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REVIEW ARTICLE

Barriers and facilitators to HIV Pre-Exposure Prophylaxis (PrEP) in Specialist Sexual Health Services in the United Kingdom: A systematic review using the PrEP Care Continuum

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Abstract

Objectives: HIV pre-exposure prophylaxis (PrEP) delivery in the UK is inequitable; over 95% of PrEP users were men who have sex with men (MSM) despite making up less than 50% of new HIV diagnoses. We conducted a systematic review to identify modifiable barriers and facilitators to PrEP delivery in the UK among underserved populations.

Methods: We searched bibliographic/conference databases using the terms HIV, PrEP, barriers, facilitators, underserved populations, and UK. Modifiable factors were mapped along the PrEP Care Continuum (PCC) to identify targets for interventions.

Results: In total, 44 studies were eligible: 29 quantitative, 12 qualitative and three mixed-methods studies. Over half ($n = 24$ [54.5%]) exclusively recruited MSM, whereas 11 were in mixed populations (all included MSM as a sub-population) and the other nine were in other underserved populations (gender and ethnicity minorities, women, and people who inject drugs). Of the 15 modifiable factors identified, two-thirds were at the PrEP contemplation and PrEParation steps of the PCC. The most reported barriers were lack of PrEP awareness ($n = 16$), knowledge ($n = 19$), willingness ($n = 16$), and access to a PrEP provider ($n = 16$), whereas the more reported facilitators were prior HIV testing ($n = 8$), agency and self-care ($n = 8$). All but three identified factors were at the patient rather than provider or structural level.

Conclusions: This review highlights that the bulk of the scientific literature focuses on MSM and on patient-level factors. Future research needs to ensure underserved populations are included and prioritized (e.g. ethnicity and gender minorities, people who inject drugs) and provider and structural factors are investigated.

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KEYWORDS
HIV prevention, pre-exposure prophylaxis, PrEP care continuum, systematic review, underserved populations

INTRODUCTION

The UK Government is committed to zero new HIV transmissions by 2030; England's HIV Action Plan pledges equitable access to HIV prevention, including condoms and pre- and post-exposure prophylaxis (PrEP and PEP, respectively) [1]. PrEP involves taking antiretrovirals (ARVs) to prevent HIV-negative people from acquiring HIV [2, 3]. Oral PrEP with a combination of emtricitabine and tenofovir is almost 100% effective at preventing HIV acquisition when taken as prescribed [3–6]. In 2015, the World Health Organization (WHO) recommended PrEP use with other HIV prevention methods for people at risk of acquiring HIV [7].

Wales and Scotland adopted uncapped PrEP programmes in 2017 and Northern Ireland established a pilot in 2018, whereas PrEP supply in England was limited to participants of the Impact Trial between 2017 and 2020, after which the roll-out of an uncapped programme was commissioned [8]. Available data showed inequitable access and uptake of the prophylaxis within these PrEP programmes, which are delivered exclusively in Specialist Sexual Health Services (SSHS) [9–11]. Of the 24 255 Impact Trial participants, 96% were men who have sex with men (MSM), of whom 76% were of white ethnicity [9]. Even though cisgender people of Black African ethnicity accounted for 40% of new HIV diagnoses acquired through heterosexual contact in England in 2020, they represented 19% of cisgender heterosexual men and 11% of cisgender women recruited onto the trial [9, 12]. Similarly, in the Welsh and Scottish PrEP programmes, MSM represented 96% of PrEP users within the first 6 months and 97% within the first 2 years, respectively [10, 11]. In contrast, MSM accounted for 36% of all new UK HIV diagnoses in 2020 [12].

These findings suggest problems with the UK PrEP delivery model. Although systematic reviews have investigated the modifiable factors that can facilitate and/or hinder access to PrEP in other geographical settings (particularly the USA and Canada), no study has focused on the UK [13–15].

PrEP delivery is a complex intervention, with uptake dependent on the interaction between multiple stakeholders (e.g. clinicians, patients, commissioners) and delivery factors [16]. The PrEP Care Continuum (PCC) is well suited to study such factors [17]. It comprises five distinct successive steps for someone at risk of HIV acquisition to reach effective PrEP use (Figure 1) [17], starting when they are neither willing to use PrEP nor perceiving themselves as at risk, finishing with optimal PrEP adherence. This framework also acknowledges that someone might go through multiple risk episodes, where discontinuation of PrEP brings them back to the first step and gives them the opportunity to cycle through the PCC as and when required [17].

The aim of this systematic review was to identify the modifiable barriers and facilitators to PrEP access in minority populations in SSHS in the UK along the PCC.

MATERIALS AND METHODS

This systematic review is based on the protocol registered with the International Prospective Register of Systematic Reviews (CRD42021244700), which included all high-income countries [18]. However, this paper is restricted to the UK to highlight modifiable factors specific to its national PrEP programmes. We use the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to report the findings (Appendix S1) [18, 19].

Eligibility criteria

Eligibility criteria were developed using the population-intervention-comparison-outcomes framework (Table 1): randomized controlled trials; demonstration and implementation projects; and observational, qualitative, and mixed-methods studies that investigated barriers and facilitators to PrEP access in the UK were eligible for inclusion. A barrier was defined as a factor that prevents or obstructs access to PrEP and/or its effective use; a facilitator was defined as a factor that promotes or supports these. No date restriction was applied to the searches.

Search strategy

The MEDLINE, Embase, Global Health, EU Clinical Trials and WHO International Clinical Trials Registry Platform databases were initially searched on 24 March 2021 (updated on 28 March 2022) using six search terms: HIV, PrEP, barriers, facilitators, underserved populations, and UK (Appendix S2). The British Association for Sexual Health and HIV, British HIV Association, Conference on

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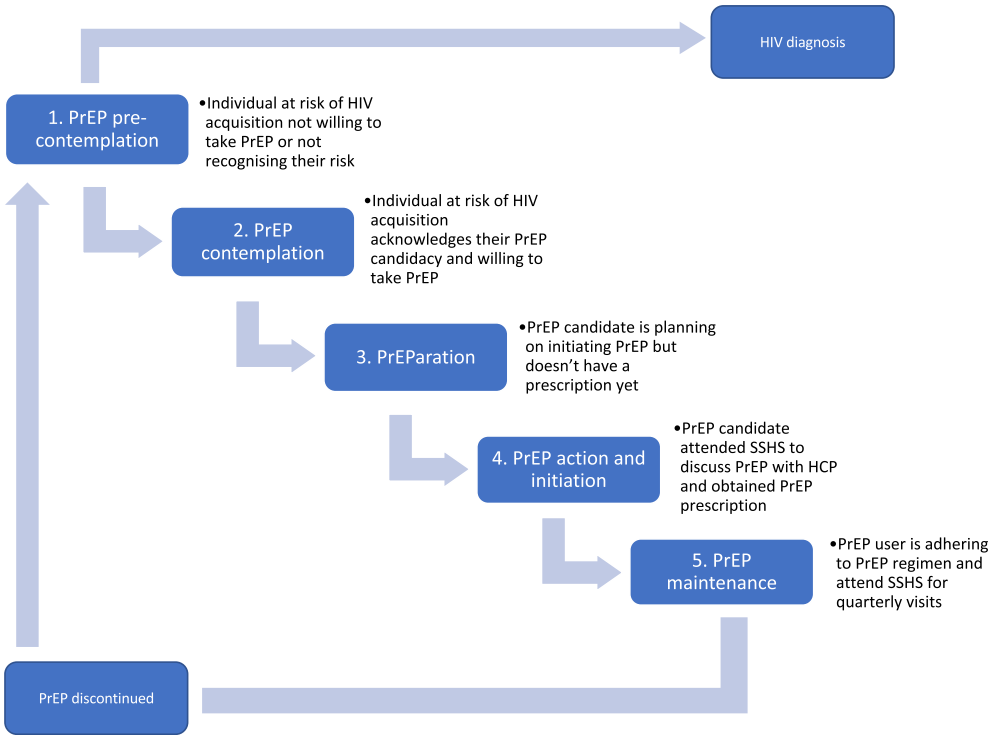


FIGURE 1 The stepped flowchart of the motivational PrEP care continuum and its five stages to effective PrEP use (reproduced from Parsons et al.) [17]. HCP = healthcare professional; PrEP = pre-exposure prophylaxis; SSHS = specialist sexual health services.

