Establishing an evidence base to inform the development and implementation of an online HIV pre-exposure prophylaxis service for GBMSM in Scotland

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Establishing an evidence base to inform the development and implementation of an online HIV pre-exposure prophylaxis service for GBMSM in Scotland.

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Abstract

HIV pre-exposure prophylaxis (PrEP) is a game changing addition to combination HIV prevention strategies wherein people who are HIV-negative take antiretroviral medications before and after possible sexual exposure to HIV to prevent acquisition. PrEP has been available through Scottish NHS sexual health services since July 2017. In Scotland, an online PrEP service is in the early stages of development with the aim of enhancing patient choice, overcoming challenges within current pathways, and scaling up PrEP provision. The aim of this thesis was to establish an evidence base to inform the development and implementation of this online PrEP service.

First, I conducted a scoping review (n=59 studies) to explore the extent to which PrEP-related care had been delivered online. I concluded that additional formative research was required to properly inform the development of the proposed online PrEP service. To this end, I adopted a pragmatic mixed-methods approach, using the Intervention Mapping approach as a guiding framework to develop my research questions which I answered through the following studies.

I included questions in two national online surveys of gay, bisexual and other men who have sex with men (GBMSM): 1) SMMASH3 (n=970) conducted before the Covid pandemic (December 2019 – March 2020), and 2) SMMASH Pan (n=456) conducted during the first national stay-at-home order (June 2020 – July 2020). My survey questions examined online health behaviours and the prospective acceptability of the proposed online PrEP service. The high willingness to engage with online health services, and the high acceptability of the online PrEP service, provided a clear direction for the qualitative studies that followed.

I conducted two qualitative studies to further explore the acceptability of the proposed online PrEP service: 1) semi-structured interviews with potential service users (n=15); and 2) focus groups (n=3) with potential service providers (n=9). Participants found the online PrEP service to be acceptable and provided valuable, nuanced insights into how the service should be developed and implemented to best meet users' needs. Crucially, participants highlighted the importance of choice and appropriate support.

Overall, this thesis provides a clear rationale for the development of the proposed online PrEP service by synthesising contemporary research findings with the views of PrEP users and clinicians involved in PrEP provision. Accordingly, I conclude by providing specific evidence-based recommendations for the development and implementation of the proposed online PrEP service and specific directions for future research.

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Pre-print article

Kincaid, R., Estcourt, C., Frankis, J., Dalrymple, J., & Gibbs, J. (2021). Delivering HIV pre-exposure prophylaxis (PrEP) care online: A scoping review. *medRxiv.* https://doi.org/10.1101/2021.12.15.21267774

Conference presentations

Kincaid, R., Gibbs, J., Frankis, J., Dalrymple, J., & Estcourt, C. (2022, June 20). O15: What is the acceptability of online PrEP care, drawing on lessons learned from remote PrEP provision during the Covid-19 pandemic? Findings from a qualitative study with gay, bisexual and other men who have sex with men. Oral abstract, The British Association for Sexual Health and HIV (BASHH) Annual Conference 2022, Sheffield, England, UK.

Kincaid, R., Estcourt, C., Dalrymple, J., Gibbs, J., & Frankis, J. (2021, July 21). P296: Do GBMSM's preferences for in-person, telephone or digital sexual healthcare vary according to health concerns and symptoms? A cross-sectional survey. Poster, STI & HIV 2021 World Congress, Amsterdam, The Netherlands.

Kincaid, R., Estcourt, C., Dalrymple, J., Gibbs, J., & Frankis, J. (2021, April 21). O-019: Do GBMSM's preferences for in-person, telephone or digital sexual healthcare vary according to health concerns and symptoms? A cross-sectional survey. Oral, 5th Joint Conference of the British HIV Association (BHIVA) & The British Association for Sexual Health & HIV (BASHH), virtual conference, UK.

Kincaid, R., Estcourt, C., Dalrymple, J., Gibbs, J., & Frankis, J. (2019, Sept 7). P-49: Could online provision of HIV pre-exposure prophylaxis (PrEP) care provide an alternative to face-to-face care? A scoping review. Poster, 33rd IUSTI-Europe Congress on Sexually Transmitted Infections, Tallinn, Estonia. https://www.conference-expert.eu/en/iusti2019/en/abstract-book/1/P-49

Preface – Covid statement

It feels important to acknowledge the impact that the Covid pandemic had on this research from the beginning of this thesis.

The advent of the Covid pandemic, its impact, and the national stay-at-home orders imposed in March 2020 led to unprecedented changes in the way that research was conducted and healthcare was provided. This was around the mid-point of my PhD, a time where I had already planned my studies and collected some of my data. I had to take time to consider how my research would be affected; both in its focus and the methods used. I decided it was important to maintain the focus on online HIV pre-exposure prophylaxis (PrEP) care but to be responsive to the changes that had occurred in how PrEP care was being delivered. I also adopted remote data collection methods. I found the level of uncertainty at this time challenging as someone at an early stage of their research career; however, I was able to adapt and produce a thesis I am proud of. Moreover, I am confident that the findings of my doctoral research will have real impact on the development and implementation of online PrEP services in Scotland and elsewhere in the world.

Acknowledgements

I feel immense gratitude to everyone who supported me throughout this PhD.

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Finally, I want to thank my partner (Calum), my Mum (Fiona), and the rest of my family for their support and patience over the years. I am forever grateful.

Author’s declaration

I declare that this thesis is original and my own work, and that all materials not my own have been identified and referenced appropriately.

Acronyms and abbreviations

BASHH: British Association for Sexual Health and HIV

BBV: Blood borne viruses

BHIVA: British HIV Association

GBMSM: Gay, bisexual and other men who have sex with men

GCU: Glasgow Caledonian University

HIV: Human immunodeficiency virus

HIVST: HIV self-test

NHS: National Health Service

OPSS: Online postal self-sampling

PEPSE: HIV post-exposure prophylaxis after sexual exposure

PrEP: HIV pre-exposure prophylaxis

SMMASH3: The third iteration of the Sexual Health, Men Who have Sex with Men, Sexual and Holistic Health Study

SMMASH Pan: The Covid pandemic iteration of the Sexual Health, Men Who have Sex with Men, Sexual and Holistic Health Study

SMS: Short message service

STI: Sexually transmitted infection

UNAIDS: Joint United Nations Programme on HIV/AIDS

WHO: World Health Organization

Chapter 1. Introduction

1.1. Human Immunodeficiency Virus

Human immunodeficiency virus (HIV) transmission continues to be an important global health problem (UNAIDS, 2021a). In 2020, 37.7 million people were living with HIV globally, 1.5 million of whom were newly diagnosed that year (UNAIDS, 2021a). The majority of people living with HIV live in low- and middle-income countries (HIV.gov., 2021). In 2020, it was estimated that 55% of people living with HIV were living in Eastern and Southern Africa, 15% were in Asia and the Pacific, 13% in Western and Central Africa, and 6% in Western and Central Europe and North America (HIV.gov., 2021). People living with HIV have a lower risk of developing HIV-related comorbidities and live longer lives than in previous decades due to advancements in treatment (Althoff, Smit, Reiss & Justice, 2016; May et al., 2011; Sabin & Reiss, 2017; Smith et al., 2014). People living with HIV who adhere to an effective regimen of antiretroviral medication can reach the point at which their viral load – the concentration of HIV in their blood – is undetectable and they cannot pass on the virus to others (UNAIDS, 2018a). Furthermore, people who are diagnosed early and start treatment promptly have a life expectancy comparable to people who are not living with HIV in many countries (Wandeler et al., 2016). Despite these important developments, people living with HIV remain at increased risk of: cardiovascular, kidney and liver diseases; some cancers; bone disease and neurological diseases (Deeks, Lewin & Havlir, 2013). Moreover, people living with HIV are at risk of HIV-related illnesses (such as tuberculosis) and progression to acquired immunodeficiency syndrome (AIDS); however, given the advancements in antiretroviral medication, progression to AIDS and HIV-related deaths are decreasing (Mayo Clinic, 2018; World Health Organisation, 2019). Continued efforts to reduce HIV transmission are crucial to further reduce the impact of HIV across societies.

1.1.1. Key populations

The likelihood of acquiring HIV is relatively low for most people (Avert, 2018). However, there are key populations who experience an elevated burden of HIV. These include: gay, bisexual, and other men who have sex with men (GBMSM), people who inject drugs, sex workers, and transgender people (UNAIDS, 2018b; UNAIDS, 2021c). These key populations account for 94% of new HIV infections outside of sub-Saharan Africa and 51% within sub-Saharan Africa (UNAIDS, 2022). Within sub-Saharan Africa, girls and women experience a higher burden of HIV, accounting for 63% of new HIV infections in 2021 (UNAIDS, 2022). In

Western and Central Europe and North America, GBMSM experience the highest burden of HIV; 75% of new HIV diagnoses in these regions in 2020 were in GBMSM (UNAIDS, 2021c). An elevated prevalence in potential partners, a larger number of sexual partners compared to heterosexual men, and higher rates of condomless anal sex are believed to account for the higher rate of HIV within GBMSM (Jackson et al., 2019; Patel et al., 2014; UNAIDS, 2018b). In addition, condomless anal sex holds a higher per-act risk of HIV transmission than condomless penile-vaginal sex (Centre for Disease Control and Prevention, 2018a; Varghese et al., 2002). Therefore, GBMSM are at higher risk of acquiring HIV than other populations due to a variety of bio-behavioural factors, and are the focus of this thesis.

1.1.2. HIV in Scotland

In Scotland, 5,617 people had been diagnosed with HIV by the end of 2019 – 92% of the 6,122 people estimated to be living with HIV in Scotland at the time (Public Health Scotland, 2020). There has been a reduction in new HIV diagnoses in Scotland in recent years (Estcourt et al., 2021; UK Health Security Agency, 2021). In 2011, 281 people in Scotland were newly diagnosed with HIV, in 2019 that figure was 190 (UK Health Security Agency, 2021). While this decline in diagnoses suggests that recent advancements in HIV prevention are working, continued efforts are needed to further reduce HIV transmissions. Around 47% of the people known to be living with HIV in Scotland at the end of 2019 were GBMSM (Public Health Scotland, 2020).

1.1.3. UNAIDS targets

The Joint United Nations Programme on HIV/AIDS (UNAIDS) developed the '2025 targets' in an effort to guide research, policy and care towards the goal of ending AIDS as a global health threat by 2030 (Avert, 2022; UNAIDS, 2014; UNAIDS, 2021b). These built upon the Fast Track 90-90-90 targets which set out to accelerate the provision of HIV prevention and treatment so that 90% of people living with HIV know their status, 90% of whom are on treatment, and 90% of those on treatment have an undetectable viral load (UNAIDS, 2015). The 2025 targets see these figures rise from 90% to 95% (Avert 2022; UNAIDS, 2014; UNAIDS, 2021b). In order to achieve these targets, UNAIDS developed the five pillars of combination HIV prevention: 1) comprehensive prevention for young women, girls and their male partners in places with high HIV prevalence; 2) prevention services for key populations across all countries; 3) national condom programmes; 4) voluntary circumcision in places with high HIV

prevalence; and 5) provision of HIV pre-exposure prophylaxis (PrEP) to key populations (Avert, 2022; UNAIDS, 2019). Figure 1 summarises the UNAIDS 2025 targets.

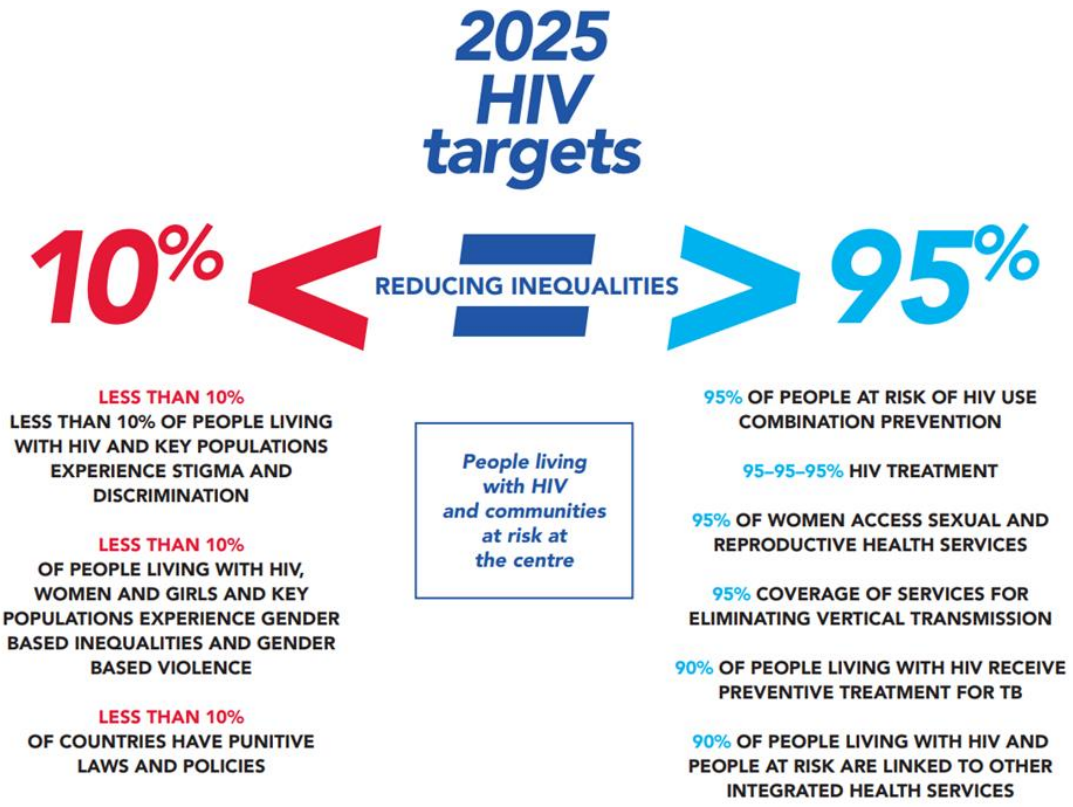


Figure 1. UNAIDS 2025 targets (UNAIDS, 2021b, p.18)

1.1.3. Combination HIV prevention

Although there are many effective HIV prevention methods, each has its limitations (UNAIDS, 2010). Combination HIV prevention refers to the use of complementary HIV prevention methods to meet the specific but diverse needs of key populations (UNAIDS, 2010). Combination HIV prevention combines various biomedical, behavioural, and structural strategies to address challenges at the individual, community and societal levels with a view to achieve more than any single method could separately (UNAIDS, 2010). Here, I explore some of these prevention methods, focusing primarily on those relevant to GBMSM given the focus of this thesis. Although I examine the primary prevention methods, this is by no means an exhaustive list of HIV prevention methods.

1.1.3.1. Condoms

The use of condoms has been found to reduce HIV transmission by 91% for receptive anal sex when used correctly (Johnson, O'Leary & Flores, 2018). However, condom use has

been found to be inconsistent among GBMSM: Brogan et al. (2019) found that 71.5% of Canadian GBMSM who took part in the European Men-who-have-sex-with-men Internet survey 2017 and who did not use PrEP reported condomless anal sex in the past 12 months; Frankis et al. (2018a) also found that 52.9% of GBMSM in Scotland who took part in the Social Media, Men who have sex with men, Sexual and Holistic Health study (SMMASH2) reported condomless anal sex in the past 12 months. Inconsistent condom use limits the utility of condoms as a method of HIV prevention and calls for additional interventions to reduce HIV transmission.

1.1.3.2. HIV testing and treatment as prevention

Regular HIV testing is advantageous for multiple reasons. If a person acquires HIV, prompt initiation of treatment buffers the potential consequences for the person's health and ideally allows them to reach an undetectable viral load preventing further health consequences (Rodger et al., 2019; Vernazza, Horschel, Bernasconi & Flepp, 2008). As mentioned above, this undetectable viral load means that the person cannot transmit HIV to HIV-negative partners as long as their treatment is adhered to and the viral suppression is maintained (Rodger et al., 2019; Vernazza et al., 2008). This is known as treatment as prevention (TasP) (Avert, 2019a). Increasing the proportion of people who have an undetectable viral load will reduce future transmissions within the population.

1.1.3.3. HIV post-exposure prophylaxis

While treatment as prevention involves people living with HIV using antiretroviral medication to reduce HIV transmission, antiretroviral medication can also be used by people who are HIV-negative to reduce their likelihood of acquiring HIV (Asanati et al., 2021; Centre for Disease Control and Prevention, 2018b). HIV post-exposure prophylaxis following sexual exposure (PEPSE) involves an HIV-negative person taking antiretroviral medication after a suspected HIV exposure to prevent HIV acquisition (Centre for Disease Control and Prevention, 2018b). PEPSE usually consists of three antiretroviral medications taken over the course of 28 days and requires initiation within 72 hours of possible exposure to be effective (Asanati et al., 2021; Centre for Disease Control and Prevention, 2018b). PEPSE is available in the UK as an emergency intervention for people who know or suspect they have been exposed to HIV through sex (National Health Service, 2018). However, the effectiveness of PEPSE has largely been drawn from animal studies given that it would be unethical to conduct the type of studies needed to ascertain effectiveness on people (Brady et al., 2019). PEPSE relies on a number of

variables which might impede uptake and effectiveness, including: lack of PEPSE awareness, the prerequisite of recognising a potential HIV exposure, prompt help-seeking, and adherence to the PEPSE regimen (Sundaram & Mani, 2008). Thus, the utility of PEPSE is limited to those who are able to recognise a possible exposure and act promptly.

1.1.3.4. HIV pre-exposure prophylaxis

HIV pre-exposure prophylaxis (PrEP) is a relatively new, revolutionary addition to the combination HIV prevention toolkit. PrEP involves people who are HIV-negative taking a combination of two antiretroviral medications – tenofovir disoproxil fumarate (TDF) and emtricitabine (FTC) – before and after possible sexual exposure to HIV to prevent acquisition (McCormack et al., 2016). Compared to PEPSE, PrEP provides people with the opportunity to protect themselves from acquiring HIV in the long-term, while PEPSE is more reactionary and used in emergency situations (aidsmap, 2022a). PEPSE requires the individual to recognise that they may have been exposed to HIV and requires prompt help-seeking whereas PrEP is planned and offers a continuous level of protection as long as the regimen is adhered to (aidsmap, 2022a). With that said, and consistent with the combination HIV prevention approach, PEPSE still provides an important method for prevention if a person has condomless sex at a time when they were not protected by PrEP (e.g. if they forgot to take their medication) (Asanati et al., 2021). Given how ground-breaking the introduction of PrEP has been, I will now examine the effectiveness and implementation of PrEP in more detail.

1.2. PrEP

For PrEP to be effective, a sufficient concentration of the drugs needs to build up in the tissue at the site where potential exposure may occur (Brady et al., 2019; iwantprepnow.co.uk, 2022). It takes longer for a protective level of PrEP to build up in vaginal tissue than it does for rectal tissues (Brady et al., 2019) necessitating different treatment regimes. When starting PrEP, a double dose is taken 2-24 hours before anal sex to ensure adequate protection, while a single tablet once per day for seven days is needed to ensure adequate protection before having vaginal sex without a condom (Brady et al., 2019). When stopping PrEP, a single dose per day is required for the two days following the last episode of anal sex to ensure protection, and a single dose per day for seven days following the last episode of vaginal sex is needed to ensure protection (Brady et al., 2019).

PrEP is typically taken in one of three regimens. A 'daily' PrEP regimen involves starting PrEP correctly (see above) followed by a single dose of PrEP being taken each day, over an extended period of time (Brady et al., 2019). This dosing is best suited to people who have condomless sex at least once per week and does not require people to plan when they will be having condomless sex (Brady et al., 2019). Moreover, this regimen is somewhat more forgiving as a single missed does will likely not affect protection levels (Brady et al., 2019). The daily PrEP regimen is the only regimen that offers adequate protection for vaginal sex; however, other regimens are available to those who engage in condomless anal but not vaginal sex (Brady et al., 2019). The 'four days per week' regimen involves people taking PrEP four days out of every seven (Brady et al., 2019). This is also referred to 'T's and S's' as people are encouraged to take their doses on a Tuesday, Thursday, Saturday and Sunday (iwantprepnow, 2022). This regimen is only advised to people who engage in condomless anal sex and not condomless vaginal sex (Brady et al., 2019). The level of PrEP likely becomes insufficient to offer protection if fewer than 4 doses are taken per week (Brady et al., 2019). Finally, an 'event-based' PrEP regimen, also called 'on-demand PrEP' is also only suitable for people who engage in condomless anal sex only (Brady et al., 2019). This regimen is best suited for people who only occasionally engage in condomless anal sex and know in advance when this is going to occur (Brady et al., 2019). Event-based PrEP involves starting PrEP correctly by taking a double dose between two and 24 hours prior to sex, taking PrEP once every 24 hours during the period of having sex, and continuing this once per day dosing until two sex-free days have passed (Brady et al., 2019).

Currently, PrEP is provided in the form of a pill; however, long-acting injectable PrEP has been approved by the Food and Drug Administration and is being trialled (Food and Drug Administration, 2021). This injectable PrEP involves cabotegravir being injected every two months instead of the daily tablets (Food and Drug Administration, 2021; Landovitz et al., 2021). In a completed trial, injectable PrEP was found to be more effective at preventing HIV acquisition than oral PrEP in a sample of GBMSM and trans women who have sex with men, and no safety concerns were identified (Landovitz et al., 2021). Injectable PrEP seems likely to be an important addition to the combination HIV prevention toolkit, especially for service users who have difficulty with adherence. However, this form of PrEP is yet to be adopted in Scotland.

1.2.1. PrEP efficacy and safety

The effectiveness of PrEP as a method of reducing HIV transmission was first demonstrated in animal trials. Initial trials on macaques found that daily and intermittent TDF/FTC (the drugs now used as PrEP) reduced the transmission of a simian variant of HIV when compared to no PrEP and that this protective factor was higher when TDF/FTC was administered before and after exposure than solely after (García-Lerma et al., 2008; García-Lerma et al., 2010). Not only did this suggest that PrEP is effective in reducing HIV transmission, it also suggested that PrEP may be more effective than reactive prevention, i.e. PEPSE (García-Lerma et al., 2010; Grant et al., 2010).

Following the success of the initial Macaque trials, the effectiveness of PrEP in reducing HIV transmissions in people was established through a number of trials, most notably: iPrEx, PROUD and IPERGAY (Grant et al., 2010; McCormack et al., 2016; Molina et al., 2015). iPrEx was a randomised, placebo-controlled trial conducted in USA, Brazil, Thailand, South Africa, Ecuador and Peru (Grant et al., 2010). GBMSM and transgender women (n=2499 and 399, respectively) received daily PrEP or a placebo with the aim of testing the effectiveness of PrEP in reducing HIV transmission (Grant et al., 2010). There was a 44% reduction in HIV incidence in the PrEP arm compared to the control; suggesting that PrEP was effective at reducing HIV transmission (Grant et al., 2010). The PROUD trial was a randomised controlled trial conducted in England and involved 544 GBMSM receiving daily PrEP immediately after enrolment or deferred after a year with the primary aim of time taken to recruit 500 participants and secondary aims of understanding HIV incidence, safety, adherence and risk compensation (McCormack et al., 2016). Participants immediately initiated on daily PrEP experienced an 86% risk reduction compared to the deferred arm (McCormack et al., 2016). Given the effectiveness of PrEP in reducing HIV transmission, and overall safety, those in the deferred arm initiated PrEP early (McCormack et al., 2016). Finally, IPERGAY was a randomised controlled trial conducted in France and Canada which involved participants either being prescribed event-based PrEP or a placebo (Molina et al., 2015). Participants in the PrEP arm experienced an 86% risk reduction for HIV compared to controls (Molina et al., 2015). Thus, daily and event-based PrEP were found to be equally effective in reducing HIV transmission. Evidence for T's and S's comes from comparing the necessary concentration of TDF/FTC for protection with the concentration observed in clinical trials when the individual had reported taking four tablets per week (Anderson et al., 2012; Anderson et al., 2017; Castillo-Mancilla et al., 2012; Grant et al., 2014; Liu et al., 2014).

In addition to providing evidence for the effectiveness of PrEP in reducing HIV transmission, these trials provided valuable insight into potential concerns and considerations when it came to PrEP eligibility and ongoing care. Overall, both daily and event-based PrEP regimens were found to be safe with mild gastrointestinal adverse events being the most commonly reported (Brady et al., 2019; Grant et al., 2010; McCormack et al., 2016; Molina et al., 2015). Renal function was highlighted as a concern as a minority of people experienced reductions in creatinine clearance when on PrEP (Brady et al., 2019; Grant et al., 2010; Grant et al., 2014). However, these renal impairments were considered mild and found to be reversible (Brady et al., 2019; Grant et al., 2014). Regardless, renal monitoring is advised as part of routine PrEP care particularly in people over 40 years or who have a creatinine clearance of less than 90mL/min (Brady et al., 2019). In addition, decreases in bone mineral density were observed in the iPrEx trial with a 0.7-1% decrease in bone mineral in PrEP users compared to controls (Grant et al., 2010; Brady et al., 2019). Thus, risk factors for bone mineral diseases should be considered at PrEP initiation.

1.2.2. PrEP and risk compensation

In addition to the medical concerns associated with PrEP, there have been concerns regarding PrEP and risk compensation (Hojilla et al., 2016). Risk compensation refers to an increase in risky behaviours following a perceived reduction in risk (Hojilla et al., 2016). In terms of PrEP, there are concerns that people will engage in more condomless anal sex in response to their lower HIV risk status and that this will lead to an increase in the incidence of sexually transmitted infections (STIs) (Hojilla et al., 2016). It is not possible to infer if PrEP had an effect on behaviour or STI incidence in the placebo-controlled effectiveness trials as participants were blind to their treatment and thus did not know if they were on PrEP (Brady et al., 2019). In PROUD, where participants were aware they were taking PrEP, there was no difference in the number of sexual partners or STI incidence between those on PrEP and those deferred; however, participants in the immediate PrEP arm were more likely to report receptive condomless anal sex with ten or more partners than those deferred PrEP (Brady et al., 2019; McCormack et al., 2016). More research is needed to fully understand if PrEP has had a significant impact on sexual behaviour.

1.2.3. PrEP implementation

The approval of PrEP by the Food and Drugs Association in 2012 lead to subsequent access through healthcare providers across the USA (AIDS Info, 2012). Since then, many other countries have adopted PrEP and implemented it through their health services (World Health Organization, 2022). The World Health Organization reported that PrEP was provided at least once in 83 countries in 2020 (World Health Organization, 2022). PrEP was made available through the Scottish National Health Service (NHS) in July 2017 (Health Protection Scotland & Information Services Division, 2019). In the first year of NHS provision, 1872 people accessed PrEP – 99% of whom identified as GBMSM (Health Protection Scotland & Information Services Division, 2019). By the end of the second year of NHS provision, 3,354 people had been prescribed PrEP at least once – 97% of whom identified as GBMSM (Health Protection Scotland, 2019a).

When PrEP was first implemented in Scotland, eligibility criteria were adopted to guide prescribing and to help healthcare professionals identify who would likely benefit from using PrEP (Health Protection Scotland & Information Services Division, 2019). The criteria were split into two categories: the universal criteria (i.e. being a resident in Scotland; aged 16 or older; HIV-negative; able to attend the sexual health clinic every three months for monitoring, care, support and prescriptions; and willing to stop NHS funded PrEP if no longer eligible) and the risk-specific criteria (be an individual who has a sexual partner who is living with HIV and has a detectable viral load; be a GBMSM or transgender woman with a rectal STI documented in the past 12 months; be a GBMSM or transgender woman who has engaged in condomless anal intercourse with two or more partners in the past 12 months and likely to do so in the next three months; or be an individual deemed to be at high HIV risk agreed so by two clinicians) (Health Protection Scotland & Information Services Division, 2019). A person had to fulfil all universal criteria and at least one of the risk-specific criteria to be considered eligible for PrEP (Health Protection Scotland & Information Services Division, 2019). These eligibility criteria are set to be replaced with guidance which refers to 'people who might benefit from PrEP' (C. Estcourt, chair of Scotland's national PrEP monitoring and research group, personal communication).

In Section 1.2.1., I outlined the trials that evidenced the effectiveness of PrEP in reducing HIV transmissions (Grant et al., 2010; McCormack et al., 2016; Molina et al., 2015). Evaluations of national PrEP programmes have shown the effectiveness of PrEP outside the context of trials

(or 'implemented in the real world') and its impact on HIV transmission. Estcourt et al. (2021) assessed the population level effectiveness of the Scottish national PrEP program in reducing new diagnoses by comparing the two-year period post-implementation (July 2017 – June 2019) with the two years immediately preceding implementation (July 2015 – June 2017) and the two years before that (July 2013 – June 2015). The number of new diagnoses did not significantly change between the 2013-2015 and 2015-2017; however, a 20% reduction in new HIV diagnoses was observed between 2015-2017 and 2017-2019 (Estcourt et al., 2021). The proportion of recent infections similarly reduced post-PrEP implementation (Estcourt et al., 2021). This suggests that PrEP is indeed effective at reducing HIV transmissions in a real-world context. Moreover, it highlights that the Scottish national PrEP programme was successful in reaching some key populations who would, and did, benefit from PrEP. With that said, an evaluation of the Scottish national PrEP programme by Grimshaw et al. (2022) found that the programme mainly benefited white GBMSM, native to Scotland, suggesting that further work is needed to raise PrEP awareness in other key populations and understand how to optimally meet their needs.

1.2.3.1. Challenges with PrEP implementation

With PrEP uptake having surpassed expectations in the first year of NHS provision in Scotland, a number of challenges emerged. A substantial proportion (19%) of people who accessed PrEP through the Scottish NHS were new to the National Sexual Health System (NaSH) – the electronic health records for Scottish sexual health service which was ten years old at the time of the report (Health Protection Scotland & Information Services Division, 2019). Therefore, nearly a fifth of the people who accessed PrEP were either new to sexual health services or had not accessed them in the past ten years. This is positive in terms of addressing the sexual health needs of those service users; however, given that no additional funding or support was provided to cope with PrEP implementation, this increase in service users posed a significant challenge for healthcare providers (Health Protection Scotland & Information Services Division, 2019).

PrEP is provided in conjunction with routine sexual health care and so the duration of a standard appointment is often insufficient to deliver PrEP care (Health Protection Scotland & Information Services Division, 2019). In addition, PrEP requires regular medical monitoring. Currently this involves quarterly screening for HIV, STIs and renal function, and a consultation to assess ongoing eligibility and review any drug interactions or adverse events that have

occurred (Brady et al., 2019; Health Protection Scotland & Information Services Division, 2019). Herein, I will refer to these routine appointments as 'PrEP reviews'. Therefore, an increase in the number of clinic attendees, and the need for longer, more frequent appointments has proved challenging, especially given the absence of additional funding to implement PrEP (Health Protection Scotland & Information Services Division, 2019). As a result, there is a clear need for additional methods of PrEP care delivery to reduce the current challenges.

1.2.3.2. PrEP during the coronavirus pandemic

A national 'stay at home order' was imposed on Scotland, and the rest of the UK, on 23 March 2020 in response to the growing impact that SARS-COV-2 (Covid) was having on the country (Scottish Government, 2020). Health services responded rapidly, prioritising key services and changing the way in which they provided care to service users in order to reduce face-to-face contact (British Association for Sexual Health and HIV et al., 2020). PrEP was retained as a core service in Scottish NHS sexual health services throughout the pandemic but the way in which care was provided changed (British Association for Sexual Health and HIV et al., 2020; Henderson et al., 2022). Existing PrEP users were maintained through a telephone-based model of care where possible, but only people with specific vulnerabilities were initiated on PrEP at this time (C. Estcourt, personal communication; Henderson et al., 2022). The telephone-based model saw the single-appointment PrEP reviews (face-to-face) replaced with two appointments: 1) a telephone consultation with a doctor or nurse to discuss ongoing suitability and prescribe PrEP as appropriate; and 2) a brief in-person appointment to obtain samples to screen for HIV, STIs and renal function (Henderson et al., 2022; Kincaid et al., 2022).

1.2.4. PrEP and HIV elimination goals

As mentioned in Section 1.1.1., PrEP forms one of the UNAIDS pillars of combination HIV prevention and directly feeds into one of the 2025 targets that: *"more than 95% of people at risk of HIV use combination prevention"* (UNAIDS, 2019; UNAIDS, 2021b, p.18). The target for the number of people on PrEP globally is 3 million (UNAIDS, 2017); however, at the end of 2020 it was estimated that fewer than 1 million people had received PrEP at least once that year (Bavinton & Grulich, 2021). UNAIDS state that the lack of systematic implementation of HIV prevention methods (including PrEP) at scale is slowing progress towards reaching HIV transmission elimination targets (AFAO, 2021; Bavinton & Grulich, 2021; UNAIDS, 2017). Given its pivotal role in HIV prevention, it is vital that we develop additional methods of PrEP

provision in order to reduce the challenges outlined in Section 1.2.3.1. and increase provision so that we can reach HIV elimination targets. Digital health could provide a solution.

1.3. Digital health

Digital health refers to the use of digital, information and communication technology to delivery healthcare (Oh et al., 2005; World Health Organization, n.d.). Digital health covers a wide scope of health services and provides the opportunity to promote healthy behaviours, improve health outcomes, and increase the coverage of health services (Murray et al., 2016). The World Health Organization further notes digital health's potential as it *"plays an important role in strengthening health systems and public health, increasing equity to health services, and in working towards health coverage"* (World Health Organization, n.d.). This is particularly promising given the importance of scaling up PrEP coverage outlined by UNAIDS (UNAIDS, 2017). Thus incorporating digital health methods into PrEP provision seems to be an appealing approach for optimising service delivery. Moreover, this is congruent with the Scottish Government's Digital Health and Care Strategy which aims to promote the development of innovative digital solutions to health problems (Scottish Government & COSLA, 2021).

Although digital health offers a number of benefits, it is important to be aware of the limitations of digital health services. Digital health relies on both the service user and provider having access to, and be able to use, the necessary technology. The concept of digital health literacy is also important to consider. This refers to a person's ability to perform the skills necessary to engage with online health services and understand the information that they are presented with (e.g. to searching for health-related information or navigating an online booking interface) (van der Vaart & Drossaert, 2017). Without sufficient digital health literacy, service users would not be able to effectively navigate an online health service (van der Vaart & Drossaert, 2017). This reliance on certain prerequisites such as access to technology and the skills to use them brings up discussions around digital exclusion and health inequalities (Honeyman et al., 2020). Moreover, there is limited evidence on the cost-effectiveness of digital health interventions, which is important to consider especially when services are already under strain (Fleming et al., 2011). This is especially pertinent given the costs incurred when developing and implementing high quality online services (Fleming et al., 2011).

An increasing proportion of sexual health services are being delivered online (Public Health England, 2019; World Health Organization, 2016a). For example, Estcourt et al. (2017) describe

an online chlamydia pathway wherein service users test for chlamydia and their results are made available via the eSexual Health Clinic web application. Those who have tested positive for chlamydia receive an online clinical consultation (if appropriate), can select a pharmacy from which to pick up their treatment, and link the service to any sexual partners for follow up (Estcourt et al., 2017). The majority of service users who required treatment for chlamydia received this through the online pathway exclusively and it took a median of one days for people to collect their treatment after diagnosis (Estcourt et al., 2017). Moreover, the vast majority of service users accessed their test results through the eSexual Health Clinic web application (Estcourt et al., 2017). The feasibility of this service suggests that it could be possible to deliver other aspects of sexual healthcare through similar pathways. Indeed, this is being further developed in an ongoing programme of research: SEQUENCE Digital (SEQUENCE Digital, 2022).

1.3.1. The online PrEP service

An online PrEP service is in the early stages of development in Scotland (Estcourt et al., unpublished manuscript; Henderson et al., 2022; Kincaid et al., 2022). The service is intended to be implemented as an additional method of PrEP provision that could replace 2-3 of established PrEP users' quarterly (3-monthly) PrEP reviews per year depending on individuals' circumstances (Estcourt et al., unpublished manuscript; Henderson et al., 2022; Kincaid et al., 2022). The intention is also for this service to be seamlessly integrated with existing services so that service users, for whom online PrEP care is suitable, are able to transition between online and traditional care pathways at will (Estcourt et al., unpublished manuscript; Henderson et al., 2022; Kincaid et al., 2022). The online pathway within the online PrEP service is comprised of three stages, shown in Figure 2 and further detailed below.

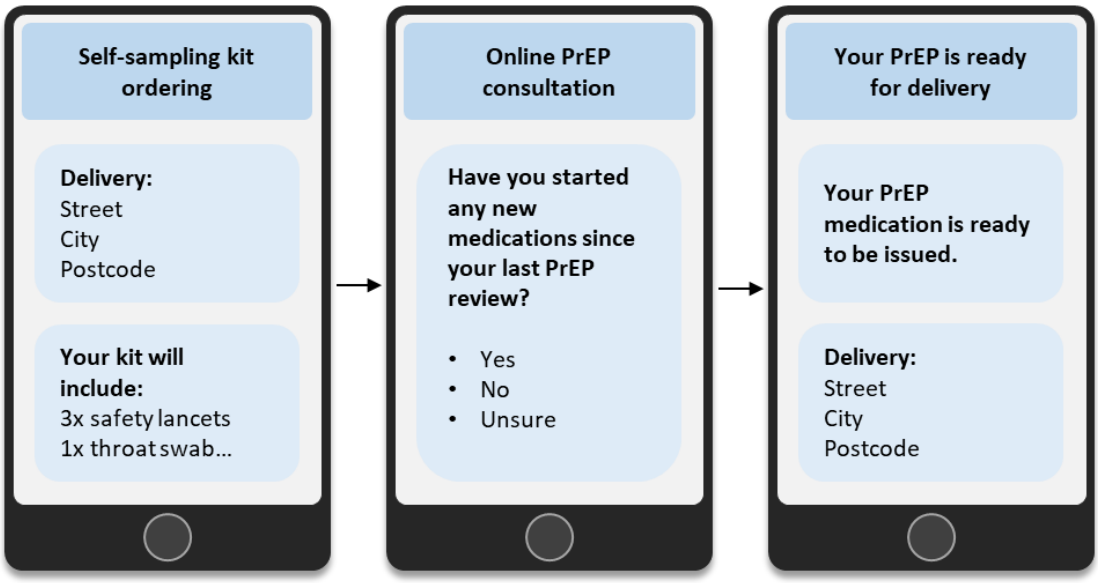


Figure 2. The three stages of the proposed online PrEP service

The first stage comprises online postal self-sampling for HIV and STIs (Estcourt et al., unpublished manuscript; Henderson et al., 2022; Kincaid et al., 2021a; Kincaid et al., 2022). Online postal self-sampling typically involves service users performing their own swabs (e.g. pharyngeal, vaginal, anal), taking a urine sample, and performing a finger-prick blood sample wherein they prick their finger with a safety lancet and drop blood into a vial (aidsmap, 2022b; Sumray et al., 2021). This self-sampling kit is typically ordered online via a website or app, is delivered through the post, and the user returns the completed kit in a prepaid package provided (Sumray et al., 2021). Online postal self-sampling has already been implemented within the UK (Sumray et al., 2021), for example SH24 (Syred et al., 2019; Turner et al., 2018; Wilson et al., 2017), and a national service is being developed for Scotland (C. Estcourt, personal communication).

The second stage is an online consultation to assess the appropriateness of providing further PrEP medication to the service user (Estcourt et al., unpublished manuscript; Henderson et al., 2022; Kincaid et al., 2021a; Kincaid et al., 2022). The online consultation would ask service users for the necessary information to decide if remote PrEP prescribing was appropriate and/or if additional follow-up was necessary.

The third stage is automated provision of the PrEP medication wherein service users would be provided with a further 90 days' supply of PrEP if their samples and online consultation indicated that this was safe and appropriate (Henderson et al., 2022; Kincaid et al., 2021a;

Kincaid et al., 2022). This can be viewed as an extension of the second stage, especially from a user perspective (C. Estcourt, personal communication). Alternatively, if the service user's test results or online consultation indicated that they required additional care they would be contacted and provided with this care (Kincaid et al., 2021a). This is also based on the automated clinical decision making algorithm methodology developed for the eSexual Health Clinic (Estcourt et al., 2017; Gibbs, 2015; Gibbs et al., 2016).

In an effort to better understand how to optimally design the online PrEP service, Frankis et al. (2018b) developed and advertised a PhD studentship through Glasgow Caledonian University. I was successful in my application for the position and this thesis outlines the work that I conducted within this role. The PhD proposal had suggested aims, research questions, and methods (Frankis et al., 2018b). The research I conducted differs from this proposal as I framed the project differently, focused on different research questions, and some of the methods I used differed from those proposed. I did, however, retain the central aim of understanding how to optimally design the online PrEP service for GBMSM in Scotland.

1.4. Thesis outline

The aim of my doctoral research was to establish an evidence base to inform the development and implementation of the proposed online PrEP service. To address this aim, I conducted a mixed-methods research project which consisted of a scoping review, two online surveys, semi-structured interviews with PrEP service users, and focus groups with healthcare professionals involved in PrEP provision. The research questions for my doctoral research are presented in Chapter 3. Below, I provide a brief overview of the thesis chapters.

In Chapter 2, I present a scoping review in which I aimed to understand the extent to which PrEP-related care had been delivered online. Understanding the scope of the existing evidence base is a fundamental practice in research and thus it was an important first step within this doctoral research project (Templier & Paré, 2015). I detail the rationale for choosing the scoping review design and the methods used within the review. I then present the findings and discuss how this influenced the direction of this doctoral research. This chapter has been written up for publication and a preprint is available online (Kincaid et al., 2021a).

In Chapter 3, I explore and justify the ontological, epistemological, methodological and axiological stances that underpinned my research. I then explain how the Intervention

Mapping approach to intervention development (Eldredge et al., 2016) informed the development of the research questions for this doctoral research before outlining the individual studies that I conducted to answer the research questions.

In Chapter 4, I detail an online survey of GBMSM in Scotland: The Social Media, Men who have sex with men, Sexual and Holistic Health study (SMMASH3). In this study, I aimed to understand GBMSM's online health beahviours, their preferred modalities of care (e.g. online or in-person), and the broad prospective acceptability of the proposed online PrEP service. I present the rationale, methods and findings of the study and discuss these findings in relation to the proposed online PrEP service and the direction of the subsequent studies. Some of this data was presented at national and international conferences targeting healthcare professionals involved in HIV prevention and sexual health (Kincaid et al., 2021b; Kincaid et al., 2021c).

In Chapter 5, I present findings from a further iteration of SMMASH that was conducted during the Covid pandemic (SMMASH Pan). In this chapter, I sought to understand GBMSM's online health behaviours during the Covid pandemic. I present the rationale, methods and findings of the study, comparing these with the findings of SMMASH3.

In Chapter 6, I present the findings of a semi-structured interview study I conducted with PrEP service users (specifically, GBMSM). In these interviews, I explored service users' experiences with the existing model of PrEP care and online health services in general. I then explored participants' thoughts and feelings towards the proposed online PrEP service. The findings of this study provided important, nuanced information on how to develop the online PrEP service so it meets the needs of potential service users. Some of the findings from this study were presented at a national conference targeting healthcare professionals involved in HIV prevention and sexual health (Kincaid et al., 2022).

In Chapter 7, I present the findings of a focus group study that I conducted with healthcare professionals who deliver PrEP care as part of their role within the Scottish NHS. In this study, I explored the acceptability of the proposed online PrEP service from the service providers' perspective and key considerations around its development and implementation.

Finally, in Chapter 8, I bring together the findings of the individual studies to address the research questions outlined in Chapter 3. I then discuss the findings within the wider research context, outline the strengths and limitations of this doctoral research as a whole (the strengths and limitations of the individual studies are discussed in their specific chapters), and share some reflections on my experience conducting this research. I then present some preliminary recommendations for the development and implementation of the online PrEP service before making my closing remarks.

Chapter 2. Scoping review of online PrEP-related care

I conducted a scoping review to explore the extent to which PrEP-related care had been provided online. In this chapter, I begin by providing the rationale for the scoping review, its aim and research questions. I then detail the methods used, including the process of defining PrEP-related care and translating this into a comprehensive search strategy. Finally, I present the findings of the review and discuss them in relation to the proposed online PrEP clinic. This scoping review was written up for submission to an academic journal and a pre-print of the manuscript was uploaded to medRxiv (Kincaid et al., 2021a).

2.1. Rationale

Having an awareness and understanding of the scope of the existing evidence base is arguably one of the most fundamental and essential practices in research and health intervention development (Templier & Paré, 2015). Health-related research is concerned with furthering knowledge, building on what is already known to improve health systems and outcomes for service users (Remme et al., 2010). Naturally, the first step of this doctoral research was to understand the scope of existing evidence relating to online provision of PrEP-related care by conducting a literature review. Not only would this provide useful lessons for the development of the online PrEP service, it would also help me to understand where my research was positioned and provide direction for the subsequent empirical studies.

The purpose of conducting literature reviews is to identify relevant existing evidence and synthesise these findings through a critical lens to provide a concise, transparent, and robust overview of the existing knowledge, and to identify avenues for future research and intervention (Templier & Paré, 2015). The aim of this review was to understand the extent to which PrEP-related care had been delivered online. To address this aim, I posed four research questions:

1. What PrEP-related elements of care have been delivered online?
2. How have PrEP-related elements of care been delivered online?
3. What was the acceptability and feasibility of online PrEP-related care?
4. What barriers and facilitators have been identified in relation to online PrEP-related care?

Safe PrEP provision relies on a number of different elements of care being delivered to service users (e.g. HIV testing) (Brady et al., 2019). Therefore, it was important to understand what PrEP-related elements of care had been delivered online. Secondly, online care can be delivered through a variety of methods (e.g. smartphone apps or websites) with each having its own strengths and limitations (Arigo et al., 2019). Therefore, it was important to understand how PrEP-related elements of care had been delivered online. The action of performing health behaviours (e.g. use of an online health service) depends on several factors, or determinants (Eldredge et al., 2016). Perceived acceptability is an important concept within digital health research, particularly within the Technology Acceptance Model (Hilpert & Marchand, 2018; Perski et al., 2017; Perski & Short, 2021; Sekhon et al., 2017), which suggests that the perceived acceptability of a service directly affects engagement which in turn affects effectiveness and, cyclically, perceived acceptability (Hilpert & Marchand, 2018; Perski et al., 2017; Perski & Short, 2021; Sekhon et al., 2017). Within this model, engagement seems closely related to the concept of 'feasibility' which is also an important consideration in health research – can the intervention be implemented and will people use it (Eldridge et al., 2016)? Therefore, it was important to understand the acceptability and feasibility of existing services that delivered PrEP-related care online. Returning to the factors that affect the performing of health behaviours, it was important to understand what barriers and facilitators had been identified that had an impact on engagement with the services identified in the review to better understand the determinants of engagement with these services (Eldredge et al., 2016; Léegaré & Zhang, 2013).

2.2. Methods

2.2.1. Choice of review and guiding frameworks

There are many types of literature reviews (e.g. narrative reviews, rapid reviews, reviews of reviews) (Grant & Booth, 2009), and while I considered a variety of options, the two methods that seemed most appropriate and worth further consideration were the systematic review and scoping review given the degree to which they implement transparent and systematic methods and focus on primary research, as opposed to reviews of reviews (Grant & Booth, 2009). I decided that a systematic review was not appropriate for this review for a number of reasons. Systematic reviews require a clear understanding of the scope of the existing literature in order to develop specific, narrow research questions (Grant & Booth, 2009). When I designed this review, there was no such overview of the literature in existence. Moreover, my research questions were wide and exploratory rather than narrow and specific.

This aligned with the strengths of the scoping review (Grant & Booth, 2009). Systematic reviews also tend to focus on specific study designs and effectiveness whereas it was important for this review to explore all study designs to understand the scope of available evidence (Grant & Booth, 2009). Ultimately, I felt that a systematic review was not appropriate.

The focus of this review was to establish an understanding of the scope of the existing literature – to understand the breadth of what had already been done. This aligned with the strengths and purpose of the scoping review (Grant & Booth, 2009; Levac et al., 2010). While argued to be less robust than systematic reviews, scoping reviews aim to follow similar frameworks and reporting guidelines in an attempt to be "systematic, transparent, and replicable" (Grant & Booth, 2009, p.101). A scoping review allowed for a more exploratory approach while still providing rigor through the use of systematic and transparent procedures. The frameworks used within this scoping review were: Arksey and O'Malley (2005), Levac et al. (2010), and Tricco et al. (2018). Levac et al. is an expansion of Arksey and O'Malley which outlines the steps that should be followed when designing and conducting scoping reviews: 1) identifying the research question; 2) identifying relevant studies; 3) study selection; 4) charting the data; 5) collating, summarising, and reporting the results, and 6) consultation (the last stage is optional). In addition, the PRISMA extension for scoping reviews (PRISMA-ScR) was followed when reporting the findings within this chapter (Tricco et al., 2018).

2.2.2. Defining PrEP-related care

PrEP care involves a variety of different elements of care, some of which are unique to PrEP (e.g. providing PrEP adherence support), and others that are delivered more generally within sexual healthcare (e.g. communicating HIV test results) (Brady et al., 2019). Simply searching for "PrEP" and its related terms seemed too restrictive as it was likely that PrEP-related care had been provided online without explicit linkage to PrEP (e.g. service users ordering HIV self-tests online). I was interested in understanding the extent to which PrEP-related care had been delivered online which goes beyond the provision of the medication. After extensive discussions with my supervisory team (experienced clinical academics) and a review of the literature, I concluded that there was no existing definition of PrEP-related care that had the desired balance of completeness and conciseness on which the search could be based. Therefore, I sought to develop a definition of PrEP-related care to inform the search strategy of this review.

I used the British HIV Association and British Association for Sexual Health and HIV joint guidelines on PrEP use as the basis for my definition (Brady et al., 2019). These evidence-based guidelines detail best-practice on how to safely and appropriately prescribe PrEP and what factors need to be considered when making decisions around PrEP-related care (Brady et al., 2019). The guidelines offer a comprehensive series of recommendations which break PrEP care down in a very granular way – an ideal starting point for developing a definition but not practical as a definition in its own right as it was, by design, very elaborative and lengthy. The recommendations were presented in sections; however, I felt that for the purposes of developing the definition, there was a lot of overlap between these sections and some sections needed to be separated. Therefore, I listed the recommendations and then grouped them thematically, for example, all recommendations related to HIV testing were grouped together. This resulted in me identifying 13 'care components' displayed in Table 1.

Table 1. PrEP care components identified from the BHIVA/BASHH guidelines for PrEP use – adapted from Kincaid et al. (2021a)

PrEP-specific care components	**PrEP-adjacent care components**
1. PrEP eligibility assessment (including HIV risk assessment)	1. PEPSE
2. PrEP education and support	2. STI testing and treatment
3. HIV testing	3. Hepatitis testing and care
4. Renal function testing	4. Vaccinations (hepatitis A and B, and human papillomavirus)
5. Bone mineral density assessment and monitoring	
6. PrEP prescription	
7. PrEP adherence monitoring and support	
8. PrEP side-effect monitoring and care	
9. PrEP-related drug interaction monitoring and support.	

I felt that there were two categories emerging during the process of creating the care components: 1) PrEP-specific care, and 2) PrEP-adjacent care (see Table 1). PrEP-specific care referred to the care components that were either unique to PrEP or integral to safe PrEP provision. For example, a PrEP prescription is clearly unique to PrEP provision, while HIV testing is not unique to PrEP, but is essential for safe provision. PrEP-adjacent care components were those that were routinely performed within a sexual health setting, outside the context of PrEP, and which were not themselves integral to safe PrEP provision. These were mostly straightforward to categorise, apart from 'STI testing and treatment'. While

routinely delivered outside of PrEP care and not 'strictly' integral to PrEP delivery, STI testing formed part of the NHS Scotland PrEP eligibility criteria at the time of writing and is part of the quarterly PrEP reviews (Health Protection Scotland, 2019a). Through discussion with the supervisory team (three of whom are healthcare professionals who have experience with PrEP provision), it was decided that it fell within the PrEP-adjacent theme since STI testing is not *essential* for safe PrEP provision.

Given the already wide scope of this review, I decided that the review would only focus on PrEP-specific care components. While bone mineral density risk assessment and monitoring was considered PrEP-specific care, it was not included in the review. Experienced clinicians within my supervisory team advised that concerns around bone mineral density were less common and are usually screened for in conjunction with renal function, using the same blood sample, meaning no additional online clinical input is required. Therefore, this review focused on online PrEP-specific care defined as the provision of any of the following care components online: PrEP eligibility assessment (including HIV risk assessment); PrEP education and support; HIV testing; renal function testing; PrEP prescription; PrEP adherence monitoring and support; PrEP side-effect monitoring and care; and PrEP-related drug interaction monitoring and support.

2.2.3. Developing the search strategy

The search strategy was created in line with recommendations made within the PRISMA extension for scoping reviews (PRISMA-ScR) and scoping review guidelines; specifically: establishing clear objectives (see research questions), transparent search terms, sources of evidence, and eligibility criteria (Arksey & O'Malley, 2005; Levac, Colquhoun & O'Brien, 2010; Tricco et al., 2018).

2.2.3.1. Search terms

This scoping review aimed to cover a wide array of PrEP-specific care components. I considered whether to conduct one search with all of the terms or conduct individual searches for each care component. Some of the care components were specific to PrEP and others were not. It felt more manageable to run individual searches and to combine the results than it did to run a single search containing each of the eight care components, especially given the different combinations of search terms outlined below. This was a purely procedural decision that had no impact on the results.

When I ran preliminary searches, I noticed that some of the searches were returning a small number of articles (less than 100) and there were many duplicates across the searches. I felt it was appropriate to combine these components into one search I referred to as the 'ePrEP' search. This combined search terms related to PrEP with those relating to digital health (see Table 2). This combined search included: PrEP eligibility assessment; PrEP education and support; PrEP adherence monitoring and support; PrEP side-effect monitoring and care; and PrEP-related drug interaction monitoring and support. Not only did this make the search more efficient, it also widened the scope of the search as there were fewer parameters/words. To clarify, I searched for any combination of PrEP and digital health, not just those related to symptoms, education or any of the other terms. This aligned with the exploratory nature of the review. This resulted in four independent searches (see Table 2).

Table 2. Method of combining search terms (Kincaid et al., 2021a)

Search title	**Individual component terms? (See Table 3)**	**'AND' PrEP terms?**	**'AND' digital health terms?**
HIV testing	Yes	No	Yes
Renal function	Yes	No	Yes
PrEP prescription	Yes	Yes	No
ePrEP	No	Yes	Yes

Search terms were adapted from existing peer reviewed systematic reviews where possible (see Table 3 for the specific terms, truncations, their sources and adaptations). Each component (aside from those in the ePrEP search) had its own component-specific terms which were then either combined with the PrEP terms or the digital health terms (see Table 2). Some terms were altered to end in the wildcard character '*' to allow for different variations of a word to be included and thus expanded the search. For the HIV testing and renal function assessment searches, the component-specific terms were combined with the digital health terms using the Boolean operator: 'AND'. For the ePrEP search, the PrEP terms and the digital health terms were combined with the 'AND' Boolean operator. For the online prescription search, the component-specific terms already had the digital health terms incorporated and so these were combined with the PrEP terms using the 'AND' Boolean operator. There was some overlap between the online prescription and ePrEP searches which could have been streamlined in hindsight. However, the only impact this repetition had was that there were likely duplicates within the searches that were removed early in the screening process.

Table 3. Search terms for PrEP, digital health and included PrEP-specific care components (Kincaid et al., 2021a)

	Search terms	Source and adaptations
PrEP	"PrEP" OR "pre-exposure prophylaxis" [MeSH] OR "preexposure prophylaxis"	Terms created through combining names for PrEP.
Digital health	"telemedicine" [MeSH] OR "eHealth" OR "e-health" OR "mHealth" OR "m-health" OR "mobile health" OR "mobile technology" OR "mobile applications" [MeSH] OR "app" OR "apps" OR "social medi*" OR "cell phone*" OR "cellphone*" OR "mobile phone*" OR "mobile telephone*" OR "cellular phone*" OR "smartphone*" OR "smart phone*" OR "mobile device*" OR "text messag*" OR "texting" OR "texted" OR "SMS" OR "MMS" OR "multimedia messag*" OR "short messag*" OR "computers, handheld" OR "personal digital assistant" OR "email*" OR "e-mail*" OR "online" OR "internet" OR "web" OR "digital health" OR "remote*"	Daher et al. (2017). Added terms: email*, e-mail*, online, internet, web, "digital health", remote*.
HIV testing	"HIV test*" OR "HIV screen*" OR ("HIV" AND "test*") OR ("HIV" AND "screen*")	Deblonde et al. (2018). Original search: "HIV testing" OR "HIV screening". Added '*' to expand search.
Renal function testing	"kidney function test*" OR "renal function*" OR "creatinine" OR "proteinuria" OR "urinalysis"	Elswyk, Weatherford and McNeill (2018). Removed terms relating to disease, osmolality, and urea, and added '*' to expand search.
Online prescription	("prescri*" AND (**digital health terms**)) OR "drug therapy, computer assisted" [MeSH] OR "electronic prescribing" [MeSH] OR "medical order entry system" [MeSH] OR "pharmaceutical services, online" [MeSH]	Terms created through combining MeSH terms, digital health terms, and with input from Dr Jo Gibbs.

2.2.3.2. Sources of evidence

Sources of evidence were identified in three stages. Firstly, Bramer et al. (2017) suggested that Embase, MEDLINE, Web of Science and Google Scholar were the optimal combination of evidence sources in terms of coverage, recall, and precision. Google Scholar was omitted from this review for a number of reasons. Google Scholar was not able to

accommodate the complexity of the searches required for this review given that searches are limited to 32 words or 128 characters (Stox, 2017). Google Scholar also did not have the function to export full search results meaning that it was not feasible to export all search results in a single session; this would compromise the systematic nature of the search as the order of hits on Google is not static (Bonato, 2016). Therefore, Embase, MEDLINE and Web of Science were the primary evidence sources for this review.

Bramer et al. (2017) noted that, in addition to their proposed combination of evidence sources, subject-specific databases should also be included in the search strategy. Flowers et al. (2017) offered a suitable source of additional evidence sources. The target population of Flowers et al.'s systematic review was GBMSM who had recently had a negative HIV test result. While the review outlined in this chapter did not solely focus on studies that targeted GBMSM, the population within Flowers et al. was a key population within HIV prevention and their review focused on HIV prevention interventions so it was deemed a suitable source of additional databases. The relevant databases from Flowers et al. that I employed were the Cumulative Index of Nursing and Allied Health Literature (CINAHL); PsycINFO; Applied Social Sciences Index and Abstracts (ASSIA); and PUBMED.

It was important to ensure that grey literature was also covered to reduce publication bias, so Open Grey and British Library EThOS were included (Paez, 2017). In total, nine evidence sources were searched for this review: Embase, MEDLINE, Web of Science, CINAHL, PsycINFO, ASSIA, PUBMED, Open Grey, and EThOS.

2.2.3.3. Inclusion and exclusion criteria

Included studies had to have been published between 01 January 2009 and 28 July 2021 (when the updated search was conducted). The cut off of 2009 was chosen due to the advancements in digital health, and technology in general, witnessed in the past ten years (World Health Organization, 2020). The relevance of technologies implemented over a decade prior to this review was questionable since the digital landscape has changed so much, as had that of HIV prevention – e.g. PrEP had not yet been approved (HIV.gov, n.d.; World Health Organization, 2020). Therefore, it seemed acceptable to set a limit of studies published after the start of 2009 as this was ten years prior to the initial searches of this review. Included studies had to describe a service in which at least one PrEP-related element of care had been delivered online but this did not have to be within a PrEP context (e.g. studies examining HIV

test results communicated online were of interest regardless of the context). Included studies had to explicitly target service users or clients. Included studies had to be written in English. Studies were not included if the service required the internet to download an app or software which was then used entirely offline. Studies that focused on training or support for healthcare professionals were excluded if they focused solely on SMS (as a pre-Internet technology) or if they used online methods for recruitment but not for care. Conference abstracts, posters, presentations and literature reviews were excluded. Reviews of online content such as YouTube videos or websites were included if the content they reviewed met the other inclusion criteria.

2.2.4. Procedure

I performed the initial searches between 21.01.2019 and 06.02.2019. This was followed by updated searches on 28.07.2021. Embase was not accessible through Glasgow Caledonian University so the Embase searches were conducted by Dr Jo Gibbs at University College London, one of my supervisory team and an online clinical care expert, using search terms provided by me (the updated searches were also conducted on 28.07.2021). I imported all of the search results into Mendeley (Mendeley, 2019). I removed the duplicates and converted the remaining references into .cvs files and imported them into Excel where I performed title and abstract screening. I then obtained full texts where possible for the remaining references and performed full text screening. Ideally, the literature should be reviewed by more than one reviewer as this reduces the likelihood of bias (Tricco et al., 2018). This was not feasible for my scoping review; however, I wanted to ensure there was a process wherein any articles which were, in my opinion, borderline or potentially relevant to the review could be checked by a second reviewer. A pragmatic solution was having Dr Jo Gibbs act as adjudicator when I was unsure if articles met the inclusion criteria (n=7). I acknowledge that this is not best practice; however, within the limits of the review, I felt it was a way of adding rigour. I extracted the data using an altered version of the Cochrane Collaboration Data Extraction Tool that I tailored to the needs of this review (Cochrane Collaboration, 2014) – see Appendix 1.

2.2.5. Data analysis

I extracted data into an Excel spreadsheet that was based on Cochrane Collaboration Data Extraction Tool and summarised study descriptives with appropriate statistics (e.g. sample characteristics, study designs and location) (Cochrane Collaboration, 2014) (see

Appendix 1). Herein, I present my analysis for each research question. For research question 1 (What PrEP-related elements of care have been delivered online?), I charted the elements of care that were delivered in each of the included studies in a table to understand the spread of elements of care. Similarly, for research question 2 (How have PrEP-related elements of care been delivered online?), I charted the methods of delivery (e.g. instant messaging within a smartphone app) for each of the included studies. For research question 3 (What was the acceptability and feasibility of online PrEP-related care?), I charted the measure of acceptability (e.g. cross-sectional survey) and the outcomes of this measure for each study where acceptability was measured. For feasibility, having anticipated that the outcomes and measures of feasibility would be heterogeneous, I focused on uptake and retention. I also noted any aspects of the study delivery that seemed relevant (e.g. fidelity or recruitment of a key population). Finally, for research question 4 (What barriers, facilitators, and factors associated with engagement have been identified in relation to online PrEP-related care?), I charted the barriers, facilitators and other factors identified in each study and grouped these thematically.

Quality appraisals are not typically performed within scoping reviews; however, I felt it would be useful to include a measure of quality in this review to further understand the existing literature. I considered using the Critical Appraisal Skills Programme tools to measure quality, however this seemed to be a bit too in-depth and each study design had its own tool (CASP, 2022). Instead, I used the Mixed Methods Appraisal Tool because it uses a combination of questions for all study designs and questions for specific study designs (including mixed methods) (Hong et al., 2018). I felt this was more appropriate given that this was an additional step within the scoping review unlike in systematic reviews where it is crucial.

2.3. Results

The initial searches identified 29,028 articles and the updated searches identified a further 11,113 – see Figure 3 for the PRISMA flow diagram. Three hundred and eight full text articles were assessed of which 59 met the inclusion criteria. The included studies had sample sizes ranging from 11 to 19,497 for quantitative studies, and 10 and 59 for qualitative studies. The articles were published between 2012 and 2021 and the number published per year seem to follow an upward trend until 2020 – possibly disrupted by the COVID-19 pandemic – see Figure 4. Studies were predominantly conducted in the USA (n=27, 45.8%), with nine (15.3%) conducted in the UK (England and/or Wales), seven (11.9%) in Canada, six (10.2%) in China,

three (5.1%) in Thailand and one (1.7%) in each of Brazil, France, Italy, Netherlands, and South Korea. Figure 5 shows a heat map of where the studies were conducted.

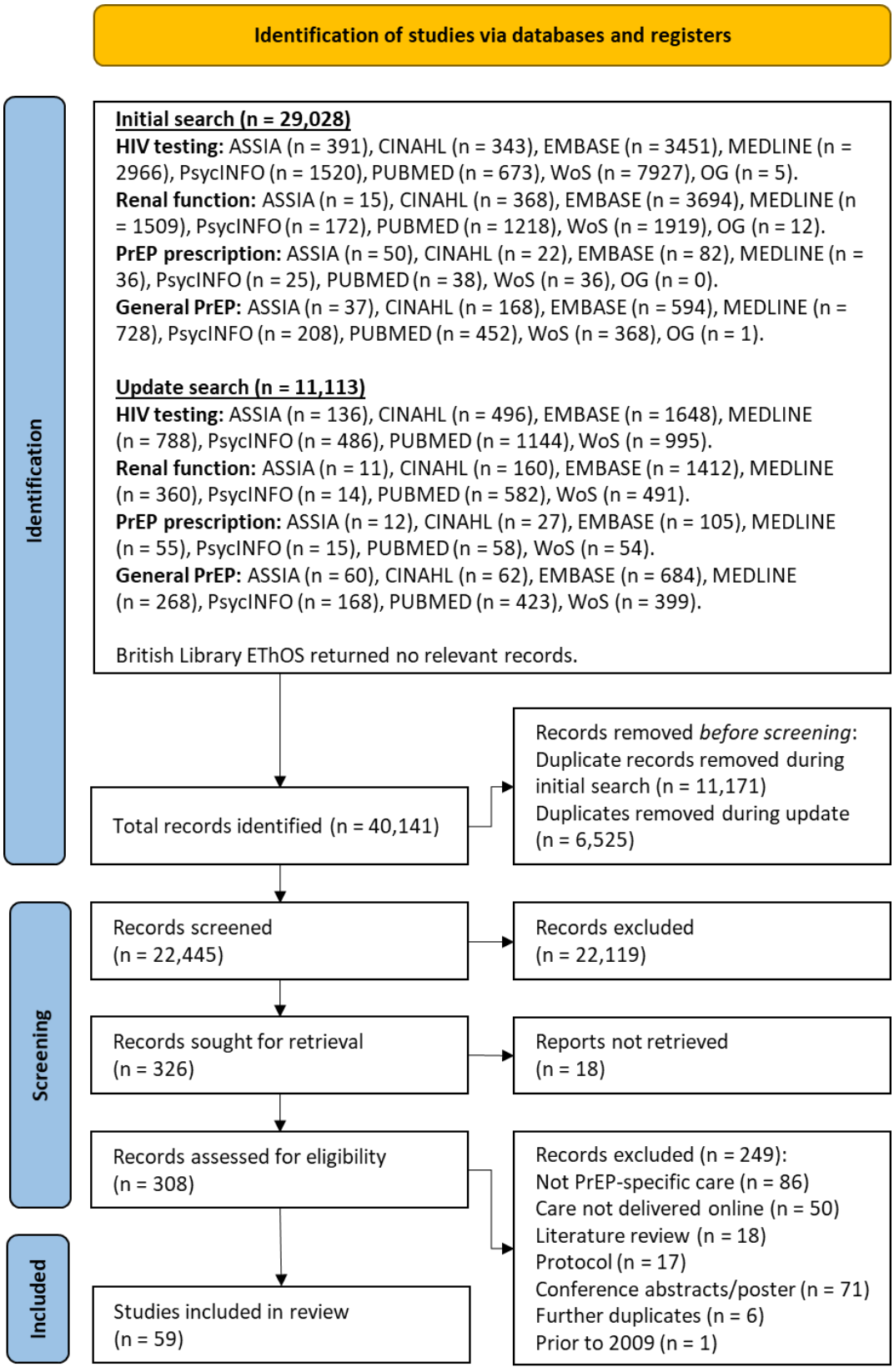


Figure 3. PRISMA flow diagram

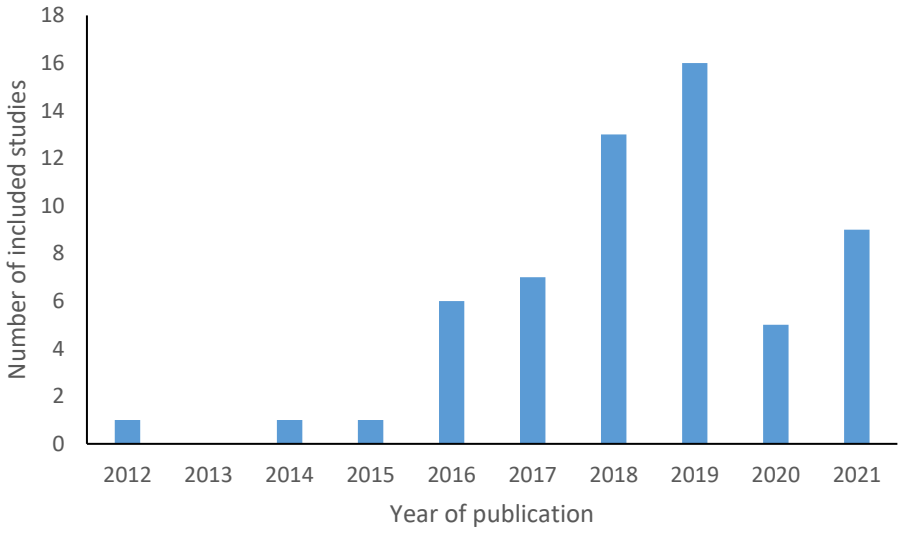


Figure 4. Number of studies published per year

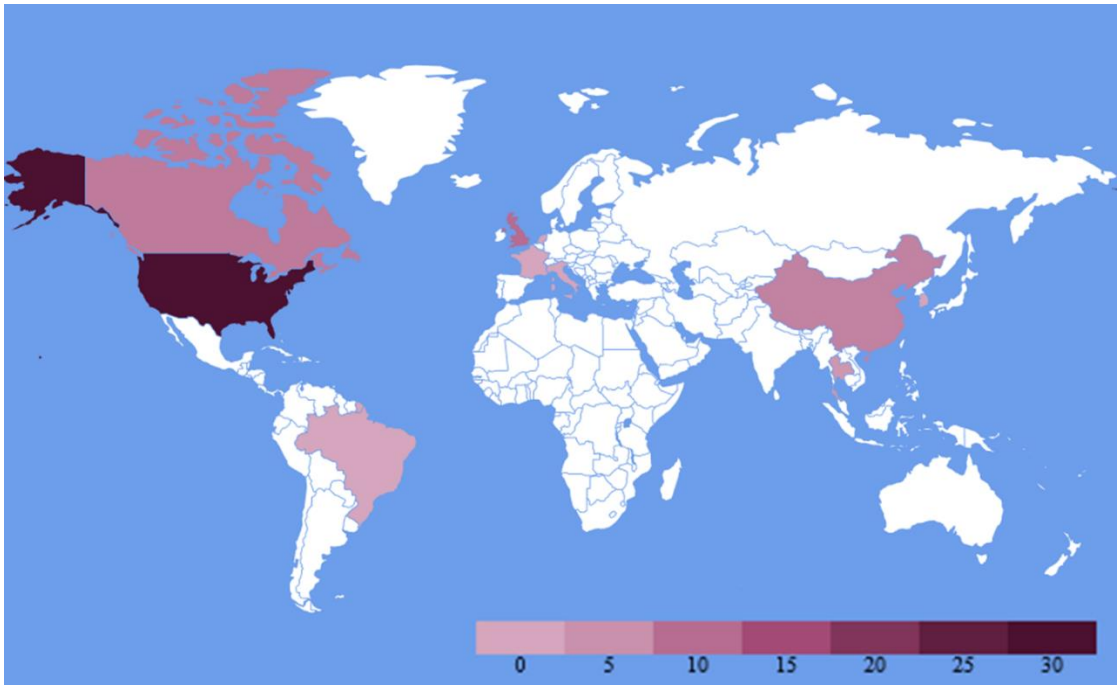


Figure 5. Heat map of countries in which the included studies were conducted

Study design was not consistently reported and so I adopted the categories used in the Mixed Methods Appraisal Tool to group study designs to aid clear and complete reporting (Hong et al., 2018). Eight articles (13.6%) outlined randomised controlled trials, 12 (20.3%) were categorised as non-randomised quantitative studies, 30 (50.8%) were categorised as descriptive quantitative studies, and 14 (23.7%) used qualitative methods. Of the 14

qualitative studies, eight implemented focus groups and eight used semi-structured interviewing – two studies used both methods. Four articles reviewed existing online content. A total of nine studies used a mixed-methods design which accounts for the total designs exceeding the number of studies. The quality of the included studies varied (Appendix 2 presents the full Mixed Methods Appraisal Tool findings). As expected, the included studies' outcomes were heterogeneous.

2.3.1. What elements of PrEP-related care have been delivered online and how?

PrEP-related elements of care were mainly delivered via websites (n=41), followed by video call (n=10), smartphone apps (n=10), email (n=6), and YouTube videos (n=2), with some studies implementing more than one modality. Sixteen studies delivered PrEP-related elements of care in the context of PrEP, 38 delivered an aspect of HIV testing online without being explicitly related to PrEP, one study provided renal test results online outside a PrEP context, and four studies reviewed existing online content. I grouped the findings based on whether or not there was a 'PrEP context' (e.g. PrEP provision formed part of the service, or participants were explicitly linked to PrEP services within the study) given the possible higher relevance of the studies that delivered care in a PrEP context (see Tables 4 & 5). Naturally, studies that included components such as PrEP education are clearly linked to PrEP. Care was taken to categorise studies where the sole relevant care component was HIV risk assessment as this forms part of the PrEP eligibility assessment. If PrEP was not mentioned explicitly in these instances they were judged as 'no PrEP context' and were grouped with the HIV testing studies.

2.3.1.1. Studies conducted within a PrEP context

There was considerable heterogeneity in the type and number of PrEP-specific care components examined in the 16 studies that delivered PrEP-related care in a PrEP context (summarised in Table 4). Aspects of HIV testing were delivered online in ten studies, specifically: ordering HIV self-tests (HIVSTs) or self-sampling kits (n=4), online booking for an in-person appointment (n=2), providers sending results to patients (n=2), patients sending results to providers (n=1), online HIV counselling (n=1), and an online instructional video for completing HIVSTs (n=1). Two studies provided services relating to renal monitoring; specifically, one allowed participants to order a self-sampling kit for creatinine analysis (Chasco et al., 2021), and the other offered online booking for in-person renal function tests (Hoth et al., 2019). One service, documented in two papers, allowed participants to order 90 days'

worth of PrEP online following satisfactory test results and assessment (Hughes et al., 2021; Koester et al., 2020). An online PrEP eligibility assessment or HIV risk assessment was offered in eight studies, PrEP education was provided online in nine studies, and eight studies either monitored or provided support for PrEP adherence online. No studies explicitly mentioned that they allowed participants to monitor PrEP side-effects and/or possible drug interactions online. Seven studies described somewhat complete PrEP pathways (Chasco et al., 2021; Hoth et al., 2019; Hughes et al., 2021; Koester et al., 2020; Refugio et al., 2019; Siegler et al., 2019; Stekler et al., 2018). Online modalities were employed in conjunction with in-person and telephone-based care and studies tended to rely on clinic or lab-based testing for HIV, renal function, and STIs.

Table 4. Overview of studies (PrEP context) – adapted from Kincaid et al. (2021a)

Study (Location)	PrEP-specific care components delivered online	Design	N	Overview of study
Anand et al., 2017a (Thailand)	HIV testing; PrEP education and eligibility assessment	Non-randomised quantitative	425	Evaluated Adam's Love – an online to offline model for HIV testing and PrEP.
Biello et al., 2021a (USA)	HIV testing; PrEP education	Descriptive quantitative; focus groups	28 (focus group); 11 (quant)	Evaluated MyChoices – a smartphone app that aimed to improve HIV testing and PrEP use.
Chasco et al., 2021 (USA)	HIV testing; renal function monitoring	Non-randomised quantitative; qualitative interviews	77	Evaluated incorporating self-sampling into IowaPrEP – a PrEP telehealth program.
Elliot et al., 2016 (England, UK)	HIV testing; PrEP eligibility assessment	Descriptive quantitative	17,361	Evaluated Dean Street @ Home – free HIV self-sampling, HIV assessment, and PrEP recommendation.
Finkenflügel et al., 2019 (Netherlands)	PrEP adherence monitoring	Descriptive quantitative	374	Explored users' experience of the AMPrEP app – daily questions about adherence and sexual behaviour.
Fuchs et al., 2018 (USA)	PrEP adherence support	Non-randomised quantitative; focus group	56	Evaluated bi-directional SMS or email-based adherence support for PrEP.
Guinness et al., 2018 (USA)	PrEP education	Descriptive quantitative	126	Evaluated a one-time email or letter that provided information about PrEP and linkage to PrEP care.
Hoth et al., 2019 (USA)	HIV testing; renal monitoring; PrEP education, adherence support and eligibility assessment	Descriptive quantitative	186	Evaluated Iowa TelePrEP – a service where users can opt for a video consultation for PrEP.
Hughes et al., 2021 (USA)	HIV testing; PrEP eligibility assessment, education, adherence support and prescription	Qualitative interviews	31	Explored the acceptability of Nurx – a website that offers internet-based PrEP care.

Study (Location)	PrEP-specific care components delivered online	Design	N	Overview of study
Koester et al., 2020 (USA)	HIV testing; PrEP eligibility assessment, education, adherence support and prescription	Qualitative interviews	31	Explored the acceptability of integrating lab monitoring into Nurx – internet-based PrEP care.
Liu et al., 2021 (USA)	PrEP adherence monitoring and support	Focus groups; descriptive quantitative; qualitative interviews	54 (focus group); 20 (pilot)	Documented the development and evaluation of DOT – an app that monitors and supports PrEP adherence by collecting adherence and behavioural data and feeding back when the user is/isn't protected by PrEP.
Mitchell et al., 2018 (USA)	PrEP adherence monitoring	Descriptive quantitative	12	Evaluated the feasibility and acceptability of mSMART for PrEP – real-time adherence monitoring.
Refugio et al., 2019 (USA)	PrEP education, eligibility assessment and adherence support	Non-randomised quantitative	25	Evaluated the feasibility of PrEPTECH where users create an account, test for HIV in at a lab, then receive 90-days' worth of PrEP.
Siegler et al., 2019 (USA)	HIV testing; PrEP eligibility assessment	Descriptive quantitative	58	Evaluated PrEP@HOME – a service where participants completed self-sampling for HIV at home and an online behavioural survey resulting in a PrEP prescription being issued.
Stekler et al., 2018 (USA)	PrEP education	Non-randomised quantitative	48	Evaluated the use of video calls within PrEP initiation appointments.
Sullivan et al., 2017 (USA)	HIV testing; PrEP eligibility assessment	Descriptive quantitative	121	Assessed the usability and acceptability of HealthMindr – an app with an HIV risk assessment, PrEP screening, HIV test comparison and ordering system.

2.3.1.2. Studies focused on HIV testing with no explicit PrEP context

Thirty-eight studies focused on HIV testing without explicitly being linked to PrEP (summarised in Table 5). Seventeen studies (44.7%) allowed participants to order HIVSTs or self-sampling kits online, ten studies (26.3%) allowed patients to inform their healthcare providers of HIV test results online, and 16 (42%) allowed providers to inform patients of their results online. Participants were able to book in-person appointments for HIV testing online in two studies (5.3%), and five studies (13.2%) offered online HIV counselling. Eleven studies (29.0%) had an online HIV risk assessment. Some studies delivered multiple aspects of HIV-testing-related care online which accounts for the number of aspects of care exceeding the number of studies. However, 29 (76.3%) of the studies only delivered a single aspect of care online – mainly providers informing patients of their HIV test results (n=12, 41.4%) and HIVST or self-sampling kit ordering (n=9, 31.0%).

Table 5. Overview of studies (HIV testing, no PrEP context) – adapted from Kincaid et al. (2021a)

Study (Location)	Elements of HIV testing delivered online	Design	N	Overview of study
Anand et al., 2017b (Thailand)	HIV counselling; ordering tests; booking in-person appointments; user to provider results; provider to user results	Non-randomised quantitative	489	Evaluated myhealth.adamslove.org (electronic health records platform).
Balán et al., 2020 (USA)	User to provider results	Qualitative interviews and focus groups; descriptive quantitative	59	Overview of users' preferences for a smartphone app that aimed to alleviate barriers associated with HIV self-tests.
Balán et al., 2021 (USA)	User to provider results	Descriptive quantitative; qualitative interviews	48	Described participants' use of the INSTI Multiplex and SMARTtest smartphone app.
Baraitser et al., 2019 (England and Wales, UK)	Ordering tests; user to provider results; HIV risk assessment	Descriptive quantitative	1466	Evaluated HIV self-testing and –sampling through SH24 – an online sexual health service.
Bauermeister et al., 2015 (USA)	HIV risk assessment	Randomised controlled trial	130	Evaluated an online intervention that allowed user to identify HIV testing locations based on their specific structural needs.
Biello et al., 2021b (USA)	Ordering tests; provider to user results	Descriptive data from a randomised controlled trial	80	Evaluated the provision of HIV self-test and STI self-sample kits via the LYNX and MyChoices apps.

Study (Location)	Elements of HIV testing delivered online	Design	N	Overview of study
Chan et al., 2021 (China)	Ordering tests; pre- and post-test counselling	Descriptive quantitative	350	Evaluated an online service where people received a free self-test and booked a video call appointment via social media or phone call.
Cohen et al., 2017 (USA)	Provider to user results	Non-randomised quantitative	1460	Evaluated Healthvana, an online portal for accessing HIV and STI test results.
Daniels et al., 2016 (USA)	User to provider results	Descriptive quantitative	37	Evaluated the acceptability of having users send photos of completed HIV self-tests to providers.
De Boni et al., 2019 (Brazil)	Ordering tests	Descriptive quantitative	4800	Evaluated a free, anonymous, internet-based HIV self-test strategy wherein users could order HIV self-tests online.
Gilbert et al., 2017 (Canada)	Risk assessment; provider to user results	Descriptive quantitative	868	Evaluated GetCheckedOnline – users complete an online assessment that suggests which tests need performed, they take this into a lab where the tests are performed, they receive their results online.
Gilbert et al., 2019a (Canada)	Risk assessment; provider to user results	Descriptive quantitative	394	Evaluated GetCheckedOnline – see Gilbert 2017.
Gilbert et al., 2019b (Canada)	Risk assessment; provider to user results	Non-randomised quantitative	19,497	Evaluated GetCheckedOnline – see Gilbert 2017.
He et al., 2018 (China)	Provider to user results	Descriptive quantitative	500	Evaluated a service where people were offered anonymous HIV urine tests distributed through pharmacies.
He et al., 2019 (China)	Provider to user results	Descriptive quantitative	957	Evaluated a service where people were offered anonymous HIV urine tests distributed by vending machines on university campuses.
Hottes et al., 2012 (Canada)	Risk assessment; provider to user results	Focus groups	39	Explored the acceptability of internet-based STI and HIV testing where users complete an online assessment that suggests necessary tests which is taken to a lab. Results are accessed online.

Study (Location)	Elements of HIV testing delivered online	Design	N	Overview of study
Huang et al., 2016 (USA)	Ordering tests	Descriptive quantitative	122	Evaluated an HIV testing program where users of social media were linked to a website where they could order HIV self-tests.
Jackman et al., 2018 (USA)	Provider to user results	Focus groups; descriptive quantitative	35 (focus group); 380 (quant)	Explored the use of electronic health records as a means of sexual health communication between partners.
Jin et al., 2019 (China)	Risk assessment; order tests; user to provider results	Descriptive quantitative	879	Assessed the feasibility of Easy Test – users completed an online risk assessment and ordered tests online.
Knight et al., 2019 (Canada)	Risk assessment; provider to user results	Semi-structured interviews	37	Explored users' experiences with GetCheckedOnline and regular clinic-based care – see Gilbert 2017.
Lessard et al., 2019 (France)	Provider to user results; provider to user's partner(s) results notification	Focus groups	21	Explored of the acceptability of WeFLASH© - a smartphone app where sexual partners link accounts, allowing providers to contact all relevant sexual partners immediately if someone tests positive for HIV or an STI.
MacGowan et al., 2020 (USA)	Ordering tests; user to provider results	Randomised controlled trial	2665	Evaluated the provision of HIV self-test kits online.
Maksut et al., 2014 (USA)	Counselling	Descriptive quantitative	20	Piloted a video call-based HIV self-test support service.
Manavi et al., 2017 (England, UK)	Risk assessment; ordering tests	Descriptive quantitative	5301	Evaluated Umbrella Health – a service that allows people to complete an assessment that determines what tests are needed.
Menza et al., 2021 (USA)	Ordering tests	Descriptive quantitative	233	Described the roll-out of Oregon's state-wide pilot HIV self-test program.
Page et al., 2019 (England, UK)	Ordering tests; provider to user results	Non-randomised quantitative	550	Compared the feasibility of self-sampling for HIV using dry blood spot and micro-tube kits.

Study (Location)	Elements of HIV testing delivered online	Design	N	Overview of study
Phanuphack et al., 2018 (Thailand)	Counselling; ordering tests; appointment booking; user to provider results; provider to user results	Non-randomised quantitative	571	Evaluated the acceptability and feasibility of myhealth.adamslove.org – an online HIV testing and linkage service.
Polilli et al., 2016 (Italy)	Risk assessment; appointment booking	Descriptive quantitative	"about 6000"	Evaluated a web-based HIV testing initiative where participants could complete an online HIV risk assessment then book an in-person appointment.
Rosengren et al., 2016 (USA)	Ordering tests	Descriptive quantitative	125	Evaluated the distribution of HIV self-test kits through Grindr.
Salway et al., 2019 (Canada)	Risk assessment; provider to user results	Non-randomised quantitative	352	Compared GetCheckedOnline users' (see Gilbert 2017) HIV test knowledge and sexual behaviours with users accessing regular clinics.
Stephenson et al., 2020	Counselling; user to provider results	Randomised controlled trial	202	Evaluated Project Moxie – a service where participants attend a video call appointment with an HIV counsellor who provides real-time support for people while they complete an HIV self-test.
Syred et al., 2019 (England, UK)	Ordering tests	Non-randomised quantitative	6254	Described a 'choose to test' service where participants completed an assessment that then recommends what tests they should order.
Wang et al., 2018 (China)	Counselling	Randomised controlled trial	430	Evaluated the efficacy of real-time instructions and counselling for HIV self-testing delivered via video call.
Wilson et al., 2017 (England, UK)	Ordering tests	Randomised controlled trial	2072	Evaluated SH24 (an online STI/HIV testing and results service).
Witzel et al., 2019 (England and Wales, UK)	Ordering tests	Randomised controlled trial; focus groups	1035 (RCT); 10 (focus group)	Evaluated the feasibility of an online recruitment strategy for an RCT looking at online provision of HIV self-test kits.

Study (Location)	Elements of HIV testing delivered online	Design	N	Overview of study
Witzel et al., 2021 (England and Wales, UK)	Ordering tests	Randomised controlled trial; semi-structured interviews	295	Evaluated online provision of HIV self-tests.
Wray et al., 2018 (USA)	Notification of test initiation	Randomised controlled trial	65	Evaluated the use of 'beacons' that signal when HIV self-tests are opened, allowing providers to follow-up and offer support.
Xia et al., 2018 (China)	Provider to user results	Descriptive quantitative	3092	Evaluated anonymous urine testing for HIV where users accessed their results online.

2.3.1.3. Content reviews

The reviews of online content included in this review all related to PrEP education. Whiteley et al. (2020) evaluated websites and YouTube videos that provided PrEP information and found that no website fully satisfied their four appraisal criteria. Kecojevic et al. (2018) evaluated YouTube videos that provided information on PrEP and found that the videos varied in terms of the completeness of the information provided. Gilbert et al. (2019c) evaluated the information relating to HIV risk and prevention on Canadian HIV websites (this included PrEP). They highlighted the potential accessibility challenges found in the websites (e.g. high reading level) and the low usability and lack of interactive features included in the websites. Deviating slightly from the other reviews which focused on information readily available to users, Lee et al. (2020) conducted a retrospective analysis of questions submitted to an online HIV counselling website about HIV and PrEP – in this case, it was the service users requesting information about PrEP. Questions tended to revolve around HIV testing, self-perceived HIV risk, emotional state, and treatment and prevention.

2.3.1.4 Studies that focused on renal function with no explicit PrEP context

Only one study was related to renal function monitoring and was not linked to PrEP (Woywodt, 2014). This study described a website-based patient portal where patients could access their renal test results. Participants found the portal easy to use (92%) and said that it helped them manage their conditions (93%).

