEP use
Chan *et al.*, 2021 (4) PrEPare-to-Start *In-person/telehealth counselling*	U.S.	2019–2020	RCT	PrEPare-to-Start consists of 2 brief motivational interviewing counselling sessions (10–15 minutes) to help participants decide if they should start PrEP: • Initial session: conducted in-person at the time of STI testing to discuss barriers to PrEP uptake (about 15 mins) • Booster session: follow-up telephone session; and develop an action plan (about 10 mins Control: Treatment-as-usual, including referral to PrEP services, access to STI clinic counsellors to discuss PrEP and encourage use, and facilitation of PrEP uptake by addressing structural barriers if possible (e.g. transportation)	MSM at high risk of HIV (aged 18+)	MSM (n=86) – Mean age: 32 – Control (n=43) Intervention (n=43) – White (n=56) African American/Black (n=9) Asian (n=5) Other (n=11)	• Improved linkage to PrEP care

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Silva *et al.*, 2021 (5) PS-PrEP *In-person/telehealth counselling*	U.S.	2015–2017	RCT	PS-PrEP (Partner Services PrEP) is an intervention to improve linkage to PrEP care among Black MSM and transgender women presenting at network referral services (e.g. partner notification services): • A 60-minute face-to-face session with a social work interventionist guided participants' through 4 components: ✓ Interactive education on HIV and PrEP ✓ Assessing participant's motivation to reduce HIV risk and engage in PrEP ✓ Creation of a PrEP linkage roadmap ✓ Problem-solving exercises to address barriers in engagement with PrEP care • Up to 4 booster check-in sessions via phone/text message from a social worker to address challenges with PrEP care engagement Control: Treatment-as-usual, including risk assessment, referral for additional STI testing, and provision of HIV prevention programming (e.g. PrEP)	Black MSM and transgender women (aged 18–40)	MSM (n=126) Transgender women (n=10) – Median age: 26 – Control (n=65) Intervention (n=71) – Black (n=118) Latino (n=8)	• Increased linkage to PrEP care • Increased PrEP uptake
Lee *et al.*, 2023 (68) Listos *Telehealth counselling*	U.S.	2021	RCT	Listos, Spanish for "ready" or "smart", is a peer-based counselling intervention encouraging HIV and STI self-testing and PrEP uptake: • A peer counselling session with one follow-up session, and access to peers via phone/text/email for the study's duration • Provision of mail-in HIV and STI test kits Note: Initial design was in-person; it was moved to a fully remote format due to COVID-19 Control: Only peer counselling	Latinx immigrant sexual minority men (aged 18+)	MSM (n=50) – Mean age: 37 – Control (n=20) Intervention (n=30) – Latinx (n=50)	• Increased PrEP initiation
Van den Elshout *et al.*, 2021 (8) AMPrEP *Mobile app*	The Netherlands	2016	RCT	The standard AMPrEP (Amsterdam PrEP) mobile app (Control) allows all users to record on a daily basis whether they used PrEP, had sexual intercourse, the type of sex partner they had anal sex with, and condom use The enhanced version of the AMPrEP app (Intervention) included the standard app features plus: • Visual displays of recorded data in graphs and bar charts • Alarm function to set daily reminders • Tab for taking personal notes	MSM (aged ≥18)	MSM (n=165) Transgender female (n=1) – Median age: 39 – Control (n=83) Intervention (n=83) – White (n=146) Nonwhite (n=20)	• No change in good adherence was observed
Mitchell *et al.*, 2022 (6) mSMART *Mobile app*	U.S.	2017–2018	Pretest–posttest design	mSMART (Mobile App-Based Personalized Solutions for Medication Adherence of Rx Pill Tool) is a gamified mobile app for PrEP adherence. Features include: • Interactive adherence tracking • Adaptive daily surveys to gauge PrEP knowledge • Individualized adherence strategies • Coping strategies to manage PrEP side effects • Feedback on PrEP adherence	Young Black MSM (aged 18–30)	MSM (n=15) – Mean age: 26 – Black (n=14) Multiracial (n=1)	• Improved PrEP adherence