TABLE 1 Study PICO criteria.

Population	HIV-seronegative minority individuals, aged >15 years - Potential sub-populations include, but not limited to, HIV-seronegative transgender men and women, cisgender women of Black ethnicity, and rural communities
Intervention	Antiretroviral use as PrEP
Comparison	No PrEP use for quantitative studies (qualitative studies do not require a comparison for the purpose of this systematic review)
Outcomes of interest	- Barriers to PrEP access - Facilitators to PrEP access

Abbreviations: PICO = population – intervention – comparison – outcome; PrEP = pre-exposure prophylaxis.

Retroviruses and Opportunistic Infections, and International AIDS Conference conference databases were searched manually using the terms PrEP, pre-exposure prophylaxis, and pre-exposure prophylaxis.

Study selection

All identified references were uploaded onto Covidence [20], and two reviewers (FC and VP) independently conducted title, abstract, and full-text screening according to the eligibility criteria. Reasons for exclusion were recorded (including duplicates). Any conflicts were resolved by consensus; if an agreement could not be reached, a third reviewer (HW) made the final decision.

Data extraction

A standardized Excel template was used to collect study design characteristics and methodologies along with baseline characteristics and key outcomes of interest (i.e. survey and regression results for quantitative studies or themes identified by study authors and matching participants' quotations for qualitative studies). Data were extracted by one reviewer (FC) and checked by a second reviewer (KM).

Quality assessment

The quality of quantitative studies and their outcomes was assessed via the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) tool [21], which accounts for study limitations. Qualitative papers were assessed via the Standards for Reporting Qualitative Research (SRQR) [22]. The quality assessment was

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undertaken by one reviewer (FC) and checked by a second reviewer (KM).

Data synthesis and analysis

A thematic analysis of the standardized Excel template was undertaken to identify the main barriers/facilitators. Themes were checked by a second reviewer (KM) for consistency. Lastly, each modifiable factor was assigned to one of the five steps of the PCC (Figure 1) by one reviewer (FC) and checked by three co-authors (HW, CA, JS).

RESULTS

After removing duplicates, 2057 studies were identified, of which 201 met the inclusion criteria of the original protocol. A total of 44 were UK-specific and included in this review (Figure 2).

Of the 44 UK studies, 29 were quantitative, 12 were qualitative, and three used mixed methods (Table 2). Over half ($n = 24$ [54.5%]) exclusively recruited MSM (two were in Black MSM only), whereas 11 were in mixed populations (all but one included MSM as the biggest sub-population), and four recruited Black and other ethnic minorities. Another two studies recruited people who inject drugs, two studied gender minorities, and one recruited women (Table 2).

The majority of the quantitative studies had a rating of low to very low quality based on the GRADE tool, as all but one [49] were observational studies. Meanwhile, the quality of qualitative studies was high: ranging from 15 to 21 (out of 21) on the SRQR scale.

Modifiable factors were identified at every step along the PCC apart from the first step (PrEP pre-contemplation), and all but three were at the patient level (those were identified as such in the following results).

Modifiable barriers to PrEP access

Two-thirds ($n = 10$) of modifiable factors identified were assessed as hindering or obstructing access to PrEP and/or its effective use. They were at every step along the PCC apart from the first step, PrEP pre-contemplation (Figure 3).

PrEP contemplation step of the PrEP Care Continuum (step 2)

Four of the 10 barriers were understood to prevent an individual at risk of HIV acquisition from recognizing their risk of acquisition and/or being willing to use PrEP.

Lack of PrEP awareness was the second most frequently reported barrier, tied with lack of PrEP willingness and lack of access to a PrEP provider ($n = 16$) [25, 27, 29–35, 37, 44, 56, 57, 59, 61, 63]. Although awareness was high among MSM (81%–100%) [25, 27, 33, 35, 37, 44, 56, 57], it was much lower among ethnic minorities (13%–54%) [29, 30, 34, 56, 57] and trans-identifying people (16%–66%) [61] [56].

Qualitative findings highlighted that participants were most likely to have heard of PrEP if they were friends with people living with HIV or someone who worked in sexual health. Participants also highlighted that "we have to talk about PrEP awareness like condoms. So, PrEP should also be important..." as part of an HIV-prevention framework [32, 34, 59].

Lack of PrEP knowledge was the most studied barrier (Figure 3): it was investigated in 19 of the studies [10, 24, 25, 27, 33–35, 41, 44, 46, 48, 51, 53, 56, 58, 59, 61, 62, 65]. One study found that 44% of survey respondents listed lack of PrEP knowledge as a direct barrier to PrEP use [56]. In fact, another study of MSM at risk of HIV acquisition showed that, of those who declined PrEP offer, nearly half declined because they wanted more information [62].

PrEP knowledge outcomes could be further categorized into lack of sourcing knowledge, i.e. where to access it, concerns over PrEP effectiveness, concerns about PrEP side effects, and lack of representation.

- *Lack of sourcing knowledge.* A total of 59% of MSM in London who considered PrEP use did not know how to obtain it [25], and 39% of MSM in Bristol were unaware of how to access it [44]. Like PrEP awareness, MSM often found out how to get PrEP via friends and sexual partners [51] and acknowledged that their limited PrEP knowledge inhibited them from knowing where to source it [46]. Only 14% of 'cross-dressers', 'transvestites' and transwomen and their sexual partners knew how to access PrEP [61].
- *PrEP effectiveness concerns.* Although 72% of Scottish MSM perceived PrEP as effective, 60% reported they would have serious/some concerns about taking it [27]. Likewise, one-fifth of transwomen and their sexual partners had serious concerns about PrEP reliability, including 44% who had specific concerns about interaction with their hormone therapies [61]. MSM, Black women, and African migrants highlighted distrust of PrEP effectiveness as advertised [41, 48, 58, 65], given that it is always indicated for use with condoms [65].
- *Side effects concerns*. In the first 6 months of the Welsh PrEP demonstration project, 17% of patients who declined PrEP cited concerns about side effects [10]. In

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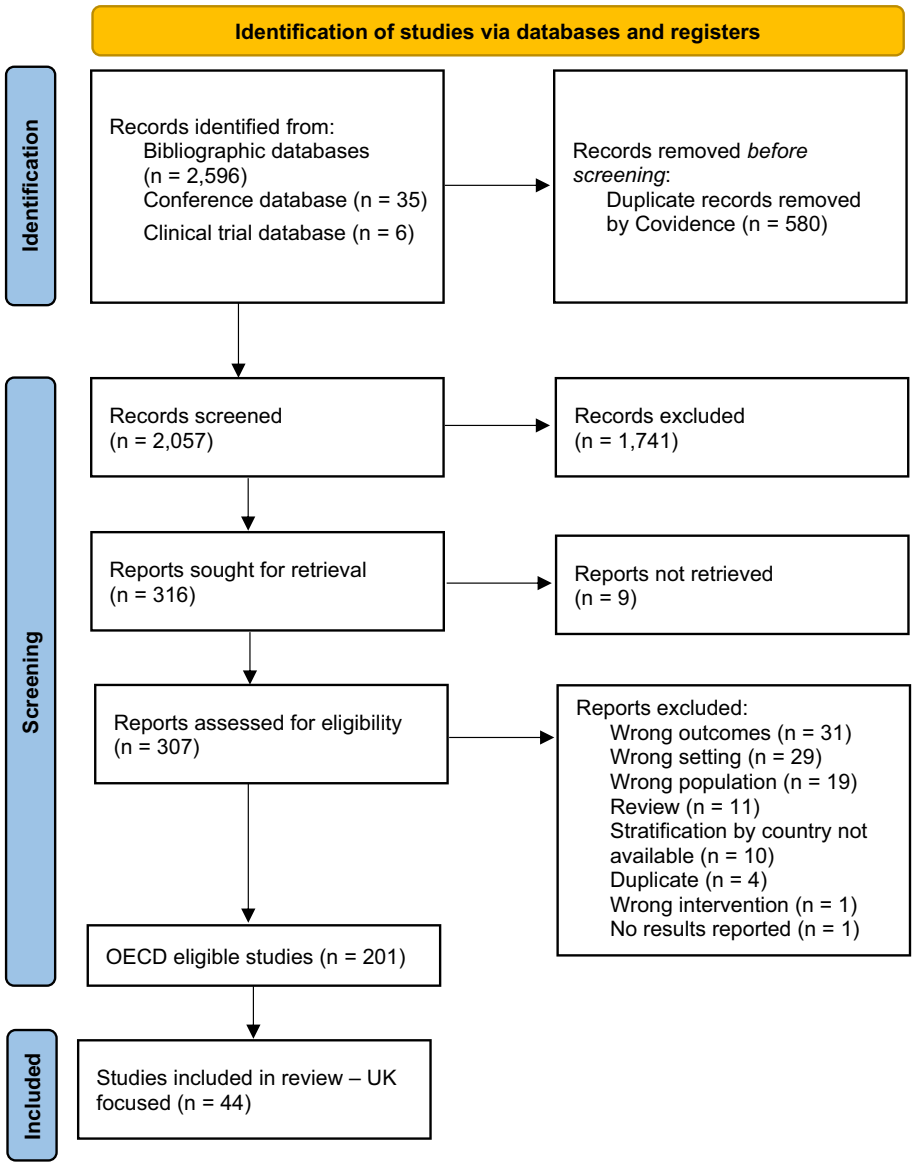


