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High Interest in the Use of mHealth Platform for HIV Prevention among Men Who Have Sex with Men in Nepal

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Abstract

Mobile technology growth in Nepal offers promising opportunities for using mobile health (mHealth) interventions to facilitate HIV prevention efforts. However, little is known about access and utilization of communication technology and their willingness to use mHealth for HIV prevention services in Nepal. We conducted a cross-sectional respondent-driven sampling survey of 250 MSM in Kathmandu Valley of Nepal from October to December 2022. We collected information on participant characteristics, HIV risk-related behaviors, ownership, or access to and frequency of use of communication technology (phones, tablets, laptops, and computers), and willingness to use mHealth to access HIV prevention services. Descriptive, bivariate, and multivariate linear regression analyses were performed. Almost all participants had smartphones with the internet (231/250, 92.4%) and accessed the internet daily (219/250, 87.6%) on the smartphone (236/250, 94.4%). The median score for willingness to use mHealth for HIV prevention was 10 (IQR: 3 to 17). Willingness to use mHealth was higher among those

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Declarations of Interest None.

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participants with a high school or above education (β = 0.223, p = < 0.001), had experienced violence (β = 0.231, p = 0.006), and had moderate to severe depressive symptoms (β = 0.223, p = < 0.001). However, monthly income above NPR 20,000 (USD 150) (β= −0.153, p = 0.008), disclosure of their sexual orientation to anyone (β= −0.159, p = < 0.007), and worry about being negatively judged by health care workers (β= −0.136, p = 0.023) were less willing to use mHealth strategies. The findings from this study suggest that there is a high willingness for utilizing mHealth interventions for HIV prevention in MSM population who are at higher risk of HIV acquisition.

Keywords

mHealth; HIV Prevention; Men who have sex with men; Mobile Phone; Nepal

Introduction

Over the past three decades, significant progress has been made worldwide in Human Immunodeficiency Virus (HIV) prevention and treatment. However, the HIV epidemic in key populations, such as men who have sex with men (MSM), remains a significant public health concern world-wide, including in low- and middle-income countries [1-3]. MSM are particularly vulnerable to HIV infection because of a combination of biological vulnerabilities (e.g., sexual exposure risk, concurrent sexually transmitted infections [STIs]), behavioral factors (e.g., multiple anal sex partners, condomless receptive anal sex, sexualized drug use), and structural factors (e.g., legal recognition, stigma and discrimination, and limited access to healthcare) that impact their access to HIV prevention, testing, and treatment [1, 4-7].

In Nepal, the prevalence of HIV is significantly higher (5%) among MSM than in the general population (0.13%) [8, 9]. The prevalence of syphilis among MSM in Nepal is also high (4%) [10]. Factors contributing to elevated rates of HIV infection and other STIs among MSM in Nepal include the presence of social stigma and discrimination, lack of adequate social protection and support, violence, sexual assault, and mental health issues [11-13]. These factors, whether alone or together, are associated with lower access to and use of condoms, HIV testing, and counseling services among MSM in Nepal [12]. Although Nepal's legal landscape is supportive and inclusive towards MSM, it remains a taboo subject, and awareness and understanding of MSM are lacking [13]. Few studies have documented negative attitudes, stigma, and discrimination toward LGBTQ individuals in Nepal, including in healthcare settings [9, 14-16]. Consequently, rates of HIV testing, prevention, and retention in care for those who are most vulnerable to HIV and are frequently marginalized, such as MSM, are low [9], highlighting the need for innovative strategies to reach and engage them in care.

Mobile health (mHealth) has emerged as a promising tool for improving global healthcare access and delivery [17]. Several studies have shown that mHealth can reach and engage MSM in HIV prevention and care, suggesting that mHealth interventions have the potential to improve HIV prevention efforts [18-23]. One systematic review found that mHealth

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interventions for HIV prevention and treatment were both feasible and acceptable among MSM, with interventions showing promising signs of preliminary efficacy [24]. Nepal has experienced significant growth in mobile phone ownership, with over 73% of the population owning smartphones and over 70% using the internet [25]. Moreover, one study reported that marginalized populations, including MSM, are using the internet daily for sexual expression which is more than among general populations [26]. This presents an opportunity to leverage mHealth technology to reach and engage MSM in HIV prevention in Nepal.