2.3.2. What was the acceptability and feasibility of online PrEP-related care?

Acceptability was measured in 30 studies either qualitatively through focus groups and interviews (n=9) or in a cross-sectional survey (n=23). Full details on acceptability can be found in Table 6. Overall, acceptability for online PrEP-related care was very high. Participants praised the convenience of the online services and the added privacy they provided, as well as reporting a positive overall experience. Four studies used the System Usability Scale (SUS), a validated measure of subjective usability (Brooke, 1986). SUS scores ranged from 68.25 to 85 (Biello et al., 2021; Liu et al., 2021; Mitchell et al., 2018; Siegler et al., 2019), where scores above 68 are considered above average in terms of usability (Brooke, 1986).

Table 6. The acceptability of included studies – adapted from Kincaid et al. (2021a)

Study	Method of measuring acceptability	Level of acceptability
Anand et al., 2017b	Cross-sectional survey (5-point Likert scale: higher number = higher satisfaction). Mean (SD) reported.	Overall satisfaction = 4.4 (.68). Design and interface = 4.34 (.78). Consent and understanding = 4.58 (.57). Ease of registration = 4.51 (.63). Online data security = 4.64 (.53). Ease of accessing lab results and post-test counselling summaries = 4.37 (.70). Video chat quality for guidance = 4.71 (.47).
Balán et al., 2021	Cross-sectional survey and qualitatively via interviews.	7-point Likert scale measured the helpfulness of SMARTtest components (1 = not helpful; 7 = extremely helpful), mean scores varied from 5.74 (locating clinics using zip codes) to 6.46 (video instructions). 5-point Likert scale measured functionality (1=completely disagree; 5 = completely agree), mean scores varied between 3.58 ("the SMARTtest app was fun and entertaining to use") and 4.48 ("I trusted the presented on the SMARTtest app"). 100% said that they would use the INSTI for self-testing; 89% said they would use the INSTI for partner testing.
Bauermeister et al., 2015	Cross-sectional survey (7-point Likert: higher number = higher satisfaction). Descriptive statistics not specified; assumed to be mean (SD) given that t-tests were reported.	Overall satisfaction: INT = 6.16 (1.08); CON = 6.00 (.77). Frustrating usability: INT = 2.09 (1.27); CON = 2.19 (1.44). Recommend to friend: INT = 6.00 (1.21); CON = 5.74 (.99). Easy to use: INT = 6.29 (.96); CON = 6.24 (1.01). Provides accurate info: INT = 6.35 (.88); CON = 5.74 (1.15). ** Likelihood of continuing use: INT = 5.77 (1.30); CON = 5.79 (.93). INT = intervention; CON = control **p<.01
Biello et al., 2021a	Cross-sectional survey	SUS = 71 (SD = 11.8) 73% were very satisfied with the app. 91% would recommend the app to a friend.

Study	Method of measuring acceptability	Level of acceptability
Biello et al., 2021b	Cross-sectional survey	93% of participants stated that it wasn't difficult to order an HIVST via the app. 87% of participants stated that the app was extremely or very helpful when ordering HIVSTs. 80% of participants who used an HIVST during the study (n=20) reported that HIVSTs would be convenient in the future.
Chan et al., 2021	Cross-sectional survey	74.3% of participants said they would be likely to use free HIVST with online counseling in the next 6 months. 76.0% of participants said that the HIVST was easy and 82.3% said it was convenient. 79.1% said HIVSTs could reduce embarrassment; 50.0% said they could help avoid stigma; and 84.0% said that they could improve privacy. 64.0% of participants stated that the online real-time counseling was important or very important for supporting new HIVST users.
Chasco et al., 2021	Qualitatively via interviews.	Participants felt that the service was convenient and was able to mitigate some of the barriers typically associated with testing.
Daniels et al., 2016	Cross-sectional survey	**Most preferred method of sharing results** E-mail = 37.8%; SMS = 21.6%; in-person = 16.2%; taking and sending a pic of used test = 13.5%; in writing = 5.4%; mailing in used test = 2.7%; and by phone = 2.7%.
Fuchs et al., 2018	Qualitatively via focus groups.	Participants reported that the intervention provided additional support and security. Participants reported that the intervention was unnecessary for those who were already fully adherent. Staff found the intervention easy to implement.
Hottes et al., 2012	Qualitatively via interviews.	Most participants would use the internet service in the future or recommend it to others. **Perceived benefits of internet based testing:** Anonymity, immediate access, 24hr availability of internet and extended/flexible hours of lab sites, and standardised service, controlled by client. **Concerns re: internet based testing:** Reluctance to provide personal info online; distrust of security of data provided online; ensuring comprehensive pre-test counselling; support for those waiting for test results and receiving positive results.

Study	Method of measuring acceptability	Level of acceptability	
Huang et al., 2016	Cross-sectional survey	**Ease of using self-test** • Very easy (58%) • Easy (39%) • Neutral (4%) • Hard (0%) • Very hard (0%)	**Testing preference** • Prefer self-test kit (44%) • Somewhat prefer self-test kit (25%) • Neutral (12%) • Somewhat prefer clinic (16%) • Prefer clinic (4%)
Hughes et al., 2021	Qualitatively via interviews	Most participants were satisfied with the service and reported having to "overcome scepticism" as the service appeared "too good to be true" or a departure from the care they were used to receiving. Participants found the web-based nature of the service convenient and felt it was able to strike a balance between efficiency (simplicity, speed, convenience) and "humanity" (personalised, responsive, feeling of a connection/care).	
Jackman et al., 2018	Cross-sectional survey	**Percentage reporting helpful/very helpful or agree/strongly agree:** • Effect of ePHR on communication of STIs: 63.6% • Effect of ePHR on confidence in partner's results: 66.4% • ePHR will make it easier for talks re: STI testing: 55.6% • ePHR make it easier to check-in on partners: 55.1%	• Soliciting a partner's ePHR will be awkward: 24% • Confidence in sharing positive STI through ePHR: 16.7% • Belief partner will initiate STI talk earlier: 52% • Only use ePHR when distrusting of partner: 26.3% • Suspicious of partner who is unwilling to share: 75.7%
Knight et al., 2019	Qualitatively via interviews	Participants preferred GCO because it was convenient, private and they felt that they had more control. Participants noted that it improved access for rural patients and that they preferred getting results online rather via email or over the phone. Almost all participants said that they would use the service again in the future.	
Koester et al., 2020	Qualitatively via interviews	Participants found presenting to a clinic to testing or to drop of specimens acceptable.	
Lessard et al., 2019	Qualitatively via focus groups.	Overall acceptability appears good. Potential benefits of the service are that it could allow better patient notification, customized linkage to care, and transferrable data. Potential risks could be privacy and confidentiality, changes in sexual behaviour, and fairness.	

Study	Method of measuring acceptability	Level of acceptability
Liu et al., 2021	Cross-sectional survey and focus groups	Median SUS score was 85/100 at week 4 and 80/100 at week 8. 84% reported that they were likely to use the app again in the future.
Maksut et al., 2016	Cross-sectional survey	All participants reported that they would like to participate in at-home HIV testing with peer counseling via video chat in the future and that they would recommend this to a friend. 72% said they would prefer this mode for their next HIV test.
Menza et al., 2021	Follow-up email	Participants said that the service was convenient and enhanced privacy.
Mitchell et al., 2018	Cross-sectional survey SUS and 4-point Likert scale (1= not at all; 4 = extremely) Mean (SD) reported	**SUS = 68.25 (15.10)** • Overall satisfaction = 2.80 (.63). • Usability on a daily basis = 3.50 (.53). • Recommend to others = 2.70 (.82). • User-friendliness = 2.80 (.79). • Difficulty learning to use = 1.20 (.42).
Refugio et al., 2019	Cross-sectional survey	>85% agreed that PrEPTECH was a better way for GBMSM to access PrEP (measured at 90- and 180-day follow-up). 88% of participants reported that PrEPTECH was very or extremely easy to use. >85% of participants said that they trusted PrEPTECH.
Rosengren et al., 2016	Cross-sectional survey	93% of participants found the HIVST kits easy or very easy to use. 77% of participants preferred or somewhat preferred self-testing over in person testing.
Siegler et al., 2019	Cross-sectional survey	SUS mean (SD) = 76.91 (18.4). 85% indicated that they would prefer to use the service in place of a standard visit. 40% reported that they would be more likely to stay on PrEP if the service was made widely available. **Acceptability of features:** • Packaging and mailing results (89.1% acceptable/very acceptable) • Urine specimen collection (92.7% acceptable/very acceptable) • Rectal swab specimen collection (87.3% acceptable/very acceptable) • Finger prick and blood collection in micro-tube (58.2% acceptable/very acceptable) • Finger prick and dried blood spots (69.1% acceptable/very acceptable)

Study	Method of measuring acceptability	Level of acceptability	
Stephenson et al., 2020	Cross-sectional survey	Satisfaction was high (overall satisfaction = 98.3%): • 98.3% thought the counsellor was friendly • 100% thought the counsellor was knowledgeable • 98.3% thought the counsellor was experienced • 98.3% thought the counsellor was professional • 78.3% found the intervention easy to use	• 73.3% thought the intervention was good quality • 98.3% thought the HIVST was easy to use • 93.3% thought the HIVST was easy to interpret • 89.8% would be willing to repeat the session • 81.3% would be willing to recommend the session • 98.3% would be willing to recommend home test
Sullivan et al., 2017	Cross-sectional survey	Composite usability score was 73.4 (above average): • 88% found level of detail useful/very useful. • 81% found assessment recommendations useful/very useful. • 66% felt the app content helped them to stick to HIV prevention plan. • 71% found the app to be a good balance of personal and professional language.	• 90% found the information easy to understand. • 86% found the app to be secure. • 85% found the password/PIN offered sufficient protection. • 84% found the app name and icon not to be readily associated with HIV prevention.
Wang et al., 2018	Cross-sectional survey	• Satisfaction with logistics of implementation = 89.5% • Satisfaction with performance of HIV testing admin = 96.5% • Satisfaction with usefulness of the HIVST-OIC in helping understand HIV testing (86.7%) • Satisfied with usefulness of HIVST-OIC in preparing them to take up such a test (80.3%)	• Perceived effectiveness of intervention in reducing risk behaviours (71.4%) • Use the service again (78.5%) • Recommend to a friend (75%) • Would pay for HIVST-OIC in the next six months (47.8%)
Wilson et al., 2017	Cross-sectional survey	71% of participants found the service acceptable.	
Witzel et al., 2019	Cross-sectional survey	98% found the instructions easy; 97% found the HIVST simple to use; and 97% had an overall good experience.	
Witzel et al., 2021	Cross-sectional survey	97% found the instructions easy; 97% found the HIVST simple to use; and 100% had an overall good experience.	

Study	Method of measuring acceptability	Level of acceptability
Woywodt et al., 2014	Cross-sectional survey	84.8% of participants rated the service as good or very good.

I extracted data on service uptake, retention and service delivery to summarise feasibility given the heterogeneity of the included studies – see Table 7. The included studies appeared to be able to recruit and retain a sufficient sample to address their specific aims, and appeared to be able to deliver their services as intended. Notably, studies that focused on online HIV testing were able to recruit a high number of people who were either engaging in higher risk behaviours or who were unaware that they were already living with HIV (Anand et al., 2017a; Anand et al., 2017b; Elliot et al., 2016; He et al., 2018; Jin et al., 2019; Phanuphak et al., 2018; Xia et al., 2018). Moreover, one study demonstrated the feasibility of having patients self-sample for creatinine, with 81% of the self-samples being valid for analysis (Chasco et al., 2021).

Table 7. Uptake, retention, and notes on service delivery – adapted from Kincaid et al. (2021a)

Study	Uptake	Retention	Notes on service delivery
Anand et al., 2017a	Reached 272,568 people in 3 months. 435 booked an appointment.	325 (76.5%) checked in at one of the study sites.	• The study identified 9 people who were unaware that they were living with HIV. • The study reached people who were considered at increased risk of acquiring HIV. • 53.2% of the participants who were HIV-negative decided to initiate PrEP.
Anand et al., 2017b	489 people were introduced to the study arms. 186 (38%) enrolled in the study: • 89 (47.9%) in the offline arm. • 72 (38.7%) in the hybrid arm. • 25 (13.4%) in the online arm.	Percentage of participants who revisited after baseline: • 48.0% in the offline arm. • 62.5% in the hybrid arm. • 48.3% in the online arm.	Proportion of participants diagnosed with HIV via the study: • 2.2% in the offline arm. • 1.4% in the hybrid arm. • 16.0% in the online arm. Proportion of participants who had never previously tested for HIV: • 19.1% of the offline arm. • 13.9% of the hybrid arm. • 31.6% of the online arm.
Baraitser et al., 2019	1502 orders placed; 1466 kits dispatched. 67% chose HIVST, 34% chose self-sampling.	Test results were obtained for 57.2% of the HIVSTs and 53.9% of the self-samples.	No notes.
Bauermeister et al., 2015	130	104 (80%) completed the 30-day follow-up.	No notes.
Biello et al., 2021a	11	100% retention	Participants used the app an average of 8 times (SD = 5) for an average total duration of 4 hour and 39 minutes. All functions of the app were used to some degree, the least used was the FAQ section which was only used by 4 participants.
Biello et al., 2021b	80	71 (89%) completed at least one follow-up assessment.	No notes.

Study	Uptake	Retention	Notes on service delivery
Chan et al., 2021	350	337 participants accepted an HIVST kit, 169 completed the HIVST-online service, 155 of whom were followed-up at 6 months. 143/168 who refused the HIVST-online service were followed-up at 6 months.	No notes.
Chasco et al., 2021	77 people were offered home kits, 42 (54.5%) accepted. 207 monitoring episodes (79 of which were using home kits).	Not reported.	HIV samples were completed at 100% of the clinic visits and 83.5% of the self-samples. Adequate sample for creatinine analysis was obtained in 91.9% of the clinic visits and 81% of the self-samples.
Cohen et al., 2017	1460	Not reported.	The intervention appeared to be successfully implemented and resulted in shorter mean waiting times. 41.51% of participants opted into the intervention.
De Boni et al., 2019	17,786 unique visitors to the study website; 7,300 questionnaires initiated; 4,800 questionnaires eligible; 3,885 packages requested; 2,526 packages delivered	542 packages returned	• 65% of the participants who started the online process received an HIVST (success indicator = ≥60%) • 38.5% collected their HIVST from the pharmacy within two weeks of ordering (success indicator = ≥50%) • 2526 HIVSTs were distributed during the first 12 months (success indicator = ≥1000) • 21.4% of participants reported their HIVST results (success indicator = ≥20%) • 88.2% of reactive tests were followed-up with confirmatory testing (success indicator ≥50%).

Study	Uptake	Retention	Notes on service delivery
Elliot et al., 2016	17,361 participants completed the baseline assessment; 7,872 (45%) were identified as being at high risk of acquiring HIV; 11,127 (64.09%) clicked through for more information; 10,323 (93%) requested an HIVST	55% of those who requested an HIVST kit returned it	Blood tests were preferred but saliva tests were more likely to be returned. 82 people were newly diagnosed with HIV (1.4% of the participants who returned samples).
Finkenflügel et al., 2019	374	92.5% completed the 12-month follow-up	The percentage of participants who reported data 27 to 30 days per study month decreased over time ($p<0.001$). PrEP adherence measured by app data and follow-up questionnaire were comparable for those on a daily regimen. The median number of pills taken according to the app tended to be lower than reported in the questionnaire for those on an event-based regimen – this was significant at month 9 and the questionnaire was administered every three months.
Fuchs et al., 2018	56	52 (92.9%) completed the study: 3 people were unable to activate their email accounts; 1 person withdrew due to a technical error.	18 participants (32.1%) opted for email over SMS. 80% of participants preferred weekly message frequency at the start of the week. Participants who opted for email were less likely to reply (14% did not reply at all compared to 9% who opted for SMS). 4% of messages were not delivered due to an early rectified technical issue. Email respondents took longer to reply.
Gilbert et al., 2017	868	15-25% discontinued at each stage. 318 (36.6%) participants submitted specimens. 96 (30.2%) retested within the study period.	• 3.1% of participants were diagnosed with an STI. • 1.7% opted out of urine test. • 5.8% opted out of HIV test. • 5.0% opted out of syphilis test. • 8.8% opted out of HCV test. • All participants who were received a positive test result received their results over the phone within 6 days. 90% confirmed they had received treatment.

Study	Uptake	Retention	Notes on service delivery
Gilbert et al., 2019a	100 were contacted; 73 participated	Not reported.	No notes.
Gilbert et al., 2019b	19,497	Not reported.	For the online service, there were 1951 testing episodes across 1093 clients. For the STI clinics, there were 39,357 testing episodes across 18,404 clients. STI clinic clients repeat tested 1.53 times/person year and online clients had repeat tested 1.87 times/person yr. Most online clients only tested through the online service. Of the 272 who tested both online and an STI clinic, 87% were tested at a clinic first (44 of whom went on to test at a clinic again), 13% were tested online first.
Guinness et al., 2018	126 patients were identified as being eligible for the study. 77% of patients were sent an email.	78% of those send an email opened the email.	12.4% of those sent an email were linked to PrEP care, 91.7% of whom were prescribed PrEP at least once.
He et al., 2018	500 HIV self-sample kits were distributed.	430 (86%) of kits were completed and returned.	16.3% of the returned kits were reactive.
He et al., 2019	957 tests distributed.	378 tests were returned (2 were invalid). 255 participants accessed their results.	65.9% of participants whose test was negative accessed their results. 100% of participants whose test was reactive accessed their results (n=7). 88.9% of the kits were dispensed between 9pm and midnight.
Hoth et al., 2019	186 referrals resulting in 127 initial video calls.	83 people started PrEP and had enough time to measure follow-up within the study period. 60% of these were retained at 180 days.	All calls were completed within 40 days of the referral, 78% of these were completed within two weeks of referral, and 53% within one week. Completion of blood tests was 96%. Of the 167 eligible creatinine visits, 98% (n=164) were complete.

Study	Uptake	Retention	Notes on service delivery
Huang et al., 2016	• 62,820 people potentially saw the promotion. • 11,939 unique visitors to the study website. • 238 people were interested in participating in the study. • 122 were eligible.	81 (66.4%) of participants confirmed that they had received an HIVST kit and completed the follow-up.	No notes.
Jin et al., 2018	1,015 people applied for an HIVST kit; 879 (86.6%) were eligible.	77.7% of participants who received a test submitted a photo of their results.	40% of participants had never been tested for HIV before. 14.3% of the people who submitted their results were found to be living with HIV. 72.4% of the people newly diagnosed with HIV were receiving treatment within 1 month of their test. 42.9% of those who uploaded a photo of their test were first time testers and among the first time testers, 18.8% were diagnosed with HIV.
Liu et al., 2021	20	19 (95%)	Median PrEP adherence was 91%.
MacGowan et al., 2019	2,665	Retention was >54% at each follow-up.	A significantly higher proportion of participants in the HIVST group reported testing 3 or more times during the trial than in the control group (76.6% vs 22.0%; p<0.01).
Maksut et al., 2016	20	18 (90%)	No notes.
Manavi et al., 2017	5,130 kits were requested.	3,099 (58.4%) kits were returned.	Kits delivered to homes were more likely to be returned (60.6%) than those provided through clinics (56.4%) and pharmacies (44%).
Menza et al., 2021	233 participants ordered a total of 248 kits.	Not reported.	73% of the 150 kits assigned to the study to begin with were ordered within the first 24 hours of implementation. 22% of the participants lived in rural zip codes.
Mitchell et al., 2018	10 people participated in the study.	100% retention.	Daily doses were registered 91% of the time. Among these, 88% involved the camera. 40% of participants didn't miss any days; 40% missed 1-5 days; 10% didn't log a dose on six days and 10% for 12 days. 70% of the participants responded to all of the daily surveys.

Study	Uptake	Retention	Notes on service delivery
Page et al., 2019	550 kits (275 each of MT and DBS) were requested online.	98.8% of the DBS were returned and 55.7% of the MT were returned.	96 MT were not processed, 62 of which were due to insufficient sample. 21 returned DBS were not processed, 2 of which were due to insufficient sample. 5.4% false positive rate for MT compared to 0% for DBS.
Phanuphack et al., 2018	564 participants were recruited: • 202 selected the offline arm. • 158 selected the hybrid arm. • 211 selected the online arm.	100% of the offline group completed testing. 94.3% of the hybrid group completed testing. 92.4% of the online group completed testing.	Percentage of each arm that were first time testers: 42.4% in offline; 18.1% in hybrid; 47.3% in online. 13% of the people in the offline arm were diagnosed with HIV, 3.4% in the hybrid arm, and 15.9% in the online arm.
Polilli et al., 2016	The authors used approximations: 6000 visited the website; 5000 completed the risk calculator; 3500 booked a test; 3,046 presented for testing.	*Retention was covered in the uptake column.*	No notes.
Refugio et al., 2019	401 people created an account. 44 completed the consent process.	25 participants completed baseline; 21 completed follow-up.	16 participants were interested in continuing PrEP after the study ended; 11 were confirmed to have accessed PrEP after the study ended.
Rosengren et al., 2016	4,389 visitors to the website, 333 requested a test.	125 participants completed the online survey. 56 (45%) completed the follow-up survey.	4% of the people who completed the follow-up survey had a reactive HIV result; all of whom were linked to care.

Study	Uptake	Retention	Notes on service delivery
Salway et al., 2019	352	Not reported.	No notes.
Siegler et al., 2019	58	55	• 1 participant had an insufficient volume of blood for remote testing and 1 participant's rectal swab was not done correctly so could not be analysed. • Of the 57 participants whose data was available, 4 required and received standard in-person care instead due to 2 being unable to prick their finger and 2 having insufficient specimen collections. • 93% were able to have their prescription renewed based on the online service.
Stekler et al., 2018	48	40% of the participants in the intervention group attended the 3-month follow-up compared to 87% of the control group.	No notes.
Stephenson et al., 2020	202	See notes on service delivery.	100% of the control group ordered an HIVST, 91% reported their HIV test results via the study portal. 48% of those randomised to receive the intervention received the intervention - all of whom ordered HIVST and received video-chat counseling.
Sullivan et al., 2017	919 survey responses, 309 of which were eligible. Final enrolment was 121.	81% of participants completed the 4-month evaluation.	No notes.
Syred et al., 2019	6,253 users ordered 7,550 tests prior to implementation; 7,772 users ordered 9,785 tests following implementation	Not reported.	When compared to data for the same time period prior to implementing the 'choose to test' service, the positivity rate for gonorrhoea and chlamydia tests was unchanged. Too few HIV and syphilis tests were completed to analyse.

Study	Uptake	Retention	Notes on service delivery
Wang et al., 2018	430	Loss to follow-up: 10.7% intervention; 6% control	No notes.
Wilson et al., 2017	2,072	1,739 (83.9%) completed follow-up.	No notes.
Witzel et al., 2019	1,370 people registered; 1,035 (76%) enrolled	Of the 631 randomised to receive an HIVST at baseline, 78% completed one of the follow-up surveys.	97% of the participants in the baseline HIVST arm received an HIVST and 90% had used it.
Witzel et al., 2021	118	**Randomisation 1:** Baseline test retention = 72%; no baseline test retention = 41%. **Randomisation 2:** Repeat test retention = 100%; no repeat retention = 88%.	For trans men, HIV testing uptake was significantly higher in the baseline test group (95%) than in the no baseline test group (29%) ($p<0.001$). Trans people in the repeat test group had a 3 times higher rate of repeat HIV testing compared to no repeat test group ($p<0.001$).
Woywodt et al., 2014	295 returned questionnaires (response rate of 45%)	Not reported.	No notes.
Wray et al., 2018	65	12.3% of participants withdrew before month 7	Monthly survey completion rate = 89%. 93.1% of the sample used the study-provided HIVST.
Xia et al., 2018	3,092 packs were distributed.	1,977 (63.9%) samples were mailed to the lab, 1,911 (96.7%) were eligible for analysis.	7.1% of the samples were reactive. 65.4% of the people who submitted a sample accessed their results online, this was higher for the people whose HIV test was reactive (83%).

2.3.3. What barriers and facilitators have been identified in relation to online PrEP-related care?

Nineteen studies discussed barriers and facilitators that influenced engagement with their specific service. Here, I focus solely on the barriers and facilitators linked to the PrEP-specific elements of care that were delivered online – presented in Table 8.

Table 8. Barriers and facilitators that influenced engagement with online PrEP-related care

Barriers	Facilitators
• Lower perceived ability to complete an online postal self-sampling kit correctly, in a timely manner (Biello et al., 2021b; Chasco et al., 2021; Knight et al., 2019). • Difficulty completing HIV self-sampling and self-testing kits (Biello et al., 2021b). • Lack of, or a negative, prior experience of completing online postal self-sampling kits and HIV self-tests (Biello et al., 2021b; Chasco et al., 2021; Witzel et al., 2019). • Low perceived security or reliability of postal service (Chasco et al., 2021). • Reluctance to provide information online due to low perceived security of online systems (Hottes et al., 2012). • Scepticism due to online services seeming 'too good to be true' (Hughes et al., 2021).	• High perceived ability to complete an online postal self-sampling kit correctly, in a timely manner (Chasco et al., 2021). • Positive prior experience of completing online postal self-sampling kits (Chasco et al., 2021). • Convenience, specifically in terms of scheduling and travel (Chasco et al., 2021; Hottes et al., 2012; Knight et al., 2019; Koester, 2020; Maksut et al., 2016; Menza et al., 2021; Witzel et al., 2019). • Confidentiality, anonymity or privacy (Chasco et al., 2021; Hottes et al., 2012; Menza et al., 2021; Witzel et al., 2019). • Reduced stigma, embarrassment, or judgment (Chasco et al., 2021; Hughes et al., 2021). • The incorporation of smartphone notifications (Mitchell et al., 2018).

The included articles identified a number of barriers that affected engagement with online PrEP-related services. Biello et al. (2021b) reported that some participants experienced difficulty using the HIV and STI self-sampling and self-test kits which resulted in feelings of frustration and anxiety and the return of incomplete kits. Similarly, a low perceived ability to complete HIV self-test and self-sample kits was identified as a barrier in two other studies (Chasco et al., 2021; Witzel et al., 2019). Service users' past experiences, or lack of, appeared to affect their choice of care in the future (Biello et al., 2021b; Chasco et al., 2021; Witzel et al., 2019). For example, in Witzel et al., participants who had no previous experience of using safety lancets were concerned about their ability to collect their own sample.

Hughes et al. (2021) reported that some participants were sceptical of their online PrEP service because it seemed 'too good to be true' which was linked to general uncertainty about web-based interactions. Indeed, Hottes et al. (2012) reported that some participants their study looking at internet-facilitated lab-based sampling for STIBBVs were reluctant to provide information online because they worried about hacking and the overall security of web-based services. Continuing this theme of 'security', Chasco et al. (2021) reported that some participants perceived the postal service to be insecure or unreliable which affected their decision whether to opt for online postal self-sampling.

The included articles also identified a number of facilitators that affected engagement with online PrEP-related services. Chasco et al. (2021) reported that prior experience of similar procedures (primarily blood glucose tests) seemed to reassure participants and made the blood self-sampling seem manageable. Similarly, Chasco et al. found that having a high perceived ability to complete the kits correctly, in a timely manner, made the prospect of self-sampling more appealing to participants.

The convenience that online services provided, or were anticipated to provide, appeared to facilitate engagement; specifically, mitigating geographic barriers, providing more flexibility around scheduling, and 24-hour access in some cases (Chasco et al., 2021; Hottes et al., 2012; Knight et al., 2019; Koester, 2020; Maksut et al., 2016; Menza et al., 2021; Witzel et al., 2019). Mitchell et al. (2018) reported that participants found the notification function of the smartphone-based adherence tool useful as it prompted them to complete their daily monitoring event. Confidentiality, anonymity, and privacy were all identified as facilitators within included articles and were often discussed together by authors (Chasco et al., 2021; Hottes et al., 2012; Menza et al., 2021; Witzel et al., 2019). Online services were perceived to allow service users to avoid the stigma, embarrassment, and judgement sometimes experienced in face-to-face settings (Chasco et al., 2021; Hughes et al., 2021).

2.4. Discussion

The aim of this review was to explore the extent to which PrEP-related care had been delivered online to subsequently inform the direction of my doctoral research. Below, I discuss the findings in relation to the research questions posed in the introduction.

2.4.1. What PrEP-related elements of care have been delivered online?

Seven articles described somewhat complete online PrEP pathways in that they involved a consultation, testing for STIs and BBVs, and provision of PrEP medication (Chasco et al., 2021; Hoth et al., 2019; Hughes et al., 2021; Koester et al., 2020; Refugio et al., 2019; Siegler et al., 2019; Stekler et al., 2018). However, these studies only delivered part of their pathways online, and tended to rely on lab or clinic-based testing. The remaining articles focused on a single or small number of PrEP-specific care components, primarily HIV testing. Online renal-related care was mentioned in two articles (Chasco et al., 2021; Woywodt et al., 2014). The findings suggested that aspects of almost all of the PrEP-specific care components I identified in section 2.3.4.5.6. had been delivered online. No studies explicitly mentioned that they monitored PrEP side effects or possible drug interactions online, however, it is possible that this was addressed within PrEP eligibility assessments/consultations and therefore not explicitly further detailed within the papers.

2.4.2. How have PrEP-related elements of care been delivered online?

The primary modalities used to deliver PrEP-specific care online were websites, followed by video calls and smartphone apps. Email was explicitly used to deliver care in six studies; however, it is possible that that it was used to communicate with participants in other settings. Although one study explored preferences for communicating HIV test results (where email and SMS were included as options (Daniels et al., 2016)) it is unclear in a wider context if participants make a clear distinction between different modes of digital communication. Moreover, I made a distinction between online (e.g. email, videoconference, internet-based instant messaging) and SMS/phone-based care for this review. Whilst on reflection it is unclear if this would be a meaningful distinction from a patient perspective, this was not an objective of the review.

2.4.3. What was the acceptability and feasibility of online PrEP-related care?

The acceptability and feasibility of providing PrEP-specific care online seemed promising. Studies were able to recruit and retain participants and appeared to deliver their services as intended. Moreover, online services were able to reach people who were at elevated risk of acquiring HIV and also identify people who were unaware they were living with HIV and link them to care (Anand et al., 2017a; Anand et al., 2017b; Elliot et al., 2016; He et al., 2018; Jin et al., 2018; Phanuphak et al., 2018; Xia et al., 2018). Thus, the level of reach demonstrated in these studies was encouraging.

A particularly important study highlighted in this review was Chasco et al. (2021). Chasco et al. evaluated a service in which service users could order kits that allowed them to self-sample for creatinine analysis. This is important in the context of remote or online PrEP care given that serum creatinine is used as an indicator of renal health (Brady et al., 2019). Evidence of the feasibility of self-sampling for creatinine in the context of PrEP care is an important step towards self-managed care given the potential for patients' renal monitoring to be conducted outside the clinic setting.

Where measured, participants rated the acceptability and usability of services highly and the four studies that used the validated SUS each scored above average (Biello et al., 2021a; Liu et al., 2021; Mitchell et al., 2018; Siegler et al., 2019). However, it is unclear how transferable this acceptability and feasibility would be to a more complete, complex model of online PrEP care as was proposed in Chapter 1 (Estcourt et al., unpublished manuscript; Henderson et al., 2022; Kincaid et al., 2022), given that the studies in this review focused on aspects of a small number of specific care components at a time or only delivered part of their pathways online. It is therefore unclear how acceptable and feasible a more complete model of online PrEP care would be.

2.4.4. What barriers and facilitators associated with engagement have been identified in relation to online PrEP-related care?

The studies that identified barriers and facilitators primarily focused on self-sampling and self-testing for HIV and other STIBBVs. Some of the barriers and facilitators were opposite sides of a single construct; specifically, past experience (if any) and perceived ability. Having a positive past experience of self-sampling or self-testing for HIV facilitated future engagement (Chasco et al., 2021), and having had no previous experience, or a negative experience, was a barrier (Biello et al., 2021b; Chasco et al., 2021; Witzel et al., 2019). Similarly, a high perceived ability to obtain a blood sample was viewed as a facilitator or self-sampling (Chasco et al., 2021), while a low perceived ability was a barrier (Biello et al., 2021b; Chasco et al., 2021; Knight et al., 2019). Given that the proposed online PrEP service will likely involve processes that service users will be unfamiliar with, this suggests that it would be beneficial to offer support to improve service users' perceived ability to complete the stages of the online PrEP service.

Many of the facilitators of engagement centred around potential benefits when using online PrEP-related services, and the reduction of some barriers experienced or expected with face-to-face care, specifically: added convenience (Chasco et al., 2021; Hottes et al., 2012; Knight et al., 2019; Koester, 2020; Maksut et al., 2016; Menza et al., 2021; Witzel et al., 2019), increased confidentiality and privacy (Chasco et al., 2021; Hottes et al., 2012; Menza et al., 2021; Witzel et al., 2019), and a reduction in the stigma and embarrassment (Chasco et al., 2021; Hughes et al., 2021). These potential benefits made the prospect of online care appealing to service users. Conversely, some people's scepticism of online interactions (i.e. the legitimacy or security of these processes) acted as barriers to engagement (Chasco et al., 2021; Hottes et al., 2012; Hughes et al., 2021). Again, these provide useful insights into where support and education should be targeted to optimise engagement with the proposed online PrEP service.

2.4.5. Strengths and limitations

I conducted and reported this review in line with established guidelines (Arksey & O'Malley, 2005; Levac, Colquhoun & O'Brien, 2010; Tricco et al., 2018); prioritising transparency and taking systematic approach. I chose an appropriate design (scoping review) which allowed me to address the aim and research questions posed at the start of the review. Moreover, the review provided a clear direction for the doctoral research.

There were several limitations of this review. Some of the studies in this review did not clearly report their design nor did they detail their methods in a way that I felt confident to ascribe a specific design to them. Instead I categorised them broadly using the categories used in the Mixed Methods Appraisal Tool (Hong et al., 2018). I felt this was appropriate as it allowed me to group studies without incorrectly assigning designs. I used the Mixed Methods Appraisal Tool to gain an understanding of the quality of the included studies (Hong et al., 2018). Its use could be criticised as scoping reviews do not tend to address the quality of studies; however, I felt it was important to gain a more informed insight into the existing evidence base. With that said, I felt that the Mixed Methods Appraisal Tool was more lenient on qualitative studies than it was on quantitative studies. The quantitative criteria seemed more specific than the qualitative criteria meaning that it was quite clear if a quantitative study had not addressed a criterion but the qualitative criteria seemed to be more open to interpretation. I felt that this skewed the qualitative studies to a higher quality outcome. I would consider other tools in the future when conducting reviews; however, I do feel that the measure provided the light-touch assessment I aimed for. Moreover, in the future, I would ensure that a second researcher

reviewed the eligibility and quality of potential/included studies to reduce the likelihood of bias. Another limitation of this review was that I distinguished between online messaging (e.g. instant messaging) and SMS. On reflection, I am unsure if this would be a meaningful distinction from a service user perspective; especially with the option to receive both on a smartphone.

2.4.6. Implications for this doctoral research

The purpose of this review was to explore the existing literature to understand the extent to which PrEP-related care had been provided online with a view to inform the development of the online PrEP service outlined in Chapter 1 (Estcourt et al., unpublished manuscript; Henderson et al., 2022; Kincaid et al., 2021a; Kincaid et al., 2022), and to inform the direction of my doctoral research. The findings of this review suggested that most of the elements of care related to safe PrEP provision had been delivered online, to varying degrees, feasibly and acceptably. However, it was unclear how this feasibility and acceptability would apply to a more complete online PrEP service. This review provided a starting point for my doctoral research and signalled a need for additional formative work to properly inform the development and implementation of the proposed online PrEP service.

2.4.7. Reflexivity

I felt that this was the most challenging chapter to write because the scoping review was also written up as a paper (Kincaid et al., 2021a). I led the paper but there were parts that had a great deal of input from my co-authors who also supervised my doctoral research. This was concentrated in the introduction and discussion sections of the paper. Much of this chapter was roughly drafted prior to this paper but also formed its basis. I found it difficult to figure out the best way to write the chapter, honouring the work that I put into the review, while not appropriating any of my co-authors ideas or contributions. I felt that the best approach was to be as transparent as possible and to have my co-authors review this chapter to ensure they were happy that I had not appropriated any of their contributions. I am confident that the work included in this chapter is entirely my own.

2.5. Conclusions

The findings of this review suggested that online care was an acceptable and feasible method of delivering PrEP-related elements of care; however, given that existing studies tended to focus on just one component of PrEP care or only delivered part of their pathway online, it was

unclear how generalizable this acceptability and feasibility would be to a more complete online PrEP pathway as was presented in Chapter 1. Additional formative work was needed to understand the acceptability of a more complete online PrEP pathway and how to optimally deliver this within existing services. Therefore, my doctoral research aimed to establish an evidence base to inform the development and implementation of the online PrEP service proposed by Estcourt et al. (unpublished manuscript). I explain how I approached this research in the next chapter.

Chapter 3. Methodology

3.1. Introduction and aim

I concluded the scoping review chapter by stating that additional research was necessary in order to properly inform the development and implementation of the proposed online PrEP service. The aim of this doctoral research was, therefore, to establish this evidence base. In this chapter I focus on the overall methodology that underpinned my research. I first discuss the target population of this research. I then present how I approached this research by discussing the axiological, ontological, epistemological, and methodological stances I adopted. I then explain how the research was partly guided by the Intervention Mapping approach to healthcare intervention development (Eldredge et al., 2016). Finally, I provide an overview of the studies that comprised this doctoral research.

3.2. Target population

I focused on gay, bisexual and other men who have sex with men (GBMSM) within my doctoral research for a number of reasons. As outlined in Chapter 1, GBMSM are one of the key populations who experience a higher burden of HIV (UNAIDS, n.d.; World Health Organization, 2016b), accounting for around half of all of the people in Scotland living with HIV (Public Health Scotland, 2020). Moreover, 97% of the people prescribed PrEP at least once in the first two years of the Scottish NHS PrEP programme were GBMSM (Health Protection Scotland, 2019a). The proposed online PrEP clinic will likely be available to established PrEP users in the first instance (Estcourt et al., unpublished manuscript; Henderson et al., 2022; Kincaid et al., 2022); therefore, it seemed sensible to focus on tailoring the service to GBMSM in the first instance given that the service would likely be used by this population to start with (Health Protection Scotland, 2019a). Tailoring health interventions to the target population is vital and so it seemed logical to focus on GBMSM within my doctoral research (Eldredge et al., 2016). That is not to say that the online PrEP service will only provide care to GBMSM. One of the objectives of the proposed online PrEP service is that clinic time and resources can be redistributed and targeted to people who have more complex needs and those yet to engage – although additional interventions are needed to reach those not yet reached. Therefore, balancing tailoring and maximum impact, I felt it was appropriate to focus on GBMSM within this doctoral research.

3.3. Axiology and my values

I felt it was important to discuss axiology first because my values as a researcher factored into the ontological and epistemological stances I took in this research. Axiology is concerned with the role of values in research (Dudovskiy, n.d.; Saunders et al., 2012). For example, in positivism, the research is conducted in a value-free way, while, in interpretivism, the researcher, and their values, are interwoven with the research (Dudovskiy, n.d.; Saunders et al., 2009; Saunders et al., 2012). Pragmatism, however, acknowledges that the researcher's values play a role in the collection and interpretation of the data, and argues that research should benefit people (Dudovskiy, n.d.; Saunders et al., 2009; Saunders et al., 2012). I believe that the values of the researcher are woven into each of the decisions made when planning, conducting and analysing research studies and data, and that it is important to reflect on these values and consider how they may impact the research (Kelly et al., 2018; Rescher, 2004). However, I also acknowledge the distinction between the degree to which values influence the interpretation of quantitative data compared to qualitative data. I have included some reflections below that I feel inform my position within this research. Indeed, these have been relevant and shaped my decision making and interpretations throughout the thesis.

My background in health psychology has instilled in me the importance of considering the individual as well as the many which I think is part of what drew me to HIV prevention research which is as much a public health matter as it is to do with the individual's health and behaviour (UNAIDS, 2010). I believe that each individual's experience is unique and valuable; however, I also acknowledge the importance of understanding shared experiences and trends in data/behaviour. I am driven primarily by wanting to use the skills I have developed, and continue to develop, to facilitate dialogue between health service users and providers to improve outcomes and experiences for both groups. This was at the core of this doctoral research.

I am not a trained healthcare professional and have no medical training aside from very basic procedures I learned while working in care – although I have completed the Stage 1 Health Psychology training and I am an NHS certified health coach. My experience working in care allowed me to assume the role of the observer in many interactions between the service user (my clients) and various health professionals which is similar to my position within this research – neither the provider nor the receiver of care. I am at a point in my life where I have a stable, monogamous partner and, while I have used sexual health services in the past, my

relationship status means I feel somewhat distanced from the service user role that I would have identified with in the past. Naturally, I also feel distanced from the healthcare provider perspective as I have never assumed that role. Therefore, within data collection and analysis I assumed the role of the observer which I think put me in a good stead to explore and understand the experiences of participants as I think I was less likely to assume shared knowledge.

I feel strongly that PrEP is an important health intervention that should be freely available to people for whom the benefits outweigh the harms. Moreover, I believe that healthcare should be person-centred and that people should have a choice in how they receive healthcare so long as it is safe and appropriate – which is subjective. I acknowledge the concept of the 'digital divide' (or 'digital exclusion') where those who do not have the capacity, opportunity, or motivation to engage with digital health services are disadvantaged (McKay, 2021; Litchfield et al., 2021). However, I feel that the digital divide should not be used as an excuse to impede innovation and progress; especially when the innovation has the potential to alleviate barriers and increase reach (see: Chapter 2). I believe that there needs to be a variety of methods available to people so that they can engage with health services in a way that works for them.

For the purpose of accessing health services, I would say that I fall under the umbrella of GBMSM – the population of focus of this doctoral research. However, I personally do not feel much affinity with traditional binary gender identities. I think this is important to note because I did experience some internal conflicts while conducting this research. I focused on GBMSM because it made sense in terms of relevancy and potential impact/benefit of the research, and because this is how people are categorised within the literature and health services. However, I also considered how appropriate this approach is today given current debates around inclusivity, gender fluidity and erasure (Bragazzi et al., 2022; Cameron & Stinson, 2019; Frohard-Dourlent et al., 2016). Consequently, I wonder whether we should be focusing on the behaviour rather than the gender identity and sexual orientation given the shifts in how people identify. Ultimately it is behaviour, rather than identity, that increases people's risk of acquiring HIV. I acknowledge that the majority of people likely have no issue with the use of 'GBMSM', and there is an important place for gendered services; however, I do wonder where non-binary people fit within all of this – there is an important balance between inclusion and erasure (Bauer et al., 2009; Bragazzi et al., 2022, Casey et al., 2019). Moreover, when phrasing it as "… who have sex with men", how are people meant to interpret this if they have receptive

anal sex with someone who identifies as non-binary – do they say that they do not have sex with a man, honouring their partner's identity, which may make them ineligible for a service they might benefit from, or do they discredit their partner's identity and say that they did have sex with a man in order to access a service they would benefit from? My views towards gender changed over the course of completing this research; hence I critique some of my decisions that I made in the early stages of the doctoral research. Ultimately, I think that focusing on GBMSM (and referring to this group as such) was appropriate, especially at the time of designing the studies within this thesis and the consensus within the literature/health systems. However, I felt it was important to highlight this internal conflict as I think it informs some of my critiques throughout the thesis.

3.4. Philosophical underpinnings

I considered a number of philosophical paradigms when planning my doctoral research. Paradigms offer a way of articulating the philosophical assumptions that underpin a piece of research, specifically: ontology, epistemology, and methodology (Rehman & Alharthi, 2016) – see Figure 6 (Proofed, 2022). I decided that pragmatism was the most appropriate paradigm for this research. The pragmatic approach is argued to be the best suited to address real world problems (Creswell & Poth, 2018). Indeed, Kivunja and Kuyini (2017) state that the pragmatic paradigm involves the *"adoption of a worldview that allows for a research design and methodologies that are best suited to the purpose of the study"* (p.36) and *"utilising lines of action that are best suited to studying the phenomenon being investigated."* (p.36). It involves considering and acknowledging the merit of different methodological approaches and methods, evaluating the context within which the project sits, and using the most appropriate methodology and methods to address the research questions (Creswell & Creswell, 2018; Creswell & Poth, 2018). At the core of this research project is a real world problem – optimising PrEP provision. Moreover, pragmatism rejects the need to position a study within a positivist or interpretivist paradigm which can be limiting (Kivunja & Kuyini, 2017). I felt that the pragmatic paradigm was most appropriate for this doctoral research. I detail my decision making process further below by discussing what pragmatism means for this research in terms of ontology, epistemology, and methodology compared to other research paradigms.

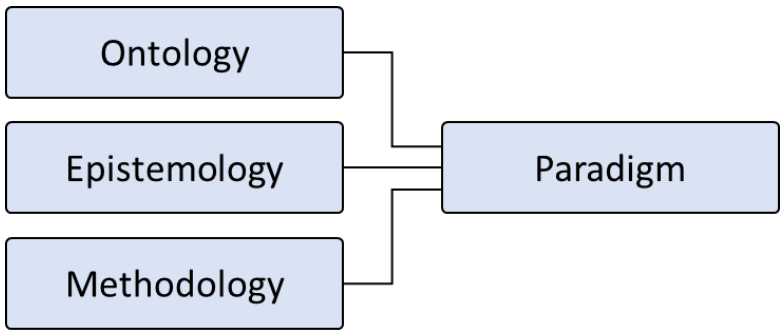


Figure 6. The research paradigm – adapted from Proofed (2022)

Ontology is concerned with the *"nature of reality"* whereas epistemology is concerned with *"the nature of knowledge"* (Al-Ababneh, 2020, p.82; Bryman, 2012; Saunders et al., 2009, p.119). Ontology can be divided into two branches: realism and relativism (Moon & Blackman, 2017). Realism argues that there is a single reality that exists independent of the observer; whereas, relativism argues that there are multiple realities with each individual, or group, experiencing a different reality based on their internal perceptions, beliefs and experiences (Moon & Blackman, 2017). Pragmatism shares the view that each individual has their own perception of reality (Kivunja & Kuyini, 2017). Within the context of my doctoral research, I was interested in understanding people's views and experiences, both individually and collectively, which aligned with the assumptions of pragmatism.

Depending on the text, pragmatism is labelled as a paradigm or epistemological stance (Kivunja & Kuyini, 2017; Creswell & Creswell, 2018). For the purpose of this thesis I use it as a paradigm to explain the underpinnings of the research but acknowledge that there does seem to be a lack of consensus within the literature. Epistemology refers to the way in which knowledge is acquired, and can vary between objectivism and subjectivism (Kivunja & Kuyini, 2017; Moon & Blackman, 2014). Objectivism, adopted within the positivist paradigm, strives for reliability and validity and argues that knowledge is acquired through direct observation of an object (Creswell & Creswell, 2018; Moon & Blackman, 2014; Snape & Spencer, 2003). Subjectivism, central to the interpretivist paradigm, argues that understanding the individual's perception of the world around them and how their experiences shape these perceptions is what is important (Creswell & Creswell, 2018; Johnson & Onwuegbuzie, 2004; Moon & Blackman, 2014). Pragmatism argues that the way in which knowledge is acquired depends on the phenomena or object of interest, what makes most sense within that particular research study (Cronen, 2001; Kivunja & Kuyini, 2017). It was important when establishing the evidence

base to have an understanding of people's experiences, thoughts and feelings, and to gain broad insights into patterns in behaviour and thought; again, this aligned with pragmatism.

Methodology refers to the approach taken within the research to gather knowledge and is driven by the researcher's ontological and epistemological stances (Killam, 2013). It is important not to conflate methodology (the overall approach to data collection) and the methods (the specific study designs, procedures, and analyses undertaken) (Killam, 2013; Kivunja & Kuyini, 2017). Although I explore this further in 3.7., I felt it was important to explore methodology as it relates to pragmatism. The positivist paradigm tends to favour a deductive, quantitative approach while interpretivists usually use an inductive, qualitative approach (Creswell & Creswell, 2018; Kivunja & Kuyini, 2017). Pragmatism instead considers the value of the different approaches and implements whichever is most appropriate within the research study (Kivunja & Kuyini, 2017). Indeed, the researcher may decide that a qualitative and quantitative approach are needed which is typically described as a mixed-methods approach (Creswell et al., 2011; Kivunja & Kuyini, 2017). Again, pragmatism seemed the most appropriate paradigm for this research because I wanted to generate knowledge that would be the most useful or beneficial for the development of the online PrEP clinic and those who would go on to use it, so I let that guide the research rather than any affiliation with positivism or interpretivism.

While I addressed axiology in Section 3.3. it is important to revisit having discussed pragmatism further. Pragmatism argues that the researcher's values are important and impact the research (Kivunja & Kuyini, 2017). Moreover, pragmatism actively encourages research that will benefit people (Kivunja & Kuyini, 2017). This clearly aligns with my beliefs as a researcher and the aim of this research. Therefore, it seemed appropriate to adopt a pragmatic paradigm for this research.

3.5. Guiding framework: Intervention Mapping

Frameworks are important within research as they can provide direction, guide study/service development, and the interpretation of findings (Moullin et al., 2020). It was important for me to have a guiding framework for this research so I could identify what evidence needed to be collected in order to properly inform the development and implementation of the proposed online PrEP service. While I initially considered the Medical Research Council framework for developing and evaluating complex interventions (Craig et al., 2008) and the Behaviour Change

Wheel (Michie, Atkins & West, 2014), I felt these were too concise and did not provide the depth or scope of insight into what knowledge/evidence needed to be gathered to properly inform the development and implementation of interventions. Rather, I needed a more expansive framework to ensure that I established as wide an evidence base as possible. I decided that the most appropriate framework was the Intervention Mapping approach to intervention development (Eldredge et al., 2016). I would like to note that I am aware that the Medical Research Council framework was recently redeveloped but this occurred after data collection had been started (Skivington et al., 2021) so could not be used to guide this thesis.

The Intervention Mapping approach considers the development, implementation and evaluation of health interventions/programmes through close collaboration with key stakeholders (Eldredge et al., 2016). Intervention Mapping emphasises the importance of implementation and evaluation and specifies that these should be planned for ahead of implementation (Eldredge et al., 2016). Ross et al. (2016) note that having an implementation plan is critical to the success of eHealth interventions (a facet of digital health). Intervention Mapping focuses on changing health behaviours and their determinants by developing interventions using evidence, theory and direct input from the target population, potential implementers and adopters, and other stakeholders (Eldredge et al., 2016). The interventions are developed through the systematic completion of six stages, each containing a series of tasks (see: Figure 7). This process can be resource heavy and time consuming, and requires direct input from a multidisciplinary team which is not feasible within the parameters of a PhD. Rather than following the steps and completing the tasks outlined in the Intervention Mapping approach, I used the framework as a guide to identify what evidence needed to be collected in order to inform the development and implementation of the proposed online PrEP service.

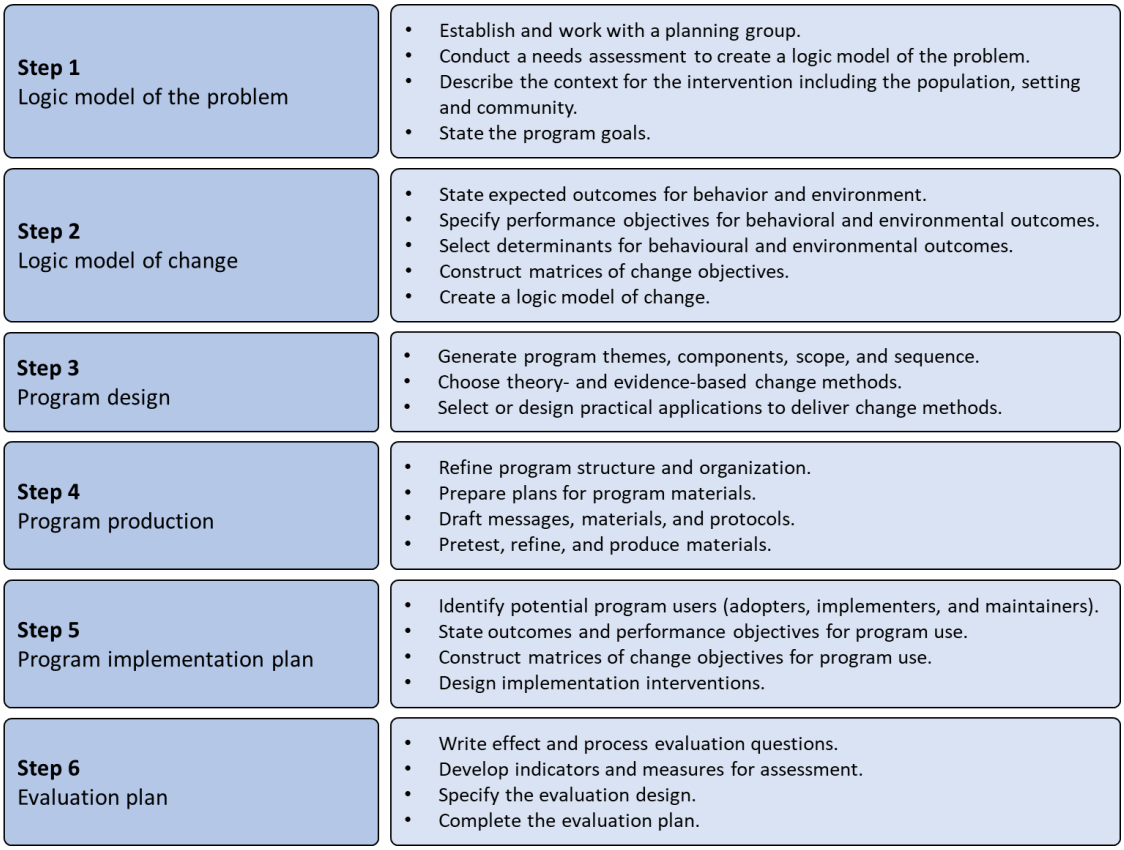


Figure 7. Steps and tasks involved in Intervention Mapping – adapted from Eldredge et al. (2016, p.13)

I chose to focus on the tasks within the Intervention Mapping approach that typically require additional data collection or reviewing existing literature. Consequently, I decided to omit the tasks that were dependent on previous steps (e.g. 'create a logic model of change') or those that would require extensive input from a multidisciplinary team (e.g. 'state the program goals'). Therefore, not all bullet points within Figure 7 are covered within this thesis. Below, I outline the tasks I used to inform my research questions (see Table 9).

Table 9. Intervention Mapping (Eldredge et al., 2016) steps and tasks which informed the areas of interest for this doctoral research

Step	Included tasks	Areas of interest
Step 1: Logic model of the problem	Conduct a needs assessment to create a logic model of the problem.	• Who is the target population? • Who are the environmental actors? • What are the determinants of relevant existing behaviours (e.g. use of existing services)?
	Describe the context for the intervention including the population, setting and community.	• What is the current context? • What are the existing capacities and abilities relevant to this intervention? • What existing services may help to inform this intervention?
Step 2: Logic model of change	Select determinants for behavioural and environmental outcomes.	• What determinants are likely to affect engagement with, and the implementation of, the intervention (e.g. lack of salient cues to remind service user to order tests)? • How might these determinants be modified (e.g. text reminder to prompt test ordering)?
Step 3: Program design	Generate program themes, components, scope, and sequence.	*The components and preliminary sequence were planned ahead of this doctoral research (Estcourt et al., unpublished manuscript); however, I did seek to understand the acceptability of these (see Step 4, Task 1).* • What support needs to accompany the intervention?
	Select or design practical applications to deliver change methods.	• What channels and vehicles are best to deliver the intervention?
Step 4: Program production	Refine program structure and organisation.	• What do the target population and potential implementers think of the proposed intervention? • What alterations/additions need to be made to the existing design?
Step 5: Program implementation plan	Identify potential program users (adopters, implementers, and maintainers).	• Who will act as implementers and maintainers of the intervention?
	Design implementation interventions.	• What support needs to be put in place to support the adoption, implementation and maintenance of the intervention?

Within Step 1 (Logic Model of the Problem; see Figure 7), it is important to perform two distinct assessments: the needs assessment and the assets assessment (part of the 'describe

the context…' task) (Eldredge et al., 2016). The needs assessment seeks to establish what the health need is, who the target population is, who the environmental actors are (those whose behaviour affects the target population (e.g. healthcare professionals or peers)), identify relevant behaviours of the target population and the environmental actors, and the determinants of these behaviours (Eldredge et al., 2016). The assets assessment forms part of the process of establishing the context in which the intervention will be implemented and seeks to understand the existing capacities, abilities and structures which the intervention can make use of (e.g. if people are already familiar with completing some health behaviours online via their smartphone).

Within Step 2 (Logic Model of Change), determinants are selected which are targeted within the intervention (Eldredge et al., 2016). Within the context of this research this would include barriers and facilitators and other factors associated with the current model of care and those anticipated for the future service (e.g. anticipated benefits/challenges). Moreover, it would be important to understand how these barriers/challenges might be overcome within the intervention or its implementation.

Within Steps 3 and 4, the intervention is developed and piloted (Eldredge et al., 2016). Within the context of this research, I sought to understand the prospective acceptability of the proposed online PrEP service and its components: specifically, online postal self-sampling, online consultation, and remote PrEP medication provision. It was also key to understand the channels and vehicles through which the intervention would be delivered (Eldredge et al., 2016). For the online PrEP service, the channels would likely include (but not be limited to) interpersonal communication and smartphones. Vehicles are the specific methods through which the intervention is delivered (e.g. telephone consultation to discuss the suitability of online PrEP care, or a website through which the online consultation would be completed).

The last step that informed this doctoral research was Step 5 (Program Implementation Plan) (Eldredge et al., 2016). Here, it is important to identify those whose role it would be to implement and maintain the intervention. It is also important to consider what implementation interventions need to be developed which can include additional support for service users (e.g. web-based chat to answer queries), and training for implementers (Eldredge et al., 2016). The final step in the Intervention Mapping Approach is planning the evaluation of

the service. I did not cover this step within my thesis as it depends on the outcomes generated in preceding steps.

3.6. Research Questions

The aim of this doctoral research was to establish an evidence base to inform the development of the proposed online PrEP service. The specific research questions were formed through consideration of the areas of interest identified from the Intervention Mapping approach (Table 9). Table 10 presents these research questions and shows how they relate to the Intervention Mapping areas of interest. Within the subsequent chapters, some of these research questions are broken down further and additional questions were added in response to the Covid pandemic – see chapter summaries in Section 3.8. Moreover, I felt that there was some overlap between different areas of interest which is reflected in Table 10.

Table 10. Research questions in relation to the Intervention Mapping informed areas of interest

Area of interest	Research question	Chapters
• Who is the target population?	1. For whom might the online PrEP service be appropriate?	6, 7
• Who are the environmental actors? • Who will act as implementers and maintainers of the intervention?	2. Who will be responsible for linking service users to the online PrEP service and who will be responsible for supporting service users' use of the service?	6, 7
• What is the current context? • What existing services may help to inform this intervention? • What are the determinants of relevant existing behaviours (e.g. use of existing services)? • What are the existing capacities and abilities relevant to this intervention?	3. How can service users' experiences of the telephone-based model of PrEP care, and online health services in general, inform the development and implementation of the online PrEP service? 4. What online health behaviours have GBMSM previously performed? 5. What online health behaviours would GBMSM be willing to perform in the future?	4-7
• What determinants are likely to affect engagement with, and the implementation of, the intervention? • How might these determinants be modified? • What alterations/additions need to be made to the existing design? • What do the target population and potential implementers think of the proposed intervention?	6. What is the acceptability of the proposed online PrEP service (and its components)? 7. What do GBMSM anticipate will be the benefits or challenges associated with the proposed online PrEP service and how might these challenges be overcome? 8. What impact might the online PrEP service have on existing services?	6, 7
• What channels and vehicles are best to deliver the intervention?	9. What devices have GBMSM used to access online health services, and what devices would GBMSM be willing to use to access these services in the future?	4, 5
• What support needs to accompany the intervention? • What support needs to be put in place to support the adoption, implementation and maintenance of the intervention?	10. How can GBMSM be supported to use the online PrEP service? 11. How can the online PrEP service be integrated with existing services?	6, 7

3.7. Methodological approach

As mentioned above, a pragmatic approach was taken for this doctoral research meaning that the methods chosen reflected the nature of the research question rather than an affiliation with a particular philosophical paradigm such as positivism or interpretivism (Creswell & Creswell, 2018; Creswell & Poth, 2018; Kivunja & Kuyini, 2017; Ritchie et al., 2014). I adopted a mixed-methods approach to create the evidence base to inform the online PrEP service. Mixed methods typically refers to the integration of qualitative and quantitative methods in an effort to produce more informative results than would be possible from either method alone (Creswell & Clark, 2018; Shorten & Smith, 2017). The Intervention Mapping approach notes the importance of having both qualitative and quantitative evidence when considering the development and implementation of interventions (Eldredge et al., 2016). Each approach (qualitative and quantitative) complements the other with qualitative methods providing depth to the quantitative methods' breadth (Brannen, 2005; Creswell & Creswell, 2018). In this doctoral research, I was interested in understanding a wide array of different concepts some of which are better addressed through quantitative methods (e.g. summarising self-reported behaviours) and some better addressed through qualitative methods (e.g. exploring experiences of existing services) (Brannen, 2005). Thus, a mixed methods design seemed most appropriate.

I considered two types of mixed methods designs for this doctoral research: sequential and parallel mixed methods (Shorten & Smith, 2017). Sequential mixed methods involve the implementation of one method followed by another (Shorten & Smith, 2017). This can be explanatory in which the quantitative precedes the qualitative, or exploratory wherein the qualitative precedes the quantitative (Shorten & Smith, 2017). Parallel mixed methods involves multiple methods being implemented simultaneously (Shorten & Smith, 2017). Due to the novelty of the proposed online PrEP service and the limited generalisability of the evidence gathered in the scoping review, I felt that it was important to start by understanding the broad acceptability of online PrEP care as this would inform the direction of the qualitative work. Therefore, I felt that it was important to adopt the structure of the explanatory sequential mixed methods design in order to explore this broad acceptability so that the qualitative work could be sufficiently tailored. I present the sequence of empirical studies within this thesis in Figure 8.

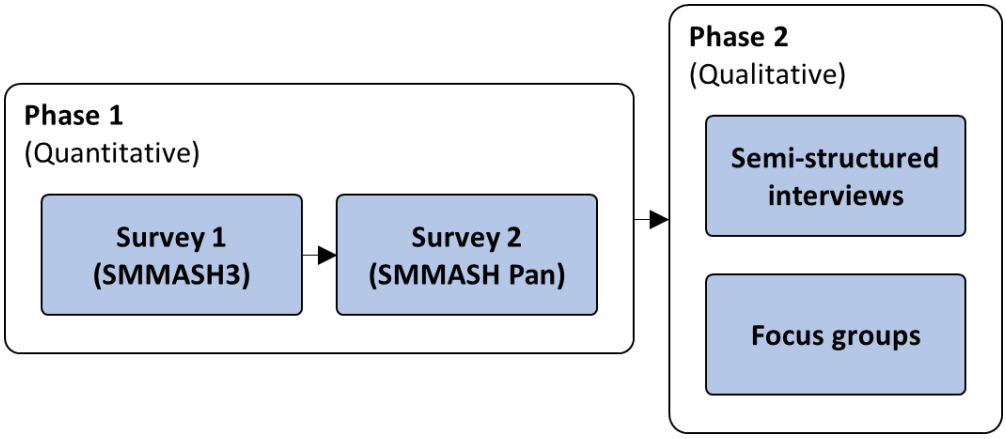


Figure 8. Sequence of studies

3.8. Outline of studies

In order to address the aims and research questions set out in this doctoral research, I collected data through four studies. These studies were collaborative; however, the wider team were clear from the outset that this work would form the basis of my doctoral thesis and I led the development and analyses that in formed my thesis specifically. Where I did not lead aspects of the projects, my collaborators and I ensured that I had input throughout. I comment on this further within each study's chapter. This thesis is comprised of two quantitative studies and two qualitative studies. Below is a brief overview of each study and justification for the approach taken. I critically explore the full methods for each within the relevant chapter.

3.8.1. Study 1: An online survey of GBMSM in Scotland exploring online health behaviours and the broad acceptability of online PrEP care (Chapter 4)

I started by conducting an online quantitative survey of GBMSM living in Scotland wherein I measured participants' self-reported PrEP use, online health behaviours performed in the past, and willingness to perform online health behaviours in the future among other concepts. A quantitative approach was necessary in this case as I was interested in understanding the views of a large group of people in order to gain a broad understanding of the aforementioned constructs (Creswell & Creswell, 2018). This helped to guide the focus of the later studies by providing a useful insight into the prospective acceptability of the proposed online PrEP service which was then explored in greater depth in later qualitative studies. This chapter aimed to address the following research questions which expand on those displayed in Table 10. I note at the end of each in parentheses which overarching research question (RQ) they map onto (see Table 10).

1. What is the broad acceptability of the proposed online PrEP service among GBMSM in Scotland who use PrEP? (RQ6)
2. Which online health behaviours have GBMSM performed? (RQ4)
3. Which online health behaviours would GBMSM be willing to perform? (RQ5)
4. What devices have GBMSM used in order to access online health services? (RQ9)
5. What device(s) would GBMSM be willing to use to access online health services? (RQ9)
6. What are GBMSM's preferred modalities for performing health behaviours? (RQ5 & RQ9)

3.8.2. Study 2: An online survey of GBMSM in Scotland during the coronavirus pandemic investigating online health behaviours: the SMMASH Pan study (Chapter 5)

In response to the Covid pandemic and stay-at-home order, and the associated move to online and remote healthcare provision, working practices and socialisation, I felt it was important to understand how this may have impacted GBMSM's willingness to perform online health behaviours. Therefore, I conducted a second online quantitative survey of GBMSM in Scotland during the pandemic. A quantitative approach was again appropriate because I was interested in measuring the self-reported behaviours and views of a large group of people in order to understand the constructs on a large scale (Creswell & Creswell, 2018). This also allowed for comparisons to be made between this study and the previous survey documenting potential changes engendered by the move to remote service provision during the pandemic. This chapter intended to address the following research questions:

1. What online health behaviours have GBMSM performed? (RQ4)
2. What online health behaviours would GBMSM be willing to perform? (RQ5)
3. What devices have GBMSM used in order to access health services online? (RQ9)
4. What devices would GBMSM be willing to use to access health services online? (RQ9)

3.8.3. Study 3: Semi-structured interviews with PrEP service users exploring the acceptability of online PrEP care (Chapter 6)

Having obtained an insight into the behaviours and views of GBMSM in the surveys, I wanted to add depth to these findings as well as explore other areas better explored through qualitative methods. It was important to understand the views of the target population as well as the environmental actors/potential implementers, so I started by focusing on potential

service users – GBMSM who use PrEP. I conducted semi-structured interviews in order to address the research questions detailed below – the full methods are covered in Chapter 6.

1. What were people's experiences of accessing PrEP during the COVID-19 pandemic and how might this help inform online, remote PrEP care in the future? (New research question in response to Covid & RQ3)
2. What is the acceptability of an online, automated PrEP consultation? (RQ6)
3. What is the acceptability of self-sampling to test for HIV and STIs within the context of an online PrEP service? (RQ6)
4. What barriers and facilitators might affect people's engagement with an online PrEP service and how might anticipated challenges be overcome? (RQ7)
5. What is the optimal way(s) for people to transition between online and traditional PrEP care pathways? (RQ2 & RQ11)
6. Who might the online PrEP service be appropriate for and who might be better suited to in-person or telephone-based care? (RQ1)
7. How can GBMSM be supported to use the online PrEP service? (RQ10)

3.8.4. Study 4: Focus groups with healthcare professionals exploring the acceptability of online PrEP care (Chapter 7)

It was important to gain insights into the views of potential implementers of the online PrEP service – i.e. those who would be linking service users to the service and supporting their use of the service. In this case it would be the healthcare professionals involved in providing PrEP care within the existing models of care. Moreover, their experience and expertise would prove valuable when considering how the service should be integrated and the potential impacts it may have for sexual health services more widely. It was important to gain an in-depth understanding of this and so a qualitative approach was the most appropriate (Creswell & Creswell, 2018). I conducted focus groups with healthcare professionals who deliver PrEP care within their job role to understand the acceptability of the online PrEP service from the perspective of the care providers. The focus groups aimed to address the following research questions – full methods are detailed in Chapter 7:

1. What were people's experiences of providing PrEP care during the Covid pandemic and how might this help inform online, remote PrEP care in the future? (New research question in response to Covid & RQ3)
2. What is the acceptability of an online, automated PrEP consultation and prescription? (RQ6)

3. What factors might affect the implementation of an online PrEP service and how might anticipated challenges be overcome? (RQ7)
4. What is the optimal way(s) for people to transition between online and traditional PrEP care? (RQ2 & RQ11)
5. What impact might the introduction of online PrEP care have on existing services? (RQ8)
6. Who might the online PrEP service be appropriate for and who might be better suited to in-person or telephone-based care? (RQ1)
7. How can GBMSM be supported to use the online PrEP service? (RQ10)

3.8.5. Synthesis and recommendations (Chapter 8)

Within the discussion chapter, I will synthesise the findings of all studies within this doctoral thesis by applying the findings of the individual studies to the research questions outlined in Table 10. I do not use the Intervention Mapping approach to frame these as this framework was only intended to help focus on the areas of interest. Instead, I use the structure of the online PrEP service (as proposed in Chapter 1) and the key considerations that emerged within the qualitative studies. I then provide recommendations on how the online PrEP service should be developed and implemented based on the findings of this doctoral research.

3.9. Conclusion

In summary, I adopted a pragmatic approach to this research and implemented explanatory, sequential mixed-methods in order to establish an evidence base to inform the development and implementation of an online PrEP service. The Intervention Mapping approach to intervention development served as a guiding framework for developing the research questions (Eldredge et al., 2016). In the next chapters, I present the methods and findings of the four key studies within my doctoral thesis starting with study 1, an online survey of GBMSM in Scotland.

Chapter 4. An online survey of GBMSM in Scotland exploring online health behaviours and the broad acceptability of online PrEP care

In this chapter, I present data from the third iteration of the Social Media, Men Who Have Sex with Men, Sexual and Holistic Health Study (SMMASH3) (SMMASH2020.org, 2022). I start by providing the rationale for the questions I included in SMMASH3 before presenting the methods used and the findings. I then critically discuss these in the context of my doctoral research and the wider literature.

4.1. Introduction

In Chapter 3, I explained that my doctoral research implemented an explanatory, sequential mixed-methods design wherein the quantitative stage preceded the qualitative stage. In this chapter, I detail the first of the two quantitative studies. In Chapter 3, I also demonstrated how I used the Intervention Mapping approach (Eldredge et al., 2016) to develop the overarching research questions for my doctoral research and how these fed into the study-specific research questions. A key task within the Intervention Mapping approach is developing an understanding of the context in which the intervention will be implemented (Eldredge et al., 2016). Specifically, this entails understanding what abilities and skills the target population already possess that may be drawn on when implementing the intervention (Eldredge et al., 2016). Understanding past behaviour can help to achieve this (Eldredge et al., 2016). Although this is not a perfect proxy for the target population's abilities and skills, at this stage in this pragmatic research project, it seemed appropriate. Past behaviour can be an important predictor of future behaviour (Hagger et al., 2018). For example, past HIV testing behaviour predicts future testing behaviour (Tolou-Shams et al., 2007). Given the novelty of the proposed online PrEP service, it was important to consider a wider scope of online health behaviours. For clarity, 'online health behaviours' refer to the health-related behaviours that are completed through the use of internet-enabled devices; for example, searching for health-related information or booking an appointment online. Therefore, one of the aims of this study was to determine what online health behaviours, if any, GBMSM in Scotland had performed in the past.

The introduction of digital and online health services in Scotland was, and arguably still remained, in its infancy at the time this study was conducted and many people would likely not have had the opportunity, or indeed the need, to access any online health services. Therefore, I felt it was also important to understand what online health behaviours GBMSM would be willing to perform if they were presented with the opportunity, and need, in addition to those they had already performed. Like past behaviour, willingness is not a perfect predictor of future behaviour but understanding this would provide further context and help shape the qualitative stages of my doctoral research (Eldredge et al., 2016; Haggar et al., 2018; van Lettow et al., 2014).

Having focused on past behaviour and willingness, I think it is important to reflect on the concept of 'intentions' and why I decided not to explore this within this study. Intention to perform a behaviour is a recurring construct in models of health behaviour – for example the Theory of Planned Behaviour (Ajzen, 1991) and the Integrated Behaviour Model (Montaño & Kasprzyk, 2015). Often, intention is viewed as the antecedent to behaviour and can prove useful within intervention development (i.e. implementation interventions (Gollwitzer & Sheeran, 2006)). With that said, there is typically a significant discrepancy between intentions and observed behaviour (Frates & Faries, 2016). This is true of the predictive ability of past behaviours and willingness (Haggar et al., 2018; van Lettow et al., 2014). However, past behaviour, even self-reported, is somewhat tangible, especially compared to intentions and, in this context, past behaviour suggests that a person was able to navigate a system and complete a behaviour so it was important to measure. Willingness is also considered an antecedent to behaviour but unlike intentions, willingness is considered to be more situational (Gibbons et al., 2020; Todd et al., 2014; van Lettow et al., 2014). For example, a person intends to use a condom when having anal sex but their partner suggests that they engage in condomless sex. If the person's willingness to have condomless sex is high enough then they may engage in condomless sex despite their intentions not to. Willingness denotes an openness to a behaviour whereas intentions are more 'reasoned' (Gibbons et al., 2020; Todd et al., 2014; van Lettow et al., 2014). Given the pragmatic, formative nature of this study, I felt it was more appropriate to understand willingness than intentions.

As I mentioned in Chapter 3, within the Intervention Mapping approach it is important to identify acceptable channels and vehicles through which to implement the intervention (Eldredge et al., 2016). Within the context of the online PrEP service, the channels will likely be

a combination of: 'interpersonal', 'computer- and internet-based interventions', and 'phones and smartphones' (Eldredge et al., 2016). 'Vehicles' are the specific methods through which the intervention is delivered (e.g. email, SMS, leaflet, healthcare professionals, website) (Eldredge et al., 2016). Critically, Eldredge et al. (2016, p. 359) note that: *"before the planners can choose channels and vehicles for delivery of program components, they must ascertain the preferred and most accepted media use by the intended audiences".* Therefore, it was important to understand what devices GBMSM in Scotland had used, and would be willing to use, to access online health services.

The act of seeking sexual healthcare, in particular HIV testing, can be an emotionally charged experience (Dowson et al., 2011; Worthington & Myers, 2003). Testing for HIV as part of a routine PrEP review likely elicits a different emotional response from service users than testing for HIV following potential exposure or even testing for the first time. Therefore, it seemed important to understand how emotional context may affect GBMSM's care preferences. Preference over modality of care has been linked to several factors, including: the type of care being provided (i.e. urgent or routine); the convenience or quality of the available services; and the cost to the service user (Crossnohere et al., 2021). I was interested in determining if GBMSM's preferred modality of performing different health behaviours was dependent on their emotional context at the time of seeking care. Moreover, this study was primarily focused on understanding online health behaviours in general, so the inclusion of questions focused on emotional context added some nuance to the data. Therefore, I developed questions to determine GBMSM's preferred modality of care within different emotional contexts.

Finally, the proposed online PrEP service is novel and there was no comparable service in use at the time of this study. Indeed, the scoping review (Chapter 2) found no service delivering a similar PrEP pathway entirely online. Due to this novelty, it was important to understand the broad acceptability of the proposed service before delving deeper in the qualitative studies (Chapters 6 and 7). I felt it would be beneficial to understand this level of acceptability on a large scale to help inform and focus the qualitative work. If acceptability was high, the focus would be on exploring potential benefits and challenges and how best to implement the service. If the acceptability was low, then the focus would be on exploring why this was the case and assessing whether this was due to movable or immovable barriers.

The aims of this study were to determine the extent to which GBMSM in Scotland had performed online health behaviours, the extent to which they were willing to perform these behaviours in the future, and the broad acceptability of the proposed online PrEP service. Accordingly, I set six research questions:

1. What is the broad acceptability of the proposed online PrEP service among GBMSM in Scotland who use PrEP?
2. Which online health behaviours have GBMSM performed?
3. Which online health behaviours would GBMSM be willing to perform?
4. What devices have GBMSM used in order to access online health services?
5. What device(s) would GBMSM be willing to use to access online health services?
6. What are GBMSM's preferred modalities for performing health behaviours?

4.2. Methods

4.2.1. Design

A quantitative approach was appropriate to address the aim and research questions within this study as the focus was to describe, or quantify, GBMSM's past behaviour, and views around acceptability and willingness (Bryman, 2012; Creswell & Creswell, 2018; Walliman, 2006). The most appropriate method of data collection was a self-report survey. Surveys tend to be convenient, relatively non-intrusive, and able to collect data from a large number of people (Bryman, 2012; Creswell & Creswell, 2018; Salters-Pedneault, 2020). Surveys do, however, rely on the accuracy of participants' responses which may be consciously or unconsciously biased, and are limited in the depth of information that can be obtained (Creswell & Creswell, 2018, Salters-Pedneault, 2020). The latter was not a major concern for this study as I also conducted qualitative studies which provided depth to the survey's breadth (Chapters 6 and 7). Ultimately, the survey design was the most appropriate and efficient method of collecting quantitative data from a large number of people.

I designed questions to be included in SMMASH3, the third iteration of a triennial online survey that asks GBMSM about their sexual, physical, and mental health alongside other areas such as social media use (Strongylou & Frankis (Chief investigator), 2020a; Strongylou & Frankis, 2020b). SMMASH typically recruits through sociosexual media sites (e.g. Grindr), and more general social media such as Twitter and Facebook (Strongylou & Frankis, 2020a; Strongylou & Frankis, 2020b). I had the opportunity to design questions for SMMASH3 for use in my doctoral research and for use in future SMMASH surveys as appropriate. It seemed

advantageous to run my study through SMMASH3 for several reasons: 1) SMMASH had sufficient funding to reach a large group of GBMSM (the second iteration SMMASH2 recruited 1547 GBMSM from Scotland) (Frankis et al., 2018a); 2) the inclusion criteria were very similar to those I designed for this study; 3) it avoided some participant burden (had my study ran independently, and participants participated in both, they would have had to read two participant information leaflets, provided consent twice, and reported demographics twice); and 4) the overall focus of SMMASH3 was sexual and holistic health which aligned with my research focus.

While the SMMASH surveys are usually repeated every three years, my survey was intended to be cross-sectional as my questions were newly introduced and were meant to be a snapshot to inform the context in which the online PrEP service would be introduced. However, it is likely that some questions will be retained in future iterations (J Frankis, personal communication). Cross-sectional surveys are able to capture a moment in time (Bryman & Bell, 2007; Mann, 2003) which was the intention of this study – to understand the present context regarding online health behaviours and the broad, preliminary acceptability of the proposed online PrEP service at the time of the survey.

I considered whether the online nature of SMMASH was an appropriate vehicle for my questions. Online surveys tend to be convenient for both the researcher and the participants, they potentially offer widespread reach, and provide a great deal of control over which participants are shown which questions (Evans & Mathur, 2018). However, online designs can limit the population reached as participants require a certain level of digital literacy, they require a suitable sampling frame to exist to facilitate online participation (e.g. social media sites, email user lists) and it excludes those who are not visiting the sites facilitating recruitment (Evans & Mathur, 2018), do not have access to the internet (Evans & Mathur, 2018), or do not have the literacy or cognitive skills to work through an online questionnaire. This could be particularly important as HIV infections are over represented in people from lower socio-economic groups (Health Protection Scotland & Glasgow Caledonian University, 2017), and people from these groups are also more likely to experience digital exclusion (Kruse et al., 2018; Office for National Statistics, 2019; Scottish Government, 2022). However, I felt that these limitations were acceptable in this study as a pre-requisite for being able to use the online PrEP service would be a sufficient level of digital literacy and online access. With that

said, the limitation that the sample only comes from sociosexual media remains, but ultimately, I felt that the online survey design was appropriate for the aims of this study.

4.2.2. Participants and recruitment

4.2.2.1. Inclusion criteria

The focus of this doctoral research was GBMSM in Scotland. Therefore, participants were included if they resided in Scotland at the time of completing the survey, were aged 16 or over, and self-identified as GBMSM. Potential participants were not formally excluded based on their sexual orientation; but the promotional material and participant information leaflet specified that the study was for GBMSM, and the study was advertised on GBMSM-specific sociosexual media. This decision was made by the SMMASH research team originally; however, I chose to maintain this and to not exclude further based on gender or sexual identity. I felt that it was important to allow anyone who identified as GBMSM to participate and applying further parameters may exclude people unnecessarily – specifically those who identify as non-binary but feel issues that affect GBMSM also affect them. I explore the concept of gender and sexual identity throughout the latter parts of this thesis. I decided to exclude people living with HIV in my analysis of the SMMASH3 data as I was interested in understanding the views and self-reported behaviour of PrEP users and GBMSM who may use PrEP in the future. PrEP is solely for preventing HIV acquisition; therefore, people already living with HIV should not be given PrEP. Perhaps more importantly, people living with HIV tend to be experienced health care users as over 90% of those diagnosed with HIV in Scotland engage with HIV care (Public Health Scotland, 2020). The pre-existing health care experience may have given them different views and perceptions of the acceptability of online care.

4.2.2.2. Participant recruitment

Participants were recruited between December 2019 and mid-March 2020. Recruitment stopped just before the first Covid 'stay at home order' in Scotland (Scottish Government, 2020). Participants were recruited from sociosexual media websites and apps that target GBMSM: Gaydar, Grindr, Growlr, Hornet, Planet Romeo, Recon, Scruff, and Squirt. These websites/apps were used to recruit for the previous iterations of SMMASH. Participants were presented with a pop-up ad or a message through the apps' internal messaging service which linked them to the study. This was targeted to users whose Internet Protocol (IP) addresses showed they were in Scotland, Wales, Northern Ireland, and the Republic of Ireland although errors in social-media website/app's geo-targeting meant some participants in

England were also recruited; however, I only used the data from those who later stated that they currently resided in Scotland within the survey itself. Participants were also recruited from Facebook and Twitter via targeted ads and tweets from the SMMASH Twitter account to boost the sample size.

4.2.3. Development of study materials

4.2.3.1. Participant information sheet and consent form

The participant information sheet and consent form for SMMASH3 were created by the wider SMMASH3 study team (see Appendix 3). However, I reviewed the documents prior to the submission of the ethics application and thought they were suitable. They were modified from SMMASH2 and so were already approved by ethics committees in the past.

4.2.3.2. Survey questions

The demographics questions (age, gender, ethnicity, and sexual orientation) were existing questions within the SMMASH surveys (Frankis et al., 2018a). See Appendix 4 for the questions I developed for this study (see Section 4.2.3.2.3.). The full SMMASH3 survey can be accessed on the SMMASH website (SMMASH2020.org, 2020).

4.2.3.2.1. PrEP-related questions

The main focus of this study was online health behaviours in general; however, it was also important to gain some context around the sample's PrEP use. There were some nuances that I wanted to be sensitive to. Firstly, I felt it was important to distinguish between those who had never heard of PrEP and those with some knowledge of PrEP but had never used it. Secondly, I felt that there could have been some confusion between those who used an event-based PrEP regimen (also known as on-demand) and those who had used PrEP in the past and had stopped 'more permanently'. I ordered the response options for this question so the 'event-based' option preceded the discontinued option so those on event-based PrEP would see that option first and not click 'used in the past' if they were in a period of non-use.

I wanted to understand the reasons why people had stopped PrEP as this may help to identify barriers that the online PrEP service may help to overcome or that should be considered when developing the intervention. To do this, Dr Strongylou and I adapted the options given for discontinuation in Holloway et al. (2017) for a Scottish/UK context where PrEP was free or

available through clinical trials. Clinical, academic and lay experts reviewed these options and suggested additional response options which were included.

At the time the survey was conducted, PrEP was freely available from sexual health services in Scotland to those who met the eligibility criteria outlined in Chapter 1 (Health Protection Scotland, 2019a). I was interested in how people were sourcing their PrEP: from a clinic, purchased online, or from a friend or partner. SMMASH3 also recruited from Wales, Northern Ireland and the Republic of Ireland so additional response options were added to reflect the ways PrEP was accessible in those countries (clinical trials, bought privately from a clinic, and the option for people to enter another source).

One of the main aims of the study was to understand the broad acceptability of the proposed online PrEP service. It was not possible to base my questions on any other surveys because of the novelty of the proposed service. Because of this novelty, I felt it was important to provide participants with an overview of the service and then ask how likely they would be to use the service if it were made available to them using a Likert scale ranging from 'very likely' to 'very unlikely'. There is no consensus on the optimal number of Likert scale points (options) to present in this type of study (Babakus & Mangold, 1992; Dawes, 2008; Wakita, Ueshima & Noguchi, 2012); although five or seven point scales are often used. At the time, I felt that a 7-point Likert scale would provide more nuanced data than a binary yes/no response or even a 5-point Likert scale (Preston & Colman, 2000). It is important to note that this question was hypothetical and the only familiarity participants had with the online PrEP service was the concise description I provided alongside the question.

4.2.3.2.2. Online health behaviour questions

I wanted to understand what online health behaviours GBMSM had already performed, and were willing to perform. I started by considering the various health behaviours that may be included in a PrEP care pathway by consulting the scoping review (Chapter 2) and generalised the terms (i.e. 'ordered a medical test' instead of 'ordered an HIV self-test') because I was interested in understanding capacity and willingness in a more general sense, not just specific to PrEP. I designed the questions to require a checkbox response with a binary outcome (checked/unchecked). When asking about the online health behaviours performed in the past in the past, I asked participants to reflect on the previous 12 months. Recall error increases over time so it was important to impose a timeframe (Kjellsson et al., 2014; Stull et

al., 2009). For more 'micro' behaviours, a shorter recall window is preferred (Kjellsson et al., 2014); however, the optimal time frame depends on the object of study (Stull et al., 2009). Due to the anticipated infrequency of some of the behaviours I wanted to measure, and the intention for past behaviour to act as a proxy for demonstrated ability, it was important to have a longer recall period. I chose 12 months because this seemed to balance recall and the inclusion of semi-frequent behaviours. However, I acknowledge that recall for some of the more 'micro behaviours' may be somewhat compromised and some of the less frequent behaviours may have been missed (Kjellsson et al., 2014).

I asked participants what devices they used on a weekly basis. I also wanted to understand what devices they had used, and would be willing to use, to access online health services. Data for this section were collected using checkboxes which allowed multiple responses (e.g. used smartphone and tablet).

To understand participants' preferred modalities of care (e.g. face-to-face or online) and the potential for emotions to influence this, I developed two vignettes (scenarios): 1) participants were asked to imagine they were accessing a sexual health service for a routine check-up, that they were not particularly worried about their health; and 2) participants were asked to imagine they were worried about their sexual health because they either had a symptom or were worried that they may have been exposed to an STI. Within each of these vignettes, I asked participants to state whether they preferred 'face-to-face', 'online', or 'telephone' based care, if they had 'no preference', or if they would 'would never do this' in reference to each of: appointment booking, reporting sexual behaviour, reporting symptoms, reporting medications, receiving HIV test results, and receiving STI test results (other than HIV). The use of vignettes is well established in survey research (Alexander & Becker, 1978; Atzmüller & Steiner, 2010). Vignettes allow researchers to provide participants with a set context on which to base their responses with the view to improve the validity and reliability of the measures (Alexander & Becker, 1978; Atzmüller & Steiner, 2010) In hindsight, I should have counter balanced these; presenting half of the participants with scenario 1 first and scenario 2 second, and vice versa. This would have eliminated the possibility of 'order effects' wherein the order that questions or response options are presented affects the responses given by participants (Corriero, 2017). Moreover, I realise that reporting symptoms when asked to imagine you have none may not be the most natural wording; since they would be reporting that they had no symptoms. Also providing two examples within scenario two may have been confusing for participants.

However, on balance, the two scenarios seemed to cue the intended mind-sets when piloted with lay GBMSM.