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Hightow-Weidman *et al.*, 2025 (7) P3/P3+ *Mobile app*	U.S.	2019–2021	RCT	P3 (Prepared, Protected, emPowered) is a mobile app developed to support PrEP adherence through gamification, medication tracking, and social engagement P3+ is the standard P3 app plus: • Access to in-app adherence coaches Control: Standard of care included adherence-only messages	Young MSM and young TWSM (aged 16–24)	Cisgender male (n=216) Non-binary/gender queer (n=9) Transgender female (n=5) Multiple genders (n=14) – Median age: 22 – Control (n=83) Intervention: P3 (n=82) Intervention: P3+ (n=81) – White (n=137) Black (n=51) Asian (n=16) American Indian or Alaska Native (n=3)	• Improved PrEP adherence in P3/P3+
Weitzman *et al.*, 2021 (9) Dot *Mobile app plus text messaging*	U.S.	2019	Pretest–posttest design	Dot is a mobile app that offers adherence tracking and pill reminders in addition to text messages to encourage adherence. 3 types of text messages are offered: • Daily pill reminders, plus • Weekly: 6 educational and 6 motivational messages, plus • Weekly: reminder text for daily adherence and consistent condom use	Young MSM (aged 20–29)	MSM (n=54) – Mean age: 25 – White (n=28) Asian (n=10) African American (n=10) Hispanic/Latino (n=3) Mixed (n=3)	• Improved PrEP adherence
Liu *et al.*, 2021 (10) DOT Diary *Mobile app plus text messaging*	U.S.	2018	Pretest–posttest design	DOT Diary is an app using an automated directly-observed therapy (aDOT) approach for real-time PrEP adherence monitoring and pill reminder system coupled with an electronic sexual diary: • The aDOT component: date and time stamp of each dosing event, daily dose reminder alarms, and an automated text message if participants are late on taking a dose • Electronic sexual diary component: tracks sexual encounters, sexual behaviours, rating characteristics of partners, calendar overview showing overlap of PrEP use and sexual encounters while on PrEP • Text messages are sent to follow up on missed or late doses	Young MSM (aged 18–35)	MSM (n=20) – Median age: 28 – Black (n=15) White (n=5)	• PrEP adherence supported by the app

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Buchbinder *et al.*, 2023 (11) DOT Diary *Mobile app plus text messaging*	U.S.	2019–2020	RCT	DOT Diary mobile app previously described by Liu *et al.*, 2021 (10), plus: • Micro-incentive ($0.50) each day DOT Diary was used to record a dose Control: Participants received a micro-incentive ($0.50) for each day they used a health-related app of their choosing (i.e. a sleep tracking app)	Young MSM (aged 18–35)	MSM (n=100) – Mean age: 26 – Control (n=34) Intervention (n=66) – Control: Asian/Pacific-Islander 11.8% Black/African American 20.6% Latinx 20.6% White 44.1% Other 2.9% Intervention: Asian/Pacific-Islander 15.2% Black/African American 28.8% Latinx 22.7% White 31.8% Other 1.5%	• No improvement in PrEP adherence
Whiteley *et al.*, 2021 (12) Viral Combat *Mobile app*	U.S.	2017–2019	RCT	Viral Combat is a gaming app for young MSM initiating PrEP: • Players are "inside" the human body, where they combat HIV by engaging in health-promoting behaviours such as taking medication and interacting with providers • The game consists of five progressively challenging levels; throughout gameplay, tailored messages from healthcare providers and peers reinforce PrEP adherence, use, and routine care • Success across levels reflects improved health status and adherence behaviours Control: Non-PrEP related mobile gaming app	Young MSM (aged 18–35)	MSM (n=69) – Mean age: 25 – Black/African American 85.5% Hispanic/Latinx 6%	• Increased PrEP adherence
Horvath *et al.*, 2024 (70) PrEP iT! *Website plus text messaging*	U.S.	2021	RCT	PrEP iT! is a website optimized for mobile devices (i.e. not an app) designed to support PrEP adherence and education. Primary components include: • Self-monitoring tool for daily PrEP and sexual activity tracking • PrEP adherence interface displaying visual feedback on adherence and protection levels • Brief educational tips with infographics addressing HIV risk, stigma, and PrEP cost • Feature to ask anonymous PrEP-related questions • Optional text message reminders for adherence and healthcare appointments Control: Usual PrEP care, as received by participants from their provider	Young MSM (aged 18–29)	MSM (n=80) – Mean age: 25 – Control (n=40) Intervention (n=40) – Non-Hispanic White (n=37) Asian (n=16) Hispanic White (n=14) Non-Hispanic Black (n=9) Hispanic Black (n=4)	• No overall effect on PrEP adherence