Despite the growing opportunity of mHealth interventions, research on the use of these interventions for HIV prevention among MSM in Nepal is limited. Our study sought to assess the willingness and preference to use mHealth-based interventions for HIV prevention and its determinants. We also aimed to understand the ownership, accessibility, and usage of communication technology among MSM.

Methods

Study Design and Participants

This study is part of a larger HIV/AIDS bio-behavioral cross-sectional survey that was conducted among 250 MSM participants in Kathmandu Valley, Nepal. Participants were eligible if they were 18 years or older, identified as gay, bisexual and men who have sex with men, spoke Nepali or English, and were willing to undergo screening for HIV and Syphilis. The survey was conducted between October and December 2022.

Study Procedures

To recruit study participants, we employed respondent-driven sampling, a network-based sampling method commonly used with hard-to-reach populations [27]. The recruitment chains were initiated with five MSM “seeds” purposively selected based on recommendations from community-based organizations providing services to MSM. We considered their sociodemographic and geographic representations. Each seed that completed the self-administered questionnaire with support from research assistant received five recruitment coupons to recruit their peers. In turn, subsequent participants were given five coupons to recruit additional peers. All participants provided informed consent before participating in the study.

Trained research assistants administered the questionnaire face-to-face to each participant in a private room, using Qualtrics, a survey tool. The survey took approximately 40 min to complete. Each participant received an incentive of 1000 Nepali Rupees (~ USD 8) for participating in the study. Those who recruited 5 eligible peers received 500 Nepali Rupees (~ USD 4) for each recruited. Details about the recruitment process and demographic information of the study participants are covered in other published articles [28, 29].

Ethics Approval

The study was approved by the institutional review boards at the University of Connecticut and the Nepal Health Research Council.

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Measures

Participant Characteristics—We gathered information about the characteristics of the participants, including their age, educational level, relationship status, income, diagnosis with HIV or other STIs (i.e., syphilis, chlamydia, gonorrhea), history of pre-exposure prophylaxis (PrEP) use, experience of violence, depressive symptoms experienced in the last two weeks, and engagement in anal sex, multiple sex partners, transactional sex, and condomless sex in the last six months. Similarly, we also collected information on lifetime engagement in injection drug use and chemsex (i.e., use of psychoactive substances before or during sexual activity).

Violence and Depressive Symptoms

The 4-item Hurt, Insult, Threat, and Scream (HITS) screening tool was used to assess the participants' exposure to violence. Each question was answered using a 5-point frequency format that ranged from "never" to "frequently," and score values ranged from 4 to 20. The final scores were classified into Normal (0–10) and Violence (11–25) [30].

The Patient Health Questionnaire (PHQ-9) instrument was utilized to evaluate depressive symptoms. The nine DSM-IV criteria were each assigned a score ranging from "0" (not at all) to "3" (nearly every day). A composite score of 0–27 was computed, and a score of 10 and above indicated experiencing moderate to severe depressive symptoms [31].

Access to and Frequency of Use of Communication Technology

We adapted a scale from previous studies [32-35] to measure how often participants used different communication devices, such as phones, tablets, laptops, and computers. Participants rated their technology use on a 5-point scale (ranging from 1, never, to 5, all the time). We also asked about their daily internet access, primary devices for accessing the internet, time spent online, and usage of smartphones for various activities using a 5-point Likert scale (ranging from 1, never, to 5, all the time). Additionally, we asked which geosocial networking apps or websites the participants currently use.