4.2.3.2.3. Validity, reliability, and expert review

Validity and reliability are important concepts within survey design: validity refers to the survey's ability to measure the intended constructs and reliability refers to the consistency of the measure and results (Prous et al., 2009; Tsang et al., 2017). Validity can be broken down into different facets. Content validity refers to the extent to which the survey covers all theoretical aspects of a given construct (Tsang et al., 2017). This is typically measured through expert review (Tsang et al., 2017). Within the context of this survey, experienced clinicians, academics and third sector stakeholders reviewed the questions and provided feedback on how accurately the questions represented the scope of each construct. For example, one stakeholder highlighted the need to include the option of taking PrEP on alternating days which was not originally included in early drafts. Face validity is closely related to content validity but focuses on the extent to which the target population feel the questions are valid, or that the questions are meaningful to them (Prous et al., 2009; Tsang et al., 2017). I achieved this through having the questions reviewed by lay GBMSM, key stakeholders from third sector organisations, and clinicians who had expertise in researching service users' experiences of care pathways. Finally, construct validity deals with the questionnaire's ability to measure constructs that are not observable (e.g. willingness). This is an area I feel I could have addressed more thoroughly. I did not include any validated measures (e.g. of willingness) to compare my measures with due to there not being any measures relevant to this particular study. However, those who piloted the questions reported that they understood what was meant by 'willing' – i.e. an openness to performing the behaviour if the right situation presented itself.

The different facets of reliability can be measured in different ways. Internal consistency is typically measured using Cronbach's alpha; however, I did not measure this as I only used a single item to measure each construct (i.e. a single question to measure willingness to order a medical test online) (Prous et al., 2009; Tsang et al., 2017). Nor was it necessary to measure interrater reliability (i.e. using Pearson's R) as the questionnaire was self-administered (Tsang et al., 2017). In hindsight, I should have conducted analyses for test-retest reliability, particularly on the willingness and 'likeliness to use the proposed online PrEP service' questions (Tsang et al., 2017); however, there were time constraints outside of my control

when developing the questionnaire. In future, I would ensure these analyses were performed. Tsang et al. (2017) propose a framework for developing and validating questionnaires. I summarise this framework and detail how I followed this when developing the survey in Figure 9.

To summarise the expert review process, I piloted and revised the survey questions with four groups: 1) experienced clinicians; 2) academics experienced in survey development; 3) stakeholders from third sector organisations; and 4) lay GBMSM. I redrafted the questions after each person's feedback. However, in hindsight, I think a more structured approach would have been more efficient. While I feel that it would have been beneficial to have applied a specific methodology to this review (e.g. cognitive testing (Beatty & Willis, 2007)), as I mentioned above, I did consider relevant facets of reliability and validity and attempted to ensure these were at least partially addressed.

Figure 9. The steps taken to develop the SMMASH3 survey questions – adapted from Tsang et al. (2017)

4.2.4. Data management

Data were collected via REDCap – a web-based survey application (REDCap, n.d.). Data were stored on GCU's secure REDCap server accessible only by Dr Frankis, Dr Strongylou, and me. Dr Strongylou performed initial data cleaning and combined the dataset with that of the later SMMASH Pan study (see Chapter 5). I then had access to the dataset and checked the data for the questions relevant to my analyses. All data collected in the study was anonymous and was stored and managed in line with GCU's data protection procedures and protocols (Glasgow Caledonian University, 2018), and GDPR (General Data Protection Regulation, 2018).

The final dataset was stored on my secure, password protected GCU OneDrive account and I only accessed this using my GCU issued, password protected, encrypted laptop.

I re-categorised some of the participants' demographic characteristics based on their responses. 'White American' was categorised as 'Any other White background'. 'Any other background' responses which were not clarified were categorised as 'no response'. 'White Welsh' was combined with 'White British' as there was no separate entry for 'White English'. 'Android phone' was categorised as 'smartphone'. Finally, any 'other' device that was not specified was treated as 'not reported'.

4.2.5. Data analysis

All analyses for this study were performed on SPSS Version 26 (IBM Corp., 2019). Participants' demographic data were summarised using descriptive statistics. All comparisons in this study were made using an alpha value of 0.05 unless it was appropriate to use Bonferroni corrections – i.e. multiple comparisons were being made with the same data (e.g. post-hoc analyses) (Armstrong, 2014; Dancey & Reidy, 2004).

I compared age across the different PrEP regimen groupings (current PrEP user, discontinued, and never used PrEP) using Kruskal-Wallace tests as the data was not normally distributed and so violated the assumptions of ANOVA (Dancey & Reidy, 2004; Field, 2013). I used a chi-squared test comparing the likelihood of using the online PrEP service with age using the National Surveys of Sexual Attitudes and Lifestyles (Natsal) age groupings (Sonnenberg et al., 2013; Dancey & Reidy, 2004; Field, 2013). Natsal is the world's largest survey of sexual behaviour and the data collected informs UK government policy (Institute for Global Health, 2022). Natsal runs approximately every ten years and involves face-to-face surveys with adults in Britain (Institute for Global Health, 2022). Natsal has an upper age limit of 74 years old. I did not implement an upper age limit for this study so I chose to treat the 65-74 age group as '65+'. I compared device use/willingness to use with age using chi-squared tests. Finally, I used McNemar-Bowker tests to compare participants' most preferred methods of performing different health behaviours between the two scenarios with post-hoc McNemar tests where appropriate to understand shifts in preference (Agresti, 1990; Bowker, 1948; International Business Machines, n.d.).

4.2.5.2. Sample size

The SMMASH surveys are implemented without power calculations with the reasoning that it is not possible to know how many respondents there will be to an online survey conducted in the public domain (Strongylou & Frankis, 2020a). Since my study was an addition to the SMMASH3 survey and primarily concerned with descriptive data, I accepted this; however, in the future I would ensure that I estimated the sample size particularly if I intended to make comparisons.

4.2.5.2. SMMASH reports and clarifying contribution

In fulfilment of the funding conditions for SMMASH3, two reports were written by Dr Demi Strongylou and Dr Jamie Frankis (Chief Investigator) (Strongylou & Frankis, 2020a; Strongylou & Frankis, 2020b). I led the development of my questions with input academic, clinical and lay experts. These were developed with the primary intention of being part of my thesis. All of the analyses in this thesis were planned and run by myself independently of the analyses performed by Drs Strongylou and Frankis. Moreover, I used different parameters when selecting eligible cases and ran different analyses than Drs Strongylou and Frankis did. Dr Frankis and I discussed if there were any issues regarding originality to ensure that the funders' reports and my thesis were sufficiently different. Dr Frankis and I confirm that the work presented in this chapter is original and conducted by myself, independently. With that said, I wished to draw attention to this for transparency as summaries of the data collected for my questions (albeit with different parameters) were included in the reports.

4.2.6. Ethical approval and considerations

Ethical approval was granted by Glasgow Caledonian University's Nursing and Community Health ethics committee: HLS/NCH/19/019 (see Appendix 5). This was a relatively low risk study in terms of the ethical implications. I have presented my main considerations below. I would note that while my points below were considered, I did not lead on the ethics application.

While SMMASH3 touched on some sensitive issues such as mental health and experience of sexual abuse, the questions developed as part of this study were anticipated to have a low risk of triggering any negative emotions. Regardless, participants were presented with sources of potential support throughout the survey in case they experienced distress because of any of the questions asked.

The SMMASH3 survey took around 30 minutes to complete. This could have been burdensome for participants, possibly introducing bias for those who have learning difficulties or disabilities, or who simply do not have the time to complete a long survey. However, participants were made aware of the anticipated length of the survey before consenting to take part, were made aware of their right to withdraw, and none of the questions in the sections designed for this study were set as mandatory (none had to be answered before the participant could progress), except for the consent process.

Participants were asked to report some sensitive information within the survey. However, no identifiable information was collected and all data was stored and managed in line with General Data Protection Regulation and Glasgow Caledonian University data protection protocols (General Data Protection Regulation, 2018; Glasgow Caledonian University, 2018). Therefore, the risk of a data breach was minimal and the information held was anonymous.

4.3. Results

The results section is divided in two: 1) the PrEP data; and 2) the online health behaviour data. The PrEP questions appeared earlier in the survey than the online health behaviour questions and there was significant participant attrition between the two sections which I elaborate on within the online health behaviour section.

4.3.1. The PrEP data

Nine hundred and seventy participants answered some or all of the PrEP questions in the survey. Table 11 provides a summary of their demographics. Participants had a median age of 38, the majority were of White ethnicity (n=931, 96.0%), and identified as gay (n=794, 81.9%). Very few trans men participated (n=7, 0.7%). Nine hundred and twelve participants (94.0% of the sample) had heard of PrEP. Two hundred and twelve participants (23.2% of those who had heard of PrEP; 21.9% of the whole sample) reported that they were on PrEP at the time of completing the survey: 129 (13.3% of the whole sample) reported using PrEP daily, seven (0.7%) reported using PrEP on alternating days[1], and 76 (7.8%) reported using event-

[1] Alternating days was the term suggested by third sector stakeholders at the time the survey was designed. This may overlap to an extent with 'T's and S's' (see Chapter 1), which was not measured.

based PrEP at the time of completing the survey. Thirty-one participants (3.2%) reported that they had discontinued PrEP[2]. This left 669 (69.0%) who had heard of PrEP but never used it.

Age was the only demographic that it was appropriate to perform statistical analysis on due to the small number of responses for many of the options in the other demographic measures (ethnicity, sexual orientation, and gender identity) violating the parameters/assumptions of difference tests (e.g. for Chi^2, >5% of cells had a count <1) (Field, 2013). Moreover, when working with such small numbers, the power of tests and the reliability of the results are often compromised (Button et al., 2013). The distribution of age was not normally distributed within the sample and thus violated a fundamental assumption of ANOVA (Field, 2013). Instead, I grouped PrEP use into three categories[3] ('current PrEP users', 'discontinued PrEP', and 'never used PrEP') and performed a Kruskal-Wallace test to measure any difference in age between the different PrEP categories: $H(3) = 21.3$, $p < 0.001$. This suggested that there was a difference between the median age of the groups (see Table 11). Post-hoc Dunn tests, with a Bonferroni corrected alpha of 0.017, suggested that those who had discontinued PrEP were statistically significantly younger than current PrEP users and participants who had never used PrEP (current PrEP/discontinued $p < 0.001$; current PrEP/never $p = 0.04$; discontinued/never $p < 0.001$). The survey was primarily completed on smartphones.

[2] Discontinuation refers to the option within the survey that states 'used PrEP in the past but stopped' as opposed to event-based/on demand which is taking PrEP around areas of possible exposure.
[3] 'Current PrEP users' consisted of those who reported using PrEP daily, on alternative days, or event-based at the time of completing the survey. 'Discontinued PrEP' consisted of those who reported using PrEP in the past but had stopped. 'Never used PrEP' consisted of those who had never heard of PrEP and those who had heard of PrEP but never used it.

Table 11. Summary of participants' demographics (n=970) according to PrEP use (SMMASH3)

	Whole sample (n=970)	Current PrEP users (n=212)	Discontinued PrEP (n=31)	Never used PrEP (n=727)
Age (years)				
Mean (SD)	39.9 (13.5)	41.5 (11.6)	30.3 (6.7)	39.8 (14.1)
Median [IQR]	38 [29,51]	41 [32,51]	29 [25,34]	38 [28,51]
Ethnicity				
White Scottish	682 (70.3%)	149 (70.3%)	20 (64.5%)	513 (70.6%)
White British	170 (17.5%)	37 (17.5%)	7 (22.6%)	126 (17.3%)
White Irish	23 (2.4%)	5 (2.4%)	0 (0%)	18 (2.5%)
Any other white background	56 (5.8%)	13 (6.1%)	3 (9.7%)	40 (5.5%)
*Any other background**	30 (3.0%)	6 (3.0%)	1 (3.2%)	23 (3.2%)
No response	9 (1.0%)	2 (0.9%)	0 (0%)	7 (1.0%)
Gender				
Male	963 (99.3%)	212 (100%)	31 (100%)	720 (99.0%)
Trans man	7 (0.7%)	0 (0%)	0 (0%)	7 (1.0%)
Sexual orientation				
Gay	794 (81.9%)	198 (93.4%)	27 (87.1%)	569 (78.3%)
Bisexual	150 (15.5%)	11 (5.2%)	4 (12.9%)	135 (18.6%)
Straight	10 (1.0%)	0 (0%)	0 (0%)	10 (1.4%)
Other	14 (1.4%)	3 (1.4%)	0 (0%)	11 (1.5%)
No response	2 (0.2%)	0 (0%)	0 (0%)	2 (0.3%)
Device used to complete survey				
Smartphone	792 (81.6%)	188 (88.7%)	30 (96.8%)	574 (79.0%)
Laptop/computer	121 (12.5%)	13 (6.1%)	1 (3.2%)	107 (14.7%)
Tablet	54 (5.6%)	10 (4.7%)	0 (0%)	44 (6.1%)
Not reported	3 (0.3%)	1 (0.5%)	0 (0%)	1 (0.1%)

Note: *When the number of people reporting an ethnicity was <5, I collapsed these into "Any other background" to avoid potentially disclosing participants (most were n=1). This was important for confidentiality but I acknowledge that this does somewhat erase non-White representation.

Of the 31 participants who had discontinued PrEP, the most common reasons for stopping PrEP were: entering a stable relationship where the risk of acquiring HIV was low (n=12, 38.7%); experiencing side effects (n=10, 32.3%); too much testing and too many PrEP reviews (n=6, 19.4%); and kept forgetting to take their PrEP (n=6, 19.4%) (see Table 12.

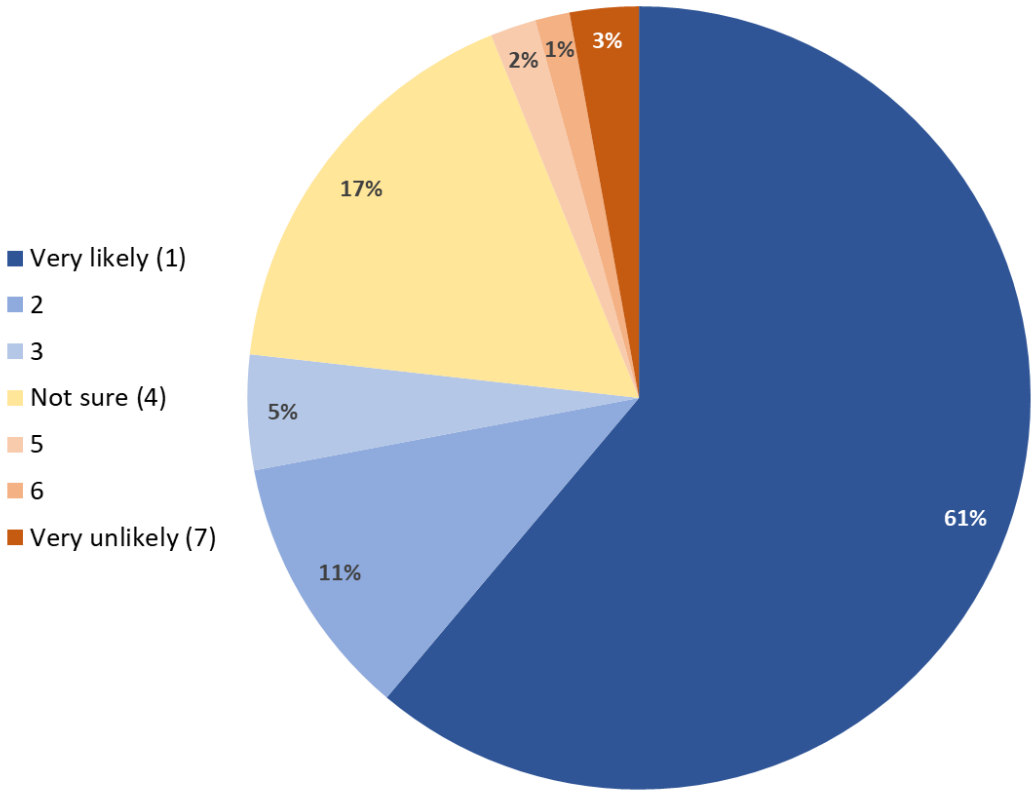
Table 12. Reasons for discontinuing PrEP (SMMASH3) (n=31)

Reason	N	%
I entered a stable relationship where my risk of getting HIV was low	12	38.7
I experienced side effects	10	32.3
Too much testing and clinic visits	6	19.4
I kept forgetting to take my PrEP	6	19.4
I was worried about possible consequences of long-term PrEP use	5	16.1
I can no longer access PrEP	3	7.0
I no longer wanted to have sex without condoms	3	9.7
I could not afford PrEP	2	6.5
My doctor, nurse or other health professional advised me to stop taking PrEP	1	3.2
My partner advised me to stop taking PrEP	0	0.0

Of the 212 current PrEP users, the majority stated that their most recent source of PrEP was part of free NHS provision from a sexual health service (n=185; 87.3%). Others bought their most recent supply of PrEP online (n=19; 9.0%), bought it privately from a clinic (n=4; 1.9%), got it free as part of a clinical trial (n=3; 1.4%), and one participant got it from a friend, boyfriend or sex partner (0.5%).

The current PrEP users were asked about the likelihood of them using the proposed online PrEP service for most of their PrEP visits[4] if it were made available to them (see Figure 10 which includes the description of the online PrEP service presented to participants). One hundred and sixty-two (76.8%) participants said that they would be likely/very likely to use it, 36 (17.1%) said they were unsure if they would use it, and 13 (6.2%) reported that they would be unlikely/very unlikely to use it. One participant did not respond. The median response [IQR] was 1 [1,3]. I planned to compare the likelihood of using the online PrEP service across the different Natsal age groups; however, this was not possible as the data violated the assumptions of the chi-square test. I tried to collapse age into the SMMASH age groupings (Erens et al., 2013; Strongylou & Frankis, 2020a), and collapsed likelihood into three categories: 'likely' (1-3), 'unsure' (4), and 'unlikely' (5-7); however, this data still violated the assumptions of the chi-square test. Therefore, no comparisons were made.

[4] I referred to the 'PrEP reviews' (i.e. the three-monthly appointments to screen for HIV, STIs and renal function, and to provide further PrEP medication) as 'PrEP visits' in the survey.



Summary of the proposed online PrEP service as provided within the survey:
People who get PrEP through sexual health clinics currently have to visit the clinic in person every three months to access PrEP.
We're developing a new online PrEP service, so you could provide information about your sexual behaviours on a secure website, use a simple kit to take your own blood sample[5], post this to a clinic, then have your PrEP sent to you or collect it from a pharmacy. You would only have to come into the clinic about once a year for PrEP.

Figure 10. Participants' responses to the question: How likely would you be to complete most of your PrEP visits online if this was made possible?

4.3.2. The online health behaviour data

As I mentioned at the start of the results section, I decided to present the data in two sections due to the attrition that occurred between the PrEP questions and the online health behaviour questions. Seven hundred and twenty-seven participants completed some or all of the online health behaviour questions. This is 74.9% of the original sample who answered some or all of the PrEP questions. The online health behaviour questions were at the end of the survey so the attrition may have been the result of the length of the survey. There were

[5] I omitted sexually transmitted infections from this description for brevity and to limit the cognitive burden of the question.

also potentially sensitive areas of the survey, not connected to this study (e.g. sexual wellbeing, and mental health), between the PrEP and online health behaviour questions which may have resulted in participants withdrawing.

Table 13 presents the online health behaviour questions sample's demographic data. I chose to present the data for the sample as a whole (including current PrEP users) and the data for current PrEP users only. The sample as a whole would provide useful insights into the views and behaviour of internet-using GBMSM regardless of PrEP use. It was also important to isolate the data from the current PrEP users as this is the group that the proposed online PrEP service aims to target. I considered presenting the data for non-PrEP users separately as well; however, there would have been a mix of participants who had discontinued PrEP, potential future PrEP users, and participants who will never use PrEP. I saw little benefit in presenting this data separately or making any comparisons between non-PrEP users and current PrEP users because of the mix of participants. These participants were predominantly White (n=701, 96.5%), and identified as gay (n=598, 82.5%), few identified as trans men (n=6, 0.8%) and the majority completed the survey on a smartphone. One hundred and sixty-seven participants (23.1%) reported that they were on a PrEP regimen at the time of completing the survey: 100 (59.9%) were on daily PrEP, 5 (3.0%) were taking PrEP on alternating days, and 62 (37.1%) were taking event-based PrEP.

Table 13. Summary of participants' demographics (SMMASH3; online healthcare section)

	Whole sample (n=727)	**PrEP users only (n=167)**
Age (years)		
Mean (SD)	40.18 (13.24)	41.33 (11.42)
Median [IQR]	39 [29,51]	41.50 [32,51]
Ethnicity		
White Scottish	511 (70.3%)	116 (69.1%)
White British	127 (17.5%)	29 (17.3%)
White Irish	18 (2.5%)	5 (3.0%)
Any other white background	45 (6.2%)	12 (7.1%)
*Any other backgrounds**	18 (2.5%)	5 (3.0%)
No response	8 (1.0%)	1 (0.6%)
Gender		
Male	721 (99.2%)	168 (100%)
Trans man	6 (0.8%)	0 (0%)
Sexual orientation		
Gay	598 (82.5%)	155 (92.3%)
Bisexual	115 (15.8%)	11 (6.6%)
Straight	4 (0.6%)	0 (0%)
Other	8 (1.1%)	2 (1.2%)
No response	2 (0.3%)	0 (0%)
Device used to complete survey		
Smartphone	587 (80.7%)	148 (88.1%)
Laptop/computer	94 (12.9%)	12 (7.2%)
Tablet	41 (5.6%)	7 (4.2%)
Not reported	3 (0.4%)	1 (0.6%)

Note: *When the number of people reporting an ethnicity was <5, I collapsed these into "Any other background" to avoid potentially disclosing participants (most were n=1). This was important for confidentiality but I acknowledge that this does somewhat erase non-White representation.

4.3.2.1. Online health behaviours

Participants were asked which, if any, of the given behaviours they had performed in the past 12 months. Responses varied – see Figure 11 for the whole sample and 12 for the PrEP users only. The most commonly reported behaviour was searching for health related information which 76.2% of the sample had done. Participants were also asked which online health behaviours they would be willing to perform. All but two behaviours had over 75% of participants willing to perform them: communicating directly with a healthcare professional (61.9%) and purchasing medication (69.6%). There were clear differences between the

proportion of participants who had performed the behaviours and those willing to perform the behaviours in the future.

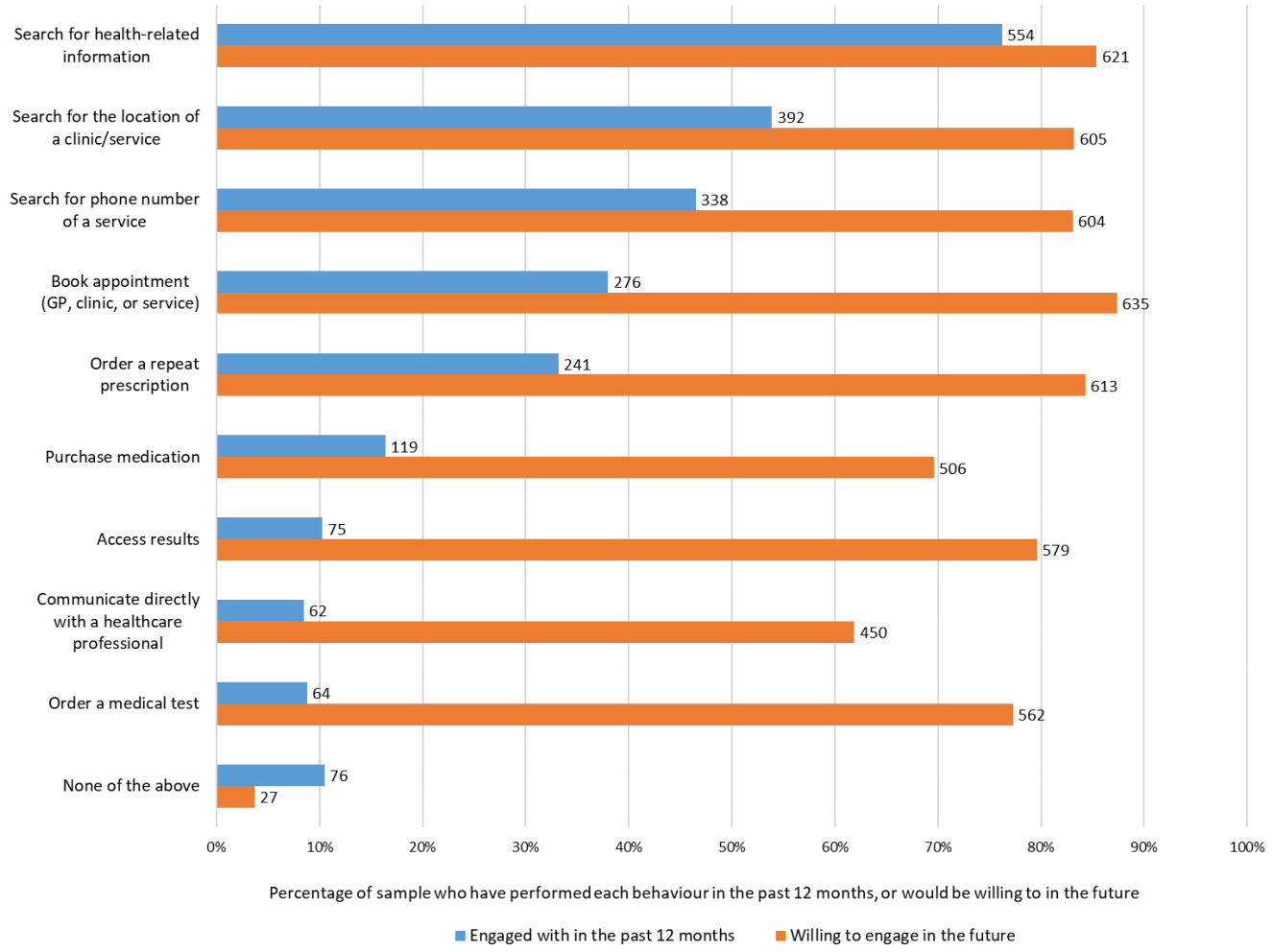


Figure 11. Whole sample's online health behaviours for the past 12 months and proportion willing to perform the behaviours in the future (SMMASH3) (n=727; the numbers at the end of each bar represents the number of participants)

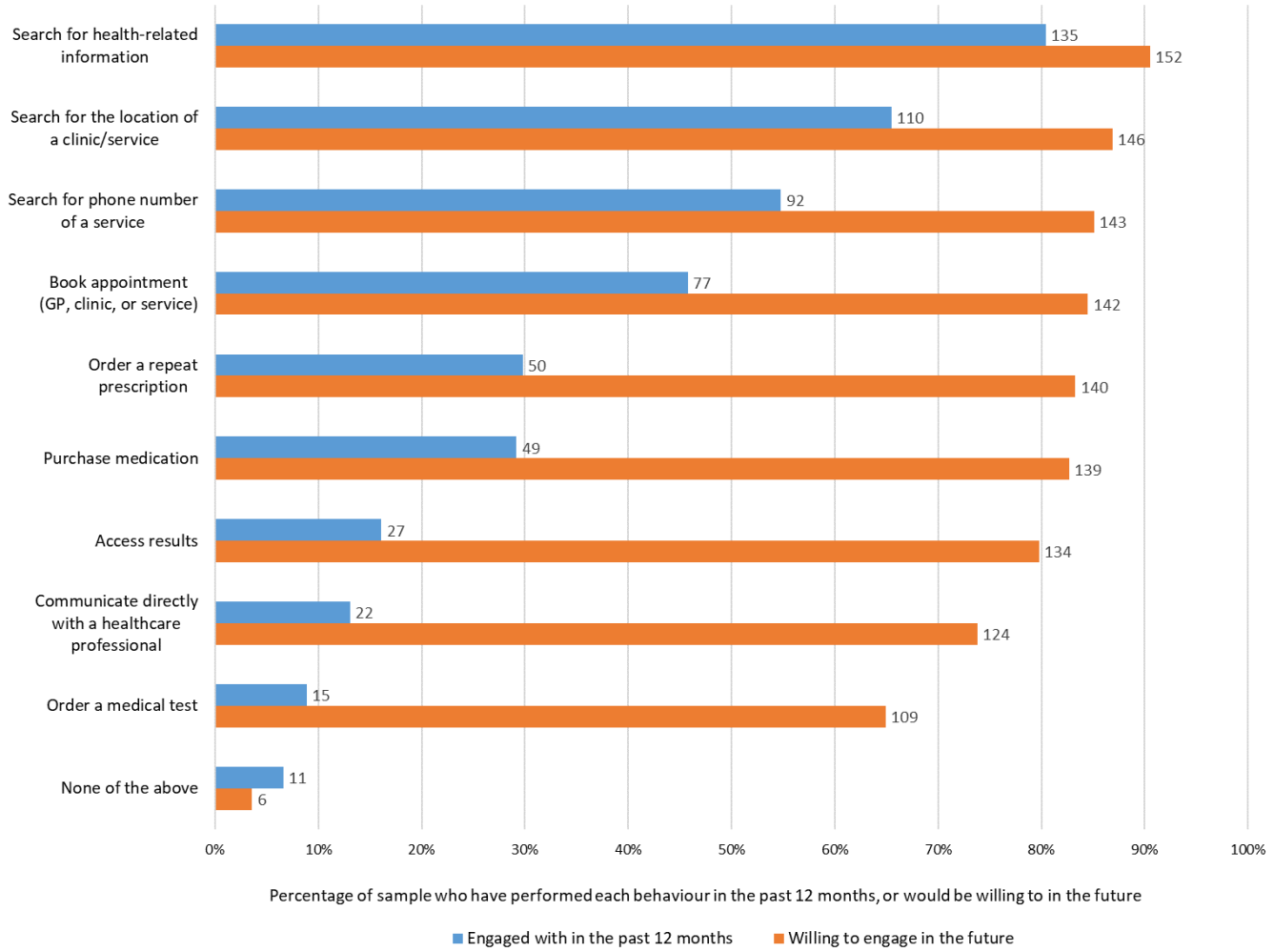


Figure 12. PrEP users' health behaviours for past 12 months and proportion willing to perform the behaviours in the future (SMMASH3) (n=167; the numbers at the end of each bar represents the number of participants)

Participants were asked if they had provided different types of information online in order to access healthcare in the past 12 months. The majority of participants had not provided any information online to access health services – see Figures 13 and 14. Participants were also asked which types of information they would be willing to provide online in order to access health services. While only 10.9-26.8% had provided each type of information online in the past 12 months, 71.7-82.3% were willing to provide each in the future.

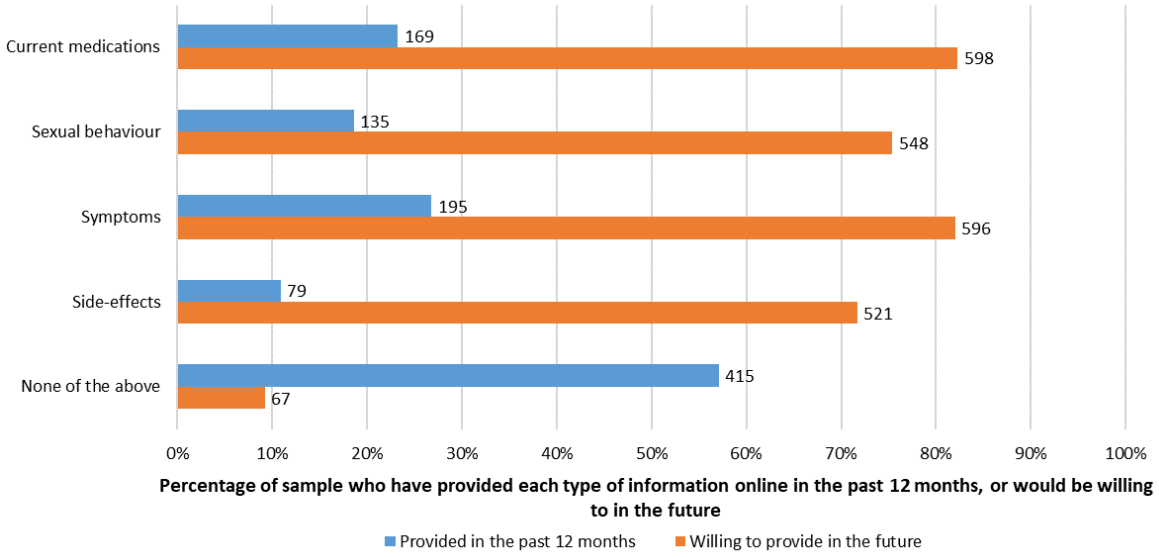


Figure 13. The proportion of the whole sample who reported providing each type of information online in the past 12 months, or who were willing to provide each type of information online in the future, to access health services (SMMASH 3) (n=727)

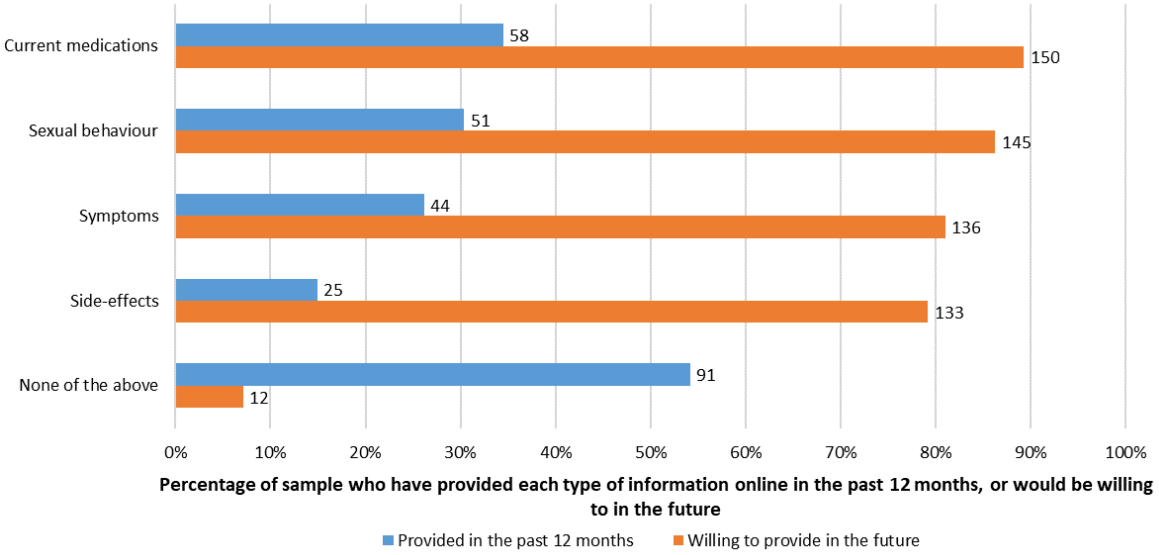


Figure 14. The proportion of current PrEP users who reported providing each type of information online in the past 12 months, or who were willing to provide each type of information online in the future, to access health services (SMMASH3) (n=167)

4.3.2.2. Device use and willingness

I chose to focus on smartphones, computers, and tablets as the online PrEP service could only be feasibly delivered through these three devices. I asked participants what devices they used on a weekly basis to get a broad understanding of the devices the sample used on a regular basis. The vast majority (n=696, 95.7%) used smartphone and computers/laptops (n=638, 87.8%) at least weekly while a lower proportion used tablets (n=329, 45.3%) (see Figures 15 and 16).

Participants were asked about the devices they had used to access online health services in the last 12 months - see Figures 15 and 16. The majority had used a smartphone (n=522, 71.8%) and/or a computer (n=445, 61.2%) to access online health services in the 12 month prior to completing the survey. A minority used a tablet to access online health services in the 12 months prior to completing the survey (n=185, 25.5%).

When asked about the devices they would be willing to use to access online health services. A very high proportion of participants were willing to use smartphones (n=631, 86.8%) or a computer (n=613, 84.3%) to access online health services. A high proportion reported that they would be willing to use a tablet to access online health services in the future (n=452, 62.2%).

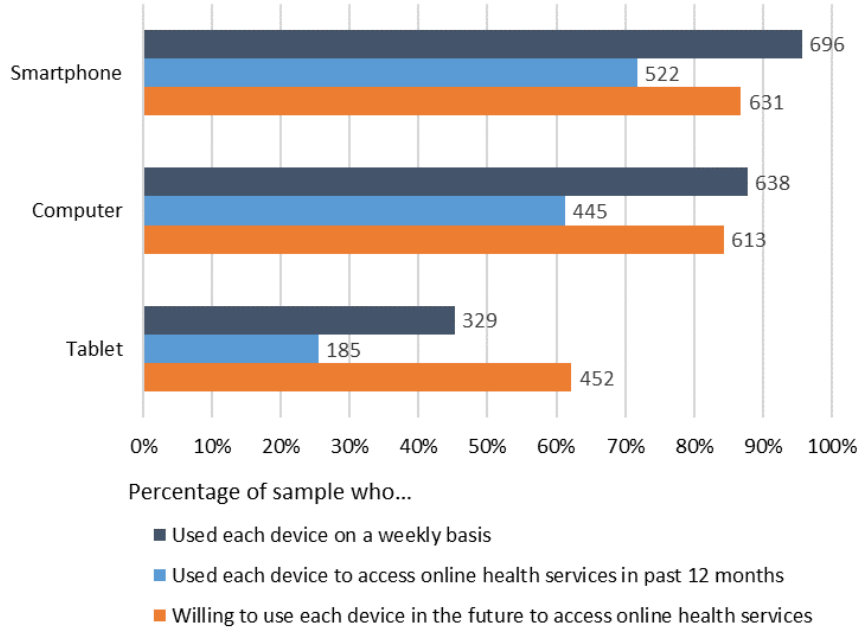


Figure 15. The proportion of the whole sample who reported using each device on a weekly basis, used each device to access online health services in the past 12 months, and would be willing to in the future (SMMASH3) (n=727)

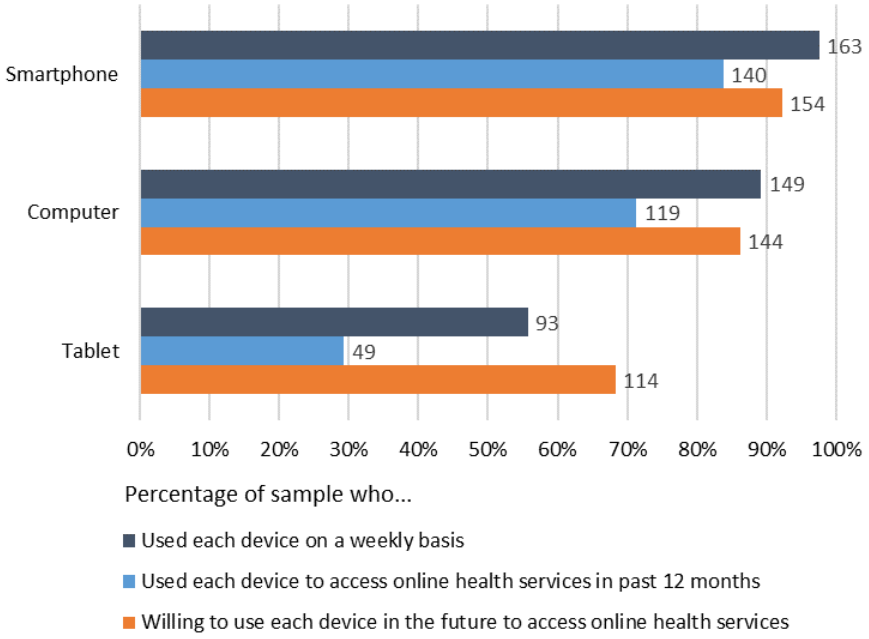


Figure 16. The proportion of current PrEP users who reported using each device on a weekly basis, used each device to access online health services in the past 12 months, and would be willing to in the future (SMMASH3) (n=167)

4.3.2.2.1. Device use, and willingness, by age

Table 14 summarises the whole sample's device data separated by age. Participants aged 44 and under were more likely, and those aged 55 and over were less likely, to report using a smartphone on a weekly basis than other age groups (χ^2=69.84, df=5, p<0.001). There were no statistically significant differences in the proportion of participants who use a computer on a weekly basis over the different age groups (χ^2=1.30, df=5, p=0.94). Participants aged 35-64 were more likely, and participants aged 34 and under were less likely, to report using a tablet on a weekly basis than the other age groups (χ^2=45.16, df=5, p<0.001).

Participants aged 25-44 were more likely, and those aged 55 and over were less likely, to report having used a smartphone to access online health services in the last 12 months than the other age groups (χ^2=44.06, df=5, p<0.001). There were no statistically significant differences between the proportion of participants who had used a computer to access online health services in the last 12 months over the different age groups (χ^2=6.53, df=5, p=0.26). Participants aged 35-54 were more likely, and those aged 34 and under were less likely, to report using a tablet to access online health services in the last 12 months than other age groups (χ^2=23.77, df=5, p<0.001).

Finally, participants aged 16-24 and 35-44 were more likely, and those aged 55 and over were less likely, to be willing to use a smartphone to access online health services than other age groups (χ^2=55.27, df=5, p<0.001). There were no differences in the proportion of participants willing to use a computer (χ^2=8.78, df=5, p=0.12) or a tablet (χ^2=3.76, df=5, p=0.58) to access online health services between the different age groups.

Table 14. Device data separated by age (SMMASH3)

Age Group	Smartphone	Computer	Tablet
Devices used on a weekly basis			
16-24	**89 (100.0%)^**	80 (89.9%)	**21 (23.6%)***
25-34	**201 (98.5%)^**	179 (87.7%)	**69 (33.8%)***
35-44	**143 (99.3%)^**	127 (88.2%)	**77 (53.5%)^**
45-54	164 (94.3%)	149 (85.6%)	**96 (55.2%)^**
55-64	**83 (90.2%)***	82 (89.1%)	**51 (55.4%)^**
65+	**16 (66.7%)***	21 (87.5%)	15 (62.5%)
Devices used to access online health services in past 12 months			
16-24	67 (75.3%)	60 (67.4%)	**12 (13.5%)***
25-34	**158 (77.5%)^**	116 (56.9%)	**37 (18.1%)***
35-44	**117 (81.3%)^**	84 (58.3%)	**49 (34.0%)^**
45-54	122 (70.1%)	114 (65.5%)	**58 (33.3%)^**
55-64	**51 (55.4%)***	59 (64.1%)	23 (25.0%)
65+	**7 (29.2%)***	12 (50.0%)	6 (25.0%)
Devices willing to use to access online health services			
16-24	**84 (94.4%)^**	81 (91.0%)	55 (61.8%)
25-34	181 (88.7%)	171 (83.8%)	133 (65.2%)
35-44	**135 (93.8%)^**	119 (82.6%)	89 (61.8%)
45-54	152 (87.4%)	141 (81.0%)	111 (63.8%)
55-64	**67 (72.8%)***	83 (90.2%)	52 (56.5%)
65+	**12 (50.0%)***	18 (75.0%)	12 (50.0%)

Note: (**^**) adjusted residuals signal that the observed value was significantly higher than expected;
(*****) adjusted residuals signal that the observed value was significantly lower than expected. The threshold for adjusted residuals to signal a significant difference is 1.96 which corresponds to an alpha value of 0.05 (International Business Machines, 2020).

4.3.2.3. Preferred modalities for sexual healthcare

Participants were asked to choose their preferred method of performing different health behaviours in two scenarios: 1) lower concern (they had no symptoms or worries and want to get a routine STI test); and 2) higher concern (they were concerned about a symptom or possible STI exposure). Participants' preferences are presented in Figures 17-22. I compared participants' preferences in scenario 1 with their preferences in scenario 2 using McNemar-Bowker tests to determine if a significant proportion of the sample's preferences changed between the scenarios. These are summarised in Table 15. I then used post-hoc McNemar tests to identify where these changes in preferences occurred. The alpha value for the post-hoc tests was set at 0.005 following Bonferroni correction as I was conducting multiple pair-wise comparisons using the same data: alpha (0.05)/number of comparisons (10).

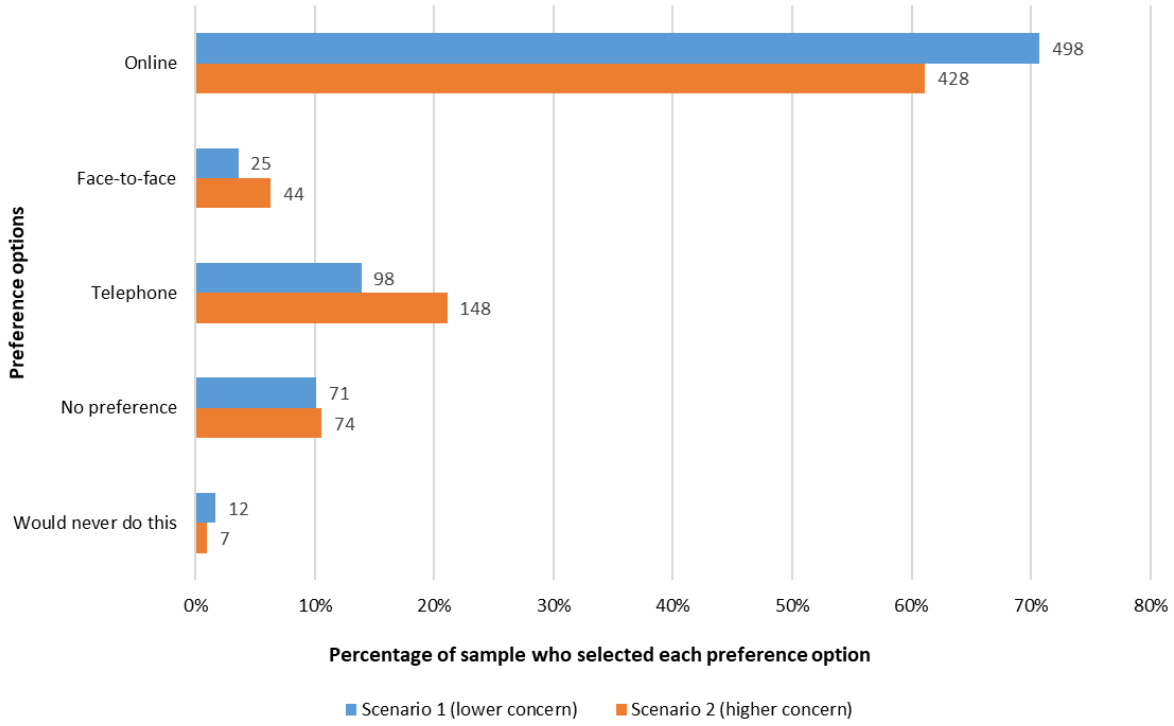


Figure 17. The whole sample's preferred modalities for booking an appointment in Scenario 1 (lower concern; n=704) and Scenario 2 (higher concern; n=701)

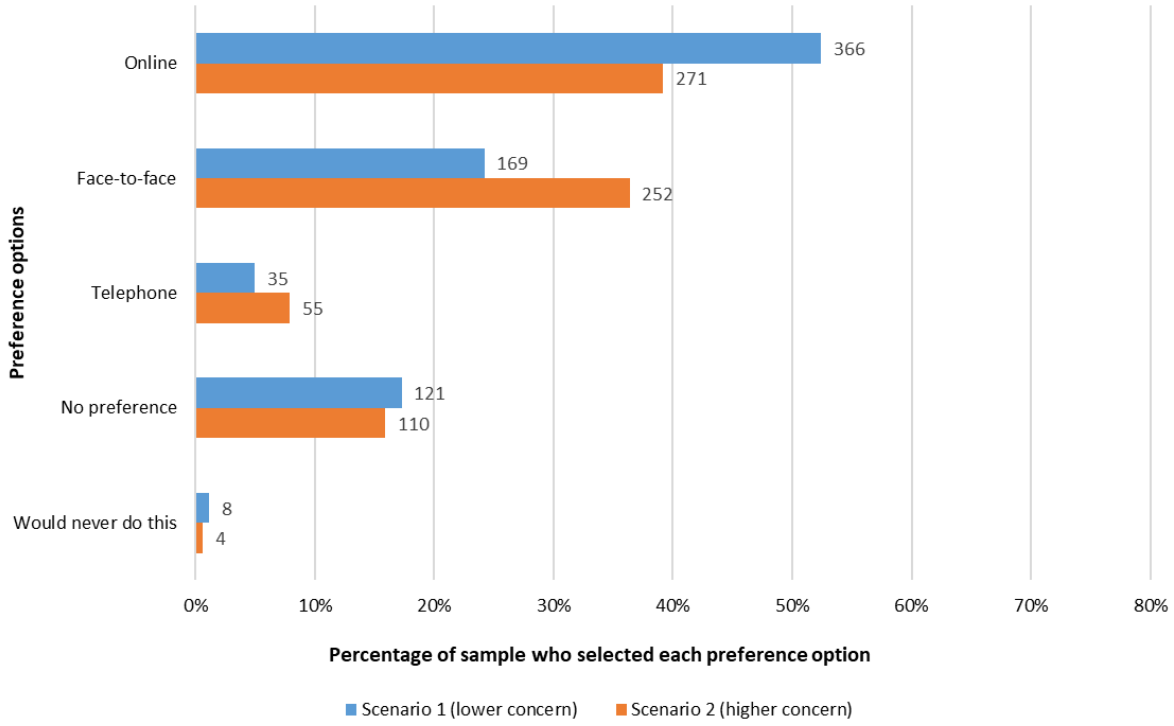


Figure 18. The whole sample's preferred modalities for reporting their sexual behaviour in Scenario 1 (lower concern; n=699) and Scenario 2 (higher concern; n=692)

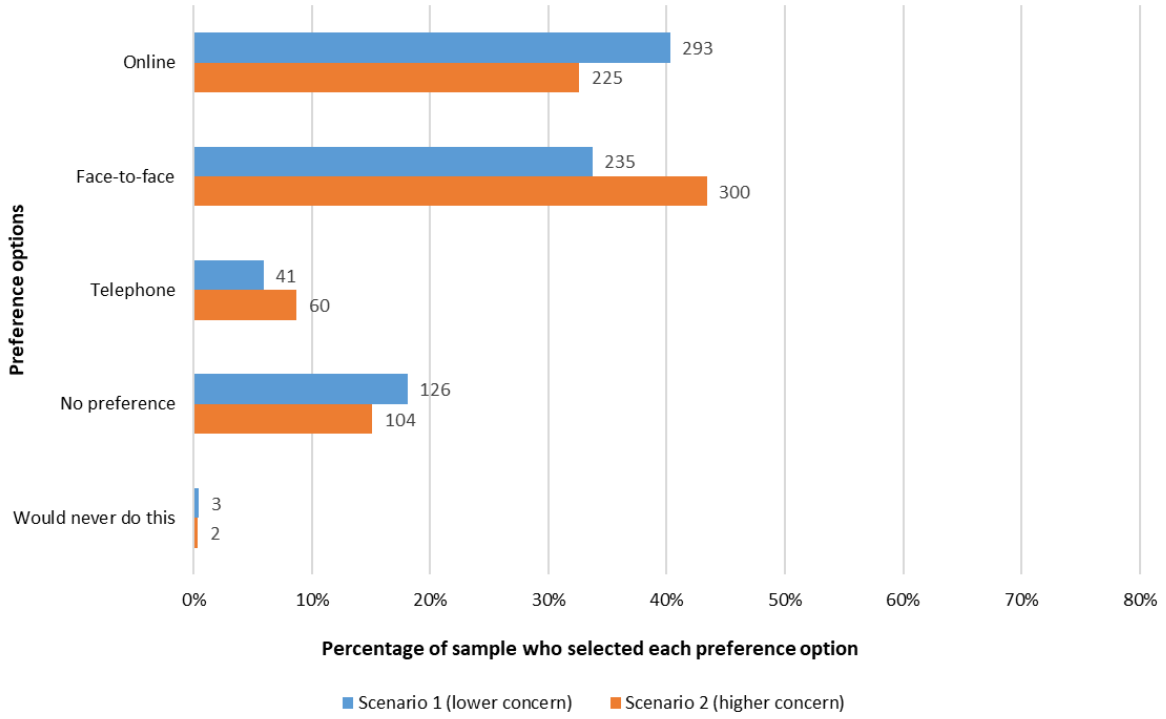


Figure 19. The whole sample's preferred modalities for reporting any symptoms they were experiencing in Scenario 1 (lower concern; n=698) and Scenario 2 (higher concern; n=691)

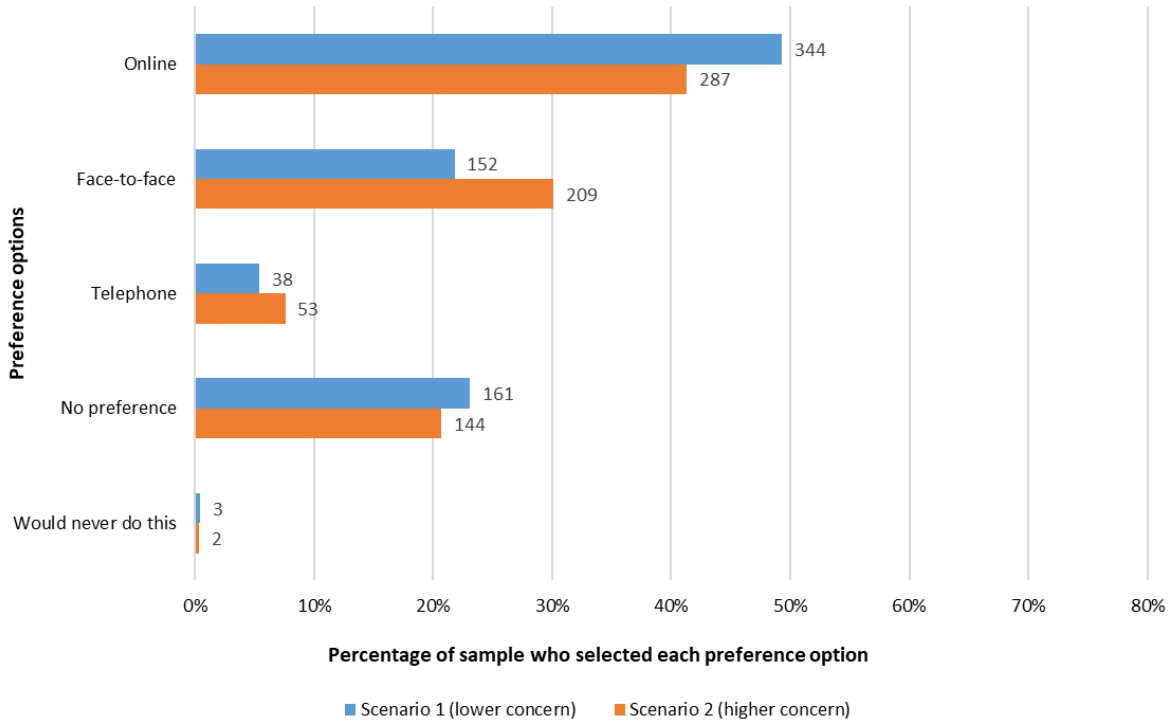


Figure 20. The whole sample's preferred modalities for reporting their current medications in Scenario 1 (lower concern; n=698) and Scenario 2 (higher concern; n=695)

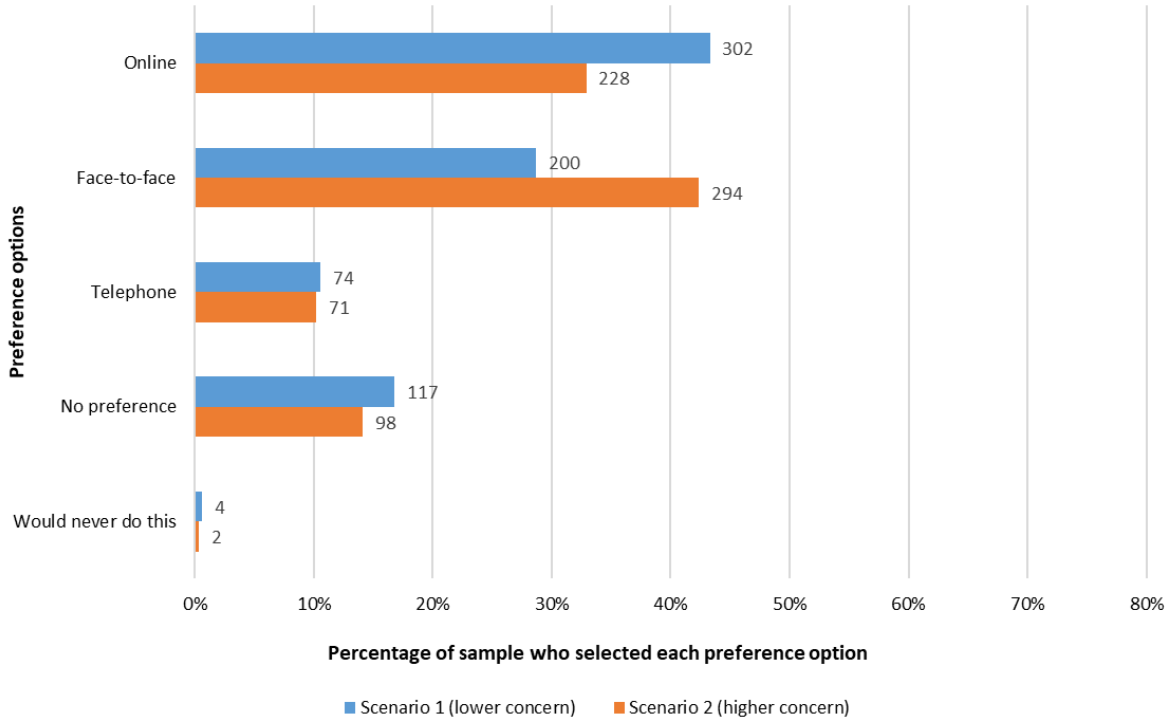


Figure 21. The whole sample's preferred modalities for receiving HIV test results in Scenario 1 (lower concern; n=697) and Scenario 2 (higher concern; n=693)

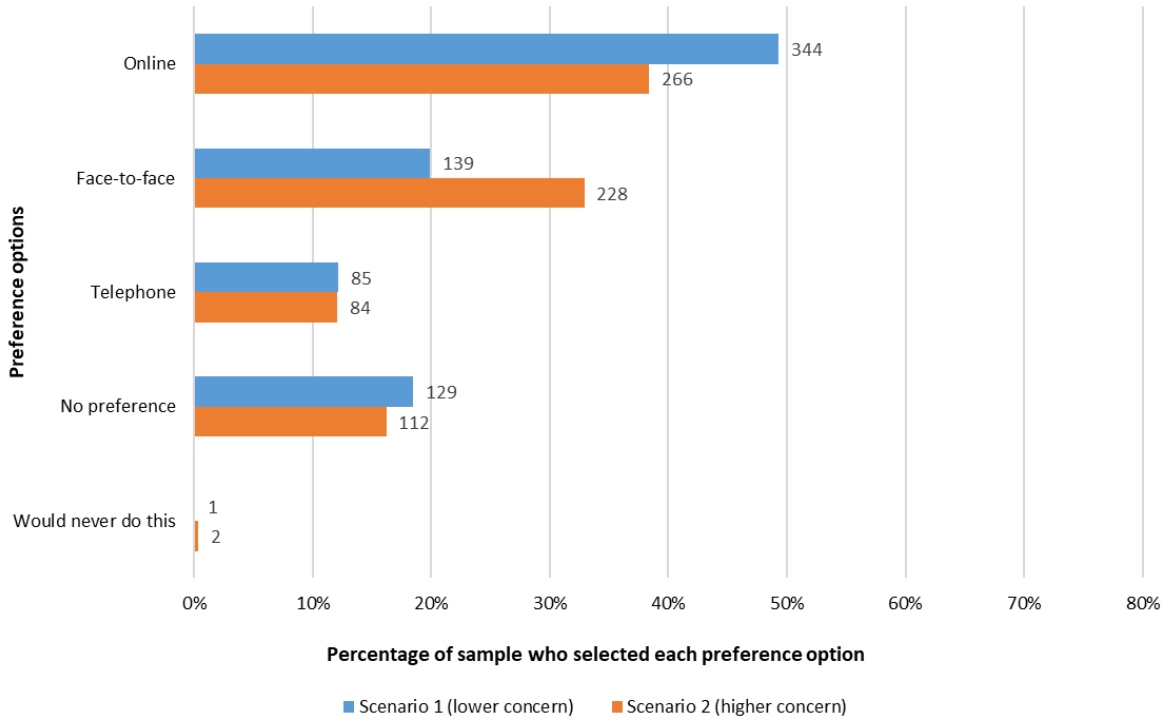


Figure 22. The whole sample's preferred modalities for receiving STI test results (other than HIV) in Scenario 1 (lower concern; n=698) and Scenario 2 (higher concern; n=692)

Table 15. McNemar-Bowker tests to detect shifts in preference within each behaviour, between the two scenarios

Behaviours	McNemar-Bowker	Statistically significant shifts in preference
Booking an appointment	χ^2=50.82, df=9, p<0.001	Online to phone call (<0.001)
Reporting sexual behaviour	χ^2=78.84, df=9, p<0.001	Online to face-to-face (<0.001); online to phone call (<0.001); no preference to face-to-face (=0.001)
Reporting symptoms	χ^2=52.54, df=7, p<0.001	Online to face-to-face (<0.001); online to phone call (=0.001); no preference to face-to-face (=0.002)
Reporting current medications	χ^2=38.86, df=7, p<0.001	Online to face-to-face (<0.001); no preference to face-to-face (=0.003)
Receiving HIV test results	χ^2=88.91, df=8, p<0.001	Online to face-to-face (<0.001); online to phone call (p=0.001); phone call to face-to-face (p<0.001); no preference to face-to-face (p<0.001)
Receiving STI test results	χ^2=86.00, df=7, p<0.001	Online to face-to-face (<0.001); online to phone call (=0.001); phone call to face-to-face (<0.001); no preference to face-to-face (=0.002)

Note: Shift in preference denotes the move from scenario 1 (lower concern) to scenario 2 (higher concern).

The McNemar-Bowker tests presented in Table 15 suggest that a statistically significant proportion of participants changed their preferred modality between the two scenarios for all six behaviours. Post-hoc pairwise McNemar tests then suggested where these changes in preferences occurred. For example, a significant proportion of participants changed their preferred option for booking an appointment from online in scenario 1 (lower concern) to phone call in scenario 2 (higher concern). There was a shift from preferring online care in scenario 1 to preferring telephone-based care in scenario 2 in five of the behaviours (all behaviours apart from reporting current medications). There was a shift from preferring online care in scenario 1 to preferring face-to-face care in scenario 2 five behaviours (all apart from booking an appointment). There was a shift from having no preference in scenario 1 to preferring face-to-face care in scenario 2 for five behaviours (all apart from booking an appointment). Finally, there was a shift from preferring telephone-based care in scenario 1 to preferring face-to-face care in scenario 2 when receiving HIV or STI test results. Therefore, there appeared to be a shift towards human interaction (primarily face-to-face but also phone-

call) when participants were asked to consider their preferences in scenario 2, where there was a higher level of concern than in scenario 1.

I decided not to compare the preferences of PrEP users only due to the lower power of this analysis given the smaller sample size and the aim of performing this test was to understand if different scenarios would influence preference, not specifically for PrEP users. However, I do present the preferences of PrEP users in Appendix 6.

4.4. Discussion

In this study, I aimed to determine the extent to which GBMSM in Scotland had performed, and were willing to perform, online health behaviours, and to determine the broad acceptability of the proposed online PrEP service. Here I briefly discuss the sample's PrEP use and then address each of the research questions set at the start of this chapter. I then discuss the strengths and limitations of the study and present some reflections.

4.1.1. PrEP use and discontinuation

Just over a fifth of the participants in this study reported they were currently using PrEP and most used it daily or event-based. The participants who said they had discontinued PrEP reported doing so because they perceived their susceptibility to HIV to have reduced, they experienced medical complications/worries, the need for regular monitoring was too much, and they experienced issues with adherence. While the number who had discontinued PrEP was low (n=31), 19.4% reported that the need for frequent-in person monitoring contributed to their decision to stop PrEP. The proposed online PrEP service may be able to reduce this burden for service users, potentially retaining people in PrEP care. This is important because cessation of PrEP is associated with HIV acquisition (Cannon et al., 2022) and so reducing this burden could help with continuation. The reasons for stopping PrEP were somewhat congruent with other quantitative studies: Koppe et al. (2021) found that in a German sample of former PrEP users, discontinuation was primarily due to changes in perceived HIV susceptibility and because of medical concerns; while Holloway et al. (2017) found that in addition to medical and perceived susceptibility, the cost of the PrEP medication and required medical visits were the main reasons for discontinuation (for context, this study was implemented in California, USA).

4.4.2. RQ1: What is the broad acceptability of the proposed online PrEP service among GBMSM in Scotland who use PrEP?

The prospective acceptability of the proposed online PrEP service was very promising. Among current PrEP users, the vast majority (76.8%) stated that they would be likely/very likely to use the online PrEP service if it were made available to them. Only around 6% stated that they would be unlikely/very unlikely to use the service. Although this is an online sample and hypothetical, these findings are encouraging and provided a clear direction for the rest of my doctoral research.

4.4.3. RQ2: Which online health behaviours have GBMSM performed?

When looking at current PrEP users and the sample as a whole, the majority of participants had searched for health-related information online or for the location of a clinic/service, and many had searched for the phone number of a clinic/service, booked an appointment, or ordered a repeat prescription online. Very few had performed any of the other online health behaviours. The provision of digital health services was limited in Scotland at the time this study was conducted so this was unsurprising. It is also worth mentioning that the study looked at the 12 months preceding the survey so it is possible participants had performed these behaviours online and the survey did not capture these. Considering these findings in relation to the online PrEP service, we cannot assume that service users will be familiar with online health services and we need to consider how best to support their use of the online PrEP service.

4.4.4. RQ3: Which online health behaviours would GBMSM be willing to perform?

While participants had limited past experience with the measured health behaviours, the proportion of participants willing to perform the behaviours online was high. Not only is this promising for the online PrEP service, it is encouraging for the incorporation of digital health services more widely as is laid out in the Scottish Government's Digital Health and Care Strategy (Scottish Government & COSLA, 2021). Of course, this is an online sample and how this willingness would translate to the wider population and actual behaviour is unclear; however, it suggests that the incorporation of digital health services would be welcomed by GBMSM in Scotland.

4.4.5. RQ4: What devices have GBMSM used in order to access online health services?

By understanding what devices are used by the target population, we can consider what device(s) a digital health intervention should be optimised for in the first instance. Most participants reported using a smartphone or computer to access online health services in the past 12 months. The use of smartphones was particularly high in participants aged 44 and under with 25-44 year olds being more likely to have used a smartphone to access online health services than other age groups. Smartphone use was lower for those aged 65 and above which is congruent with existing data (Office for National Statistics, 2021a; Office for National Statistics, 2021b). Tablets were used by a minority of participants but this was unsurprising due to: 1) the smaller proportion of participants reporting weekly tablet use in this survey; and 2) household tablet ownership in Scotland was 63% in 2021 (Office for National Statistics, 2021b). The findings of this study suggest that it may be beneficial to optimise the proposed online PrEP service for computers and smartphones, and tablet optimisation may be less of a priority. This is explored further below.

4.4.6. RQ5: What device(s) would GBMSM be willing to use to access online health services?

Continuing with devices, a very high proportion of participants were willing to use a smartphone and/or a computer to access online health services in the future. The exception to this was the proportion of over 55 year olds willing to use a smartphone to access online health service; however, the high proportion of this age group willing to use computers appears to compensate for this. Given that I did not measure device preference in this survey, it is unclear if participants favoured smartphones or computers; however, the age-related differences do indicate that focusing on one type of device may exclude some potential service users. The majority of participants were willing to use tablets to access online health service in the future, although this was a smaller proportion than for smartphones and computers. Ultimately, it seems the online PrEP service may need to be optimised for smartphones and computers; however, further, more nuanced data was required. I explored this further in the qualitative studies (Chapters 6 & 7).

4.4.7. RQ6: What are GBMSM's preferred modalities for performing health behaviours?

Participants' preferences varied and no one method was unanimously preferred for accessing care. In the scenario where participants imagined they were accessing routine care, online care was the most preferred modality; however, many participants' preferences changed when asked to imagine they had a symptom of an STI or thought they had been exposed to an STI, that is, within a higher concern scenario. The findings were congruent with similar research which found that people's preferred modality of care depended on the type of care being offered, and the perceived convenience and quality of available services (Crossnohere et al., 2021). There are different ways to conceptualise the 'type of care' in my study: 1) the different health behaviours (e.g. booking an appointment or reporting symptoms); or 2) the emotional context (i.e. higher concern versus lower concern) – the latter being closer to Crossnohere et al.'s definition which focused on 'urgency' of care. Indeed, there appeared to be differences within both as participants' preferences seemed to vary between the different health behaviours, and some participants' preferences changed when comparing the two scenarios. While convenience and quality were not measured in my study, online/telephone-based care tends to be considered more convenient than in-person care as there is no need to travel to the clinic/service (Fleischhacker, 2020). There was a shift from these 'more convenient methods' towards methods with more human interaction when participants were asked to imagine they had a symptom/possible exposure. Face-to-face care arguably has more human interaction than telephone-based care, which, in turn, has more human interaction than online care. Indeed, in a similar study of hospital out-patients in Australia (n=525), the majority (approx. 60%) would prefer to return to hospital if they experience a symptom of concern, while the majority (approx. 60%) would prefer to communicate with the hospital via telephone or 'technology' if they experienced a symptom not of concern (Alexander et al., 2021). Ultimately, my study emphasised the importance of providing a variety of methods through which people can access care, and the role that context plays in health decision making.

4.4.8. Strengths and limitations

The strengths of this survey were that it was able to reach a large number of participants, and the questions were reviewed extensively by academic, clinical, and lay experts; however, I feel I would implement an established review methodology such as

cognitive testing when designing future surveys (Beatty & Willis, 2007) in order to further improve the validity and reliability of the survey.

One of the main limitations of much of this study was that, by necessity, participants had to predict how they would feel in future situations. Affective forecasting is the process of anticipating future emotional and mental states and people tend to be somewhat poor at doing so (Martin et al., 2021). This is relevant because emotional state is thought to be an important aspect of how people perceive their health and the decisions they make (Martin et al., 2021). This is why I frame this part of the study as an indication of preference because it is unclear how accurate participants' conjectures were.

Participants mostly reported White ethnicity. This is consistent with the Scottish census' ethnicity data (Scotland's Census, 2021); however, I think it is important to keep this in mind when considering the generalisability of the data and when considering where to focus in future research. Moreover, the sample had very few participants who identified as trans. The difficulty with survey research is that underrepresented voices are often lost due to small numbers. This tends to be listed as a limitation of many studies and is something that I will revisit in the discussion chapter (Chapter 8).

The online design of the study introduces some potential biases and limits the generalisability of the findings. Moreover, participants were primarily recruited from sociosexual media and thus the sample is limited to users of those particular sites. There is also an inherent level of digital literacy with a sample who are recruited online and are able to complete an online survey. Given the subject matter, it is important to bear this in mind when considering how much of the sample preferred online care and would be willing to engage in online health services.

4.4.9. Reflections

I initially approached this study with the mind-set of trying collect as much data as possible, to explore every avenue I could think of, and perform exhaustive tests on the data. Then I realised that if I were to add questions to SMMASH3, which is already a lengthy survey, I would have to be more mindful of participant burden – which I should have been mindful of anyway. Alternatively, I could have designed a separate study; however, I would not have had the resources to achieve the same level of reach. I took a robust but pragmatic approach. I

spent time considering what evidence I wanted to collect, how the questions I was developing related to the research questions and aims of the study and the doctoral research. There were some areas where I feel I should have asked some questions and I did not (e.g. preferences for an app versus website). However, by taking time to really consider what data I wanted to collect and what analyses I wanted to perform, I feel that I was able to collect important and useful evidence that has clear benefits for the development of, and justification for, the online PrEP service.

4.5. Conclusions

The preliminary acceptability of the proposed online PrEP service was high, providing justification for its development and a clear direction for my subsequent qualitative studies. Although past experience with online health care was modest, the vast majority of GBMSM were willing to complete elements of care online in the future. It seemed important that the online PrEP service was optimised for smartphones and computers, although this needed further exploration in the qualitative studies. In the next chapter, I explain how the Covid pandemic impacted my research and present my second quantitative study – a follow-up to the SMMASH3 within the context of the Covid pandemic.

Chapter 5. An online survey of GBMSM in Scotland during the coronavirus pandemic investigating online health behaviours: the SMMASH Pan study

Following the first 'stay at home order' issued in response to the Covid pandemic (Scottish Government, 2020), an additional iteration of the SMMASH survey, (SMMASH Pan) was conducted. This provided an opportunity to gain an understanding of GBMSM's online health behaviours within the context of the Covid pandemic. In this chapter, I present the rationale for the study and my involvement, the methods used, and findings. I then critically discuss the findings in relation to SMMASH3 (Chapter 4) and the doctoral research as a whole.

5.1. Introduction

Shortly after recruitment for SMMASH3 stopped, a national 'stay at home order' was issued to Scotland and the rest of the UK in response to the rising impact of Covid-19 (Scottish Government, 2020). This impacted research activity greatly and caused me to feel uncertain about how I should proceed with my doctoral research given that, at this stage, I had already designed and prepared the ethics application for the qualitative studies (Chapters 6 and 7). I considered if it would be appropriate to change the focus of my PhD especially given the potential changes to service delivery and access to health services in the long-run. After reflecting and consulting with my supervisors, I decided that it was important to continue with the core aim of the doctoral research: to establish an evidence base to inform the development and implementation of the online PrEP service. However, it was also important to respond to the changes that had occurred due to Covid and lockdown as these were, and are, likely to be part of our lives for the foreseeable future.

I felt it would be advantageous to capture data on people's online health behaviours in this new context where telephone-based care was offered in the first instance to avoid unnecessary in-person contact (Henderson et al., 2022b). I had the opportunity to work on an interim iteration of SMMASH funded by the Chief Scientist Office (Frankis et al., 2020) as part of the Rapid Research in Covid-19 call (Chief Scientist Office, 2020). The survey was titled SMMASH Pan (Pandemic) and focused on determining the impact that Covid and the stay at home order had on GBMSM's mental and wider health (Frankis et al., 2020). The shift in focus and the need to develop additional Covid-related questions limited the number of questions

that I was able to include. I decided to prioritise the questions that focused on the online health behaviours because of the importance of understanding this context. I reflect on this decision further in the discussion section of this chapter.

My aim for this study was to understand participants' online health behaviours after the advent of the stay at home order. I posed four research questions:

1. What online health behaviours have GBMSM performed?
2. What online health behaviours would GBMSM be willing to perform?
3. What devices have GBMSM used in order to access health services online?
4. What devices would GBMSM be willing to use to access health services online?

5.2. Methods

5.2.1. Design

The overall structure of the PhD (explanatory, sequential mixed-methods) remained unchanged as this quantitative study was treated as an extension of the quantitative stage (SMMASH3) and preceded the qualitative studies. The design of this study was very similar to that of SMMASH3 (Chapter 4); it was an online, quantitative survey. Full considerations for the appropriateness of this design are presented in Chapter 4 (Section 4.2.2.). The main difference in design was that I was able to compare the data collected in this study with the data from SMMASH3 as I used the same questions. I was aware that there may be some participants who participated in both studies and some who only participated in one. This is a recognised limitation of repeated surveys (Steel & McLaren, 2009). A question was included asking if participants had completed the SMMASH3 survey to determine what proportion of the sample took part in both studies. However, I did not factor this into the analyses. I did, however, plan to weight cases if there were any discrepancies in the demographics of the samples – specifically age, gender or sexual orientation.

The SMMASH surveys historically recruited new participants during each iteration. Dr Frankis decided that it would be advantageous to set up a cohort to better facilitate the repeated nature of the SMMASH surveys. Participants were asked if they were interested in taking part in future SMMASH surveys within the consent process as an additional consent option, not required to take part in this survey. Participants were also asked if they were interested in taking part in similar research projects in the future. This was specifically designed so we could

recruit participants for the qualitative stage of the SMMASH Pan study and for my service user interviews (Chapter 6).

5.2.2. Participants and recruitment

5.2.2.1. Inclusion and exclusion criteria

The focus of this doctoral research was GBMSM in Scotland. Therefore, participants were included if they stated that they resided in Scotland at the time of completing the survey, were aged 16 years or older, and self-identified as GBMSM. I did not formally exclude people based on gender or sexual orientation; however, the promotional material and participant information sheet specified that the study was for GBMSM, and the study was advertised on GBMSM-specific sexual-social media. Participants who were HIV-negative or of unknown status were included in this study. I excluded people living with HIV because, as was the case in Chapter 4, I was interested in current PrEP users and people who may use PrEP in the future, and people living with HIV attend services regularly which may shape their views.

5.2.2.2. Participant recruitment

Participants were recruited between June and July 2020. For context, the first 'stay-at-home order' was implemented in Scotland on 23 March 2020 (Scottish Government, 2020). Participants were recruited from sociosexual media site and apps: Grindr, Gaydar, Recon, Squirt, and Scruff. Participants were also recruited through Facebook, Twitter, and Instagram through targeted ads and posts. I only looked at the data from participants who indicated within the survey they were residing in Scotland at time of participation. Recruitment for SMMASH-Pan proved slower and more challenging than SMMASH3 and so the third sector and NHS groups affiliated with the study promoted the study on their social media and websites and contacted members of their organisations' mailing lists in order to boost the sample size.

5.2.3. Development of study materials

5.2.3.1. Participant information sheet and consent form

The participant information sheet and consent form for SMMASH Pan were created by the wider study team (see Appendix 7); although I did review and comment on these documents ahead of submission.

5.2.3.2. Survey questions

I was limited in the questions I could include in this survey given the shift in focus from sexual to mental health, and the inclusion of a section asking about Covid and mental health resources. I wanted to prioritise understanding participants' online health behaviours, especially their willingness to perform these behaviours in the future and used the questions developed for SMMASH3 to do so (Chapter 4). I opted to exclude questions with a high cognitive load such as the preferred modality of care in different scenarios and the online PrEP service question. This was because it required the participant to consider if they would engage with a hypothetical service that was completely new to them around half way through a lengthy (30+ minute) survey. After starting data collection, I regretted cutting the online PrEP service acceptability question because it would have been useful to understand this in the context of Covid; however, a relatively small number of PrEP users ended up participating in this study. I will explore this further in the discussion section. The full list SMMASH Pan survey can be accessed on the SMMASH website (smmash2020.org, 2020). The questions pertinent to this study are found in Appendix 8.

The questions that were included in this study were identical to those used in SMMASH3 with the exception of some additional options for the reason for stopping PrEP that reflected the Covid pandemic ('I couldn't get an appointment because of Covid', 'I'm avoiding clinics because of Covid', and 'I'm not having sex because of Covid'), and the inclusion of a question on length of time since stopping PrEP so I could understand the number of people who stopped PrEP since the introduction of the first lockdown. These were reviewed and piloted, alongside the survey as a whole, by clinical, academic, and lay experts in the same way detailed in Chapter 4 (Section 4.2.3.2.3.).

5.2.4. Data collection

The survey was implemented using REDCap (REDCap, n.d.). When participants clicked through to the survey, they were presented with the participant information sheet. Participants were able to take time to consider their participation and to contact a member of the study team if they had any questions – particularly because the survey was online. If the participant was interested in participating, they clicked through to the survey. They also had the opportunity to consent to be contacted to take part in future SMMASH iterations, the SMMASH Pan interviews, and other related studies at this point and at the end of the survey. Once the participants had completed the survey, they were debriefed and provided with links

to relevant support services should they feel they needed them if any difficulties arose during the survey. Links to relevant support services were provided throughout the survey (e.g. mental health support services during the mental health questions).

5.2.5. Data management

Data were collected and stored on GCU's secure REDCap server accessible only by Dr Strongylou, Dr Frankis and me. Dr Strongylou performed initial data cleaning and combined the dataset with that of the SMMASH3 study. I then had access to this dataset and checked the data for the questions relevant to my analyses. All data collected in the study was anonymous and stored and managed in line with GCU's data protection protocols and GDPR (General Data Protection Regulation, 2018; Glasgow Caledonian University, 2018). The final dataset was stored on my secure, password protected GCU OneDrive account and only accessed using my GCU issued password protected, encrypted laptop.

5.2.6. Data analysis

All analyses for this study were performed on SPSS Version 26 (IBM Corp., 2019). Participants' demographic data were summarised using descriptive statistics. Where appropriate I performed comparisons between the demographics of different classifications of PrEP use. All comparisons in this study were made using an alpha value of 0.05. Unlike in Chapter 4, Bonferroni corrections were not necessary as I was not running pair-wise tests on the same data (Dancey & Reidy, 2004). I wanted to compare participants' responses in SMMASH Pan with the data from SMMASH3. The majority of data was binary and nominal (e.g. 'willing' or 'not willing') and was being compared between the two surveys meaning that a continuity correction was the most appropriate analysis (Field, 2013). The 2x2 nature (i.e. (SMMASH3/SMMASH Pan) x (willing/not willing)) means that a continuity correction is more appropriate than a chi-squared test which tends to produce more type 1 errors when dealing with a 2x2 contingency table (Field, 2013). One of the exceptions to this was comparing age across groups and surveys which was planned to be done by t-test if normally distributed, or a Mann-Whitney U test if the data were not normally distributed or another parameter was not met (Field, 2013). I also compared PrEP use across surveys using a chi-squared test (Dancey & Reidy, 2004; Field, 2013). I used a chi-squared test to compare PrEP use across the surveys because I needed to compare six nominal categories (PrEP use options) over the two surveys (6x2 contingency table) and this was the most appropriate test for this analysis (Dancey & Reidy, 2004; Field, 2013).

5.2.6.1. Sample size

The SMMASH surveys are implemented without power calculations with the reasoning that it is not possible to know how many respondents there will be to an online survey conducted in the public domain (Strongylou & Frankis, 2020a). I accepted this decision; however, in the future I would ensure that I estimated the sample size ahead of recruitment because it is good ethical practice to ensure that the sample size is adequate to detect any anticipated differences (Suresh & Chandrashekara, 2012).

5.2.7. Ethical approvals and considerations

The study was funded by the Chief Scientists Office as part of a package of funding for rapid Covid projects (grant number: COV/GCU/20/10) (see Appendix 9). Ethical approval was granted by Glasgow Caledonian University's Nursing and Community Health ethics committee: HLS/NCH/19/050. The ethical considerations for this were the same as that in Chapter 4: there was a risk, albeit low, that participants could become distressed if the questions triggered unpleasant memories and so they were provided with a list of sources of support throughout the survey; participants were being asked to disclose information but this was anonymous and secure data management was observed; and the survey was long but participants were made aware of this and their right to withdraw before consenting to participate.

Covid fatigue (the response to the barrage of Covid-related media) was an additional concern introduced in this study. There were several surveys recruiting participants at the time as this study – all of whom focused on the impact of Covid on different parts of people's lives. We anticipated that this may negatively impact recruitment as Covid-related news and content was widespread at this time. These predictions were accurate and recruitment was challenging. This difficulty with recruitment was experienced by other members of the 21st Century Behavioural Surveillance group (Nathan Lachowsky, personal communication, May 2021).

5.3. Results

Four hundred and fifty-six (n=456) people took part in this study; 56 (12.2%) of whom reported taking part in the prior SMMASH3 survey. The number of participants who took part in both studies is too small to offer meaningful separate analyses. I felt it was important to acknowledge that a percentage of the sample took part in both studies as is the case for many repeated surveys (Steel & McLaren, 2009), and to run tests for 'independent' samples.

However, it is important to be mindful of this caveat when interpreting the data. The comparisons made in this chapter are between the SMMASH Pan sample and those who completed the online healthcare questions in SMMASH3 (Chapter 4, Section 4.3.2.).

5.3.1. SMMASH Pan demographics

The sample's demographic data is presented in Table 16. The sample was predominantly White (96.5%) and the majority identified as gay (82.9%). Very few participants identified as trans men (n=15, 3.3%). Age was the only demographic it was appropriate to perform statistical analyses on given the small number of responses violated the parameters of different tests for other variables (Field, 2013). Age was not normally distributed within the samples therefore a Mann-Whitney U test was more appropriate than t-test (Dancey & Reidy, 2004; Field, 2013). Age did not differ between participants in SMMASH3 and SMMASH-Pan (U=160658.5, z=-0.89, p=0.37).

Table 16. SMMASH Pan participants' demographic information

	Whole sample (n=456)	**Current PrEP users (n=68)**
Age (years)		
Mean (SD)	39.8 (14.8)	40.9 (14.0)
Median [IQR]	37 [27,52]	40.5 [29,51]
Ethnicity		
White Scottish	311 (68.2%)	48 (70.6%)
White British	88 (19.3%)	8 (11.7%)
White Irish	11 (2.4%)	2 (2.9%)
Any other white background	30 (6.6%)	6 (8.8%)
*Any other background**	13 (2.8%)	3 (4.4%)
No response	3 (0.7%)	1 (1.5%)
Gender		
Male	411 (96.7%)	68 (100.0%)
Trans man	15 (3.3%)	0 (0%)
Sexual orientation		
Gay	378 (82.9%)	65 (95.6%)
Bisexual	69 (15.1%)	3 (4.4%)
Straight	1 (0.2%)	0 (0.0%)
Other	6 (1.3%)	0 (0.0%)
No response	2 (0.4%)	0 (0.0%)

Note: *When the number of people reporting an ethnicity was <5, I collapsed these into "Any other background" to avoid potentially disclosing participants (most were n=1). This was important for confidentiality but I acknowledge that this does somewhat erase non-White representation.

5.3.2. PrEP use

Sixty-eight (14.9%) participants reported being on a PrEP regimen at the time of the survey: 35 (7.7%) were on a daily PrEP regimen, 2 (0.4%) reported taking PrEP on alternating days, and 31 (6.9%) reported taking event-based PrEP. Twenty-eight (6.2%) participants reported that they had taken PrEP in the past but had stopped. Thirty-two (7.1%) participants had never heard of PrEP and 324 (71.7%) had heard of PrEP but never used it. Of the 28 participants in SMMASH Pan who had discontinued PrEP, 46.4% had stopped over 6 months prior to completing the SMMASH Pan survey, and 28.6% reported having stopped PrEP since the beginning of the first Covid lockdown in Scotland (mid-March 2020). The most commonly reported reasons for stopping PrEP were: entering a stable relationship where the risk of acquiring HIV was low (n=10, 35.7%); not having sex because of Covid (n=10, 35.7%); and too much testing and too many clinic visits (n=3, 10.7%). The full list of reasons reported is presented in Table 17.

Table 17. Reasons for discontinuing PrEP (SMMASH Pan) (n=28)

Reason	N	%
I entered a stable relationship where my risk of getting HIV was low	10	35.7
I'm not having sex because of COVID-19	10	35.7
Too much testing and clinic visits	3	10.7
I was worried about possible consequences of long-term PrEP use	2	7.1
I kept forgetting to take my PrEP	2	7.1
I can no longer access PrEP	2	7.1
My doctor, nurse or other health professional advised me to stop taking PrEP	2	7.1
I was unable to get an appointment due to COVID-19	2	7.1
I'm avoiding clinics because of COVID-19	2	7.1
I experienced side effects	1	3.6
I no longer wanted to have sex without condoms	1	3.6
I could not afford PrEP	1	3.6
My partner advised me to stop taking PrEP	0	0

5.3.2.1. Comparing PrEP use between SMMASH Pan and SMMASH3

Chi-squared analysis suggested that there were differences between the SMMASH3 and SMMASH Pan samples' PrEP use: χ^2=19.84, df=5, p=0.001. Examining the adjusted residuals suggested that a smaller proportion of the SMMASH Pan sample were taking PrEP daily (7.7% compared to 13.8% in SMMASH3), and a larger proportion reported having

discontinued PrEP (6.2% compared to 3.0% in SMMASH3) – the adjusted residuals were -3.2 and 2.6, respectively.

5.3.3. Online health behaviours

5.3.3.1. Past performance and willingness

Participants were asked to report which online health behaviours, if any, they had performed in the past 12 months (see Figure 23). Searching for health information online was the most frequently reported behaviour (n=345, 75.5%) and accessing results was the least frequently reported (n=56, 12.3%). The PrEP users' data is presented separately in Figure 24 and while some behaviours appear higher, no statistical analyses were performed to compare PrEP users and the rest of the sample; moreover, these figures were from a relatively small sample. Participants were also asked to report what online health behaviours they would be willing to perform in the future. At least 70% of participants were willing to perform each behaviour in the future – this was true for the whole sample and PrEP users, specifically. Only 4.8% (n=22) of the whole sample reported that they would be unwilling to perform any of the behaviours.