FIGURE 2 Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 flow diagram adapted from Page et al. [19]. OECD = Organisation for Economic Co-operation and Development.

fact, another study found that MSM who had such concerns were 99% less likely to be willing to use PrEP than those without concerns [35]. This was reflected in qualitative findings [24, 44], whereby MSM tended to associate PrEP with earlier-generation ARVs and their side effects [51].

- *Representation*. Black MSM, Black women and people who inject drugs highlighted that the lack of representation of people like them in PrEP campaigns made it seem like it wasn't for them [48, 53, 59].

Lack of PrEP willingness was a commonly studied barrier ($n = 16$) [23, 26–33, 35, 44, 48, 53, 56, 61, 63]. Among MSM, PrEP willingness ranged between 48% and 59% pre-WHO recommendation [23, 26, 31, 32, 63] but increased to between 57% and 68% post-WHO recommendation [35, 44]. Older MSM were significantly less likely to be PrEP-willing than younger MSM, whereas those who had unprotected anal intercourse (UAI) with a casual partner in the year prior were around twice as likely to be PrEP-willing than those who did not [26, 32, 63].

Most respondents from minority ethnic groups (60%) were willing to take PrEP if it was offered on the national health service (NHS) [29, 30], and people who inject drugs became "overwhelmingly enthusiastic" about PrEP once provided with information about it [53]. However, 75% of transwomen and their sexual partners were PrEP

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TABLE 2 Summary of the main characteristics of studies included in the review-full details of the studies and outcomes are presented in Appendix S3.

Author	Publication type	Study location, year	Setting	Participants	Design	Methods/analysis	Modifiable factors	Study quality
Aghaizu et al. [23]	Journal article	London (England), 2011	Gay Men's Sexual Health Survey (London gay social venues)	Sexually active MSM ($n = 842$)	Cross-sectional	Descriptive statistics, logistic regression	PrEP willingness; associated factors	Low (GRADE)
Arnold-Forster et al. [24]	Journal article	England, 2014–2016	PROUD trial (open-label RCT in 13 SSHS)	'High risk' MSM ($n = 40$) and transwoman ($n = 1$)	In-depth, semi-structured interviews	Framework analysis	PrEP knowledge, self-perceived risk, PrEP stigma, peer support, adherence	19/21 (SRQR)
Bayley et al. [25]	Conference abstract	North-east London (England), 2016–2018	Grindr® (a geo-spatial social networking app for MSM)	MSM ($n = 513$)	Cohort	Descriptive statistics, logistic regression	PrEP awareness, knowledge, access to provider	Very low (GRADE)
Bradshaw and Surdhar [26]	Conference abstract	Swansea (Wales), 2017	Review of PrEP clinical codes reported in SSHS	PrEP users ($n = 214$); majority MSM (92%)	Demonstration project	Descriptive statistics	PrEP eligibility, adherence	Very low (GRADE)
Bull et al. [27]	Journal article	London (England), 2015–2016	Three SSHS in London	MSM attending one of three SSHS ($n = 839$)	Cross-sectional	Descriptive statistics, logistic regression	PrEP awareness, knowledge, willingness; perceived benefits, access to provider	Low (GRADE)
Cochrane and Knapper [28]	Journal article	Southeast Wales, 2017–2019	Review of PrEP clinical codes reported in a local health board	Patients with booked PrEP appointments ($n = 278$); majority MSM ($n = 275$)	Demonstration project	Descriptive statistics	PrEP uptake, adherence	Very low (GRADE)
Ekong et al. [29]	Conference poster	Leeds (England), 2017	Leeds African cup of nations and Leeds refugee football tournament	Black and minority ethic community ($n = 75$)	Cross-sectional	Descriptive statistics	PrEP awareness, willingness	Very low (GRADE)
Ekong et al. [30]	Conference poster	Leeds (England), 2020[a]	Community champions exercise	Black and minority ethic community ($n = 127$)	Cross-sectional	Descriptive statistics	PrEP awareness, willingness, stigma	Very low (GRADE)
Fina et al. [10]	Journal article	Wales, 2017	Review of PrEP clinical codes reported to Public Health Wales	PrEP-eligible patients ($n = 516$);	Demonstration project	Descriptive statistics	PrEP knowledge, self-perception of HIV risk, PrEP uptake, adherence	Very low (GRADE)

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TABLE 2 (Continued)

Author	Publication type	Study location, year	Setting	Participants	Design	Methods/analysis	Modifiable factors	Study quality
				majority MSM ($n = 494$)				
Frankis et al. [31]	Journal article	Celtic nations, 2013	SMMASH online survey recruited from gay sociosexual media	'High-risk' MSM ($n = 309$)	Cross-sectional	Descriptive statistics, logistic regression	PrEP awareness, willingness (associated factors), HIV testing	Low (GRADE)
Frankis et al. [32]	Journal article	Scotland, 2013	SMMASH online survey recruited from gay sociosexual media	MSM ($n = 690$)	Mixed-methods (cross-sectional; in-depth interviews)	Descriptive statistics, logistic regressions, thematic analysis	PrEP awareness, willingness, HIV testing	Low (GRADE), 18/21 (SRQR)
Gilson et al. [33]	Journal article	Lothian (Scotland), 2016	Clinical services in Lothian and MSM website	MSM ($n = 341$)	Cross-sectional	Descriptive statistics	PrEP awareness, knowledge, willingness, eligibility	Very low
Giuseppe et al. [34]	Journal article	East London and Hertfordshire (England), 2019[a]	Churches and other recreational events (modified version of the Biobehavioural Survey Guidelines for Populations at Risk for HIV)	Black Africans ($n = 247$)	Mixed methods (cross-sectional; focus group)	Descriptive statistics, thematic analysis	PrEP awareness, knowledge; HIV knowledge; self-perception of HIV risk; PrEP stigma; agency, self-care	Very low (GRADE); 15/21 (SRQR)
Goedel et al. [35]	Journal article	London (England), 2016	Geosocial-networking smartphone app for MSM	MSM ($n = 179$)	Cross-sectional	Descriptive statistics, ordinal logistic regressions	PrEP awareness, willingness, knowledge, stigma; self-perception of HIV risk; PrEP access, adherence	Low (GRADE)
Grimshaw et al. [36]	Journal article	Glasgow (Scotland), 2018–2020	Outreach PrEP service based in a local homeless health centre	People who inject drugs ($n = 47$)	Cohort	Descriptive statistics	PrEP eligibility, uptake, adherence	Very low (GRADE)
Hanum et al. [37]	Journal article	London and Brighton (England), 2013–2018	Two SSHS in London; one SSHS in Brighton	MSM attending SSHS in London or Brighton ($n = 1162$)	Cohort	Descriptive statistics, longitudinal analysis	PrEP awareness, HIV testing, factors associated with PrEP uptake	Low to very low (GRADE)
Henderson et al. [38]	Journal article	Glasgow (Scotland), 2020	Telephone-based PrEP provision ('Tele-PrEP')	PrEP patients who used Tele-PrEP service ($n = 62$);	Cross-sectional	Descriptive statistics	Access to PrEP provider	Very low (GRADE)