Willingness to Use mHealth

We adapted and utilized the mHealth willingness scale from previous studies [32-35]. The participants were asked to express their willingness to use ten different mHealth-related features: receiving medication reminders, screening, and monitoring sexual behaviors/activity, receiving information about HIV prevention, e-consultation with doctors, ordering HIV prevention supplies, receiving information on mental health, engaging in a mental health support group, monitoring cravings for chemsex, screening and monitoring illicit drug use, and receiving information about drug use treatment. The features were evaluated on a 5-point Likert scale ranging from 0 to 4 (0, never; 1, rarely; 2, sometimes; 3, often; and 4, all of the times). A score for the acceptance of mHealth was established by calculating the average cumulative score of 10 variables related to mHealth, with a higher score indicating a stronger level of acceptance. The respondents were also asked questions about how often participants preferred mHealth interactions (daily, weekly, or monthly) and their preferred

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mode (phone calls, text messages, emails, or apps). For example, if someone chose text messages, they were then asked how often they would like to receive them [32-35]..

Data Analysis

The IBM SPSS v. 29 software was used to conduct the data analysis. Descriptive statistics were computed by calculating frequencies and percentages for categorical variables and means, medians, interquartile range, and standard deviations for continuous variables. Additionally, we used multivariable linear regression to examine the factors associated with willingness to use mHealth, measured through the continuous variable of the mHealth acceptability scale. Covariates were chosen based on the prior research on mHealth acceptability [32, 34, 35] and were included in the multivariate model if they showed significance ($p < 0.1$) in the bivariate model. Estimates were based on probability criteria of p-value less than 0.05 for statistical significance.

Results

Participants Characteristics

The characteristics of the participants ($N = 250$) are summarized in Table 1. Most participants were between 20 and 30 (M = 27.6; SD = 8.9) years old and identified as Hindu (69.2%). Over half of the participants (58%) had completed high school or above, and 54.8% had a monthly income of USD 200 and above. Nearly two-thirds of the participants were single (64.4%).

Most of the participants were HIV-negative (98.4%), while 4.8% of participants were diagnosed with Syphilis. Much higher proportion of the participants reported ever using PrEP (30.4%) as compared to PEP (2.4%). In terms of mental health, 19.2% of participants reported experiencing moderate to severe depressive symptoms.

Regarding sexual behaviors, the majority of participants (72.8%) reported engaging in anal sex in the past 6 months, and nearly three-quarters of them (72.6%) reported having multiple sex partners during that period. However, only a small proportion of participants (16.4%) reported engaging in transactional sex. Consistent condom use during anal sex was reported by slightly more than half of participants (51.6%).

Access to and Frequency of Use of Communication Technology

Almost all (92.4%) participants owned or had access to a smartphone with internet access, while 7.6% had access to a basic cell phone without internet (Table 2). About 32.8% of participants reported having a laptop. A personal computer, tablet, and landline telephone were available to 10.4%, 10.4%, and 8.4% of participants, respectively. The frequency of use of communication technology devices was largely consistent with ownership and access rates. Smartphones were the most frequently used technology (mean 3.5, SD 1.0), followed by laptops (mean 1.0, SD 1.4), personal computers (mean 0.3, SD 0.9), tablets (mean 0.4, SD 0.9), basic cell phones (mean 1.3, SD 1.5), and landline telephones (mean 0.4, SD 0.8).

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The majority of participants (87.6%) had daily access to the internet. Notably, smartphones emerged as the dominant choice for internet access, with 94.4% of participants using them as their primary devices (Table 3). Participants spent about 7.2 h daily (SD 4.3) on the internet. Participants spend the most time on social networking (mean 3.1 h per day, SD 1.2) and sending or receiving emails (mean 1.3 h per day, SD 1.3). Participants also used their smartphones to search for health-related information (mean 1.6, SD 1.2), access geosocial networking applications/websites (mean 1.3, SD 1.4), and use health-related apps (mean 0.7, SD 1.1). More than three-quarters (76.5%) used any dating apps or websites (geosocial networking), with Blued (34.4%) and Grindr (32.4%) being the most popular (Fig. 1).