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Wray *et al.*, 2024 (69) Game Plan for PrEP *Website plus text messaging*	U.S.	2021–2022	RCT	Game Plan for PrEP is a website that collected an individual's basic demographic and behavioural information and assessed their drinking habits. Features included: • Feedback on HIV risk and how PrEP could impact this • A decisional balance to help weigh the pros and cons of changing sexual behaviour • Goal setting (e.g. "set a routine to take PrEP every day"), specific motivations for each goal (e.g. "to improve my relationship with my partner"), and steps to reach their goal (e.g. "keep my meds within reach") • Any goals and steps selected were then displayed on a final page that participants could email to themselves • Text message service assessed weekly PrEP adherence, sexual risk behaviour, alcohol use, and HIV risk Control: Participants encouraged to visit a website that guided them through educational videos on sleep, hygiene, and diet	Sexual minority men who report heavy alcohol use (aged ≥18)	Sexual minority men (n=73) – Mean age: 35 – Control (n=36) Intervention (n=37) – White (n=60) Black/African American (n=8) Asian (n=1) Multiracial (n=3) Chose not to respond (n=1)	• No improvement in PrEP persistence or adherence • No reduction in condomless anal sex acts
Serrano *et al.*, 2023 (72) iTAB *Text messaging*	U.S	2013–2015	RCT	iTAB (Individualized Texting for Adherence Building) is a text messaging system where participants receive personalized, automated daily texts to support PrEP adherence: • Participants can select health promotion and factoid type messages • Each message came with a personalized prompt to take PrEP • Participants were prompted to respond to whether or not they took PrEP that day Control: Standard of care (not specified)	MSM who use stimulants (aged ≥18)	MSM who use stimulants (n=119) – Age range: 28–35 – Control (n=61) Intervention (n=58) – White (n=88) African American (n=17) Asian (n=5) Other/unknown (n=4)	• Increased PrEP adherence
Swendeman *et al.*, 2024 (71) AMMI *Text messaging*	U.S.	2017–2019	RCT	AMMI (Automated text messaging and monitoring): Non-interactive daily informational, motivational, and reminder text messages and a weekly self-monitoring survey; up to five messages were sent daily on five different content themes (physical health and health care, mental health and wellness, sexual health, substance use, medication reminders) AMMI plus peer support: Invitation to participate in reading and posting comments in a private online discussion board, where evidence-based responses and links to information and referrals were provided AMMI plus peer coaching: Support was provided via telephone calls, text messaging, social media direct messaging, and/or in-person meetings AMMI plus peer support and coaching: A combination of all described approaches	Adolescents at risk of HIV (aged 12–24)	Cisgender male (n=724) Transgender male (n=48) Transgender female (n=59) Gender diverse male (n=47) Gender diverse female (n=17) – Mean age: 21 – Control: AMMI (n=313) Intervention: AMMI plus peer support (n=205) Intervention: AMMI plus peer coaching (n=196) Intervention: AMMI plus peer support and coaching (n=181) – Black or African American (n=362) Latino or Hispanic (n=257) White (non-Hispanic) (n=184) Asian or Pacific Islander (n=53) Other or mixed backgroud (n=39)	• AMMI plus peer support and coaching increased PrEP uptake

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Brothers *et al.*, 2022 (73) Proteus Discover *Digital monitoring adherence system*	U.S.	2017–2019	RCT	Proteus Discover is a digital monitoring adherence system that measures PrEP adherence: • A sensor tablet coencapsulated with the drug is swallowed; a signal is transmitted to a wearable patch and registered as an event on the app • Weekly automated weekly text messages with information of estimated HIV risk reduction calculated from the total number of days of confirmed drug ingestion Two intervention groups: • Initial Proteus (IP) arm: start with Proteus Discover for 12 weeks followed by standard PrEP (i.e. no sensor); or • Crossover Proteus (CP) arm: start with standard PrEP (i.e. no sensor) followed by Proteus Discover	Young MSM and transgender women (aged 16–24)	MSM (n=98) Transgender female (n=2) – Mean age: 22 – Intervention: IP (n=50) Intervention: CP (n=50) – White (n=28) Black (n=17) Latinx (n=33) Asian Pacific Islander, multiracial, and others (n=22)	• Increased PrEP adherence
Nelson *et al.*, 2022 (75) Wheeler *et al.*, 2019 (74) Whitfield *et al.*, 2023 (76) C4 *In-person counselling & care coordination*	U.S	2014–2017	Pretest–posttest design	The Client-Centred Care Coordination (C4) intervention combines comprehensive risk counselling and services using an integrative anti-racism lens and self-determination theory approach to counseling and client engagement: • C4 session offered at each study visit (n=6) with the option to decline • Sessions focused on PrEP understanding, initiation, and adherence • HIV testing, risk reduction education, and clinical monitoring were also offered • Care coordination including referrals, follow-up care, and planning for transition off study and into community care	Black MSM (aged 18+)	MSM (n=226) – Median age: 26 – Black or African American 86% Afro-Caribbean, African and Afro-Latino 14%	• Increased PrEP initiation and adherence, decreased HIV incidence
Schnall *et al.*, 2022 (77) MyPEEPS Mobile *Mobile app*	U.S.	2018–2020	RCT	MyPEEPS Mobile focuses on psychosocial and contextual risk related to HIV: • Content is delivered through games, scenarios, and role-plays within 21 online psychoeducational and skill-building modules, completed over a 3-month period • Provides educational information about HIV and STIs • Raises awareness about minority stress • Builds skills for condom use, emotion regulation, and communication One group received the intervention immediately ("Immediate"), and another group received the intervention after 9 months ("Delayed")	Young MSM (aged 13–18)	MSM (n=736) – Mean age: 16 – Intervention: Immediate (n=382) Intervention: Delayed (n=381) – White (n=284) Black/African American (n=158) Asian (n=72) American Indian or Alaskan Native (n=43) Native Hawaiian or other Pacific Islander (n=11) Multiracial (n=94) Missing or unknown (n=98)	• Reduced condomless anal sex acts