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TABLE 2 (Continued)

Author	Publication type	Study location, year	Setting	Participants	Design	Methods/analysis	Modifiable factors	Study quality
				majority MSM ($n = 54$)				
Hibbert et al. [39]	Conference abstract	England, 2017–2020	SSHS	Gender minority individuals ($n = 978$), including PrEP Impact trial participants ($n = 501$)	Cross-sectional	Descriptive statistics, logistic regression	PrEP eligibility, PrEP uptake; associated factors	Low to medium (GRADE)
Hillis et al. [40]	Journal article	Liverpool, Manchester, Sheffield, Leeds, Birmingham (England), 2018–2019	Community health and support services	MSM ($n = 20$)	Semi-structured interviews	Interpretative phenomenological analysis	Self-care, agency; PrEP eligibility, access	20/21 (SRQR)
Jaspal and Daramilas [41]	Journal article	East Midlands, West London (England), 2016[a]	Snowball sampling strategy	MSM ($n = 11$)	Interviews	Thematic analysis	PrEP knowledge; self-perception of HIV risk; PrEP stigma; agency, self-care	15/21 (SRQR)
Jaspal et al. [42]	Journal article	Leicester (England), 2019[a]	Grindr®	MSM ($n = 191$)	Cross-sectional	Descriptive statistics, corelation analysis	HIV knowledge; history of testing; self-perceived HIV risk	Very low (GRADE)
Logan et al. [43]	Conference abstract	London (England), 2016	Social and sex on premises venues	MSM ($n = 767$)	Cross-sectional	Descriptive statistics, logistic regression	HIV testing history, PrEP access, use	Low to very low (GRADE)
Lorenc et al. [44]	Journal article	Bristol (England), 2018–2019	SSHS	MSM and gender minority patients ($n = 578$); majority MSM	Mixed methods (cross-sectional; interviews)	Descriptive statistics, thematic analysis	PrEP awareness, knowledge, willingness, eligibility, access, agency, self-care; perceived HIV risk; sexual pleasure	Very low (GRADE); 16/21 (SRQR)
Mason et al. [45]	Conference abstract	England, 2017–2020	SSHS	Routine SSHS attendees ($n = 2\,230\,972$), including PrEP	Cross-sectional	Descriptive statistics	Distance travelled to PrEP provider (access)	Very low (GRADE)

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TABLE 2 (Continued)

Author	Publication type	Study location, year	Setting	Participants	Design	Methods/analysis	Modifiable factors	Study quality
				Impact trial participants ($n = 21\ 754$)				
Maxwell et al. [46]	Journal article	England, 2019	UK MSM/PrEP community-based organizations, social media, geospatial gay social networking app	MSM engaging in chemsex ($n = 19$)	In-depth, semi-structured interviews	Thematic analysis	PrEP knowledge, stigma, access; self-perceived HIV risk; adherence; sexual pleasure; peer support	18/21 (SRQR)
McDaid et al. [47]	Conference abstract	Edinburgh, Glasgow, London (England, Scotland), 2011	Gay social venues	MSM ($n = 2222$)	Cross-sectional	Descriptive statistics	HIV test history; PrEP willingness	Very low (GRADE)
Nakasone et al. [48]	Journal article	London, Glasgow (England, Scotland), 2018	Purposive sampling through community events, social media, referrals from study participants and community organizations	Black African and Black Caribbean women living in urban setting ($n = 19$)	In-depth, semi-structured interviews	Thematic analysis guided by social ecological model	PrEP knowledge, willingness; HIV knowledge; stigma of HIV; access to provider; peer support; agency, self-care	16/21 (SRQR)
O'Halloran et al. [49]	Journal article	England, 2012–2014	PROUD trial (open-label RCT in 13 SSHS)	'High-risk' MSM ($n = 388$)	RCT	Descriptive analysis, logistic regression	PrEP adherence, associated factors	High (GRADE)
O'Halloran et al. [50]	Journal article	UK, 2019	iWantPrEPNow mailing list, social media, Grindr®	MSM PrEP users ($n = 2275$)	Cross-sectional	Descriptive analysis	PrEP stigma, access; HIV testing history; sexual satisfaction	Very low (GRADE)
Paparini et al. [51]	Journal article	London (England), 2017	Purposive sampling through advertisements on social networks	MSM (current and recent self-sourcing PrEP users; $n = 20$)	Focus groups	Thematic content analysis	PrEP knowledge, access, adherence; peer support	21/21 (SRQR)
Richardson et al. [52]	Journal article	Brighton (England), 2018–2020	Review of PrEP clinical codes reported in SSHS	MSM who accessed PEPSE ($n = 277$)	Cross-sectional	Descriptive analysis	PrEP willingness, eligibility, uptake	Very low (GRADE)

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TABLE 2 (Continued)

Author	Publication type	Study location, year	Setting	Participants	Design	Methods/analysis	Modifiable factors	Study quality
Smith et al. [53]	Journal article	Glasgow (Scotland), 2018	A homeless drop-in centre and a drug crisis centre	People who inject drugs ($n = 16$)	Semi-structured interview	Thematic analysis	PrEP knowledge, willingness; self-perceived HIV risk; HIV knowledge, stigma; access to PrEP provider; peer support; self-agency, adherence	19/21 (SRQR)
Strachan et al. [54]	Conference abstract	England, 2020	One SSHS involved in the PrEP Impact trial	Women ($n = 624$)	Cross-sectional	Descriptive analysis	PrEP eligibility, uptake	Very low (GRADE)
Sullivan et al. [55]	Conference abstract	England, 2017–2019	SSHS	MSM SSHS attendees ($n = 165\,157$), including PrEP Impact trial participants ($n = 15\,432$)	Demonstration project	Descriptive analysis	PrEP eligibility, uptake	Very low (GRADE)
West et al. [56]	Conference abstract	England, 2017–2018	Quota sampling methods	Mixed population (MSM, gender minorities, women, ethnic minority heterosexual men; $n = 1056$)	Cross-sectional	Descriptive analysis	PrEP awareness, willingness, knowledge, stigma	Very low (GRADE)
Wilkinson and Carracedo [57]	Conference abstract	London (England), 2017–2018	Point-of-care HIV testing in high-risk community settings	Mixed population (MSM, heterosexuals, White, minority ethnicities; $n = 948$)	Cross-sectional	Descriptive analysis	PrEP awareness, HIV knowledge	Very low (GRADE)
Williamson et al. [58]	Journal article	Leicester (England), 2017	Local LGBTQ press, social media; snowballing; flyers at Leicester Pride	HIV-negative MSM ($n = 13$)	Focus groups	Thematic analysis	PrEP knowledge; PrEP, HIV stigma; adherence; sexual pleasure	17/21 (SRQR)
Witzel et al. [59]	Journal article	London (England), 2016	Geolocation social networking applications, social media, mailing list for the PROUD study	Black MSM (PrEP naïve and experienced; $n = 25$)	In-depth interviews	Thematic analysis	PrEP awareness, knowledge, stigma; lack of self-perception of HIV risk; agency; self-care	20/21 (SRQR)

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TABLE 2 (Continued)