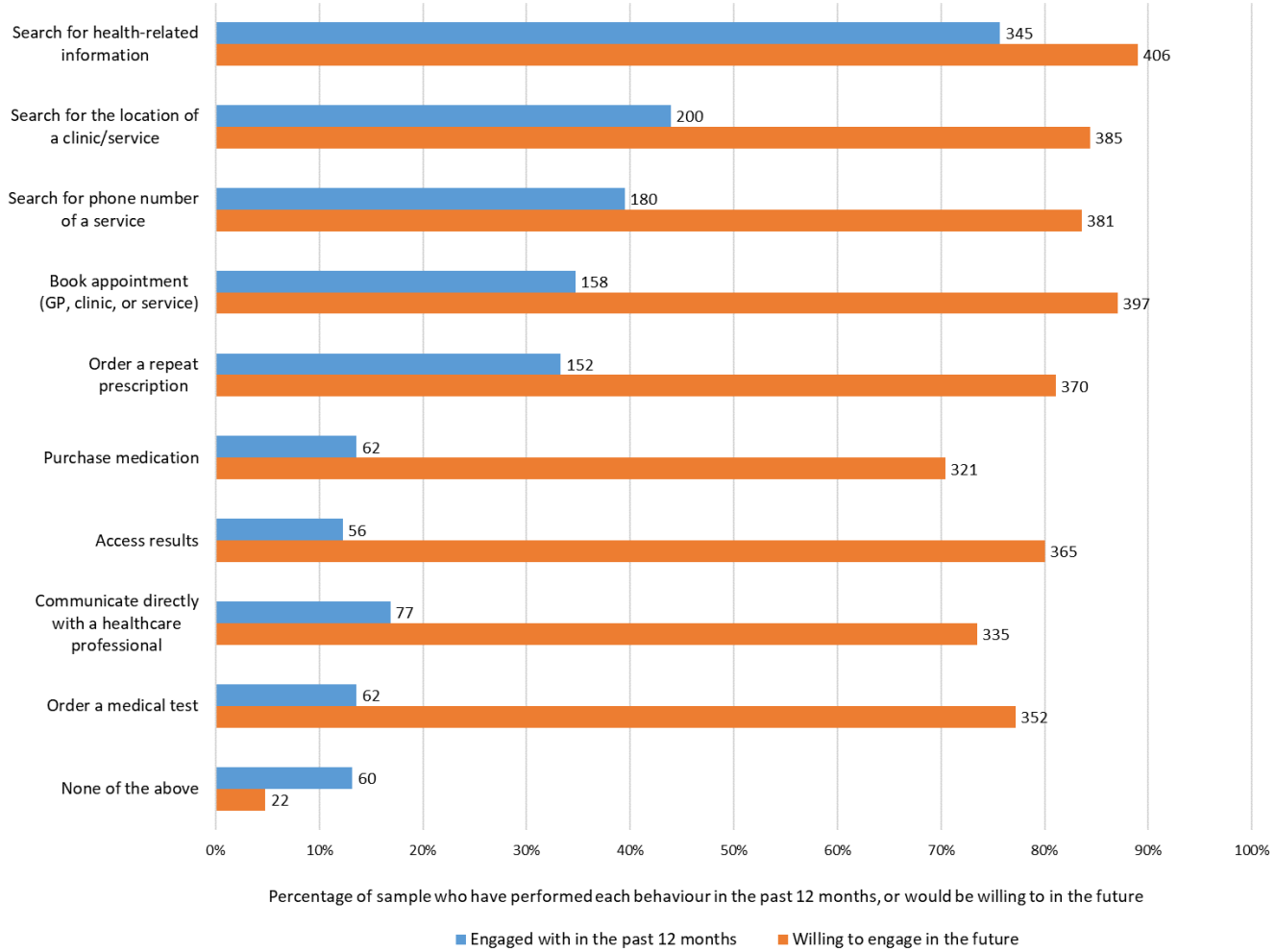


Figure 23. Whole sample's online health behaviours in the past 12 months and proportion willing to perform each behaviour in the future (SMMASH Pan) (n=456)

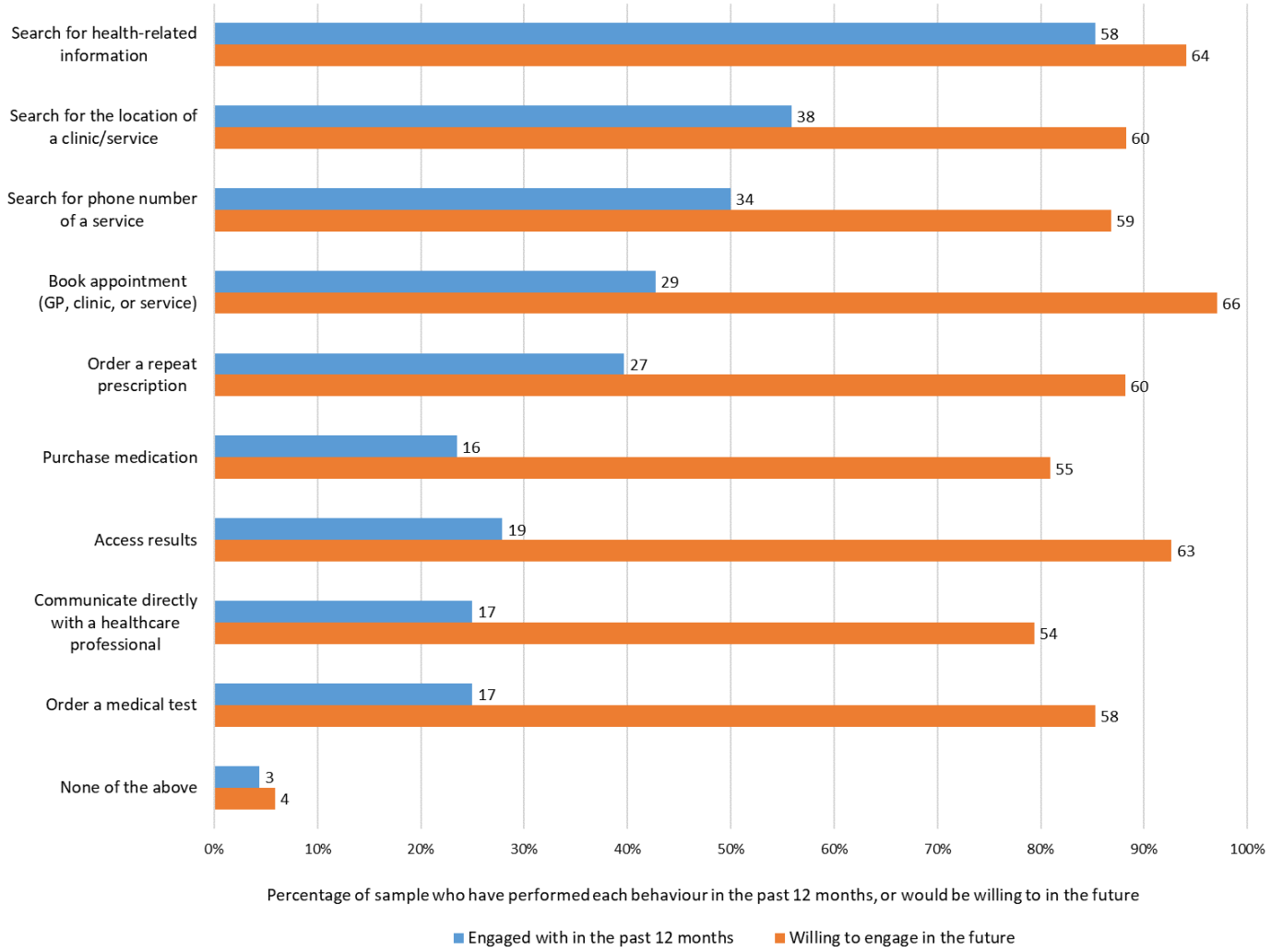


Figure 24. PrEP users' online health behaviours in the past 12 months and proportion willing to perform each behaviour in the future (SMMASH Pan) (n=68)

5.3.3.1.1. Comparison between SMMASH3 and SMMASH Pan

I compared the proportions of participants who had performed each of the online health behaviours in the past 12 months in SMMASH3 and SMMASH Pan using continuity corrections – see Table 18. Considering the whole sample, a lower proportion of participants in SMMASH Pan reported searching for the location of clinic/service (χ^2=10.95, df=1, p=0.001) and the phone number of a clinic/service (χ^2=5.34, df=1, p=0.02) in the past 12 months than in SMMASH3 – this was not sustained when looking specifically at current PrEP users. A higher proportion of participants in SMMASH Pan reported communicating with a healthcare professional online in the past 12 months (χ^2=18.08, df=1, p<0.001) and were willing to in the future (χ^2=4.01, df=1, p=0.04) compared to SMMASH 3. This difference was sustained when looking at PrEP users only (χ^2=16.28, df=1, p<0.001; χ^2=4.24, df=1, p=0.04). Finally, a higher proportion of all SMMASH Pan participants had ordered a medical test online in the previous 12 months than in SMMASH3 (χ^2=6.27, df=1, p=0.01), and this was sustained when looking specifically at current PrEP users (χ^2=9.22, df=1, p<0.01).

Table 18. Continuity corrections comparing the proportion of participants in SMMASH3 and SMMASH Pan who performed each behaviour in the past 12 months, or who were willing to perform the behaviours in the future

	Past use				Willingness			
	Whole sample		PrEP users		Whole sample		PrEP users	
Behaviours	χ^2	p	χ^2	p	χ^2	p	χ^2	p
Search for health-related information	0.02	0.89	0.38	0.54	2.89	0.09	2.90	0.09
Search for location of a clinic/service	**10.95**	**0.001**	1.66	0.20	0.22	0.64	0.76	0.38
Searched for phone number of service	**5.34**	**0.02**	0.32	0.57	0.02	0.90	0.06	0.80
Booked appointment (GP, clinic, or service)	1.19	0.28	0.12	0.74	0.00	0.96	2.15	0.14
Communicate directly with HCP (email/video)	**18.08**	**<0.001**	**4.01**	**0.04**	**16.28**	**<0.001**	**4.24**	**0.04**
Order a medical test	**6.27**	**0.01**	**9.22**	**<0.01**	0.00	>0.99	0.68	0.41
Access results	0.91	0.34	3.54	0.06	0.01	0.93	2.81	0.09
Order a repeat Rx	0.00	>0.99	1.67	0.20	1.78	0.18	0.01	0.94
Purchase medication	1.46	0.23	0.55	0.46	0.05	0.82	1.01	0.32
None of the above	1.76	0.19	0.03	0.87	0.61	0.43	0.19	0.67

Note: all degrees of freedom (df) = 1

5.3.3.2. Provision of, and willingness to provide, information online

Participants were asked what types of information they had provided online, if any, in order to access health services in the past 12 months (see Figure 25). Each type of information measured had been provided by fewer than 30% of participants and the majority had not provided any of the types of information online in the past 12 months to access health services. PrEP users' data are presented separately in Figure 26 and seem to be comparable with that of the whole sample. Participants were also asked what types of information they would be willing to provide in the future in order to access health services. At least 75% of participants were willing to provide each of the types of information in the future and only 7.8% (n=35) reported that they would be unwilling to provide any. When looking specifically at PrEP users, at least 85% were willing to provide each type of information online in the future to access health services and all were willing to provide at least one type of information.

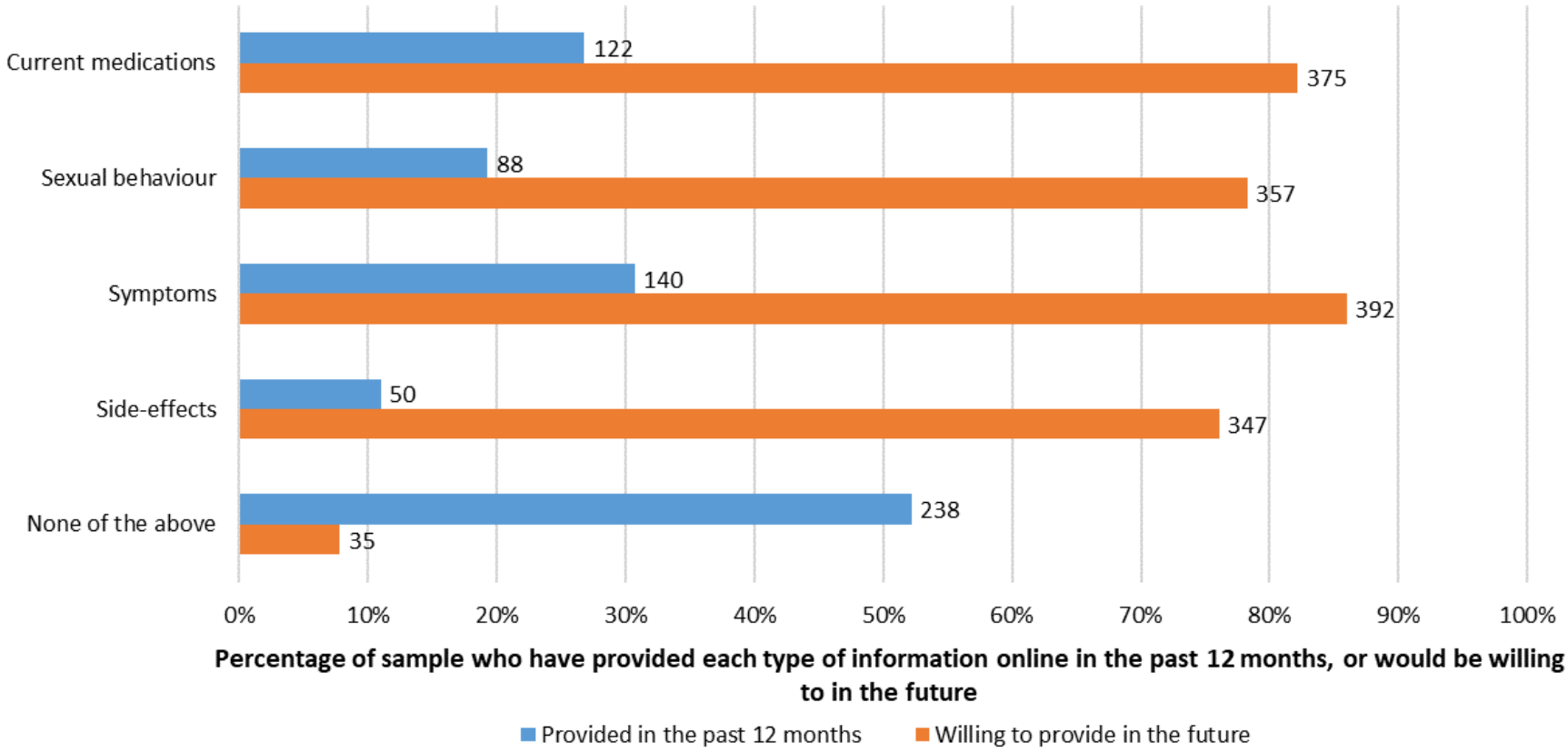


Figure 25. The proportion of the whole sample who reported providing each type of information online in the past 12 months, or who were willing to provide each type of information online in the future, to access health services (SMMASH Pan) (n=456)

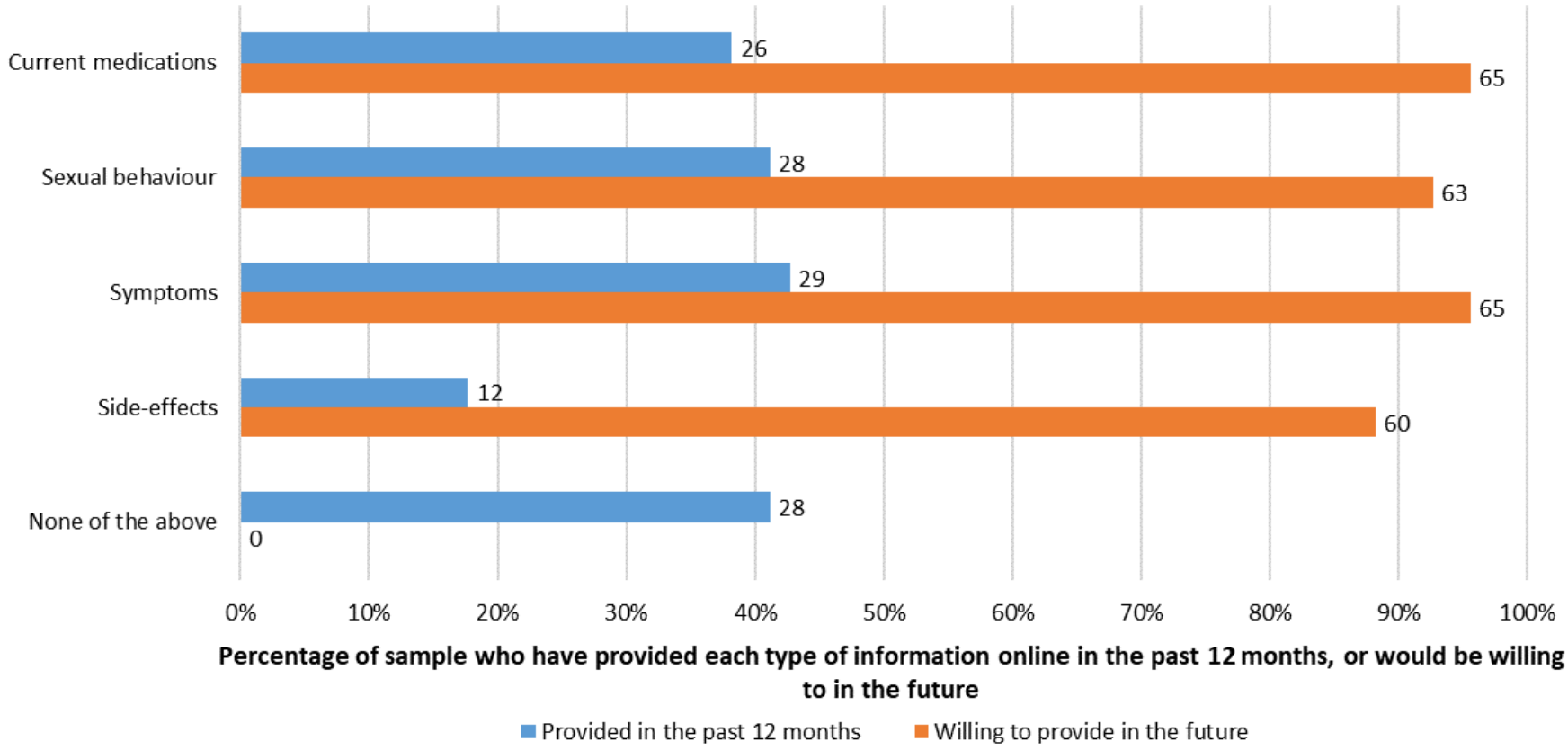


Figure 26. The proportion of the whole sample who reported providing each type of information online in the past 12 months, or who were willing to provide each type of information online in the future, to access health services (SMMASH Pan) (n=68)

5.3.3.2.1. Comparison between SMMASH3 and SMMASH Pan

I compared the proportion of participants who had provided each type of information online in the past 12 months in SMMASH3 and SMMASH Pan using continuity corrections – see Table 19. There were no statistically significant differences when looking at the sample as a whole. When considering PrEP users only, a higher proportion of participants in SMMASH Pan reported that they provided information about symptoms they were experiencing online in the past 12 months in order to access health services compared to SMMASH3 (χ^2=5.26, df=1, p=0.02). Also, a higher proportion of PrEP users in SMMASH Pan were willing to provide information about their sexual behaviour online in order to access health services compared to SMMASH 3 (χ^2=4.23, df=1, p=0.04).

Table 19. Continuity corrections comparing the proportion of participants in SMMASH3 and SMMASH Pan who provided information online in order to access health services in the past 12 months, or who were willing to provide information online in order to access health service in the future

	Provided in the past				**Willing to provide in the future**			
	Whole sample		**PrEP users**		**Whole sample**		**PrEP users**	
Information about…	**χ^2**	**p**	**χ^2**	**p**	**χ^2**	**p**	**χ^2**	**p**
Symptoms	1.89	0.17	**5.26**	**0.02**	2.95	0.09	3.40	0.07
Sexual behaviour	0.06	0.81	2.00	0.16	1.16	0.28	**4.23**	**0.04**
Current medications	1.68	0.20	0.13	0.72	0.00	>0.99	1.69	0.19
Side-effects	0.00	>0.99	0.10	0.75	2.60	0.11	2.15	0.14
None of the above	2.52	0.11	2.64	0.10	0.66	0.42	3.77	>0.05

Note: all degrees of freedom (df) = 1

5.3.3.3. Device use and willingness

The vast majority of participants used smartphones (n=437, 95.8%) and/or computers (n=389, 85.3%) on a weekly basis (see Figures 27 & 28). A minority (n=183, 40.1%) reported using a tablet on a weekly basis. The majority of participants had also used a smartphone (n=328, 71.9%) or computer (n=280, 61.4%) to access online health services in the 12 months prior to completing the SMMASH Pan survey. Only 106 (23.3%) reported using a tablet to access online health services in the prior 12 months. Continuing the pattern, the vast majority of SMMASH Pan participants were willing to use a smartphone (n=410, 89.9%) or computer

(n=391, 85.8%) to access online health services in the future, and a smaller majority (n=280, 61.4%) were willing to use a tablet.

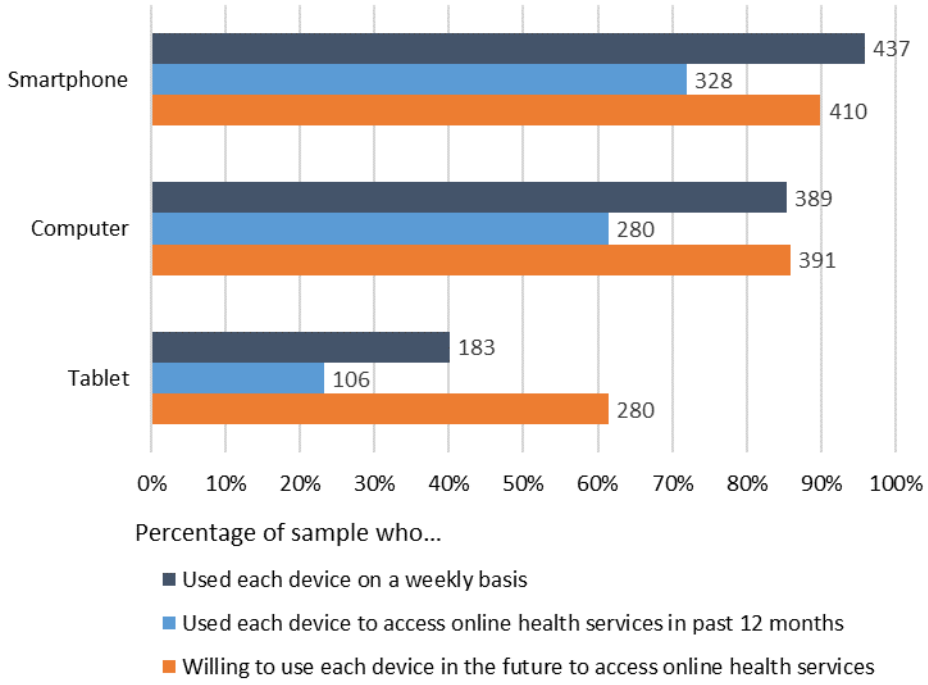


Figure 27. The proportion of the whole sample who reported using each device on a weekly basis, used each device to access health services in the past 12 months, and would be willing to use each device to access health services in the future (SMMASH Pan) (n=456)

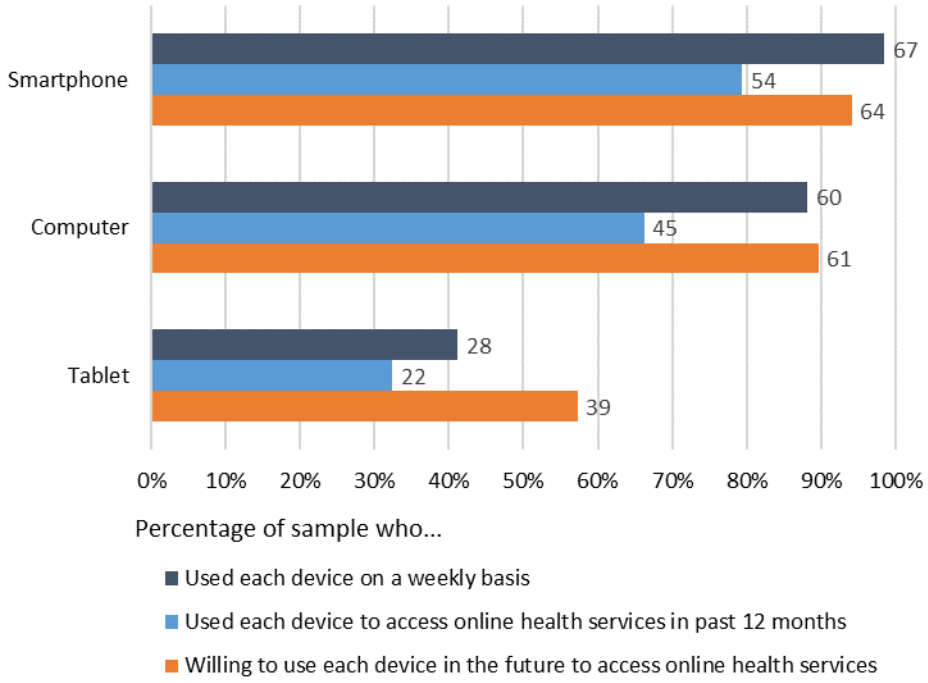


Figure 28. The proportion of current PrEP users who reported using each device on a weekly basis, used each device to access health services in the past 12 months, and would be willing to use each device to access health services in the future (SMMASH Pan) (n=68)

5.3.3.3.1. Device use, and willingness, by age

Table 20 summarises the sample's device data separated by age. Participants aged 55-64 were more likely, and those aged 34 and under were less likely, to use a tablet on a weekly basis than other age groups (χ^2=33.94, df=5, p<0.001). There were no age-related differences in weekly smartphone (χ^2=10.23, df=5, p=0.07) and computer (χ^2=9.99, df=5, p=0.08) use.

Participants aged 25-34 were more likely, and participants aged 55 and over were less likely, to have used a smartphone to access online health services in the past 12 months than other age groups (χ^2=62.12, df=5, p<0.001). Participants aged 55-64 were more likely, and participants aged 24 and under were less likely, to have used a tablet to access online health services in the previous 12 months (χ^2=24.19, df=5, p<0.001). There were no age-related differences in use of computers in the past 12 months to access online health services (χ^2=4.48, df=5, p=0.48).

Finally, participants aged 25-34 were more likely, and participants aged 65 and over were less likely, to be willing to use a smartphone to access online health services in the future than other age groups (χ^2=35.61, df=5, p<0.001). Participants aged 25-34 were more likely, and participants aged 35-44 were less likely, to be willing to use a computer to access online health

services in the future than other age groups (χ^2=15.76, df=5, p<0.01). There were no age-related differences for willingness to use tablets (χ^2=9.02, df=5, p=0.11).

Table 20. Device data separated by age (SMMASH Pan)

Age Group	Smartphone	Computer	Tablet
Devices used on a weekly basis			
16-24	74 (94.9%)	72 (92.3%)	**18 (23.1%)***
25-34	129 (97.7%)	116 (87.9%)	**42 (31.8%)***
35-44	67 (98.5%)	56 (82.4%)	26 (38.2%)
45-54	87 (94.6%)	74 (80.4%)	43 (46.7%)
55-64	56 (96.6%)	45 (77.6%)	**38 (65.5%)^**
65+	24 (85.7%)	26 (92.9%)	16 (57.1%)
Devices used to access online health service in past 12 months			
16-24	63 (80.8%)	55 (70.5%)	**5 (6.4%)***
25-34	**112 (84.8%)^**	82 (62.1%)	26 (19.7%)
35-44	55 (80.9%)	37 (54.4%)	17 (25.0%)
45-54	60 (65.2%)	54 (85.7%)	26 (28.3%)
55-64	**32 (55.2%)***	35 (60.3%)	**22 (37.9%)^**
65+	**6 (21.4%)***	17 (60.7%)	10 (35.7%)
Devices willing to use to access online health services			
16-24	72 (92.3%)	72 (92.3%)	38 (48.7%)
25-34	**126 (95.5%)^**	**120 (90.9%)^**	86 (65.2%)
35-44	65 (95.6%)	**51 (75.0%)***	43 (63.2%)
45-54	79 (85.9%)	74 (80.4%)	57 (62.0%)
55-64	51 (87.9%)	48 (82.8%)	41 (70.7%)
65+	**17 (60.7%)***	26 (92.9%)	15 (53.6%)

Note: (**^**) adjusted residuals signal that the observed value was significantly higher than expected;
(*****) adjusted residuals signal that the observed value was significantly lower than expected. The threshold for adjusted residuals to signal a significant difference is 1.96 which corresponds to an alpha value of 0.05 (International Business Machines, 2020).

5.3.3.3.2. Comparison between SMMASH3 and SMMASH Pan

I compared the proportion of the whole sample of participants and PrEP users only in SMMASH3 and SMMASH Pan who: 1) reported using each device on a weekly basis; 2) reported having used each device in the past 12 months to access online health services; and 3) reported being willing to use each device to access online health services in the future (see Table 21). There were no statistically significant differences between the two surveys.

Table 21. Continuity corrections comparing the proportion of participants in SMMASH3 and SMMASH Pan who used each device on a weekly-basis, who used each device in the past 12 months to access online health services, and who are willing to use each device in the future to access online health services

	Whole sample		PrEP users	
Weekly use	χ^2	p	χ^2	p
Smartphone	0.00	>0.99	0.00	>0.99
Computer	1.26	0.26	0.00	>0.99
Tablet	2.80	0.10	3.51	0.06
Used in the past 12 months to access online health services	χ^2	p	χ^2	p
Smartphone	0.00	>0.99	0.39	0.54
Computer	0.00	>0.99	0.38	0.54
Tablet	0.62	0.43	0.09	0.77
Willing to use in the future to access online health services	χ^2	p	χ^2	p
Smartphone	2.29	0.13	0.05	0.82
Computer	0.34	0.56	0.26	0.61
Tablet	0.04	0.84	2.08	0.15

5.4. Discussion

In this study, I aimed to understand participants' online health behaviours after the advent of Covid and the stay at home order. Here I briefly discuss the sample's PrEP use and then address each of the research questions set at the start of this chapter. I then discuss the strengths and limitation of the study and present some reflections.

5.4.1. PrEP use and discontinuation

Approximately 15% of the sample were current PrEP users. Compared to SMMASH3, a smaller proportion of the sample were taking PrEP daily and a larger proportion reported that they had discontinued PrEP. This is unsurprising given that meeting people from different households was prohibited at this time (Scottish Government, 2020). Over a quarter of those who had discontinued had done so since the implementation of the first stay at home order. Although the sample size was small, the need for regular monitoring was still highlighted as a reason for PrEP discontinuation. As expected, the Covid pandemic appeared to affect people's use of PrEP. However, this study was conducted in mid-2020, over two years before submission of this thesis so it is likely that the situation has subsequently changed.

5.4.2. RQ1: What online health behaviours have GBMSM performed?

The proportion of the sample who had performed each of the measured online health behaviours in the past 12 months were largely comparable with SMMASH3, although there were some key differences. A smaller proportion of SMMASH Pan participants had searched for the location and/or phone number of a clinic/service in the past 12 months which may reflect the lower availability of services in the early days of the pandemic (Scottish Government, n.d.) or the distanced model of care adopted by services (Henderson et al., 2022a) – note this question was not specific to sexual health. These difference were not present when looking specifically at PrEP users although the sample size was much smaller so the likelihood of type 2 errors was greater (Dancey & Reidy, 2004). A higher proportion of SMMASH Pan participants reported communicating directly with a healthcare professional online in the past 12 months compared to SMMASH3 which likely reflects the adoption of video consultations/appointment during the pandemic, particularly within mental healthcare (Appleton et al., 2021). In addition, a higher proportion of SMMASH Pan participants reported ordering medical tests online in the past 12 months which may reflect the incorporation of online postal self-sampling within sexual health services (C Estcourt, personal communication). A higher proportion of current PrEP users in SMMASH Pan had provided information about symptoms they were experiencing online in order to access health services in the past 12 months than in SMMASH3. This too may be linked to online postal self-sampling for STIBBVs; however, it is impossible to tell from this data. It appeared that the Covid pandemic may have provided some additional opportunities for people to engage with online health services; I explore this further within the qualitative studies (Chapters 6 & 7).

5.4.3. RQ2: What online health behaviours would GBMSM be willing to perform?

The proportion of the sample in this survey who were willing to perform each of the online health behaviours in the future was largely comparable with SMMASH3 aside from two areas. A higher proportion of SMMASH Pan participants were willing to communicate directly with a healthcare professional online compared to SMMASH3. This may be linked to an increased opportunity to access services such as video chat therapy/counselling sessions (Appleton et al., 2021). Alternatively, it may be linked to the need for working from home and the incorporation of video calls in everyday life (Office for National Statistics, 2020). In addition, a higher proportion of current PrEP users were willing to provide information about their sexual behaviour online in order to access health services in SMMASH Pan than in

SMMASH3. This may be linked to the brief introduction of online postal self-sampling at the start of the pandemic or perhaps a wider acceptance of online care. It is encouraging that the high proportion of people willing to engage with online health services was sustained; however, this study was conducted 3-4 months following the first stay at home order so there may be some changes to this.

5.4.4. RQ3: What devices have GBMSM used in order to access health services online?

The proportion of participants who used each device on a weekly basis and used each device to access online health services in the past 12 months were consistent across the two surveys. With that said, I feel it is important to highlight that 85.7% of SMMASH Pan participants aged 65 and older reported using a smartphone on a weekly basis compared to 66.7% in SMMASH3. Although these samples were small it suggests that there may be some changes in the device use in people aged 65+ which could potentially be tied to the extensive changes in technology use afforded by the pandemic; however, further research would be needed given the small number of participants in this age bracket in this study.

5.4.5. RQ4: What devices would GBSMSM be willing to use to access health services online?

The proportion of participants who were willing to use each device was consistent across the two surveys. As in SMMASH3, I did not measure device preference given the limited scope of this follow-up study so it is unclear how this willingness translates into preference. However, I do explore this in Chapters 6 and 7. At this stage, it appears that it may be important to optimise the online PrEP service for both smartphones and computers.

5.4.6. Strengths and limitations

The strengths and limitations of SMMASH3, discussed in Chapter 4, are also applicable to this study. The biggest limitations of this study were that some participants participated in SMMASH3 *and* SMMASH Pan meaning that the samples were not entirely independent. In addition, the recall window for the questions that asked participants to reflect on the past 12 months overlapped as SMMASH Pan started recruiting around three months after SMMASH3 had stopped. With that said, this was a unique opportunity to gather data in a rapidly changing world and I felt it was important to gain an overview or indication of online health behaviours within the context of the Covid pandemic. Given the changeable nature of the Covid pandemic

and regulations, it is likely that some of these data are out of date (particularly the PrEP use data). However, this is to be expected with the initial studies that make up a PhD thesis given the time between data collection and thesis submission.

5.4.7. Reflections

The rapid nature of this study was challenging but ultimately provided me with excellent experience designing and implementing a study within a short timeframe. The study was designed and built in one month and, while I only focused on some of the questions for this study, I was involved in developing new, and adapting old, questions for this survey and created the survey on REDCap with support from Dr Frankis and Dr Mohamed Hammoud. I think the rapid nature of the research project limited the time I had to consider different elements but I think that the study did collect important information and supports the viability of online care within the context of living with Covid. I had to limit the questions I was able to include, and I feel I missed an opportunity by not including the online PrEP acceptability question. However, the sustained high proportion of the sample willing to perform the online health behaviours suggests that online care is still appealing. I put this down to naivety and the stress and rapid pace of preparation for the survey.

I think it is also important to reflect on what the benefits were of collecting data from SMMASH Pan in addition to SMMASH3. The Covid pandemic had an unprecedented impact on research and healthcare provision and caused a great deal of uncertainty. The data collected in SMMASH Pan helped to clarify the extent to which people's willingness to engage with online health services had been impacted by the pandemic (although this data was collected very early, only 3-4 months after the start of the first stay-at-home order). Moreover, it provided an indication that people had moved towards using some online health services; however, it is unclear if any of the trends observed sustained as the pandemic progressed.

5.5. Conclusions

While not originally planned as part of my doctoral research, this study provided an overview of internet-using GBMSM in Scotland's online health behaviours, including their willingness to perform the behaviours in the future. Moreover, the study provided some insight into how these changed in the early days of the Covid pandemic compared to pre-pandemic data. While there were some methodological limitations, the study does further justify the incorporation of digital health into healthcare delivery within Scotland. In the next chapter, I present a semi-

structured interview study which explores the acceptability of the proposed online PrEP service among current PrEP service users.

Chapter 6. Semi-structured interviews with PrEP service users exploring the acceptability of online PrEP care

In this chapter, I present the methods and findings of a qualitative study in which I aimed to explore the acceptability of the proposed online PrEP service among PrEP service users using semi-structured interviews. I start by situating the study within my doctoral research and the wider context by providing the rationale and relevant background information. I then detail the methods used, explaining my decision making process, before presenting and critically discussing the collected data.

6.1. Introduction

In chapters 4 and 5, I presented data from the SMMASH surveys which suggested a high degree of acceptability for online PrEP care and a broad willingness to perform online health behaviours among an online sample of GBMSM. The data also suggested that people's preferences for care are not static and vary depending on the person and their current circumstances (Kincaid et al., 2021b; Kincaid et al., 2021c). I wanted to explore these ideas in more depth and understand the acceptability of each of the stages within the online PrEP service. Collecting further, more nuanced data would help better inform the development of the online PrEP service (Eldredge et al., 2016, p. 242). As a reminder of the proposed structure, the online PrEP clinical pathway is anticipated to comprise of three distinct stages (Estcourt et al., N.D.; Henderson et al. 2022b; Kincaid et al., 2022). The first stage will involve service users ordering, completing and returning a self-sampling kit for HIV and STIs (online postal self-sampling). Service users will then complete an online clinical consultation which will collect the information necessary to determine if further PrEP provision is safe and appropriate. The final stage will be remote provision of the PrEP medication to the service user. This online PrEP pathway will likely replace 2-3 of the quarterly PrEP reviews per year for those who opt to use the service.

It was important to understand service users' past experiences with PrEP care, particularly within the context of the Covid pandemic, in order to understand the context in which the online PrEP service would be implemented and identify any challenges that the online service could help to alleviate. In Scotland, PrEP was retained as an essential service during the pandemic with consultations being completed via phone call rather than in person (Henderson et al., 2022a; Henderson et al., 2022b; Kincaid et al., 2022). This can be viewed as a shift,

driven by necessity during the pandemic, towards the more remote model of care proposed in the online PrEP clinical pathway. Service users still had their samples to test for HIV, STIs and renal function taken in person at the clinic for the most part (Henderson et al., 2022a; Henderson et al., 2022b; Kincaid et al., 2022); although some service users briefly had access to remote sampling via SH24, an online postal self-sampling service contracted by some health boards, at the start of the pandemic (C Estcourt, personal communication). During the pandemic, PrEP was delivered via post – again, moving towards the remote model of care proposed in the online PrEP pathway (Henderson et al., 2022a; Henderson et al., 2022b; Kincaid et al., 2022). I wanted to draw on service users' experiences of this remote provision to understand what impact this more distanced model of PrEP care had on them, and what lessons could be taken forward when developing the online PrEP pathway.

It is important to clarify that the online PrEP pathway will likely not be appropriate for everyone who wishes to use it and that the actual frequency of in-person PrEP reviews will likely depend on the individual service user's health needs and preferences. Common factors requiring consultant level review for ongoing PrEP provision are: renal issues, medication side-effects, and comorbidities (Tittle et al., 2022). The World Health Organization also outlined the 'digital determinants of health' wherein people are only able to access digital health interventions if they have reliable access to the necessary technology and a sufficient level of digital health literacy (Norman & Skinner, 2006; World Health Organization, 2021a). Therefore, it was important to understand people's perceptions around eligibility and suitability, and how they would feel if they were unable to access the online PrEP service.

The online PrEP service is intended to be an opt-in and opt-out service where service users can decide, alongside their healthcare provider, what care is best suited for them based on their current circumstances (C Estcourt, personal communications). Moreover, it is envisaged that all service users will have at least one PrEP review in person each year to ensure they are given the full scope of care which may not be feasible though an online interface/remotely (C Estcourt, personal communications). The frequency of this in-person review may vary between individuals depending on their individual health needs. Therefore, service users will potentially transition between online and in-person PrEP pathways somewhat regularly so I felt it was important to understand how this could be done efficiently from a service user point of view.

As highlighted in the scoping review of online PrEP-related care (Chapter 2), the proposed online PrEP service is anticipated to be the first globally to deliver a fully online, remote pathway for people to complete their PrEP reviews. It is unclear what taking PrEP care out of the clinic setting will do to the service user and provider relationship, nor is it clear how this different model of care will affect how service users view their PrEP care or what their expectations of this service will be. PrEP is somewhat unique in that people take a medication to prevent acquiring a virus rather than treating an existing condition. There is a different dynamic there and so it seemed important to explore this within the interview – to understand what PrEP service users expect from this online model of care.

Within contemporary health psychology literature, the notion of barriers and facilitators are widely used to categorise factors which influence people's engagement with health interventions (Légaré & Zhang, 2013). I felt it was important to understand what PrEP service users anticipated would be important barriers and facilitators for the online PrEP service. I was aware that these would be hypothetical but also felt that they would be informed by service users' past experiences of face-to-face and telephone-based care, and would provide crucial insights into potential challenges which could be planned for during the developmental process.

The aim of this study was to explore current PrEP users' views on the acceptability of online PrEP care. I set the following research questions:

1. What were people's experiences of accessing PrEP during the COVID-19 pandemic and how might this help inform online, remote PrEP care in the future?
2. What is the acceptability of an online, automated PrEP consultation?
3. What is the acceptability of self-sampling to test for HIV and STIs within the context of an online PrEP service?
4. What barriers and facilitators might affect people's engagement with an online PrEP service and how might anticipated challenges be overcome?
5. What is the optimal way(s) for people to transition between online and traditional PrEP care pathways?
6. Who might the online PrEP service be appropriate for and who might be better suited to in-person or telephone-based care?
7. How can GBMSM be supported to use the online PrEP service?

6.2. Methods

6.2.1. Methodology summary

The full methodological considerations were presented in Chapter 3. In summary, a qualitative approach was taken to address the aim and research questions for this study given the exploratory nature of the questions and the need for rich, nuanced data concerning people's thoughts, feelings and experiences (Creswell & Clark, 2018; Creswell & Creswell, 2018; Shorten & Smith, 2017). This also allowed me to build upon the findings from the SMMASH studies (Chapters 4 and 5), adding depth to these findings.

6.2.2. Study design

I considered focus groups for this study as they provide the potential for rich discussions (Barbour, 2007); however, I felt semi-structured interviews were more appropriate for several reasons. Firstly, I was conscious that I would be introducing participants to new information during the study – specifically, what the online PrEP service was and what would be required from them when using it. While I strived to make this information clear and provided a diagram to aid communication, I anticipated that people may have questions, want parts clarified, and understand the information at different speeds which may not have worked well in a group environment. I felt this process would be easier for participants if it were done on a 1:1 basis. Secondly, I wanted to explore individual experiences – which are better captured in a 1:1 setting (Balfour, 2007, p. 18). Thirdly, while I did not anticipate that this study would touch on particularly sensitive topics, I did acknowledge that participants may choose to disclose experiences that may be difficult for themselves or others to process (Balfour, 2007, p. 18). Fourthly, I wanted to cover a wide range of topics while getting detailed answers from participants which I anticipated would be challenging to balance. It would not have been feasible to collect rich data on this wide array of topics in a focus group setting without having a lengthy session which may have been burdensome for participants. Finally, semi-structured interviews provided more flexibility when scheduling, particularly when the interviews would be conducted remotely, and it was anticipated that some people may opt for a phone call and others for a Microsoft Teams call.

I chose semi-structured interviews over other interviewing methods (e.g. structured, unstructured) because I wanted to explore participants' views and experiences relevant to the concept of online PrEP care and the components of the online PrEP clinic, and have the flexibility to explore ideas that participants brought which perhaps did not fit with the topic

guide: this is a strength of the semi-structured interview design (Creswell & Clark, 2018; Creswell & Creswell, 2018; Low, 2013; Qu & Dumay, 2011). The semi-structured topic guide I developed allowed me to have a mix of specific questions about the online PrEP service, wider questions about thoughts, feelings and experiences of healthcare, and the flexibility to follow ideas introduced by the participant which did not appear on the guide itself (Low, 2013; Qu & Dumay, 2011).

All correspondence with participants and data collection was conducted remotely via email, REDCap and Microsoft Teams. Prior to the Covid-19 pandemic, I had originally designed the study so that data collection would take place in person or via phone call. I had to redesign the study in response to the pandemic and decided to offer participants the choice between Microsoft Teams video or voice call, and phone call. Microsoft Teams was the method of video call preferred and supported by GCU and offered the ability to share the study diagram (which I felt was important for explaining the online PrEP service to participants) and to still have a face-to-face interaction, albeit virtually, if the participant wanted. I anticipated that the remote data collection may limit rapport building; however, I found that this was not the case. No participant opted for a phone interview and all but one chose to share their camera which made the interviews still feel personal. It was my preference that the interviews were conducted via video call because I wanted to see participants' body language so that I could pick up on cues; however, I did not mention this and let the participants decide the method of interview.

The target population of this doctoral research was gay, bisexual and other men who have sex with men (GBMSM). Therefore, I sought to recruit people who self-identified as male and specified that this included cis- and transgender men to emphasise that trans men were included. In hindsight, I query whether this was the best way to frame the eligibility criteria and if it reflected contemporary ideas around gender identity – I explore this more in depth in Chapter 8. Eligible participants had to have reported having had sex with a man in the last 24 months. This was originally 12 months to coincide with the Scottish PrEP eligibility criteria timescales at that time (Health Protection Scotland, 2019a); however, I decided to extend this just prior to starting recruitment so that the study could include people who may have stopped having sex temporarily because of the Covid-19 pandemic. For context, data collection for this study occurred over a year after the first stay-at-home-order. Similarly, participants had to report using PrEP in the last 24 months – this too was extended from 12 months to open the

study to people who may have temporarily stopped PrEP because of the pandemic. Participants had to have access to a device through which they could access Microsoft Teams and email, or receive a phone call and text messages so that they could be contacted and interviewed. Participants were eligible if they currently lived in Scotland and were aged 18 years or older. Participants had to be able to speak and read English well enough to take part in an interview. According to the 2011 Scottish census, 98.6% of people in Scotland speak English and 93.8% could speak, read and write English (Scotland's Census, 2021). Therefore, for the purpose of this study, it seemed appropriate to limit participation to only those who could speak and read English well enough to participate in an interview. The eligibility criteria are presented in Table 22.

Table 22. Eligibility criteria presented to participants

Eligibility criteria
• Identify as male (both cis and trans men)
• Live in Scotland
• Aged 18 years or older
• Have had sex with a man in the last 24 months
• Have accessed PrEP in the last 24 months
• Have access to a computer, tablet or smartphone
• Be able to understand what the study is asking from you and consent to this
• Be able to read and speak English well enough to participate in an interview

6.2.3.2. Sampling strategy

I implemented purposive sampling in this study because I wanted to understand the views of people from a range of ages and ethnicities (Etikan et al., 2016; Palinkas et al., 2015). There are documented disparities in digital health literacy and use of technology between different age groups (Honeyman et al., 2020). Moreover, in studies conducted in the USA, this disparity seems to be more pronounced in ethnic minority groups (Mitchell et al., 2019; Yoon et al., 2020). I originally planned to recruit purposively based on rurality; however, I decided to drop this during the redesigning of the study due to Covid-19 and the switch to a single NHS site which I explore further in Section 6.2.3.3. I also wanted to ensure that I recruited some trans participants for the study given the documented inequalities experienced by trans people when accessing healthcare (Avert, 2019b; Leven, 2020).

6.2.3.3. Recruitment strategy

Participants were recruited in two ways: 1) from the cohort established through the SMMASH Pan study; and 2) from an urban NHS sexual health service. Recruiting from both sources seemed advantageous as they appeared to complement certain biases each exhibited. Cohort members were mainly recruited through social-sexual media denoting a certain level of digital literacy or familiarity. Cohort members were not guaranteed to be routinely engaged with NHS services. Moreover, the cohort members had already participated in a 30+ minute survey with no reimbursement, suggesting a level of altruism or interest in research (Sheridan et al., 2020). The cohort did not exhibit a great deal of diversity in terms of ethnicity; however, it was generally representative of the Scottish population (Scotland's Census, 2021b) and the availability of existing data meant that purposive sampling would be efficient. NHS service users could be seen as complementary to the cohort as there was no guarantee of digital proficiency above having the capacity to book appointments online, nor was there guaranteed sociosexual media use. NHS service users were also likely engaged in routine PrEP care. Therefore, it seemed advantageous to sample from both the SMMASH cohort and the NHS site.

I obtained permission to recruit through third sector organisations (HIV Scotland and Waverley Care). These were arranged as additional methods of recruitment in case recruitment proved challenging through the cohort and NHS. I felt it was necessary to have this arranged because of the challenges experienced when recruiting for the SMMASH studies. However, ultimately, this was not necessary as I obtained a sufficient sample from the NHS and SMMASH sampling.

When deciding what the appropriate target sample size would be for this study, I considered the purpose of the project as well as the concept of saturation. Saturation is controversial and is often conceptualised in different ways (Sebele-Mpofu, 2020). For this pragmatic, formative piece of research, reaching saturation was arguably less important than it would be within other studies that, for example, implemented grounded theory (Saunders et al., 2018). Within the literature, some argue for smaller sample sizes since they afford more time to spend conducting detailed analyses of each transcript (Creswell, 2014; Roy et al., 2015; Sebele-Mpofu, 2020); others question the credibility of studies that use smaller samples and argue for a larger sample size (Mason, 2010; Sebele-Mpofu, 2020) although this is criticised for potentially glossing over some of the nuance within the data (Creswell, 2014; Sebele-Mpofu, 2020). Ultimately, it seems that it depends on the individual study. I was also conscious that I

wanted to obtain a diverse sample which potentially made saturation unfeasible within the context of a PhD where there are limited resources and time (Guest et al., 2006; Mason, 2010; Sebele-Mpofu, 2020). A more homogeneous sample may lead to quicker saturation given the likelihood of more similar experiences (Guest et al., 2006; Mason, 2010; Sebele-Mpofu, 2020). Therefore, I had to consider how to balance diversity and saturation with the parameters of the PhD. The purpose of this study was to gain a depth of understanding, as opposed to a broad, representative overview (Rosenthal, 2016) – which was achieved in the SMMASH surveys. I decided on recruiting approximately 12-15 as I planned on covering a wide scope of topics and aimed to recruit purposively based on age, ethnicity, and trans identity, but this was an approximation and I intended to let the data guide me. I felt this was a balance between credibility, taking a detailed approach, and being realistic to what is feasible within the parameters of a mixed-methods PhD.

6.2.3.3.1. SMMASH cohort

Participants who took part in the SMMASH Pan study (Chapter 5) were given the option to consent to being contacted about similar research in the future. The PI of the SMMASH Pan study (Dr Frankis) approved my use of the cohort as a method of recruiting for this study because the SMMASH Pan study and this study both focus on GBMSM and issues relating to PrEP and digital health. To identify potential participants, I created a report within REDCap (REDCap, n.d.) which searched the dataset for cases who met the following criteria: had consented to being contacted about similar research in the future; were aged 18 years or older; resided in Scotland; and indicated ever having used PrEP. This returned 35 potential participants. I emailed five cohort members at a time to invite them to find out about the study, with a single follow-up email a week later if they had not replied to the initial email. I repeated this four times (n=20 cohort members contacted). I took this approach so that I could control the rate of recruitment and sample purposively based on who had already responded. The 20 cohort members yielded four interviews. At this stage I had contacted all who seemed to fit with the purposive sampling and I decided to switch focus to the NHS recruitment with a view of returning to the cohort if NHS recruitment was low.

In the initial contact email there was a brief introduction to the study and a link to the study website where the cohort members could access the participant information leaflet and complete an online expression of interest and demographics form hosted by REDCap. The expression of interest and demographics form first checked participants' eligibility (ineligible

participants were thanked for their time and their responses were not saved). Eligible participants were then invited to provide informed consent to allow their responses to the eligibility questions to be saved and, if they gave consent, they were also asked to complete some further demographic questions. Participants were informed that their completion of this form did not guarantee an interview but that they would be contacted regardless and their data destroyed if they were not invited for an interview. I then contacted eligible participants to arrange an interview at a mutually convenient time.

6.2.3.3.2 NHS service users

Participants were also recruited from Sandyford Sexual Health Services, an urban NHS sexual health service in the centre of Glasgow which is the primary provider of sexual healthcare in the NHS Greater Glasgow and Clyde health board. In the first two years of PrEP implementation in Scotland, NHS Greater Glasgow and Clyde provided 41% of all PrEP in Scotland making Sandyford an ideal site for recruitment for this study (Health Protection Scotland, 2019a). There were also longstanding, close working relationships between Sandyford and my supervisory team – Prof Claudia Estcourt is a consulting physician at Sandyford and Dr Jenny Dalrymple previously worked there as a sexual health nurse. Dr Lindsay Henderson, who, along with Prof Estcourt and Dr Jo Gibbs, conducted a study that cognitively tested the online clinical consultation component of the online PrEP service, was the lead recruiter for the study within Sandyford. This was advantageous as Dr Henderson's study ran parallel to mine and both studies could be offered to service users simultaneously, further reducing the burden, albeit small, placed on the clinic.

Service users who already accessed PrEP at Sandyford were asked if they would be interested in participating in the study at the end of their PrEP appointment. Service users were given a short verbal introduction to the study by Dr Henderson who then texted a link to an electronic participant information leaflet via the national patient records system (NaSH) if they were interested in finding out more about the study. The service users were also asked if they consented to a follow-up phone call with Dr Henderson to further discuss participation – this verbal consent was noted in their patient notes. Dr Henderson then phoned the service users, screened their eligibility, discussed participation in the two studies (the cognitive interviews and my study) and scheduled them to take part in either or both. My interview was conducted first so that participants would not have been exposed to the clinical consultation ahead of my interview. This ensured there was consistency with participants recruited through the cohort

who were not recruited into Dr Henderson's study. Dr Henderson then passed participants' details to me via a phone call, and I entered these directly into a password protected, encrypted file, then contacted the participant to arrange an interview at a mutually convenient time.

I had originally also planned to recruit from NHS Grampian. Much of NHS Grampian is considered rural (Scottish Government, 2018) and I was interested in understanding the views of people who live more rurally given how geographic barriers can affect PrEP access, and how digital health methods can overcome geographic barriers (Chasco et al., 2021; Hottes et al., 2012; Knight et al., 2019; Maksut et al., 2016; Minichiello et al., 2013; Scottish Government, 2018; Witzel et al., 2019). However, I decided that this would no longer be feasible given the restrictions that were in place at the time and the uncertainty around the Covid-19 recovery timeline. I had close links with Sandyford and Dr Henderson was able to recruit for my study alongside hers which meant that the process was streamlined and minimally disruptive. In retrospect, I feel that there may have been scope to still recruit from Grampian; however, there were still restrictions in place and a great deal of uncertainty around the long-term impact of the pandemic at the time of data collection. I acknowledge this may have been a missed opportunity but the decision to focus on Sandyford felt appropriate at the time. This led me to decide not to recruit purposively based on rurality.

6.2.4. Development of study materials

6.2.4.1. Participant information sheet

I used the GCU participant information sheet template developed by the GCU Nursing and Community Health ethics committee (Glasgow Caledonian University, 2020a) as the basis for my participant information sheet. I ensured that I considered and addressed key issues by consulting participant information sheets of studies that used similar methods, targeted a similar population, and covered somewhat similar topics (Frankis, 2020; MacDonald, 2018). I created separate participant information sheets for each of the recruitment methods so that the process was clear for participants and they were not confused by any information irrelevant to their recruitment stream (see Appendices 10 & 11).

6.2.4.2. Expression of interest and demographics form

Similar studies had implemented a paper-based expression of interest form where participants were recruited through a physical NHS site when attending for an appointment,

and would provide contact information on an expression of interest form and put this in a secure box in the waiting area of the clinic (MacDonald, 2018). I could not implement the same method because some participants were being recruited online and the PrEP consultations were being conducted via phone call. I decided to create an online expression of interest form instead using REDCap (REDCap, n.d.) (see Appendix 12). This would also provide an opportunity to check eligibility and to collect demographics data to aid purposive sampling.

The expression of interest form started by presenting the participant information sheet to ensure that participants had the opportunity to read this before proceeding. Participants were then asked questions related to the eligibility criteria (see Table 23). If participants provided an answer that did not match the inclusion criteria, a message appeared thanking them for their time. Once eligibility had been confirmed, participants were directed to the consent page where they were asked to provide consent to store the data already entered, to store the data from the demographics questions that would follow, and to be contacted by me. If participants provided this consent they were directed to the demographics questions. If participants did not provide consent, they were thanked for their time and their data was not retained. Participants were then asked to provide contact information and choose their preferred methods of being contacted and for taking part in an interview. The ethnicity questions were sourced from the 2011 Scottish Census (Scotland's Census, n.d.). The gender and sexual orientation questions were sourced from Stonewall – an organisation that supports and advocates for LGBTQ+ people (Stonewall, 2016). Stonewall provides specific guidance on how to ask questions around gender and sexual orientation within research (Stonewall, 2016). The contact information and demographics questions presented to participants are shown in Table 24. All questions and consent forms were reviewed by my supervisory team, experienced healthcare professionals, third sector stakeholders, and lay GBMSM in order to develop the final version presented for ethical approval and subsequently used in the study.

6.2.4.3. Website

In order to link potential participants to the participant information sheet and expression of interest form, I created the study website using Wix.com. The participant information sheet for participants recruited through the SMMASH cohort was available on the website. Participants were linked to the expression of interest and demographics form through a link in the participant information sheet. I also used the website to host the participant information sheets that participants recruited through the NHS site were directed to; however,

this was not visible or accessible to people accessing the website, it merely provided a link through which participants could access it.

6.2.4.4. Consent form

As stated by Kadam (2017, p. 111): *"Informed consent must be viewed as a continuous dynamic process rather than an isolated event during the clinical study"*. While consent is a continual process, explicit, informed consent was sought at two points in this study: 1) in the expression of interest form; and 2) just before the interview. Both consent forms were based on the GCU template (Glasgow Caledonian University, 2020b). The expression of interest consent form was embedded in the form and participants checked the boxes to acknowledge they understood and agreed with each point (see Appendix 12). Participants had to check all boxes to proceed with the rest of the form. If there were any points they did not agree with, they were thanked for their time and the data they had provided up to that point was not saved.

The interview consent form was paper- and audio-based (see Appendix 13). Due to the remoteness of the data collection, verbal consent was sought. I read each of the statements to the participant who responded "I agree" in acknowledgement of each statement. This process was audio recorded and kept separate from all other recordings and information. I simultaneously completed a paper copy of the consent form on the participant's behalf. Participants were offered a copy of the completed consent form but all declined.

Table 23. Eligibility questions for the expression of interest form

Expression of interest form – eligibility questions	
We are looking to recruit gay men, bisexual men, and other men who have sex with men for this study – this includes trans men. Does this apply to you? *If you are non-binary and feel that research on any of the above groups affects you, this study is open to you as well.*	• Yes • No • Not sure
What is your age?	[free text limited to numbers]
Where do you currently live?	• Scotland • England • Northern Ireland • Wales • Other
Have you had sex with a man in the past 24 months?	• Yes • No • Unsure • Prefer not to say
Have you accessed or used PrEP in the last 24 months?	• Yes • No • Unsure • Prefer not to say
Which of the following do you have access to? *Select all that apply.*	• Computer • Tablet • Smartphone • None of the above
Do you speak English well enough to take part in an hour-long interview?	• Yes • No • Unsure • Prefer not to say

Table 24. Contact information and demographic questions from the expression of interest form

Expression of interest form – contact information and demographic questions	
Name	[free text]
Email address	[free text limited to valid email address]
Mobile phone number	[free text limited to numbers]
How would you prefer to be contacted about the study? *Please select all that apply.*	• Text message • WhatsApp message • Phone call • WhatsApp call • Email
What is your preferred interview method? *Please note that you do not have to have a Microsoft Teams account or the application downloaded to select this method. Microsoft Teams interviews can be conducted through your computer's internet browser if you have a webcam and microphone.*	• Phone call • WhatsApp call • Microsoft Teams video call
What best describes your ethnicity?	[options from the Scottish census 2011 (Scotland's Census, 2021b)]
[If 'other'] What is your ethnicity?	[free text]
What best describes your gender?	• Male • Female • Prefer not to say • Prefer to self-describe
[If 'prefer to self-describe'] How do you describe your gender?	[free text]
Do you identify as trans?	• No • Yes • Prefer not to say
What is your sexual orientation?	• Gay man • Gay woman/lesbian • Bisexual • Heterosexual/straight • Prefer not to say • Prefer to self-describe
[If 'prefer to self-describe'] Please describe your sexual orientation.	[free text]

6.2.4.5. Topic guide and pathway diagram

I started developing the topic guide for this study (see Appendix 14) by looking at examples from similar studies (INTUIT, n.d.; Frankis et al., 2018c). I then created a structure based on my research questions and the different stages of the online PrEP pathway. I want to emphasise that at the time of the interview data collection, the online PrEP service was at a very early stage in its development – essentially, the concept and the stages were conceptualised and a concurrent study (Henderson et al., 2022) was developing the questions for the online clinical consultation. I wanted to examine anticipated benefits, challenges, and solutions to those challenges within each of the online PrEP service's stages. The interview would involve participants reflecting on their own experience but also anticipating how they would feel in hypothetical scenarios, the latter of which I felt would be more challenging. I structured the questions so that I began with an open question about the participant's experience of PrEP in general so that they could get used to talking and reflecting on their experience and so I could build some rapport and flow early in the interview. This also made sense narratively, beginning with participants' past experiences of PrEP, PrEP care during Covid-19, and any other digital health services. I felt it was then appropriate to introduce the online PrEP service and wrote a script to ensure that I told each participant the same details in the same way. From there I designed questions exploring participants' thoughts around the online service as a whole before touching on each of the different stages: online postal self-sampling, the online clinical consultation, and the remote provision of PrEP medication. I included questions towards the end that explored ideas of responsibility, equity, and expectations. These were more abstract and so I felt they were better suited to come towards the end as participants would be used to talking and would be more familiar with the concept of the online PrEP service at this point.

The participants needed to have an understanding of what the proposed online PrEP service would involve so they could reflect on how they felt about it. I was aware that this would involve providing them with a lot of information at once. To make this process more manageable, I created a simple diagram that showed each of the stages that would make up the online PrEP service (see Figure 29) which I displayed on the screen when I explained the service to participants.

The topic guide and diagram were reviewed by my supervisory team, experienced healthcare professionals, third sector stakeholders, and lay GBMSM. Moreover, I checked in with my

supervisory team after the first three interviews to make slight alterations to the topic guide as there were some areas where I felt I was not being clear enough. I also removed a line from the script introducing the online PrEP service that mentioned some anticipated benefits of the proposed online PrEP service which seemed leading on reflection although participants still reported these potential benefits in subsequent interviews.

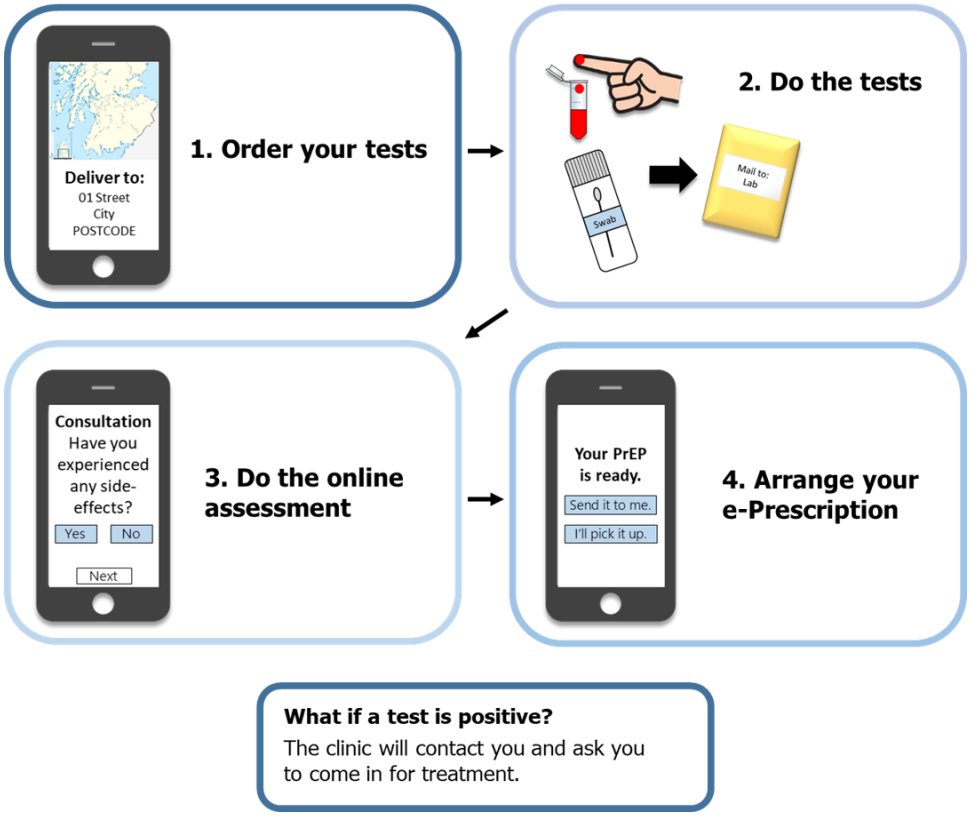


Figure 29. Participant diagram

6.2.4.6. Support document

It was important to provide participants with a list of resources should any difficulties have arisen in the interviews. I developed a support document that included a range of mental and sexual health services so that participants could access support if needed (see Appendix 15). This was sent to participants after each interview and was also available on the study website.

6.2.5. Data collection

6.2.5.1. Prior to the interview

As discussed above, participants provided data before the interview itself. Participants who were recruited through the SMMASH cohort had completed the online expression of interest and demographics survey. Participants recruited through the NHS did not complete this form. Instead, they consented for the lead recruiter at the site (Dr Lindsay Henderson) to pass on their contact information to me. Dr Henderson provided this information via a phone call and I input this information directly into a password protected, encrypted Excel file. We both ensured we were in a private place to have this call. I then contacted participants via their preferred method of communication (all preferred email) and arranged a time for the interview to take place.

6.2.5.2. During the interview

At the time of the interview, the participants and I entered the call, I thanked them for their time and I provided them an overview of what would happen during the interview. I checked they were happy with the interview process and answered any questions they had at this stage. We then completed the informed consent process wherein I started the audio recorder and read each of the statements listed on the consent form. The participants acknowledged their consent by answering "I agree" to each of the statements and I simultaneously initialled next to the statement on a paper consent form.

For participants who were recruited from the NHS, this is the point at which I collected their demographic data. I asked the same questions that were in the expression of interest and demographics form and input their responses directly to a password protected, encrypted Excel file, separate from the rest of their data. For participants who were recruited from the SMMASH cohort, we went straight from the consent process to the interview itself.

I checked that the participant was happy to start the interview recording and switched on the audio recorder. I used the topic guide to structure the interview and to check that we had covered the relevant areas; however, the order of the questions and the length of time spent on each area varied depending on the participant. I felt I needed to rely on the topic guide less as the study progressed but I always ensured I referred back to it – especially before I was about to introduce the proposed online PrEP service as this acted as a useful pause roughly a third of the way through the interview. I made a conscious effort to be present, actively

listening to the participant, and making mental notes of points to revisit. This became more natural as the study progressed. Before finishing the interview, I made sure to check in with the participant and ask if they had anything else they wanted to share before the interview finished. I then stopped the recording, thanked the participant for their time, and reminded them that I would send them an email with their reimbursement (see Section 6.2.7.1.) and support document following the interview.

6.2.5.3. Following the interview

After the interview, I sent the participant an email that included their reimbursement voucher and the support document. I then uploaded the audio files to my university issued laptop, checked the quality and ensured that they were stored in the appropriate folders. I then uploaded the interview audio file to the transcription company's secure system. Finally, I filed the participant's paper consent form.

6.2.6. Data management and analysis

6.2.6.1. Data management

Participants were assigned a record ID at the time they expressed interest in the study – when they completed the online expression of interest form or when their contact details were passed onto me. Participants' contact information was stored in a password protected, encrypted Excel file on my GCU OneDrive account. Participants' demographic information was stored on a different Excel file with the same level of security. The record ID was the only way of linking this data. Participants' paper consent forms were temporarily kept in a secure locked box within a cupboard at my home before being transferred to a secure filing cabinet on GCU premises. The audio recording of their consent was held in a secure file on my GCU OneDrive account, held separately from participants' other data and recordings. The interview audio recording was immediately uploaded to my GCU OneDrive account after the interview. I checked the quality of the audio and then uploaded this to the transcription company's secure online portal. When I received the transcript back, I checked the accuracy, made any corrections, and anonymised the transcript. I then destroyed the corresponding audio file so only the anonymised transcript remained. I imported these transcripts into an NVivo file where analysis was performed as detailed below.

6.2.6.2. Data analysis

I chose the Framework approach (Gale et al., 2013; Spencer & Ritchie, 1994), a form of thematic analysis, for this study for several reasons. Gale et al. (2013) state that a strength of the framework approach is that it is not aligned with a specific methodological stance nor is it tied solely to an inductive or deductive approach. This research takes a pragmatic approach where the methods have been chosen based on what is appropriate for the research rather than subscribing to a specific paradigm/epistemology (i.e. interpretivism or positivism). The flexibility of the framework approach was congruent with this pragmatism (Ritchie et al., 2014). The research questions and the stages of the proposed online PrEP pathway provided a clear basis for the development of the coding framework as follows: experience of PrEP care during the pandemic; experience of other digital health services; the general acceptability of online PrEP care; each of the stages of the online PrEP pathway (online postal self-sampling, online clinical consultation, and remote medication provision); the need for in-person care/transitions between pathways; equity and eligibility; support; and changes in responsibilities and expectations. I also wanted to focus on potential benefits and challenges. I anticipated that these would all work well as an a priori analytic framework. However, it was also important to retain scope to explore ideas that participants brought that may not fit into my coding framework and the framework approach allows for this (Gale et al., 2013). The framework approach also exhibits other advantages such as the ability to provide an auditable, clear pathway from transcript to interpretation and clear steps to follow when conducting and reporting the analysis which I detail below. I followed Gale et al. (2013) who present the Framework approach in seven steps as opposed to the original five (Spencer & Ritchie, 1994) because I thought it would provide further structure for me as someone who was new to this approach (see Figure 30). In hindsight, I think Spencer & Ritchie's approach would have been sufficient given that I found it necessary to revisit some of the steps within the Gale et al framework that would have been dealt with concurrently within Spencer and Ritchie's.

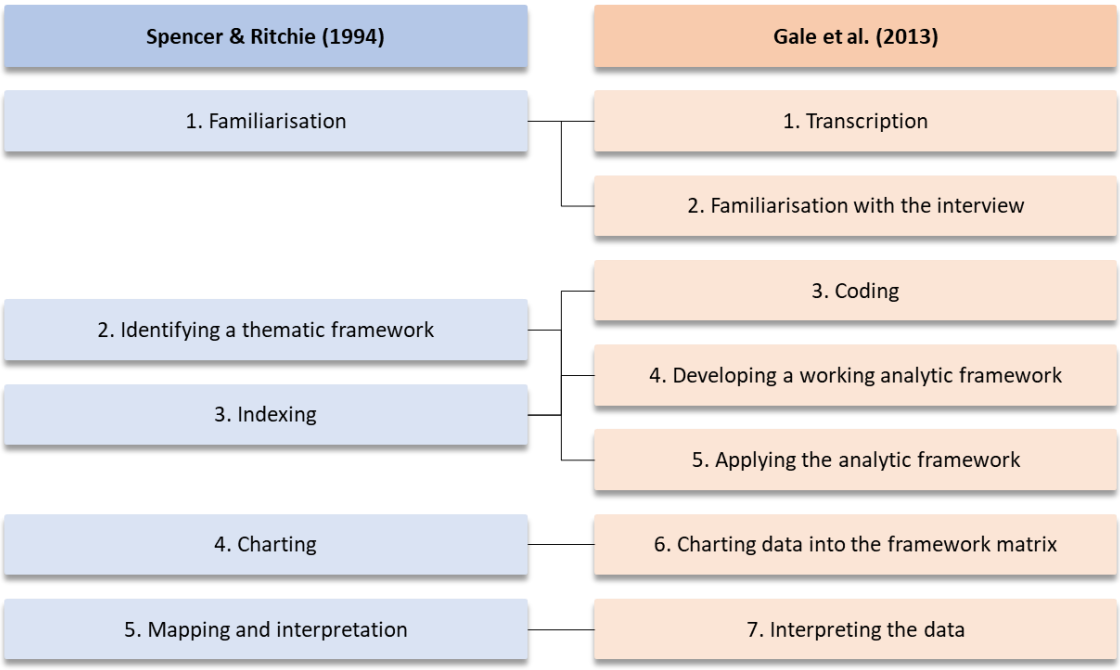


Figure 30. Comparing the Spencer and Ritchie (1994) and the Gale et al. (2013) conceptualisations of the Framework approach

Step one in the Framework approach is transcription (Gale et al., 2013). The transcription for this study was conducted by an external transcription company (1stClass Secretarial). Using a transcription company was advantageous for this study as it helped to regain some of the time lost due to Covid delays and proved a useful learning opportunity for me in relation to ensuring safe and secure data transfer and working with external companies. Gale et al. (2013) highlight the benefit of transcribing the data yourself as it allows you to become familiar with the data. While I acknowledge this benefit, I feel I also had the opportunity to do this when checking the accuracy of the transcripts and anonymising them.

Step two in the framework approach is familiarisation (Gale et al., 2013). As mentioned above, I started to familiarise myself with the data when anonymising the transcripts and checking their accuracy. I made sure to take time to immerse myself in the data and took this opportunity while data collection was still in progress to check my interviewing technique and that I was gathering sufficient data to answer the research questions. I met with my supervisory team after the first three interviews to examine the transcripts and discuss any changes that needed to be made. This process led me to decide that I needed to spend more time focusing on the topics of responsibility and expectations as these were typically at the end of the interview and were not being explored fully. During this step, I also started, albeit tentatively, to identify codes that were not part of the a priori analysis framework.

Steps three to five in the framework approach are coding, developing a working analytic framework and applying the analytic framework (Gale et al., 2013). I discuss these together because I completed them in close proximity and in practice found there was some overlap. I did not take a singularly inductive or deductive approach to coding. I had developed an a priori framework based on the research questions and the different stages of the online PrEP pathway and aimed to identify, where relevant, anticipated benefits, challenges, and solutions to those challenges. However, I also acknowledge the exploratory nature of the study and the novelty of online PrEP care. I therefore intended to have the scope to identify data-driven, emerging areas of interest. For example, I aimed to identify anticipated benefits of the online PrEP service as a whole but I let the data inform what those anticipated benefits were as opposed to specifically looking for concepts such as convenience and privacy. Table 25 shows the final framework where emboldened text signifies the a priori framework and italicised text signifies inductive, data-driven additions to the framework. I completed the process of coding over several rounds. I started by broadly coding the data, separating it into the broader codes represented by Tier 1 in Table 25. I then recoded my data to tease each of these apart, assigning the Tier 2 codes. Where relevant, I then took each of the Tier 2 codes and further separated them into Tier 3 (and beyond). During these stages, I met with my supervisory team to discuss my coding and analytic approach. Once the coding was complete, I revisited each of the transcripts to ensure I had not missed any data relevant to the later developed codes. I had another meeting with my supervisory team to present the data, my process of coding the data, and preliminary themes that had emerged. These preliminary themes were still quite specific, more closely resembling the subthemes outlined in the results section. However, they were grouped by their position within the online PrEP care pathway, or the behaviour they related to, which more closely resembled the final themes.

Step six in the framework approach is charting the data and involves creating matrices to summarise the coded data (Gale et al., 2013). This was a straightforward stage given the ability to automatically generate these matrices within NVivo (NVivo, n.d.). I found this stage very useful as it reduced the somewhat overwhelming volume of data from the transcripts down to clear, concise summaries for each of the codes. This helped me to decide on the final themes.

Step seven in the framework approach is interpreting the data (Gale et al., 2013). While this is technically the final stage of the framework approach, I found I was also interpreting the data

to some extent throughout the various analytical stages because of the use of a dual inductive-deductive approach. With that said, I made a conscious effort to keep an open mind, particularly during data collection but throughout I noticed when data emerged that related to wider issues within digital or sexual health and topics covered in the scoping review and surveys. I met with my supervisors at the beginning of this stage to discuss the data both in terms of importance and relevance, but also how it relates to experiences within a clinic setting. Each of my final themes related to a behaviour within a specific stage or feature of the online PrEP care pathway, or to a concept that was closely related to a particular stage or behaviour. For clarity, although I specifically coded 'benefits' and 'challenges' using the analytic framework, I did not end up with a theme dedicated to benefits and challenges; rather, these became independent themes and subthemes such as 'empowerment' and 'convenience'.

Table 25. Analytic framework

Tier 1	Tier 2	Tier 3
Experience of PrEP during the pandemic	**Benefits and enablers**	*Each benefit/enabler had its own code*
	Challenges and barriers	*Each challenge/barrier had its own code*
	Service structure	
Experience of other digital health services	*Covid tests*	
	E- consultations	
	Prescription	
General acceptability of online PrEP care	**Acceptability**	
	Potential benefits	*Each benefit/enabler had its own code*
	Potential challenges	*Each challenge/barrier had its own*
Self-sampling for STIBBVs	**General acceptability**	
	Blood sample	**Acceptability** **Anticipated benefits** *(each benefit/enabler had its own code)* **Anticipated challenges** *(Each challenge/barrier had its own)* *Prior experience* *Importance of instructions* *Support*
	Swabs and urine	**Acceptability** **Anticipated benefits** *(each benefit/enabler had its own code)* **Anticipated challenges** *(Each challenge/barrier had its own)* *Previous experience*
	Postage	
	Support (general)	
	Past experience	
	Completeness of home screening	
Online consultation	**Devices**	
	Medical questions	**Acceptability**
		Anticipated benefits *(each benefit/enabler had its own code)*
		Anticipated challenges *(Each challenge/barrier had its own)*
	Sexual behaviour questions	**Acceptability**
		Anticipated benefits *(each benefit/enabler had its own code)*

		Anticipated challenges *(Each challenge/barrier had its own)*
	Security	*Ambivalence*
		Risk mitigation and security features
		Importance
PrEP prescription	*Home*	**Acceptability**
		Anticipated benefits *(each benefit/enabler had its own code)*
		Anticipated challenges *(Each challenge/barrier had its own)*
	Pharmacy	**Acceptability**
		Anticipated benefits *(each benefit/enabler had its own code)*
		Anticipated challenges *(Each challenge/barrier had its own)*
	In-clinic pick-up	**Acceptability**
		Anticipated benefits *(each benefit/enabler had its own code)*
		Anticipated challenges *(Each challenge/barrier had its own)*
	Choice	
In-person care and switching pathways	**Acceptability of in-person care**	
	Importance of in-person care	
	Frequency of in-person care	
	Clinic advises exit from online pathway	
	Choosing pathway and transitioning between pathways	
Equity and eligibility	*Exclusion*	
	Eligibility	
	Opening access	
	Different frequencies of review/attendance	
Support	*Each support service had its own code*	
Shifting responsibilities	*Capacity*	
	Need for support	
Expectations		

6.2.7. Rigour

It was important that I took steps to ensure that I was conducting the research in a rigorous manner (Meyrick, 2006). I considered a number of different frameworks; however, I found that many relied on addressing very subjective questions (e.g. Britten et al., 1995; Elder & Miller, 1995; Giacomini & Cook, 2000). Instead, Lincoln and Guba's (1985) criteria for

evaluating the trustworthiness of qualitative research seemed the most appropriate. This had similarities to later frameworks (Creswell, 1998; Malterud, 2001) but Lincoln and Guba seemed more elaborative. The Lincoln and Guba framework suggests actions for the researcher rather than simply answering questions. I felt this was important as it would ensure that my research practice was rigorous, transparent, and credible, and would create good habits for future research.

Lincoln and Guba (1985) focus on four areas: credibility, transferability, dependability, and confirmability. To evaluate the credibility of my research – the idea that the findings are a true and accurate reflection of the subject/object of study – I implemented prolonged engagement (as much as was possible), and triangulation (Cohen & Crabtree, 2006; Lincoln & Guba, 1985). Prolonged engagement is the act of immersing oneself in the field or understanding the context. I explored the idea of being an observer within the methodology chapter – that I felt somewhat detached from the service user and provider perspectives (Cohen & Crabtree, 2006; Lincoln & Guba, 1985). However, I did make an effort to speak with colleagues who had lived experience of providing care to understand the inner workings of the PrEP service. Professor Estcourt had suggested that I shadow a consultant within a PrEP clinic; however, this was not possible due to the Covid restrictions. Although I wanted to immerse myself more fully, I do think I had a useful balance of insight and naivety. Moreover, my supervisors, who are experienced healthcare professionals, had reviewed my topic guide and early transcripts to help ensure I was capturing relevant data. I also used triangulation to check the credibility of my data (Cohen & Crabtree, 2006; Lincoln & Guba, 1985); specifically, against an evaluation of the telephone-based PrEP service (Henderson et al., 2022a). I found that the views expressed in this study were largely in keeping with the results of that survey.

In order to establish transferability – how applicable the findings would be in other contexts – I endeavoured to provide 'thick descriptions' (Cohen & Crabtree, 2006; Lincoln & Guba, 1985). Specifically, I have provided a detailed overview of the proposed online PrEP pathway, the PrEP pathways that were already implemented, and detailed the methods used in this study (including limitations around the transferability of the finding, e.g. because all participants were interviewed via an online platform (Microsoft Teams)). For dependability – showing that the findings are consistent and could be repeated – I implemented an 'inquiry audit' by having my themes and a proportion of my transcripts (n=3, 20.0%) reviewed by my supervisory team (Cohen & Crabtree, 2006; Lincoln & Guba, 1985). Lastly, for confirmability – how the findings

are shaped by the researchers' views – I provided my supervisors with an audit trail from my data through to my final themes and I practiced reflexivity which I detail in the discussion section of this chapter (Cohen & Crabtree, 2006; Lincoln & Guba, 1985). Moreover, I present my world views clearly in Chapter 3 as I acknowledge that these likely shaped how I interpreted the data.

6.2.7. Ethical considerations and approvals

This study was approved by Glasgow Caledonian University's School of Health and Life Sciences department ethics committee on 17.12.2020 under the approval code: HLS/NCH/20/004 (see Appendix 16). The study was also reviewed and approved by the North of Scotland Research Ethics Committee (2) on 22.04.2021 (IRAS: 293269; REC: 21/NS/0044) (see Appendix 17). Research and Innovation approval for NHS Greater Glasgow and Clyde was confirmed on 26.05.2021 (see Appendix 18). When preparing the study, I identified the following ethical issues and considered how to address each.

6.2.7.1. Participant reimbursement

The study, and the online PrEP service, benefited from participants' lived experience and views. This contribution needed to be compensated. While there are some arguments against participant reimbursement (i.e. that it could be coercive, removing the voluntary aspect especially for people experiencing financial difficulties) (Millum & Garnett, 2019), I feel that expecting people to contribute their lived experience without reimbursement is somewhat exploitative (e.g. emotional labour) (Müller, 2018; Ward & McMurray, 2015). The National Institute for Health and Care Research's guidelines encourage participant reimbursement (National Institute for Health and Care Research, 2022). Therefore, participants were offered a £30 Amazon voucher as reimbursement for their time and contribution. All participants accepted the reimbursement.

6.2.7.2. Participant burden and distress

I felt that this study had a low risk of causing any distress as I did not plan on covering particularly sensitive issues. However, I am also aware that what constitutes sensitive or difficult issues is largely subjective and people can be triggered by a variety of cues. I was going to be asking participants about their use of PrEP and sexual health services, including blood samples. I felt it was important to ensure that people knew what to expect prior to the interview, knew they had the right to withdraw, and that I, as the researcher, was equipped to

signpost participants to relevant support, manage emotional situations, and had a clear support structure in place should I need to debrief. I addressed each of these points while planning the study.

Participants were informed ahead of the interview that we would be discussing their experience of PrEP and sexual health services. They were also made aware at this stage that the interview was completely voluntary and they could withdraw at any stage without any repercussions. This was particularly important for participants recruited through the NHS in case they perceived the study to be linked to their care in some way. All participants were informed that they would receive a support document after the interview. The information provided in the support document was also available on the study website.

I felt confident in my ability to handle any difficult or particularly emotive or sensitive situations as I have a background working with vulnerable adults, people with learning difficulties and disabilities, and some counselling training. I conducted practice interviews with Prof Estcourt, Dr Gibbs, and Dr Jen MacDonald. Moreover, I planned to actively monitor each participant's emotional state throughout the interview and move away from any area that appeared to be causing any distress. My supervisors and I discussed the procedure for checking in after interviews for a confidential debrief if needed. None of the interviews were challenging in this regard, participants reported that they felt the interview had gone well, and all were sent the support document after the interview had ended. The appraisal of 'low risk' appeared appropriate; especially, with the presence of the risk mitigations.

6.3. Results

Fifteen participants took part in this study. Eleven were recruited from the NHS site and four were recruited from the SMMASH cohort. After interviewing the thirteenth participant, I felt that I was close to having sufficient data to answer my research questions, and, although I was not seeking saturation, I felt that no entirely novel ideas were emerging in interviews 14 and 15. This aligned with my anticipated sample size but my decision to stop recruitment at this point was in response to the data rather than meeting the 'target' (Vasileiou et al., 2018). Participants' self-reported demographics are summarised in Table 26. The mean age (SD) of the sample was 37.47 (14.62) years and the median age [IQR] was 35 [24,42] years.

Table 26. Summary of participants' demographics

	NHS Sample, n=11	Cohort Sample, n=4	Total Sample, n=15
Gender identity			
Male	9	4	13 (86.7%)
Trans	1	0	1 (6.7%)
Trans man	1	0	1 (6.7%)
Trans identity			
Cis-gender	9	4	13 (86.7%)
Transgender	2	0	2 (13.3%)
Sexual orientation			
Gay	10	3	13 (86.7%)
Bi	1	0	1 (6.7%)
Queer	0	1	1 (6.7%)
Ethnicity			
White Scottish	6	4	10 (66.7%)
White (Other)	4	0	4 (26.7%)
Mixed	1	0	1 (6.7%)
Age			
16-24	2	2	4 (26.7%)
25-34	2	1	3 (20.0%)
35-44	5	0	5 (33.3%)
45-54	0	1	1 (6.7%)
55-64	1	0	1 (6.7%)
65+	1	0	1 (6.7%)

Within this results section, I present the final themes and subthemes. The data is presented in two parts: the first addresses participants' experiences of PrEP and digital care during the Covid pandemic, and the second addresses participants' views of the proposed online PrEP pathway. Subthemes will be addressed within the theme headings. I use quotes from the participants to illustrate some of the key points within each theme, balancing my interpretations of the data with the participants' own words.

6.3.1. Experiences of care during the Covid pandemic

At the start of the interviews, I asked participants to reflect on their experience of PrEP care and digital health services during the Covid pandemic. Figure 31 summarises the themes and subthemes of the overarching themes 'experience of PrEP care during the Covid pandemic' (Section 6.3.1.1.) and 'experience of digital health services' (Section 6.3.1.2.). As described within the methods section, I used a framework that consisted of a priori and data-

driven codes to analyse the data. I then grouped the data into themes based on behaviours, determinants of behaviours, and aspects of the services/care pathways.