Willingness to Use mHealth

The participants' willingness and preferences in using mHealth strategies varied across the different purposes. The highest level of willingness was observed for receiving HIV prevention information (183/250, 73.2%) on a monthly basis (106/183, 42.4% of those who expressed their willingness) or weekly (47/183,18.8%) and in receiving information about drug use treatment (183/250, 73.2%) on a monthly basis (42.4%). This was followed by ordering HIV prevention supplies (162/250, 64.8%) on a monthly basis (99/162, 39.6%) or weekly (53/162, 21.2%). Additionally, participants were willing to e-consult with doctors (154/250, 61.6%) mostly on a monthly basis (112/154, 44.8%); receiving information on mental health (152/250 60.8%), monthly (106/152, 42.4%); receive PrEP medication reminders (141/250, 56.4 monthly (80/141, 33.2%); engaging in a virtual support group for mental health (132/250, 52.8%); screening and monitoring illicit drug use (76/250, 30.2%), monthly (17.6%); and monitoring the craving for chemsex (26/250, 10.4%), monthly. Most participants preferred mHealth interventions via mobile apps, followed by phone calls and websites. Monthly interactions were the preferred frequency for engagement in these mHealth strategies (Table 4).

Correlates of mHealth Acceptance

The median score for willingness to use mHealth was 10 (IQR: 3 to 17). In multivariable analysis, participants with a high school or above education ($\beta = 0.223$, $p = < 0.001$), had experienced violence ($\beta = 0.231$, $p = 0.006$), and had moderate to severe depressive symptoms ($\beta = 0.223$, $p = < 0.001$) were significantly associated with higher willingness to use mHealth strategies. However, monthly income above NPR 20,000 (USD 150) ($\beta = -0.153$, $p = 0.008$), disclosure of their sexual orientation to anyone ($\beta = -0.159$, $p = < 0.007$), and worry about being negatively judged by health care workers ($\beta = -0.136$, $p = 0.023$) were less likely to use mHealth strategies as shown in Table 5.

Discussion

Findings revealed high daily internet access rate and smartphone use among MSM in Nepal, substantial time spent online, especially on health-related information seeking, and a high level of willingness and acceptability of mHealth strategies, like mobile apps and websites. Findings support the feasibility of mHealth platform to deliver interventions on HIV and other co-morbidities (e.g., mental health services) among MSM in Nepal.

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The high level of willingness to receive HIV prevention information and information about drug use treatment through mHealth tools, primarily via smartphone apps, indicates a strong interest in and potential acceptance of digital interventions in the realm of HIV prevention. Implementing app-based interventions that provide accurate information, real-time updates, and resources for safe sexual practices can be highly effective in reaching this community and reducing the risk of HIV transmission. Websites can serve as platforms to offer information, resources, and guidance on addiction treatment, connecting users to relevant healthcare services [36]. Nearly two-thirds of the participants' willingness to order HIV prevention supplies through mHealth channels and e-consultations with doctors present an avenue for improving the essential HIV prevention services accessible. In Kathmandu, Nepal, the COVID-19 pandemic saw a significant increase in people using online health and counseling services, indicating a rising trend in mHealth adoption [37]. This creates a favorable environment to use mHealth and e-consultations to reduce barriers to HIV counseling and online ordering of HIV prevention supplies, ultimately promoting safer sex [38-40].. Implementing mHealth solutions for mental health support and general healthcare consultations can enhance access to medical advice and treatment, particularly for individuals who may face stigma or discrimination when seeking in-person care [41, 42]. The preference for mobile apps as the primary platform for mHealth interventions aligns with the ubiquity of smartphones and their convenience for health-related tasks. Developing user-friendly, culturally sensitive, and informative mobile apps can be key to reaching and engaging MSM in Nepal [43].

In contrast, lower willingness among participants for specific mHealth interventions, such as screening and monitoring sexual activity, cravings for chemsex, and illicit drug use, reveals notable insights. Concerns about privacy and the persistent stigma associated with discussing sensitive topics like sexual health might contribute to the hesitancy in engaging with digital monitoring [44, 45]. Cultural considerations, particularly in conservative societies, further influence the reluctance to openly share information about sexual activities. Trust in traditional healthcare settings and the preference for in-person discussions are evident, suggesting a need for cautious approaches in these domains. For monitoring chemsex cravings, the overwhelming reluctance can be driven by heightened sensitivity surrounding substance use, privacy concerns, and potential legal consequences [46, 47]. Addressing these concerns through culturally sensitive mHealth interventions with robust legal safeguards is crucial. User-centered design and clear communication about benefits can collectively contribute to building trust and encouraging user acceptance of these mHealth features.