Author	Publication type	Study location, year	Setting	Participants	Design	Methods/analysis	Modifiable factors	Study quality
Witzel et al. [60]	Journal article	London (England), 2016	Geolocation social networking applications, social media, mailing list for the PROUD study	Black MSM (PrEP naïve and experienced; $n = 25$)	In-depth interviews	Thematic analysis	PrEP access, uptake; agency, self-care	19/21 (SRQR)
Wolton et al. [61]	Journal article	London (England), 2016–2017	Monthly outreach testing at a trans sex-on-premises venue	Transwomen, cross-dressers, transvestites, and their sex partners ($n = 133$)	Cross-sectional	Descriptive analysis	HIV testing history, PrEP awareness, knowledge, willingness	Very low (GRADE)
Wong et al. [62]	Conference abstract	London (England), 2020	One SSHS	'High-risk' MSM ($n = 110$)	Cross-sectional	Descriptive analysis	PrEP knowledge, eligibility, uptake; perceived HIV risk	Very low (GRADE)
Young et al. [63]	Journal article	Glasgow, Edinburgh (Scotland), 2011	Medical Research Council Gay Men's Sexual Health Survey (17 gay commercial venues)	MSM ($n = 1393$)	Cross-sectional	Descriptive analysis, logistic regressions	HIV knowledge; PrEP awareness, willingness; associated factors	Low (GRADE)
Young et al. [64]	Journal article	Scotland, 2012	Scottish community and support groups	MSM ($n = 8$), African migrants ($n = 3$)	Mixed qualitative methods (interviews, focus groups)	Thematic analysis	HIV stigma (in context of homophobia); PrEP access	16/21 (SRQR)
Young et al. [65]	Journal article	Scotland, 2012	Scottish community and support groups	MSM ($n = 8$), African migrants ($n = 3$)	Mixed qualitative methods (interviews, focus groups)	Thematic analysis	PrEP knowledge, stigma, access, adherence; perception of HIV risk	19/21 (SRQR)

Abbreviations: GRADE = Grading of Recommendations, Assessment, Development and Evaluation; LGBTQ = lesbian, gay, bisexual, transgender, questioning; MSM = men who have sex with men; PEPSE = post-exposure prophylaxis following sexual exposure; PrEP = pre-exposure prophylaxis; RCT = randomized controlled trial; SMMASH = social media, MSM and sexual health; SSHS = specialist sexual health services; SRQR = Standards for Reporting Qualitative Research.

[a]Year of publication (study year not included in publication).

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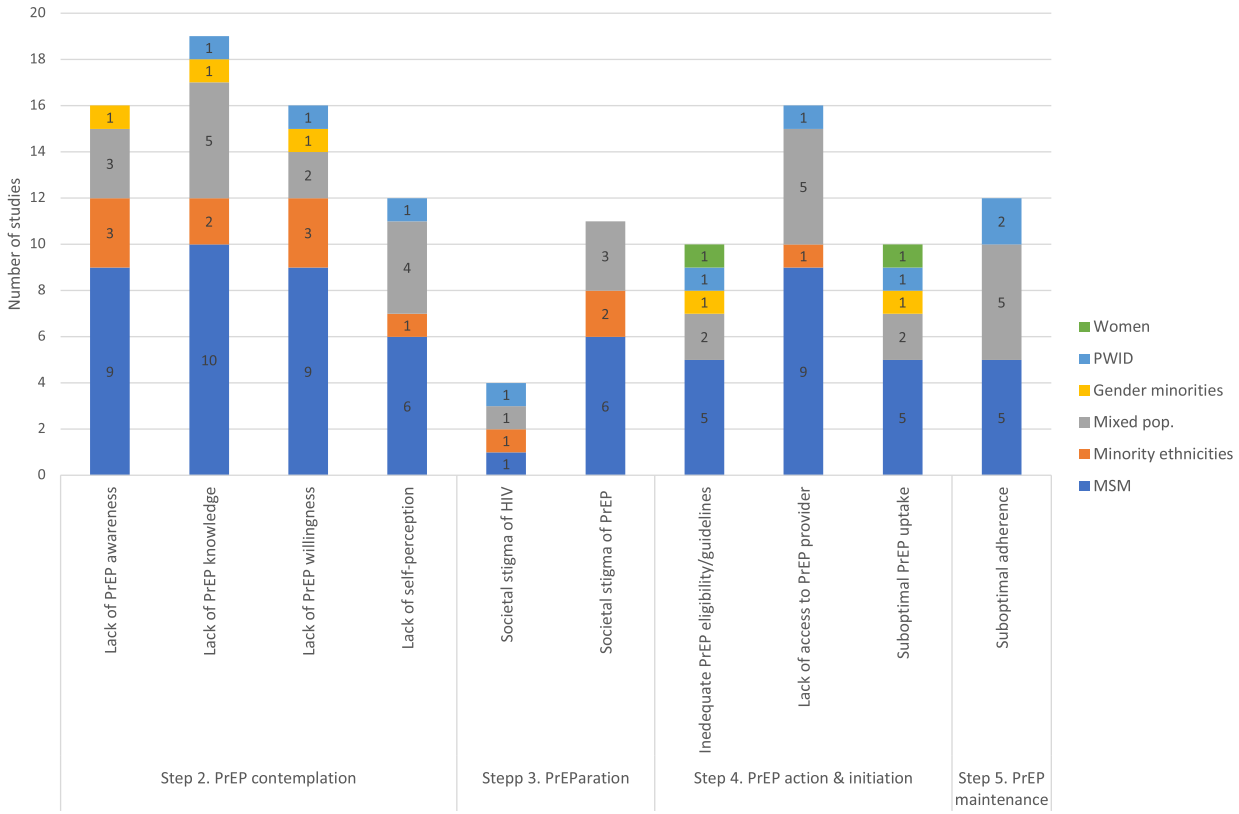


FIGURE 3 Modifiable barriers to pre-exposure prophylaxis (PrEP) access in the UK by population investigated for each study included in the systematic review along the PrEP Care Continuum. MSM = men who have sex with men; pop = population; PWID = people who inject drugs.

unwilling: 80% of those who provided reasons why had concerns about PrEP reliability, 44% had hormone interaction concerns and 4% preferred condoms [61].

Lack of self-perception of HIV risk was the least studied barrier at the PrEP contemplation step ($n = 12$, Figure 3) [10, 24, 34–36, 41, 44, 46, 53, 59, 62, 65]. In Wales, a majority (57%) of those who declined PrEP did so because they did not perceive themselves as at risk of HIV acquisition [10]. In fact, a 2016 study found that MSM who did not perceive themselves as at risk of HIV acquisition had an 89% lower prevalence of PrEP willingness than those who did (adjusted prevalence ratio [aPR] 0.11; 95% confidence interval [CI] 0.04–0.33) [35].

Qualitative findings highlighted the importance of recognizing one's own HIV acquisition risk as one of the biggest motivators for PrEP use [24, 44, 46]. However, they also emphasized how PrEP stigma negatively influenced accurate self-perception of HIV risk as MSM distanced themselves from at-risk "promiscuous" behaviours (Appendix S3) [41, 59].

Black African women did not perceive HIV acquisition risk within their respective communities but rather as a risk for those travelling to Africa [34]. Finally, interviews with people who inject drugs highlighted that a lack of self-perception of HIV risk was linked to a lack of HIV knowledge [53].

PrEParation step of the PrEP Care Continuum (step 3)

Although *societal stigma of HIV* was one of the least reported barriers ($n = 4$, Figure 3), this important factor was only identified in qualitative studies [38, 48, 53, 58]. HIV-negative MSM internalized the societal stigma of HIV in an effort to distance themselves from HIV for fear of homophobia in a society uneducated about HIV: they believed people living with HIV might misrepresent themselves as HIV negative as PrEP became available [58], had a general mistrust of PrEP, preferred condom use, and used sero-sorting strategies with sexual partners [38].

Similarly, Black women were hesitant to discuss PrEP and other HIV prevention with friends because of fears about misinterpretation [48], which was reflected amongst people who inject drugs, whose high level of HIV stigma meant that discussion and knowledge-sharing about HIV was rare [53].