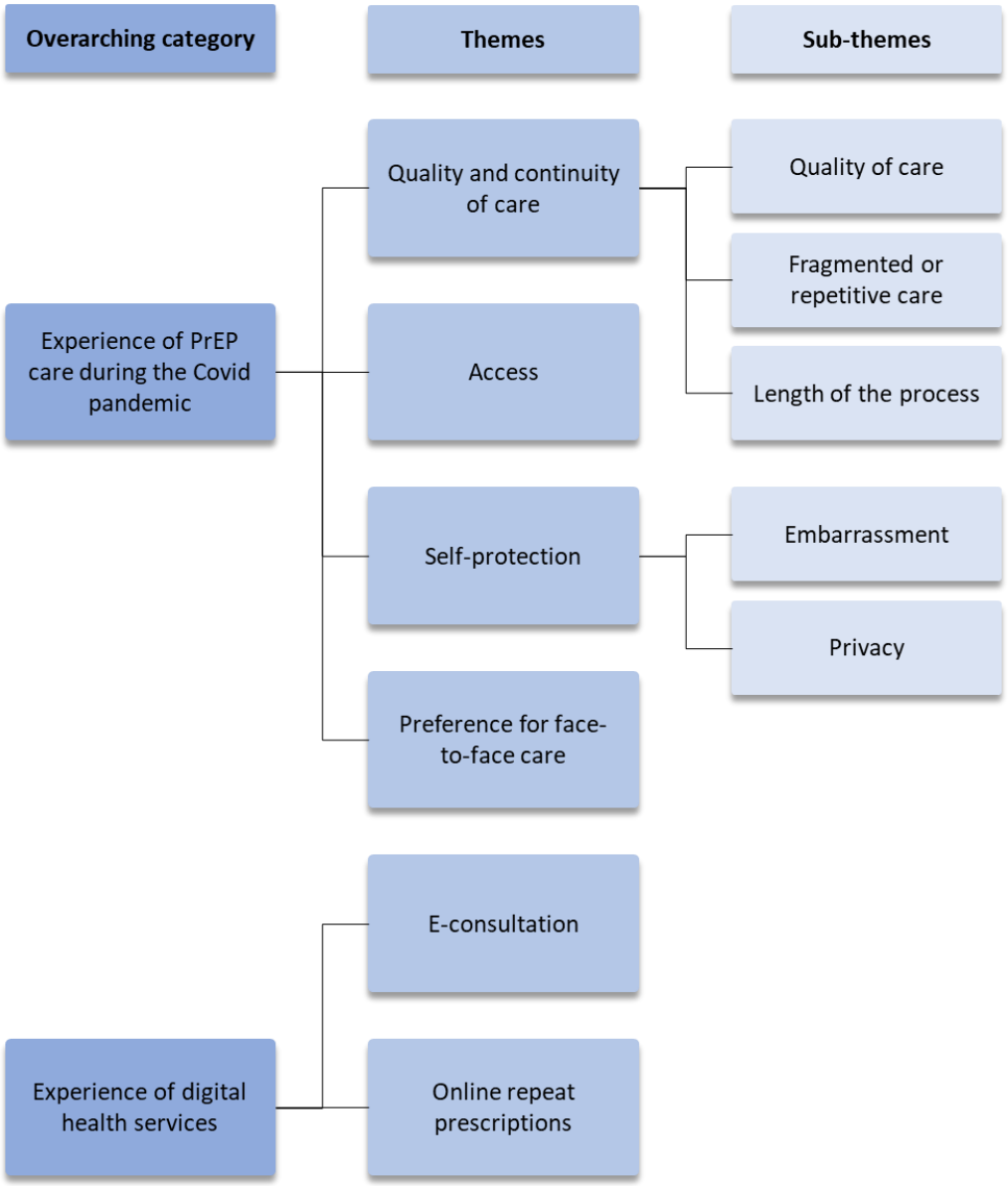


Figure 31. Themes and subthemes within the overarching categories relating to participants' experiences during the Covid pandemic

6.3.1.1. Experience of PrEP care during the Covid pandemic

Participants reflected on the care they received during the pandemic. Some of the issues discussed were not entirely specific to PrEP but did present themselves within the context of PrEP care.

6.3.1.1.1. Quality and continuity of care

Despite the rapid shift to remote care and the need to navigate Covid restrictions, participants felt that the quality of care they received remained high throughout the pandemic. Participants stated that the service was largely efficient despite the need for two appointments per review (i.e. the phone consultation and the in-person appointment for STIBBV (sexually transmitted infections and blood borne viruses) sampling) which caused challenges for some. A recurring issue was that participants were being asked the same questions during both appointments which left them confused about the need for both appointments. Moreover, some participants questioned the need for any history-related questions to be asked during the in-person appointments given that they had already provided the clinic with information during the phone consultation. Participants reported that their care was provided by different healthcare professionals at each stage of their PrEP review and, for some, this made the care feel impersonal.

> *I don't think I've ever actually had the same doctor twice, so I feel like such a number in the system, a person on call, kind of thing, rather than I have a relationship with a person who is sitting in front of me, kind of thing. (P1, 16-24)*

With that said, one participant mentioned that they felt accepted within the service.

> *The care there's absolutely brilliant. They treat you as a person, for want of a better word. Which is all you ask for. You don't want somebody looking at you and thinking, hey, you're transgender. Don't want that. I'm just a normal person, no different from anybody else. That's how you should be treated. (P5, 65+)*

Some participants commented on the length of the review process; specifically, having to wait a week or more between the phone consultation and the in-person appointment. This was particularly noted by one participant who underestimated how long the process would take which resulted in them worrying about running out of PrEP.

> *Obviously to get it I had to come in and have interview and that took a bit of time and I was on the last PrEP tablet before I got support. So the present set-up doesn't work as fast as it should. […] I thought a week would have been enough but in the end it was just and no more. (P5, 65+)*

6.3.1.1.2. Access

Participants reflected on issues around access. Some felt that the need for an in-person appointment was a barrier. One participant described difficulty attending the clinic in winter due to the combination of a long-term health condition and adverse weather. Another participant reflected on their experience completing the samples at the clinic and the challenges they experienced because of the setting:

> *If you're not used to doing the self-testing, you know…in one of these little cubicles in the clinic and, you know you're like…you drop things or things…there's no shelves in the toilet space to put things, it just sits on top of the cistern and you can just picture people…guaranteed there's so many guys who have put stuff down on the cistern and it's rolled off and landed on the floor or spill things or…you know, it's…and you just think…and if you can picture somebody who's really apprehensive and nervous about attending the clinic anyway, I can totally see them coming out of that cubicle traumatised. (P4, 45-54)*

Some participants reported that they found the PrEP service easy to navigate during the Covid pandemic. Specifically, they found it easy to keep on top of when to schedule appointments because of the SMS reminders sent out by the clinic. The online appointment booking system was found to be straightforward and an improvement on the previous model where people had to phone to arrange an appointment. Some participants also reported that they found the phone consultations easy to navigate, and that the process for in-clinic STIBBV screening was easy and efficient. However, difficulty scheduling a convenient time for these PrEP review appointments was a recurring issue for participants.

> *Sometimes I work nine to five, it's always an evening appointment and they only do certain nights, or they did only do certain nights that were evening appointments, and just doing that home testing kit, and then just popping it in the post-box was...it was ideal. It saved the hassle, like going up to the clinic. (P3, 25-34)*

6.3.1.1.3. Self-protection

The theme of 'self-protection' centred around the subthemes of embarrassment and stigma and the potential negative consequences of these for the individual. Some participants reported difficulty with the phone consultation. This was either due to a general dislike or discomfort with phone calls, or because it was difficult to schedule calls at a time or place where they would have sufficient privacy.

I have to do this stupid phone call which I hate because I find it so…I find it very difficult because especially when I was living at home, when I was living with my parents, if it was in business hours, I would have to…it was really stressful actually, I would have to go for a walk when I knew the appointment was going to be… I just thought it would be a bit awkward and then when they talk about how many sexual partners have you had in the last few months. I was like, well I don't really want to say when my dad is working in the room next door, it's like all these things, it's like, I don't really want to talk about it. (P1, 16-24)

Conversely, one participant reported that they preferred phone consultations because there was a sense of anonymity which made talking about sexual behaviours less awkward/embarrassing.

I found it easier to actually open up over the phone, because you obviously don't have the kind of awkwardness of talking to somebody you don't know. So, I felt more confiding, being able to speak to somebody on the phone, who was quite friendly. I just find sometimes, it's more difficult if you're chatting to somebody you've never met before, face to face, for that obstacle to cross, as well as you are kind of speaking quite, about quite personal things. (P10, 35-44)

6.3.1.1.4. Preference for face-to-face care

One participant reflected in depth on their preference for in-person care over the model of care implemented in response to Covid-19. They went on to explain that this preference was, in part, due to "Zoom fatigue" from working from home. They also mentioned that they felt the current model was less personal than having an in-person consultation.

I much prefer the face-to-face contact, it makes it a lot easier to ask questions and makes it…it actually feels a lot more confidential, it feels more professional in a way […] I work from home all day, so I have zoom fatigue, all day I'm spending on zoom, so it's like another thing in my life, where I'm having to spend it on zoom […] I actually just prefer talking to a doctor in real life, face-to-face, who can talk to me about these things, and it feels a bit more personal, and it feels more like I'm not just another…because I feel like on the phone, it's just they say their name so quickly, I go, I don't know who this is. (P1, 16-24)

6.3.1.2. Experience of digital health services

6.3.1.2.1. E-consultations

Two participants shared their experiences using an e-consultation service where they completed an online questionnaire describing their symptoms and providing a brief history, and their doctor responded with a phone call or email depending on the situation. One participant felt that the process was streamlined – they were not having to repeat the same information to different people. The other participant had mixed feelings towards the service. They felt that they were able to take their time and complete the questionnaire and write questions. However, they questioned if the questionnaire would collect a sufficient level of data and how the quality of the service compared to a traditional consultation.

> *[…] the doctor is not able to do everything that he would be able to do face-to-face. So, of course, I understand they know what they do. But of course there may be a small fear, you know, if the visit online or a call is equally effective just to collect all the data. (P9, 35-44)*

6.3.1.2.2. Online repeat prescriptions

Participants shared their experiences of using online repeat prescription services and generally preferred these over phone-based prescription services. In addition to feeling that the online prescription service offered more convenience and flexibility than phone-based services, one participant noted that the online prescription service gave them a feeling of assurance that they had completed that part of the process correctly as they had visual confirmation that they had completed each step.

> *I think it's a bit more positive, because I know that I've definitely done it. Whereas, when you phone, and leave a message on an answering machine, you're not always sure whether somebody has actually picked it up, and you have to follow it up by phoning the pharmacy to see if that they did actually get that repeat prescription instruction. (P10, 35-44)*

6.3.2. The proposed online PrEP service

In this section, I explore participants' thoughts and feelings towards the proposed online PrEP service. I start by presenting data on the acceptability of the online PrEP service as

a whole, including the broad anticipated benefits and challenges. I then explore participants' views on each of the stages of the service before widening the scope and considering necessary support and themes of suitability, equity, responsibility, and expectations.

6.3.2.1. General acceptability

Participants found the proposed online PrEP service highly acceptable. While there were discussions around potential challenges and barriers, participants still showed keen interest in having the service made available and suggested it would help overcome some of the challenges and barriers experienced through in-person care. All but one participant expressed interest in using the proposed online PrEP service if it were made available to them. The participant who stated they would not use the online PrEP service still felt that it should be developed and available for others whom it would be appropriate. Figure 32 presents the themes and subthemes within the 'general acceptability' overarching theme.

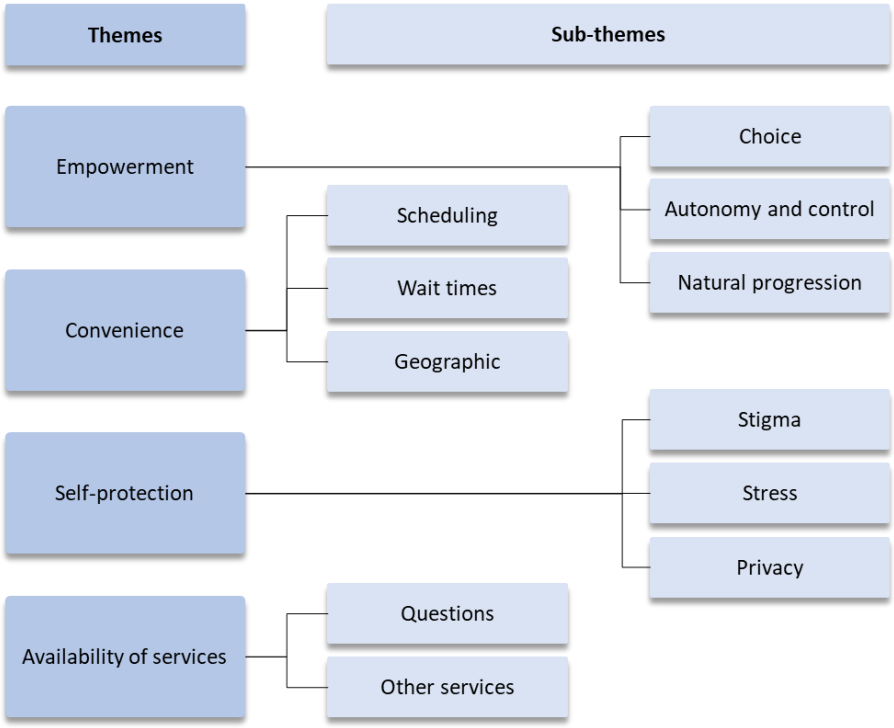


Figure 32. Themes and subthemes within 'general acceptability'

6.3.2.1.1. Empowerment

The subthemes of choice, autonomy and control were interconnected and within the interviews revolved around the idea of transferring power back to the service users over when and where they complete their PrEP reviews. Most participants felt that online PrEP care

would give them more choice. Specifically, participants liked the intention for the service to be opt-in and opt-out so they could choose what was right for them based on their situation at that time.

> *I think that's a good idea, again it's just a choice and it is genuinely an option, and you don't get pigeon-holed down one route and it's really difficult to change. Let's say you had to call [the sexual health clinic] to request them to change the route you're in and then they can't do it for this time, they have to do it in four months' time, all this stuff. (P1, 16-24)*

Participants felt that the online PrEP service would give them more control or autonomy over their PrEP care and seemed confident that, with the right support, they would be able to self-manage their PrEP care with the online service. Some participants felt that the proposed model of care felt like a natural progression given the increasing digitalisation within society and healthcare. Moreover, participants felt that their experiences during Covid-19 pandemic made this model of care particularly appealing as they had experienced a more remote model of care and echoed the idea that they were capable of self-managing their care.

> *It makes a lot of sense. There's a lot of logic there. To be fair as well, because I think obviously with PrEP being a service that's provided it's fairly new, newish at least, this seems like the next logical step. (P2, 16-24)*

6.3.2.1.2. Convenience

Participants anticipated that convenience would be a major benefit of the online PrEP service. Convenience was discussed in many ways, primarily in relation to not having to travel and being able to complete the different stages at more suitable times. Participants reflected on how difficult it was to schedule appointments within the existing service. Participants felt that the online service would be more convenient as they would not need to take time off of work and they could make their PrEP care fit around their life.

> *I think it's good having it online and…especially, like, if you're really busy, you know your PrEP review's coming up, you're literally struggling to get some time then at least, you know, right, I can just go online, that takes away that added stress. (P15, 35-44)*

Physically travelling to the clinic was viewed as an inconvenience: participants were willing to do it, it did not prevent them from accessing care, but it did make the process more

challenging. Most participants felt that being able to complete each of the stages online, at a place of their choosing, would be much more convenient. Moreover, some participants suggested that the online PrEP service would make PrEP care a lot more accessible for people who live remotely and would save a lot of time.

> *I would use it, because of the travel, and the organisation. Obviously, you have to have time to be able to come in to see somebody face to face, there's a lot of things to consider, like traffic, parking, time, free time, time off work for example, if you're full time, these all have to come into consideration when you come to see somebody to get your, to do your test, and to get your PrEP. So it would certainly help in that sense, avoiding having to spend all that time to come in to see somebody. (P10, 35-44)*

Many participants expressed difficulty with the phone consultation because it was challenging for them to find a time and place where they felt their conversation would be private. They felt that the online PrEP service would help to overcome this challenge.

> *A telephone call isn't really, sort of, conducive to somebody being open and honest which really could impact on their own sexual health, which is...it shouldn't be happening in this day and age anyway, but if it is then done completely online you just...the only thing you, sort of, really need to, sort of, watch for, and I don't mean this in a funny way, but just somebody looking over your shoulder, rather than somebody listening into what is a very private and personal phone call. (P3, 25-34)*

6.3.2.1.3. Self-protection

I combined the subthemes of stigma, stress, and privacy into the 'self-protection' theme as they were intertwined and related to the participants' need to protect themselves from the negative impact of these concepts. Some participants felt that the online PrEP service had the potential to help overcome some of the stigma people experienced in relation to their sexual healthcare. They acknowledged that efforts still need to be focused on reducing stigma but that the online PrEP service may avoid some of the stigma they anticipate or experience to an extent. Some participants also spoke about how they felt that the online PrEP service may appeal to people who are not yet engaged in services but who may benefit from PrEP.

> *Oh I think it's good. I think any opportunity, any possibility of PrEP being more available to more people in more sections of the public, society, can only be a good*

thing to benefit more and more people [..] by not making [people need to attend] a sexual health clinic, which for a lot of people is quite shameful or nerve-wracking and stuff, you're accessing a lot more heterosexuals as well, which are also at risk, a lot more women, a lot more working parents by destigmatising it a wee bit and de-escalating the gravity of PrEP… (P2, 16-24)

One participant talked about *"NHS guilt"* (P2, 16-24) and how they, and perhaps others, felt guilt for accessing PrEP care which they viewed as not being strictly essential.

Definitely something I'd be considering because I also feel like a lot of people feel guilt for going, wasting taxpayers' time and NHS time. So, this seems like a great way to make the process a lot quicker and simpler and easier and a much more efficient use of everyone's time and money for sure. […] there's kind a guilt, again an NHS guilt. […] Going to a sexual health clinic, being on PrEP sometimes feels like sorry for it, this almost guilty burden […] I think there's this guilt going into the clinic, booking an appointment when someone else could really need it. So, having it online I definitely think would alleviate a lot of that. I guess it's in a selfish way but would make me feel less bad for going in. so, from that perspective massively. (P2, 16-24)

Many participants reflected on the stress they had experienced when attending sexual health services in the past and felt that the online PrEP service would help to avoid some of that stress. One of the participants felt that the online service would help normalise PrEP by taking some care out of the clinic environment which they viewed as a *"big appointment"* and *"scary"* (P2, 16-24).

I think it would make it a lot less of a 'thing' […] just taking PrEP as just a normal prescription, rather than the whole thing of going to the clinic and oh, it's a big appointment and stuff. I think normalising taking PrEP as a preventative measure it would make everything a lot easier and a lot less scary. (P2, 16-24)

Participants felt that the online PrEP service would provide additional privacy for people who were uncomfortable with discussing their sexual behaviours with others. They also suggested that people may feel uncomfortable physically attending services in case they are seen by people they know and felt that the online clinic had the potential to reduce the frequency of these in-person attendances and, consequently, the potential to be seen at the clinic.

But I would expect that for somebody who takes PrEP, for example, they might not want to make it public, so they might feel a bit anxious about going into that place

[the sexual health clinic], in case somebody might see them, or something like that. You know, it probably adds to the whole experience, negative experience, of having to go in to get that, to get your test for PrEP. So I think it would be a lot easier for a lot of people, to have it at home, in that sense. (P10, 35-44)

6.3.2.1.4. Availability of services

Some participants reflected on how they felt the online PrEP service may benefit the sexual health services themselves. They felt that, by offering some patients online care, it may reduce pressure on services and increase capacity for people to be seen in person with shorter waiting times. Some participants felt that the online service may feel less personal and this was linked to concerns about feeling like if they had questions then they would not be able to get the same answers or reassurance as they would with a phone or in-person consultation. Moreover, participants felt that there may be less opportunity to access other services such as chemsex support and worried that the service may not be able to identify people who would benefit from these services in the same way that a healthcare professional would over the phone or in person. Participants felt that it was important to be able to identify people who should be followed-up through their responses in the online consultation.

I suppose that goes back to my initial concern is that if you just choose one size fits all, that I think there's the other agencies that maybe need to be involved could get missed. So…yeah. It's about making sure that the online assessment, if you like, has the right questions to pick up on any other issues. (P4, 45-54)

6.3.2.2. Online postal self-sampling

Figure 33 presents the themes and subthemes related to the online postal self-sampling stage of the online PrEP clinical pathway.

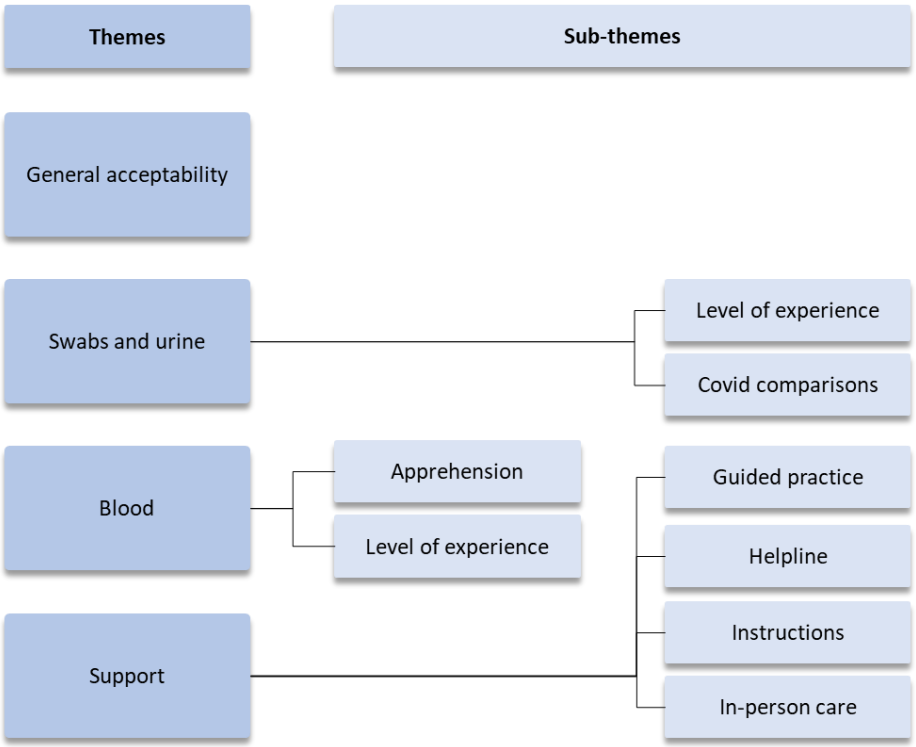


Figure 33. The themes and subthemes relating to the online postal self-sampling stage of the online PrEP pathway

6.3.2.2.1. General acceptability

In general, participants found the idea of self-sampling for STIBBVs as part of the online PrEP service acceptable and attributed this to having already had experiences of collecting their own samples at the clinic, aside from the blood sample. Some participants did find the need for self-sampling for STIBBVs as a potential barrier to engaging with the proposed online PrEP service. One participant shared their experience using an STI self-sampling kit during the pandemic and felt it was a stressful experience.

> *I've done it once and I found it really stressful…well I've done it once with an STI kit and I found it really stressful and then that's why the next time I said, can I just come into the clinic and do it there because there all I had to do was do the…pee into the test tube, kind of thing, put it in the bag and give it to the doctor. (P1, 16-24)*

6.3.2.2.2. Swabs and urine

Self-sampling via swabs and urine sample appeared highly acceptable to most participants. Most felt that the transition to collecting swabs and urine samples at home would be easy as they had experience collecting these samples themselves in a clinic setting and so

were familiar with the process. One participant shared that they would be more comfortable doing their own swabs at home where they could go at their own pace and ensure that they were in the correct position to limit any discomfort.

> *Well, for me it would be getting to do my tests at home, because it's easier for me. Because I'm transgender and I've got female anatomy, I need to also do the vaginal swabs and then unfortunately, because of my medication, you know, the testosterone treatment, I'm not particularly great down there. So I cut myself really easily, and so being able to do that at home and take my time and lie down on my bed, that's ideal, because I'll have less chance of hurting myself when I do my swabs. So that's quite ideal for me. (P6, 16-24)*

Participants often referenced the Covid-19 pandemic as a factor which changed their perception of self-sampling having performed self-tests for Covid-19 throughout the pandemic. This appeared to give participants a point of reference as to how the sampling would be for them at home. One participant pointed out that, while people are getting used to doing Covid tests, they are a single test while the PrEP service will require multiple samples, adding complexity to the process.

6.3.2.2.3. Blood

There appeared to be a clear distinction in participants' minds between the swabs and urine samples, and the blood samples. As mentioned above, participants reported having experience performing their own swabs and urine collection so the main difference in the proposed service would be the location in which these were being completed. However, the blood sample was considered separately, even in passing when expressing approval.

> *And for the tests, well, the swab and the urine, I think it's maybe...you do it yourself so I don't think that matters. The only thing is that blood, but just the finger. I think that's okay. (P13, 25-34)*

There was a marked apprehension to perform the blood self-sample in some participants. This ranged from a slight concern to a firm unwillingness. This apprehension centred around a fear of blood and difficulties in obtaining a valid sample. Similarly, the fear of blood itself varied in severity for participants from a slight discomfort to strong aversion.

> *Oh I just hate the sight of blood. Hate the sight of blood… sometimes in the clinic I'm fine getting bloods taken and other times you're walking out feeling woozy...if I can*

stay away from blood and needles I will, so…yeah. So that's my biggest hurdle. (P15, 35-44)

A recurring query that participants had was how the accuracy of at-home self-sampling compared to the samples taken at the clinic. This appeared to be a factor that contributed to their decision on whether they would be comfortable using the online PrEP service or not. Reflecting on similar, past experiences of finger-prick blood tests and samples, some participants shared instances where they had difficulty obtaining a valid blood sample and how they worried about performing similar procedures in the future. Some participants likened the blood sampling method to their own or family member's diabetic finger-prick tests. While this is a different process, requiring a smaller quantity of blood, it appeared to be a natural reference point for these participants. Participants who spoke of other people's experiences with diabetes viewed the process as straightforward while a participant who shared that they had diabetes had a more cautious view of the process and worried if they would be able to provide enough blood for a valid sample.

Just the blood, because I am diabetic and we do use finger pricks so I am a bit worried because it doesn't really have a lot of blood that comes out of my fingertips. That is the only thing that would concern me is trying to get enough blood to fill up the vial…it is the volume of blood because pricking your finger it gets quite sore after a while. (P8, 16-24)

With that said, most participants were willing to collect a blood sample in the context of the online PrEP service but highlighted the need for clear instruction and support.

6.3.2.2.4. Support

In this section, I present data on participants' views on the types of support they felt they might need to enable them to self-sample for STIBBVs as part of the online PrEP service.

6.3.2.2.4.1. Guided practice

Some participants discussed the benefit of completing the self-sampling kit within an in-clinic appointment to gain experience using the kit under the guidance of a health professional. They suggested that this would help them to gain confidence and give them reassurance that they were completing the tests correctly.

P: Maybe in that first clinic appointment maybe run through it just to say, oh you need to do this, this and this and then maybe give them a... what is that word...a kind of show of how you do it, that kind of thing. Something like that…it doesn't really do any harm for them to try it themselves, just clicking their fingers, filling up the vial. They already have to do their own swabs and stuff so I would be fine. I think it would just be the finger pricking thing…

I: You mentioned that you were worried about the finger prick blood test. I am wondering if there was that demonstration how that would affect those feelings?

P: I think it would actually completely make them go away because if you have seen it being done and then you are just like, oh I know it is possible. I don't think I would be too uncomfortable trying it. (P8, 16-24)

One participant suggested that this should be optional and not a requirement as this may be frustrating for those who are already proficient in the task.

6.3.2.2.4.2. Helpline

Most of the participants expressed interest in having a telephone-based helpline where they could receive clarification on how to do the tests.

Then maybe just have a helpline number that they can call just to give them a bit more advice if they get a bit lost […] sometimes I think it is helpful to talk to someone to try and explain what is going on rather than trying to fill out a box […] then you get instant answers as well. (P8, 16-24)

They also spoke about how the helpline would help the online service feel more personal and would help them feel less alone in the testing process.

Having someone to help you because so much of life feels like you're just on your own and you're struggling your way through it and a gay man, I only have a few other gay friends and even less of them are on PrEP, so that feels even more like an individualised experience. So to have someone who can help you, which is the whole point of healthcare, you don't feel like a burden, you don't feel like you're a nuisance and you don't feel like you're wasting people's time. (P1, 16-24)

6.3.2.2.4.3. Instructions

Participants spoke about the importance of having clear instructions to ensure that people could understand the process and what they referred to as *"medical language"* (P7, 55-64). One participant recalled their experience of the SH24 self-sampling service and felt it provided instructions that were of a good quality.

> *They were so self-explanatory […] they had cards, so the cards were, sort of, colour coded to match the sample bottles that you were putting things into […] there was like a URL on the card that you could, sort of, type in and it would then actually give you a video to show you [what to do], and if that wasn't enough there was a [video] option that you could go on… I don't actually think they could have made it any clearer without somebody actually coming and demonstrating for you. (P3, 25-34)*

The benefit of having instructions in a variety of media was echoed by other participants. One participant spoke about the benefit of having written instructions as a way to prepare for what a video would show so they would not be overwhelmed by being shown multiple procedures in a row.

6.3.2.2.4.4. In-person care

Participants also highlighted the importance of having the option to go into the clinic for testing if the self-sampling was proving too challenging. This is explored in more depth within the context of the service as a whole (see Section 6.3.2.6.3).

> *For me it would be if I could do the blood test on my own, I would be happy using it all the time. If I couldn't get used to doing the blood test then, yeah, I would have to go back to being at the clinic. (P15, 35-44)*

6.3.2.3. Devices, data, and the online clinical consultation

I had originally intended to present the data related to the online clinical consultation separately; however, in writing this section, I felt it was so entwined with the more general points relating to device preferences and data security that it was more appropriate to present this data together. Figure 34 presents the themes and subthemes of this section.

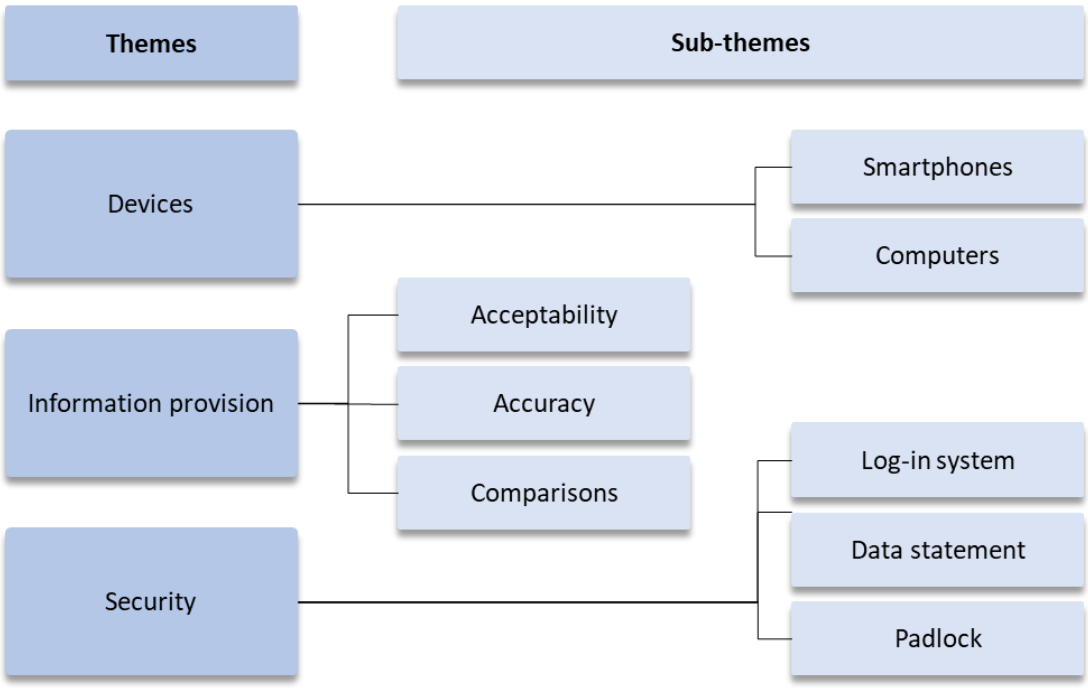


Figure 34. Themes and subthemes relating to devices, data, and the online clinical consultation

6.3.2.3.1. Devices

When discussing the device(s) participants wanted to use to complete the online consultation, participants were divided between smartphones and computers. One reason participants gave for preferring their smartphone over a computer was convenience – they could access the service from anywhere at any time.

> *I think a phone is more convenient, you can do it on the go, it's like portable, I have it with me nearly all the time, so it's one of those things like, oh Christ, I need my book my kit, so I can just do it there and then. So, being able to be accessible on a phone would be really important. (P2, 16-24)*

Some participants viewed smartphones (and smartphone apps) as being more accessible to a wider group of people and more secure than computers. Some specified that a smartphone app would be their preferred method, suggesting that the ability for apps to send notifications would help remind them to complete the various stages of the online service and they perceived that there was more room for security features. One participant shared that, while they would prefer to access the service on their phone, they would prefer a mobile-optimised website over an app so it did not take up permanent space on their phone.

I would probably just prefer a website, because I don't really have a lot of space on my phone so it would be easier […] it just means it's not taking up permanent space on my phone. (P6, 16-24)

Some participants were open to using either a computer or a smartphone to access the service. The strength of preference in those who preferred a computer appeared less intense than those who preferred a smartphone. Indeed, some participants voiced that they had no access to a computer while all of the sample said they had access to a smartphone. The perceived benefit of using a computer over a smartphone was related to the interface with participants feeling that computers are less *"fiddly"* (P15, 35-44) and have larger screens (P7, 55-64). Ultimately, some participants voiced that their preference would largely depend on the quality of the interface. One participant highlighted the importance of optimising the interface across devices.

6.3.2.3.2. Information provision

When considering the acceptability of being asked questions within the online consultation, participants were asked to consider the medical questions first, then the sexual behaviour questions. The acceptability of providing medical information online was high with some participants expressing that they would prefer to provide that information online rather than directly to a health professional.

I think for the online assessment, I think I prefer that to the face-to-face because then it's just like I think...I find it easier to respond to questions online than face-to-face, because also you have more time to think or to remember what happened. (P13, 25-34)

One participant felt that providing the information online would not be much different to providing it to a health professional as the information was still being logged on a system. The main benefit that participants felt providing medical information online was that it may be easier to provide accurate information as they would have more time to respond and could access their other medications to ensure they gave the correct name/details.

I was taking a lot of medication. So I couldn't even remember the name. And now I'm just one or two, it's very easy. But if you are on some more medication, if I'm at home I can go check the boxes. So for me that would be quite useful. Because I remember telling the doctors, I'm like, yes, these tablets, I don't know how they call them. (P13, 25-34)

Participants anticipated that they might find it challenging if they were asked a question and were unsure how to respond. They felt that they would find a helpline useful in this instance so they could check their understanding.

The acceptability of providing information about sexual behaviour online was high with many participants anticipating that they would prefer this option over the methods currently available.

That would probably easier because it is like talking to a blank screen which is easier than talking to some stranger… the blank screen it won't judge you. (P8, 16-24)

Some participants felt that providing this information online would help people avoid feelings of stigma and judgement. Again, some felt that providing this type of information online may lead to more accurate responses. Some participants felt that they may worry about what would happen to the information provided and that this may be a barrier to use if it was not made clear to them.

6.3.2.3.3. Security

Data security was a major topic of discussion in the interviews. Participants' views ranged from a general ambivalence to, and acceptance of, providing personal information online to acknowledging potential risks and wanting specific measures in place.

I'm fine with that. I can see maybe some people would potentially be worried about privacy online, but it doesn't bother me… I enter information on other sites and I don't, I suppose, think about it too much. (P6, 16-24)

And obviously there's a huge thing about the sale of healthcare data to private companies… So a year ago I wouldn't have had any qualms. I'm now careful. (P4, 45-54)

When asked about what measures the online PrEP service had to have in place to assure them that their information was being held securely, participants suggested a number of features. Participants felt that there needed to be a secure log-in system and drew on experiences using banking apps which had a high perceived security and implemented passwords or finger-print IDs and two-factor authentication. Participants also expressed that they would be assured of the system's security if the system implemented end-to-end encryption. Some participants suggested that a statement on the log-in page would be sufficient to quell their worries as it

acknowledged that the risks had been considered. Participants also stated that they looked for the padlock symbol on websites and perceived this as a mark of a secure system. One participant spoke about how they saw little difference between disclosing information to health professionals during a consultation and providing that information online as the information was still being logged somewhere.

> *When I go to the clinic face-to-face, I tell them and they're putting it in to a system. So if that system's just as easily hacked as anything… well I'm not a hacking expert or… but, you know, just because I'm telling someone, it's not any safer than…actually it's still going through an IT process, it's still logged somewhere. (P4, 45-54)*

6.3.2.4. Remote provision of PrEP medication

Figure 35 presents the themes and subthemes related to the remote provision of PrEP medication.

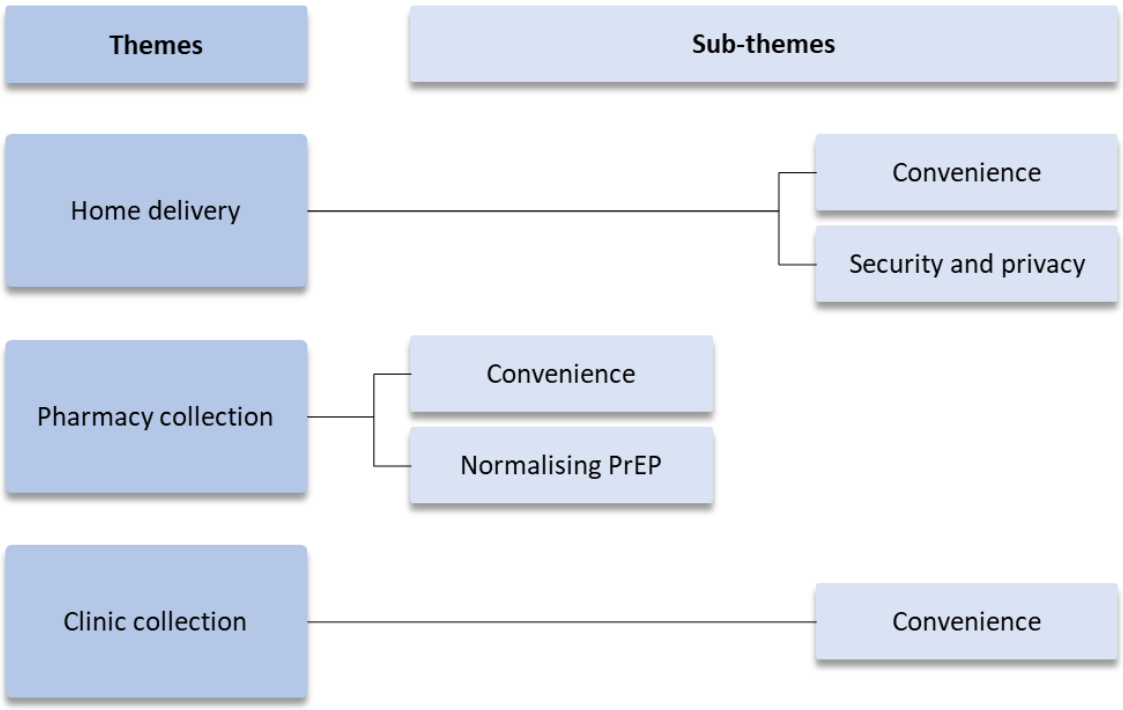


Figure 35. Themes and subthemes relating to the remote provision of PrEP medication

6.3.2.4.1. Home delivery

The majority of the discussion around how participants wanted to receive their PrEP medication focused on home delivery. This was the method that most participants had

experienced during the Covid pandemic and so they had lived experience to draw upon. The acceptability of post as a method of delivery was mixed with some participants having no issues with the idea of being sent their PrEP in the mail and others reflecting on challenges they had experienced in the past.

> *Well, I actually have my PrEP, I've only actually had PrEP delivered once to me. Because I started mine just in the summer there, and it was by post. Which actually was a wee bit concerning, because my address, I live in a flat, and there's an issue with addresses here, they're not right… (P10, 35-44)*

Most participants cited convenience and ease as potential benefits of having their PrEP delivered to them by post. However, this appeared to be situational as some participants reported challenges with the reliability of their local postal service. Some participants were also worried about privacy and having packages delivered to their homes where other people may intercept their mail or query what was being delivered.

> *[It] could be an issue for someone in a shared household where they don't necessarily want the…other people in the household to know this is going on or they're taking this […] when I first started taking PrEP, I had to hide it […] And when I say 'had to', I chose to because that's the world we live in sometimes, you know. (P4, 45-54)*

Some participants also had concerns about the packaging in terms of how easy it would fit through their letter box, the time it would take to arrive, and how discreet the packaging would be. One participant argued in favour of an *"address of your choice"* (P3, 25-34) rather than a home address so people were able to have their PrEP sent to a safe location if there were issues with their home environment.

> *If it's going to be completely online then it needs to then be delivered to home, or to an address of your choice, because there might be somebody who is maybe 16, 17, staying with parents, they're not maybe...they're embarrassed about being sexually active at that age, or they might be gay and they don't...their parents don't know […] so maybe an address of choice. I think...because I know that some, some things, your address has to, sort of, match your actual address that's registered... (P3, 25-34)*

6.3.2.4.2. Pharmacy collection

Many participants expressed interest in being able to collect their PrEP from a community pharmacy.

Pharmacies could be good. Because then you can select the pharmacy that is open at the times that suit you and that it's close by. So it's not like going to the clinic that, I mean, for me, it's driving ten minutes. But I have a pharmacy ten minutes' walk from my house. So that could be as good. (P13, 25-34)

Participants felt that this would be convenient and spoke about how much closer their local pharmacies were than the clinic. Some also expressed the view that pharmacies were discreet and confidential.

Well you have always got one that is kind of close by. It is a bit more discreet almost. Everybody goes to the pharmacy to pick up their scripts and that, it is just what you do. (P8, 16-24)

Some participants also talked about wanting to be able to pick up their PrEP like any other *"normal medication"* (P10, 35-44) and how this could help normalise PrEP.

I think I would prefer to kind of go to the pharmacy and just pick it up. I don't find that embarrassing, particularly, when you get it in a kind of bag that's, you know…The person that works in the pharmacy, that's the only person that's going to know, you know, your prescription. So I'd probably prefer just going, just like normal medicine, and just go and collect it there. (P10, 35-44)

6.3.2.4.3. Clinic collection

Some participants mentioned collecting their PrEP from the clinic. These participants all indicated that they regularly were in close proximity to their local clinic but these participants also all expressed willingness to have their PrEP delivered by post or collect it from a pharmacy.

For me personally [the sexual health clinic] is next to my uni campus so next year, if it is open, picking up the PrEP wouldn't necessarily be too much of a bother. (P2, 16-24)

6.3.2.5. Support

Participants identified a number of different ways in which they could be supported to use the online PrEP service. Some of these methods of support were presented in relation to STIBBV sampling; however, participants also identified how these and other methods could be

used to support them more generally within the online pathway. These themes are presented in Figure 36.

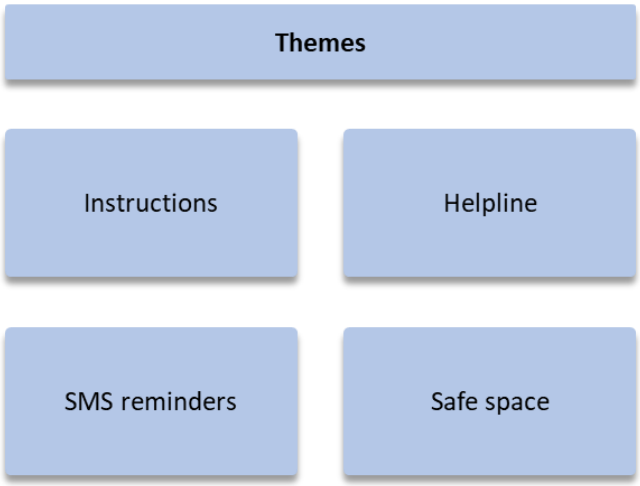


Figure 36. Themes relating to support

6.3.2.5.1. Instructions

Most participants voiced the need for clear instructions but suggested different ways that these instructions could be provided: paper-based handed out at the clinic, sent electronically through an SMS or email, or accessed through the online PrEP service itself.

> *I suppose like when I started PrEP I got a wee leaflet telling me information about it and how to use it. So I suppose just a wee section either somewhere on the site that you're using or if there are leaflets that are in the clinic that just tells you how it works […] that would probably help people know what to expect. (P6, 16-24)*

In addition, some participants suggested that videos depicting the process would help them to complete the stages of the service correctly. Participants also expressed the need for linkage to other services. This was linked to participants' worries around having fewer opportunities to express a need for additional services because there would be less direct contact with healthcare professionals.

> *I think probably the easiest thing with that would be if there's a wee section on the site that does the online service, if there's just another wee bit […] something that links you to other services, like another service's website if you're needing that. (P6, 16-24)*

6.3.2.5.2. Helpline

A helpline was discussed in relation to STIBBV sampling where some participants felt it would be beneficial so they could get clarification about how to obtain a valid sample. The majority of participants anticipated that the helpline would also be beneficial when completing other parts of the online service such as the consultation. In most circumstances, participants felt that completing the stages of the online PrEP service would be relatively straightforward unless there was an issue such as having a question or worrying about an STI. They saw the helpline as a source of information and a first point of call should any difficulties arise. One participant expressed a preference for a helpline over online chat services because they felt reassured when the spoke to an actual person. However, participants also acknowledged that a helpline would likely not be available 24 hours a day and expressed the need for relevant signposting within the online PrEP service interface for times when the helpline was not available.

> *Hearing someone's voice, a bit like when you call 999 and there's someone there and if you've got an emergency and they're talking you through what to do and stuff that to me is what I possibly was envisaging… I think having an automated one to me is quite you could just read something off the internet, you could do something, you know what I mean. (P2, 16-24)*

In addition, participants suggested that there could be the option to submit a question through the online PrEP service where a health professional could respond with a message. Participants also expressed interest in the option to request a call-back if they had a query that may not be straightforward enough for a text reply.

6.3.2.5.3. SMS reminders

Participants found the SMS text messages they get from the clinic to remind them to book appointments extremely useful. They felt that it was important that this feature was incorporated into the online PrEP service, reminding them that they are due a PrEP follow-up and to complete each of the required steps.

> *I think it would be important to have the reminder, like mentioned before. And maybe give within some amount of days, like a week, some will take longer or something like that, activate a reminder. So to make sure you're going to complete it and you just don't leave it and leave it and leave it. (P13, 25-34)*

6.3.2.5.4. Safe space

One participant spoke about the benefits of having a safe space where people who experience barriers to testing at home and at the clinic could go to complete their self-samples.

> *Or even necessarily like having these home kits, again I don't know if it defeats the point, but doing like a hybrid where you do it yourself but in a clinic, and then you're not having to worry about doctors, nurses, the kind of medical anxiety that's there, but you're doing it yourself but in the clinic toilet, or somewhere sanitary, but doing it in a place where there are people around to help if you need it but it takes away a lot of the medical anxiety. (P2, 16-24)*

6.3.2.6. Appropriateness of online care

Figure 37 presents the themes and subthemes of this section which examines issues participants raised around the appropriateness of online care. Suitability focuses on the reasons why the online PrEP service may or may not be appropriate for individual service users. Equity and transitioning between pathways are also explored in this section because participants explicitly linked these issues to suitability within the interviews.

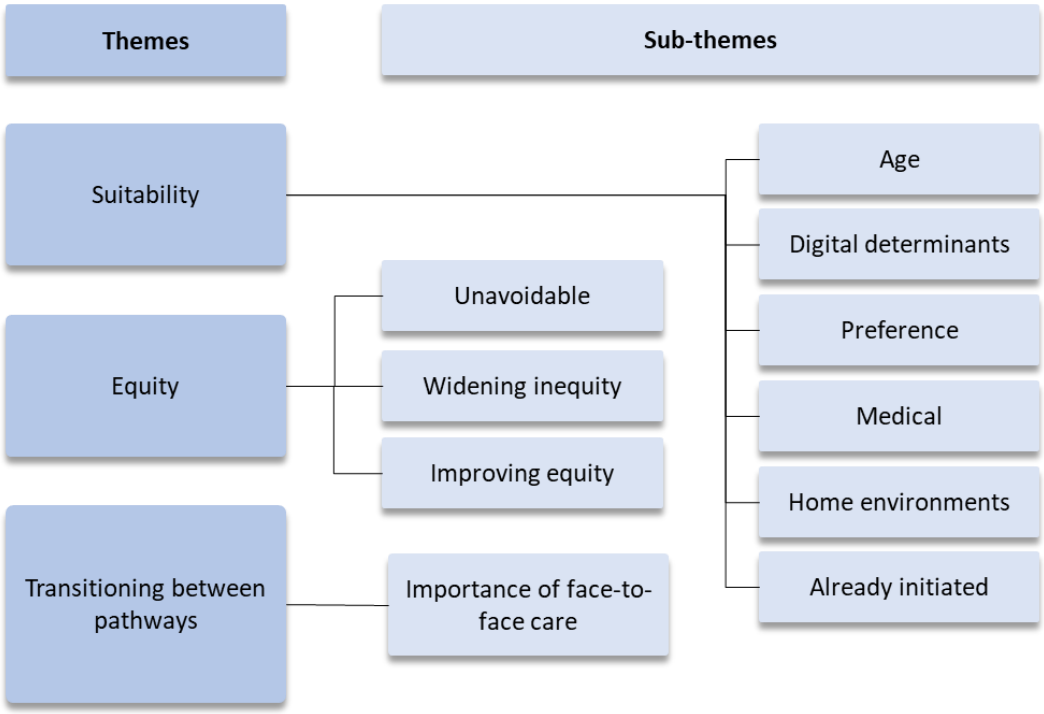


Figure 37. Themes and subthemes relating to the appropriateness of online care

6.3.2.6.1. Suitability

Participants felt that the online PrEP service may not be appropriate for people who have complex health needs who may need additional support and monitoring.

> *I think that's going to be expected […] obviously it's a new system, it's for people that probably don't have underlying health conditions, obviously not taking much more medication, not seeing much change in their medication. So obviously if you've got a health condition, you're moving around medication and then you're trying to take PrEP, obviously I would hope people would understand that they'd probably need a review anyway. (P15, 35-44)*

Participants anticipated that the service may be more appealing to younger PrEP users, stating that they assumed older PrEP users would have a lower level of digital literacy or willingness to engage with online care. This view was not shared by PrEP users in the upper age brackets, all of whom expressed interest in using the online service. Participants acknowledged that the online PrEP service would only suit people who had reliable access to technology and that people's ability to engage with the online service may be dependent on their phone's data plan. Participants also acknowledged that not everyone has a safe space where they can be sent the self-sampling kits or the PrEP prescription, or that their home environments may be challenging and may affect their ability to complete the sampling or consultation.

> *People who don't have a fixed home regularly or haven't got a safe place to call a home it does make things a bit more difficult. I remember when I was younger some of my family who I lived with weren't too open-minded about stuff, so doing that at home when you're living with people who aren't as open that can be interesting, not impossible but harder I think. So, having the opportunity to keep the clinics open is obviously still a good thing. (P2, 16-24)*

Participants reflected on their own experiences with PrEP and felt that it was important that the proposed online PrEP service was only made available to people who had already been initiated on PrEP in person and who were comfortable taking it. In particular, they felt the first appointment should always be in person.

> *Because for the first appointment or for the first decisions I think the online self-assessment may not be perfect, just to give the space to ask the questions. But if we*

are talking here about the follow-up appointments, whether it's every three months, then I think it looks very promising. (P9, 35-44)

6.3.2.6.2. Equity

When asked how they felt about some people not being able to use the online PrEP service, participants had mixed feelings. Most participants acknowledged that this is inherent with any health service, not specifically the online PrEP service.

I mean, I think that's just a part of life. I think for some people it just won't be as maybe accessible to them. Not exactly sure how to work around that. (P6, 16-24)

Participants anticipated an added benefit of the online PrEP service would that it would increase capacity within in-person and phone services so people may still experience some indirect benefits from the online PrEP service.

It means that there will be more appointments available. If people are only going once or twice a year rather than every three months, then it will be so much easier to get an appointment rather than having to wait two weeks to get in. (P8, 16-24)

Participants were asked how they felt about the prospect of people requiring in-person reviews at different frequencies (i.e. every 6 months as opposed to every 12 months). Participants felt that this was acceptable and would be a sign that the service was well designed and sensitive to people's individual needs.

While participants acknowledged that the online PrEP service would not be suitable for everyone's health needs, they also felt it had the potential to open access and make PrEP more appealing to some people who were not be accessing PrEP but would benefit. Participants explained that the online PrEP service may help alleviate or remove some of the barriers people experience with current models of PrEP care.

I think it's very good, especially I can imagine it would be very good for some remote locations. I assume that not everywhere there is a clinic, a specialist clinic, so from that perspective I think it may be very good. (P9, 35-44)

6.3.2.6.3. Transitioning between pathways

Participants felt that in-person appointments should always be available to those using the online PrEP service and reflected on situations where they would prefer in-person care. These situations centred around having specific worries about STIs or HIV, having questions, and having difficulty collecting samples.

> *Obviously if something serious has happened to somebody and they're needing somebody to talk to and then…sometimes…especially if it's something sexual, [an in-person appointment is] maybe, kind of, a good place to talk about it. Obviously I know it's not a counselling service but, you know, just…there is sometimes…there is the bit of chat and you've got the…you know, whoever you're seeing at the time and so making sure everything's been okay and things like that. (P15, 35-44)*

Participants accepted the potential need to transfer from the online pathway to in-person care should any issues arise in the samples or online consultation. Participants acknowledged that their preferences for care may not remain the same and depended on their circumstances at the time of their PrEP review. Participants suggested that it would be beneficial to have an option for requesting or booking a phone or in-person appointment within the online PrEP services interface or via the existing online booking portal.

> *You could have a thing of 'my preference[s] are' and it would be like, 'online only' or 'online and face-to-face' option or 'always face-to-face'. It would like, to give that option and then […] be put into an algorithm of where you would be sorted. Then if you selected face-to-face or face-to-face and online, you then would be presented with that choice before you start the user journey on the online test section. (P1, 16-24)*

Participants appreciated and welcomed the need for yearly or six-monthly in-person appointments. In some cases, participants expressed that they would actually prefer to have in-person appointments every six months than waiting 12 months between seeing a healthcare professional. This sentiment was also evident when discussing the potential need for people to transition from the online pathway to in-person care if there was a positive test result or any indication in the online consultation that they needed to be seen by a health professional. Participants tended to assume there would be a good reason for this and trusted the health professionals to make these decisions while others expressed that being asked to attend in person would be fine if they were provided with a clear rationale.

I would be absolutely fine with that because I know that it is responsible of the doctors and of myself to make sure that everything is working properly. Obviously, I think one of the assessments is kidney function, so obviously I know that that is a requirement. It wouldn't bother me if I had to go in for a face to face or a further test. (P14, 35-44)

6.3.2.7. Self-management of care

The themes of responsibility and expectations were closely linked within the data and related to the self-management of care: participants felt that clear expectations would facilitate responsible use of the online PrEP service. Thus, Figure 38 presents these as linked themes.

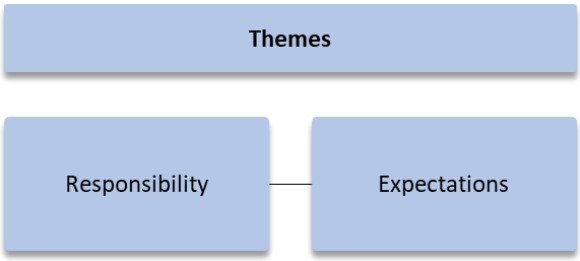


Figure 38. Themes within the self-management of care

6.3.2.7.1. Responsibility

Participants were asked to reflect on the idea that the online PrEP service would involve a shift in responsibilities from the health professional to the service user (e.g. making sure the samples are ordered, completed and returned in sufficient time). Participants had varied views on this with most feeling that they would be able to take on the added responsibility.

I mean, it wouldn't be a problem for me, because I'm quite, you know, I work to a kind of routine, you know, I've got my calendar, and I just follow it. But I guess there would be people out there that would find it difficult to remember to do things. And at a certain time, and they'd probably leave it too late, and then that would become an issue, they might then, they'd put themselves at more risk, because they don't have PrEP. (P10, 35-44)

One participant stated that people who were unable to take on this responsibility and complete the stages at the right time would be better suited to remain on the existing pathway.

> *I think people should really take responsibility for their own medical issues. If they can't be responsible enough to say, oh I need to do this by this point then they probably should be going into the clinic to get it anyway really. (P8, 16-24)*

Participants acknowledged that the main difficulty may be remembering to complete the samples on time. Some suggested that they would take on the responsibility of setting reminders for themselves while others looked to the clinic or online service to prompt them.

> *I think you would need a notification that your tests were due […] So you can't forget just exactly what day they're due unless you actually mark it in your diary. For me, I probably would [forget]. Memory's not as good as it should be at the moment. […] That's me putting the onus on [the clinic] for sending me the notification that I'm due to order them. Rather than the onus being on me to order them, if you know what I mean? (P5, 65+)*

6.3.2.7.2. Expectations

Participants highlighted the importance of making sure that people understood what to expect from the online PrEP service and what would be expected of them in the process.

> *You need to put it in black and white or send it to each individual in an email, exactly how you expect it to work for them. (P5, 65+)*

Participants were asked how they thought these expectations should be communicated. Participants felt that an explanation and accompanying leaflet or document should be sufficient. One participant added that there could even be *"terms and conditions"* (P9, 35-44) as a more formal agreement.

6.4. Discussion

The aim of this study was to explore current PrEP users' views on the acceptability of online PrEP care. The findings of this study suggest that the online PrEP service is highly acceptable to potential service users and provide crucial, nuanced insights into how the proposed service can be further optimised to meet the needs and preferences of those who may use it. Here, I address each of the study's research questions, discussing the findings in the context of the

doctoral research project and the proposed online PrEP pathway - for clarity, I will situate my findings within the wider literature more fully in Chapter 8. I also reflect on my experience conducting the study and consider the strengths and limitations of the study.

6.4.1. What were people's experiences of accessing PrEP during the COVID-19 pandemic and how might this help inform online, remote PrEP care in the future?

Although participants experienced some challenges with the telephone-based PrEP service, they felt the overall quality of the care they received was high. The telephone-based PrEP service was seen to be impersonal by some participants. Crucially, participants shared reasons why the telephone-based service felt impersonal; specifically, a lack of cohesion and the repetitiveness of the questions. This repetitiveness could be minimised in the online PrEP service by fully integrating the online consultation with the national patient records system so that the information input by service users is readily available to healthcare professionals. The lack of cohesion, which primarily resulted from care being provided by different healthcare professionals within a single review (i.e. the telephone consultation and the in-person appointment), may become less of an issue for online PrEP service users given that the purpose of the online PrEP service is to reduce the frequency of these telephone and in-person appointments.

Some participants experienced stress and anxiety in relation to the telephone consultations because they disliked speaking on the phone or they were not able to be in an environment where their privacy was guaranteed. This seems to be an understudied area, particularly within the health context. One study, albeit in a different field, found that 62% of office-based employees experienced phone call-related anxiety and this was linked to worries about being overheard and the person on the phone perceiving them negatively (Face for Business, 2019). In theory, the proposed online PrEP service will reduce the frequency of these phone calls which may reduce the level of distress experienced by service users. Moreover, offering an online interaction that can be completed on a smartphone will prevent the possibility of being overheard (but potentially not over-*viewed*, especially if accessing a computer in a public or semi-public area). Inevitably, some service users will need to be followed-up via phone call at times; however, within the existing pathway phone calls are unavoidable so any reduction in the frequency of these would likely bring some benefit to these service users.

Participants found the telephone-based PrEP pathway easy to navigate. They were able to adapt to a new, distanced method of accessing PrEP care that was implemented rapidly during a global pandemic – a time of significant stress and uncertainty. This is promising for the implementation of the proposed online PrEP service where we have the benefit of being able to take a steady, evidence-informed approach to its development and implementation. The quick adoption of the telephone-based PrEP service shows service users' ability to adapt and learn new ways of accessing care. With that said, it is unclear what happened to those who struggled adapting to, or who did not engage with, this model of care and continued efforts are needed to ensure people are able to access the care they need.

6.4.2. What is the acceptability of an online, automated PrEP consultation?

The concept of the online PrEP clinical consultation appeared acceptable to all participants. Some participants were ambivalent to how their data was stored while other were accepting of the need to provide information online but wanted clarity over how the information would be managed and what security features would be in place (e.g. encryption). This was largely consistent with service users' experience of the eSexual Health clinic where participants expressed concerns about online data security but ultimately accepted the need to provide information online part of online health services (Aicken et al., 2018). Participants were willing to provide information about their sexual behaviour online and some felt that it may be easier to provide this information online compared to speaking to a healthcare professional. This is also congruent with Aicken et al., where participants felt that the online consultation was a more private way of disclosing their sexual behaviour. Moreover, participants felt that they would be able to provide more accurate information about other medications they were taking as they could copy the name from the box at home rather than trying to remember it in the clinic. Overall, the findings of this study in relation to the provision of information online was congruent with the findings of the SMMASH surveys (Chapters 4 and 5) where the majority of participants were willing to provide the information necessary for accessing PrEP online.

There was no consensus on what device participants would prefer to use to complete the online consultation. Participants considered smartphones and computers, in-keeping with the findings of the SMMASH surveys. Smartphones were seen to be convenient, allowing people to complete their online PrEP reviews at a time and place of their choosing. We know from participants' experience of the telephone consultations that they are not always able to

schedule their telephone consultations at a time and place where they had sufficient privacy so the use of a smartphone to complete the online consultation seems to address this challenge. This aligns with Aicken et al. (2018) who found that participants opted to use smartphones to access their online consultation as it would facilitate privacy. In contrast, computers were preferred because they were more accessible: they have larger screens and less 'fiddly' controls. Interestingly, in the SMMASH surveys, older participants were less likely to be willing to use a smartphone to access online health services but a comparatively larger proportion were willing to use a computer. That's not to say all older people will experience difficulties but vision and manual dexterity do decline with age (Choi et al., 2020; Elboim-Gabyzon & Danial-Saad, 2021), perhaps contributing to, or explaining, these age-related trends in use of, and willingness to use, different devices. It seems that smartphones and computers address different needs and it seems that both should be considered when developing the service to ensure that people are not disadvantaged.

6.4.3. What is the acceptability of self-sampling to test for HIV and STIs within the context of an online PrEP service?

Participants made a clear distinction between swabs and urine samples, and blood samples. The acceptability of performing swabs and urine samples was high among participants. These were procedures that participants were already familiar with, having completed these themselves in the clinic setting. The blood sample, however, was new to most. Participants' attitudes seemed to range from slight apprehension to considerable aversion. Some of this apprehension may be due to uncertainty or unfamiliarity with the process (Hillen et al., 2017). Indeed, participants suggested that if they were able to perform the blood self-sample in the presence of a healthcare professional, they may be more comfortable performing the sample themselves at home. This maps onto the behaviour change technique 'behavioural rehearsal/practice' (Michie et al., 2013) or 'guided practice' (Eldredge et al., 2016) wherein supervised practice of a health behaviour leads to improved self-efficacy. I explore this further in Chapter 8. Other participants' aversion to the blood self-sample seemed to be a less moveable barrier. This was linked to a fear of blood. Blood-injury-injection phobia is relatively common and given the potential for people to faint or experience panic attacks (Ayala et al., 2009), it is important that the voluntary nature of the online PrEP service is clear to participants, as is the availability of face-to-face care if needed. Indeed, the need for a blood self-sample appeared to be the deciding factor for participants as to whether or not they would opt to use the online PrEP service.

6.4.4. What barriers and facilitators might affect people's engagement with an online PrEP service and how might anticipated challenges be overcome?

The proposed online PrEP service seems to have the potential to empower PrEP users by giving them more autonomy and control over their PrEP care. This coincides with the Scottish Government's Self Management Strategy (Long-Term Conditions Alliance Scotland & Scottish Government, 2008) and the wider movement towards person-centred care in the NHS (NHS Scotland, 2019). Indeed, participants anticipated that they would have more control and be able to overcome some of the barriers they experience with existing services such as traveling to the clinic and scheduling appointments around work, at times where they would have sufficient privacy. Participants contrasted this with the telephone-based model where they found it challenging to schedule appointments at suitable times. The incorporation of digital methods has revolutionised various aspects of life with participants highlighting how convenient online banking is and how the online PrEP service could similarly help make PrEP care less burdensome. Moreover, by reducing the need for telephone calls, the online PrEP service may help to alleviate some of the stress and anxiety experienced by service users.

The introduction of the online PrEP service is anticipated to lead to changes in responsibility. Within the existing model, the service user attends the clinic and, while it is their responsibility to attend, the healthcare professional leads the consultation and sample collection. Within the online PrEP service, the responsibility shifts to the service user. Participants in this study acknowledged this but appeared to vary in the degree to which they were prepared to take on this responsibility. The vast majority of participants felt comfortable taking on this responsibility, suggesting ways that they could ensure they would complete the necessary steps in time (e.g. setting reminders on their phones). Those less confident in their ability to take on this responsibility instead considered how the clinic could support them to complete the steps on time to avoid running out of PrEP. Participants reflected on the need for clear expectations and how this may help to ensure that service users understand what they will be responsible for before opting into the online PrEP pathway. Participants considered SMS reminders and how they help them to keep on top of their PrEP care within the existing pathway. Given that SMS reminders are relatively cost effective (Farmer et al., 2014; Sallis et al., 2019; Schwebel & Larimer, 2018) and already implemented within the context of PrEP care, it seems important that they are incorporated into the online PrEP service. The concepts of

responsibility and expectations need to be carefully considered to ensure that service users are able to use the online PrEP service successfully and appropriately.

Participants spoke about how having their PrEP medication delivered to their home was sometimes challenging. They worried about it being intercepted, being questioned about what they were having delivered, and about the reliability of the postal service. Within the online PrEP pathway, in addition to being provided with their PrEP remotely, service users would also be provided with their postal self-sampling kit. This could exacerbate the challenges already faced. Participants suggested that there should be the opportunity to collect their PrEP medication from a pharmacy or the clinic to avoid the challenges with home delivery. If this is feasible, perhaps it would also be possible to distribute the postal self-sampling kits through these locations to bypass the need for home delivery completely. Moreover, participants also suggested allowing an "address of choice" which would allow them to direct their deliveries to a safe space (e.g. a friend's house) and help remove the home-delivery barriers.

Participants identified digital determinants of health (device access, data plans, digital literacy) as potential barriers to engagement with the online PrEP service. While this is perhaps a wider barrier, there are some steps that could be taken to minimise these obstacles within the context of the online PrEP service. Firstly, the online PrEP service should be optimised for smartphones and computers as some participants indicated that they do not have access to a computer and others reported accessibility issues with smartphones that are less pronounced when using computers (i.e. small screens and 'fiddly' controls). It seems important to ensure that the online PrEP service can be accessed on both devices so not to discourage people from using the service. Participants also spoke about having the option of transitioning via the helpline or via the online interface. Offering both ways may ensure people have access to care if they run out of mobile data or minutes on their phone plan. The barriers related to the digital determinants of health emphasise the importance of face-to-face care and ensuring that this is available to all who need it. I explore this further in Chapters 7 and 8.

6.4.5. What is the optimal way(s) for people to transition between online and traditional PrEP care pathways?

I do not think it is possible to conclude what the 'optimal' method for transitioning between online and existing PrEP pathways will be from this study; however, participants did provide useful insights into what this process should involve. Participants acknowledged that

there will likely be times when they would prefer to be seen in person and felt that it was important that the transition between pathways was quick and easy. Participants wanted to be presented with the option to order the online postal self-sampling kit or book a telephone consultation at the start of the review episode as they anticipated that they would know which pathway they wanted to use ahead of their review. Participants also wanted to have the option to transition from the online PrEP pathway to telephone/face-to-face care after starting the online pathway and suggested that this be built into the online interface. Participants also suggested that the helpline could be a suitable method for transitioning between pathways. If their query or concern could not be remedied through the helpline, participants expected that they would be able to be booked in for an in-person appointment on the same call. The views expressed in the interviews need to be considered alongside the practical capabilities of the online interface in the next stages of development.

6.4.6. Who might the online PrEP service be appropriate for and who might be better suited to in-person or telephone-based care?

Participants felt that it was important that people were initiated on PrEP through the existing pathway and that the option for online care was introduced once they were comfortable with taking PrEP. This aligns with the intentions of the proposed online PrEP service's developers (Estcourt et al., unpublished manuscript). Much of the data relating to suitability centred on medical factors such as comorbidities and kidney function – again, in line with the intentions for the online PrEP service. Participants specifically noted that they would be understanding if they were told that in-person care was more appropriate for them for medical reasons.

Some of the younger participants anticipated that older PrEP users would have difficulty using the online PrEP service because of perceived lower digital literacy. This view was not expressed by participants in the older age groups. While there is a wealth of literature exploring older adults' internet use and digital literacy (e.g. Hargittai et al., 2019; van Boekel et al., 2017), perhaps it is better to focus on digital literacy as the potential barrier rather than age so not to unnecessarily exclude older adults who may be perfectly able to navigate the online PrEP service interface. It is clear that accessing the online PrEP service will require a level of digital literacy and we need to consider how to assess this within the context of a consultation. One possible solution could be the 3-item Digital Health Care Literacy Scale (Nelson et al., 2022) which is a brief screening tool for core digital health skills; however, the digital health skills

covered in this tool do not map onto the skills needed to follow the proposed online PrEP pathway. Perhaps it could prove a useful starting point for a tailored scale that could be used to assess a service user's ability to access the online PrEP service prior to moving onto the online pathway.

6.4.7. How can GBMSM be supported to use the online PrEP service?

Participants suggested a number of ways that they could be supported to use the online PrEP service. In addition to the guided practice for completing the blood self-sample, participants highlighted the importance of clear instructions and suggested that these come in a variety of mediums (text, image, video). SH24 was noted as a service that had high quality support materials (SH24, 2022). Participants felt that there needed to be a clear explanation of what their responsibilities would be and what the online PrEP service would involve so they could make an informed decision as to whether online care was something they could manage or wanted to use. Participants expressed the need for a helpline so they could ask questions and be linked back into the telephone-based/face-to-face pathway if needed. Finally, they stated that SMS reminders should be used within the online PrEP service to flag that their review was due or to prompt them if they forgot to complete a stage. I explore support features further in Chapters 8.

6.4.8. Provision of PrEP medication

I did not set a specific research question for the remote provision of PrEP medication; however, there were important points raised within the interviews that should have a bearing on the development of the online PrEP service. Home delivery of PrEP medication was implemented within the telephone-based PrEP service (Henderson et al., 2022a). While most participants were content with this method of delivery, others experienced challenges which I address above. In-keeping with the idea of choice which was clear throughout the interviews, participants suggested additional ways that they wished to be able to access their PrEP medication: through their local pharmacy, collection from the clinic itself, or by selecting an address of choice. Perhaps this could extend to the 24-hour prescription collection points available throughout Scotland (MedPoint, 2021; Browns Pharmacy Healthcare, 2022). Pharmacies do not stock every medication (C Estcourt, personal communication) and so it may be important to consider pharmacies in key locations. Further research would be beneficial to understand the optimal distribution of these pharmacies if this is indeed feasible.

6.4.9. Strengths and limitations

This study provided PrEP service users an opportunity to share their views on the development of a service which they may eventually use. Moreover, it provided them with an opportunity to share their views on the existing service and suggest ways in which their needs can be better met moving forwards. The recruitment strategy implemented was able to recruit a sufficient sample to answer the research questions which is noteworthy given that the study was conducted during the Covid pandemic. I also presented the methods and findings transparently and took steps to ensure that I conducted the research rigorously.

With these strengths, the study also had some limitations. The sample was entirely from an urban setting. Given the potential for digital health services to overcome geographic barriers (Chasco et al., 2021; Hottes et al., 2021; Knight et al., 2019; Maksut et al., 2016), it would have been useful to include voices from rural or semi-rural settings. I was also not successful in recruiting purposively based on ethnicity. While this is partly due to the composition of the Scottish population and trends in PrEP uptake (Health Protection Scotland, 2019a; Scotland's Census 2021b), there are ways I can ensure better reach in the future; for example, working more closely with community-based organisations to identify more effective recruitment channels. The need to conduct the interviews remotely may have excluded some potential participants and limits the transferability of this data. Participants were given the choice between having the interview be conducted via telephone call or Microsoft Teams – all opted for the latter. Therefore, this sample had a level of digital literacy that cannot be assumed in the wider population; again, limiting the transferability of this data.

Finally, the study, by design, dealt with many hypotheticals. Indeed, the online PrEP service itself is hypothetical at this stage. While participants often drew on their experience of similar services and situations, we know that what people anticipate they will think and feel in a given situation and what they subsequently think and feel often are not perfectly aligned (Martin et al., 2021). That is not to say that the participants were necessarily expressing inaccurate views; but rather, that individuals simply are not always able to forecast accurately. Accordingly, it is important to be mindful of this when considering the data and using it to inform services moving forward.

6.4.10. Reflections

I made efforts to ensure that the participants in this study knew that I was not a healthcare professional as I anticipated that this may affect how they interacted with me during the interview. I stated in the participant information leaflet that this study was in no way linked to their care, and that I was from the university, rather than the NHS. However, I noticed a subtle difference between how participants recruited from the online cohort and the NHS spoke to me and settled into the interview. The interviews with the cohort members were also longer than those with the NHS service users. I considered why this was the case. I initially thought this may be due to my technique as an interviewer – getting better at managing time or being less explorative as the interviews progressed, although I was conscious to avoid the latter. I then wondered if they viewed me differently because the cohort was not explicitly connected to the NHS, and the other group was. Participants were being recruited into another study run by one of their PrEP care providers. It seems logical that the closeness of the studies meant that they perceived me as being linked to their care in some way. I do not think that this had a hugely detrimental impact on the data but I think it was a useful experience for me to perhaps spend more time letting participants know what my role is and where I am approaching the research from.

This doctoral research project focused on GBMSM. I feel it is important to be inclusive and acknowledge people's individual identities, not just because it is respectful but because lack of acceptance or representation is a significant barrier to people engaging with services (Bauer et al., 2009; Roberts & Fantz, 2014). Contemporary ideas around gender may mean that the traditional binary way of separating people into male or female is no longer sufficient to represent the identities of the people accessing care (Matsuno & Budge, 2017). However, there is also the concept of erasure wherein people feel that their identity is not being recognised (Bauer et al., 2009). There is an interesting and difficult balance between being inclusive and erasing identities. I feel that when designing this study, I intended to be as inclusive as possible within the umbrella of GBMSM. I wanted to be very clear that trans men were included in this definition and open the study up to people who may identify as non-binary or otherwise who feel that research or care focused on GBMSM also directly affects them. I do not think I was fully successful in this, in part because of a slight inconsistency across materials wherein I only felt it was clear in the expression of interest form that non-binary people were eligible if they felt GBMSM services were relevant to them. I will explore gender in greater depth in Chapter 8.

I was able to collect a plethora of data in this study. I anticipated that it would be challenging to decide what data to include and what to exclude; however, the process was relatively straight forward. As I mentioned in Chapter 4, I began the process of developing my questions for SMMASH3 wanting to know as much as I could and had to restrain myself and consider exactly what data needed to be collected to answer my research questions. This made the process much easier in this study. I approached the research questions, topic guide and analytic framework with more focus from the beginning and this continued into the analysis and write-up. It was quite clear what data fit with the research questions and aim of this study (including the more inductive themes and subthemes). I did present the data to my supervisory team who agreed with the decisions I had made regarding what data informed the research questions and aim. I think I may have erred on the side of inclusion and perhaps could have streamlined the results more but I feel it was important given the novelty of online PrEP care.

6.5. Conclusions

The qualitative interviews provided nuanced answers to the research questions and a clear justification for the development and implementation of the proposed online PrEP service. Participants found the prospective online PrEP service highly acceptable and gave clear views on how to develop and implement the online PrEP service so it meets their needs. Choice was an important issue across the interviews and participants felt that it was important that they were able to opt in and out of the online pathway depending on their circumstances at the time of their review. In the next chapter, I present a focus group study conducted with healthcare professionals involved in PrEP provision that explored the acceptability of the online PrEP service from their perspectives as care providers.

Chapter 7. Focus groups with healthcare professionals exploring the acceptability of online PrEP care

In this chapter, I present a focus group study in which I aimed to explore the acceptability of the proposed online PrEP service among healthcare professionals who are involved in delivering PrEP care. I start by positioning the study within the doctoral research project, providing rationale for the study and relevant background information. I then detail the methods used and present the data collected before critically discussing the findings in relation to the wider project and the proposed online PrEP service.

7.1. Introduction

In Chapter 6, I presented data from semi-structured interviews with GBMSM who use PrEP. Participants found the proposed online PrEP service highly acceptable and highlighted key considerations for the development of the service. I decided that it was also important to understand the views of healthcare professionals involved in providing PrEP care for several reasons.

The Intervention Mapping approach that partly informs this doctoral research highlights the importance of environmental actors and processes, and the importance of thoughtful planning of implementation interventions or strategies (Eldredge et al., 2016). Therefore, it was important to understand the views of healthcare professionals when creating this evidence base as their involvement will be crucial for the implementation and maintenance of the online PrEP service. As mentioned above, developing an implementation strategy is a crucial aspect of intervention development (Eldredge et al., 2016). Understanding how an intervention will fit within existing structures and workflow, who will implement it, and anticipating challenges and planning for these is crucial for optimal service delivery (Eldredge et al., 2016). The healthcare professionals' first-hand experience with these structures would prove vital in understanding this. In Chapter 6, participants shared benefits and challenges that they perceived the online PrEP service would introduce from a service user perspective. I felt it was important to understand similar factors from a service provider point of view, particularly when service users highlighted how important it would be that services were well integrated, allowing seamless transition between online and in-person pathways.

The aim of this study was to explore healthcare professionals' views on the acceptability of online PrEP care. I wanted to address the following research questions:

1. What were people's experiences of providing PrEP care during the Covid pandemic and how might this help inform online, remote PrEP care in the future?
2. What is the acceptability of an online, automated PrEP consultation and prescription?
3. What factors might affect the implementation of an online PrEP service and how might anticipated challenges be overcome?
4. What is the optimal way(s) for people to transition between online and traditional PrEP care?
5. What impact might the introduction of online PrEP care have on existing services?
6. Who might the online PrEP service be appropriate for and who might be better suited to in-person or telephone-based care?
7. How can GBMSM be supported to use the online PrEP service?

7.2. Methods

7.2.1. Summary of methodology

The full methodological considerations were presented in Chapter 3. To summarise, a qualitative approach was taken to address the aim and research questions of this study given the exploratory nature of the questions and the need for rich, nuanced data concerning people's thoughts, feelings and experiences.

7.2.2. Study design

I decided to use focus groups for this study for several reasons. I wanted to collect nuanced data and felt that focus groups would be ideal for this given their ability to generate rich discussions where disagreements, discrepancies, and behavioural norms may be explored in real-time (Barbour, 2007). Participants were asked to reflect on the online PrEP service from a professional perspective; therefore, it was anticipated that it would be very unlikely that any participants would choose to disclose any sensitive personal information during the sessions so safeguarding was not a concern and a group forum seemed appropriate.

I anticipated that conducting focus groups with healthcare professionals as a non-healthcare professional would have been challenging given that there is a great deal of shared knowledge and experience that I would likely not be privy to. As I stated in Chapter 3, I come from a health psychology background, not a medical background, and so I anticipated that

participants may have questions that I would not be equipped to answer which may have impaired the flow and quality of data collected. I felt it was important to cover the gaps in my knowledge and experience. I, along with my supervisors, felt that it would be advantageous to have a co-facilitator who had a clinical background to assist with the focus groups. Having two facilitators is advantageous as it can reduce bias and combines the strengths of both facilitators which may make up for individual weaknesses (Masadeh, 2012). Dr Lindsay Henderson was already attached to the service user interview study as she was the lead recruiter, and was conducting a related study cognitively testing the online consultation tool, and so was ideally suited for this role and kindly agreed.

All correspondence and data collection were conducted remotely via email and Microsoft Teams. Prior to the Covid pandemic, I had designed the study so that data collection would take place in person or via phone call. I had to significantly redesign the study in response to the pandemic. Unlike the service user interviews, I did not offer the option of phone calls because I was advised that all participants would be familiar with Microsoft Teams as it is used within the site for remote meetings, and all focus group participants would need to access the sessions in the same manner. In addition, this allowed me to show participants a presentation (see Section 7.2.4.4.) via screen share to help explain the concept of the online PrEP service.

7.2.3. Participants

7.2.3.1. Inclusion and exclusion criteria

I sought to recruit healthcare professionals who were employed by the NHS and working in Scotland at the time of recruitment who delivered PrEP care to patients. I chose to keep the study open to people who fit the eligibility criteria who were temporarily redeployed due to the Covid pandemic since it was likely they would return to their sexual health role at some point.

7.2.3.2. Sampling strategy

I intended to implement purposive sampling based on job role and years of experience in sexual healthcare in order to collect data from a variety of professional perspectives (Higginbottom, 2006; Llewellyn et al., 2004). While I did achieve a varied sample, slow recruitment and a relatively small population to recruit from meant that this occurred more coincidentally than by design. I had originally intended to recruit from two NHS sites which would have better facilitated my planned purposive sampling strategy and subsequent

transferability; however, I had to redesign the study due to the Covid pandemic which meant scaling down to a single site.

7.2.3.3. Recruitment strategy

Participants were recruited from an urban NHS sexual health service in Scotland. I liaised with the clinic-based staff leading the PrEP service when designing the study to understand if they were willing to help facilitate recruitment and had capacity for focus groups to be conducted within working hours. Dr Lindsay Henderson, Prof Claudia Estcourt, and I met with the PrEP service leads to discuss the project and any questions they may have. They agreed to the study being conducted and I arranged preliminary times with the clinic for the focus groups to take place. After ethical approvals were obtained, I sent an email to the PrEP service lead at the site which included an introduction to the study and a link to the participant information leaflet. Within the participant information leaflet was a link to the expression of interest and demographics form. The lead for the PrEP service circulated this email to all healthcare professionals at the site who were involved in providing PrEP care. Those interested completed the online expression of interest and demographics form. I then contacted them via email to check their availability and allocate them to a focus group. I had intended to have a mix of job roles in each of the focus groups; however, this was not possible due to participants' availabilities.

7.2.4. Development of study materials

7.2.4.1. Participant information sheet

I based the participant information sheet on the GCU template and the participant information sheet from studies that used similar methods and covered similar topics (Glasgow Caledonian University, 2020a; MacDonald, 2018) (see Appendix 19).

7.2.4.2. Expression of interest and demographics form

I felt that an expression of interest form ensured voluntary participation, allowing interested potential participants to express interest at their leisure having read the study participant information sheet (see Appendix 19). As was the case in Chapter 6, having an online form seemed to be the most convenient way of collecting expression of interest. Moreover, this provided an opportunity to check potential participants' eligibility and to collect demographic information in a secure, confidential and efficient manner – rather than doing

this during the focus group. I created the online expression of interest and demographics form using REDCap (REDCap, n.d.).

The expression of interest form started by presenting the participant information sheet to ensure that participants had the opportunity to read it before proceeding. Participants were then asked questions related to the eligibility criteria (Table 27). If participants provided an answer that did not match the inclusion criteria, a message appeared thanking them for their time. Once eligibility was confirmed, participants were directed to the consent page where they were asked to provide consent to store the data already entered, to store the data from the demographics questions that would follow, and to be contacted by me. If participants provided this consent, they were directed to the demographic questions. If participants did not provide consent, they were thanked for their time and their data was not retained.

Table 27. Eligibility questions for healthcare professionals

Expression of interest form – eligibility questions	
Do you work within the NHS in Scotland?	• Yes • No • Prefer not to say
Are you involved in delivering PrEP care as part of your job role?	• Yes • No • Prefer not to say

Participants were then asked to provide their contact information and answer some demographic questions. The ethnicity questions were sourced from the 2011 Scottish Census (Scotland's Census, n.d.). The gender and sexual orientation questions were sourced from Stonewall – an organisation that supports and advocates for LGBTQ+ people (Stonewall, 2016). Table 28 displays the contact and demographics questions presented to participants. All questions and consent forms were reviewed by my supervisory team and other experienced healthcare professionals and academics.

Table 28. Contact information and demographic questions for healthcare professionals

Expression of interest form – contact information and demographic questions	
Name	[free text]
Email address	[free text limited to valid email address]
Mobile phone number	[free text limited to numbers]
What is your job role? *If you are currently redeployed or have multiple roles, please detail all roles within the NHS.*	[free text]
How many years have you worked in healthcare?	[free text]
How many years have you been working in sexual and reproductive healthcare?	[free text]
How many years have you been involved in delivering PrEP care?	[free text]
What best describes your ethnicity?	[options from the Scottish census 2011 (Scotland's Census, 2021b)]
[If 'other'] What is your ethnicity?	[free text]
What is your age?	[free text limited to numbers]
What best describes your gender?	• Male • Female • Prefer not to say • Prefer to self-describe
[If 'prefer to self-describe] How do you describe your gender?	[free text]
Do you identify as trans?	• No • Yes • Prefer not to say
What is your sexual orientation?	• Gay man • Gay woman/lesbian • Bisexual • Heterosexual/straight • Prefer not to say • Prefer to self-describe
[If 'prefer to self-describe'] Please describe your sexual orientation.	[free text]

7.2.4.3. Consent form

Informed consent was sought at two points in this study: 1) in the expression of interest form; and 2) just before the focus group. Both consent forms were based on the GCU template (Glasgow Caledonian University, 2020b). The expression of interest consent form was

embedded in the REDCap survey and participants checked the boxes to acknowledge they understood and agreed with each point (see Appendix 19). Participants had to check all boxes to proceed with the rest of the form. If there were any points they did not agree to, they were thanked for their time and routed out of the form.

The focus group consent form was paper-based (see Appendix 20). Due to the remoteness of the data collection, verbal consent was sought. One-by-one, I went into a breakout room with each participant. I read each of the statements to the participant who responded "I agree" in acknowledgement of the point. This process was audio recorded and kept separate from all other recordings and information. I simultaneously completed a paper copy of the consent form on the participant's behalf. Participants were offered a copy of the completed consent form but all declined.

7.2.4.4. Topic guide and participant presentation

I started to develop the topic guide by looking at examples from similar studies; specifically, those that covered the topics of PrEP and digital health (Frankis et al., 2018c). From there I developed a structure based on my research questions and different aspects of the proposed online PrEP service (see Appendix 21). The topic guide started with questions around the current model of PrEP care and other health services participants had experience of which implemented digital health methods.

Before moving onto the online PrEP service questions, I felt it was important to provide participants with sufficient information about the service on which to base their opinions. I developed a short presentation for the online PrEP service rather than opting for the simple diagram used in the service user interviews because I felt the purpose of providing information was subtly different between the two studies. In the service user interview, I wanted to convey the key messages to participants who likely were not medical experts; hence the diagram to accompany the explanation. For the healthcare professionals, they are knowledgeable about PrEP and their current services and likely would have more questions about service delivery and require a more detailed understanding of the proposed online PrEP service. For that same reason, we decided that it would be more appropriate for Dr Henderson to lead this presentation given her shared experience with the participants and familiarity with terminology and processes within the site. Figure 39 shows the main slides from this presentation.