People with higher educational attainment showed higher interest in the use of mHealth. This implies that individuals with more extensive educational backgrounds may be more comfortable with technology, emphasizing the need for tailored mHealth programs accommodating various levels of digital literacy [48, 49]. Higher levels of education are often associated with enhanced health literacy, which confers a more profound comprehension of health-related subjects, encompassing the advantageous aspects of technology in healthcare. Those with advanced educational backgrounds may exhibit heightened health consciousness and a proclivity towards actively utilizing health-related tools to improve their well-being. This heightened consciousness engenders a greater

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proclivity toward engaging with mHealth solutions. Moreover, MSM with higher educational attainment may possess a heightened awareness of HIV risk factors such as engaging in condomless sexual intercourse and having multiple sexual partners. Consequently, this heightened awareness may compel them to seek information about preventive measures for HIV through online resources.

Mental health and experiences of violence emerge as significant determinants of mHealth adoption. The positive relationships between depressive symptoms and experiences of violence with a willingness to use mHealth suggest that these digital platforms may serve as valuable resources for individuals facing mental health challenges or those experiencing violence [50]. In this lower-middle-income country, significant stigma surrounds mental health issues, particularly depression, which discourages people from seeking help in physical clinical spaces [51, 52]. As a result, many individuals turn to their mobile phones to access information and support. Additionally, members of the LGBTQ + community are concerned about disclosing their sexual orientation due to potential repercussions, which can contribute to mental health challenges. Consistent with the findings from existing literature, experiences of violence were significantly related to depressive symptoms [53, 54]. The convergence of violence, depressive symptoms, and stigma within the MSM community can create barriers to seeking in-person medical care at hospitals. Consequently, many may prefer the convenience and accessibility of mHealth solutions as an alternative means of addressing their healthcare needs. This underscores the potential of mHealth in providing vital mental health support services and assistance to vulnerable populations.

The disclosure of one’s sexual orientation also influences mHealth adoption, with a negative association observed between disclosure and willingness to use mHealth. Coming out has often been linked to positive outcomes, fostering a sense of authenticity and social support [55]. However, in the context of mHealth adoption, this negative association might be attributed to privacy concerns and the unique challenges faced by individuals within the LGBTIQA + community. It is plausible that those who have not disclosed their sexual orientation and sexual behavior perceive digital channels as safer and more discreet avenues for seeking support. The intersectionality of sexual orientation, stigma, and the digital landscape may create a complex dynamic wherein MSM may prioritize anonymity over openness because of concerns about potential discrimination or lack of understanding and social support [26, 56, 47].

On the other hand, MSM with higher incomes were less willing to use the mHealth platform. This association could be because high-income MSM often have better access to health care services [57], including in-person doctor visits and specialist care. Moreover, this result could be because high-income participants in this study may have more concerns about the privacy and security of their health data [46, 47], so they may feel uncomfortable sharing information via digital platforms. To bridge this gap and ensure equitable healthcare access across all income brackets, privacy protection is vital to foster trust and sustained engagement, ultimately facilitating improved healthcare access and healthier behaviors within this marginalized community.

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Furthermore, concern about being negatively judged by healthcare workers negatively impacts willingness to use mHealth. This underscores the importance of creating non-judgmental and supportive healthcare environments and positions mHealth as a crucial means of providing a safe and stigma-free space for individuals to access healthcare information and services [58]. These findings emphasize the complexity of factors that shape willingness to use mHealth interventions. To effectively promote mHealth adoption, interventions should be tailored to the unique needs and concerns of individuals with diverse backgrounds and experiences. Ensuring privacy, affordability, and non-discrimination within mHealth platforms is essential for building trust and fostering utilization, ultimately enhancing healthcare access and outcomes for this population.