Of the 11 studies exploring *societal stigma of PrEP* [24, 30, 34, 35, 39, 41, 46, 56, 58, 59, 65], most were among

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MSM ($n = 6$, Figure 3). In this population, PrEP stigma manifested as users feeling judged for taking PrEP: 17% of MSM PrEP users reported being treated differently by acquaintances/strangers (42%), dates (40%), healthcare providers (26%), and others [39]. Indeed, 10% of PrEP-unwilling MSM gave PrEP stigma as their reason for unwillingness [35], whereas others reframed PrEP from an overtly moralizing perspective ("slut shaming") and associated it with an "irresponsible" gay lifestyle, promiscuity ("Truvada whore"), and hedonism [41, 46, 58, 59].

A survey found that 65% of Black and ethnic minority individuals saw stigma as a barrier to PrEP uptake [30], whereas Black African women highlighted how stigma of promiscuity changed PrEP use from an action of self-agency/responsibility into an action of shame [34].

PrEP action and initiation step of the PrEP Care Continuum (step 4)

Inadequate PrEP eligibility/guidelines outcomes were reported in 10 studies [28, 33, 40, 42–45, 47, 50, 62], five of which exclusively recruited MSM. This was the only barrier identified at the provider and system levels as it relies on national guidelines (system level) being followed properly by healthcare professionals (provider level):

- National PrEP guidelines overemphasized eligibility based on UAI, which in turn favoured PrEP offers to MSM as demonstrated in Wales and England: 92% and 96% of PrEP users were MSM, respectively [42, 50]. In fact, some MSM described "stretching the truth a little by saying it was condomless sex" to meet current PrEP eligibility guidelines [40].
- Furthermore, healthcare providers often failed to follow those guidelines. In one clinic, they discussed PrEP with only half of MSM using PEP [28]; in another, 40% of eligible MSM not using PrEP were not offered PrEP [62]. This was similar in women, where 29% of eligible women attending English SSHS were not offered PrEP [47].

Lack of access to PrEP provider was the only factor identified solely at the system level since PrEP is currently only available from SSHS [25, 27, 35, 38–40, 44, 46, 48, 51–55, 60, 65]. One study estimated that 19% of Scottish MSM had not engaged with SSHS in 2018 [25], which reflected the 15%–22% who considered regular clinic visits a barrier to PrEP [27, 35]. Those men had an 89% lower prevalence of PrEP willingness than those who did not see clinic visits as a barrier (aPR 0.11; 95% CI 0.04–0.30) [35].

Exclusive provision of PrEP in SSHS was also a barrier to PrEP as some might not be able to travel to those services in the first place: Impact Trial participants living in rural areas had to travel over three times further than those living in urban areas to reach a PrEP service [60]. Furthermore, MSM and Black women wanted to access it "somewhere [they're] comfortable with" such as pharmacies or general practice [40, 48]. This was due to inadequate privacy in SSHS and negative experiences when accessing SSHS (Appendix S3) [40, 46, 48, 51, 54]. Black women and Black MSM also worried about using NHS services due to experiences of institutional racism or lack of separation between community and service [48, 54]. People who inject drugs did not engage with SSHS due to "extremely low aspirational drive" [53].

Suboptimal PrEP uptake was reported in 10 studies [10, 28, 37, 43, 45, 47, 50, 54, 62, 64], half of which were exclusively in MSM. Uptake varied between 24% and 59% among PrEP-eligible MSM, with prior engagement with UAI and HIV prevention shown to significantly increase the likelihood of PrEP uptake [28, 37, 50, 62]. Empathy and professionalism from SSHS staff were considered determinants of PrEP uptake by Black MSM [54].

In Wales, PrEP uptake was 57% among all eligible patients attending SSHS [10] and 70% among those with a PrEP appointment [64]. Finally, although uptake among eligible people who inject drugs and gender minorities was high (78% and 85%, respectively) [43, 45], less than half of eligible women went on to access PrEP [47].

PrEP maintenance step of the PrEP Care Continuum (step 5)

Suboptimal adherence to PrEP was the only barrier identified in the PrEP maintenance step [10, 24, 35, 42, 43, 46, 49, 51, 53, 58, 64, 65]. MSM who expected PrEP adherence issues had an 87% lower prevalence of PrEP willingness than those who did not (aPR 0.13; 95% CI 0.04–0.42) [35]. During the PROUD trial, 14% of participants always missed a dose before/after UAI and 53% ever missed a dose [49]. Despite drug-using PrEP users admitting to missing PrEP doses in qualitative studies due in part to their drug use [46, 53], the 29% increased likelihood of missing a dose before/after UAI when engaging in chemsex was not statistically significant [49].

Other concerns regarding lack of privacy and routine and side effects were also seen as having a potentially negative impact on adherence [65]: Among Welsh PrEP users, although only one in 10 had suboptimal PrEP use [10], 32% of those lost to follow-up were due to side effects [64].

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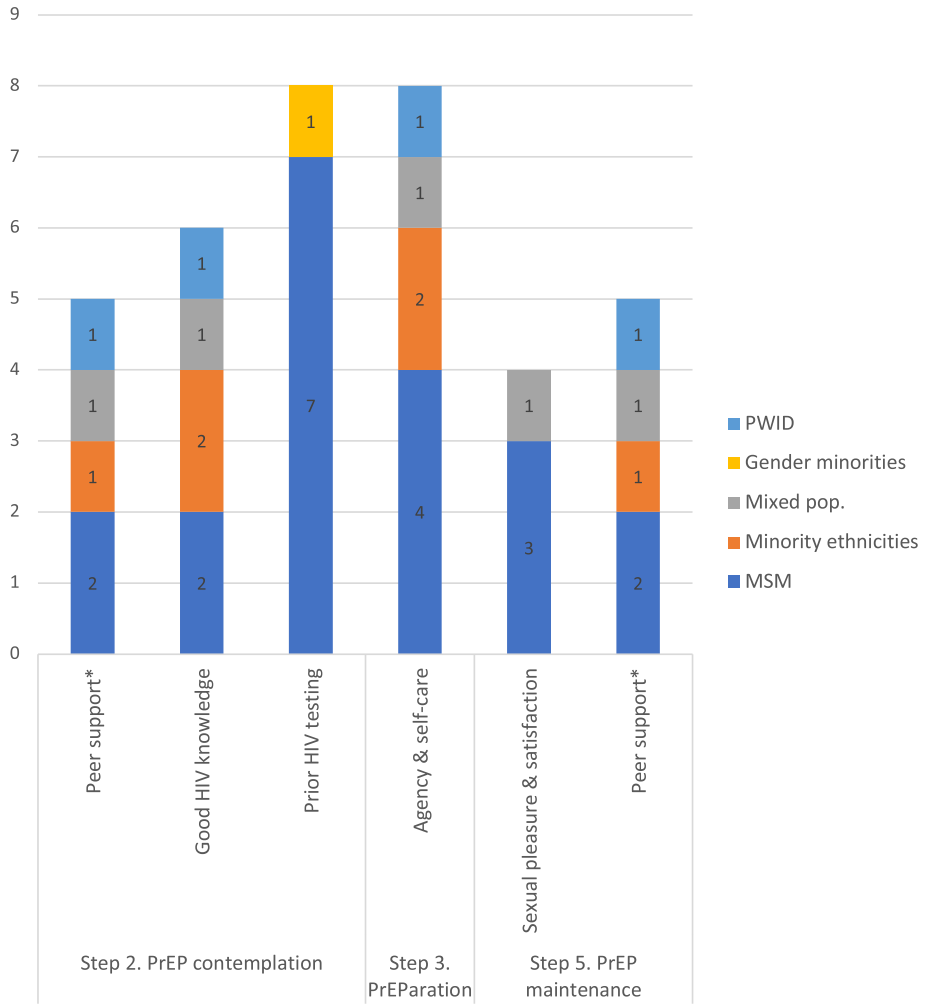


FIGURE 4 Modifiable facilitators to pre-exposure prophylaxis (PrEP) access in the UK by population investigated for each study included in the systematic review along the PrEP Care Continuum (PCC). *Peer support is the only modifiable factor that can be identified at both the PrEP contemplation and PrEP maintenance step of the PCC as it helps individuals understand what PrEP is and recognize their risk, and it supports them with their adherence. MSM = men who have sex with men; pop = population; PWID = people who inject drugs.