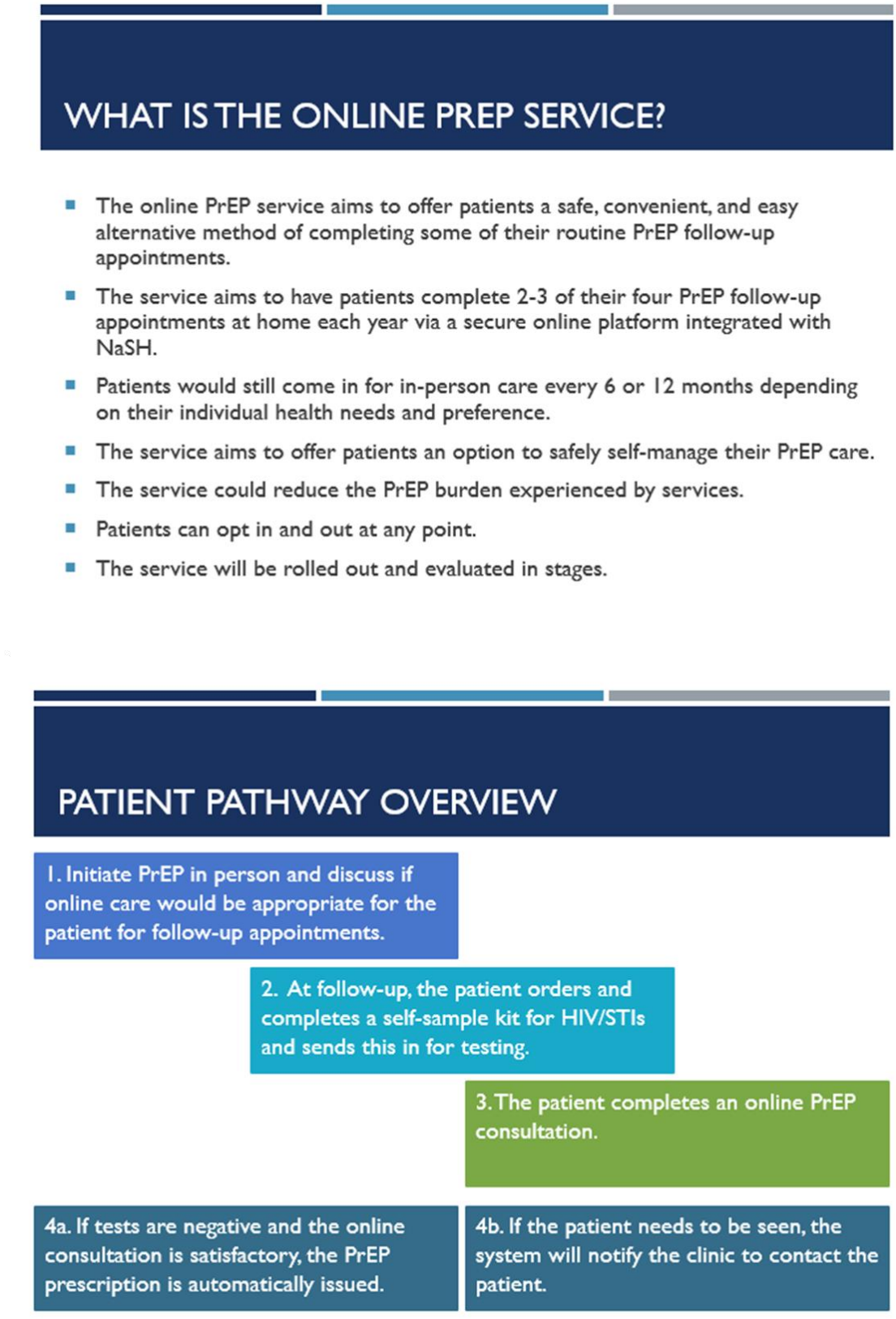


Figure 39. Summary slides from the healthcare professional presentation

Following the presentation, I planned a general question about initial impressions then sought to cover the areas detailed in the research questions. I included fewer questions within this topic guide compared the service user interview because I anticipated that participants would have their own questions that would generate discussion and I was also aware that there may have been between 3 and 5 participants per group so I wanted to make sure there was room to hear from everyone. The topic guide and presentation were reviewed by healthcare professionals and academics ahead of data collection.

7.2.5. Data collection

7.2.5.1. Prior to the focus group

As discussed above, participants provided data before the focus group itself via the expression of interest and demographics form. I contacted the participants via email and scheduled them to one of three initial time slots for the focus groups. One of these dates did not suit any participants so an additional time was also arranged which was checked with the clinic to avoid clashing with other scheduled events. I provided a link to the Microsoft Teams meeting on the morning of the day the focus group was scheduled on to all participants.

7.2.5.2. During the focus group

At the time of the focus group, Dr Henderson and I entered the call 15 minutes prior to the start time to talk through the session and ensure all the necessary features of MS Teams were working (e.g. breakout rooms and screen sharing).

When the participants entered the call, I welcomed them, provided an overview of the session and asked if any of the participants had any questions. I then completed the consent process one-on-one in a separate breakout room to ensure confidentiality. The remaining participants who I was not seeking consent from at that time were in the main room with Dr Henderson. All of the participants were colleagues of each other and Dr Henderson so this avoided any awkwardness from waiting and helped settle participants into the online focus group environment. The process was somewhat time consuming and probably the least streamlined aspect of doing the interviews remotely. Otherwise, the consent process was identical to the process covered in Chapter 6.

After the consent process was completed with each of the participants, I reconvened with them and Dr Henderson in the main room. I checked that the participants were happy to start

the focus group and switched on the audio recorder. I used the topic guide to structure the focus group and to check that we had covered the relevant areas; however, the order of the questions and length of time spent on each area varied depending on the group. I frequently checked in with Dr Henderson to ask if she had any questions for participants based on what they had discussed given that she would likely pick up on areas of interest from a medical viewpoint that would not immediately be apparent to me. We also had a brief debrief during a comfort break roughly half-way through the focus group to discuss how the data collection was going and if there were any areas we thought we should probe further. Before finishing the focus group, I checked in with each participant to ask if they had anything to add before the focus group finished. I then stopped the recording and thanked them for their time and contribution. Dr Henderson and I debriefed after all participants had left the call.

7.2.6. Ethical approvals and considerations

This study was approved by Glasgow Caledonian University's School of Health and Life Sciences department ethics committee on 17.12.2020 under the approval code: HLS/NCH/20/004 (see Appendix 16). The study was also reviewed and approved by the North of Scotland Research Ethics Committee (2) on 22.04.2021 (IRAS: 293269; REC: 21/NS/0044) (see Appendix 17). Research and Innovation approval for NHS Greater Glasgow and Clyde was confirmed on 26.05.2021 (see Appendix 18).

The main ethical consideration for data collection was to ensure that the benefit outweighed any disruption to the NHS site. I endeavoured to implement a seamless process for expressing interest and collecting demographic information which I feel I achieved through the online form. This meant less time was taken up during the focus group doing administrative tasks and provided participants privacy to answer the questions. I also liaised with the clinic coordinator to identify times where there would be no disruption to clinics and no clashes with other events (e.g. staff training). I think these combined measures mitigated any disruption to services.

7.2.7. Data management and analysis

7.2.7.1. Data management

Participants were assigned a record ID at the time they expressed interest in the study via the online expression of interest and demographics form. Participants' contact information was stored in a password protected, encrypted Excel file on my GCO OneDrive account.

Participants' demographic information was stored on a different Excel file with the same level of security. The record ID was the only way of linking this data. Participants' paper consent forms were temporarily kept in a secure locked box within a cupboard at my home before being transferred to a secure filing cabinet on GCU premises. The consent audio recording was held in a secure file on my GCU OneDrive account, held separately from participants' other data and recordings. The focus group audio recording was immediately uploaded to my GCU OneDrive after the focus group ended. I checked the quality of the audio and then uploaded this to the transcription company's secure online portal. When I received the transcript back, I checked the accuracy, made any corrections, and anonymised the transcript. I then destroyed the corresponding audio file so only the anonymised transcript remained. I imported these transcripts into an NVivo file where analyses were performed as detailed below.

7.2.7.2. Data analysis

As in Chapter 6, I decided that the Framework approach (Gale et al., 2013; Spencer & Ritchie, 1994) was the most appropriate method of analysis for the data collected in this study. I detail how I completed the steps of the Framework approach below.

Step one in the framework approach is transcription (Gale et al., 2013). As in Chapter 6, transcription for this study was conducted by an external transcription company (1stClass Secretarial). Step two is familiarisation (Gale et al., 2013). Again, transcribing the data oneself can be a valuable opportunity to familiarise oneself with the data (Gale et al., 2013). Therefore, I ensured that I spend sufficient time with the data to familiarise myself since I did not transcribe the data.

Steps three to five in the framework approach are coding, developing a working analytic framework and applying the analytic framework (Gale et al., 2013). I wanted to discuss these together because I completed them in close proximity and there was some overlap. As was the case in Chapter 6, I did not take a singularly inductive or deductive approach to coding. I used a different a priori analysis framework in this study than I did in the interviews (Chapter 6), based on the research questions for this study but again with scope to include data-driven, emerging areas of interest – see Table 29 (emboldened text signifies the a priori framework and italicised text signifies inductive, data-driven additions to the framework). I completed the coding over several rounds. I started by broadly coding the data, separating it into the broader codes represented by Tier 1 in Table 29. I then recoded these, teasing each apart, assigning the

Tier 2 codes. Where relevant, I then took each of the Tier 2 codes and further separated them into Tier 3 (and beyond). I met with my supervisory team to discuss my coding and analytic approach after coding the first transcript. Once the coding was complete, I revisited each of the transcripts to ensure I had not missed any data relevant to the later developed codes. I had another meeting with my supervisory team to present the data, how I coded the data, and preliminary themes that had emerged.

Step six in the framework approach is charting the data and involves creating matrices to summarise the coded data (Gale et al., 2013). This was a straightforward stage given the ability to automatically generate these matrices within NVivo (NVivo, n.d.). As was the case in Chapter 6, I found this stage very useful as it reduced the somewhat overwhelming volume of data from the transcripts down to clear, concise summaries for each of the codes. This helped me to decide on the final themes.

Step seven in the framework approach is interpreting the data (Gale et al., 2013). While this is the final stage of the framework approach, I was interpreting the data throughout the various stages because of the use of a dual inductive-deductive approach; although, I made a conscious effort to keep an open mind. As I mentioned above, I met with my supervisors at the beginning of this stage to discuss the data both in terms of importance and relevance, but also how it relates to the wider literature and experiences within a clinic setting. Although some themes did focus on a particular stage of the online PrEP service, the themes in this study crossed multiple stages or dealt with the impact on services more generally. The themes in this study are in ways more akin to the overarching themes of Chapter 6.

Table 29. Focus group analysis framework

Tier 1	Tier 2	Tier 3
Current model of PrEP care	**Acceptability**	
	Benefits	*Each benefit/enabler had its own code*
	Challenges	*Each challenge/barrier had its own code*
Other relevant services	*Commercial pharmacies*	
	Online postal self-sampling	
General acceptability of online PrEP care	**Acceptability**	
	Anticipated benefits	*Each benefit/enabler had its own code*
	Anticipated challenges/barriers	*Each challenge/barrier had its own code*
Self-sampling	**Acceptability**	
	Anticipated benefits	*Participants did not reflect on this much*
	Anticipated challenges/barriers	*Participants did not reflect on this much*
Online consultation	**Acceptability**	
	Anticipated benefits	*It became apparent that participants' views were more appropriately categorised as considerations rather than distinct benefits/challenges*
	Anticipated challenges/barriers	
	Key considerations	*Each consideration had its own code*
Prescription	**Acceptability**	
	Anticipated benefits	*It became apparent that participants' views were more appropriately categorised as considerations rather than distinct benefits/challenges*
	Anticipated challenges/barriers	
	Key considerations	*Each consideration had its own code*
Implementation	*Opt-in*	
	Transitioning between pathways	
	Initiating PrEP	
	Service user access	
Support	*Support role*	
	Training for staff	
Eligibility and equity	**Factors affecting eligibility**	*Each factor had its own code*
	Conversations around eligibility	

Identity	
Online care	
Responsibility	*For service users*
	Paternalism

7.2.8. Rigour

I used the Lincoln and Guba (1985) framework to ensure rigour in my research practise in the same way I did in Chapter 6. To reiterate, Lincoln and Guba measure 'trustworthiness' through four key areas: credibility, transferability, dependability, and confirmability. To these ends, I implemented the same practices as before: prolonged engagement, triangulation, referential adequacy, thick descriptions, audit trail, inquiry audit, and reflexivity. I feel that this ensured that I conducted the research rigorously and transparently.

7.3. Results

Nine participants took part in this study – six doctors and three advanced nurse practitioners. There were three focus groups in total with three participants in each. After the third focus group, I felt that I had sufficient data to answer my research questions. Each focus group lasted the full two hours allotted, including the consent process. It was not appropriate to report the specific job roles of participants who fell under the 'doctor' category because it may compromise anonymity given the single recruitment site. Participants' demographics are summarised in Table 30. Participants were mostly female (88.89%) and varied in the duration of their time working in healthcare, sexual healthcare and PrEP care.

Within this results section, I present the final themes and subthemes. The data is presented in two parts: the first addresses PrEP and digital health care during the Covid pandemic, and the second addresses participants' views of the proposed online PrEP pathway. Subthemes will be addressed within the theme headings. I use quotes from the participants to illustrate some of the key points within each theme, balancing my interpretations of the data with the participants' own words.

Table 30. Participant demographics

Profession	**N (%)**
Doctor	6 (66.67%)
Advanced nurse practitioner (ANP)	3 (33.33%)
Years working in healthcare	
Range	2 years – 35 years
Mean (SD)	14.44 (10.21) years
Median [IQR]	10 years [7 years, 22 years]
Years working in sexual healthcare	
Minimum, maximum	3 months – 20 years
Mean (SD)	7.65 (7.58) years
Median [IQR]	5 years [4 months, 15 years]
Years working in PrEP care	
Minimum, maximum	1 month – 5 years
Mean (SD)	2.71 (2.06) years
Median [IQR]	3 years [2 month, 4 years]
Gender	**N (%)**
Female	8 (88.89%)
Male	1 (11.11%)
Trans identity	**N (%)**
Cis-gender	9 (100%)
Sexual orientation	**N (%)**
Heterosexual/straight	6 (66.67%)
Mostly straight	1 (11.11%)
Bi	2 (22.22%)
Ethnicity	**N (%)**
White Scottish	5 (55.56%)
White British	4 (44.44%)

7.3.1. Telephone-based PrEP care and other digital health services

At the start of the interviews, I asked participants to reflect on the telephone-based model of PrEP care delivered during the Covid pandemic and any other services that they had experience of that used digital health methods. Figure 40 presents the themes and subthemes within these areas.

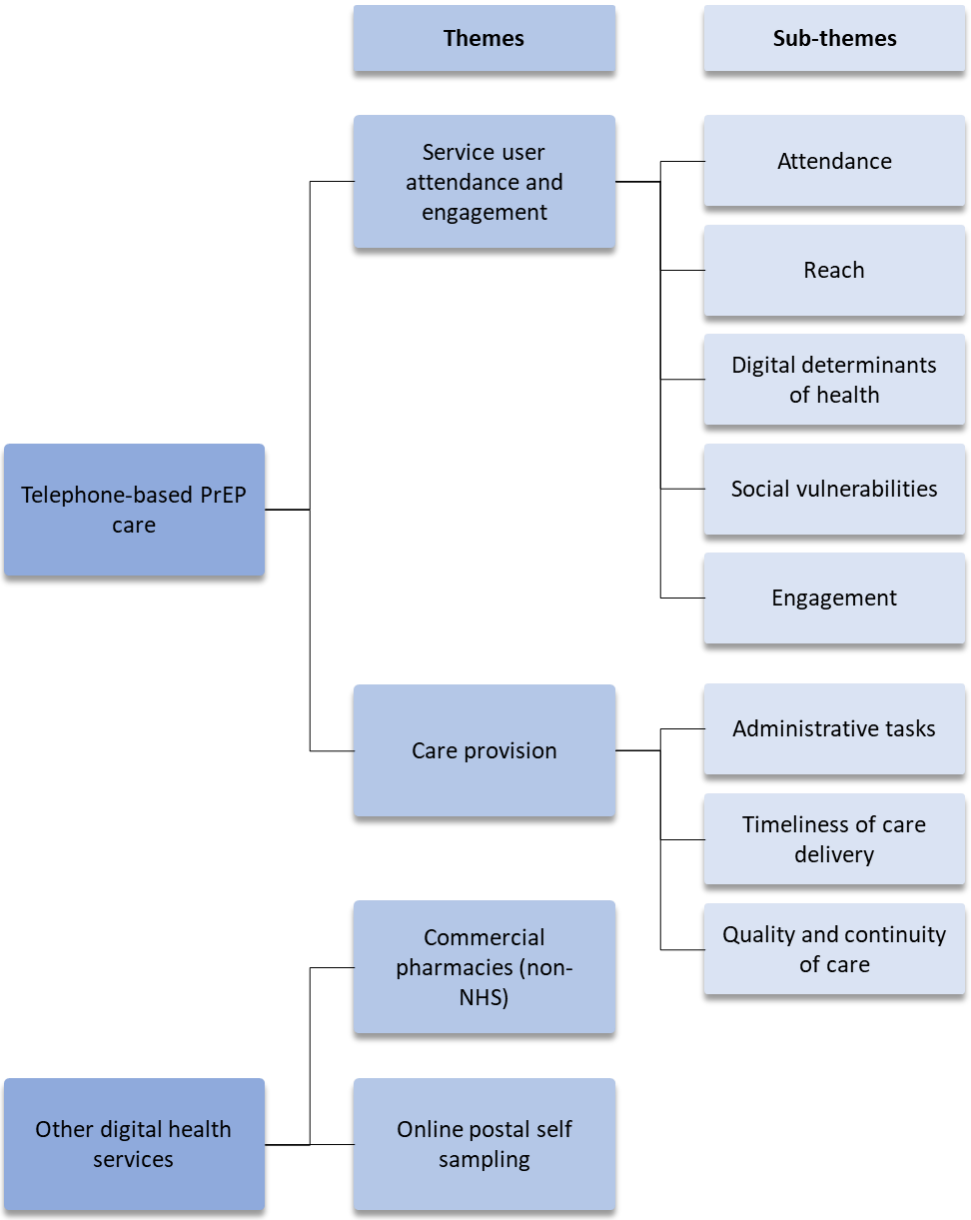


Figure 40. Telephone-based PrEP care and other digital health services themes and subthemes

7.3.1.1. Telephone-based PrEP care

7.3.1.1.1. Service user attendance and engagement

Participants stated that the implementation of telephone-based PrEP had a positive effect on service user attendance. Participants reported that there were fewer people who did not attend their booked appointments (*"DNA"* – 'did not attends') (P6, ANP, FG2) since they moved to telephone-based PrEP care. One participant shared that they felt that the switch to telephone consultations may have helped reach people who would typically not present at a clinic.

I think we're reaching a lot of patients who we wouldn't see normally […] I think having telephone contact, and not face to face, they like that, because they can dip their toe in the water, kind of thing, and see what they're like. And they can always end the call really quickly if they didn't like the session […] once we kind of do the assessment on the phone, I think they're more comfortable then coming to the service, and the questions are done, you know, before they come in. (P5, ANP, FG2)

Participants reflected on populations for whom the current system may be difficult. Participants discussed the challenges that telephone consultations and online appointment booking pose for some key populations. Participants felt that the current service relies heavily on the service users' ability to access the internet. This was discussed in conjunction with literacy and English proficiency.

…I think there are still, that difficult to engage group, are equally as difficult to engage on the phone, as they are in kind of face to face appointments, so I do think that's still a challenge. But I think, we would need to look at, in general, what's the best way to engage them, maybe this system is very good for the broad, vast majority of users, but there are maybe groups within that, that aren't as easy to reach, that we are gonna miss with this system. (P6, ANP, FG2)

Moreover, one participant spoke about the importance of service users having a safe environment where they could receive calls.

So those who need more support. So they may be potentially at risk from a partner. So, you know, telephone consultation is not ideal if they're in a house where there is some intimate partner violence or something like that, then a telephone consultation isn't going to work if the partner's around, to talk about health issues. Or if their support worker's involved, the support worker obviously can't be there for a telephone consultation. (P3, Doctor, FG1)

Participants felt that the current model of PrEP care mainly suited people who knew they were at elevated risk of acquiring HIV or who prioritised their sexual health. This was linked to feelings that the current model is well-suited to people who are in a social environment where PrEP is a *"cultural norm"* (P4, Doctor, FG1). Moreover, participants acknowledged the potential barrier of having to have multiple appointments before PrEP is issued.

One of the main challenges participants reported relating to the telephone consultations was service users not being in a suitable place to receive the call and not providing sufficient attention during the call (e.g. the service user is on a bus or is driving and not paying attention to the questions the healthcare professional is asking them). Participants felt uncomfortable conducting these consultations and reported having to ask the service user to reschedule the consultation at a more appropriate time on some occasions. Participants felt that this was sometimes due to service users trying to schedule care around busy work lives but also felt that some service users viewed telephone consultations less seriously than in-person appointments. Moreover, participants felt that the clinic environment was free from distraction and service users had a reason for being there which telephone appointments did not simulate.

> *The other thing is, sometimes you get patients who, I don't know if they're not seeing it as a consultation, it's like a quick phone call. So they might be in their work, on the bus, you know, and you're kind of saying, oh this would have been better if you were somewhere private, because I'm going to ask you questions that you might find difficult to answer where you are just now, you know. And sometimes it's like, right, they're wanting you off the phone as quick as possible because it's like, you know, I'm at my work, right, I'm going to nip out, you know, nip out the room just now – right, go, kind of thing, you know. And you feel then under pressure, you know, to rush through it, which is not ideal. (P5, ANP, FG2)*

7.3.1.1.2. Care provision

Participants spoke at length about how a large proportion of the PrEP review appointments are spent doing administrative tasks. Participants felt that this was both time consuming and mentally draining.

> *The other thing that's just been said there is, an awful lot as you're doing it over the telephone, is really just doing admin, it's about making appointments and making sure that people are put into the right slot. Which, if you were doing it as a face-to-face clinic, you wouldn't really normally be involved in and you'd get…admin staff would be doing that. So quite a lot of that 20-minute appointment, perhaps even half of it, perhaps 10 minutes of seeing each person is actually making appointments, which doesn't really seem like a really good use of time. (P1, Doctor, FG1)*

Participants reported that service users felt the service was more convenient now that telephone consultations have replaced most in-person consultations. One participant reflected on how the former method of allocating appointments – where the healthcare professional booked service users in for future appointments – combined with the general demand for PrEP led to issues such as service users running out of PrEP and needing to be seen at short notice in 'urgent care' which is usually restricted to people with pressing sexual health needs/symptoms rather than during PrEP clinics. However, with the new measures and method of providing PrEP care – such as telephone consultations and service users being prompted and booking their own appointments online – this issue appeared to have been resolved. Moreover, one participant felt that, despite there still being high demand for PrEP care, service users were able to be seen in a timely manner due to the changes made to service delivery.

> *I don't think, we're not seeing PrEP at all in urgent care. Previously, prior to this model, it was taking over urgent care, it was constantly seen. (P6, ANP, FG2)*

Participants felt that they missed out on some of the nuance and rapport gained through in-person conversations when the consultations were conducted via telephone. This was particularly relevant for service users just starting on PrEP where one participant felt that standard telephone consultations were too short and impersonal to provide comprehensive care. Participants also reported that service users felt more reassured during in-person consultations compared to telephone-based consultations.

> *And occasionally, folk say as well, they like the face to face, because they like the reassurance, and the time, and you know, somebody clapping eyes on them, and you know, it just feels like it's more of a consultation and an assessment, rather than, you know, just a quick phone call. It's quite, you know, there's just not the space for them to ask an extra question, or you know, at that time. (P2, ANP, FG2)*

7.3.1.2. Other digital health services

7.3.1.2.1. Commercial pharmacies (non-NHS)

Apprehension with non-NHS commercial pharmacies was discussed in two focus groups. Participants felt that these companies sometimes offered inappropriate care (i.e. tests and medication) which can have consequences for service users' emotional and medical wellbeing.

I would be very wary, though, if signposting them towards another private company, even something like [a commercial pharmacy's] online test. Because even though it has, you know, like that convenience, if it comes to your house, I've found that private companies can often offer tests that aren't needed. So, [one company offers] HPV testing on their website, and that's not something that people need to be testing themselves for, and feeling very anxious about […] And so I think there can be sort of added anxiety if patients don't get sort of extra information along with those services. (P8, Doctor, FG3)

7.3.1.2.2. Online postal self-sampling

Some service users were channelled into online postal self-sampling during the pandemic for a short period of time (C Estcourt, personal communication). One participant reflected on their experience of signposting service users to the SH24 service (online postal self-sampling) and shared some of the barriers they felt service users experienced with that service (i.e. home environment and anxiety).

I suppose with the Sexual Health 24, like postal STI kits, that's something that I find I signpost a lot of patients towards […] I think that's a really helpful service. I think, maybe the [barriers] that people have to using them, though, are if you're a young person living at home, even if it's delivered in like discreet packaging, some people don't really want that coming to their house. (P8, Doctor, FG3)

7.3.2. The proposed online PrEP service

Participants found the proposed online PrEP service acceptable, anticipating that the service could benefit service users and the clinic itself in many ways. Participants also discussed key potential challenges. Within the overarching theme of the proposed online PrEP service, I start by presenting the themes that map directly onto two of the stages of the proposed online PrEP service: 'online PrEP consultation' and 'automated PrEP prescribing'. I then present the themes that focused on service users, and those that focused on the care providers and wider clinic services. With that said, there was not always a clean separation between service user-, and care provider and wider service-specific themes.

7.3.2.1. Stage-specific themes

Figure 41 presents the themes and subthemes explored in this section.

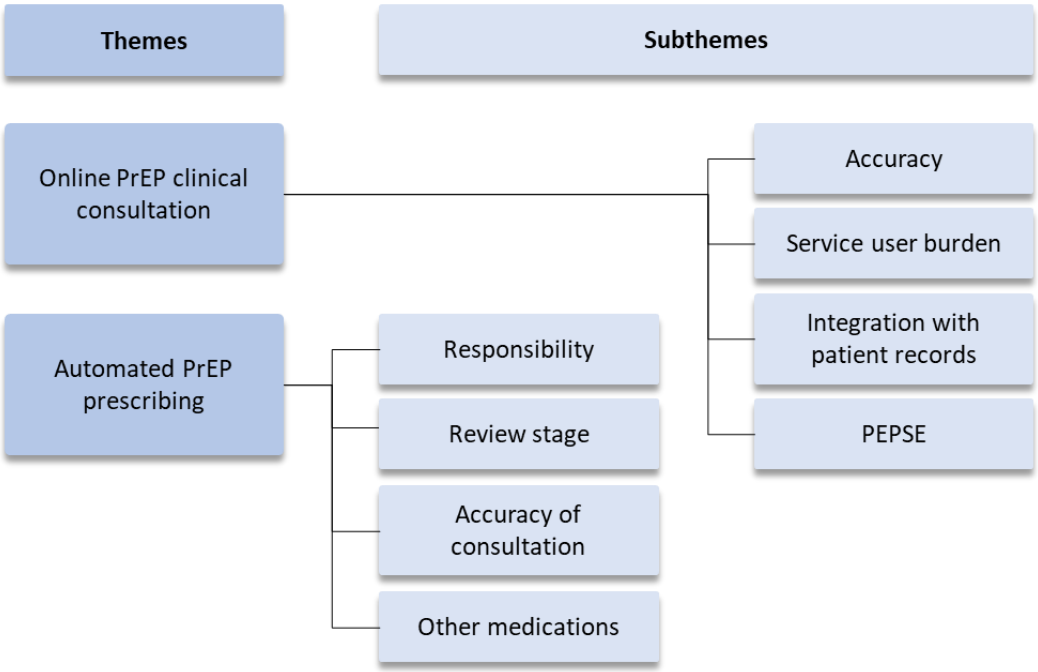


Figure 41. Stage-specific themes and subthemes

7.3.2.1.1. Online PrEP clinical consultation

The main concern participants had in relation to the online consultation was that they worried that the information provided by the service users may not be accurate. Participants felt that this may be, in part, due to some service users learning what responses to give to ensure remote PrEP provision rather than providing accurate responses that may need further clinical input.

> *I suppose, it worries me a little bit, is that, will the patients learn, if they just tick, no, no, no, then they get their prescriptions, no questions asked. (P5, ANP, FG2)*

Participants also worried that participants may not provide a complete, accurate list of medications they are taking or health problems they may be experiencing. Participants felt that they had to prompt service users on these areas within consultations to get an accurate account of their health.

> *I think you might miss some things […] for instance, even just like a medical question – do you have any health issues. Like, we can ask some patients that, and they just go, no. But actually, if you actually say to people, have you got any concerns about your mental health, or you know, do you have any problems with your heart, your liver, your kidneys, have you ever had, blah, blah, blah, and then they go, oh yeah,*

I've got this, I've got that, you know. So, sometimes, prompting some of the questions, and putting them in different ways, can get answers that you maybe wouldn't get answers online. (P5, ANP, FG2)

One participant added that this may be quite burdensome for patients, particularly inputting accurate medication information. Participants also spoke about the importance of having the information collected in the online consultation integrated into the patient records so that the information service users provide online is readily available when they are seen in-person.

I think it would be really, really difficult if you had to look at what they'd put online separately to their clinical notes. […] I think that would be a bit of a nightmare as far as, and there would be a lot of room for error, there, or confusion about what was going on, when, if you had two separate lots of notes. (P2, ANP, FG2)

There were also discussions around what the most appropriate plan of action would be for people who indicated that they would benefit from PEPSE. Participants felt that the online consultation had to capture information that would indicate if a service user would benefit from PEPSE.

It depends how good that triage is, I guess. If it's really good triage and it's very clear that they need PEPSE, then the computer should offer them an appointment with us in our urgent care. Or say we don't have an appointment available today, you should go to A&E asap. But it depends how good those questions are… (P1, Doctor, FG1)

Participants also discussed what linkage to PEPSE may look like and whose responsibility that should be – the sexual health services or the service user.

If we're going to move to a model that is really like patients managing their own healthcare, then I do think we might have to slightly move our goalposts of how much we allow patients to manage those additional risks. […] That would be something I think that potentially might need medico-legal advice of, if someone gives medical information online, what's the responsibility in terms of that being acted upon... (P4, Doctor, FG1)

So we need to ask ourselves, is it indeed even worth asking the question or should we make it more as light touch as possible? (P1, Doctor, FG1)

7.3.2.1.2. Automated PrEP prescribing

Participants expressed apprehension around remote, automated prescribing of PrEP in each of the focus groups. Participants considered the process from a medico-legal perspective and queried who would sign the prescription and who would be responsible if something went wrong – i.e. PrEP being prescribed inappropriately.

> *And if the shit hits the fan, you'll go back to that clinician, well, you prescribed it and this person's dead now and you shouldn't have done this, should you. Yes, you have now lost your job, yes. So whoever it is has got to feel comfortable with that scenario. (P1, Doctor, FG1)*

Participants suggested that they would prefer there to be a review stage where the information input by service users was reviewed by a healthcare professional before the prescription was issued. One participant felt that it ultimately depended on what their regulatory body advised.

> *I guess, as long as you're getting all the information that you need to be able to do a prescription, I'd be happy to write a prescription, if that makes sense. I think the responsibility does fall on the prescriber, to make sure that they've got everything. (P9, Doctor, FG3)*

Participants highlighted the importance of ensuring that the information provided by service users was accurate, especially when concerning what other medications they were taking and why. Participants pointed out that this tends to be challenging as many service users initially reply that they have no other medical conditions until probed.

> *There seems to be this strange thing in [the clinic], and I assume other sexual health services, where if I ask somebody what their past medical history is, they seem to put this filter on where they try and decide whether or not they think it's going to be relevant to their possible chlamydia. And so they just say, oh no, I don't have any medical conditions. And you ask them about their medications, and they name a few medications, and you think, well what are they for. (P8, Doctor, FG3)*

Moreover, one participant felt that trained staff often experience confusion over medications and felt that this confusion would be heightened in service users who have no medical training. Another participant felt that this may put additional pressure on service users.

I think that would be quite a lot of pressure to put on the patient. I think, as well, a lot of people would start to type in a drug name, and sort of go, that bit is not right. Yeah, I wouldn't...and I think as well, like even if you started to type in, I don't know, hydro, you could get everything from hydromol to hydrocortisone, to hydroxychloroquine, to…there are just some, yeah, I feel like there's some letter combinations where you can get some real, a real variety of stuff on there, that might look like quite similar drugs to patients. (P8, Doctor, FG3)

One participant did mention that they felt an automated computer process may combat some human error by being able to detect some errors that may not be noticed by someone manually entering the information.

7.3.2.2. Service user-specific themes

Figure 42 presents the themes and subthemes explored in this section.

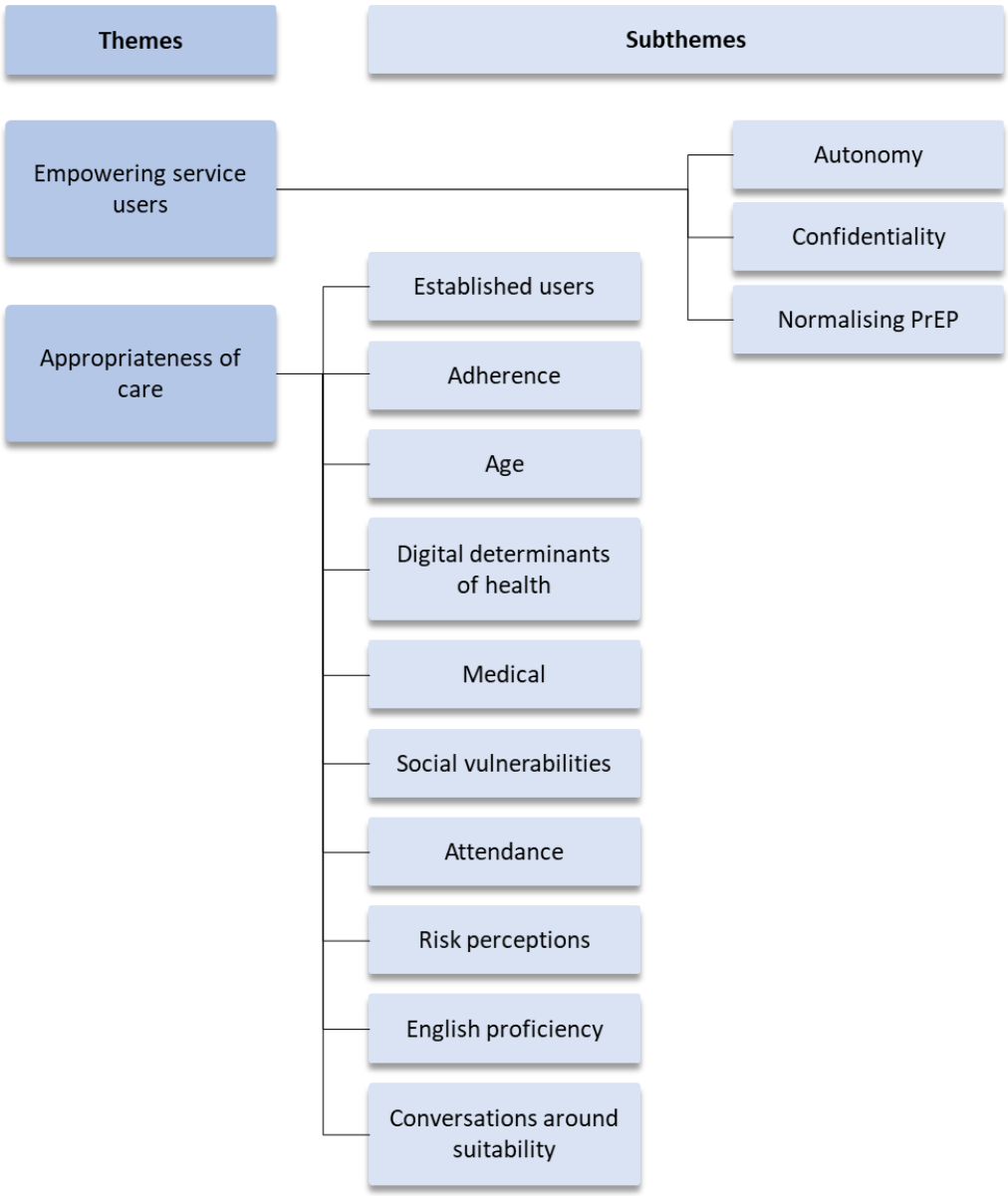


Figure 42. Service user-specific themes and subthemes

7.3.2.2.1. Empowering service users

The proposed online PrEP service was seen as an opportunity to give service users more autonomy over their healthcare and move away from a more paternal approach to care.

> *I think you're kind of giving the patients control, and giving them the opportunity to kind of take things into their own hands. And I think, sometimes, with the way that we're doing things just now, I think we maybe mollycoddle our patients a wee bit. Although it's good to give them that support, I think it would also be good for patients to realise that their health is also their responsibility, you know. (P9, Doctor, FG3)*

Participants felt that the online PrEP service had the potential to offer more confidentiality for service users who struggled to find a private space for their telephone consultations. Moreover, they felt that the online PrEP service could help overcome some of the stigma service users experience around attending sexual health clinics and make PrEP more accessible to some key populations.

> *So I think it's probably, for the right people, I think it is better than telephone consultations in some ways. Potentially, it's better confidentiality, I suppose. So yeah, I don't see any problem with that as long as it's set up well. (P3, Doctor, FG1)*

One participant felt that the online PrEP service aligned more with how people access other services – not necessarily related to health – which may help integrate their PrEP care within their lives.

7.3.2.2.2. Appropriateness of care

Much of the discussion during the focus groups was about who the online PrEP service may and may not be appropriate for. Participants identified a variety of factors, presented below, which could mean that a person would choose not to opt into the online PrEP service or that, from a care provider perspective, the online service may not be appropriate. Participants felt that the service would be most appropriate for established, experienced PrEP users who demonstrate good adherence. Participants felt that the service may not be appropriate for service users who are new to PrEP, noting that PrEP should always be initiated with direct contact with the service users either via telephone or in person.

> *I'd say, somebody that's been on PrEP – just off the top of my head – at least, kind of a year, or something. So they're kind of fairly well established, and I'm assuming, someone without other risk factors. (P6, ANP, FG2)*

Participants cited age as a potential factor influencing the appropriateness of the online PrEP service. Specifically, age was discussed either in relation to perceived digital literacy or in relation to age-related health issues such as needing more frequent renal monitoring. Participants felt that the online PrEP service would rely on service users' ability to access the internet and navigate online spaces and that a larger proportion of older service users would struggle with this.

I suppose, but somebody who's quite sensible, and you think would be able to navigate an online system, so how kind of digitally competent. So, somebody that's going to be quite good with that side of it. (P6, ANP, FG2)

Remote renal monitoring and its potential to open the online PrEP service up to service users who require additional renal monitoring but otherwise may be willing and able to complete their PrEP care online was discussed.

The other issue I suppose is what tests can be done, can we done any renal function tests in a postal kit? […] Because there are some people that, yes, they've got…we want to keep a close eye on their renal function but otherwise that are really straightforward, we just need to be checking their renal function regularly. (P1, Doctor, FG1)

One participant flagged a potential challenge around syphilis sampling wherein service users who had acquired syphilis in the past would return a reactive home sample despite not currently having an active infection.

The other issue we had with home testing last time […] is people who had had previous syphilis infection, we only had an antibody test as part of the home testing kit last time. So it wasn't appropriate for people who'd had syphilis infection before, which actually within our cohort of people using PrEP, there is a significant proportion of people who have had syphilis infection previously. I know you can get alternative home tests, so I presume that's what the plan would be. But that was just an issue that we had last time. (P4, Doctor, FG1)

Also reflecting on their experience of service users self-sampling, the participant stated that there were service users for whom finger-prick blood self-samples were a barrier.

Participants felt that the online PrEP service would not be suitable for people who had drug or alcohol problems. One participant also mentioned that the online PrEP service would not be suitable for people who receive their PrEP alongside their opiate replacement therapy. For context, opiate replacement therapy is when people who inject drugs use prescribed opiate drugs to help them stop injecting heroin.

I think so there's a very small cohort of people in [the city] who get their PrEP alongside their daily dispensed opiate replacement, it [the online PrEP service] wouldn't be suitable for them. (P4, Doctor, FG1)

Participants felt that some service users might not opt to use the online PrEP service due to difficulties in their home environment. Specifically, participants may not want people in their house knowing that they are receiving packages because this may lead to uncomfortable situations, and that people may have issues receiving deliveries when they live in flats.

> *So sometimes there was difficulty with parcel delivery and that's why they didn't want home testing kits sent out to the house. And sometimes there were issues with people they lived with. I'm just trying to think of the people who declined the self-testing kits. (P4, Doctor, FG1)*

Participants felt that it was important to consider how compliant service users were with the agreed quarterly PrEP reviews and general attendance as a proxy for whether or not they would adhere to the steps of the online PrEP service. Participants felt that service users who had difficulties attending regularly may be better suited to a more involved, in-person pathway.

> *Just that, again, your kind of patients with slightly more chaotic lifestyles, are probably not suitable for it. Anyone that's not really engaging that well with the current PrEP system is probably not going to engage with that system either. (P6, ANP, FG2)*

Participants discussed how they perceived people who may struggle with their identity or who may not identify as being in a *"risk group for HIV"* (P4, Doctor, FG1) might view the online PrEP service. One felt that people in these groups may need more support to attend regularly while another participant disagreed and felt that the online PrEP service may remove some of the barriers to accessing PrEP care that these groups may experience or anticipate. The following is part of a discussion between two participants:

> *And I think people who struggle with being in a risk group for HIV, so people who don't really identify themselves as being in a risk group for HIV. So for example, there's men who have male partners who don't openly identify as gay, who sometimes struggle more with identifying themselves to be in a risk group who might, who sort of need that prompting of going to clinic, of an appointment being made for them in three months, so it's there, they go. I don't know, I think there are definitely people. (P4, Doctor, FG1)*

> *Actually, I was thinking that's one of the groups that might be easier for because then they don't need to engage in the clinic quite so much or quite so often, it might*

be better for those people. Certainly, it's going to be better for…it's really only going to be suitable for people that are stable, I suppose like with HIV care, people that are stable on whatever they're on already and we're thinking that things aren't likely to be changing over the next six to 12 months. (P1, Doctor, FG1)

Participants felt that service users would need to have a level of proficiency in English in order to use the online PrEP service appropriately, with one participant adding that the online PrEP service would not be suitable for people who have literacy difficulties.

Having identified factors that may contribute to the decision as to whether or not a service user wants to opt into the online PrEP pathway, or the healthcare professional feels the online PrEP service is appropriate for a service user, participants discussed how they anticipated conversations around eligibility or appropriateness would play out. Reflecting on experiences of similar conversations around PrEP eligibility, participants felt that conversations around the online PrEP service being unsuitable for a service users' needs may be challenging. Participants anticipated that service users may be frustrated at perceived inequalities or that the reasons for exclusion may be difficult to convey gently.

I think one of the problems is going to be people who we don't think are going to be appropriate for it, say that's not fair, my pal uses that service, why can't I? I think that's going to create problems for the people that we're insisting that we do need to see regularly face-to-face, to have those…to have face-to-face discussions. (P1, Doctor, FG1)

Especially if the reason is like, oh we actually think you're a little bit vulnerable, we want to keep an eye on you, I don't think that would go down very well. (P8, Doctor, FG3)

Participants felt that it was important to frame the conversation tentatively so that accurate expectations could be set which may help to avoid some of the difficult conversations.

I wonder if it's, how you frame it and set up expectations, though. You know, I think if it says on the website, like, patients will be able to get PrEP online, speak to a clinician about this now. Then you could end up having some challenging conversations with people. I think if the way it's advertised is more on, like, the PrEP webpage it does say, for some patients it may be suitable for us to support them managing their health care remotely, a clinician will be able to discuss this with you if

you're suitable. I think, sort of framing it, and setting those expectations, could prevent some, like, difficult conversations. (P8, Doctor, FG3)

7.3.2.3. Healthcare professional and service-specific themes

Figure 43 presents the themes and subthemes explored in this section.

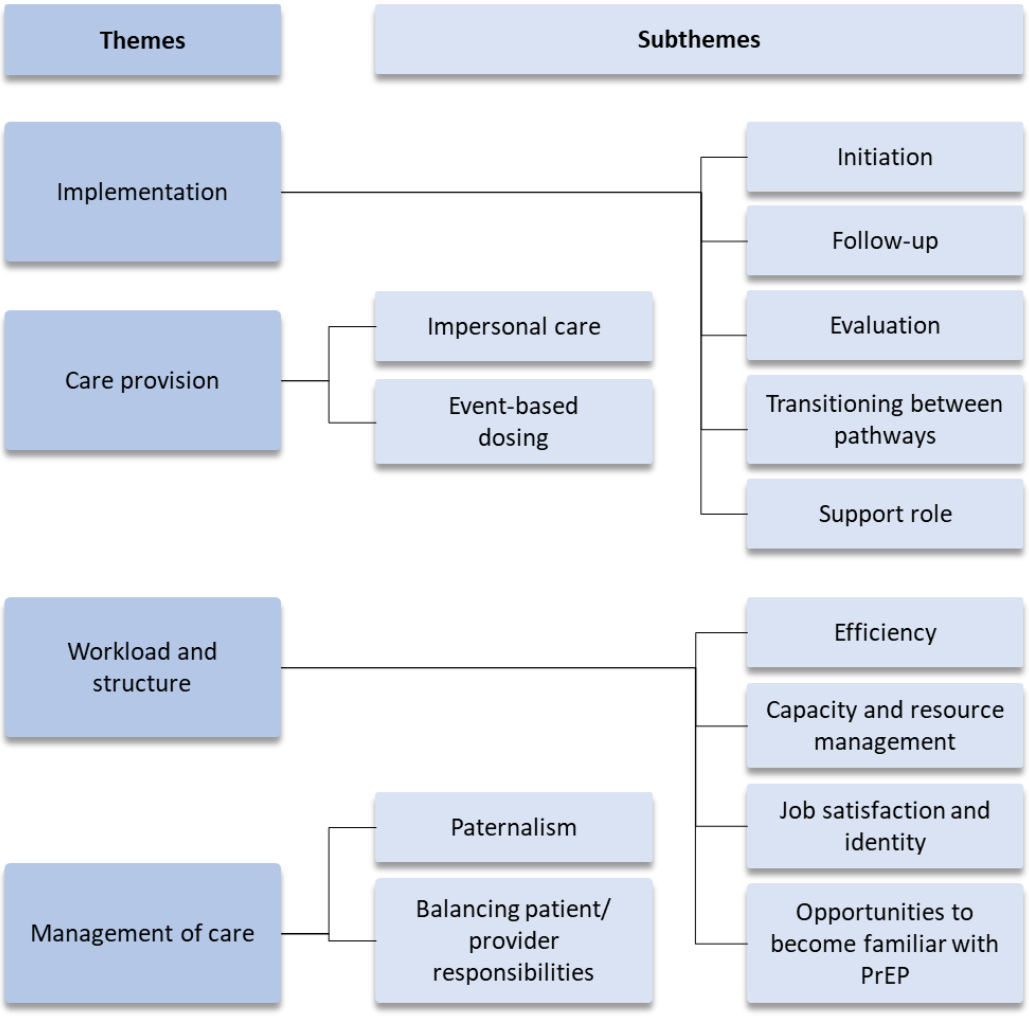


Figure 43. Healthcare professional- and service-specific themes and subthemes

7.3.2.3.1. Implementation

Participants made several recommendations about how to structure the implementation of the online PrEP service. Participants felt that it was important that patients were initiated on PrEP in person or via the telephone and that online provision should only be considered once a service user is established on PrEP. Participants also felt that the online

service should be opened to people whose PrEP needs are relatively straight forward in the first instance and that the roll out should start on a small scale.

> *I think because it's an iterative thing, like we said, my gut reaction would be to start it with the people who are really straightforward, see how it goes. (P4, Doctor, FG1)*

Some participants talked around some of the difficulties that may arise when people are starting on the online PrEP pathway. One participant pointed out that if participants need to transition to another pathway, they may require an additional consultation to clarify their care. However, another participant explained that teething problems are to be expected with any new service and that instances when service users need to change pathways could provide opportunities to refine the service and more accurately assign people to an appropriate pathway.

> *There might be the occasional patient where something comes up that hasn't been thought of in advance which would have been better managed in a face-to-face appointment [and] we're going to have [to] look back and [consider] how we could have prevented that. (P4, Doctor, FG1)*

Participants felt that service users should be opted into the service after discussion with a health professional and that this should be actioned by the health professional rather than service users being able to opt into the service independently. This would allow the health professionals to ensure that only service users for whom online PrEP care was appropriate would have access to the online service.

> *So, somebody would have to have their usual telephone appointment that they would have anyway, and when you go through things like stop/start rules, and understanding of how to take their medication, and making sure there aren't any big risks, that then, sort of being able to say, we feel that you're somebody who would be able to self-manage your PrEP for, you know, for some of the time, because they'll only see us every six months. And then offer to opt them in, as opposed to, it's this big button on the website that people can click, and then potentially not maybe understand it as much as they should. (P8, Doctor, FG3)*

Participants discussed the process of providing service users with access to the online PrEP service and advised sending the service user a unique link, emphasising that it should not be shared with anyone else as this seemed to work well when it was implemented in the online postal self-sampling (OPSS) service. The participant added that service users were directed to a

separate booking system for the OPSS service and felt this may be a viable way of opting people into the online PrEP pathway.

> *When we used to do it with SH24, you would send the link. So if they've opted for the online for their next review, instead of just a standard rebook, they go on a different kind of online rebooking system. But it's quite clear, when they're sent that, if they don't want to do that route, that there's a link to just like, back into the main service… (P6, ANP, FG2).*

One participant felt that it may be beneficial to follow-up with service users after their first online PrEP review to make sure they were comfortable with the process and able to navigate it effectively. Another participant highlighted that there will likely be unforeseen challenges, especially when the online PrEP service has just been introduced. They highlighted the importance of evaluation and responding to these challenges by making appropriate changes to the service.

Participants also emphasised that it was important that service users could transition between online care and in-person/telephone-based care when needed and that the voluntary nature of the online PrEP service needed to be emphasised so patients were fully aware that they had choice over the type of care they received.

> *As long as it's voluntary on the patient's part that they would opt into it. And you're then giving them the choice, and equally they can opt out of it, as well. So, if they're within that system, they don't have to stick to that system, so we can give them the option of coming back. (P6, ANP, FG2)*

Participants discussed the need for a new role to coincide with the online PrEP service which would involve following up with service users whose online consultation flagged any issues and to act as a helpline for service users who needed support.

> *I think that role is a really interesting role and it will be interesting to see how that works in the first few months and how many of the patients end up needing a phone call compared to how many just get signed off without a phone call. Because I think probably the person who…or the people who start doing that role at the beginning will probably phone patients much more and a lot of them will probably end up getting a phone consultation if there's anything unusual in their inputting. But I*

think as we trust the system more and more, maybe that will change. But I think that will be really interesting. (P4, Doctor, FG1)

Participants felt that this would be an interesting role and highlighted that it was essential that training was provided and that it would likely best suit someone who was already familiar with the PrEP processes within clinics. Moreover, one participant emphasised the importance of training for everyone involved in the PrEP service so they could appropriately and efficiently opt people into the online pathway.

7.3.2.3.2. Care provision

One participant anticipated that providing care through the online PrEP service would result in a less personal service. While there was a slight worry that the online PrEP service would make it difficult to identify people who would benefit from other services, another participant felt that this was already difficult to do in the current model of care meaning this challenge is already present and not unique to online PrEP care.

We're not really doing it with the telephone consultations because 20 minutes on the phone isn't a suitable length of time or medium, to be going into holistic care, really. (P1, Doctor, FG1)

Participants talked about how event-based dosing may cause challenges within the context of an online PrEP service. These discussions generally centred around service users adhering to proper event-based schedules and the consistency of their engagement in PrEP care.

So I can see that if you're giving it for daily use, it's going to work relatively well because you'll give out as much as will be needed. And then when you're coming to the end of it, that's your prompt that you need to get into the service. But I think we are having…we're already having significant problems with people that are using it event-based that are only re-engaging with the service to get three-monthly tests when they're running out of PrEP. (P1, Doctor, FG1)

Again, participants mentioned that these challenges already exist and are not specific to the proposed online PrEP service; however, they are none-the-less important to consider in this context.

I think none of us know what the key is to getting someone to correctly take event-based PrEP, that is obviously a very important part of PrEP counselling to explain exactly how to do the dosing. Whether that's going to have to be through an

animation or graphics but that is very, very important. Because we know that dosing errors with event-based dosing are potentially more risky than dosing errors with daily dosing. And that's been sort of shown I think in the data. So that is going to be a really important part of the [online PrEP service]. (P4, Doctor, FG1)

7.3.2.3.3. Workload and structure

Participants tended to view some service users' PrEP care as fairly routine, not needing much clinician-level input and this meant that some of their PrEP reviews were not entirely necessary. Providing service users with the opportunity to self-manage their PrEP care through an online PrEP service was seen as a way of reducing potentially unnecessary reviews.

I think like, there is a lot of people on PrEP who do not need medical input four times a year. […] I think the frequency of reviews for PrEP is a really interesting point because certainly, if you have HIV and you're well-controlled, you only need a medical review every six months. Whereas if you're on PrEP, you have a medical review every three months […] I think as we move through more iterations and we become more comfortable with PrEP, the need for medical input will hopefully become less and less for the patients who do not require input. So I think this is a good step in the right direction for those patients. (P4, Doctor, FG1)

The online PrEP service was also seen to be a way for services to increase capacity by reducing the number of in-person PrEP reviews per service user. Participants felt that this would have a benefit to service users (particularly those with more complex PrEP needs) as they may have to wait less time for in-person appointments. Participants also felt it would have a positive impact on resource management more widely.

I think it's great, because I think then, we can concentrate on the patients that need us to concentrate on them, you know. (P5, ANP, FG2)

Importantly, some participants felt that the online PrEP service could reduce the admin tasks associated with their roles which was identified as a challenge with the current models of care and could shift their focus to more fulfilling tasks.

I suppose, when you're seeing anyone, how quite a lot of the challenge for your brain is, like, the admin side of things. Perhaps it would mean that the challenge for those patients would be, you know, the medical side of things, which would be, actually, it would make it satisfying […] so if you had, like, you were seeing six people in the

clinic, and you're having to think, this date, that date, this date, whereas if you were seeing fewer people who are more complicated, it would actually be, like, you'd feel that you were engaging your brain, and your knowledge, to tackle those consultations. (P9, Doctor, FG3)

Participants were asked how they felt the prospect of clinical care moving online would affect their identity as healthcare professionals. Overall, participants did not feel it would impact their identities and suggested that it may lead to increased satisfaction if they have more time to focus on people with more complex needs.

If it means you can focus your time and effort on their…on the patients that need it and on developing like systems and protocols, I think it means that you can use your time more effectively. I think if it can be done online, it doesn't mean that there's going to be nothing for you to do. I think it means that you can be doing stuff that requires a clinician. (P4, Doctor, FG1)

One participant felt that moving a portion of PrEP services online may exacerbate an existing issue where PrEP is viewed as a specialised area that the wider sexual health team are not as familiar with. They felt that moving more routine patients onto an online pathway could further reduce the opportunity for clinic staff to become comfortable delivering PrEP care.

Yeah, it remains a concern to me that currently, PrEP is seen as this special thing which happens only by special people and is covered and is done elsewhere. So normal staff […] don't know how to organise PrEP, they don't know how to give it or how to make…how to do it safely. So, in some ways, it worries me taking all the easy PrEP out, which could…which is the way in to making people feel comfortable knowing how to prescribe and stuff […] I want more staff that work in a sexual health clinic to feel comfortable talking…not only talking about PrEP but providing it as well. (P1, Doctor, FG1)

7.3.2.3.4. Management of care

I labelled this theme as 'management of care' as the issues included relate to the tension between person-centred, self-managed care, and provider-led care and issues around paternalism. One participant spoke about how some clinicians may struggle with the idea of service users being managed without direct input from a healthcare professional and linked this to feelings of control.

I guess there will be clinicians that are more worried about the loss of control. I don't know a better way of saying that. I think there will definitely be clinicians that will really struggle with there being a cohort of patients that are being managed online. But I think that's the way the world's going and I think that it would…it's a good idea for us to do. If there's safeguards in place that mean that if there's anything, any like patient safety concerns that crop up and it could be managed, I don't see a problem with it. (P4, Doctor, FG1)

The concept of paternalism emerged at a number of points within the focus groups – the balance between promoting service user autonomy and ensuring appropriate and safe care is provided (Dumez & Pomey, 2019; Fernández-Ballesteros et al., 2019). It seems to be a delicate balancing act between not being 'overprotective', limiting the service users' autonomy or choice, and ensuring that sufficient support is provided and that service users are taking their PrEP safely. One participant contrasted PrEP (and sexual healthcare more generally) with other areas of medicine, noting that there is a lot more focus on supporting service users in sexual healthcare while, in other fields, there is much more focus on service users being responsible for their care.

I guess, [you're trying to] prevent something that is very serious. But again, people's contraception is there to prevent pregnancy which is also something that's very serious. [In GPs] there's a lot of focus on patients being responsible for their health, I think, maybe a wee bit more. Because a lot of the stuff that I've found myself doing at [the clinic], I know that if I was at a GP, like, I know that my supervisor would be like, why are you sorting all this out for this person, you know. […] I think they're grown adults, I think, you know, we're not giving PrEP to children, and we're not…you know, if they've got the capacity to consent to have sex, then you'd like to think that they've got the capacity to take the medication, or to have protected sex. (P9, Doctor, FG3)

One participant felt that, for a lot of service users, many elements of care involved in PrEP reviews did not constitute clinical care, particularly for those whose needs were relatively straightforward.

For me, it's not really clinical care at all. So I don't see it's that much different than asking your GP for a repeat prescription of your beta-blockers and your ACE inhibitors [medication for cardiological health problems], but with the understanding

that you get checked once in a while. So yeah, I think we need to stop being quite so precious about it. (P1, Doctor, FG1)

Moreover, one participant posited if service users were perhaps being *"mollycoddled"* within the current PrEP pathway (P9, Doctor, FG3).

Participants felt that it may be useful to emphasise the idea of responsibility to service users, particularly when initiating PrEP. Participants also posited where the responsibility lies for service users being informed about their PrEP care. Participants felt that there was a lot of focus on how services can support their service users to manage their PrEP care and adhere to an appropriate regimen. However, participants felt that some service users did not engage with or action the guidance they were provided with.

I mean, really, is it not the patient's responsibility if they haven't read things properly… (P9, Doctor, FG3)

While discussions around paternalism and responsibility focused on past experiences more than the proposed online PrEP service, participants expressed that these views did influence their perceptions of the online PrEP service and, in particular, service users' responsibilities to provide accurate information within the online consultation.

I suppose you might worry that, if people are filling in forms, […] there was a concern that people weren't filling them in properly. And I think that's, it's difficult not to take that paternalistic view and be like condescending to your patients. (P7, Doctor, FG3)

7.4. Discussion

The aim of this study was to explore healthcare professionals' views on the acceptability of online PrEP care. Participants anticipated that the proposed online PrEP service would provide several benefits to service users and had rich discussions about some potential challenges as well as how they might be alleviated. Here I address the research questions using the data collected in this study. I then consider the strengths and limitations of the study and other reflections on the experience of data collection.

7.4.1. What were people's experiences of providing PrEP care during the Covid pandemic and how might this help inform online, remote PrEP care in the future?

Participants felt that they were still able to provide high quality care despite the rapid adjustments made in response to the Covid pandemic. They felt that the telephone-based model of care was more convenient for service users; although participants felt that they did miss some of the nuance and rapport that they were able to generate in face-to-face consultations. Participants also spoke of the reduction in missed appointments since introducing the telephone-based consultations. This was perhaps due to the initial telephone consultation acting as a facilitator – starting the pathway remotely and thus the in-clinic appointment was simply completing the pathway. The findings of this study were largely consistent with Henderson et al.'s (2022) survey-based evaluation of the telephone-based PrEP service at the same site, although this was conducted much earlier in the pandemic than my focus group study.

One of the main challenges identified by participants was how difficult it was to engage with some service users during the telephone consultations. Participants perceived that some service users did not think the telephone consultations were as important as a face-to-face consultation. This was characterised by service users receiving their telephone consultation while in an 'unsuitable' environment (e.g. on a noisy bus) or engaged in other activities where their attention was diverted (e.g. driving a car). Participants were concerned that some service users will take a similar view of the online consultations. However, in the service user interviews (Chapter 6), participants shared how challenging it was for them to schedule appointments at suitable times. The proposed online PrEP service would likely help to alleviate this challenge by: 1) reducing the frequency of telephone consultations for some participants and allowing service users to complete the online consultation at a time and place of their choosing; 2) potentially increasing the availability of appointments; and, 3) removing the need to schedule appointments when using the online PrEP service for a review. The service user and healthcare professionals' accounts seem to be somewhat incongruous. While it is likely that some service users do not engage because they do not see the telephone consultations as important, it is likely that at least some of the barriers service users face when attending appointments (e.g. difficulty scheduling appointments at a time when they will have sufficient privacy) account for a proportion of these challenging consultations.

7.4.2. What is the acceptability of an online, automated PrEP consultation and prescription?

Participants were somewhat cautious of the online consultation and automated prescribing. Participants questioned the accuracy of the information that would be collected via the online consultation and were concerned about the cognitive burden service users may experience. However, the online consultation tool has already been cognitively tested (Henderson et al., 2022) to ensure that the questions are clear and elicit the necessary information for safe PrEP provision. It is likely that some service users will struggle with completing the online PrEP consultation since it will require a certain level of health literacy. It is important to determine how we can identify those for whom the online consultation would be too burdensome so their care can be delivered through more appropriate pathways (i.e. face-to-face). Indeed, looking at self-sampling for STIBBVs, Middleton et al. (2021) found that people with mild learning difficulties found at least one element of the kits challenging and concluded that a variety of care options (including face-to-face) are needed to ensure equitable care. We need to be clear that the online PrEP service will not be suitable for all and ensure that people are able to easily transition back to face-to-face care when needed.

Participants expressed some apprehension regarding the automated PrEP prescribing. This is unsurprising given that automated prescribing is a novel concept within the Scottish sexual health context. The apprehension appeared to centre around who would be responsible for the prescription and how the prescription would be issued based on the information service users provide during the online consultation. Regarding the accuracy of this information, participants felt it was challenging to elicit the information required from service users during telephone or face-to-face consultations without probing and anticipated that the online consultation would result in less accurate history taking. This contrasts with what the service users said in Chapter 6 who felt that they would be able to provide *more* accurate information online because they anticipated less embarrassment around reporting their sexual behaviour and that they would be able to provide more accurate information about other medications they were taking by simply coping the name from the box rather than relying on their memory.

Participants considered how best to deal with PEPSE in the online PrEP consultation.[6] The time-sensitivity of this medication is what makes it difficult to know how to incorporate PEPSE

[6] As a reminder, PEPSE must be initiated as soon as possible to be effective and no later than 72-hours after possible exposure (Asanati et al., 2021; Centre for Disease Control and Prevention, 2018b).

into the online PrEP consultation. The online PrEP service will be specifically for PrEP reviews which will likely be every three months so the likelihood that the need for PEPSE would overlap with the online consultation is arguably small. Moreover, the online PrEP service will likely not be staffed at all times so if the initiation of PEPSE was dependent on action from clinic staff, there would likely be delays. Participants considered a number of options, balancing the practicalities of following up service users up and their 'duty of care'. Some felt that signposting would be sufficient, transferring the responsibility to the service user while still providing them with the information they would need to access PrEP. Others felt it was necessary for clinic staff to follow-up with the service user and link them to care. On balance, I think this requires further research.

7.4.3. What factors might affect the implementation of an online PrEP service and how might anticipated challenges be overcome?

As mentioned above, healthcare professionals exhibited some apprehension around the online clinical consultation and automated prescribing aspects of the online PrEP service. This apprehension seemed to be linked to uncertainty about how the different processes would work, what would be required of the healthcare professionals, and where the responsibility lay – especially regarding the automated prescribing. It is essential that the healthcare professionals who will be involved in the online PrEP pathway are comfortable with the processes and what is required of them, even if that is just initiating service users onto the pathway. The Intervention Mapping approach emphasises the importance of not only targeting the behaviours and determinants of the target population, but also designing 'implementation interventions' (e.g. training materials) to address the determinants of behaviour of the intervention implementers and maintainers (i.e. the healthcare professionals) (Eldredge et al., 2016). When developing the online PrEP service, we need to consider the materials (e.g. instructions) and support that the healthcare professionals will need to ensure that the service is implemented successfully.

Participants anticipated that there would be some teething issues in the early stages of development. They felt these were inherent with any new service and that would likely mean that the service would not be completely efficient to start with. This was linked to uncertainty around the number of service users who would require being transitioned between pathways. The Intervention Mapping approach states the importance of evaluating interventions and encourages that evaluation plans are designed ahead of implementation with specific

behavioural and health outcomes to monitor (Eldredge et al., 2016). Naturally, if problems arise, it is important to address these.

7.4.4. What is the optimal way(s) for people to transition between online and traditional PrEP care?

Participants were in agreement that service users should only be able to access the online PrEP service after discussion with a healthcare professional. This would provide the opportunity for expectations to be set and sufficient information to be given so that participants were making an informed choice. Participants reflected on the process of linking service users to the SH24 service wherein a unique link was sent to the service user via SMS. In terms of transitioning from the online and other pathways, participants felt that this should be service user-led to keep with the voluntary nature of the online PrEP service. Participants suggested that this could be facilitated by having a separate booking portal for the online reviews. There would also be a member of staff to oversee the online PrEP service and to support service users transitioning between pathways if needed which seems to line up with the service users' expectation that they would be able to be supported to transition via the helpline.

7.4.5. What impact might the introduction of online PrEP care have on existing services?

Participants anticipated that the online PrEP service will lead to an increase in service capacity because the online PrEP service will cover some service users' reviews. This increase in the availability of appointments may alleviate some of the difficulties experienced by services users when scheduling appointments at a suitable time (Chapter 6). While it is likely that the online PrEP service will not be appropriate for all, and many will likely choose to remain in face-to-face/telephone-based care, they may indirectly benefit from this increase in capacity also. Participants also felt that the online PrEP service would also allow them to make better use of their time: if a proportion of appointments that require little clinical input are covered by the online PrEP service, participants anticipated that they could focus on more clinically complex service users. This was linked to a potential increase in job satisfaction which seems to be an understudied area within sexual healthcare. While these all seem very beneficial, participants cautioned that this would depend on the proportion of service users who use the online PrEP service and the rate at which they need to transition back to face-to-face care. Participants also discussed that moving the 'straightforward' PrEP cases online may

reduce the opportunities for staff to become familiar with providing PrEP care, further specialising PrEP.

7.4.6. Who might the online PrEP service be appropriate for and who might be better suited to in-person or telephone-based care?

The consensus among the participants was that the online PrEP service should be offered to established PrEP users who demonstrate good adherence. Participants felt that older service users may be better suited to the existing care pathways as they were perceived to be more likely to experience challenges with the digital determinants of health, a view shared by the younger service users in Chapter 6 – but not the older service users themselves. Moreover, older service users are more likely to experience renal impairment. Indeed, the BHIVA BASHH guidelines for PrEP use (Brady et al., 2019) advise enhanced renal monitoring for all PrEP users aged 40 and above. This means that the suitability of online care will depend on the type of renal monitoring offered through the online postal self-sampling – if this is indeed included. Participants also highlighted an important point about syphilis testing in that some tests do not differentiate between active and past infections. This is important as a proportion of the online PrEP service's users will likely have had a past syphilis infection so we need to consider tests that can help to differentiate between past and active infections. We need to be conscious of this as newer point of care test technologies which can make this differentiation become more widely available especially given the recent increase in syphilis infections among GBMSM (Health Protection Scotland, 2019b).

Participants felt that the online PrEP service would not be appropriate for service users who demonstrated poor attendance to their review appointments. This was linked to the perception that some service users did not take the telephone consultations seriously and concerns that this would be the case for the online PrEP services. As discussed, the service users reflected on how challenging it could be to schedule appointments at a time where they will have sufficient privacy and other barriers, such as stigma and an aversion to phone calls, which may account to lapses in attendance. Moreover, the online PrEP service is anticipated to overcome these barriers, making the PrEP reviews more convenient. Indeed, many of the studies included in the scoping review (Chapter 2) found that online care was able to overcome many of the barriers experienced by service users in relation to the telephone-based model of PrEP care (Chasco et al., 2021; Hottes et al., 2021; Knight et al., 2019; Maksut et al., 2016; Witzel et al., 2019). Therefore, I think it would be hasty to prevent people who are not

optimally engaging with current pathways from using the online PrEP service, especially because it may lead to better attendance/completion of reviews.

7.4.7. How can GBMSM be supported to use the online PrEP service?

Participants were clear that access to the online PrEP service should be controlled by the healthcare professional to ensure that the suitability of online care for each service user can be assessed and expectations can be set. The importance of ensuring access to in-person care for those who opt to use the online PrEP service was clear throughout the focus groups which echoed the views of the service users (Chapter 6). Setting clear expectations was also important; specifically, ensuring that participants knew what was expected of them when using the online PrEP service, and ensuring that participants had accurate expectations of what the online PrEP service could do and what it would involve. Participants felt that this would help to reduce the likelihood that service users would misuse the service or run out of PrEP. Participants also felt that it may be more challenging to tailor the service to those who use event-based PrEP than those who take PrEP daily (e.g. the 90 days' supply aligns with the 3-monthly reviews so there is less risk of overstocking leading to medication expiring). However, these challenges appear to exist independently of the online PrEP service.

Crucially, there will need to be a role created to support service users' use of the online PrEP service: to review any flagged responses to the online consultation, follow-up with any reactive tests, and provide telephone-based support if service users require help when completing the online postal self-sampling or online consultation. Participants reflected on this role and thought that, with the right training, it would be an interesting new opportunity. Going forward, we need to consider what training will be required and what support needs to be in place for this role (e.g. cover for annual leave).

7.4.8. Strengths and limitations

The strengths of this study were that the design allowed for nuanced discussions around the online PrEP service and I used a clear analytic pathway that allowed for a clear, transparent research process. This study complemented the semi-structured interview study outlined in Chapter 6, allowing for comparisons between the views of care providers and service users. Rigour was achieved by adhering to Guba and Lincoln's (1985) guidance. One limitation of this study was that the participants were recruited from a single site, albeit the largest sexual health service in Scotland. Also, many of the questions dealt with hypotheticals;

although, I felt this was less of an issue than it was in the service user interviews because there were similar services (e.g. SH24) that the healthcare professionals had familiarity with, and any questions participants had simply generated more discussion with knowledgeable peers.

7.4.9. Reflections

Conducting these focus groups felt very different to conducting the interviews with service users. As much as I tried to reduce any perceived power differences in the interviews, I was still aware that the participants may have been viewing me as someone with a level of expertise or authority. In the focus groups, I felt that the expertise and authority sat with the participants and my co-facilitator, all of whom were trained healthcare professionals. This had its pros and cons. I was transparent that I did not have a medical background and that I would likely ask what seemed to be quite obvious questions. This lead to the main benefit of the perceived power imbalance as I felt at ease to ask for clarity on terms that seemed 'shared terms' among the participants (e.g. *"vulnerabilities"*), and this lead to rich explanations and further discussions. On the other hand, there were situations where I had to rely on my co-facilitator to pick up on points of interest that were not immediately clear to me – although, this is the reason why I had a co-facilitator.

Similarly, I think many of the participants made the assumption that Dr Henderson and I would have the answers to all the questions they might pose – that the online PrEP service was fully realised and at a later stage in development than it was even though I explicitly stated that it was in the early stages and wanted their views precisely because of this and that their views would influence its development. I tried to use the participants' questions as a starting point to generate discussion by reflecting the questions back to the participants which I think I became more successful at as the focus groups progressed. I still felt pressure to have an answer for the questions even though this was not possible, nor indeed was it the purpose of the focus group. On reflection, my status as a novice researcher collecting data from participants with a high level of clinical expertise and familiarity with PrEP provision all shaped my experience of data collection within this study.

7.5. Conclusions

The proposed online PrEP service was welcomed by participants. They anticipated that it would provide direct and indirect benefits to service users, and the wider service. Crucially, participants provided key insights into who the service may be appropriate for, how to

implement it within existing services, and key areas that need further consideration. In the next chapter, I bring together the main findings from each of the studies that contributed to this thesis to address the overarching research questions and how they relate to the wider literature. I then present recommendations for each of the composite stages of the proposed online PrEP service, its implementation, and other key considerations.

Chapter 8. Discussion and recommendations

8.1 Revisiting the aim of this doctoral research

In this thesis, I aimed to establish an evidence base to inform the development and implementation of an online PrEP service in Scotland, with a focus on GBMSM. I took a pragmatic approach and implemented an explanatory, sequential mixed-methods design to address research questions that were developed by considering the steps and tasks of the Intervention Mapping approach to intervention development (Eldredge et al., 2016). I conducted four studies: 1) an online survey of GBMSM in Scotland which sought to understand online health behaviours and the broad acceptability of the proposed online PrEP service; 2) an online survey of GBMSM in Scotland which sought to understand online health behaviours in the context of the Covid pandemic; 3) semi-structured interviews with PrEP service users (specifically GBMSM) which sought to understand the acceptability of the proposed online PrEP service in depth and how to optimally implement and support its use; and 4) focus groups with healthcare professionals who delivered PrEP care to understand the acceptability of the proposed online PrEP service from a care provider perspective. I discussed these studies individually within their respective chapters. In this chapter, I bring the findings of the studies together to address the research questions posed in Chapter 3, discuss the broad strengths and limitations of the research, my reflections on the research as a whole, and, lastly, I present recommendations for the development and implementation of the online PrEP service based on the findings of this doctoral research and avenues for future research.

8.2. Addressing the research questions

Here I present the findings of the individual studies mapped to the research questions posed in Chapter 3. I focus on summarising the main findings in order to avoid repeating the discussion sections of the individual study chapters.

8.2.1. What online health behaviours have GBMSM performed?

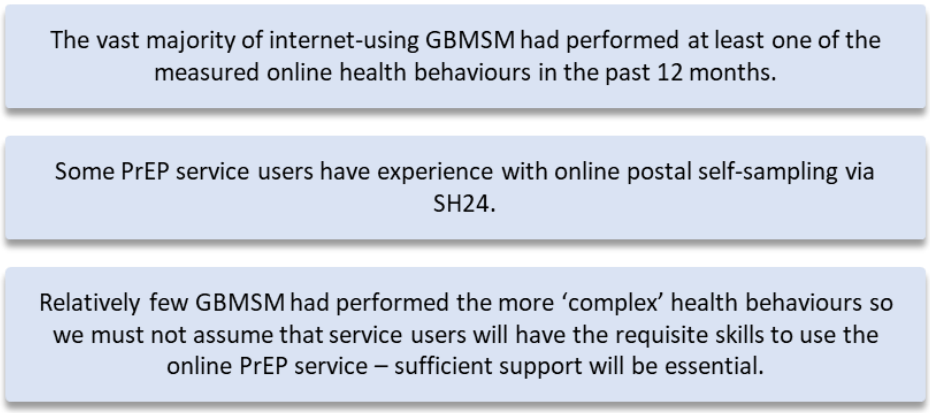


Figure 44. The main findings relevant to: What online health behaviours have GBMSM performed?

The main findings relating to this research question are summarised in Figure 44. Within the surveys, the proportion of the sample who had performed each of the measured online health behaviours varied, although the vast majority had performed at least one behaviour in the past 12 months. At first, this appears promising – the majority of the samples demonstrated some ability to engage with online health services and have some level of experience to draw upon when accessing online health services in the future. However, the behaviours performed by high percentages of participants (e.g. searching for information online) potentially require a much lower level of digital health literacy than would be required to use the online PrEP service. Moreover, this was a sample recruited entirely online who had a sufficient level of digital literacy to participate in a lengthy online survey so we need to be cautious when considering how generalisable this data is to the wider population. Paired with the knowledge that Scotland was very much in its digital health infancy when these studies were conducted (Scottish Government, 2018), it is likely that the population as a whole would not share this level of experience or digital literacy. However, it is promising that participants in both studies have already started to engage with online health services.

Turning to the qualitative data, participants also discussed their familiarity with some of the online health behaviours required to complete the online PrEP pathway. Some interview participants spoke about their experiences of using an online booking system for their PrEP reviews within the existing model of care. Some had used online postal self-sampling (i.e. SH24 (SH24, 2022)), and others had experience of ordering repeat prescriptions online. Some participants also shared their experience of using e-Consultation services. Each of these

services have aspects that closely relate to the proposed online PrEP service. These prior experiences are valuable as they show an ability to perform the behaviours needed to use the online PrEP service. In addition, participants shared benefits and challenges they experience with these services, providing key lessons for the development of the online PrEP service.

8.2.2. What online health behaviours would GBMSM be willing to perform in the future?

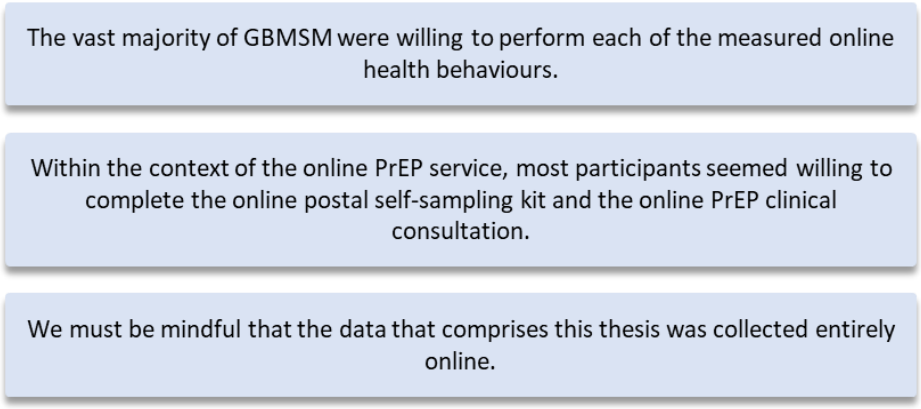


Figure 45. The main findings relevant to: What online health behaviours would GBMSM be willing to perform in the future?

The main findings for this research question are summarised in Figure 45. The vast majority of the survey participants were willing to perform each of the measured online health behaviours and very few were unwilling to perform any. However, willingness does not guarantee the behaviour will be performed in the future (Haggar et al., 2018; van Lettow et al., 2014), and the willingness questions were asked without any context. Accordingly, it is important to also consider participants' care preferences here as they were explicitly asked within different contexts. Although online care was the modality preferred by the largest proportion for routine care, preference did vary widely such that no one method was unanimously preferred. Indeed, when comparing the two emotional contexts (which related to situations of low and high concern), a significant proportion of participants changed their preferred modality of care which suggests that not only do preferences vary between people, they vary within people depending on their current circumstances. Again, this was a sample recruited entirely online so these data do not represent the population as a whole. However, considering the pragmatic approach taken in this research, these data are a promising initial indicator of an openness to online care considering how digital health methods may help to optimise care provision more generally (Scottish Government, 2018).

Interview participants also alluded to their willingness to use the online PrEP service, even though this was not specifically targeted within my topic guide. Participants expressed interest in, and an openness to, using the online PrEP service within the interviews, including its composite stages. Taking the example of the blood self-sample, it seemed that a lot of participants were willing to collect their own blood sample in order to use the online pathway but that this was not their preferred method of testing for HIV, nor one they were altogether comfortable with. However, the ability to access PrEP care online seemed to motivate them to be willing to perform the behaviour. This highlights the complex nature of health behaviours, how measuring one antecedent of behaviour (e.g. willingness, intention, or preference) likely only discovers part of what is a complex internal process (Brew-Sam & Chib, 2020; Ratz & Lippke, 2022), and the value of qualitative research in providing nuanced understandings of complex processes.

8.2.3. What devices have GBMSM used to access online health services, and what devices would GBMSM be willing to use to access these services in the future?

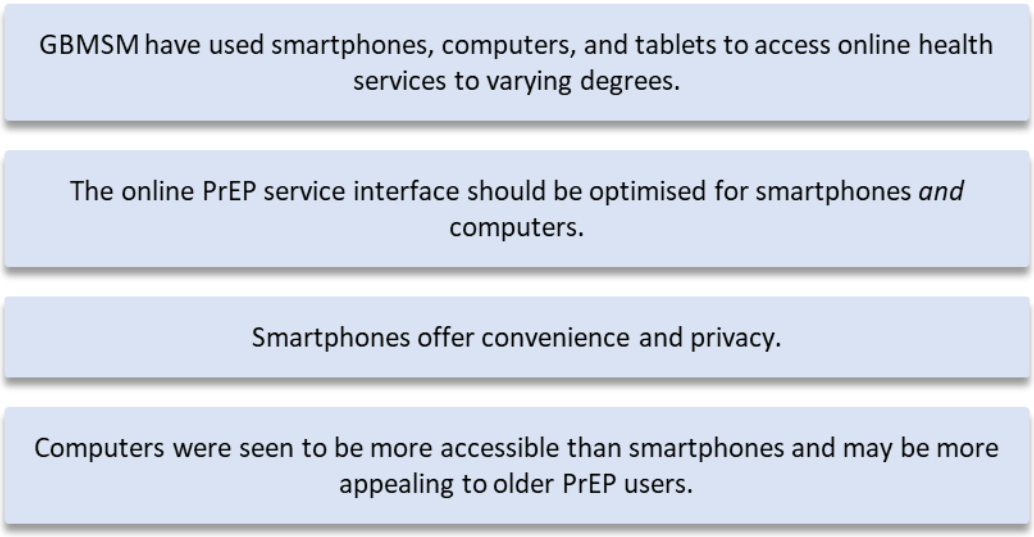


Figure 46. The main findings relevant to: What devices have GBMSM used to access online health services, and what devices would GBMSM be willing to use to access these services in the future?

The main findings are presented within Figure 46. Smartphones, computers, and tablets were all used to access online health services by the survey participants. The majority of participants had used a smartphone and/or computer to access online health services, but less than a quarter had used a tablet for this purpose. In terms of willingness, although well over half of

the participants would be willing to use a tablet to access online health services, there is a clear gap between the proportion of participants willing to use a tablet (61.4%) and the proportion willing to use a smartphone (89.9%) or computer (85.8%). These data are unsurprising given the trends in device ownership in the wider population (Office for National Statistics, 2021b). In the interview study, discussion around devices centred on smartphones and computers. Most participants favoured the convenience a smartphone would provide, others would prefer to use a computer as they were seen to be more accessible (i.e. larger screens, less 'fiddly' controls/interface). It seems that optimising the service for smartphones and computers would be optimal. Indeed, Nadarzynski et al. (2017) note the importance of providing care through multiple channels so service users can engage in a way that suits their needs, reducing the number of barriers they may anticipate or experience. This view is shared by Vass and Boeri (2021) who also echo participants' views that device/operating system optimisation is essential to ensure good usability.

8.2.4. How can service users' experiences of the telephone-based model of PrEP care, and online health services in general, inform the development and implementation of the online PrEP service?

GBMSM reported several challenges when accessing PrEP care through the telephone-based model of care (e.g. difficulty scheduling appointments at a time that was convenient and allowed for sufficient privacy).

The anticipated benefits of the online PrEP service seem to directly address many of the challenges experienced by GBMSM in the existing model of care.

Figure 47. The main findings relevant to: How can service users' experiences of the telephone-based model of PrEP care, and online health services in general, inform the development and implementation of the online PrEP service?

The main findings are presented within Figure 47. PrEP service users appreciated the telephone-based PrEP service but found it to be somewhat impersonal and fragmented, with repetitive elements. Participants felt that they were asked the same questions in the telephone consultation and the in-person appointment meaning that the stages were not sufficiently linked-up. The proposed online PrEP service is intended to be fully integrated with the national sexual health patient records system, and this data further justifies this as a priority. Ensuring seamless linkage between the online and face-to-face pathways and

providing a helpline service will hopefully minimise feelings of fragmentation, repetitiveness and that the online PrEP service is impersonal.

The telephone-based PrEP appointments were challenging for some service users. Some expressed a dislike or avoidance of phone calls, others found it difficult to schedule appointments around work, and some found it difficult to schedule appointments at a time where they had sufficient privacy. These challenges did not stop participants from attending their telephone reviews but did affect their experience and may prove to be stronger barriers to other existing and potential service users. This further justifies the development of the online PrEP service which could improve service users' experiences by reducing the number of telephone and in-person review appointments, allowing reviews to be completed discreetly on a smartphone (this was a perceived benefit of the eSexual Health Service (Aicken et al., 2018)), and providing much more flexibility over when the service user completes their review.

Online postal self-sampling for STIs is well established in some other parts of the UK but not yet in Scotland (Sumray et al., 2021). Some participants had experienced online postal self-sampling. Some found it to be convenient and wanted it to be available on a permanent basis, while others found the process stressful and were unable to collect a valid blood sample. Online postal self-sampling could help overcome some of the challenges experienced by service users when accessing existing PrEP services (e.g. the cramped bathroom environment at the clinic). However, online postal self-sampling is not acceptable to all and, since it is a crucial component of the online PrEP service, the willingness to self-sample, particularly blood, will likely be the deciding factor as to whether service users will opt for online care or not. With that said, participants suggested ways in which they could be supported to increase their self-efficacy to complete the online postal self-samples. These are explored in Sections 8.2.9.

8.2.5. What is the acceptability of the proposed online PrEP service (and its components)?

Most PrEP-using GBMSM stated that they would be likely to use the online PrEP service for most of their PrEP reviews if it were made available to them.

Figure 48. The main finding relevant to: What is the acceptability of the proposed online PrEP service (and its components)?

The main finding is presented within Figure 48. Overall, the prospective acceptability of the proposed online PrEP service was high. The majority of PrEP users in SMMASH3 indicated that they would be likely/very likely to use the online PrEP service if it were made available to them; although, this was an online sample and the questions, by necessity, were hypothetical. In the service user interviews, all but one participant stated that they would opt to use the online PrEP service if it were made available to them. The participant who said that he would not use the online PrEP service had had a negative experience with online postal self-sampling but felt that it was still important that the online PrEP service was developed and implemented because it could be beneficial to others. Within the focus groups, the healthcare professionals felt that the online service would benefit a lot of service users. Although prospective acceptability does not guarantee future engagement; in-keeping with the pragmatic approach taken within this research, it is a promising indication of interest and justification to further develop, and eventually implement, the online PrEP service. I now turn to consider the acceptability of each of the proposed online PrEP service's composite stages.

8.2.5.1. Online postal self-sampling for STIBBVs and renal function

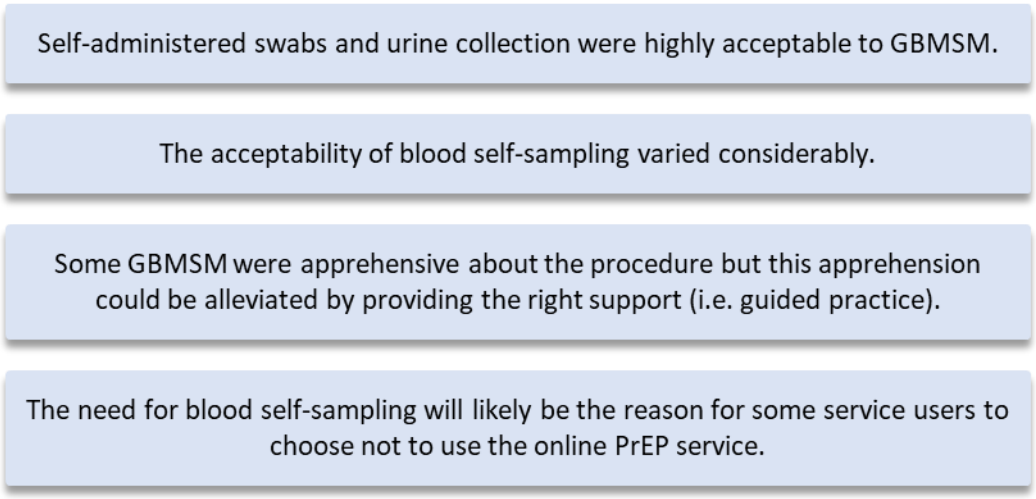


Figure 49. The main finding relevant to: Online postal self-sampling for STIBBVs and renal function

The main findings are presented within Figure 49. There were clear distinctions between PrEP service users' perceptions of swabs and urine samples, and blood samples. Self-administered swabs and urine collection were highly acceptable. The ability to collect these samples at home seems to have the potential to overcome the challenge of the cramped clinic bathrooms, allowing service users to take their time and collect the samples in a setting of

their choice. The blood self-sample, however, was met with apprehension by most service users. A fear of needles and blood, and a lack of self-efficacy to obtain a valid sample seemed to be the most salient reasons for this apprehension. This is congruent with other studies that explored the acceptability of HIV self-tests and self-sampling (e.g. Witzel et al., 2016). For most, this apprehension was mild and potentially further reduced with the right support. For others, the aversion to the blood sample was a less moveable barrier and will likely be the reason why many decide not to use the online PrEP service. Ultimately, this further justifies the importance of choice and providing service users with a variety of options so that they can choose a method of care that is right for them. While online postal self-sampling has not been extensively/permanently implemented in Scotland, the existing models elsewhere in the UK (Sumray et al., 2019) provide a clear blueprint on which to develop a similar service in Scotland that the online PrEP service can utilise.