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Sullivan *et al.*, 2023 (78) M-Cubed *Mobile app*	U.S.	2018–2019	RCT	M-Cubed (Mobile Messaging for Men) is a mobile app to address HIV prevention and care among MSM. Every other day, 1 message is sent; once per week, a 1-minute video (for 3 weeks) is sent. The app tailors content to MSM living with and without HIV: • For MSM living without HIV: tailored prevention messaging through content and videos based on HIV risk factors for MSM living without HIV • For MSM living with or without HIV: prevention and care services are offered (PrEP eligibility screening, ordering platform for delivery of HIV/STI screening kits, service locators for PrEP, nPEP, and HIV treatment/care) Control: No access to app	MSM, HIV+ and HIV- (aged 18+)	MSM (n=1,220) – Control (n=615) Intervention (n=611) – HIV status: HIV- (n=838) HIV+ (n=388) – Colour (n=709) White (n=510)	• Increased PrEP use
Mustanski *et al.*, 2023 (80) SMART Sex Ed *Online curriculum*	U.S.	2018–2020	Pretest–posttest design	SMART Sex Ed is a 4-module online sexual health education curriculum that addressed the following content areas: • Sexual and gender identity • Sexual activity, pleasure, and consent • Sex education in the real world • Healthy relationships	Adolescent MSM (aged 13–18)	MSM (n=983) – Mean age: 17 – HIV status: HIV- and status unknown – White (n=629) Hispanic/Latinx (n=345) Black (n=207) Asian (n=107) Indigenous (n=92) Other (n=104) Categories not mutually exclusive	• Increased PrEP use • Decreased condom use errors
Mustanski *et al.*, 2025 (79) KIU! *Online curriculum*	U.S.	2019–2023	RCT	KIU! (Keep It Up!) is an online sexual health program developed for young MSM vulnerable to HIV; the program uses interactive multimedia to increase sexual health knowledge, motivate safer behaviours, and encourage healthy relationships: • 9 learning modules are completed across three sessions with mandatory 8-hour breaks between sessions • Booster sessions delivered at 6 and 12 weeks This study compared two delivery strategies for implementing KIU!: • Community-Based Organizations (CBO) • Direct-To-Consumer (DTC)	Young MSM (aged 18–34)	MSM (n=2,124) – White (n=830) Black or African American (n=313) Latinx (n=617) Other (n=364)	• Both delivery strategies enhanced PrEP uptake and adherence

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
COUPLE-BASED INTERVENTIONS							
Stephenson *et al.*, 2021 (84) Stronger Together *In-person counselling*	U.S.	2014–2017	RCT	Stronger Together is a CHTC intervention aimed at optimizing HIV prevention and care for serodiscordant couples: • Motivational interviewing is used to improve adherence for the partner living with HIV by creating strategies • Couples work together on shared goals to create a joint prevention plan • 3 in-person counseling sessions (30 min, 60 min, 60 min) • 3 follow-up booster sessions • Individual participants received $50 for completing each study visit (n=4) with a total incentive amount of $400/couple Control condition: Couples are seen separately; HIV+ partner receives individual care, while the HIV- member engages in HIV testing	HIV serodiscordant male couples (aged 18–69)	MSM (n=318; n=159 couples) – Mean age: 40 – Control (n=158 MSM; n=79 couples) Intervention: (n=160 MSM; 80 couples) – HIV status HIV- (n=159) HIV+ (n=159) – White (n=105) Hispanic (n=12)	• Improved adherence
Newcomb *et al.*, 2025 (81) 2GETHER *In-person: Counselling & group education sessions*	U.S.	2017–2021	RCT	2GETHER teaches couples to use relationship skills (i.e. communication, coping, problem-solving, acceptance) to optimize relationship functioning, improve sexual health, and reduce HIV transmission risk; ten hours of content are included: • 2 group sessions are aimed at skills building • Couples then complete 2 individualized skills coaching sessions focused on skills implementation Control condition: PEONY (Positive Emotion Orientation for Nurturing Your Relationship) group sessions focused on skill-building	Young male couples (aged 18+, with at least one member of the couple between 18–29)	MSM (n=256; n=128 couples) – Median age: 28 – Control (n=124; n=62 couples) Intervention (n=132; n=66) – HIV status: HIV+ (n=40) HIV- (n=196) Status unknown (n=4) Never tested (n=16) – White (n=132) Hispanic/Latinx (n=48) Black (n=48) Asian (n=8) Multiracial (n=16)	In both intervention and highly active control groups: • Decreased condomless anal sex acts • Decreased STIs • Non-significant increase in PrEP use