The study has some limitations. First, the data relied on self-reported measures for topics such as sexual behaviors, substance use, and mental health, which might have been influenced by social desirability bias, leading to potential underreporting or misrepresentation of behaviors. Second, the focus of the study within the Kathmandu Valley limits the generalizability of the findings to MSM populations in other regions of Nepal. Third, although the study explored access and frequency of technology use, it didn't assess participants' literacy or proficiency in using smartphone applications or websites. Finally, the study solely relied on participants' willingness to engage with mHealth interventions. This measure might not accurately predict their actual usage behavior, thus providing a somewhat limited perspective on the real-world feasibility of mHealth strategies among MSM in Nepal. Despite these limitations, this study provides early evidence on mHealth on the prevention of HIV, which should be of interest to policymakers, health facility managers, and other stakeholders willing to work on digital health interventions in the future.

Conclusions

This study conducted in Nepal sheds light on the tremendous potential of digital health tools (e.g., smartphone apps and web-based) interventions for HIV prevention and overall well-being among the MSM community. Our findings not only highlight the widespread access to technology but also underscore the importance of tailored, culturally sensitive digital solutions to address the unique needs and preferences of this marginalized population. Despite this potential, factors like fear of judgment from healthcare providers and privacy concerns when disclosing their sexual orientation on digital platforms hinder their confident use of these resources. Moving forward, additional research using user-centered design principles is warranted to lead to the development of mHealth interventions that prioritize privacy and confidentiality and are intuitive, user-friendly, and tailored to the specific needs and preferences of MSM. Additionally, conducting usability testing and involving end-users and service providers (doctors, pharmacists, counselors) in the design process can optimize the functionality and acceptability of these mHealth interventions.

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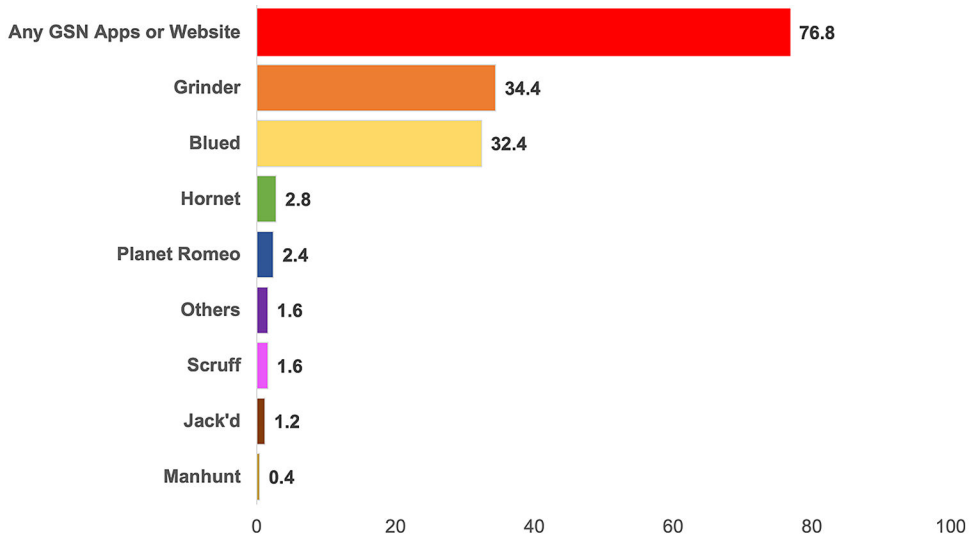

Fig. 1.
Use of geosocial networking apps and websites among participants (*N* = 250)

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Table 1

Characteristics of participants ($N = 250$)

Variables	Frequency (n)	Percentage(%)
Characteristics of participants		
Age (years): Mean (SD)	27.6 (8.9)	
Religion		
Hindu	148	69.2
Buddhist	53	21.6
Others	23	9.2
Level of Education		
Up to grade 10	105	42.0
High school and above	145	58.0
Relationship status		
Single	161	64.4
Partner	89	35.6
Monthly Income		
Less than USD 200	113	45.2
USD 200 and above	137	54.8
Ever had an HIV test		
No	85	34.0
Yes	165	66.0
HIV status		
Negative	246	98.4
Positive	4	1.6
Diagnosed with Syphilis		
No	238	95.2
Yes	12	4.8
Ever used PrEP		
No	174	69.6
Yes	76	30.4
Ever used PEP		