Renal function monitoring was not specifically addressed in the service user interviews, however the findings relating to blood self-sampling is relevant as this was the method implemented by Chasco et al. (2021) who piloted at-home creatinine sampling as part of a hybrid online/face-to-face PrEP pathway in USA. Currently, there are no widely available methods to self-sample for renal function but this will likely change over time. Moreover, the need to monitor renal function during the online reviews may reduce with the new PrEP guidelines (C Estcourt, personal communication). Nonetheless, renal monitoring will still be available within face-to-face services while we await more widely available methods for self-sampling.

8.2.5.2. The online PrEP clinical consultation

The online consultation was acceptable to service users; however, it is important that service users are aware of the steps taken to ensure their data is secure.

Healthcare professionals worried that the information collected in the online consultation would be inaccurate; however, service users anticipated that they would be able to provide more accurate information via the online consultation than in a telephone or face-to-face consultation.

Figure 50. The main finding relevant to: The online PrEP clinical consultation

The main findings are presented within Figure 50. A high proportion of survey participants were willing to provide information (sexual behaviour, medications, side-effects, and symptoms) online in order to access health services. This encompasses most of the information that will be collected within the online PrEP consultation (Henderson et al., 2022b). Moreover, participants in the service user interviews also found the prospect of providing information online acceptable; however, some preferred providing this information directly to a healthcare professional as they would have the opportunity to ask questions, clarify any uncertainties, and the healthcare professional could probe for further information if required. I think it is important to note that the service user participants liked the idea that they would attend every 6 or 12 months for what they perceived to be a more complete review which may satiate some participants' need for health professional-led care. Service users were not particularly worried about data security and assumed that the service would be developed with common security features such as encryption and a secure log-in system.

Service users anticipated that the online consultation will be convenient and anticipated that they would be able to be more honest and provide more accurate information than face-to-face or via phone call because they will feel less embarrassed and have more time to think. In addition, they anticipated that they would be able to provide more accurate information about other medications because they would have direct access to them and would not have to rely on their memory. This contrasts with the healthcare professionals who were concerned about the accuracy of the information that would be provided in the online consultations – particularly in relation to medications and other health conditions. This was based on the extent to which they had to prompt service users within consultations and their concern about the potentially high cognitive load of the online consultation. This highlights a strength of the methodology used in this doctoral research – allowing nuanced insights into convergences and divergences in opinion between service users and providers. The online consultation component of the proposed online PrEP service has already been developed and cognitively tested (Henderson et al., 2022b). This occurred in parallel to the service user interviews, using the same sample recruited from the NHS. The consultation was developed and reviewed by clinicians experienced in providing PrEP care, some of whom were also experienced at developing online clinical pathways. The drafted consultation was reviewed by PrEP service users in three rounds and amended at the end of each stage in line with the feedback received. The intention is for these questions to be validated through comparison with the decisions made in clinic when prescribing PrEP (Henderson et al., 2022b). Therefore, although

the healthcare professionals were concerned about the accuracy of the information that will be obtained through the online consultation, the cognitive testing suggests that the questions are clear and able to collect the necessary information from service users.

8.2.5.3. Remote provision of PrEP medication and automated PrEP prescribing

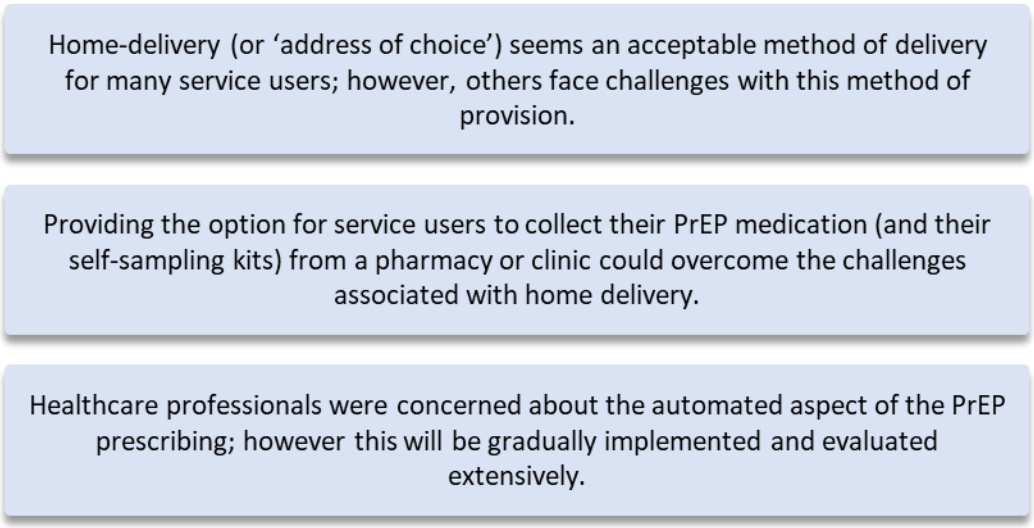


Figure 51. The main finding relevant to: Automated prescribing and remote provision of PrEP medication

The main findings are presented within Figure 51. The service users explored three methods of PrEP medication provision: home delivery, collection from a community pharmacy, and collection from a sexual health service. Home delivery of PrEP was implemented throughout the pandemic (Henderson et al., 2022a) and appeared to be generally acceptable to most participants in the interview study. However, some participants reported challenges with their unreliable postal service and voiced concerns about privacy (e.g. their package may be intercepted by a family member). Others found the prospect of home delivery convenient but it was noted that it should be framed as 'address of choice' rather than 'home delivery' so that service users with difficult home environments or who would simply prefer to have it delivered elsewhere are aware they can have it sent to a safe place.

Some participants wanted to be able to collect their PrEP from a community pharmacy because it would be convenient and they viewed pharmacies as being discreet. Participants felt a sense of anonymity at a pharmacy, because other customers do not know what medication you are collecting. This was contrasted with leaving the sexual health service with a

bag which was seen to be stigmatising by some. There was also a sense that collecting PrEP from a pharmacy would help to normalise PrEP as service users could collect it just like any other medication which seemed to be important to those who mentioned this. Indeed, PrEP has been distributed from pharmacies elsewhere in the world (Havens et al., 2019; Roche et al., 2021), but solely from sexual health services (either in-clinic distribution or postage) in Scotland.

Some participants expressed interest in being able to collect their PrEP medication from their local sexual health service. The service users who discussed this option indicated that they were frequently in close proximity to a sexual health service so it seemed convenient to them. From participants' experience of telephone-based PrEP, we know that travelling to a sexual health service is often seen as an inconvenience and so collecting PrEP from the sexual health service would likely not be acceptable to many service users and could be seen as defeating the purpose of the online PrEP service. No one method was preferred by all so, if feasible, a variety of methods of delivery/collection would ensure service users could receive their PrEP medication in a way that meets their preferences.

The healthcare professionals expressed some concern around the prospect of automated PrEP prescribing. Participants considered who would be the named prescriber on the prescriptions and responsible for any adverse events that occurred. Participants expressed that they would be more comfortable if participants' responses to the online consultation were manually reviewed by a healthcare professional who then issued the prescription, at least in the early stages of implementation. This was linked to the concerns over the accuracy of the information provided by service users within the online PrEP consultation, discussed above. The intention for the online PrEP service is for a gradual roll out with the automated prescribing aspect being the last introduced. This will allow any issues with the quality of the information collected in the online consultation to be addressed ahead of the automated prescribing being introduced. There is also a large RCT of automated prescribing planned for 2023 as part of the SEQUENCE Digital programme (C Estcourt, personal communication; SEQUENCE Digital, 2021). Having this evidence will likely help to influence perceptions of automated prescribing and reduce uncertainties.

8.2.6. What do GBMSM anticipate will be the benefits or challenges associated with the proposed online PrEP service and how might the challenges be overcome?

8.2.6.1. Benefits

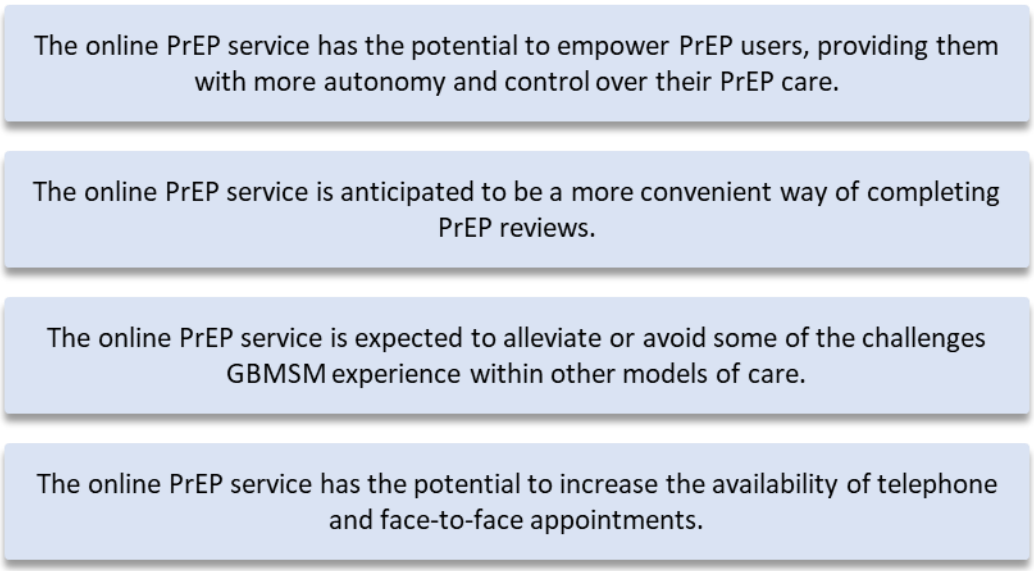


Figure 52. The main finding relevant to: Anticipated benefits of the proposed online PrEP service

The main findings are presented within Figure 52. Service users tended to highlight the potential convenience of the proposed online PrEP service before mentioning any other benefit. They predicted that the online PrEP service would make the process of ongoing PrEP care easier and less time consuming than it is through existing services. The anticipated reduction in the frequency of 'scheduled' appointments, which was a challenge in the telephone-based service, and the frequency of face-to-face appointments, which were an inconvenience for some, was seen as beneficial. This is congruent with the findings of the scoping review (Chapter 2; Kincaid et al., 2021a) where online PrEP-related care was found to be convenient and overcame scheduling and geographic barriers (Chasco et al., 2021; Hottes et al., 2021; Knight et al., 2019; Maksut et al., 2016; Witzel et al., 2019). Participants felt that the online PrEP service would provide them with more control and autonomy, promoting self-management of their PrEP care. The online PrEP service was also expected to improve privacy by reducing the need for telephone calls which may be overheard and reducing the frequency of in-person appointments where people may be seen entering the sexual health service. The potential for online care to facilitate privacy was also highlighted in the scoping review (Kincaid et al., 2021a; Knight et al., 2019; Witzel et al., 2019).

Participants felt that they would be able to provide more accurate behavioural information because they would have more time to think and there would be less stigma or judgement as they were not speaking directly with a person. This ability to avoid stigma has been demonstrated elsewhere when testing for HIV (Chasco et al., 2021; Hottes et al., 2012; Maksut et al., 2016). Moreover, some service users were uncomfortable with phone calls in general so reducing the need for these was seen as a benefit. The online PrEP service was seen as a step towards normalising PrEP, taking it out of the physical sexual health service. Participants felt that the introduction of online PrEP care may even attract people who may benefit from PrEP but for whom the three-monthly appointments are a barrier. Some participants also considered a concept which one participant referred to as 'NHS guilt', feeling guilty about using NHS resources for their PrEP care, and how the online PrEP service may help to reduce this feeling by taking up less time in clinic. Moreover, it was the view of service users and providers that the online PrEP service may increase the availability of telephone and face-to-face appointments which would provide wider benefits to service users who do not use the online PrEP service.

8.2.6.2. Challenges and solutions

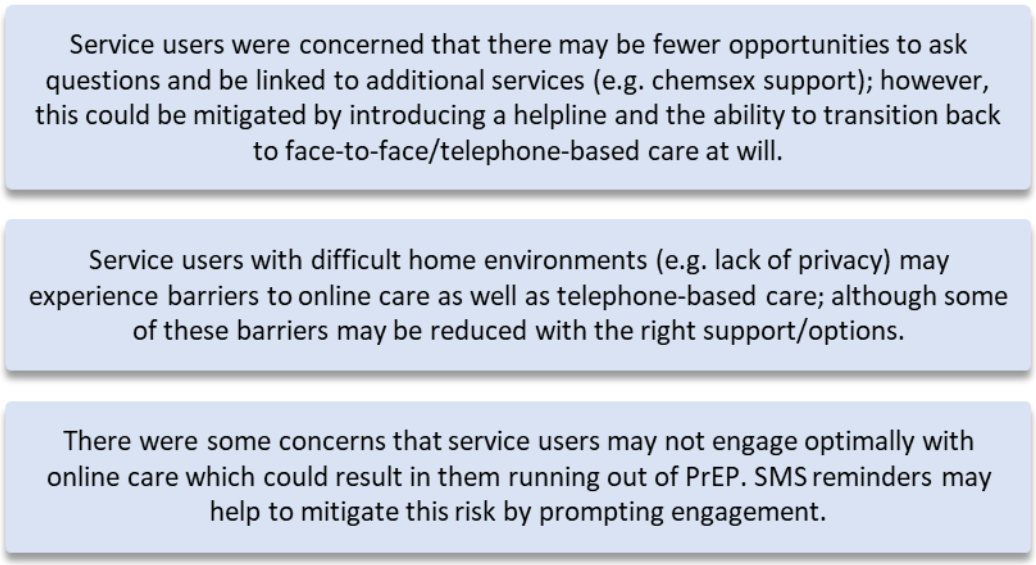


Figure 53. The main finding relevant to: Anticipated challenges for the proposed online PrEP service and possible solutions

The main findings are presented within Figure 53. Some service users were concerned that they may not have the same opportunity to ask questions and be linked to additional services such as chemsex support. This concern was shared by some of the healthcare professionals;

however, they pointed out that due to the administration burden and insufficient time within appointments, they already struggled to provide holistic care so this would not be a new problem within the online PrEP service. The helpline may mitigate these concerns to an extent as service users could ask questions and ask about additional services.

Participants felt that people who had difficult home environments may find it challenging to complete some of the stages of the online PrEP service. Within the context of medication provision, home delivery posed difficulties for some service users, and while this would likely be the case for home delivery of the online postal self-sampling kits, this issue was not explicitly explored. Collection of the self-sampling kits from community pharmacies or the clinic may be an appealing solution to this potential challenge, based on the acceptability of pharmacy and clinic collection within the sample. However, I did not include any pharmacists' views in this research so the feasibility of this needs to be explored. Perhaps the 'hub and spoke' method implemented in the Umbrella model (Jewell et al., 2017), wherein there is one central clinic (the 'hub') and several 'spoke' clinics (e.g. a community clinic or local pharmacy), could provide a basis for designing an acceptable method of distributing self-sampling kits and medication.

There is a concern that some service users may find it challenging to adhere to their PrEP care schedule if it were done more remotely – e.g. forgetting to complete a stage. Participants suggested ways that they could keep on top of their PrEP care (e.g. phone reminders). However, one of the most recurrent topics mentioned by participants in the interviews was how useful they found the SMS reminders they were sent by sexual health services, how these helped them to keep on top of their PrEP, and that they wanted these to be incorporated into the online PrEP service. This seems like a sensible decision as there is a clear precedent for their use in similar contexts, they are highly acceptable to service users, and they are relatively low-cost as an intervention (Farmer et al., 2014; Sallis et al., 2019; Schwebel & Larimer, 2018).

8.2.7. What impact might the online PrEP service have on existing services?

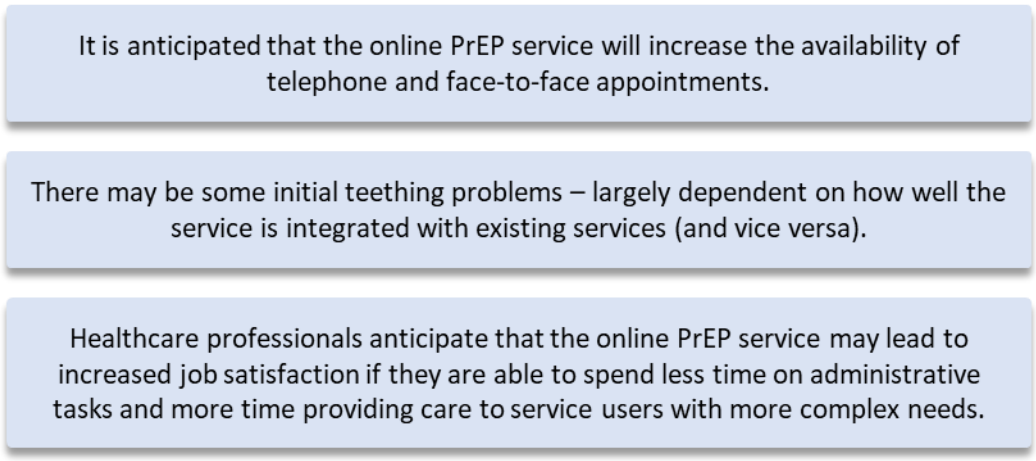


Figure 54. The main finding relevant to: What impact might the online PrEP service have on existing services?

The main findings are presented within Figure 54. The service users and healthcare professionals anticipated that the online PrEP service would increase the availability of telephone and face-to-face appointments and lead to beneficial changes in resource management. The healthcare professionals spoke about how the time they spent completing administrative tasks within the telephone consultations detracted from the time they could spend delivering more holistic care. The administrative tasks include: booking service users in for appointments; writing medical notes; completing blood forms; and writing prescriptions. The online PrEP service may help to reduce this administrative burden as the online service could run independent of a healthcare professional and automatically populate the patient notes.

Some healthcare professionals were concerned that the online PrEP service may initially be inefficient and may require more resources than existing PrEP pathways. They anticipated that this would depend on the proportion of service users who would need to frequently switch between pathways. Careful consideration of how to optimally integrate the online PrEP service within existing services and what changes to the existing structures are needed to facilitate online care is needed. Martin et al. (2022) outline four conditions required for the integration of new interventions into services: authentic integration into the organisational mission; functional and effective administrative systems; flexibility and sensitivity in implementation; and continuous inquiry, learning and improvement. What is clear from Martin et al. is that there needs to be an openness to change within the organisation/health service for integration

to be successful. In this case, the healthcare professionals need to be open to adopting the online PrEP pathway within their service and changes may need to be made to the existing service to fully integrate the online pathway.

The healthcare professionals felt that the online PrEP service would have little impact on their professional identities. However, they did anticipate that they may experience more fulfilment or satisfaction when the online PrEP service is implemented since they may have the opportunity to focus on service users whose needs are more complex. As mentioned in Chapter 7, the job satisfaction of sexual healthcare professionals is an understudied area, as is experience of healthcare professionals shifting to delivery remote/digital healthcare. Some case studies of the shifts in the roles and functions of staff within digital health services were published within The Topol Review (Topol, 2019); however further research is needed to better understand the service provider experience. Conversely, the reduction in service users with more 'straightforward' needs could limit opportunities for staff to become familiar with providing PrEP care. This may necessitate changes to how staff are trained in PrEP provision.

8.2.8. For whom might the online PrEP service be appropriate?

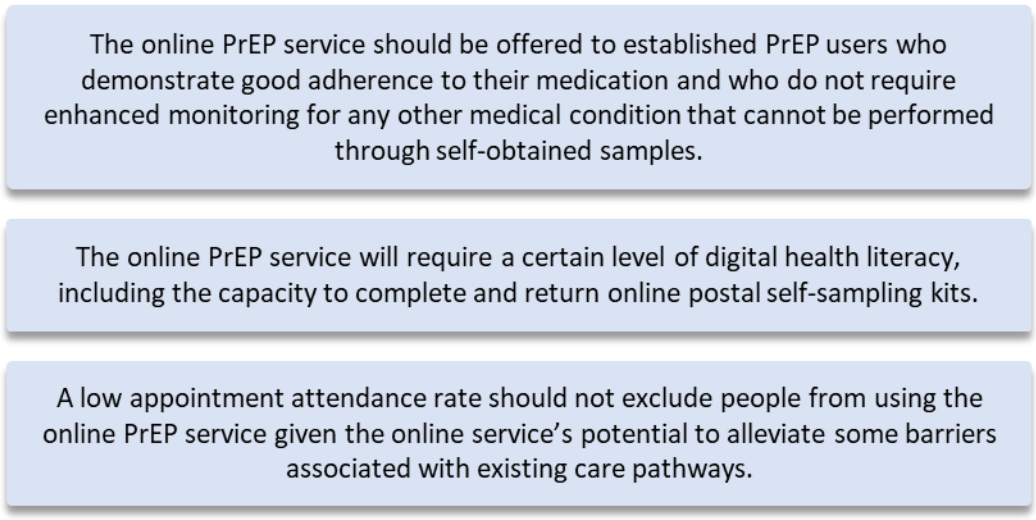


Figure 55. The main finding relevant to: Who might the online PrEP service be appropriate for?

The main findings are presented within Figure 55. The online PrEP service seems to be most appropriate for service users who have already started on PrEP in clinic, do not have medically significant comorbidities, are considered low-risk for renal impairment, have a sufficient level of digital health literacy, and want to use it. Both service users and healthcare professionals

suggested that the online PrEP service may not be suitable for people who have complex health needs or require additional monitoring (i.e. renal function). It is worth noting that Chasco et al. (2021) demonstrated the feasibility of self-sampling for creatinine analysis within the context of PrEP care (see Chapter 2). Sampling for creatinine in this way could make the online PrEP service appropriate for more service users, while it is likely that the forthcoming BHIVA BASHH PrEP guidance will likely change the frequency of renal monitoring (C Estcourt, personal communication). The need for a self-administered blood sample may be an immovable barrier for some but newer sampling technologies (e.g. Tasso (Tasso, n.d.)) could increase the acceptability of blood self-sampling in the future for some.

Digital determinants of health (e.g. reliable access to the internet and the ability to navigate online health services) were identified by service users and healthcare professionals as important factors for the appropriateness of online PrEP care. Similarly, people need to have a safe space where they can receive or complete the online postal self-sampling kit and PrEP medication. Participants in the interviews spoke about how a difficult home environment would make online PrEP care challenging. Collecting the sample kits from a community pharmacy or the clinic, in addition to collecting the PrEP medication, may be a way of mitigating some of these barriers, though again, this needs further empirical exploration.

Healthcare professionals spoke about the challenges that come with trying to support service users who experience adherence issues and how this may affect the appropriateness of online PrEP care for them. Poor adherence compromises the level of protection provided by PrEP and thus increases their likelihood of acquiring HIV (Cairns, 2020; World Health Organization, 2021b). If people then acquire HIV and continue to take PrEP, then drug resistance may develop; which underlines the importance of regular HIV testing within PrEP care (Cairns, 2020; World Health Organization, 2021b). Online care would likely not be appropriate for service users who are struggling with PrEP medication adherence since in-person care, at least ideally, allows discussion around adherence and provision of support. Participants also felt that some service users' lack of understanding of event-based dosing would also provide challenges within the context of online PrEP care. While these issues already exist in current care models, it is perhaps wise to ensure that service users are confident with event-based dosing, if this is their preferred method, before being initiated on the online pathway and/or provide specific resources to support event-based dosing within the online PrEP service interface.

The healthcare professionals felt that the online PrEP service would not be appropriate for service users who had poor levels of attendance at their PrEP review appointments, anticipating that this poor attendance would translate into not completing the stages of the online PrEP service timely. Interestingly, this did not necessarily concur with participants' expectations. Attendance can be affected by a number of factors (Bender & Fulbright, 2013; Cassidy et al., 2018). Indeed, in the service user interviews, participants shared a number of barriers to telephone-based care such as scheduling difficulties, perceived stigma and embarrassment, and a fear of telephone calls. The proposed online PrEP service has the potential to mitigate many challenges faced in existing services and thus could potentially improve attendance by reducing these barriers. Although I appreciate the healthcare professionals' concerns around attendance, I do not think it would be an appropriate screening factor necessarily as some service users may engage better with online models of care. It is important to consider how the demands of a particular care pathway fit with each users' individual life circumstances, rather than seeing each pathway as requiring a graded level of commitment. If there are service users whose attendance is poor no matter what modality this is a separate issue that needs addressed which falls outside the scope of this research.

Equity was a theme that arose in both the service user interviews and the healthcare professional focus groups. Whitehead (1994, p.1284) explains that: *"Equity in health implies that ideally everyone should have a fair opportunity to attain their full health potential and, more pragmatically, that none should be disadvantaged from achieving this potential, if it can be avoided"*. The online PrEP service will likely not be appropriate for all who wish to use it. While there are reasons why some people would be better suited to in-person care, restricting any service could be viewed as exclusionary. However, as important as choice and reducing barriers to care are, we need to remember that this is a medication that is being prescribed and that for this to be done safely and appropriately, certain tests need to be completed and conversations need to be had (Brady et al., 2019). When asked how they felt about some people being able to use the online PrEP service and not others, service users felt that this was unavoidable and inherent with any health service. Moreover, they felt that it showed that individuals' needs and safety were being considered which they viewed as a positive. Returning to Whitehead's definition: *"none should be disadvantaged from achieving this potential, if it can be avoided"* (Whitehead, 1994, p.1284), by offering an additional method of care, we are not further disadvantaging anyone. The service may not be appropriate for all who wish to use it but in-person/ telephone-based care will be available to those who need it.

However, since we know that the existing models do not work for everyone, further work is needed to understand how existing barriers to PrEP care, some of which were identified in this thesis, can be further reduced. Indeed, it is anticipated that the online PrEP service will help some to mitigate some barriers for some service users.

8.2.9. How can GBMSM be supported to use the online PrEP service?

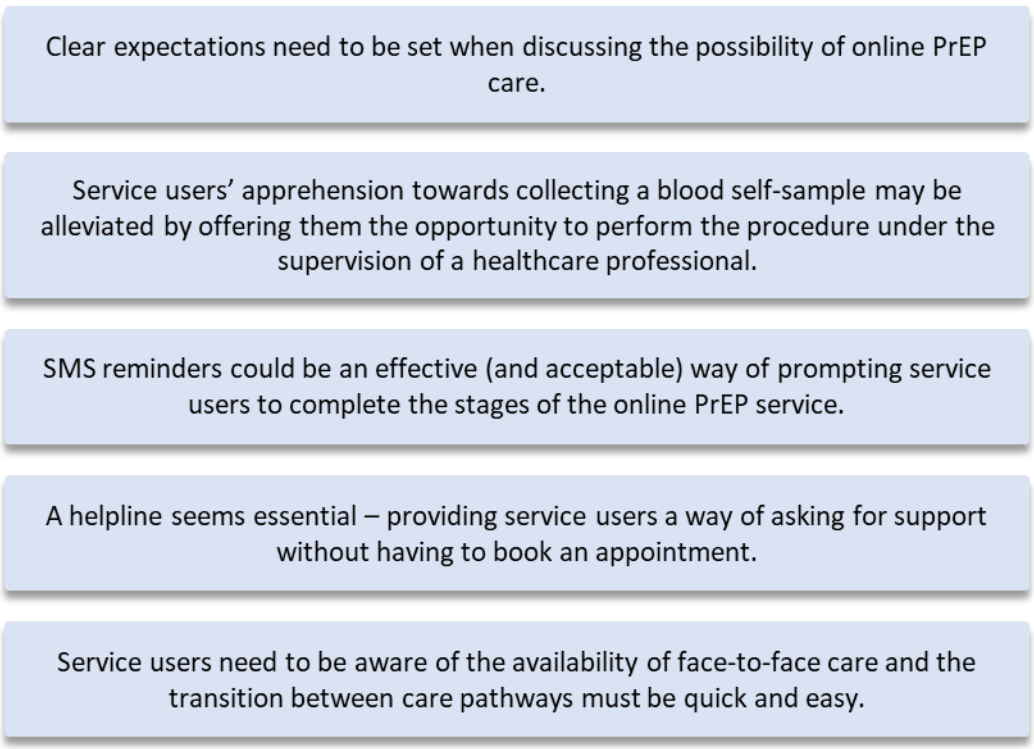


Figure 56. The main finding relevant to: How can GBMSM be supported to use the online PrEP service?

The main findings are presented within Figure 56. Service users provided clear, useful suggestions on how they wanted to be supported when using the online PrEP service. Critically, these suggestions seem to align with established empirically derived 'behaviour change techniques' (Michie et al., 2013) which refer to the 'active ingredients' of behaviour change interventions – the components that lead to changes in health behaviours (Michie et al., 2013). It is important to draw on this behaviour change theory and consider how the participants' suggestions align with techniques have been previously shown to bring about actual behaviour change given that the findings of this thesis are based largely on expectations and hypothetical behaviours.

Participants spoke about how they would find it useful to be able to practise performing the finger-prick blood sample in the presence of a healthcare professional. They felt this would reassure them that they were able to perform the sample correctly, in order to obtain a valid sample. This maps onto the behaviour change technique 'behavioural rehearsal/practice' wherein an individual is prompted to practice a behaviour in an effort to improve a skill or encourage habit formation (Michie et al., 2013). It is also related to 'guided practice', a method highlighted in the Intervention Mapping manual (Eldredge et al., 2016), based on Social Cognitive Theory and Theories of Self-Regulation (Kelder et al., 2015) wherein an individual practices a behaviour, discusses the experience, and is provided with feedback. These methods specifically aim to improve the individual's skills, capability and self-efficacy (Eldredge et al., 2016).

Unsurprisingly, participants felt it was important that they were provided with sufficient instruction on how to complete each of the stages/behaviours within the online PrEP service. They wanted these instructions to be in the form of text, images, and video. Participants mentioned that it would be useful for these to be available online through the online PrEP service interface and sent via SMS link. Again, several behaviour change techniques seem to correspond to the participants' suggestions: 'instructions on how to perform a behaviour' (within all media), 'demonstration of the behaviour' (images and videos) (Michie et al., 2013).

Participants reflected on how useful they found SMS reminders within the existing PrEP service because they helped them to adhere to their PrEP care routine. Participants stated that they wanted this feature to be incorporated in the online PrEP service as it would help them to avoid forgetting to complete stages in time and thus not run out of PrEP medication. As mentioned earlier in this chapter, SMS reminders are a relatively low-cost, highly acceptable intervention (Farmer et al., 2014; Sallis et al., 2019; Schwebel & Larimer, 2018). Moreover, they map onto the 'prompt/cues' behaviour change technique wherein individuals are reminded to engage in a particular behaviour (Michie et al., 2013).

Many participants felt that a helpline was essential within the online PrEP service. Participants stated that they may have questions, especially during their first online review episode, and that a helpline would be an acceptable way for them to clarify any queries. The phone-based support was seen as bidirectional in that service users could phone up to ask questions and healthcare professionals could phone service users to clarify flagged responses within their

online consultation. This helpline, specifically who would be operating the service, is explored more fully in the next section. The scope of behaviour change techniques that could be incorporated into this service is wide and largely depend on the resulting service and perhaps even the content of each telephone call. However, it is likely it will utilise: 'instruction on how to perform a behaviour', 'biofeedback' (i.e. test results), and 'feedback on behaviour' (Michie et al., 2013). The helpline may also incorporate 'problem solving', 'information about health consequences', 'prompts/cues', 'reduce negative emotions', and 'verbal persuasion about capability' (Michie et al., 2013). The opportunity to receive in-person care at any stage in the online PrEP service was seen as important by service users and healthcare professionals (e.g. a service user has difficulty performing the blood sample, or they test positive for chlamydia). The helpline would likely play a role in transitioning between pathways. This is explored later in this chapter.

When considering the support that service users will need, I feel it is important to discuss the concept of responsibility which was explored in the qualitative studies. It seems that there would be a shift in responsibility for those who choose to use the online PrEP service in that they will be in control of when they order, complete and return their self-sampling kit, complete their online PrEP consultation, and ensure that both stages are done ahead of running out of PrEP. In other words, they would be self-managing their care to a greater extent. Some participants acknowledged that they would need support to do this, specifically via SMS reminders. However, I think it is also worth considering a plan of action for when a service user does not complete the online review in sufficient time and I do not think any of the data collected in this study clearly illustrates how this should be done. The healthcare professionals expressed some concern around this shift in responsibility for some service users and reflected on experiences where service users were in inappropriate places (e.g. a bus) when receiving their telephone consultation or were not giving enough attention to the consultation (e.g. they were also driving their car). I feel that the online PrEP service may mitigate some of these challenges by allowing service users to complete the consultation at a time and place of their choosing but I think it is also important to be realistic and anticipate that there may be some suboptimal use of the online PrEP service and plan how to deal with these situations. Both service users and healthcare professionals mentioned the importance of setting expectations and spoke of a verbal agreement. Having clear expectations and a shared agreement seems important and also aligns with the behaviour change techniques of 'behavioural contracts' and 'commitments' (Michie et al., 2013).

Overall, the support mechanisms identified by participants in this thesis clearly align with several theoretical and evidence-based behaviour change techniques (Michie et al., 2013). This is encouraging since this alignment provides additional evidence that these support mechanisms will likely bring about real change.

8.2.10. Who will be responsible for linking service users to the online PrEP service and who will be responsible for supporting service users' use of the service?

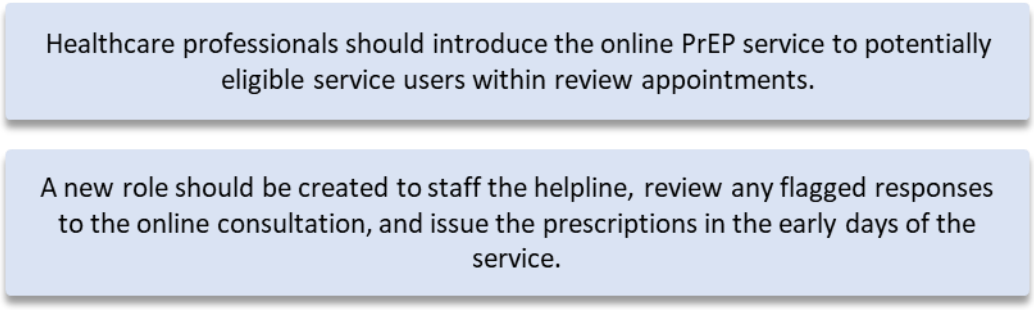


Figure 57. The main finding relevant to: How can the online PrEP service be integrated with existing services?

The main findings are presented within Figure 57. It seems appropriate for service users to be linked to the online PrEP service by the healthcare professional conducting their PrEP review after discussion around how it works and what the expectations of both parties (service users and providers) are. In both qualitative studies, participants felt that the online PrEP service would be more appropriate for experienced PrEP users and that there needed to be a level of gatekeeping over access – i.e. only 'approved' service users could access the online PrEP service. I feel it is also important to be mindful of practicalities, however, as the healthcare professionals talked about how short of time they already are within review appointments. Consideration is needed on how to best fit in discussions about online care. Perhaps a short introduction and provision of more information via an SMS link would work well with a follow-up a short time later by the person whose role it is to operate the online PrEP service. This is similar to how participants were introduced to the service user interview study which seemed acceptable to participants and required minimal time within the consultation. Discussion at the next review might be too long a window and also would mean that people would not initiate on the online PrEP service until 6 months after they were introduced to it. Further discussion with healthcare professionals would help develop an efficient process.

The healthcare professionals highlighted the need for training on how to discuss the online PrEP service with service users, how to link them to the service, and how to review the information provided by service users online. Participants discussed the prospect of a new role which would involve a healthcare professional operating the helpline and reviewing flagged online consultations. Participants felt that this would be an interesting role. Participants were concerned about how post-exposure prophylaxis following sexual exposure (PEPSE) would fit into the online PrEP service. Participants wondered if the online consultation should assess the need for PEPSE and alert the clinic, or if it was sufficient to provide recommendations to service users instead. The online PrEP service is intended to help people self-manage their routine care, it is not meant to be a triage service. Since PEPSE has a short window of 72-hours post-exposure to be effective, it could be argued that there would be a low likelihood of there being an overlap between the need for PEPSE and online PrEP service access (Asanati et al., 2021; Centre for Disease Control and Prevention, 2018b). Signposting may then be more appropriate, especially factoring in how long it may take for a flagged PEPSE case to be actioned by clinic staff (e.g. weekends). Ultimately, I think this needs to be studied further.

8.2.11. How can the online PrEP service be integrated with existing services?

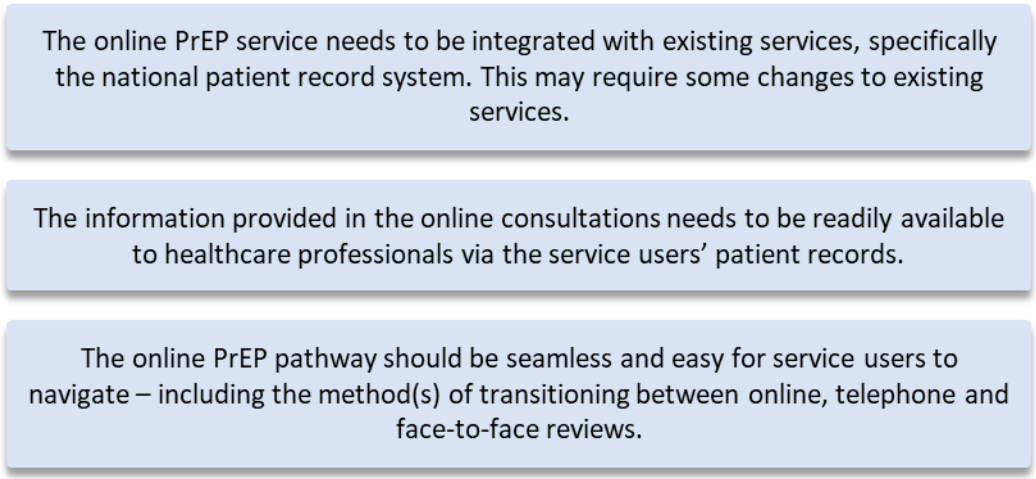


Figure 58. The main finding relevant to: How can the online PrEP service be integrated with existing services?

The main findings are presented within Figure 58. While the online PrEP service is framed as an adjunct to existing care pathways, it is critical that it is fully integrated with existing services and systems. Service users' preferences are not static and seem to depend on their current

circumstances and what they are being asked to do, as evidenced by the SMMASH3 data. Within the qualitative studies, participants expressed the importance of choice and how it was important that transitioning between online and in-person pathways was easy and quick, noting that they expected that if they had already started completing the online pathway, the transition to in-person care would be expedited. It seems important to offer the choice of in-person and online care at the start of each review episode within the online booking system for those who have been approved for the online PrEP service. This allows service users to choose in-person care if they feel that would be more appropriate for them given their circumstances at that time. However, it is also important to provide opportunity to transition within the online PrEP service itself in case service users change their mind (e.g. they are having trouble collecting a blood sample). The helpline may also be able to facilitate transition. Crucially, the information provided by the service users throughout needs to be integrated with NaSH – the Scottish sexual health national patient records. This means that healthcare professionals can have immediate access to participants' data within in-person/telephone consultations, providing continuity of care which we know is important, and ensuring that healthcare professionals have a clear and complete picture of the service user's history. There are existing precedents for online postal self-sampling and automated prescribing and we need to put careful consideration into how these can be adapted and used to inform the online PrEP service.

At the beginning of the thesis, I presented a preliminary pathway for the online PrEP service (see Figure 59). Having considered the data presented in this thesis, I have adapted this pathway to reflect the suggestions of the PrEP service users and the healthcare professionals (see Figure 60). The updated pathway has a clearer plan for how service users choose between online and other pathways, informed by my research. Crucially, the updated pathway includes the support mechanisms identified by participants and provides a clearer blueprint for developing the online PrEP pathway.

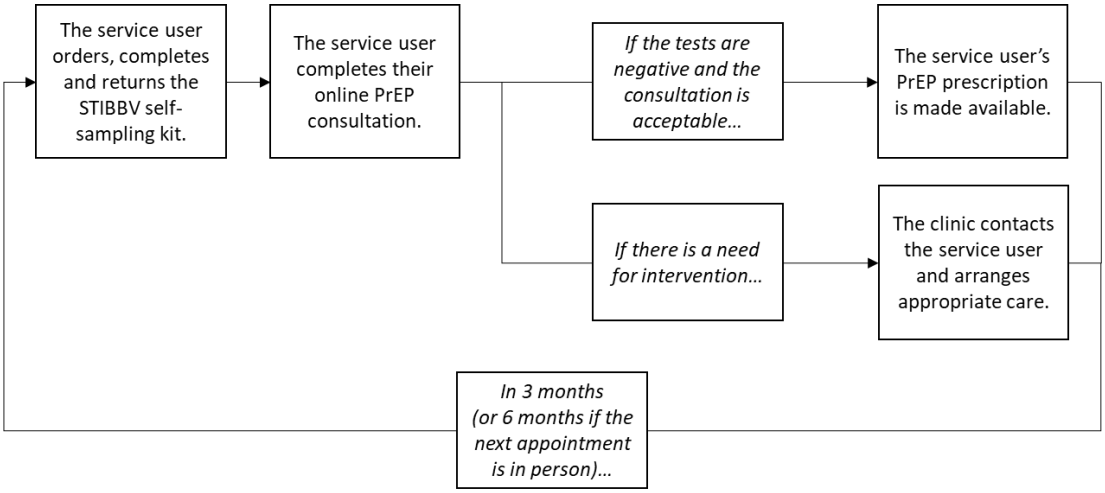


Figure 59. Preliminary online PrEP pathway

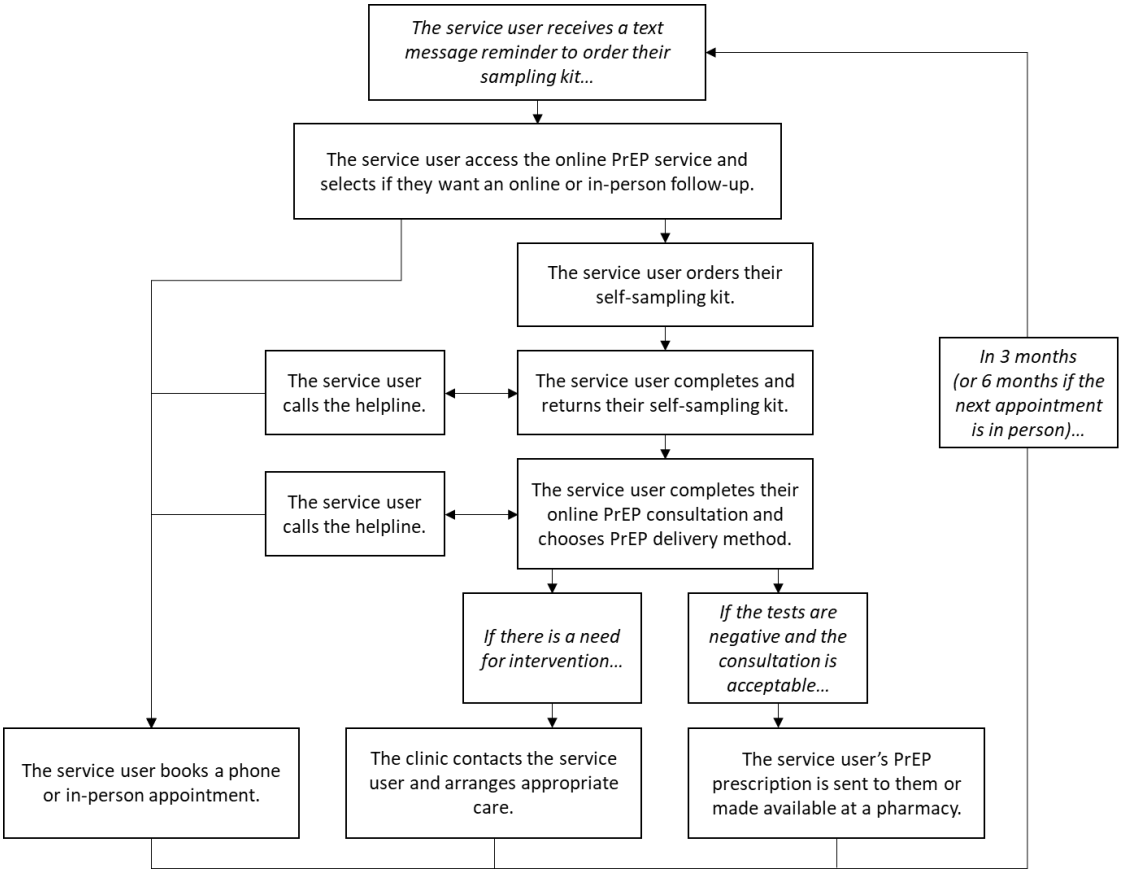


Figure 60. Updated online PrEP pathway

8.3. Contextualising this thesis

It is important to acknowledge and discuss other research projects that were being conducted at the same time at this doctoral research and to consider where this research sits in the

context of HIV transmission elimination and governmental strategies around digital health. Perhaps most closely related, and a study I have mentioned throughout the thesis, is the development and cognitive testing of the online PrEP clinical consultation (Henderson et al., 2021b). In this study, the online clinical consultation tool for the online PrEP service was developed by following the initial steps within the eClinical Care Pathway Framework (Gibbs et al., 2016) wherein the functional units (groups of questions e.g. new medical conditions) and their sequence are drafted, reviewed and cognitively tested (Henderson et al., 2021b). The functional units and their sequence were based on the BHIVA BASHH guidelines for PrEP use (Brady et al., 2019), the same source I use to defined PrEP-related care within Chapter 2. The review involved healthcare professionals experienced with PrEP provision and digital healthcare experts. Finally, the reviewed questions were cognitively tested among a sample of PrEP service users in three rounds. At the end of each round, the questions were redrafted based on feedback from the service users. Throughout the different stages, the sequence of the functional units changed and the questions were adapted to provide more detail and clarity. This study is important to consider in conjunction with the healthcare professional focus groups presented in this thesis where some healthcare professionals were concerned about the accuracy of the information that service users would provide. Now that the online consultation has been cognitively tested, we can be confident in the readability and clarity of the questions which is crucial to limit any misunderstandings (Henderson et al., 2021b). This study is an important step towards developing the initial prototype for the online PrEP service.

Another study that is important to consider within this thesis was an evaluation of a telephone-based PrEP service (Henderson et al., 2021a) – the same service that many of the service users and healthcare professionals reflected on within the qualitative studies presented in this thesis. This evaluation consisted of online surveys distributed to healthcare professionals and PrEP service users. Of the 62 service users who took part, 61 rated the telephone-based PrEP service as ‘excellent’ or ‘good’ (Henderson et al., 2021a). Sixteen-percent of PrEP users and one of the eight healthcare professionals preferred in-person care which seems congruent with the findings of the qualitative studies within this thesis. All eight healthcare professionals felt that the telephone-based PrEP service allowed them to optimise the limited capacity of in-person appointments but felt that the service may be barrier for vulnerable service users and those with low digital literacy, which was also a concern expressed regarding online care within this doctoral research.

Throughout this thesis I refer to the eSexual Health Service online chlamydia treatment pathway (Estcourt et al., 2017). In many ways this is a precursor to the proposed online PrEP service as it demonstrated the feasibility and safety of providing an innovative online pathway within the context of sexual healthcare (Estcourt et al., 2017). Moreover, the online PrEP pathway itself is based to an extent on the pathway developed in the eSexual Health Service (Estcourt et al., 2017; Gibbs et al., 2016). This leads onto a research programme that is currently being conducted – SEQUENCE Digital (SEQUENCE Digital, 2021). The National Institute for Health Research funded programme aims to provide evidence to improve sexual health within a digital NHS (SEQUENCE Digital, 2021). This aim aligns closely with this thesis and it is likely that the findings of this doctoral research and SEQUENCE Digital will have interesting and useful synergy. Another service that has recently been implemented is the EmERGE PrEP App wherein service users can access their STIBBV test results, track how much PrEP they have left and when their future appointments are (EmERGE, 2022); however, EmERGE does not offer automated prescribing. Evaluations of this service would likely provide useful lessons for the development of the online PrEP service and there may be some useful synergies between the proposed online PrEP service, the findings of this thesis, and the EmERGE PrEP app.

The Scottish Government has set out its vision for a Digital Scotland (Scottish Government & COSLA, 2021a), with specific strategies for digital health and social care (Scottish Government & COSLA, 2021b). Remote health pathways are highlighted as ways of saving time and reducing unnecessary journeys (Scottish Government & COSLA, 2021b) which is reiterated in the evidence collected in this doctoral research. The importance of designing services with input from potential service users is also highlighted (Scottish Government & COSLA, 2021b) which is essentially what this doctoral research is. Digital technology has been incorporated into most areas of life from communicating with family and friends to banking (Scottish Government & COSLA, 2021a), and participants in the service user interviews were keen for this digitalisation to continue into their healthcare. Indeed, incorporating digital health methods was viewed as a natural progression and the data in this thesis suggests that there is an appetite for further digitisation of health services for those who want to access care in this way. Moreover, this research aligns with many of the Scottish Government's digital service commitments, including to: *"continue to enable prevention, independent living and healthy ageing through the provision of digital services in the home, such as telecare…"* and *"provide*

user-friendly, role-appropriate information and resources to support the individual being cared for." (Scottish Government & COSLA, 2021b, p.17).

Ultimately, the goal of any HIV prevention intervention is to contribute in some way towards the goal of zero new HIV transmissions. As mentioned in Chapter 1, one of the UNAIDS 2025 targets is for more than 95% of the people who are at risk of acquiring HIV to use combination prevention, including PrEP where appropriate (UNAIDS, 2021b). Upscaling PrEP provision is crucial if we are to reach HIV transmission elimination goals (UNAIDS, 2021b). Online provision of PrEP care, as proposed in the online PrEP service, seems to have the potential to create capacity and reduce barriers for people accessing PrEP care. The findings of this doctoral research provide justification for pursuing this method of PrEP provision and provide evidence on how to develop and implement this service. However, we know that online PrEP care will not be suitable for all and it is crucial that further research is conducted to reach other key populations and understand how their needs are best met.

8.4. Strengths and limitations

I covered the strengths and limitations of the individual studies within each of their respective chapters; however, I will summarise them here as it was useful to bring them together to consider the quality and transferability of my research. The quantitative surveys were able to reach a large number of internet-using GBMSM in Scotland and the questions were reviewed by clinical, academic, and lay experts; however, many of the questions were hypothetical in nature (asking participants to reflect on future behaviours), the sample lacked diversity regarding ethnicity and trans identity, participants were recruited largely from sociosexual media sites/apps, and the SMMASH3 and SMMASH Pan samples were not fully independent. The semi-structured interviews provided service users to share their views on a service they may go on to use; however, all participants came from urban settings and the questions dealt with hypotheticals. Finally, the focus groups allowed for nuanced discussions among healthcare professionals; however, participants were only recruited from a single site so the data has limited transferability.

Having revisited each of the studies, I will now address the wider strengths of this thesis as a whole. This provides the first insight into PrEP service users and providers' views of online PrEP care within Scotland, and indeed the rest of the UK. The mixed methods design allowed for an understanding of broad patterns in behaviour and willingness and the prospective

acceptability of online PrEP care, and deeper exploration of acceptability from the viewpoint of service users and providers. Moreover, the inclusion of service users and providers allowed for these viewpoints to be contrasted to provide a more nuanced understanding than would have been achieved by focusing on either group.

In addition to the study-specific limitations, it is important to acknowledge that all of the data were collected digitally which excludes those who did not have access to a device or a sufficient level of digital literacy. While these would be required to access the online PrEP service, it is important to consider the views of those who would not be able to access this service due to lack of opportunity/capacity and to understand how to optimally meet their needs.

Socioeconomic status is an important concept within health research given the association between lower socioeconomic status and poorer health outcomes (Scottish Government, 2022; Stormacq et al., 2019). I did not report this within this thesis, which limits the generalisability of the survey findings and the transferability of the qualitative findings. Without this data, it is impossible to tell if the samples were generally of lower, higher or mixed socioeconomic status. In Scotland, the Scottish Index of Multiple Deprivation measures socioeconomic status based on the full postcode of the individual's residence (Scottish Government, 2020). Within the surveys, incomplete postcode data meant that any SIMD calculation would not provide an accurate overview of the socioeconomic status of the samples. I decided not to collect postcode data from service users in the interview study because I wanted to collect essential personal information only, and did not want to collect data that I would not be able to use. Given the similarities between the interview and survey eligibility criteria, I anticipated that the postcode response rates would be low and, again, I would not be able to calculate the SIMD of the sample. I now realise that this was the wrong decision for two main reasons: 1) the more 'personal' environment of an interview may facilitate the reporting of this data; and 2) the benefit of knowing the sample's SIMD arguably outweighs the risk of collecting data that cannot be used. In future, with participants' consent, I would seek to collect the data necessary to establish the socioeconomic status of the participants (SIMD) to help contextualise their responses and provide clarity on the generalisability and transferability of the findings. Moreover, I would consider how to frame this within the context of online surveys to facilitate more complete reporting, perhaps with

more focus on the importance of this data and the data security measures we have in place to protect participants' personal information.

8.5. Reflections

When I started the PhD, I was prepared for my resilience to be tested. I did not, however, expect to be completing the PhD within a global pandemic. The pandemic impacted everyone's lives greatly and I think it is important to recognise that many people had a much worse experience than I did. With that said, conducting research within the pandemic, particularly as someone who was at an early stage in their career, who did not have the same level of experience to draw upon as seasoned researchers, was challenging. I had to redesign my studies which allowed me to develop my ability to be flexible and responsive to change. However, I think the greatest impact that the pandemic had on me was in terms of resilience and energy. It was difficult to keep focused and to not let the strain of simply existing during a pandemic become overwhelming. However, I managed to complete data collection and accomplish what I set out to do.

One of the main difficulties within the PhD was understanding medical processes and pathways having no medical training or experience. I feel there is an implicit understanding among healthcare professionals about what it is like to provide care and see service users in situ, in real time, that cannot be emulated. Sometimes when I have read papers or listened to presentations I have felt unable to fully relate or visualise what is being communicated because there feels like a collective experience which I am not privy to. These feelings have reduced over time but still exist. Although this can be a strength within research – allowing me to ask 'obvious' questions and question 'taken for granted' experiences, it can also mean spending a lot of additional time simply trying to understand what is being discussed. The experience which caused the greatest shift in this was conducting the interviews and focus groups and hearing people's experiences of these processes as healthcare professionals and service users. It was a very illuminating experience and gave me a greater sense of understanding over what it is like to conduct a consultation, for example, which then makes reading about such processes much easier. It also made me reflect on how I present and write, how important it is to not assume knowledge when communicating research.

I focused on GBMSM within this thesis. As I mentioned in Chapter 3, I experienced some internal conflicts throughout the course of conducting this research regarding how appropriate

or accurate it is to use the term GBMSM. I believe it was appropriate to do so within the context of this thesis as it is the accepted term within the literature and practice. However, I do feel that the term is somewhat incongruous within some contemporary discussions around gender identities and sexual orientation (Bragazzi et al., 2022; Cameron & Stinson, 2019; Frohard-Dourlent et al., 2016). I think this is important to consider in the future especially when considering representation and reach and where non-binary people fit in when services are targeted to specific genders.

The vast majority of people who took part in the studies that made up this thesis were of white ethnicity. This is arguably less of an issue for the quantitative studies as the ethnicity data closely resembled that of the Scottish census (Scotland's Census, 2021). However, in the qualitative studies, specifically, the service user interviews, I aimed to purposively sample based on ethnicity but this was not feasible through the recruitment methods used. Representation in research is vital so that people's voices are heard and they have input in service development (National Institute for Health and Care Research, 2020; Redwood & Gill, 2013). There is a shift away from using the term 'hard to reach groups' which puts the responsibility on the group for not being reached (Stockdale, 2021). Instead, we need to consider the methods we are using and how they can be adapted to better reach underrepresented people. I need to consider how I can better reach underrepresented people in the future.

In line with my pragmatic approach, I focused on current PrEP users, as this group would likely use an online PrEP service in the first instance. Looking forward, I would be interested in understanding the acceptability of online PrEP care among people who are not currently using PrEP but who may benefit from it, including former PrEP users. Former PrEP users did provide some indication of why they discontinued PrEP within the surveys but this was limited to the response options provided in the survey and there was no qualitative follow-up to add depth to these data. We need to consider how to explore the concept of online PrEP care among people who are unfamiliar with PrEP carefully. The validity of the findings would be limited to the quality of the question and explanation especially since participants would have no frame of reference (i.e. any experience with existing PrEP services). Introducing several new concepts within a single interview or an already lengthy survey (i.e. PrEP and an online PrEP service) would likely be burdensome for participants. With that said, I think it is an important area to explore. The online PrEP service sits largely within the 'retention' stage of the PrEP care

continuum (Nunn et al., 2017). Although, for former PrEP users and people who may benefit from PrEP but have not accessed it, the prospect of online care could aid in initiation by providing a more acceptable modality of care. We should consider the potential for online PrEP care to open access and better reach other key populations.

8.6. Recommendations

In creating recommendations based on the findings of this doctoral research, I chose to focus on higher-level recommendations and omit those that would repeat standard recommendations for intervention development (e.g. develop training materials for staff) as these are clearly presented within existing frameworks such as the Intervention Mapping approach (Eldredge et al., 2016). The recommendations are presented in Table 31. These are intended to be a starting point and further work is needed to subsequently review the recommendations: I revisit this in Section 8.7.

Table 31. Recommendations for the development and implementation of the online PrEP service

Recommendations	Supporting evidence from thesis
Introducing the online PrEP service to service users	
• The online PrEP service should be offered to established PrEP users who are adherent to their PrEP regimen, have no medically significant comorbidities, and who have a sufficient level of digital health literacy to complete the online postal self-sampling and online consultation. • Service users should be made aware that they are able to transition back to face-to-face/telephone-based care at will.	• Participants in the qualitative studies suggested who the online PrEP service would be appropriate for and whose needs would be better met through other care pathways. • Participants in the qualitative studies highlighted the importance of face-to-face care. • A substantial proportion of survey participants (SMMASH3) preferred face-to-face care over online and some participants' preferences seemed to be dependent on emotional context.
Interface	
• The online PrEP service interface should be optimised for use on smartphones and computers. • The online PrEP service should have a secure log-in system.	• The survey data suggest that most service users use/will use a smartphone or computer to access online care. • The strengths and limitations of smartphones and computers seem complementary. • Service users shared what security features the online PrEP service needs to have.
Provision of self-sample kits and medication	
• Service users should be offered the choice of having their self-sample kit and medication send to an address of choice or picking them up from a community pharmacy or sexual health clinic.	• 'Address of choice' was suggested as a way of highlighting that service users can have their self-sample kit/medication sent to a safe place, not just their home address. • Some service users experience barriers with home delivery and suggested that being able to collect their medication from a community pharmacy or sexual health service would be more acceptable.

Integration	
• The online PrEP service should be integrated with existing services; including the national patient records system. This may require some changes to existing services. • The information provided by service users in the online consultation, and the results of their STIBBV samples, should be readily available to healthcare professionals via the national patient record system.	• The healthcare professionals highlighted the importance of having the online consultation data readily available via the national patient record system for subsequent appointments. • Service users expected that the information they provide within appointments will be available to their healthcare providers.
Supporting online PrEP service users	
• Service users should be asked if they want to perform a blood self-sample under the supervision of a healthcare professional as guided practice. • Instructions should be co-produced with service users and healthcare professionals. These instructions should come in a variety of media and be accessible via the online PrEP service interface. • SMS reminders should be set up to prompt online PrEP service users when they are due for a PrEP review, if they have not ordered or returned the online postal self-sampling kit, or if they have not completed the online consultation within a given time frame. • A helpline should be set up and operated by a designated healthcare professional, offering online PrEP service users a way of asking questions.	• Service users expressed that being able to practice the blood self-sample would likely improve their confidence and reduce the stress they would experience performing the test for the first time. • Service users highlighted the importance of clear instructions and having these in a variety of media. • Service users reflected on how useful they find the SMS reminders sent out by the sexual health service and expect these to be implemented within the online PrEP service. • Service users felt it was important that there be a helpline that they could phone for support.
Piloting and evaluation	

• The implementation of the online PrEP service should be gradual and evaluated at each stage.	• Some healthcare professionals expressed concern about the accuracy of the online consultation and the automated prescribing feature of the online PrEP service. They felt it would be advantageous to implement a manual review stage, at least in the early stages of implementation.

8.7. Future research

The recommendations I presented above are preliminary. It is important that they are subsequently reviewed and further developed with experienced clinicians and digital health specialists to ensure they are acceptable and feasible. Although they are evidence-based, the recommendations were created through my interpretation of the data so it is important that these are properly reviewed. The APEASE criteria seems to be an ideal tool through which to review the recommendations (West et al., 2020). APEASE stands for: acceptability, practicability, effectiveness, affordability, spill-over effects, and equity (West et al., 2020), and is used to assess proposed or existing behaviour change interventions. Moreover, it would likely be beneficial to use the Behaviour Change Wheel to further develop the recommendations into pragmatic steps (Atkins et al., 2014). I began to conceptualise the findings within behaviour change theory (i.e. aligning the support mechanisms with behaviour change techniques (Michie et al., 2013)). Applying a similar lens to the recommendations would help to further clarify how the findings of this thesis can be used to generate positive behaviour change.

In this thesis, I used the Intervention Mapping approach as a basis for establishing the evidence base given its systematic, detailed approach. Although this was ideal for this research, given the lack of evidence around a full online PrEP pathway at the start of my thesis, going forward, I think that the Behaviour Change Wheel would be a more practical model for translating the evidence developed within my thesis into action.

The scoping review identified that self-sampling for creatinine analysis appears feasible and has been implemented in the context of PrEP in the USA (Chasco et al., 2021). To my knowledge, this service is not available in Scotland (or the UK). Given the importance of renal function assessment for ongoing PrEP provision, and the ability for all other necessary samples to be collected remotely, incorporating remote renal sampling would be desirable to further reduce the frequency of mandatory in-person appointments for those whose only complication is mild renal impairment/age-related enhanced monitoring. Given the limited research, it seems important to assess the feasibility of this in a Scottish context; although, this may be less of an issue if the monitoring recommendations are relaxed in the forthcoming updated Scottish PrEP guidelines (C Estcourt, personal communication).

The development and implementation of the online PrEP service will have costs attached. It is important that, once a prototype has been developed and the pathways have been better defined through multidisciplinary input, appropriate health economic analyses are performed to understand if the online PrEP service would be cost-effective.

This thesis focused on GBMSM and, although PrEP is almost exclusively accessed by this population in Scotland (Health Protection Scotland, 2019a), it will be important to understand how the online PrEP service can be tailored for other key populations. With that said, we first need to better understand how to engage with other populations who may benefit from PrEP.

Finally, Scotland has been relatively slow in the uptake of digital health compared to other parts of the world, including England. The findings of this thesis suggest that the incorporation of digital health is welcomed by the majority of internet-using GBMSM. Therefore, it seems advantageous to consider what role digital health could play on a wider scale in Scotland.

8.8. Conclusions

The findings of this doctoral research provide clear justification for the development and implementation of the proposed online PrEP service and provide preliminary recommendations on how to do so, based on input from potential service users and implementers. The online PrEP service is anticipated to provide benefits to those who use the service and to service users and providers more generally. Potential challenges have been identified and, crucially, PrEP service users and providers have suggested ways in which these challenges can be mitigated and how they can best be supported when using the online PrEP service. More generally, this doctoral research highlights the importance of choice, arguing that no one method of care provision can meet the needs or preferences of all service users. We need to continue to understand how digital health can help optimise care provision while also being aware of the importance of retaining and continuing to develop in-person services.

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Appendices

Appendix 1: Data extraction sheet template

Originally, this was in a Microsoft Excel file; however, here I list the questions and give an example of the response to each.

Criterion	Details
Study ID	Lead author and year (e.g. Kincaid 2022)
Year	E.g. 2022
Full reference	In APA style
Related studies' IDs	Lead author and year
Date extracted	DD/MM/YYYY
Study aim	As written in the paper or paraphrased if unclear
Design	E.g. cross sectional
MMAT design grouping	E.g. descriptive quantitative
Start date	DD/MM/YYYY
End date	DD/MM/YYYY
Study duration	In months
Location	Country
Setting	E.g. single site hospital
Inclusion/exclusion criteria	As stated in the paper
Recruitment details	Sampling strategy and information on the procedure (e.g. randomisation), if applicable
Sample size	N
Age	Measure (measure) = X (X) E.g. Median [IQR] = 37 [23,56]
Gender, sex and sexual orientation	Combined as often conflated in papers
Ethnicity	A = n (%) B = n (%)
PrEP-related element(s) of care	E.g. HIV testing (patient to provider results); PrEP education
Method of care delivery	E.g. video call; email

Description of service	Detailed overview – combination of direct quotes and paraphrasing where appropriate
Findings	Due to heterogeneous outcomes, I did not break this down into separate outcomes
Barrier and facilitators	E.g. the need for in-clinic sampling was a barrier to engagement
Acceptability	Measure: Score (quantitative): Comments (qualitative):
Feasibility	Uptake: n Retention: n (%) Notes on completeness and fidelity: …

Appendix 2: Complete Mixed-Methods Appraisal Tool

In line with the recommended procedure for MMAT, if the article did not fulfil the initial screening questions, it was deemed low quality and further appraisal was not performed.

MMAT summary for quantitative randomized controlled trials

Study ID	Screening questions		Quantitative randomized controlled trial-specific questions				
	Are there clear research questions?	Do the collected data allow to address the research questions?	Is the randomization appropriately performed?	Are the groups compared at baseline?	Are there complete outcome data?	Are outcome assessors blinded to the intervention provided?	Did the participants adhere to the assigned intervention?
Bauermeister 2015	Yes	Yes	Unclear	No	No	Unclear	Yes
MacGowan 2019	Yes	Yes	Yes	Yes	No	Unclear	Unclear
Stephenson 2020	Yes	Yes	Yes	Yes	Unclear	Unclear	Unclear
Wang 2018	Yes	Yes	Yes	Yes	Unclear	No	Unclear
Wilson 2017	Yes	Yes	Yes	Yes	Unclear	Yes	Unclear
Witzel 2019	Yes	Yes	Yes	Yes	Unclear	Unclear	Unclear
Witzel 2021	Yes	Yes	Yes	Yes	Unclear	No	Unclear
Wray 2018	Yes	Yes	Unclear	Yes	Unclear	No	Unclear

MMAT summary for quantitative non-randomised studies

Study ID	Screening questions		Quantitative non-randomized study-specific questions				
	Are there clear research questions?	Do the collected data allow to address the research questions?	Are the participants representative of the target population?	Are the measurements appropriate regarding both the outcome and intervention (or exposure)?	Are there complete outcome data?	Are the confounders accounted for in the design analysis?	During the study period, is the intervention administered (or exposure occurred) as intended?
Anand 2017a	Yes	Yes	Unclear	Yes	No	No	Yes
Anand 2017b	Yes	Yes	Unclear	Yes	No	Yes	Yes
Chasco 2021	Yes	Yes	Unclear	Yes	Yes	Unclear	Yes
Cohen 2017	Yes	Yes	Yes	Yes	Yes	Unclear	Yes
Fuchs 2018	Yes	Yes	Unclear	Yes	No	Unclear	Yes
Gilbert 2019b	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Page 2019	Yes	Yes	Unclear	Yes	No	Unclear	Unclear
Phanuphack 2018	Yes	Yes	Unclear	Yes	Unclear	Yes	Unclear
Refugio 2019	Yes	Yes	Unclear	Yes	Unclear	Unclear	Yes
Salway 2019	Yes	Yes	Unclear	Yes	Unclear	Yes	Unclear
Stekler 2018	Yes	Yes	Unclear	Yes	No	Unclear	Yes
Syred 2019	Yes	Yes	Yes	Yes	Yes	Unclear	Yes

MMAT summary for quantitative descriptive studies

Study ID	Screening questions		Quantitative descriptive study-specific questions				
	Are there clear research questions?	Do the collected data allow to address the research questions?	Is the sampling strategy relevant to address the research question?	Is the sample representative of the total population?	Are the measurements appropriate?	Is the risk of nonresponse bias low?	Is the statistical analysis appropriate to answer the research question?
Balán 2020	Yes	Yes	Unclear	Unclear	Unclear	Unclear	Unclear
Balán 2021	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
Baraitser 2019	Yes	Yes	Yes	Unclear	Yes	No	Yes
Biello 2021a	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
Biello 2021b	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
Chan 2021	Yes	Yes	Unclear	Unclear	Yes	No	Yes
Daniels 2016	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
De Boni 2019	Yes	Yes	Yes	Unclear	Yes	No	Yes
Elliot 2016	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
Finkenflügel 2019	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
Gilbert 2017	Yes	Yes	Yes	Yes	Yes	Unclear	Yes
Gilbert 2018	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
Guinness 2018	Yes	Yes	Yes	Yes	Yes	Unclear	Yes
He 2018	Yes	Yes	Unclear	Unclear	Unclear	No	Unclear

Study ID	Screening questions		Quantitative descriptive study-specific questions				
	Are there clear research questions?	Do the collected data allow to address the research questions?	Is the sampling strategy relevant to address the research question?	Is the sample representative of the total population?	Are the measurements appropriate?	Is the risk of nonresponse bias low?	Is the statistical analysis appropriate to answer the research question?
He 2019	Yes	No	N/A	N/A	N/A	N/A	N/A
Hoth 2019	Yes	Yes	Yes	Yes	Yes	No	Yes
Huang 2016	Yes	Yes	Yes	Unclear	Yes	No	Yes
Jackman 2018	Yes	Yes	Yes	Unclear	Yes	No	Yes
Jin 2018	Yes	Yes	Yes	Unclear	Yes	No	Yes
Liu 2021	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes
Maksut 2016	Yes	Yes	Yes	Yes	Yes	Unclear	Yes
Manavi 2017	Yes	Yes	Yes	Yes	Yes	Unclear	Yes
Mitchell 2018	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
Menza 2021	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
Polilli 2016	Yes	Yes	Yes	Unclear	Unclear	Unclear	Unclear
Rosengren 2016	Yes	Yes	Yes	Unclear	Unclear	Unclear	Yes
Siegler 2019	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
Sullivan 2017	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
Woywodt 2014	Yes	Yes	Yes	Yes	Yes	No	Yes

Study ID	Screening questions		Quantitative descriptive study-specific questions				
	Are there clear research questions?	**Do the collected data allow to address the research questions?**	**Is the sampling strategy relevant to address the research question?**	**Is the sample representative of the total population?**	**Are the measurements appropriate?**	**Is the risk of nonresponse bias low?**	**Is the statistical analysis appropriate to answer the research question?**
Xia 2018	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes

MMAT summary for qualitative studies

Study ID	Screening questions		Qualitative study-specific questions				
	Are there clear research questions?	Do the collected data allow to address the research questions?	Is the qualitative approach appropriate to answer the research question?	Are the qualitative data collection methods adequate to address the research question?	Are the findings adequately derived from the data?	Is the interpretation of results sufficiently substantiated by data?	Is there coherence between qualitative data sources, collection, analysis and interpretation?
Balán 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Balán 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Biello 2021a	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chasco 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fuchs 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hottes 2012	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hughes 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Jackman 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Knight 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Koester 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lessard 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Liu 2021	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear

Study ID	Screening questions		Qualitative study-specific questions				
	Are there clear research questions?	**Do the collected data allow to address the research questions?**	**Is the qualitative approach appropriate to answer the research question?**	**Are the qualitative data collection methods adequate to address the research question?**	**Are the findings adequately derived from the data?**	**Is the interpretation of results sufficiently substantiated by data?**	**Is there coherence between qualitative data sources, collection, analysis and interpretation?**
Witzel 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Witzel 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes

MMAT summary for mixed methods studies

Note: quality appraisal was conducted for the specific methods used in these mixed methods studies in the preceding tables

Study ID	MMAT methodology categories used	Mixed methods-specific questions				
		Is there an adequate rationale for using a mixed methods design to address the research question?	Are the different components of the study effectively integrated to answer the research question?	Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	Are divergences and inconsistencies between qualitative and quantitative research adequately addressed?	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
Balán 2020	Quantitative descriptive and qualitative	Yes	Yes	Unclear	N/A	No
Balán 2021	Quantitative descriptive and qualitative	Yes	Yes	Yes	N/A	Yes
Biello 2021a	Quantitative descriptive and qualitative	Yes	Yes	Yes	N/A	Yes
Chasco 2021	Quantitative non-randomised and qualitative	Yes	Yes	Yes	N/A	Yes

Study ID	MMAT methodology categories used	Mixed methods-specific questions				
		Is there an adequate rationale for using a mixed methods design to address the research question?	Are the different components of the study effectively integrated to answer the research question?	Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	Are divergences and inconsistencies between qualitative and quantitative research adequately addressed?	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
Fuchs 2018	Quantitative non-randomised and qualitative	Yes	Yes	Yes	N/A	Unclear
Jackman 2018	Quantitative descriptive and qualitative	Yes	Yes	Yes	N/A	Unclear
Liu 2021	Qualitative and descriptive quantitative	Yes	Yes	Yes	N/A	Unclear
Witzel 2019	RCT and qualitative	Yes	Yes	Yes	N/A	Unclear
Witzel 2021	RCT and qualitative	Yes	Yes	Yes	N/A	Unclear

Appendix 3: SMMASH3 participant information sheet and consent

Sexual Health and Wellbeing Survey 2020

Gay, Bisexual and Other Men who have Sex with Men

Participant Information Sheet

What's this all about?

We want to look at the sexual health, mental health and general wellbeing of gay, bisexual and other men who have sex with men in Scotland, Wales, Northern Ireland and the Republic of Ireland. So we're conducting research in the form of a survey. Before you decide whether or not to take part, it is important for you to understand what the study will involve for you. Please read the following information carefully. If you would like more information, please contact us at the address below.

Who should take part?

Gay, bisexual and other men who have sex with men (or who want to) and are aged at least 16 years old and living in Scotland, Wales and Northern Ireland, or aged at least 17 years old living in the Republic of Ireland.

Who is conducting this survey and who funds it?

Researchers at GCU (Glasgow Caledonian University), led by Dr Jamie Frankis, are working together with Health Protection Scotland, NHS Greater Glasgow and Clyde, Lothian and Tayside Health boards, HIV Scotland and Waverley Care. These organisations are funding the study in Scotland and GCU are funding the study in Wales, Northern Ireland and the Republic of Ireland.

Why carry out this survey?

We want to provide appropriate health advice and services for gay, bisexual and other men who have sex with men. In order to do this, we need to find out about your sexual health behaviours and your wider health and wellbeing.

What is involved?

Taking part involves you completing an online questionnaire. This will take about 30 minutes. We know that this is a long time, but we really value your contribution. Please only complete the survey once, even if asked to do it again. It is entirely voluntary, anonymous and completely confidential. We do not store, or even know, your email or IP address. We're using a system called REDCap to conduct the questionnaire. We've set this up so there is absolutely no way the completed questionnaire can be traced back to you. You are free to leave out any questions you do not want to answer, or which you think are not relevant, although we hope you will answer all that you can.

Is it secure?

Yes! REDCap is a secure internationally recognised web site for conducting online survey research. The anonymous information you provide will be securely transferred and stored at GCU using encrypted Internet protocols. RedCap does not store the information you provide and therefore cannot access this or pass it on to anyone else.

As an online participant in this research, there is always the risk of intrusion by outside agents (i.e. hacking). However, RedCap and Glasgow Caledonian University take security really seriously and do as much as possible to ensure this won't happen.

Do I have to take part?

No, you do not need to take part in the survey if you do not wish to.

What will be done with my survey answers?

Your responses will be added to the answers of everyone else and entered onto a computer for statistical analysis. We keep these data securely according to GDPR requirements (General Data Protection Regulation (EU) 2016), and will delete them when we've finished our work. We aim to use the information you give us to devise new strategies to improve the sexual health of men who have sex with men in Scotland, Wales, Northern Ireland and the Republic of Ireland and to publish academic papers in journals to share our knowledge with others interested in men's sexual health.

What are the possible benefits of taking part?

The findings from this study will contribute to developing services for men who have sex with men. However, it is important that you understand that taking part in this study may have no direct benefit to you.

What are the possible disadvantages and risks of taking part?

Some of the questions within the survey are personal, about your sexual and mental health. We also ask about alcohol and drug use, and experiences of abuse. These are difficult issues and in case you need to contact someone about these, we provide links to online sources of information and support within the survey and at the end. It is important to note that you can skip any sections you do not wish to complete by clicking the 'submit' button at the bottom of each page. Any information you feel able to give us will still be extremely useful. Equally it is ok to stop the survey at any point.

Will my taking part in this study be kept confidential?

Yes. Ethical approval for this study has been granted by GCU. The information you provide us with will be anonymous and will confidential. Your rights are also protected under GDPR (2016).

Do I have to give my consent to take part?

Yes, and you can do this by simply completing the survey and clicking the "submit" button – this action will indicate your consent to take part based on the following:

• You have read the above information

• You voluntarily agree to take part

• You are at least 16 years of age in Scotland, Wales and Northern Ireland and at least 17 years of age in the Republic of Ireland.

What if there is a problem?

If you are concerned about taking part in the study and would like to speak with someone outwith the research team, please contact Mr Ben Parkinson, Ethics Chair, GCU 0141 331 3114.

If you need to contact a member of the research team, or would like a copy of the final study results, please email j.frankis@gcu.ac.uk.

Further information and advice

If you need to speak to someone about the issues raised in this survey, there is a list resources which provide further support and guidance at the end, of you may click **HERE**.

Please click 'submit' below to start the survey

Many thanks for your time and help.

Appendix 4: My questions included in SMMASH3

PrEP is the medication that people who do not have HIV can take to stop them getting HIV.

We'd like to ask you about your PrEP use.

Which of the following options best describes you?

◯ I have NEVER heard of PrEP
◯ I have heard of PrEP but never taken it
◯ I am taking PrEP daily
◯ I am taking PrEP on alternating days
◯ I am taking PrEP when needed (sometimes called 'on-demand' or 'event based')
◯ I took PrEP in the past but not now

• Can you tell us why you stopped taking PrEP? (Please select all that apply).

☐ I was worried about possible consequences of long-term PrEP use
☐ I experienced side effects
☐ I entered a stable relationship where my risk of getting HIV is low
☐ My partner advised me to stop taking PrEP
☐ I no longer want to have sex without condoms
☐ I kept forgetting to take my PrEP
☐ I could not afford PrEP
☐ I can no longer access PrEP
☐ Too much testing and clinic visits
☐ My doctor, nurse or other health professional advised me to stop taking PrEP
☐ Other

What was your 'other' reason for stopping PrEP? _____

• What was your most recent way of getting PrEP?
(please select one)

◯ Free from a sexual health clinic/GUM clinic
◯ Free as part of a clinical trial
◯ I bought PrEP online
◯ I bought privately PrEP from a clinic
◯ I got PrEP from a friend/boyfriend/sex partner
◯ I got PrEP from another source (please specify):

What was that 'other' source? _____

An Online PrEP Service

People who get PrEP through sexual health clinics currently have to visit the clinic in-person every three months to access PrEP.

We're developing a new online PrEP service, so you could provide information about your sexual behaviours on a secure website, use a simple kit to take your own blood sample, post this to a clinic, then have your PrEP sent to you or collect it from a pharmacy. You would only have to come into the clinic about once a year for PrEP.

	Very Likely 1	2	3	Not sure4	5	6	Very Unlikely7
• How likely would you be to complete most of your PrEP visits online if this was made possible?	◯	◯	◯	◯	◯	◯	◯

• Which of the following do you use on a weekly basis? Please select all that apply.

☐ Computer (laptop/desktop)
☐ Smartphone
☐ Tablet (e.g. iPad)
☐ Smart speaker (e.g. Echo, Alexa, Google home etc.)
☐ Other internet-enabled device (please specify):

Please specify which other internet-enabled devices you use.

_____

• In the past 12 months, which of the following have you done online?
Please select all that apply.

☐ Searched for health-related information
☐ Searched for the location of a clinic or health service
☐ Searched for the phone number of a clinic or health service
☐ Booked a GP/clinic/hospital appointment online
☐ Communicated directly with a health professional (e.g. via email, FaceTime, Skype)
☐ Ordered a medical test
☐ Accessed medical test results
☐ Ordered a repeat prescription
☐ Purchased medication via an online pharmacy or medical service
☐ None of the above

• Which of the following would you be willing to do online? Please select all that apply.

☐ Search for health-related information
☐ Search for the location of a clinic or health service
☐ Search for the phone number of a clinic or health service
☐ Book a GP/clinic/hospital appointment
☐ Communicate directly with a health professional (e.g. via email, FaceTime, Skype)
☐ Order a medical test
☐ Access medical test results
☐ Order a repeat prescription
☐ Purchase medication via an online pharmacy or medical service
☐ None of the above

We're interested in how you access health services.

This includes: booking an appointment or test; receiving information or results; communicating with a doctor, nurse or other health professional; ordering a repeat prescription; or buying medicine online.

Accessing health services usually involves providing information about your health, wellbeing and life.

• In the past 12 months, which of the following have you provided information about online in order to access health services? Please select all that apply.

☐ Your sexual behaviour
☐ Symptoms you have experienced
☐ Medications you are taking
☐ Side-effects of medicines
☐ None of the above

• Which of the following would you be willing to provide information about online in order to access health services? Please select all that apply.

☐ Your sexual behaviour
☐ Symptoms you have experienced
☐ Medications you are taking
☐ Side-effects of medicines
☐ None of the above

• In the past 12 months, what type(s) of device(s) have you used to access health services online? Please select all that apply.

☐ Computer (desktop/laptop)
☐ Smartphone (not including phone calls)
☐ Tablet (e.g. iPad)
☐ Smart speaker (e.g. Echo, Alexa, Google home etc.)
☐ Other internet-enabled device (please specify)
☐ None of the above

Please tell us about your 'other' devices you have used.

_____

• What type(s) of device(s) would you be willing to use to access health services online? Please select all that apply.

☐ Computer (desktop/laptop)
☐ Smartphone (not including phone calls)
☐ Tablet (e.g. iPad)
☐ Smart speaker (e.g. Echo, Alexa, Google home etc.)
☐ Other internet-enabled device (please specify)
☐ None of the above

Please tell us about the 'other' devices you would be willing to use.

• Imagine that you have no symptoms or worries and want to get a routine STI test. What would be your preferred way of...?
For each option, please select one answer.

	Online	Face-to-face	Phonecall	No Preference	Would never do this
Booking a clinic appointment	○	○	○	○	○
Providing information about your sexual behaviour	○	○	○	○	○
Providing information about any symptoms you have experienced	○	○	○	○	○
Providing information about any medicines you are taking	○	○	○	○	○
Receiving HIV test results	○	○	○	○	○
Receiving results for STIs other than HIV (e.g. gonorrhoea)	○	○	○	○	○

• Now imagine that you are worried about a new symptom or you concerned that you may have been at risk of infection. What would be your preferred way of...?
For each option, please select one answer.

	Online	Face-to-face	Phonecall	No Preference	Would never do this
Booking a clinic appointment	○	○	○	○	○
Providing information about your sexual behaviour	○	○	○	○	○
Providing information about any symptoms you have experienced	○	○	○	○	○
Providing information about any medicines you are taking	○	○	○	○	○
Receiving HIV test results	○	○	○	○	○
Receiving results for STIs other than HIV (e.g. gonorrhoea)	○	○	○	○	○

Appendix 5: Glasgow Caledonian University Ethical Approval for SMMASH3

First, we received approval to start recruiting but there were conditions that they also wanted addressed (although this did not prevent the start of recruitment). The second approval was sent after the conditions were met.

Dimitra Strongylou,
The Nursing Department Research Ethics Committee has reviewed the application and reached the following decision.

Ethical approval is granted subject to the following conditions:
Copyright permission is secured to use the images of the men in the adverts.
The date for the data protection legislation is changed to 2018.
Nicola Roberts is not named as an ethics chair on the PIS, but she can still be used as the contact person.
Because you are collecting full postcodes and other information it might be advisable to ensure the PIS meets GDPR requirements (and this is added to the protocol). This means information about what data will be collected, whom will be data controller (GCU), the legal basis for processing data, and other necessary content will need to be added to the PIS (see suggested wording below and/or attachment).

What will happen to the information given during the study?
This section will explain what happens to the information you given during the study.

Specify what personal data will be collected (e.g. age, name, gender); explain how data will be used/shared (e.g. shared using encrypted/password protected methods); how/when anonymisation will occur (e.g. pseudonyms used after data collection); who will have access to the information and in what form (e.g. immediate study team only); who will carry out data analysis (e.g. by study team); and the storage and destruction of data (e.g. only use encrypted devices; locked cabinet; restricted network drive; stored for 5 years; destroyed confidentially). If the personal data is being processed or shared outside the European Economic Area (EEA) or automated decision takes place you should explain this.

This section should also state that the study complies with the Data Protection Act (2018) and the General Data Protection Regulation (GDPR). GDPR requires the data controller (e.g. this will be GCU when GCU is the study sponsor) and the legal basis for processing personal data to be stated (see below).

The data controller is Glasgow Caledonian University. Information is being processed on the basis of Article 6(1)(e) of the General Data Protection Regulation and to perform a task carried out in the public interest.

Enquiries specifically relating to data protection should be made to the University's Data Protection Officer (DPO). The DPO can be contacted by email: dataprotection@gcu.ac.uk. If you are unhappy with the response from the University, you have the right to lodge a complaint with the Information Commissioner's Office (ICO). The ICO can be contacted by email: casework@ico.org.uk.

GDPR also gives study participants the right to ask for their personal data to be erased. If you would like us to stop using your personal data, then you can contact [insert name and contact details] and ask for your personal data to be erased. However, it will only be possible to erase data that has not been anonymised and/or published. Further information about your rights can be found at: https://www.gcu.ac.uk/dataprotection/rights/

There is no requirement to resubmit the application for review, but please forward the final documents to the committee.

Best wishes with your project.

Regards

Ben Parkinson MSc, PGCert (TLHE), BN, RNMH, TCH, FHEA
Lecturer of Nursing / Chair of the Nursing Department Ethics Committee
Nursing / School of Health and Life Sciences

E: ben.parkinson@gcu.ac.uk | T: +44 (0)141 331 3114 | W: www.gcu.ac.uk

Glasgow Caledonian University, Cowcaddens Road, Glasgow, G4 0BA,
Scotland, United Kingdom
Normal working hours 9am-5pm Monday to Friday
W: My research profile

From: HLS Ethics - Nursing <HLSEthicsNursing@gcu.ac.uk>

Date: Thursday, 13 February 2020 at 17:23

To: Demi Strongylou <Dimitra.Strongylou@gcu.ac.uk>, HLS Ethics - Nursing <HLSEthicsNursing@gcu.ac.uk>

Cc: Me <J.Frankis@gcu.ac.uk>

Subject: HLS/NCH/19/019 Social Media, Men who have sex with men and Sexual and Holistic Health (SMMASH3) survey

Dimitra,

The Nursing Department Research Ethics Committee has reviewed the amendment and reached the following decision.

Ethical approval is granted

The ethics committee wish you every success with the project.