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Newcomb *et al.*, 2023 (82) 2GETHER *Videoconferencing: counselling & group education sessions*	U.S.	2018–2020	RCT	2GETHER (videoconferencing version) teaches couples to use relationship skills (i.e., communication skills, coping skills, problem-solving, acceptance) to optimize relationship functioning, improve sexual health, and reduce HIV transmission risk; ten hours of content are included: • 3 videoconferencing group sessions are aimed at skill-building; prior to each session, participants view self-paced video modules addressing communication skills, coping with stress, relationship satisfaction, and HIV transmission risk • 2 videoconferencing individual couple coaching sessions are aimed at implementing skills and sexual health Control condition: A single-session, couple-based HIV testing and risk reduction session	Young male couples (aged 18+, with at least one member of the couple between 18–29)	MSM (n=400; n=200 couples) – Mean age: 28 – Control: 200 MSM (n=100 couples) Intervention: 200 MSM (n=100 couples) – HIV status: HIV+ (n=45) HIV- (n=309) Unsure of status (n=4) Never tested (n=42) – White (n=225) Hispanic/Latinx (n=94) Black (n=34) Asian (n=17) Native Hawaiian/Pacific Islander (n=2) Native American/Alaskan Native (n=1) Multiracial (n=23) Other (n=4)	• Decreased condomless anal sex acts • Decreased number of condomless anal sex partners • Decreased rectal STIs
Stephenson *et al.*, 2022 (83) Project Nexus *Telehealth counselling*	U.S.	2016–2018	RCT	Project Nexus is a telehealth-delivered intervention that combines CHTC with home-based HIV testing to help couples develop a shared HIV prevention plan that reflected their mutual understanding, risk profile, and relationship context: • Single virtual CHTC session lasting 30–45 minutes • Two-home HIV self-test kits • During the session, partners individually completed HIV self-tests and received their results together, guided by the counselor Control condition: Two home HIV self-test kits	Male couples (aged >18)	MSM (n=796; n=398 couples) – Mean age: 30 – Control (n=382 MSM; n=191 couples) Intervention (n=414 MSM; 207 couples) – HIV status HIV- 98% HIV+ 2% – White (n=605) Black/African American (n=62) Asian (n=68) Latino/Latinx (n=158) Hawaiian, Pacific Islander, other (n=61)	• Decreased risk behaviour

Table 2 (continued). Study characteristics of included behavioural interventions, published between 2021–2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
GROUP INTERVENTIONS							
Schneider *et al.*, 2021 (85) PrEPChicago *In-person group training & telehealth support*	U.S.	2016–2018	RCT	PrEPChicago is a network intervention aimed to enhance participants' knowledge of PrEP and strengthen their communication and motivational skills to engage others in the PrEP care cascade; a half-day small group workshop was followed by 8 telephone booster session (10–20 mins). The workshop had 4 modules: • HIV facts and myths • Background on PrEP • Role playing conversations about motivating peers to engage in PrEP care • Leveraging social media to spread awareness about PrEP Control: Participants received a sexual risk assessment workshop, whereby participants wrote and discussed fictional narratives about what they believe constituted low, medium, and high HIV/STI risk scenarios	Young Black MSM (aged 18–35)	MSM (n=423) – Mean age: 26 – Control (n=214) Intervention (n=209) – HIV status HIV- (n=244) HIV+ (n=179)	• Increased number of PrEP referrals • Increased linkage to first PrEP appointment
Arnold *et al.*, 2021 (86) We Are Family *In-person group sessions & mobile app*	U.S.	2018–2019	Pretest–posttest design	The "We Are Family" intervention has four components designed to overlap with one another: • 2.5-hour in-person group session on HIV/STI prevention, HIV stigma, U=U, and PrEP • Monthly community-level events to promote HIV prevention and sexual health • Mobile health app: reiterates group session content, connects users to local resources, and promotes health and well-being • Dedicated service provider facilitates group sessions and provides HIV-related services to the community	Members of the house ball and gay family communities (aged 18+)	Cisgender male (n=65) Non-binary (n=27) Transgender female (n=25) – Mean age: 31 – HIV status HIV-negative n=82 HIV-positive n=34 – Black (n=72) Hispanic (n=38) Mixed race (n=27) Latinx (n=11)	Modest non-significant changes were observed: • HIV-/HIV+ participants: decrease in condomless anal intercourse • HIV- participants: increase in PrEP adherence, increase in condom us • HIV+ participants: increased ART adherence, increased viral suppression