Modifiable facilitators to PrEP access

One-third of the modifiable factors identified were facilitators ($n = 5$) at the PrEP contemplation, PrEParation, and PrEP maintenance steps of the PCC.

PrEP contemplation step of the PrEP Care Continuum (step 2)

Prior HIV testing history was the only factor identified at both the patient and provider level as HIV testing needs to be available and accessible for someone to use this service [23, 31, 32, 36, 37, 39, 52, 61].

This factor was nearly exclusively studied in MSM (n = 7, Figure 4): surveys highlighted a shift towards HIV testing, with 46%–58% having tested recently (within the year prior) pre-WHO recommendation [23, 31, 32], which increased to 70% post-WHO recommendation [52]. Recent HIV testing was high among MSM attending SSHS (72%) [37], with 80% of PrEP users testing at least three times a year [39]. Importantly, recent and frequent HIV testing was positively associated with PrEP awareness [31, 32], PrEP initiation [37], and PrEP use [52]. In contrast, transgender women and their sexual partners had a relatively low prevalence (<30%) of recent HIV testing [61].

Six studies identified *good HIV knowledge* as a facilitator to PrEP access [34, 36, 48, 53, 57, 63]. Two-thirds of Black Africans had good HIV knowledge, which was similar across age and gender [34]. The same study highlighted that HIV education via population-specific statistics was key to de-stigmatizing PrEP use and accurately

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TABLE 3 Overview of results summarising the barriers and facilitators along the pre-exposure prophylaxis (PrEP) Care Continuum (PCC) steps. All those modifiable factors are at the patient level unless indicated. There was no facilitator identified for step 4 of the PCC (PrEP action & initiation).

PCC steps	Barrier	Population studied	Facilitator	Population studied
1. PrEP pre-contemplation: individual at risk of HIV acquisition not willing to take PrEP OR not recognizing their risk (*Step not needed as it is the default*)				
2. PrEP contemplation: Individual at risk of HIV acquisition acknowledges their PrEP candidacy and willing to take PrEP	Lack of PrEP awareness ($n = 16$)	MSM ($n = 9$), minority ethnicities ($n = 3$), mixed population ($n = 3$), gender minorities ($n = 1$)	Peer support[a] ($n = 5$)	MSM ($n = 2$), minority ethnicities ($n = 1$), mixed population ($n = 1$), people who inject drugs ($n = 1$)
	Lack of PrEP knowledge ($n = 19$)	MSM ($n = 10$), mixed population ($n = 5$), minority ethnicities ($n = 2$), gender minorities ($n = 1$), people who inject drugs ($n = 1$)		
	Lack of PrEP willingness ($n = 16$)	MSM ($n = 9$), minority ethnicities ($n = 3$), mixed population ($n = 2$), gender minorities ($n = 1$), people who inject drugs ($n = 1$)	Good HIV knowledge ($n = 6$)	MSM ($n = 2$), minority ethnicities ($n = 2$), mixed population ($n = 1$), people who inject drugs ($n = 1$)
	Lack of self-perception of HIV risk ($n = 12$)	MSM ($n = 6$), mixed population ($n = 4$), minority ethnicities ($n = 1$), people who inject drugs ($n = 1$)		
			Prior HIV testing history ($n = 8$); patient- and provider-level	MSM ($n = 7$) & gender minorities ($n = 1$)
3. PrEParation: PrEP candidate is planning on initiating PrEP but does not have prescription yet	Societal stigma of HIV ($n = 4$)	MSM ($n = 1$), mixed population ($n = 1$), minority ethnicities ($n = 1$), people who inject drugs ($n = 1$)	Agency and self-care ($n = 8$)	MSM ($n = 4$), minority ethnicities ($n = 2$), mixed population ($n = 1$), people who inject drugs ($n = 1$)
	Societal stigma of PrEP ($n = 11$)	MSM ($n = 6$), mixed population ($n = 3$), minority ethnicities ($n = 2$)		
4. PrEP action & initiation: PrEP candidate attended SSHS to discuss PrEP with HCP and obtained PrEP prescription	Inadequate PrEP eligibility/ guidelines ($n = 10$); provider and system level	MSM ($n = 5$), mixed population ($n = 2$), gender minorities ($n = 1$), people who inject drugs ($n = 1$), women ($n = 1$)		
	Lack of access to PrEP provider ($n = 16$); system-level barrier	MSM ($n = 9$), mixed population ($n = 5$), minority ethnicities ($n = 1$), people who inject drugs ($n = 1$)		
	Suboptimal PrEP uptake ($n = 10$)	MSM ($n = 5$), mixed population ($n = 2$), gender minorities ($n = 1$), women ($n = 1$), people who inject drugs ($n = 1$)		
5. PrEP maintenance: PrEP user is adhering to PrEP regimen and attends SSHS for quarterly visits	Suboptimal adherence to PrEP ($n = 12$)	MSM ($n = 5$), mixed population ($n = 5$), people who inject drugs ($n = 2$)	Sexual pleasure and satisfaction ($n = 4$)	MSM ($n = 3$) and mixed population ($n = 1$)
			Peer support[a] ($n = 5$)	MSM ($n = 2$), minority ethnicities ($n = 1$), mixed population ($n = 1$), people who inject drugs ($n = 1$)

Abbreviations: HCP = healthcare professional; MSM = men who have sex with men; SSHS = specialist sexual health services.

[a]Peer support can facilitate a PrEP candidate to acknowledge their risk of HIV acquisition and willingness to take PrEP as well as support PrEP maintenance.

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assess one's own HIV risk. This was shown to be particularly important as otherwise good HIV knowledge was attributed to personal experiences [48]. A similar theme was found among people who inject drugs who considered HIV-related health promotion more impactful when it came from someone with similar lived experiences [53].

HIV treatment optimism (a form of good HIV knowledge) was key to PrEP willingness in the MSM community, as those who were optimistic about recent treatment improvements were 43% more likely to be PrEP-willing than those who were not (aOR 0.57; 95% CI 0.43–0.77) [63].

Peer support was the only factor assessed as belonging to two separate PCC steps PrEP contemplation and PrEP maintenance (Figure 4, Table 3) and was reported in five qualitative studies [24, 46, 48, 53, 66]. Community and social networks were important across populations: peer support was key to reducing concerns about PrEP and associated stigma [46], promoting PrEP knowledge [53, 66], encouraging PrEP uptake [46], and facilitating adherence (some PrEP users were reminded to take PrEP by a partner or peer) [24, 46]. This was due to a preference to accessing essential PrEP knowledge from peers as it was otherwise difficult to access care (Appendix S3) [48], and shared experiences were key to building trust [53, 66].

PrEParation step of the PrEP Care Continuum (step 3)

Agency and self-care were the other most studied facilitators ($n = 8$) [27, 34, 39–41, 44, 48, 54, 59] and were mostly investigated in the MSM community ($n = 4$): 64% of MSM attending SSHS in London thought that they would benefit from PrEP use [27]; whereas 82% of a mixed population of MSM and transgender patients attending SSHS in Bristol thought PrEP would reduce their HIV anxiety [44]. In fact, three-quarters of MSM PrEP users said that PrEP had a good effect on their life [39]. This is likely due to PrEP use being perceived as removing fears of contracting HIV [40], which provided self-agency over one's body and sexual health as it can be difficult to negotiate condom use [41]. More specifically, Black MSM highlighted how agency over their HIV status protected them against further levels of intersectional stigma as "add[ing] HIV on top of" being Black and gay "pushed [them] lower down the hierarchy of who is desirable" [59]; and perceived accessing PrEP as the "responsible" thing to do [54].

Similar attitudes were found in Black women who perceived PrEP to be an empowering tool to negotiate safe sex in the context of imbalanced gender dynamics (e.g. male sexual partner(s) refusing to use condoms) [34]. Women's empowerment derived from PrEP was important since it shifted the norms of safer sexual practices to embrace a more holistic view of sex to include sexual autonomy and consent [48]. Among people who inject drugs, PrEP was seen as an act of self-agency to mitigate accidental at-risk behaviours and fluctuations in mental health, substance abuse, and other sudden changing circumstances [53].