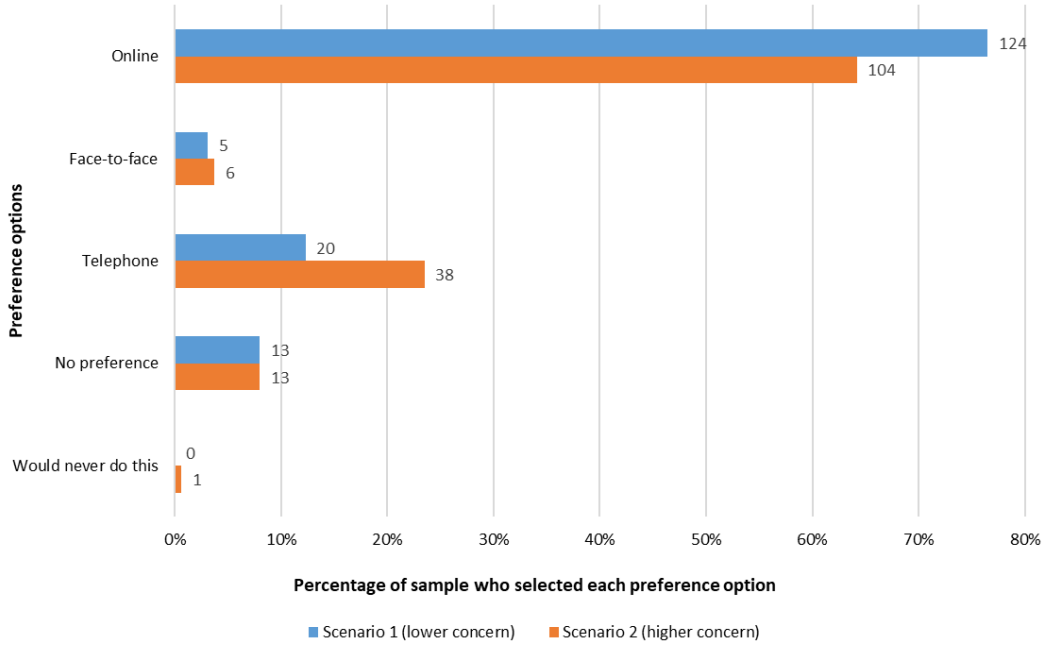
Regards

Ben Parkinson MSc, PGCert (TLHE), BN, RNMH, TCH, FHEA
Lecturer of Nursing / Chair of the Nursing Research Ethics Committee

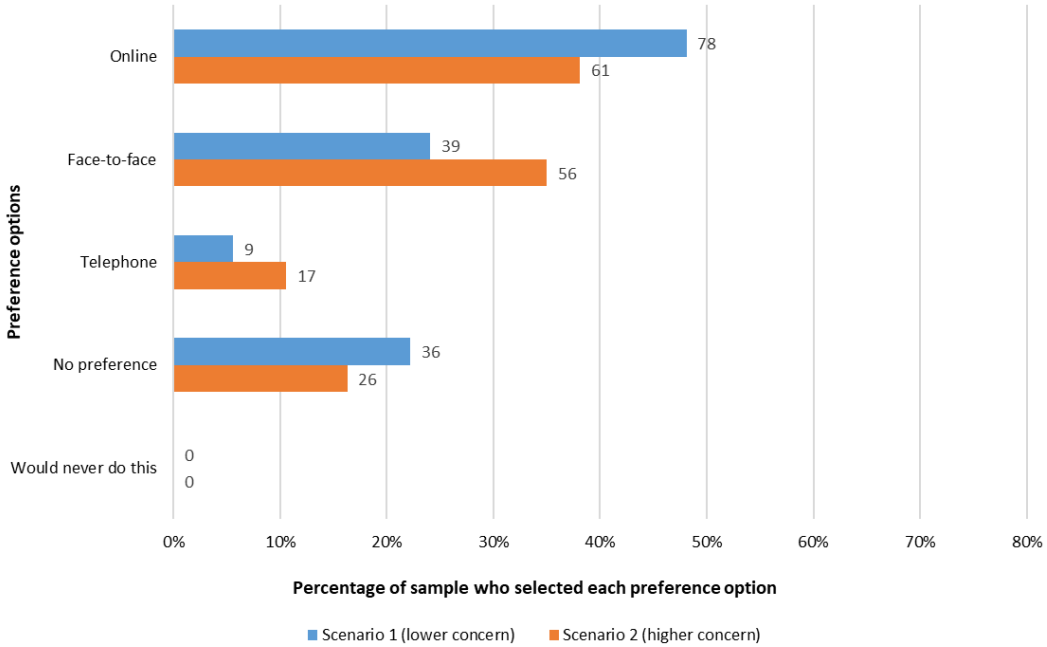
Nursing / School of Health and Life Sciences

E: ben.parkinson@gcu.ac.uk | T: +44 (0)141 331 3114 | W: www.gcu.ac.uk
Glasgow Caledonian University, Cowcaddens Road, Glasgow, G4 0BA, Scotland, United Kingdom
Normal working hours 9am-5pm Monday to Friday
W: My research profile

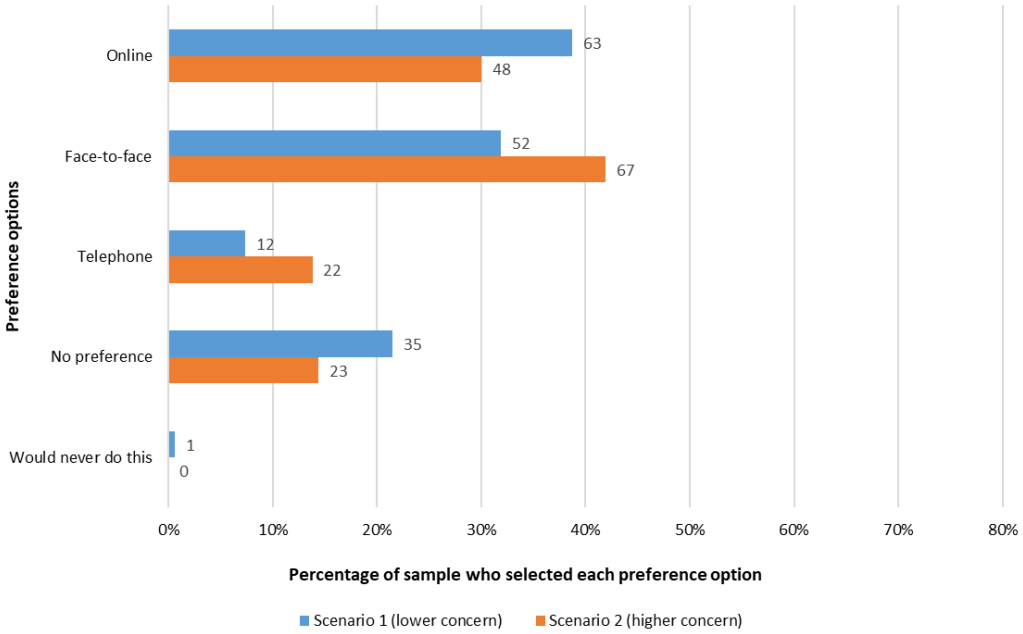
Appendix 6: PrEP users' preferred modalities of care



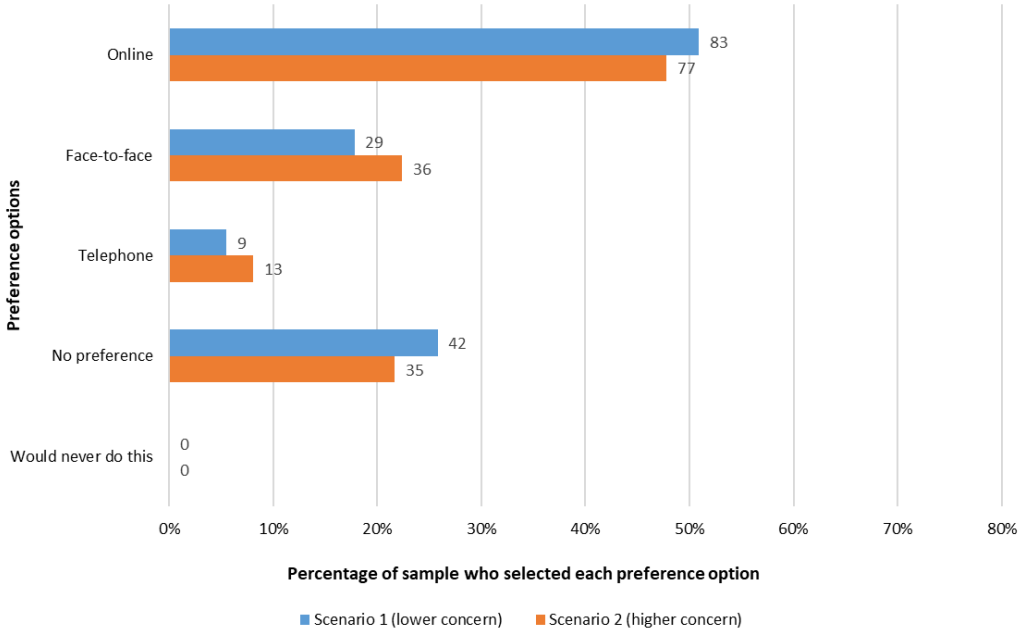
PrEP users' preferred modalities for booking an appointment in Scenario 1 (lower concern; n=162) and Scenario 2 (higher concern; n=162)



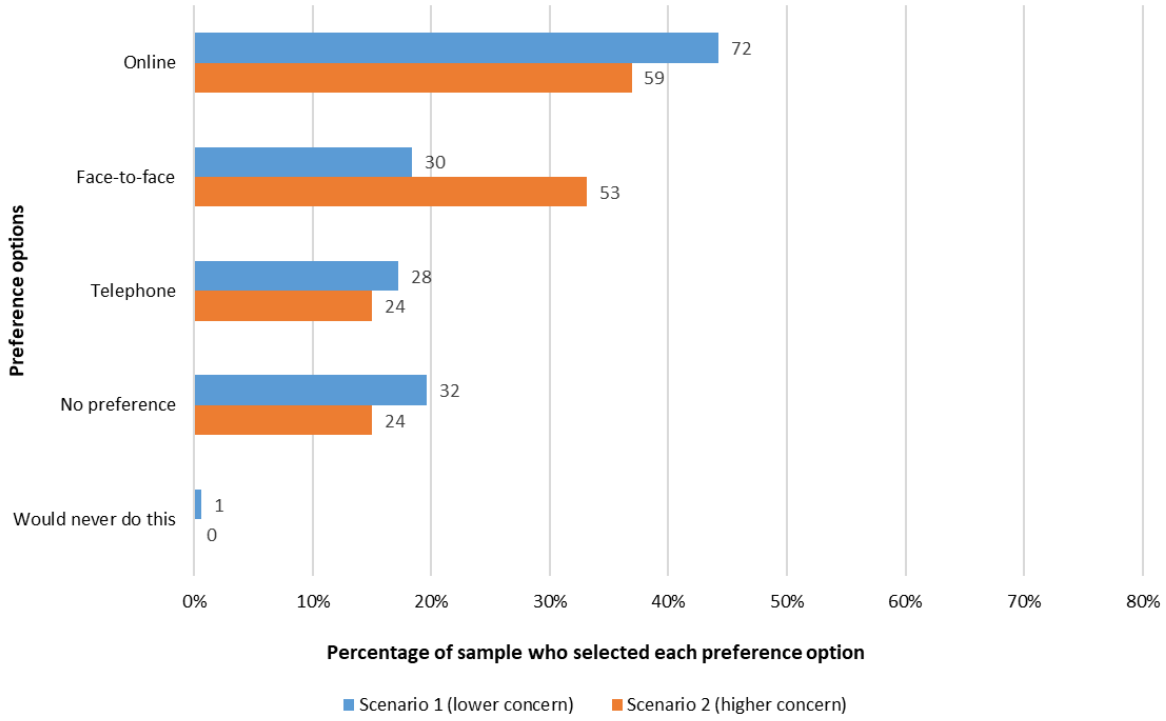
PrEP users' preferred modalities for reporting their sexual behaviour in Scenario 1 (lower concern; n=162) and Scenario 2 (higher concern; n=160)



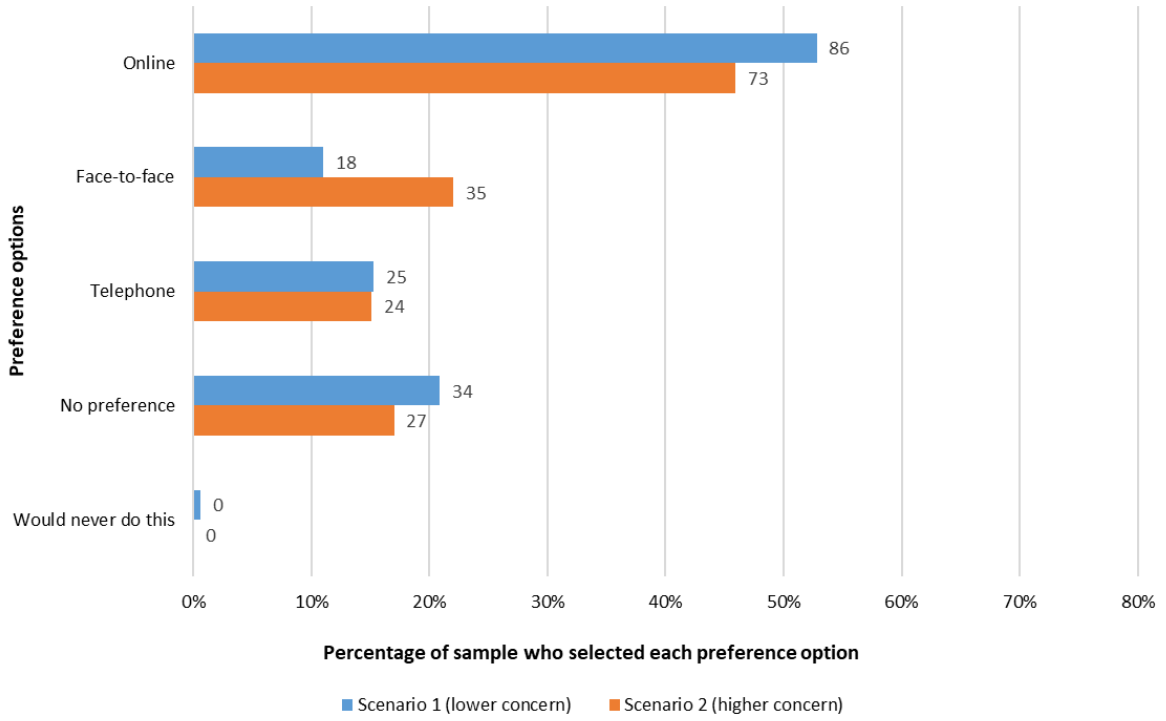
PrEP users' preferred modalities for reporting any symptoms they were experiencing in Scenario 1 (lower concern; n=163) and Scenario 2 (higher concern; n=160)



PrEP users' preferred modalities for reporting their current medications in Scenario 1 (lower concern; n=163) and Scenario 2 (higher concern; n=161)



PrEP users' preferred modalities for receiving HIV test results in Scenario 1 (lower concern; n=163) and Scenario 2 (higher concern; n=160)



PrEP users' preferred modalities for receiving STI test results (other than HIV) in Scenario 1 (lower concern; n=163) and Scenario 2 (higher concern; n=159)

Appendix 7: SMMASH Pan participant information sheet and consent

Click to enrol

SMMASH-Pan2020
Participant Information Sheet and Consent Form

What is the research study about?
We want to understand gay and bisexual men's mental health and well being how Covid-19 has impacted our health and wellbeing. So, we are conducting a survey to find out. Before you decide whether to take part, it is important that you understand what the study will involve for you. Please take the time to read this information page carefully. If you would like more information, please email j.frankis@gcu.ac.uk.

Why it is important?
Things are going to look really different for gay men in Scotland after Covid-19. We need to know about your mental and wider health NOW so we can plan and deliver the services that gay and bisexual men need.

Who should take part?
Gay, bisexual and other men who have sex with men, who are aged 16+ years old and live in Scotland. We would welcome cisgender men, transmen, non-binary people who were assigned male gender at birth, and intersex males to take part in this study. This study has been designed by members of the LGBT+ community and our allies. You have been invited because you responded to information posted online about the study.

What is the research about?
We'll ask about your mental health and resilience, work life and social isolation, your wider health and use of health services. We'll also ask about your sexual health and behaviours. Lastly, we want to find out about any resources you've used to help your mental and wider health during Covid-19 lockdown. This will help us identify what services gay and bisexual men need to cope with the impact of Covid-19, as well as work out what the best resources are for our community. You can email j.frankis@gcu.ac.uk for more information about this study.

Who is conducting this research and who funds it?
The study is being conducted by the Department of Nursing and Community Health, Glasgow Caledonian University (GCU) led by Dr Jamie Frankis, in collaboration with NHS Greater Glasgow and Clyde, Lothian and Lanarkshire Health boards, Strathclyde University, Glasgow University, HIV Scotland, Waverley Care and Public Health Scotland. This study is being funded by the Chief Scientist Office (CSO) and GCU. You can find more information about this funding here.

Do I have to take part in this research study?
No, you don't need to take part if you don't want to. If you decide to take part and later change your mind, you can withdraw at any stage. If you decide you want to take part in the research study, please:

- Read this information page carefully;
- Sign the consent form at the end and;
- Provide us with your contact details.

What does participation in this research require?
If you decide to take part in the research study, we will ask you **Complete an Online Questionnaire**. This will take up to 30 minutes to complete and will ask about: your demographic characteristics, how you've been social distancing, your mental health, general health and sexual health, your use of drugs, alcohol, smoking and vaping, plus sources of support.

How are you conducting the questionnaire?
We use a secure system called REDCap to conduct the questionnaires online. Glasgow Caledonian University is a member of REDCap and must abide by the terms and conditions set by them to conduct research. The anonymous information you provide us with will be securely transferred and stored at Glasgow Caledonian University using encrypted Internet protocols. REDCap does not store the information you provide and therefore cannot access this or pass it on to 3rd parties.

How does the survey work?
Clear guidance is given on how to complete the survey and submit it to us. It is entirely voluntary, anonymous and completely confidential. You are free to leave out any questions you do not want to answer, or which you think are not relevant, although we hope you will answer all that you can. We've set this up so there is absolutely no way the completed questionnaire can be traced back to you.

Do I have to complete it all in one go?
No - if you provide us with your contact details, we can email you a link back to the survey and remind you to go back and complete the questionnaire another time. Or click the 'save and return' part of the survey, copy the access code, and you can use this to return at any time.

Repeat questionnaires
We'd also like to ask you to consider completing follow up questionnaires at 1, 3, 6 and 12 months after your first survey. These will be shorter and take about 20 minutes to complete. You can opt out of these or only do some of these repeat questionnaires, if you prefer.

How do the repeat questionnaires work?
You provide us with your email and/or mobile number. We then link this to a unique identifier. REDCap can then automatically send you out survey invitations and reminders when they are due. However, we don't link your survey answers to your contact details, so the system remains completely anonymous and secure.

Can I withdraw?
Yes, you are free to withdraw from the research at any time. If you withdraw from the research, we will not collect additional information from you, and we will destroy any identifying information that has already been collected. You can withdraw by completing the 'Withdraw' link which will be included in any survey invitations you receive from the study. Alternatively, you can email the research team (smmash@gcu.ac.uk) and tell them you no longer want to participate. If you decide to leave the research study, the researchers will not collect additional information from you. Your decision not to participate will not affect your relationship with GCU or any healthcare providers working with this project in any way.

Are there any drawbacks to participation?
Some of the questions within the survey are personal about your mental and sexual health, your alcohol and drug use and experiences of abuse and suicide. These are difficult issues and in case you need to contact someone about these, we provide links to online sources of information and support HERE, within the survey and at the end. It is also important to note that you can skip any sections you do not wish to complete - just scroll past those questions on to the next ones. Any information you feel able to give us will still be extremely useful. Equally, it is ok to stop the survey at any point.

What are the possible benefits to participation?
The findings from this study will monitor the impact that Covid-19 has had on men in our community and help us develop services which specifically focus on promoting gay and bisexual men's health during and after the pandemic. However, it is important that you understand that taking part in this study may have no direct benefit to you.

Will my taking part in this study be kept confidential?
Yes. Your confidentiality and anonymity will be maintained at all times and no identifying details will be linked to your responses. At consent, you will be provided with a study identification number that will be used in place of your identifying information. Your contact information will only be used to contact you to complete a questionnaire and is sent from an external database, separate to your survey answers.
By signing the consent form, you consent to the research team collecting and using information about you for the research study. We will keep your data for 10 years. All data will be securely saved and all electronic databases will be protected by password and GCU firewalls. Your rights are also protected under the Data Protection Act (2018) and GDPR (2016) laws. Ethical approval for this study has been granted by GCU.

GDPR Compliance Information
In order to comply with GDPR law, we are required to provide you with the following information. The data controller is Glasgow Caledonian University and Health Protection Scotland. Information is being processed on the basis of Article 6(1)(e) of the General Data Protection Regulation and to perform a task carried out in the public interest.

Enquiries specifically relating to data protection should be made to the University's Data Protection Officer (DPO). The DPO can be contacted by dataprotection@gcu.ac.uk . If you are unhappy with the response from the University, you have the right to lodge a complaint with the Information Commissioner's Office (ICO). The ICO can be contacted by email: casework@ico.org.uk.

GDPR also gives study participants the right to ask for their personal data to be erased. If you would like us to stop using your personal data, then you can contact Dr J Frankis at smmash@gcu.ac.uk and ask for your personal data to be erased. However, it will only be possible to erase data that has not been anonymised and/or published. Further information about your rights can be found at: https://www.gcu.ac.uk/dataprotection/rights/

What will be done with my survey answers?
Your responses will be added to the answers of everyone else and entered onto a computer for statistical analysis. We keep these data securely according to Data Protection Act (2018) and GDPR (General Data Protection Regulation (EU), 2016) and will delete them when we've finished our work. Primarily, we aim to use the information you give us to devise new strategies to improve the health of gay, bisexual and other men who have sex with men in Scotland. We'll write up reports for our partner agencies and funders so they can use the study results and provide the best help and support for gay, bisexual and men who have sex with men. We will also publish academic papers in journals to share our knowledge with others interested in men's sexual health.

Is there anything else involved in the study?
Yes - We'd also like to ask some men to **complete an optional in-depth interview** on the phone or online. **You don't have to do this - we still want you to complete the online survey even if you don't want to be interviewed.** If you do agree to be contacted about an interview, we'll use your questionnaire answers to invite men based on what they tell us about their mental health and sexual health. This interview will be conducted by a trained interviewer, recorded for accuracy, and then transcribed for analysis. All recordings will be destroyed upon transcription. This interview should take about 60 minutes. Interviews are confidential and anonymous - no identifying details from the interview will be used in results or reporting of this study. You are free to stop the interview at any time. If you withdraw from the research, we will destroy any information that has already been collected.

What about other surveys?
Yes - we'd also like to ask some men to complete some other surveys, about issues important to gay, bisexual and other men who have sex with men, like HIV, sexual health and HIV PrEP, based on the survey information you give us. If you agree to this, we would contact you about these studies using your email, mobile or social media account - whatever you prefer. We'll only do this every few months and you are free to withdrawn or tell us to stop contacting you at any time.

How and when will I find out what the results of the research study?
The research team intend to report the results of the research study in a variety of ways. All information published will be done in a way that will not identify you.
Results will be disseminated through published reports, journal articles, conference presentations, local workshops, community articles, and consultations to professional organisations. The data will also be presented in other media formats if these become available.
However, we present these data, confidentiality will always be protected as outlined.
We will also provide links to our reports and summaries of key finding on our survey website. You can be kept up to date with these results by;

- Liking our study facebook page.
- Opting in for half-yearly newsletters
- Visit our study website detailing all peer-reviewed publications, conference, and community presentations
- Opting in to be contacted when new outputs are posted on our webpage

What if I have a complaint or any concerns about the research study?
If you are concerned about taking part in the study or the way it is being conducted and would like to speak with someone outwith the research team, please contact Mr Ben Parkinson, Ethics Chair, GCU. Ben.Parkinson@gcu.ac.uk or +44 (0)141 331 3114.
If you need to contact a member of the research team for any reason, please email Dr Jamie Frankis at j.frankis@gcu.ac.uk .

Do I have to give my consent to take part?
Yes, and you can do this by completing the declaration below.
Declaration by the participant
I understand I am being asked to provide consent to participate in this research project.

- I have read this page, which is the Participant Information Sheet, or someone has read it to me in a language that I understand.
- I am at least 16 years of age.
- I understand the purposes, study tasks and risks of the research described in the project.
- I provide my consent for the information collected about me to be used for the purpose of this research study only.
- I have had an opportunity to ask questions and I am satisfied with the answers I have received.
- I freely agree to participate in this research study as described and understand that I am free to withdraw at any time during the project and withdrawal will not affect my relationship with any of the named organisations and/or research team members.

I give consent to take part in this study

- ○ I consent

(if they tick this, the next question appears)
Do you consent to being invited to complete questionnaires at 1, 3, 6 and 12 months after this first questionnaire?

- ○ Yes
- ○ No
- ○ Don't know

(if they tick yes, the next questions appear – if they tick No or Don't know, they are shown the 'click here to proceed to the survey' button)
Please tick those that apply;

- ○ You can link my answers in this survey to the SMMASH3 online study (conducted in December 2019 - March 2020), based on the answers I provided.
- ○ You can contact me about future studies based on my responses to certain survey questions.
- ○ You can contact me to take part in an in-depth interview (via phone or video chat) about the issues discussed in the questionnaire.
- ○ I'd like to receive half-yearly newsletters about the SMMASH project.
- ○ I'd like to receive a copy of the study results via email.
- ○ None of the above

Email Address _____
(we need this to invite you to participate in future waves of the survey).

If you would also like to receive text message reminders, please enter your mobile number. _____
Mobile number must be entered as +44, with no spaces

Click here to submit and start the survey

Appendix 8: My questions included in SMMASH Pan

PrEP is the medication that people who do not have HIV can take to stop them getting HIV.

We'd like to ask you about your PrEP use.

Which of the following options best describes you?

◯ I have NEVER heard of PrEP
◯ I have heard of PrEP but never taken it
◯ I am taking PrEP daily
◯ I am taking PrEP on alternating days
◯ I am taking PrEP when needed (sometimes called 'on-demand' or 'event based')
◯ I took PrEP in the past but not now

Can you tell us when you stopped taking PrEP?

◯ Within the last 7 days
◯ Within the last 4 weeks
◯ Since the start of the COVID-19 (coronavirus) lockdown (mid-March)
◯ Within the last 6 months
◯ Within the last 12 months
◯ Over a year ago

Can you tell us why you stopped taking PrEP? (Please select all that apply).

☐ I was worried about possible consequences of long-term PrEP use
☐ I experienced side effects
☐ I entered a stable relationship where my risk of getting HIV is low
☐ My partner advised me to stop taking PrEP
☐ I no longer want to have sex without condoms
☐ I kept forgetting to take my PrEP
☐ I could not afford PrEP
☐ I can no longer access PrEP
☐ Too much testing and clinic visits
☐ My doctor, nurse or other health professional advised me to stop taking PrEP
☐ I was unable to get a clinic appointment due to COVID-19
☐ I'm avoiding clinics because of COVID-19
☐ I'm not having sex because of COVID-19
☐ Other

What was your 'other' reason for stopping PrEP? _____

The following questions will ask you about your use of online health services.

Which of the following do you use on a weekly basis? Please select all that apply.

- ☐ Computer (laptop/desktop)
- ☐ Smartphone
- ☐ Tablet (e.g. iPad)
- ☐ Smart speaker (e.g. Echo, Alexa, Google home etc.)
- ☐ Other internet-enabled device (please specify):

Please specify which other internet-enabled devices you use.

_____

In the past 12 months, which of the following have you done online?
Please select all that apply.

- ☐ Searched for health-related information
- ☐ Searched for the location of a clinic or health service
- ☐ Searched for the phone number of a clinic or health service
- ☐ Booked a GP/clinic/hospital appointment online
- ☐ Communicated directly with a health professional (e.g. via email, FaceTime, Skype)
- ☐ Ordered a medical test
- ☐ Accessed medical test results
- ☐ Ordered a repeat prescription
- ☐ Purchased medication via an online pharmacy or medical service
- ☐ None of the above

Which of the following would you be willing to do online? Please select all that apply.

- ☐ Search for health-related information
- ☐ Search for the location of a clinic or health service
- ☐ Search for the phone number of a clinic or health service
- ☐ Book a GP/clinic/hospital appointment
- ☐ Communicate directly with a health professional (e.g. via email, FaceTime, Skype)
- ☐ Order a medical test
- ☐ Access medical test results
- ☐ Order a repeat prescription
- ☐ Purchase medication via an online pharmacy or medical service
- ☐ None of the above

We're interested in how you access health services.

This includes: booking an appointment or test; receiving information or results; communicating with a doctor, nurse or other health professional; ordering a repeat prescription; or buying medicine online.

Accessing health services usually involves providing information about your health, wellbeing and life.

In the past 12 months, which of the following have you provided information about online in order to access health services? Please select all that apply.

- ☐ Your sexual behaviour
- ☐ Symptoms you have experienced
- ☐ Medications you are taking
- ☐ Side-effects of medicines
- ☐ None of the above

Which of the following would you be willing to provide information about online in order to access health services? Please select all that apply.

- ☐ Your sexual behaviour
- ☐ Symptoms you have experienced
- ☐ Medications you are taking
- ☐ Side-effects of medicines
- ☐ None of the above

In the past 12 months, what type(s) of device(s) have you used to access health services online? Please select all that apply.

- ☐ Computer (desktop/laptop)
- ☐ Smartphone (not including phone calls)
- ☐ Tablet (e.g. iPad)
- ☐ Other internet-enabled device (please specify)
- ☐ None of the above

Please tell us about your 'other' devices you have used.

_____

What type(s) of device(s) would you be willing to use to access health services online? Please select all that apply.

- ☐ Computer (desktop/laptop)
- ☐ Smartphone (not including phone calls)
- ☐ Tablet (e.g. iPad)
- ☐ Other internet-enabled device (please specify)
- ☐ None of the above

Please tell us about the 'other' devices you would be willing to use.

Appendix 9: Glasgow Caledonian University Ethical Approval for SMMASH Pan

From: HLS Ethics - Nursing <HLSEthicsNursing@gcu.ac.uk>
Date: Thursday, 11 June 2020 at 13:36
To: Me <J.Frankis@gcu.ac.uk>
Cc: HLS Ethics - Nursing <HLSEthicsNursing@gcu.ac.uk>
Subject: HLS/NCH/19/050 How has Covid-19 social distancing amplified the mental health vulnerabilities of gay, bisexual and other men who have sex with men (GBM)? Scotland Only Survey

Dr Jamie Frankis,

The Nursing Department Research Ethics Committee has reviewed the application and reached the following decision.

Ethical approval is granted

This ethical approval applies to the study design and associated documents presented in the application and protocol. Any changes to the design or implementation of the protocol will need to be approved by submitting an amendment to the committee.

Some studies require additional external approval (e.g. NHS) before they can start. It is the responsibility of the applicant to ensure they have all the necessary approvals in place before starting the study. All external approvals (e.g. NHS, gatekeeper) necessary for this study should be sent to the committee when they are secured.

Remember to keep a copy of this email as proof of ethical approval and use this as evidence of ethical approval in any future dissertation/thesis/publication.

The ethics committee wish you every success with the project.

Regards

Ben Parkinson MSc, BN, RNMH, TCH, FHEA
Lecturer of Nursing / Chair of the Nursing Research Ethics Committee

Nursing / School of Health and Life Sciences

E: ben.parkinson@gcu.ac.uk | T: +44 (0)141 331 3114 | W: www.gcu.ac.uk

Glasgow Caledonian University, Cowcaddens Road, Glasgow, G4 0BA, Scotland, United Kingdom

Normal working hours 9am-5pm Monday to Friday

W: My research profile

Appendix 10: Service user interview participant information sheet (online cohort)

Participant Information Sheet

Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Service user interview study.
Version 3.0; 18.03.2021

Introduction

The aim of this study is to understand what people think about an online PrEP service that is currently being developed. This online PrEP service would allow people who have already started PrEP to complete most of their routine PrEP-related appointments themselves, outside of a clinic setting. We are looking to interview people who fit the following criteria:

- identify as male (both cis and trans men)
- live in Scotland
- have had sex with a man in the last 24 months
- aged 18 years or older
- have accessed PrEP in the last 24 months
- have access to a computer, tablet or smartphone
- be able to understand what the study is asking from you and consent to this
- be able to read and speak English well enough to participate in an interview.

The study is being conducted by Ross Kincaid at Glasgow Caledonian University [GCU], Dr Jamie Frankis (GCU), Prof Claudia Estcourt (GCU), Dr Jo Gibbs (University College London), and Dr Jenny Dalrymple (NHS). The study is being carried out as part of a larger research project which aims to understand the best way of developing and delivering online PrEP care in Scotland.

Before you decide if you want to take part, it is important for you to understand what participation in this study would involve. Please take time to read the following information carefully and discuss it with others if you wish. Please contact Ross Kincaid (Ross.Kincaid@gcu.ac.uk) if you would like more information.

Why is the study important?

This study is important as it gives people who may use the online PrEP service an opportunity to express their views towards the service at an early stage in its development. The findings of this study could also help to inform similar online health services in the future.

What will I be asked to do if I take part?

If you are interested in taking part, you are invited to complete a short expression of interest form via the study's website (**https://www.prepresearch.org/prep-users**). The form starts with some questions to assess your eligibility. If your answers match our criteria, then you will be asked for your contact information so that we can get in touch with you. We will also ask some questions about your background. We collect this information for a few reasons: 1) to get a sense of who has taken part in our study; 2) to assess your eligibility to take part; and 3)

to make sure our study is as inclusive as possible. After completing the expression of interest form, a researcher from the study will contact you to arrange an interview or let you know that we will not be proceeding with an interview (we would not be able to proceed if we had already met our recruitment targets).

If you are eligible to take part in the study, we will contact you via the phone or email (whichever you prefer) and arrange a time that is mutually convenient. The interview should take around one hour. In the interview you will be asked questions about your experience with PrEP and online health services (if any). Then the interviewer will explain parts of the online PrEP service to you and ask what you think about them. Finally, you will be asked about any challenges, benefits or impact you think an online PrEP service could have. You do not have to answer any questions you do not want to and can choose to take a break or stop the interview at any point without giving a reason.

The interviews will take place by phone call, WhatsApp call, or Microsoft Teams video call. The interviews can take place at a time convenient to you within the hours of 8am and 8pm. The interviews will be audio-recorded and then transcribed for analysis.

At the end of the interview, you will be offered a £30 Amazon voucher to reimburse you for your time. If you accept, the voucher code will be sent to you via email. You will also be sent information telling you about some mental and sexual health support services. This will be sent regardless of whether any difficult issues arise in the interview.

Do I have to take part?
No. You decide if you want to take part in the study. You can stop the interview at any point without giving a reason. You can also ask for your interview to be deleted up to 2 days following the interview. We can delete your personal information at any time.

What are the possible risks of taking part?
We think that it is unlikely that you would come to any harm through taking part in the study. In the interviews, you will be asked about your experience of PrEP and health services. This could potentially bring up unpleasant memories or experiences. You will be under no obligation to answer any questions and can take a break or stop the interview at any time during the interview.

What are the possible benefits of taking part?
We can't promise that the study will help you personally. However, the results should improve our understanding of how best to deliver an online PrEP service in Scotland. This, in turn, could benefit the people who go on to use the service.

What happens when the study stops?
After the interview, the audio-recording will be turned into a written document by a professional transcriber who has signed a confidentiality agreement. The transcripts from all of the interviews will then be analysed and the results are shared in a number of ways. The findings may be presented at different events to let people know what we found in this study.

The findings will also be written up and submitted for publication in an academic journal. The findings will be used to inform the development and refinement of the online PrEP service. This will also form part of a doctoral research thesis. A copy of the report can be requested from Ross Kincaid (Ross.Kincaid@gcu.ac.uk) and should be available from December 2021.

What if there's a problem?
If you are concerned about your participation in the study and would like to speak with someone out with the study team, please contact Lawrie Elliott: Lawrie.elliott@gcu.ac.uk; +44 141 273 1803.

What will happen to the information given during the study?
In this study, you will be asked to provide the following information: first name; mobile phone number; email address; age; gender; if you have had sex with a man in the past 24 months; ethnicity; country of residence; what electronic devices you have access to; and your use of PrEP. This is held on REDCap – a password-protected system that ensures only the project team can access your information. The information will also be held on secure GCU computers under password protection. Your contact information (name, phone number and email address) will be held separately to the rest of your information and will be destroyed at the end of the study (December 2021). Your demographic information (age, ethnicity, sexual orientation, gender identity, PrEP use, country of residence, if you have had sex with a man in the last 24 months) will be held for longer (five years after the study ends) – this information is anonymised during the transcription process.

Your interview is recorded on an electronic recorder and uploaded to a secure GCU computer. This recording will be sent to the professional transcriber using an encrypted file share system based at the transcription service. Transcribers will sign a confidentiality agreement regarding the recordings they receive. Interview recordings will be destroyed once the transcripts have been checked for accuracy. Transcripts will be stored on secure GCU computers under password protection. Anonymised interview transcripts will be transferred between members of the research team via secure gcu.ac.uk and nhs.net email accounts for analysis and cross-check purposes. All transcripts will be destroyed 5 years from the end of the study.

This study complies with the Data Protection Act (2018) and the General Data Protection Regulation (GDPR). The data controller is Glasgow Caledonian University. Information is being processed on the basis of Article 6(1)(e) of the GDPR and to perform a task carried out in the public interest. Enquiries specifically relating to data protection should be made to the University's Data Protection Officer (DPO). The DPO can be contacted by email: dataprotection@gcu.ac.uk. If you are unhappy with the response from the University, you have the right to lodge a complaint with the Information Commissioner's Office (ICO). The ICO can be contacted by email: casework@ico.org.uk. GDPR also gives study participants the right to ask for their personal data to be erased. If you would like us to stop using your personal data, then you can contact Ross Kincaid (Ross.Kincaid@gcu.ac.uk) and ask for your personal data to be erased. It will only be possible to erase data that has not been anonymised and/or published. Further information about your rights can be found at: https://www.gcu.ac.uk/dataprotection/rights/.

Who has reviewed the study?
All studies involving human participants carried out at Glasgow Caledonian University are reviewed by an ethics committee. The role of the ethics committee is to protect the safety, rights, wellbeing, and dignity of study participants. This study was reviewed by the School of Health and Life Sciences departmental committee and given ethical approval on **17.12.2021** under the following approval code: **HLS/NCH/20/004**.

How do I make contact with the study team?
If you have any questions about the study, please email Ross Kincaid, the lead researcher on this study: Ross.Kincaid@gcu.ac.uk.

What happens next?
If you are interested in taking part, follow this link to the study website: **https://www.prepresearch.org/prep-users**. Here, you can complete an expression of interest form. The study team will then contact you to arrange an interview or thank you for your interest if you are not chosen for an interview.

Thank you for taking the time to read this information.

Appendix 11: Service user interview participant information sheet (NHS version)

Participant Information Sheet

Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Service user interview study.
IRAS Project ID: 293269
Version 2.0; 22.03.2021

Introduction

The aim of this study is to understand what people think about an online PrEP service that is currently being developed. This online PrEP service would allow people who have already started PrEP to complete most of their routine PrEP-related appointments themselves, outside of a clinic setting. We are looking to interview people who fit the following criteria:

- identify as male (both cis and trans men)
- live in Scotland
- have had sex with a man in the last 24 months
- aged 18 years or older
- have accessed PrEP in the last 24 months
- have access to a computer, tablet or smartphone
- be able to understand what the study is asking from you and consent to this
- be able to read and speak English well enough to participate in an interview.

The study is being conducted by Ross Kincaid at Glasgow Caledonian University [GCU], Dr Jamie Frankis (GCU), Prof Claudia Estcourt (GCU), Dr Jo Gibbs (University College London), and Dr Jenny Dalrymple (GCU). The study is being carried out as part of a larger research project which aims to understand the best way of developing and delivering online PrEP care in Scotland.

Before you decide if you want to take part, it is important for you to understand what participation in this study would involve. Please take time to read the following information carefully and discuss it with others if you wish. Please contact Ross Kincaid (Ross.Kincaid@gcu.ac.uk) if you would like more information.

Why have I been invited?

You have been invited to take part in our study because it appears you might meet the criteria outlined in the bullet points above and agreed to being contacted by our team at a recent clinic visit.

Why is the study important?
This study is important as it gives people who may use the online PrEP service an opportunity to express their views towards the service at an early stage in its development. The findings of this study could also help to inform similar online health services in the future.

What will I be asked to do if I take part?
In the interview you will be asked questions about your experience with PrEP and online health services (if any). Then the interviewer will explain parts of the online PrEP service to you and ask what you think about them. Finally, you will be asked about any challenges, benefits or impact you think an online PrEP service could have. You do not have to answer any questions you do not want to and can choose to take a break or stop the interview at any point without giving a reason. The interview should take around one hour.

The interviews will take place by phone call, WhatsApp call, or Microsoft Teams video call. The interviews can take place at a time convenient to you within the hours of 8am and 8pm. The interviews will be audio-recorded and then transcribed for analysis.

At the end of the interview, you will be offered a £30 Amazon voucher to reimburse you for your time. If you accept, the voucher code will be sent to you via email. You will also be sent information telling you about some mental and sexual health support services. This will be sent regardless of whether any difficult issues arise in the interview.

Do I have to take part?
No. You decide if you want to take part in the study. You can stop the interview at any point without giving a reason. You can also ask for your interview to be deleted up to 2 days following the interview. We can delete your personal information at any time.

What are the possible risks of taking part?
We think that it is unlikely that you would come to any harm through taking part in the study. In the interviews, you will be asked about your experience of PrEP and health services. This could potentially bring up unpleasant memories or experiences. You will be under no obligation to answer any questions and can take a break or stop the interview at any time during the interview.

What are the possible benefits of taking part?
We can't promise that the study will help you personally. However, the results should improve our understanding of how best to deliver an online PrEP service in Scotland. This, in turn, could benefit the people who go on to use the service.

What happens when the study stops?
After the interview, the audio-recording will be turned into a written document by a professional transcriber who has signed a confidentiality agreement. The transcripts from all of the interviews will then be analysed and the results are shared in a number of ways. The findings may be presented at different events to let people know what we found in this study.

The findings will also be written up and submitted for publication in an academic journal. The findings will be used to inform the development and refinement of the online PrEP service. This will also form part of a doctoral research thesis. A copy of the report can be requested from Ross Kincaid (Ross.Kincaid@gcu.ac.uk) and should be available from December 2021.

What if there's a problem?
If you are concerned about your participation in the study and would like to speak with someone out with the study team, please contact Lawrie Elliott: Lawrie.elliott@gcu.ac.uk; +44 141 273 1803.

What will happen to the information given during the study?
In this study, you will be asked to provide the following information: first name; mobile phone number; email address; age; gender; if you have had sex with a man in the past 24 months; ethnicity; country of residence; what electronic devices you have access to; and your use of PrEP. The information will be held on secure GCU computers under password protection. Your contact information (name, phone number and email address) will be held separately to the rest of your information and will be destroyed at the end of the study (December 2021). Your demographic information (age, ethnicity, sexual orientation, gender identity, PrEP use, country of residence, if you have had sex with a man in the last 24 months) will be held for longer (five years after the study ends) – this information is anonymised during the transcription process.

Your interview is recorded on an electronic recorder and uploaded to a secure GCU computer. This recording will be sent to the professional transcriber using an encrypted file share system based at the transcription service. Transcribers will sign a confidentiality agreement regarding the recordings they receive. Interview recordings will be destroyed once the transcripts have been checked for accuracy. Transcripts will be stored on secure GCU computers under password protection. Anonymised interview transcripts will be transferred between members of the research team via secure gcu.ac.uk and nhs.net email accounts for analysis and cross-check purposes. All transcripts will be destroyed 5 years from the end of the study. If you were to lose capacity to consent during the study, you would be withdrawn from the study. Data that is not identifiable to the research team may be retained.

This study complies with the Data Protection Act (2018) and the General Data Protection Regulation (GDPR). The data controller is Glasgow Caledonian University. Information is being processed on the basis of Article 6(1)(e) of the GDPR and to perform a task carried out in the public interest. Enquiries specifically relating to data protection should be made to the University's Data Protection Officer (DPO). The DPO can be contacted by email: dataprotection@gcu.ac.uk. If you are unhappy with the response from the University, you have the right to lodge a complaint with the Information Commissioner's Office (ICO). The ICO can be contacted by email: casework@ico.org.uk. GDPR also gives study participants the right to ask for their personal data to be erased. If you would like us to stop using your personal data, then you can contact Ross Kincaid (Ross.Kincaid@gcu.ac.uk) and ask for your personal data to be erased. It will only be possible to erase data that has not been anonymised and/or published. Further information about your rights can be found at: https://www.gcu.ac.uk/dataprotection/rights/.

Will the use of my data meet GDPR rules?
GDPR stands for the General Data Protection Regulation. In the UK we follow the GDPR rules and have a law called the Data Protection Act. All research using patient data must follow UK laws and rules. Universities, NHS organisations and companies may use patient data to do research to make health and care better.

More information about GDPR can be found on the Health Research Authority website at https://www.hra.nhs.uk/planning-and-improving-research/policies-standards-legislation/data-protection-and-information-governance/gdpr-guidance/templates/template-wording-for-generic-information-document/.

Who has reviewed the study?
All studies involving human participants carried out at Glasgow Caledonian University are reviewed by an ethics committee. The role of the ethics committee is to protect the safety, rights, wellbeing, and dignity of study participants. This study was reviewed by the School of Health and Life Sciences departmental committee and given ethical approval on 17.12.2020 under the following approval code: HLS/NCH/20/004. This study has been reviewed by the North of Scotland Research Ethics Committee (2).

How do I make contact with the study team?
If you have any questions about the study, please email Ross Kincaid, the lead researcher on this study: Ross.Kincaid@gcu.ac.uk.

What happens next?
The study team will contact you to ask if you are still interested in taking part in the study, check your eligibility for the study, and arrange an interview.

Thank you for taking the time to read this information.

Appendix 12: Service user interview expression of interest and demographics form

Expression of Interest and Demographics Form

Service user study.

Note: This form will be presented via REDCap – a data capture system that allows participants to securely enter information. The participant information leaflet (appendix A) will precede this form within REDCap to ensure that the participant has been presented with it before completing this form. The eligibility questions below appear in turn if the response to the previous question meets the eligibility criteria.

Thank you for your interest in this study.

We ask you to complete this form for a few reasons:

1. To check if you are suitable to take part in the study.
2. To make sure we have a range of people from different backgrounds.
3. For you to let us know that you are interested in taking part in the study.

If you are eligible to take part, we will ask for your consent to store your responses up to that point and ask you a few more questions.

If you are not eligible to take part, we will not store any of your responses.

If you have any questions, please contact Ross.Kincaid@gcu.ac.uk.

Q1. We are looking to recruit gay men, bisexual men, and other men who have sex with men for this study – this includes trans men. Does this apply to you?
If you are non-binary and feel that research on any of the above groups affects you, this study is open to you as well.
[Yes; No; Unsure]

Q2. What is your age? _

Q3. Where do you currently live? [Scotland; England; Northern Ireland; Wales; Other: _]

Q4. Have you had sex with a man in the past 24 months? [Yes; No; Unsure; Prefer not to say]

Q5. Have you accessed or used PrEP in the last 24 months? [Yes; No; Unsure; Prefer not to say]

Q6. Which of the following do you have access to? Select all that apply. [Computer; Tablet; Smartphone; None of the above]

Q7. Do you speak English well enough to take part in an hour long interview? [Yes; No; Unsure; Prefer not to say]

IF INELIGIBLE: Thank you for your interest in this study. Unfortunately, your responses indicate that you aren't eligible to take part in this study. The information you provided will not be saved.

IF ELIGIBLE: Thank you for completing the initial screening questions. It appears from your responses that you are eligible for the study. If you are still interested in taking part in the study, please continue to the next section where you will be asked for your contact information and some additional demographic information.

First, we need to check you are happy for us to keep the information you are providing us today. It is important to understand that this does not guarantee an interview. It also does not mean that you are agreeing to take part in the interview. If we decide not to invite you for an interview, we will let you know and the information you provide in these forms will be deleted.

If you are happy to proceed, please click "next".

Please read the following statements and tick the box next to each statement if you agree with it. If you agree with all statements, then you can complete the rest of the form that follows and will be considered for an interview. If you no longer wish to take part, the information you have provided until now will be deleted.

- I confirm that I have read and understood the information provided in the participant information leaflet for the study titled "Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Service user study." (version 3, 18.03.2021).
- I have had the opportunity to ask questions about the study via email and have had these questions answered satisfactorily.
- I understand that the information collected in this form will be used to assess my eligibility to take part in the above study and that my information will be deleted if I am ineligible.
- I understand that I am providing this information voluntarily and I am free to withdraw my personal information at any time without giving a reason and without my medical care and/or legal rights being affected.
- I understand that, based on the data I provide, I may be contacted to participate in an interview but I am under no obligation to agree to an interview if this is offered to me.
- I understand that I am not guaranteed an interview after completing this expression of interest form even if I appear to meet the inclusion criteria.
- I consent to the information provided up to this point being stored alongside my responses to the subsequent questions.
- I understand that if I take part in an interview, the information provided in this form will be grouped with responses given by other participants to provide an overview of the sample in publications and presentations.

Until all statements have been agreed to, the following text will appear: If you do not agree with one or more of the statements above, please exit this webpage to leave the form. If you

leave the webpage, your responses will be deleted. If you would like to ask any questions about any of the statements, please contact Ross.Kincaid@gcu.ac.uk.

Once all statements have been agreed to, the following text will appear: Now that you have agreed with all of the statements, please click the 'next' button below to continue with the form.

Contact Information
We ask for your name, mobile number and email address so that we can contact you about the study. We also ask how you would prefer to be contacted and interviewed.

Q9. Name: _

Q10. Mobile phone number: _

Q11. Email address: _

Q12. How would you prefer to be contacted about the study? Please select all that apply. [Text message; WhatsApp message; Phone call; WhatsApp call; Email]

Q13. What is your preferred interview method? Please note that you do not have to have a Microsoft Teams account or have the application downloaded to select this method. Microsoft Teams interviews can be conducted through your computer's internet browser if you have a webcam and microphone. [Phone call; WhatsApp call; Microsoft Teams video call].

Demographic Information
It is important that our study is inclusive. We ask the following questions to help us make sure that we interview people with a variety of different backgrounds. While we appreciate everyone's experience is different and everyone's views are valuable, it might mean that we don't interview you even though you met the initial inclusion criteria.

Q14. **What best describes your ethnicity?** [White Scottish; Other White British; White Irish; Gypsy/Traveller; White Polish; Other White; Mixed or multiple ethnic group; Pakistani, Pakistani Scottish or Pakistani British; Indian, Indian Scottish or Indian British; Bangladeshi, Bangladeshi Scottish or Bangladeshi British; Chinese, Chinese Scottish or Chinese British; Other Asian; African, African Scottish or African British; Other African; Caribbean, Caribbean Scottish or Caribbean British; Black, Black Scottish or Black British; Other Caribbean or Black; Arab, Arab Scottish or Arab British; Other Ethnic Group; Prefer not to say]

Q3. What best describes your gender? [Male; Female; Prefer not to say; Prefer to self-describe: _]

Q4. Do you identify as trans? [No; Yes; Prefer not to say]

Q**15. What is your sexual orientation?** [Gay man; Gay woman/lesbian; Bi; Heterosexual/straight; Prefer not to say; Prefer to self-describe: _)

Thank you for taking the time to complete this form.

Please click the button below to submit your response.

We will be in touch to let you know if you have been chosen for an interview.

If you have any questions about the study in the meantime, feel free to email Ross.Kincaid@gcu.ac.uk.

Appendix 13: Service user interview consent form

Interview Consent Form

Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Service user interview study.
IRAS Project ID: 293269

The researcher will go through this consent form with you prior to the interview. You will need to agree to each of these statements before we can conduct the interview. For participants who are being interviewed on the phone or on video call, your replies to the consent form will be audio recorded for our records but kept separate from your main interview recording and transcript. The researcher will also complete a version of this form to evidence that informed consent was obtained before the interview started. The researcher will read each statement and you should reply 'I agree' if you wish to proceed.

	Statement	Please initial box
1	I agree to this interview being audio recorded.	
2	I confirm that I have read and understood the participant information sheet (version 2.0 dated 22.03.2021). I have had an opportunity to ask questions and have had these questions answered satisfactorily.	
3	I understand that my participation is voluntary and that I can stop the interview at any time without giving any reason.	
4	I understand that I can withdraw my interview up to 2 days afterwards if I want to.	
5	I understand that this interview will be confidentially transcribed by a trained audio typist who has signed a confidentiality agreement. I give my permission for this.	
6	I understand that anonymised quotes may be used in publications about the research; however, it will not be possible to identify me, or anyone I mention, from this information. I give my permission for this.	
7	I understand that I do not need to answer any questions that I do not wish to.	
8	I therefore consent to take part in this interview and agree that my participation has been fully explained to me.	

Once the main interview audio recording has started, please read out the following statement to confirm you have been through this consent form and agree to take part in the interview. **"I have been through the study consent form with the researcher. I consent to take part in this study and agree that my participation has been fully explained to me. I agree to this interview being recorded."**

Participant name: _____

Participant record ID: _____

Interviewer name: _____

Signed: _____ Date: _____

When completed: 1 for participant; 1 for researcher site file.

End of Consent Form

Appendix 14: Service user interview topic guide

ePrEP GBMSM Topic Guide

Project title: Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Service user study.
Version 1.0; 03.03.2021

Note: Demographic questions are preceded by D and the main interview questions are preceded by Q – prompts appear as bullet points below the questions. Text within [square brackets] indicate instructions to the interviewer.

Introduction

Thank you for taking the time to talk with me today. We are doing these interviews because we want to understand the best way of developing and delivering an online PrEP service. I'll start by asking about your experience with PrEP, then I'll explain what we think the online PrEP service might look like and ask what you think about it.

Have you taken part in this kind of research interview before?

There are no right or wrong answers to these questions, so please feel free to say what you really think and how you really feel. Please don't feel like you have to answer anything you don't want to and let me know if you want to take a break or wish to stop at any point. It's okay to take time to think about your answers too – I'll try not to rush you – there might be some awkward silences but it's just me giving you space to think and speak. Sometimes I might ask what seem like obvious, repetitive questions, but it is because I'm trying to find out exactly what you think and feel without taking anything for granted. Does that sound okay?

[Complete consent process.]

Section 1. Demographics

Before we start the main interview questions, I have some demographic questions. We ask these to get an idea of who has taken part in the study and to see if there's anyone we're missing. If there are any questions you would prefer not to answer that's absolutely fine. Does that sound okay?

D1. What is your age?

D2. How would you describe your ethnicity?

D3. What best describes your gender?

D4. Do you identify as trans?

D5. What is your sexual orientation?

Is it okay to start the recording?

[Switch the recorder on (if the participant has consented).]

As we discussed before we switched on the recording, I'll read out the consent statement and, if you agree, please say "I agree" at the end.

"I have been through the study consent form with the researcher. I consent to take part in this study and agree that my participation has been fully explained to me. I agree to this interview being recorded."

[Continue with questions if participant has agreed.]

Section 2. Experience with PrEP

Before we start talking about the online PrEP service, I'd be interested to find out a bit about your experience with PrEP.

Q1. Can you tell me about your experience with PrEP?

- How did you hear about PrEP?
- What is your pattern of taking PrEP – e.g. every day or when you need to?
- Why did you decide to take it?
- Can you talk me through the last time you got your PrEP?
- Have you found anything challenging about accessing PrEP?

Q2. How do you get your PrEP?

- When was your last appointment? Since lockdown/March 2020?
- Talk me through what happens at these appointments.
- Who do you see?
- [If out-with the NHS] Do you get your health monitored?
- How do you feel about these appointments? What's good? What's not so good?
- What would improve these appointments?
- How easy is it for you to go to these appointments?

Q3. Has anything about how you get your PrEP changed since the beginning of the coronavirus pandemic?

- What did you like about this way of getting your PrEP?
- What did you dislike about this way of getting your PrEP?
- What do you think could improve this way of getting your PrEP?
- Are there any parts of the way services have been during lockdown that you think should continue once things open up again?

Q4. As you know, this interview is about an online PrEP service. Currently, there aren't many ways that healthcare is being delivered online in Scotland. Some clinics allow people to book appointments or order repeat prescriptions online and some people have used postal self-sampling (e.g. the SH24 service). Have you done any of these or something similar?

- Can you talk me through your experience with this service?
- Why did you decide to use this online service?
- What did you like/dislike about this service?
- How could it have been improved?

Section 3. The Online PrEP Service

So, moving on to thinking about the online PrEP service – an online PrEP service is currently in the early stages of development. The service will make getting PrEP easier, quicker and more convenient for people and aims to give you everything you would get at a face-to-face appointment, online.

[Show the diagram to the participant.]

So imagine that the first time you get your PrEP, it's in person at the clinic but most of your regular follow-up appointments would be done at home. This would involve being sent a self-sampling kit to do your swabs and blood sample from your finger. You'd send these back to the lab/clinic for testing and complete a PrEP assessment online rather than in person or on the telephone. If everything's as expected, you'd be sent your PrEP. If there was a reason the clinic wanted to see you in person (e.g. positive test result), they'd phone you and get it all sorted out.

You'd still go in to the clinic once or twice a year because there's some tests that can't be done at home at the moment. You can opt out at any time if you'd rather go back to seeing someone in person to get your PrEP. Also, if you had any problems in between you'd be welcome to go to the clinic as normal.

So, that's quite a lot of information to give you at once and we'll have a chat about each stage later in the interview.

Q5. What do you think of this online PrEP service?

- What do you think is good about it?
- What impact do you think it would have on you?
- Is there anything about it that you think might be a problem?
- Is there anything you think could be improved?

Q6. What do you think would influence your decision to use the online PrEP service?

- What would make you more/less likely to use it?

Q7. Can you see any downsides of an online PrEP service?

Q8. What do you think might be challenging about using an online PrEP service?

- What would help you to deal with these challenges?

Q9. We're not expecting the online PrEP service to replace face-to-face care and we don't expect it to be right for everyone all of the time. It will likely be a good option for some people some of the time. How do you feel about this?

Q10. We think that people using the online PrEP service would have four assessments per year. The online PrEP service would likely cover 2 or 3 of these assessments each year. People would still need to go to the clinic every six or twelve months to check in and do some medical tests that cannot be completed out of the clinic at present. The number of appointments that the online PrEP service would cover would depend on each individual's health needs and preference. How do you feel about this?

- How do you feel about still having to go to the clinic for face-to-face care?
- What do you think about some people being able to use the service more than others?

When you go into the clinic they usually ask about things like any medications you're on, if you've experienced any symptoms, how many sexual partners you've had… The online PrEP service would ask you to provide this information as well.

Q11. Starting with the medical details, how do you feel about providing medical details online?

- E.g. symptoms you've experienced, medications you've started since your last appointment…

Q12. How would you feel about providing information about your sexual behaviour online?

- E.g. number of sexual partners, type of sex you've had…

Q13. What would the online PrEP service have to have to assure you that your information was kept securely?

- Think about other times you've had to provide personal information online.

Q14. What devices do you think you would want to use to complete the online assessments?

- Why that/those devices?
- Why not the other(s)?

Usually when people attend the clinic, they do their own swabs and the doctor or nurse takes their blood. For the online PrEP service to work, people will need to complete their own tests at home. So this will involve doing your own swabs and putting them in the correct container. The main difference will be the blood sample. We're not asking people to put a needle in their arm, it's a finger-prick blood sample.

Q15. How do you feel about doing your own tests as part of this online PrEP service?

- What do you think might be challenging about it?
- What do you think would help overcome these challenges?
- Would anything worry you about taking these samples?

Q16. Since you would be doing your tests and assessment at home, we would need to get your PrEP to you somehow. How would you ideally want to be given your PrEP?

- Right now we're thinking about the option of having it delivered to you or pick it up from a pharmacy.

From hearing about the online PrEP service, it might sound a bit like online shopping. The service is different, there are still steps that need to be completed to make sure that PrEP is being prescribed safely and appropriately – i.e. the tests and online assessment. Sometimes people will still need to come into the clinic to get the right care. So it is quite different from online shopping.

Q17. What are your thoughts on this?

Q18. Is this something that needs to be communicated to people in some way?

Section 4. Rounding Up

Q17. Thank you for sharing your thoughts with me today. Having discussed the different parts of the online PrEP service do you have anything else you want to say before we finish?

Q18. How has the interview been for you today?

Q19. How did you find out about the study?

Thank you for taking the time to talk with me today.

[Switch off the recorder and inform the participant that they are free to get in touch if they have any other comments or questions.]

Appendix 15: Support document

Sources of Support

Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway.

IRAS Project ID: 293269

Version 2.0; 22.03.2021

We want to make sure that you had a list of services that offer different types of support and information in case something came up in the interview that was difficult or uncomfortable for you.

Sexual Health and PrEP Services and Organisations

Sandyford Sexual Health Services offers sexual healthcare for those living in the Glasgow area:
https://sandyford.scot
0141 211 8130
sandyford@ggc.scot.nhs.uk

The Chalmers Centre offers sexual healthcare for those living in the Lothian area:
https://lothiansexualhealth.scot
0131 536 1070

To find your nearest sexual health service visit https://sexualhealthscotland.co.uk/get-help/sexual-health-service-finder

S-X provide a wide range of information on sexual health, relationships, mental health and more:
https://s-x.scot

HIV Scotland provides lots of information about HIV and sex: https://hiv.scot

Terrence Higgins Trust provides information and services surrounding HIV: https://tht.org.uk/hiv-and-sexual-health

Wider Health Services and Organisations

NHS Inform provides up-to-date information about COVID-19: https://www.nhsinform.scot/illnesses-and-conditions/infections-and-poisoning/coronavirus-covid-19

NHS 24 provides health advice and help when GP practices are closed: https://www.nhs24.scot

Breathing Space allows you to access experienced advisors who will listen and offer information and advice regarding mental health: https://breathingspace.scot

Appendix 16: Qualitative studies ethical approval (Glasgow Caledonian University)

Kincaid, Ross Andrew

From: HLS Ethics - Nursing
Sent: 17 December 2020 17:12
To: Kincaid, Ross Andrew; HLS Ethics - Nursing
Cc: Frankis, Jamie; Estcourt, Claudia; McDade, Lyndsay
Subject: RE: HLS/NCH/20/004: Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway

Dear Ross Kincaid,

Thank you for submitting your revisions in response to the feedback comments provided by the Nursing Department Research Ethics Committee. The committee has scrutinised the revised application and reached the following decision.

Ethical approval is granted

This ethical approval applies to the study design and associated documents presented in the protocol. Any changes to the design or implementation of the protocol will need to be approved by submitting an amendment to the committee.

Some studies require additional external approval (e.g. NHS, gatekeeper) before they can start. It is the responsibility of the chief investigator to ensure they have all the necessary approvals in place before starting a study. All external approvals for this study should be emailed to Lyndsay McDade (Senior Research Governance Manager) Lyndsay.McDade@gcu.ac.uk. Lyndsay McDade will record external approvals and help ensure research governance is maintained during the study. Lyndsay McDade has been cc'd into this email for her information and to help monitor current research activity.

Remember to keep a copy of this email as proof of ethical approval and use this as evidence of ethical approval in any future dissertation/thesis/publication.

The ethics committee wish you every success with the project.

Kind Regards

Razak
****

Dr Razak Abubakari
Chair, Department of Nursing & Community Health Ethics Committee
School of Health and Life Sciences | Glasgow Caledonian University

Appendix 17: Qualitative studies ethical approval (National Health Service)

North of Scotland Research Ethics Service
Summerfield House
2 Eday Road
Aberdeen
AB15 6RE

Telephone: 01224 558458
Email: gram.nosres@nhs.scot

NHS Grampian

22 April 2021

Professor Claudia Estcourt
M421 George Moore Building
Glasgow Caledonian University
Cowcaddens Road
GLASGOW
G40BA

Dear Professor Estcourt

Study title:	**Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway.**
REC reference:	**21/NS/0044**
Protocol number:	**N/A**
IRAS project ID:	**293269**

Thank you for your letter of 22 April 2021, responding to the Research Ethics Committee's (REC) request for further information on the above research.

The further information has been considered on behalf of the Committee by the Vice-Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Good practice principles and responsibilities

The UK Policy Framework for Health and Social Care Research sets out principles of good practice in the management and conduct of health and social care research. It also outlines the responsibilities of individuals and organisations, including those related to the four elements of research transparency:

1. registering research studies
2. reporting results
3. informing participants
4. sharing study data and tissue

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Confirmation of Capacity and Capability (in England, Northern Ireland and Wales) or NHS management permission (in Scotland) should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA and HCRW Approval (England and Wales)/ NHS permission for research is available in the Integrated Research Application System.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations

Registration of Clinical Trials

All research should be registered in a publicly accessible database and we expect all researchers, research sponsors and others to meet this fundamental best practice standard.

It is a condition of the REC favourable opinion that **all clinical trials are registered** on a publicly accessible database within six weeks of recruiting the first research participant. For this purpose, 'clinical trials' are defined as the first four project categories in IRAS project filter question 2. Failure to register a clinical trial is a breach of these approval conditions, unless a deferral has been agreed by or on behalf of the Research Ethics Committee (see here for more information on requesting a deferral: https://www.hra.nhs.uk/planning-and-improving-research/research-planning/research-registration-research-project-identifiers/

If you have not already included registration details in your IRAS application form, you should notify the REC of the registration details as soon as possible.

Further guidance on registration is available at: https://www.hra.nhs.uk/planning-and-improving-research/research-planning/transparency-responsibilities/

Publication of Your Research Summary

We will publish your research summary for the above study on the research summaries section of our website, together with your contact details, no earlier than three months from the date of this favourable opinion letter.

Should you wish to provide a substitute contact point, make a request to defer, or require further information, please visit: https://www.hra.nhs.uk/planning-and-improving-research/application-summaries/research-summaries/

N.B. If your study is related to COVID-19 we will aim to publish your research summary within 3 days rather than three months.

During this public health emergency, it is vital that everyone can promptly identify all relevant research related to COVID-19 that is taking place globally. If you haven't already done so, please register your study on a public registry as soon as possible and provide the REC with the registration detail, which will be posted alongside other information relating to your project. We are also asking sponsors not to request deferral of publication of research summary for any projects relating to COVID-19. In addition, to facilitate finding and extracting studies related to COVID-19 from public databases, please enter the WHO official acronym for the coronavirus disease (COVID-19) in the full title of your study. Approved COVID-19 studies can be found at: https://www.hra.nhs.uk/covid-19-research/approved-covid-19-research/

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

After ethical review: Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study, including early termination of the study
- Final report
- Reporting results

The latest guidance on these topics can be found at https://www.hra.nhs.uk/approvals-amendments/managing-your-approval/.

Ethical review of research sites

NHS/HSC sites

The favourable opinion applies to all NHS/HSC sites taking part in the study, subject to confirmation of Capacity and Capability (in England, Northern Ireland and Wales) or management permission (in Scotland) being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS/HSC sites

I am pleased to confirm that the favourable opinion applies to any non-NHS/HSC sites listed in the application, subject to site management permission being obtained prior to the start of the study at the site.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Copies of materials calling attention of potential participants to the research: Appendix D - ePrEP HCP Expression of Interest Demo	2	22 March 2021
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only): GCU Indemnity 1 CT		1 August 2020
Interview schedules or topic guides for participants: Appendix I - ePrEP GBM Topic Guide	1	3 March 2021
Interview schedules or topic guides for participants: Appendix J - ePrEP HCP Topic Guide	1	3 March 2021
Interview schedules or topic guides for participants: ePrEP NHS Presentation	1	22 March 2021
Interview schedules or topic guides for participants: ePrEP Cognitive Testing Interview Schedule	1	1 March 2021
Interview schedules or topic guides for participants: ePrEP Pathway Diagram	1	22 March 2021
IRAS Application Form: IRAS Form 16032021	293269/1483788/37/704	16 March 2021
IRAS Checklist XML: Checklist 22042021		22 April 2021
Letter from Funder: Letter from Funder - NHSGG&C		1 July 2020
Letters of invitation to participant: ePrEP NHS HCP Recruitment Email	1	22 March 2021
GCU Indemnity 2 PL		1 August 2020
GCU Indemnity 3 PI		1 August 2020
Transcription Confidentiality Agreement	2	22 March 2021
CV - Dr Lindsay Henderson		22 March 2021
ePrEP NHS Researcher Notification Email	1	22 March 2021
Funding summary £15,000		6 March 2020
ePrEP Response to REC Provisional Opinion		22 April 2021
Participant Consent Form: Appendix E - ePrEP GBM Consent NHS	2	22 March 2021
Participant Consent Form: Appendix F - ePrEP Cognitive Testing Consent NHS	2	22 March 2021
Participant Consent Form: Appendix G - ePrEP HCP Consent NHS	2	22 March 2021

Document	*Version*	*Date*
Participant Information Sheet (PIS): Appendix A - ePrEP GBM Participant Information NHS	2	22 March 2021
Participant Information Sheet (PIS): Appendix B - ePrEP Cognitive Testing Participant Information NHS	2	22 March 2021
Participant Information Sheet (PIS): Appendix C - ePrEP HCP Participant Information NHS	2	22 March 2021
Participant Information Sheet (PIS): Appendix H - ePrEP Support Document NHS	2	22 March 2021
Referee's report or other scientific critique report: Sandyford Research Governance Group Approval Letter		2 February 2021
Referee's report or other scientific critique report: ePrEP GCU Ethics Approval Email		17 December 2020
Research protocol or project proposal	2	22 March 2021
Summary CV for Chief Investigator (CI): Professor Claudia Estcourt		22 March 2021
Summary CV for Student: Mr Ross Kincaid		22 March 2021
Summary CV for Supervisor (student research): Dr Jamie Frankis		22 March 2021

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

HRA Learning

We are pleased to welcome researchers and research staff to our HRA Learning Events and online learning opportunities – see details at: https://www.hra.nhs.uk/planning-and-improving-research/learning/

IRAS project ID: 293269 Please quote this number on all correspondence

Signature redacted (personal information)

Appendix 18: Qualitative studies ethical approval (Research and Innovation Greater Glasgow and Clyde)

Administrator: Mr Scott Broadley
Telephone Number: 0141 314 4001
E-Mail: Scott.Broadley@ggc.scot.nhs.uk
Website: https://www.nhsggc.org.uk/about-us/professional-support-sites/research-development/

Research & Innovation
Dykebar Hospital, Ward 11
Grahamston Road
Paisley, PA2 7DE
Scotland, UK

26 May 2021

Prof Claudia Estcourt
M421 George Moore Building
Glasgow Caledonian University
Cowcaddens Road
Glasgow, G40BA

NHS GG&C Board Approval

Dear Prof Estcourt,

Study Title:	Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEPpathway.
Principal Investigator:	Prof Claudia Estcourt
GG&C HB site	Sandyford
Sponsor	Glasgow Caledonian University
R&I reference:	GN21PH134
REC reference:	21/NS/0044
Protocol no: (including version and date)	Version 2.0, 22/03/2021

I am pleased to confirm that Greater Glasgow & Clyde Health Board is now able to grant **Approval** for the above study.

Conditions of Approval

1. **For Clinical Trials** as defined by the Medicines for Human Use Clinical Trial Regulations, 2004

    a. During the life span of the study GGHB requires the following information relating to this site
        i. Notification of any potential serious breaches.
        ii. Notification of any regulatory inspections.

It is your responsibility to ensure that all staff involved in the study at this site have the appropriate GCP training according to the GGHB GCP policy (www.nhsggc.org.uk/content/default.asp?page=s1411), evidence of such training to be filed in the site file.

2. **For all studies** the following information is required during their lifespan.
    a. First study participant should be recruited within 30 days of approval date.
    b. Recruitment Numbers on a monthly basis
    c. Any change to local research team staff should be notified to R&I team

Signature redacted (personal information)

Appendix 19: Focus group participant information sheet, and expression of interest and demographics form

Participant Information Sheet

Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Healthcare professional study.
IRAS Project ID: 293269
Version 2.0; 22.03.2021

Introduction

The aim of this study is to understand what people think about an online PrEP service that is currently being developed. This online PrEP service would allow people who have already started PrEP to complete most of their routine PrEP-related appointments themselves, outside of a clinic setting. We are looking to interview healthcare professionals employed by the NHS who deliver PrEP care in Scotland as part of their job role.

The study is being conducted by Ross Kincaid at Glasgow Caledonian University [GCU], Dr Jamie Frankis (GCU), Prof Claudia Estcourt (GCU), Dr Jo Gibbs (University College London), and Dr Jenny Dalrymple (GCU). The study is being carried out as part of a larger research project which aims to understand the best way of developing and delivering online PrEP care in Scotland.

Before you decide if you want to take part, it is important for you to understand what participation in this study would involve. Please take time to read the following information carefully and discuss it with others if you wish. Please contact Ross Kincaid (Ross.Kincaid@gcu.ac.uk) if you would like more information.

Why have I been invited?

You have been invited to take part in our study because it appears you might meet our eligibility criteria – we are looking for healthcare professionals employed by the NHS who deliver PrEP care in Scotland.

Why is the study important?

This study is important as it gives people who may implement or support those who use the online PrEP service an opportunity to express their views towards the service at an early stage in its development. The findings of this study could also help to inform similar online health services in the future.

What will I be asked to do if I take part?

If you are interested in taking part, you are invited to complete an expression of interest form via the study's website (**LINK TO WEBSITE**). The form starts with some questions to assess your eligibility. If your answers match our criteria, then you will be asked for your contact information as well as some questions about your background. We collect this information for a few reasons: 1) to get a sense of who has taken part in our study; 2) to assess your eligibility

to take part; and 3) to make sure we interview people from a variety of backgrounds and experiences. After completing the expression of interest form, you may be invited to participate in a focus group or individual interview. Focus groups/interviews will be scheduled at a time where 3-5 participants can attend and it will not disrupt services. A designated contact at Sandyford will assist in scheduling the focus groups/interviews.

The focus group should take around an hour and a half but we will schedule 2 hours to allow people to ask questions. In the focus group you will be asked questions about your experience delivering PrEP care. You will then be presented with information about the online PrEP service and asked what you think about it. Finally, you will be asked about any challenges, benefits or impact you think the online PrEP service could have. You do not have to answer any questions you do not want to and can choose to take a break or leave the focus group at any point without giving a reason. If focus groups prove challenging to schedule, you may be invited to take part in a one-to-one interview covering the same topics as the focus group. This will be scheduled for a time that is mutually convenient to you and the interviewer and will take around 1 hour.

The focus group will take place by phone call or Microsoft Teams video call. The focus group/interviews will be audio-recorded and then transcribed for analysis.

Do I have to take part?
No. You decide if you want to take part in the study. You can withdraw from the focus group at any point without giving a reason. You can also ask for your responses to be removed from the transcript up to 2 days following the interview. We can destroy your personal information at any time.

What are the possible benefits of taking part?
We can't promise that the study will help you personally. However, the results should improve our understanding of how best to deliver an online PrEP service in Scotland. This, in turn, could benefit the people who go on to use the service.

What happens when the study stops?
After the focus group/interview, the audio-recording will be turned into a written document by a professional transcriber who has signed a confidentiality agreement. The transcripts from all of the focus groups are then analysed and the results are shared in a number of ways. The findings may be presented at different events to let people know what we found in this study. The findings will also be written up and submitted for publication in an academic journal. The findings will be used to inform the development and refinement of the online PrEP service. This will also form part of a doctoral research thesis. A copy of the report can be requested from Ross Kincaid (Ross.Kincaid@gcu.ac.uk) and should be available from December 2021.

What if there's a problem?
If you are concerned about your participation in the study and would like to speak with someone out with the study team, please contact Lawrie Elliott: Lawrie.elliott@gcu.ac.uk; +44 141 273 1803.

What will happen to the information given during the study?
In this study, you will be asked to provide the following information: first name; phone number; email address; age; gender; sexual orientation; ethnicity; your job role; and years of experience. This is held on REDCap – a system that ensures only the project team can access your information. The information will also be held on secure GCU computers under password protection. Your contact information (name, phone number and email address) will be held separately to the rest of your information and will be destroyed at the end of the study (December 2021). Your demographic information (age, ethnicity, gender, sexual orientation, job role, years of experience) will be held for longer (five years after the study ends) – this information is anonymised during the transcription process.

The focus group is recorded on an electronic recorder and uploaded to a secure GCU computer. This recording will be sent to the professional transcriber using an encrypted file share system based at the transcription service. Transcribers will sign a confidentiality agreement regarding the recordings they receive. Recordings will be destroyed once the transcripts have been checked for accuracy. Transcripts will be stored on secure GCU computers under password protection. Anonymised transcripts will be transferred between members of the research team via secure gcu.ac.uk and nhs.net email accounts for analysis and cross-check purposes. All transcripts will be destroyed 5 years from the end of the study. If you were to lose capacity to consent during the study, you would be withdrawn from the study. Data that is not identifiable to the research team may be retained.

This study complies with the Data Protection Act (2018) and the General Data Protection Regulation (GDPR). The data controller is Glasgow Caledonian University. Information is being processed on the basis of Article 6(1)(e) of the GDPR and to perform a task carried out in the public interest. Enquiries specifically relating to data protection should be made to the University's Data Protection Officer (DPO). The DPO can be contacted by email: dataprotection@gcu.ac.uk. If you are unhappy with the response from the University, you have the right to lodge a complaint with the Information Commissioner's Office (ICO). The ICO can be contacted by email: casework@ico.org.uk. GDPR also gives study participants the right to ask for their personal data to be erased. If you would like us to stop using your personal data, then you can contact Ross Kincaid (Ross.Kincaid@gcu.ac.uk) and ask for your personal data to be erased. It will only be possible to erase data that has not been anonymised and/or published. Further information about your rights can be found at: https://www.gcu.ac.uk/dataprotection/rights/.

Will the use of my data meet GDPR rules?
GDPR stands for the General Data Protection Regulation. In the UK we follow the GDPR rules and have a law called the Data Protection Act. All research using patient data must follow UK laws and rules. Universities, NHS organisations and companies may use patient data to do research to make health and care better.

More information about GDPR can be found on the Health Research Authority website at https://www.hra.nhs.uk/planning-and-improving-research/policies-standards-legislation/data-

protection-and-information-governance/gdpr-guidance/templates/template-wording-for-generic-information-document/.

Who has reviewed the study?

All studies involving human participants carried out at Glasgow Caledonian University are reviewed by an ethics committee. The role of the ethics committee is to protect the safety, rights, wellbeing, and dignity of study participants. This study was reviewed by the School of Health and Life Sciences departmental committee and given ethical approval on 17.12.2020 under the following approval code: HLS/NCH/20/004. This study has been reviewed by the North of Scotland Research Ethics Committee (2).

How do I make contact with the study team?

If you have any questions about the study, please email Ross Kincaid, the lead researcher on this study: Ross.Kincaid@gcu.ac.uk.

What happens next?

If you are interested in taking part, follow this link to the study website: **study website**. Here, you can complete an expression of interest form. The study team will then contact you to invite you to a focus group.

Thank you for taking the time to read this information.

Expression of Interest and Demographics Form

Service user study.

Note: This form will be presented via REDCap – a data capture system that allows participants to securely enter information. The participant information leaflet (appendix C) will precede this form within REDCap to ensure that the participant has been presented with it before completing this form. The eligibility questions below appear in turn if the response to the previous question meets the eligibility criteria.

Thank you for your interest in this study.

We ask you to complete this form for a few reasons:

4. To check if you are suitable to take part in the study.
5. To get an understanding of who you are.
6. For you to let us know that you are interested in taking part in the study.

If you are eligible to take part, we will ask for your consent to store your responses up to that point and ask you a few more questions.

If you are not eligible to take part, we will not store any of your responses.

If you have any questions, please contact Ross.Kincaid@gcu.ac.uk.

Q1. Do you work within the NHS in Scotland? [Yes; No; Prefer not to say]

Q2. Are you involved in delivering PrEP care as part of your job role? [Yes; No; Prefer not to say]

IF INELIGIBLE: Thank you for your interest in this study. Unfortunately, your responses indicate that you aren't eligible to take part in this study. The information you provided will not be saved.

IF ELIGIBLE: Thank you for completing the initial screening questions. It appears from your responses that you are eligible for the study. If you are still interested in taking part in the study, please continue to the next section where you will be asked for your contact information and some additional demographic information.

First, we need to check you are happy for us to keep the information you are providing us today. It is important to understand that this does not guarantee an invite to a focus group. It also does not mean that you are agreeing to take part in a focus group. If we decide not to invite you to a focus group, we will let you know and the information you provide in these forms will be deleted.

If you are happy to proceed, please click "next".

Please read the following statements and tick the box next to each statement if you agree with it. If you agree with all statements, then you can complete the rest of the form that follows and will be considered for the study. If you no longer wish to take part, the information you have provided until now will be deleted.

- I confirm that I have read and understood the information provided in the participant information leaflet for the study titled "Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Service user study." (version 1.0, 28.01.2021).
- I have had the opportunity to ask questions about the study via email and have had these questions answered satisfactorily.
- I understand that the information collected in this form will be used to assess my eligibility to take part in the above study and that my information will be deleted if I am ineligible.
- I understand that I am providing this information voluntarily and I am free to withdraw my personal information at any time without giving a reason.
- I understand that, based on the data I provide, I may be contacted to participate in a focus group but I am under no obligation to agree to an interview if this is offered to me.
- I understand that I am not guaranteed an invite to take part in the study after completing this expression of interest form even if I appear to meet the inclusion criteria.
- I consent to the information provided up to this point being stored alongside my responses to the subsequent questions.
- I understand that if I take part in a focus group, the information provided in this form will be grouped with responses given with other participants to provide an overview of the sample in publications and presentations.

Until all statements have been agreed to, the following text will appear: If you do not agree with one or more of the statements above, please exit this webpage to leave the form. If you leave the webpage, your responses will be deleted. If you would like to ask any questions about any of the statements, please contact Ross.Kincaid@gcu.ac.uk.

Once all statements have been agreed to, the following text will appear: Now that you have agreed with all of the statements, please click the 'next' button below to continue with the form.

Contact Information

We ask for your name, phone number and email address so that we can contact you about the study.

Q3. First name: _

Q4. Mobile phone number: _

Q5. Email address: _

Demographic Information

It is important that our study is inclusive. We ask the following questions to help us make sure that we interview people with a variety of different backgrounds. While we appreciate everyone's experience is different and everyone's views are valuable, it might mean that we don't invite you to take part even though you met the initial inclusion criteria.

Q6. What is your job role? If you are currently redeployed or have multiple roles, please detail all roles within the NHS. _

Q7. How many years have you been working in healthcare? _

Q8. How many years have you been working in sexual and reproductive healthcare? _

Q9. How many years have you been involved in delivering PrEP care? _

Q10. What best describes your ethnicity? [White Scottish; Other White British; White Irish; Gypsy/Traveller; White Polish; Other White; Mixed or multiple ethnic group; Pakistani, Pakistani Scottish or Pakistani British; Indian, Indian Scottish or Indian British; Bangladeshi, Bangladeshi Scottish or Bangladeshi British; Chinese, Chinese Scottish or Chinese British; Other Asian; African, African Scottish or African British; Other African; Caribbean, Caribbean Scottish or Caribbean British; Black, Black Scottish or Black British; Other Caribbean or Black; Arab, Arab Scottish or Arab British; Other Ethnic Group; Prefer not to say]

Q11. What is your age? _

Q12. What best describes your gender? [Male; Female; Prefer not to say; Prefer to self-describe: _]

Q13. Do you identify as trans? [No; Yes; Prefer not to say]

Q14. What is your sexual orientation? [Gay man; Gay woman/lesbian; Bi; Heterosexual/straight; Prefer not to say; Prefer to self-describe: _)

Thank you for taking the time to complete this form.

Please click the button below to submit your response.

We will be in touch to let you know if you have been chosen to take part in a focus group.

If you have any questions about the study in the meantime, feel free to email Ross.Kincaid@gcu.ac.uk.

Appendix 20: Focus group consent form

Interview Consent Form

Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Healthcare professional study.
IRAS Project ID: 293269

The researcher will go through this consent form with you prior to the focus group. You will need to agree to each of these statements before we can conduct the interview. For participants who are being interviewed on the phone or on video call, your replies to the consent form will be audio recorded for our records but kept separate from your main interview recording and transcript. The researcher will also complete a version of this form to evidence that informed consent was obtained before the interview started. The researcher will read each statement and you should reply 'I agree' if you wish to proceed.

	Statement	Please initial box
1	I agree to this interview being audio recorded.	
2	I confirm that I have read and understood the participant information sheet (version 2.0 dated 22.03.2021). I have had an opportunity to ask questions and have had these questions answered satisfactorily.	
3	I understand that my participation is voluntary and that I can stop the interview at any time without giving any reason.	
4	I understand that I can withdraw my interview up to 2 days afterwards if I want to.	
5	I understand that this interview will be confidentially transcribed by a trained audio typist who has signed a confidentiality agreement. I give my permission for this.	
6	I understand that anonymised quotes may be used in publications about the research; however, it will not be possible to identify me, or anyone I mention, from this information. I give my permission for this.	
7	I understand that I do not need to answer any questions that I do not wish to.	

8	I therefore consent to take part in this interview and agree that my participation has been fully explained to me.	

Once the main audio recording has started, please read out the following statement to confirm you have been through this consent form and agree to take part in the interview. **"I have been through the study consent form with the researcher. I consent to take part in this study and agree that my participation has been fully explained to me. I agree to this interview being recorded."**

Participant name: _____

Participant record ID: _____

Interviewer name: _____

Signed: _____ Date: _____

When completed: 1 for participant; 1 for research site file.

End of Consent Form

Appendix 21: Focus group topic guide

ePrEP HCP Topic Guide

Project title: Online HIV pre-exposure prophylaxis (PrEP) care: Developing and exploring the acceptability of an online PrEP pathway. Healthcare professional study.
Version 1.0; 03.03.2021

Note: Demographic questions are preceded by D and the main interview questions are preceded by Q – prompts appear as bullet points below the questions. Text within [square brackets] indicate instructions to the interviewer.

Introduction

Thank you for taking the time to come and talk with me today. We are doing these focus groups because we want to understand the best way of developing and delivering an online PrEP service. We are interested in finding out what people think about different parts of the proposed online PrEP clinic and their views on how to make the clinic the best it can be.

There are no right or wrong answers to these questions, so please feel free to say what you really think and how you really feel. Please don't feel like you have to answer anything you don't want to and let me know if you want to take a break or wish to stop at any point. It's okay to take time to think about your answers too – I'll try not to rush you. Sometimes I might ask what seem like obvious questions, but it is because I'm trying to find out exactly what you think and feel without taking anything for granted. Does that sound okay?

[Complete consent process.]

Is it okay to start the recording?

[Switch the recorder on (if the participants have consented).]

As we discussed before we switched on the recording, I'll read out the consent statement and, if you agree, please say "I agree".

"I have been through the study consent form with the researcher. I consent to take part in this study and agree that my participation has been fully explained to me. I agree to this interview being recorded."

[Continue with questions if participants have agreed.]

Section 1. Background

Before we start to discuss the online PrEP service, I'd like to get an understanding of how PrEP is delivered within your service.

Q1. Can you tell me about the PrEP services you are currently involved in?

- Describe a typical patient journey through your service when seeking PrEP.
- What is covered in the first appointment?
- What is covered in the follow-up appointments?
- How has the coronavirus pandemic impacted your PrEP services?
- How do you feel about the PrEP appointments?
- What do you think is challenging about providing PrEP care?
- How has PrEP impacted your workload?

Q2. What do you need to accomplish in your PrEP appointments?

- What are your priorities?
- What are the current challenges?
- What information is it essential for patients to be given before they leave the appointment?

Q3. Can you tell me about any part of the PrEP service that involves text, online or SH24?

- What is your role in this process?
- Which patients use this service?
- Which patients do not use this service?
- What impact do you think this has on patient care?
- What impact do you think this has on your workload?
- What do you think could be improved about those services?

Section 2. The Online PrEP Service

So moving on to the online PrEP service, we have a short presentation describing the service.

[Present slides.]

SLIDES WILL INCLUDE INFORMATION ON: **rationale (quick, easy, convenient follow-ups); safety considerations; explanation of each step; flexibility to meet patients' needs (opt out at any time, access face-to-face care in the interim); maximum of three out of four follow-ups per year; aims to reduce PrEP burden on clinics and make more space for vulnerable patients.**

Q4. What do you think about this online PrEP service?

- What do you think is good about it?
- How could it be improved?
- What are your concerns and how could these be addressed?

Q5. How do you feel about clinical care being delivered online?

Q6. What impact do you think the online PrEP service would have on patient care?

Q7. Who do you think this online PrEP service would work for?

- Who would this service not work for?

Q8. What impact do you think the online PrEP service would have on your service as a whole?
Q9. How do you think the online PrEP service would integrate with existing care pathways and workflow?

Q10. For the online PrEP service to be possible, people will need to take their own samples and send these in to a lab to test for STIs and HIV. How do you feel about people self-sampling as part of the online PrEP service?

Q11. As we mentioned before, we are looking to make the online PrEP service automated so that if the clinical algorithm shows that it is safe for someone to be prescribed PrEP, it does not need to be reviewed by a prescriber before the prescription is issued. It's worth mentioning that this will be a phased process that will be validated before being fully implemented. What do you think about this?

Section 3. Rounding Up.

Q12. Thank you for sharing your thoughts on the online PrEP service. I've asked all of my questions but I wanted to open the discussion up if anyone had any other points they wanted to make.

Thank you for taking the time to talk with us today.

[Switch off the recorder and inform them they are free to get in contact if they have any other comments.]