CHTC: Couples' HIV counselling and testing

MSM: Men who have sex with men

PrEP: Pre-exposure prophylaxis

RCT: Randomized controlled trial

STI: Sexually transmitted infection

TWSM: Transgender women who have sex with men

Table 3. Study characteristics of included provider-based or structural-level interventions, published between 2021-2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
PROVIDER-BASED INTERVENTIONS							
O'Byrne *et al.*, 2021 (19) PrEP-RN *Nurse-led PrEP*	Canada	2018–2020	Prospective cohort (pre–post analysis)	PrEP-RN is a nurse-led PrEP referral and rapid initiation program within a sexual health clinic setting that functions as an ongoing service (18): • Identification: Public health nurses identify individuals for PrEP RN at elevated HIV risk (e.g. STI diagnosis, STI follow-up, PEP users, sexual contacts of someone newly diagnosed with HIV, clinical judgment) • Referral: Eligible individuals are offered immediate referral to the PrEP-RN clinic for rapid PrEP initiation or to other local PrEP providers • Initiation: Rapid PrEP initiation at the PrEP-RN clinic • Transition: Once stabilized on PrEP, patients referred to external providers for ongoing care within 1 year	MSM at risk of HIV	Cisgender male (n=89) – White (n=54) Non-white (n=23)	• No significant differences in uptake, acceptance, engagement, or discontinuation
Orser *et al.*, 2024 (18) PrEP-RN *Nurse-led PrEP*	Canada	2018–2022	Retrospective cohort (pre–post analysis)	PrEP-RN previously described by O'Byrne *et al.*, 2021 (19)	MSM at risk of HIV	Cisgender male (n=236) – Mean age: 30 – Ethnicity and race data not collected	• About half of clients declined PrEP referrals after multiple offers, while the other half accepted • Five HIV seroconversions occurred, all among individuals who declined PrEP at least once
Charest *et al.*, 2021 (20) PICME & Nurse-led PrEP *Knowledge dissemination strategy & nurse-led PrEP*	Canada	2017–2019	Pre–post analysis	Patient-Initiated Continuing Medical Education (PICME) is a knowledge dissemination strategy where empowered participants are given PrEP information cards by community-based organizations • The information cards had links to two modules: ✓ A link to educate patients about PrEP and how to engage providers in a conversation about this preventative tool ✓ A link for physicians containing practical information about how to prescribe PrEP based on current Canadian guidelines plus a self-assessment tool • Alternatively, patients could bring their information card into one of two participating clinics in Toronto (if unwilling to approach a primary care provider) where trained sexual health nurses could provide PrEP under a medical directive	MSM	MSM (n=196) – Median age: 31 – White (n=103) Asian (n=48) Latin American (n=13) Black (n=9) Middle Eastern (n=8 First Nations (n=1) Indian-Caribbean (n=1) Mixed or other (n=6)	• Nurse-led PrEP was the preferred delivery strategy
Cornelius *et al.*, 2021 (87) NP PrEP *Nurse-led PrEP*	U.S.	2019	Case series	NP PrEP is a model of care where NPs meet the needs of patients prescribed PrEP; NPs provide: • Initial face-to-face PrEP education session (indications, side effects, daily dosing, information handout, medication log, condom distribution) • Two follow-up sessions (at 1 month and 3 months) to review the PrEP handout and laboratory results • Financial incentives (e.g. $25 gift card) offered at baseline and 3-month follow-up	MSM (aged 18+)	MSM (n=7) – Mean age: 30 – Black (n=7)	• PrEP adherence supported