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Variables	Frequency (n)	Percentage(%)
No	244	97.6
Yes	6	2.4
Experienced violence		
No	214	85.6
Yes	36	14.4
Detained by police		
No	198	62.5
Yes	52	37.5
Depressive symptoms		
No	202	80.8
Yes	48	19.2
Ever injected drugs		
No	243	97.2
Yes	7	2.8
Engaged in anal sex *(past 6 months)*		
No	68	27.2
Yes	182	72.8
Multiple sex partners *(past 6 months)*	(n = 182)	
No	50	27.4
Yes	132	72.6
Engaged in Transactional sex *(past 6 months)*		
No	209	83.6
Yes	41	16.4
Condomless sex *(past 6 months)*	(n = 182)	
No	94	51.6
Yes	88	48.4

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Table 2

Ownership or access to and frequency of use of communication technology (N = 250)

Variable	Ownership / Access		Frequency of Use[a]
	Frequency	Percentage	Mean (SD)
Cell phone			
With internet access (Smartphone)	231	92.4	3.5 (1.0)
Without internet access (Basic phone)	19	7.6	1.3 (1.5)
Laptop	82	32.8	1.0 (1.4)
Personal Computer	26	10.4	0.3 (0.9)
Tablet	26	10.4	0.4 (0.9)
Landline telephone	21	8.4	0.4 (0.8)

[a]This was assessed using a 5-point Likert scale (0, never; 1, rarely; 2, sometimes; 3, often; 4, all the time)

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Table 3

Access to the Internet (N = 250)

Variables	Frequency	Percentage
Daily access to the Internet		
No	31	12.4
Yes	219	87.6
Primary device for accessing the Internet		
Smartphone	236	94.4
Laptops	2	0.8
Others	12	4.8
Time spent on the Internet (Hours per day) mean (SD)	7.2 (4.3)	
Use of the Internet on a smartphone for various activities[a], mean (SD)		
Online social networking	3.1 (1.2)	
Send or receive emails	1.3 (1.3)	
GSN apps/websites	1.3 (1.4)	
Search for health-related information	1.6 (1.2)	
Use health-related apps	0.7 (1.1)	

[a]This item was assessed using a 5-point Likert scale (0, never; 1, rarely; 2, sometimes; 3, often; 4, all the time)

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Table 4

Willingness and preference of mHealth among participants (N = 250)

Variable	Willingness to use mHealth	
	No	**Yes**
Willingness in using mHealth to:		
Receive medication reminders	109 (43.6)	141 (56.4)
Preferred frequency		
Daily		44 (17.6)
Weekly		43 (17.2)
Monthly		83 (33.2)
Never		80 (32.0)
Preferred mechanism		
Phone calls		52 (20.8)
Text messages		39 (15.6)
App notification		73 (29.2)
Websites		9 (3.6)
N/A		77 (30.8)
Screen and monitor sexual activity	174 (69.6)	76 (30.4)
Preferred frequency		
Daily		16 (6.4)
Weekly		27 (10.8)
Monthly		76 (30.4)
Never		131 (52.4)
Preferred mechanism		
Phone calls		11 (4.4)
Text messages		22 (8.8)
App		40 (16.0)
Websites		13 (11.7)
N/A		164 (65.6)
Receive HIV prevention information	67 (26.8)	183 (73.2)
Frequency		

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Variable	Willingness to use mHealth	
	No	Yes
Daily		40 (16.4)
Weekly		47 (18.8)
Monthly		106 (42.4)
Never		56 (22.4)
Preferred mechanism		
Phone calls		55 (22.0)
Text messages		42 (16.8)
App		36 (14.4)
Websites		54 (21.6)
N/A		63 (25.2)
e-Consult with doctors	96 (38.4)	154 (61.6)
Preferred frequency		
Daily		29 (11.6)
Weekly		37 (14.8)
Monthly		112 (44.8)
Never		72 (28.8)
Preferred mechanism		
Phone calls		121 (48.4)
Text messages		16 (6.4)
App		26 (10.4)
Websites		8 (3.2)
N/A		79 (31.6)
Order HIV prevention supplies	88 (35.2)	162 (64.8)
Preferred frequency		
Daily		26 (10.4)
Weekly		53 (21.2)
Monthly		99 (39.6)
Never		72(28.8)
Preferred mechanism		
Phone calls		85 (34.0)