PrEP maintenance step of the PrEP Care Continuum (step 5)

Sexual pleasure and satisfaction were the least studied facilitators and were studied nearly exclusively in MSM ($n = 3$, Figure 4) [39, 44, 46, 58]. Qualitative findings highlighted how increased sexual pleasure was a reason for PrEP use, as it allowed MSM to have sex without condoms and facilitated the exploration of sexual fantasies [44, 46]: this translated to 70% of PrEP users being satisfied with their sex lives compared with 42% of those who tried but were not able to access PrEP [39].

In fact, focus group participants advised that HIV-prevention messaging should move away from the monolithic promotion of condoms and abstinence to promoting how PrEP can increase pleasure and intimacy during sex [58].

Peer support – see modifiable facilitators under Section 3.1.1.

DISCUSSION

This is the first systematic review that used the PCC to investigate modifiable factors to PrEP access and effective use faced by underserved populations in the UK. Using the PCC enables a thorough understanding of the associated underlying behaviours and provides targets for future behaviour change.

Two-thirds of identified modifiable factors were categorized in the second and third steps of the PCC (PrEP contemplation and PrEParation): the lack of PrEP awareness, knowledge, and willingness, and self-perception of HIV risk, along with the societal stigma of HIV and PrEP were significant patient-level obstacles to PrEP access in the UK making up over half of all barriers identified. Meanwhile, all five facilitators (prior HIV testing history, good HIV knowledge, agency/self-care, peer support, and sexual pleasure/satisfaction) identified were found on the second, third, and fifth PCC steps.

Studies in other geographical settings reported similar findings. Lack of PrEP knowledge was a major bottleneck to PrEP access in transgender women worldwide [67]

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and among Canadian MSM [68]. Racialized negative interactions with healthcare workers experienced by ethnic minorities are well documented as a barrier to PrEP access in the USA [69, 70] and to wider healthcare in the UK [71–73], which is important as these communities are also at significant risk of HIV in the UK [12]. A systematic review on cisgender MSM in the USA also found that frequency of follow-up, social stigma, and relationship dynamics had an important impact on PrEP adherence, especially for ethnic minority MSM [74].

PrEP eligibility criteria represent a significant barrier to PrEP access at both the provider level and the system level. Although a range of varying but similar criteria were used to define PrEP eligibility in the studies included in this review, it is evident that they were most often MSM-centric [4, 27, 33, 44]. Regrettably, the same criteria were then used to design the UK's national guidelines on PrEP use [75], where "HIV-negative MSM and trans women who report UAI" is listed as the first criteria for PrEP eligibility. Such guidelines are not appropriate to identify every patient in need of PrEP as they de facto promote PrEP to be suitable mostly for MSM, which creates structural barriers that reinforce the existing underrepresentation of non-MSM groups at risk of HIV acquisition [76]. Furthermore, this review also found that PrEP eligibility criteria are often not applied properly by SSHS healthcare workers, as they failed to offer PrEP to a large proportion of eligible candidates using their services [28, 47, 62].

At the system level, a major barrier is the current provision of PrEP in SSHS only. This characterizes a particular challenge to equitable PrEP access as many people do not use SSHS for their sexual and reproductive health needs but instead go to their general practitioner (GP) [77, 78]. In fact, nearly 60% of women of childbearing age who accessed contraceptives did so through their GP, whereas only around 10% of women and men having vaginal intercourse used SSHS [78]. This correlates with findings on alternative delivery models of PrEP, whereby half of PrEP users would like new PrEP access points in remote services, pharmacies, and through their GP [79], especially as high satisfaction with these alternative delivery settings has been demonstrated in pilots [55].

This would also alleviate some of the financial strains in which SSHS currently find themselves: in the last decade, although attendance has increased by 36%, their funding has dropped by 17% [80]. Extension of PrEP provision in other non-SSHS would be a welcome move as SSHS staff are also at the forefront of outbreak response as seen in SSHS workforce redeployment during the COVID-19 pandemic and mpox outbreak [81], disrupting the delivery of routine SSHS activities, including PrEP access, which could put some PrEP users at risk of HIV acquisition.

The PCC indicates that certain facilitators identified in this review can counteract some of the barriers. For example, good HIV and PrEP knowledge and peer support can improve a person's realistic assessment of their own risk of HIV acquisition, reduce their stigma of HIV and PrEP, and increase their willingness to use PrEP. However, addressing such modifiable factors requires a thorough understanding of the underlying theories of behaviour change [82]. We suggest that future approaches that aim to address these factors use the Capability, Opportunity, Motivation and Behaviour (COM-B) model as it has been shown to be useful when exploring sexual health outcomes and associated behaviours [83, 84]. The practicality of the COM-B model is its integration within the Behaviour Change Wheel (BCW), which helps identify intervention strategies that can address the modifiable factors mapped onto COM-B components [85].

The fact that 90% of modifiable factors identified were at the individual level is a limitation of this study's synthesis of evidence. This has strong implications for the type of interventions that could be designed as the current findings mostly provide patient-level targets for behaviour change with only minimal evidence supporting provider- and system-level targets. This leaves the onerous task of addressing the inequitable access to PrEP with the communities who are most underserved by the current delivery model in the UK when it is evident that clear bottlenecks at the provider and system level exist. This is especially relevant to PrEP since its delivery depends on the interaction between multiple stakeholders, and interventions that only target patients are likely insufficient to overcome competing barriers for other stakeholders. HIV testing is one such bottleneck at the provider level, as it is a prior requirement to obtain a PrEP prescription and is the first point of contact where conversations about PrEP can occur intrinsically as part of the patient's clinical assessment [75]. However, these testing opportunities can vary across the UK; in England, opportunities and types of HIV tests are dependent on local authorities' funding allocations to SSHS [86], that is, local context shapes the types of HIV tests (online, point of care, in person) and HIV testing strategies (opt-in vs. opt-out testing in accident and emergency and when registering with a new GP) offered to patients [87]. HIV-testing protocols should therefore integrate PrEP conversations to normalize PrEP, share knowledge, and identify potential PrEP candidates [87, 88]. This integration should be further extended to other services providing tests, treatment, and management of sexually transmitted infections and further supports the argument to make PrEP available in non-SSHS services.

Finally, with half of the studies included in this review exclusively focusing on MSM, and this population making >95% of British PrEP users, it is clear that the populations

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currently underserved by the delivery of PrEP in the UK are also underrepresented in the scientific literature. This review shows that more evidence needs to be gathered in ethnic minority groups (especially those of Black ethnicity), gender minority groups, women, and other populations at high risk of HIV acquisition. Such investigations will need to be of much higher quality than those included here (specifically for quantitative studies), as these will likely form the basis for designing new interventions to address PrEP access inequities.

CONCLUSION

This review offers the first PCC-driven summary of the modifiable factors that hinder or facilitate PrEP access in the UK. The review highlighted potential targets to increase effective PrEP access in communities currently underserved by the delivery model of UK PrEP programmes. However, such targets will require improved understanding of the underlying theory of behaviour change to design effective interventions capable of addressing these factors.

Furthermore, most factors identified were at the individual level, and more research is needed to identify barriers and facilitators at the provider and system levels to broaden intervention design options. Similarly, there is a need to investigate these factors in diverse underserved populations other than the current MSM majority, to provide these communities with the additional support they require to access PrEP.

AUTHORS CONTRIBUTIONS

Conceptualization: Flavien Coukan, Helen Ward, Christina Atchison, John Saunders. Investigation: Flavien Coukan, Adam Lound, Vasiliki Papageorgiou, Keitumetse-Kabelo Murray. Formal analysis: Flavien Coukan, Keitumetse-Kabelo Murray. Project administration: Flavien Coukan. Supervision: Helen Ward, Christina Atchison, John Saunders. Writing – original draft preparation: Flavien Coukan. Writing – review and editing: Flavien Coukan, Helen Ward, Christina Atchison, John Saunders, Adam Lound, Vasiliki Papageorgiou. All authors have read and accepted the final manuscript.

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CONFLICT OF INTEREST STATEMENT

No conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in the supplementary material of this article.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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