Table 3 (continued). Study characteristics of included provider-based or structural-level interventions, published between 2021-2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Kimball *et al.*, 2023 (88) THRIVE *PrEP navigator*	U.S.	2015–2020	Pre–post analysis	Targeted Highly Effective Interventions to Reverse the HIV Epidemic (THRIVE) is a demonstration project that supported health departments to deliver culturally competent HIV care and prevention services to MSM and transgender women; all THRIVE sites used navigators to assist clients in linkage to services but used a variety of models and programs. Generally, navigators: • Screened clients for service needs • Provided HIV prevention education • Made referrals and assisted with appointment scheduling/ attendance • Conducted follow-up as needed	MSM (aged 18+)	MSM (n=3,481) – Navigation not used (n=2,126) Navigation used (n=1,355) – Black/African American (n=1,668) White (n=1,251) Hispanic/Latino (n=369) Other (n=165)	• Navigation increased linkage to PrEP care
Goedel *et al.*, 2022 (89) Navigation for PrEP Persistence *PrEP navigator*	U.S.	2018–2020	RCT	Navigation for PrEP Persistence is designed to improve PrEP-related outcomes by providing Black/African American MSM with a PrEP navigator: • One session with a PrEP navigator within seven days of PrEP initiation; then, weekly/biweekly check-ins for up to six months • Prescription refills and pickups verified with the pharmacy • Other supports included general PrEP education, reminder calls/emails/texts, transportation assistance on a case-by-case basis Control: General education on PrEP from their health care provider during their initial appointment	Black/African American MSM (aged 18–34)	MSM (n=60) Median age: 25 – Control (n=30) Intervention (n=3) – Black (n=60)	• Increased PrEP initiation and persistence
Saberi *et al.*, 2022 (90) PrEP-OI *PrEP coordination*	U.S.	2018–2019	RCT	PrEP-OI (PrEP Optimization Intervention) is centralized PrEP coordination supported by a web-based panel management support tool (PrEP-Rx); includes: • PrEP coordinator used PrEP-Rx to track patients' PrEP timelines, monitor adherence, manage side effects, and order quarterly labs • Included patient consultation checklists, adherence questions, and automated reminders for follow-up and testing	Individuals receiving PrEP at primary care sites	10 primary care sites – Median clinic size: 3,922	• Increased number of PrEP prescriptions • Increased in-person PrEP-related visits

Table 3 (continued). Study characteristics of included provider-based or structural-level interventions, published between 2021-2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
STRUCTURAL-LEVEL INTERVENTIONS							
Player *et al.*, 2022 (23) TelePrEP *Remote PrEP initiation*	U.S.	2018–2019	Pre–post analysis	TelePrEP includes 3 scheduled video visits across 6 months and 4 electronic visits between video sessions: • Baseline video visit: lab review, HIV/STI screening, risk assessment, medical history, lifestyle counselling, medication education, and PrEP prescription with option for pick-up at a pharmacy or home-delivery • 3- and 6-month video visits: repeated lab testing, adherence review, and continued PrEP management • 4 e-visits: medication adherence and side effects assessed • In-person lab testing performed before each video visit • Patient education materials provided	MSM eligible for and interested in PrEP	MSM (n=20) – Mean age: 36 – African American 5% White 95%	• PrEP adherence remained high
Erenrich *et al.*, 2024 (22) PrEPTECH *Remote PrEP initiation*	U.S.	2022	RCT	PrEPTECH is a fully online, technology-based PrEP delivery program that includes the following steps: 1. Online PrEP education module 2. Ordering and completing a home testing kit (rectal swab + dried blood spot) for HIV, syphilis, rectal STIs, creatinine, hepatitis B 3. Completion of an online medical intake questionnaire on the PrEPTECH platform 4. Clinician review of lab results and intake responses; PrEP prescription issued if safe/indicated 5. Medication shipment: free initial PrEP supply (30 days for MSM; 6 months for transgender women) 6. 30-day follow-up: questionnaire on side effects and adherence 7. 90-day follow-up: optional second home test kit and third intake form for review • Additional support features include customizable text/email adherence reminders and an interactive portal for ongoing PrEP access guidance	Young MSM, (aged 15–27)	MSM (n=229) Transgender women (n=20) Mean age: 24 – Control (n=113) Intervention (n=116) – Hispanic/Latinx (n=85) White (n=52) Multiracial (n=43) Asian/Pacific Islander (n=29) Black/African American (n=15) Middle Eastern/North African (n=3)	• Increased PrEP initiation
Butts *et al.*, 2025 (24) HB PrEP *Remote PrEP care engagement*	U.S.	No dates given	Pre–post analysis	The Home-Based PrEP (HB PrEP) system involves self-collected specimens delivered by mail for centralized laboratory testing, and electronic health surveillance combined with telehealth visits: • Remote assessments replace 3 quarterly in-person PrEP care visits; clients expected to return to in-clinic follow-up for their fourth quarterly visit • A brief instructional video for self-collection that complemented printed instructions was provided • Clients also received an in-person training session that included a detailed explanation of self-collection procedures	Black and Latino MSM currently on PrEP (aged 18+)	MSM (n=60) – Mean age: 38 – Control: In-clinic care (n=100) Intervention: HB PrEP (n=60) – White-Latino/Hispanic (n=100) White-Non Latino/Non-Hispanic (n=15) Black/African American–non-Latino/non-Hispanic (n=13) >1 race–Hispanic/Latino (n=9) Black/African American–Hispanic/Latino (n=3) Other (n=19)	• Decreased long-term persistence in PrEP care