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Variable	Willingness to use mHealth	
	No	Yes
Text messages		32 (12.8)
App		34 (13.6)
Websites		22 (8.8)
N/A		77 (30.8)
Receive information on mental health	98 (39.2)	152 (60.8)
Preferred frequency		
Daily		33 (13.2)
Weekly		40 (16.0)
Monthly		106 (42.4)
Never		71 (28.4)
Preferred mechanism		
Phone calls		83 (33.2)
Text messages		25 (10.0)
App		26 (10.4)
Websites		37 (14.8)
N/A		79 (31.6)
Monitor your craving for chemsex	224 (89.6)	26 (10.4)
Preferred frequency		
Daily		7 (2.8)
Weekly		6 (2.4)
Monthly		49 (19.6)
Never		188 (75.2)
Preferred mechanism		
Phone calls		6 (2.4)
Text messages		10 (4.0)
App		10 (4.0)
Websites		3 (1.2)
N/A		221 (88.4)
Screen and monitor illicit drug use	174 (69.6)	76 (30.4)
Preferred frequency		

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Variable	Willingness to use mHealth	
	No	Yes
Daily		15 (6.0)
Weekly		8 (3.2)
Monthly		44 (17.6)
Never		183 (73.2)
Preferred mechanism		
Phone calls		5 (2.0)
Text messages		5 (2.0)
App		23 (9.2)
Websites		9 (3.6)
N/A		208 (83.2)
Receive information about drug use treatment	67 (26.8)	183 (73.2)
Preferred frequency		
Daily		14 (5.6)
Weekly		47 (18.8)
Monthly		106 (42.4)
Never		56 (22.4)
Preferred mechanism		
Phone calls		10 (4.0)
Text messages		17 (6.8)
App		16 (6.4)
Websites		22 (8.4)
N/A		185 (74.0)
Engage in virtual support group for mental health	118 (47.2)	132 (52.8)
Preferred frequency *		
Daily		-
Weekly		-
Monthly		-
Never		-
Preferred mechanism		
Phone calls		61 (24.4)

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Variable	Willingness to use mHealth	
	No	**Yes**
Text messages		22 (8.8)
App		46 (18.4)
Websites		22 (8.8)
N/A		99 39.6)

Note: * Missing data

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Table 5

Multivariable linear regression correlates of mHealth acceptance among participants

Variables	Unstandardized Beta	Standard Error	Standardized Beta	Standard Error	p value
Age (Years)	−0.060	0.072	−0.063	−0.834	0.405
Religion	−1.395	0.741	−0.108	−1.882	0.061
Education	5.112	1.108	0.299	4.614	< 0.001
Relationship status	0.217	0.731	0.020	0.297	0.766
Monthly income	−2.591	0.976	−0.153	−2.655	0.008
Ever used pre-exposure prophylaxis	−1.067	1.151	−0.058	−0.926	0.355
Previously diagnosed with STIs	1.789	1.590	0.072	1.125	0.262
Perceived HIV risk	0.726	1.304	0.033	0.557	0.578
Depressive symptoms	0.511	0.132	0.223	3.878	< 0.001
Ever injected drugs	0.645	1.057	0.034	0.611	0.542
Social support	0.474	0.244	0.111	1.945	0.053
Experienced MSM related stigma	−0.108	0.093	−0.086	−1.168	0.244
Experienced violence	0.504	0.156	0.231	3.230	0.001
Living Status	1.280	1.130	0.064	1.133	0.259
Employment status	−0.756	0.957	−0.044	−0.790	0.430
Disclosed sexual orientation to anyone	−3.773	1.390	−0.159	−2.714	0.007
Worry about being negatively judged by health care workers	−1.249	0.546	−0.136	−2.288	0.023

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