Table 3 (continued). Study characteristics of included provider-based or structural-level interventions, published between 2021-2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Wai *et al.*, 2025 (21) TelePrEP *Remote PrEP initiation*	Australia	2022–2023	Pre–post analysis	TelePrEP is a model of PrEP delivery where nurses educate, clinically assess, order tests, and manage PrEP initiation and follow-up remotely: • Clients access testing via three publicly funded pathways thereby allowing clients to bypass an in-person visit and present directly to a local pathology site • Within 14 days of screening, a 15-minute TelePrEP appointment is conducted by nurses; clinical assessment is completed and education provided • Prescription provided by physician (3–12 month supply) and is mailed to or collected by the client	Uninsured clinic clients (aged 18+)	Cis-male (n=66) Transgender female (n=3) Transgender male (n=3) Non-binary (n=2) Median age: 30 – Overseas-born (n=408) Australia/New Zealand-born (n=64)	• Nearly half of appointments resulted in PrEP initiation or re-initiation • More than half of appointments resulted in PrEP continuation
Storholm *et al.*, 2021 (92) Project SLIP *PrEP screening tool*	U.S.	2017–2019	Interrupted time series analysis	Project SLIP (Screening and Linkage Intervention to PrEP) developed and pilot-tested a PrEP screening tool: • Clinics received one educational training session prior to implementing the screening tool; sessions lasted 1 hour and 15–18 clinic staff and providers attended • Training covered the PrEP care continuum, patient indications, prescribing practices, and how to introduce the new 7-item PrEP screening tool • Screening tool then incorporated into clinic workflow for 12 months (6 months via nursing staff, then 6 months via front desk staff)	Men at risk for HIV infection at two primary care clinics (aged 18–65)	Primary care visits (n=29,262) Mean age: 44 – Hispanic/Latinx (n=11,179) White (n=8,680) Asian/Pacific Islander (n=5,148) Black/African American (n=1,771) Mixed/other (n=8,680)	• Increased PrEP referrals
Volk *et al.*, 2024 (91) EHR-based PrEP prompts *Clinical decision support tool*	U.S.	2021	RCT	An electronic health record (EHR)–based HIV risk prediction model was used to improve PrEP provision among primary care providers who had >150 people living without HIV on their panel: • Providers were prompted to discuss HIV prevention and PrEP before incoming in-person or video appointments with patients whose predicted 3-year HIV risk was above a prespecified threshold • Urgent alerts sent to primary care providers 1 day before eligible patient visits, up to a maximum of 2 messages per day; patient with multiple visits were flagged no more than once monthly • Providers received pre-intervention education via focus groups, department meetings, and emails • Providers encouraged to use clinical judgment and shared decision-making Control arm: Usual care (i.e. no prompts)	Patients with increased risk of HIV (aged 18+)	Eligible patients (n=5,051) • Male (n=4,819) • Female (n=232) – Mean age: 39 – Control (n=2,580) Intervention (n=2,471) – Non-Hispanic White 42.6% Non-Hispanic Black 18.7% Hispanic 15.1% Asian 14.6% Other 3.0% Unknown 6.0%	• Nonsignificant increase in initiation of PrEP care in the intervention arm

Table 3 (continued). Study characteristics of included provider-based or structural-level interventions, published between 2021-2025

Author, year of publication Name of intervention *Delivery method*	Jurisdiction	Study years	Study design	Intervention description	Study population	Participants	Key intervention effects
Fox *et al.*, 2023 (93) HOME PEPSE *Advance provision of PEP*	UK	2018–2019	RCT	Advanced provision of PEP for sexual exposure (HOME PEPSE) allows MSM to self-initiate PEP following potential exposure to HIV: • A 5-day PEPSE pack is received in advance • Participants initiating HOME PEPSE complete diary for the first 5 days to report adherence and adverse reactions Control: Accessed PEPSE through standard of care (sexual health clinic or accident and emergency units) for 48 weeks then received HOME PEPSE for 24 weeks	MSM at risk of HIV	MSM (n=135) – Median age: 30 – Control (n=69) Intervention (n=66) – White/Caucasian (n=101) Black or African (n=9) Oriental (n=6) Other (n=19)	• PEP initiation (reduced time from exposure to first PEP)
Rashotte *et al.*, 2024 (94) PIP *Advance provision of PEP*	Canada	2017–2020	Prospective cohort (pre-post analysis)	PEP In-Pocket (PIP): Patients with low frequency HIV exposures are proactively identified and given a prescription for HIV PEP to self-initiate in case of high-risk exposures	MSM with low frequency exposures	MSM (n=42) Transgender women (n=1) – Median age: 36 – White (n=18) Asian (n=9)	• PEP initiation

ART: Antiretroviral therapy

EHR: Electronic health record

MSM: Men who have sex with men

NP: Nurse practitioner

PEP: Post-exposure prophylaxis

PrEP: Pre-exposure prophylaxis

RCT: Randomized controlled trial

RN: Registered nurse

STI: Sexually transmitted infection