



# Current and Future Perspectives of HIV Prevention Research Among Young Sexual Minority Men in South Korea

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## Abstract

Social stigma within Korean society hinders structural efforts to reduce HIV disparities among sexual minority men (SMM). To date, however, there have been limited intervention efforts to reduce HIV disparities among SMM in Korea. Therefore, the current mixed-methods study ( $n = 180$ ) explored young Korean SMM's perspectives on the acceptability of HIV prevention mHealth interventions to inform effective strategies for future intervention studies. We then analyzed participants' comments and suggestions on HIV research and examined associations with the acceptability of mHealth interventions. Through our textual coding and analysis, we identified four primary themes for comments and suggestions for HIV research in Korea: the centrality of stigma, health service accessibility, informational accessibility, and cultural adaptation. Our study suggests culturally adapted HIV intervention addressing stigma, health service accessibility, and information accessibility and mHealth interventions disseminating information and resources for stigmatized young SMM in Korea.

**Keywords** Sexual minority men · HIV prevention · Mhealth · Korea · Sexual orientation

## Introduction

Over the past 10 years, human immunodeficiency virus (HIV) incidence in South Korea has increased by 50%. In 2019, there were 1222 newly diagnosed patients, a 1.3% increase from the previous year (1). This is in contrast to other high-income countries, where new infections are steadily decreasing (Chapin-Bardales et al., 2018). Among those newly diagnosed in Korea, 91% were men and 63.7% were in their 20s or 30s (Korea Centers for Disease Control & Prevention, 2020). The National Korea HIV/AIDS cohort study was initiated in 2006 to follow HIV patients from 21 hospitals in Korea and address HIV disparities among men who have sex with men (MSM). Kim et al. (2019) analyzed this cohort ( $n = 1474$ ) from 2006 to 2018 and

found that sexual contacts with men who have sex exclusively with men and with men who have sex with both women and men (59.4%) were the most frequent modes of HIV transmission among men in Korea. Moreover, there was a higher percentage of sexual contact with men who have sex exclusively with men and with men who have sex with both women and men by HIV-infected males among young MSM. To date, however, there have been limited intervention efforts to reduce HIV disparities among sexual minority men (SMM) in Korea. Therefore, it is imperative to develop interventions that address stigma while also promoting HIV prevention behaviors, including condom use, HIV testing, and pre-exposure prophylaxis (PrEP) uptake. As a critical first step, the current mixed-methods study explores young Korean SMM's perspectives on the acceptability of HIV prevention mHealth interventions in order to inform effective strategies for future intervention studies.

Social stigma within the Korean society hinders structural efforts to reduce HIV disparities among SMM. According to a 2019 global study of national attitudes toward homosexuality, more than half of South Koreans (53%) say homosexuality should not be accepted by society (Poushter & Kent, 2020). This figure is especially notable when compared to other high-income countries such as Japan (22%), the USA (21%), Australia (14%), and Great Britain (11%) (Poushter & Kent, 2020). Homophobia

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and negative attitudes toward sexual minorities in Korea can be explained by the embedded cultural values of Confucianism, which emphasizes differentiated gender roles and heterosexual marriage, and Christianity in Korea, which teaches that homosexuality is a sin (Thomsen, 2019). These findings are concerning, as stigma and discrimination directed at sexual minorities bring unique stressors that have been related to HIV prevention and all stages of the continuum of care (Rice et al., 2017).

Socially disadvantaged statuses, such as being a sexual, racial, or gender minority, will expose those in the disadvantaged group to more stress (i.e., expectations of rejection, internalized stigma, and prejudice) than members of advantaged groups (Meyer, 2003). These experiences can lead to poor health outcomes due to limited engagement in HIV prevention services, higher engagement in sexual risk behaviors, or higher vulnerability to psychological distress (Bogart et al., 2011, 2013). For instance, in Korea, where MSM experience profound levels of discrimination, 38% of MSM have never tested for HIV in their lifetime (Sohn & Cho, 2012). This is in stark contrast to the USA, where only 15% of MSM have never tested for HIV in their lifetime (Noble et al., 2017). A deeper understanding of how stigma can impact MSM's engagement in the HIV prevention and care continuum supports the call for interventions that reduce stigma and promote HIV prevention and care outcomes.

mHealth interventions have been effective in addressing the cascade of the HIV care continuum, including linkage to care, retention in care, and initiation of antiretroviral therapy (Muessig et al., 2015; Mulawa et al., 2018), and have shown great potential for health promotion among young SMM given their appeal and reach (Visser et al., 2020). The high rate of technology use among youth makes mobile health interventions feasible and accessible, and it enables a quicker and more seamless spread of information (Hightow-Weidman et al., 2015a; Muessig et al., 2015). mHealth interventions may also provide greater access to social support, reduce the impact of stigma, and improve HIV care continuum outcomes (Bogart et al., 2011, 2013; Muessig et al., 2020; Mulawa et al., 2021). These examples underscore the potential effectiveness of mHealth interventions to reduce stigma and improve HIV outcomes for young SMM in Korea.

Our study has three objectives. First, we seek to characterize the acceptability of mHealth interventions and assess whether differences exist between respondents who responded to two open-ended survey questions and those who did not respond. Second, we further explore young Korean SMM's perspectives on HIV research by analyzing the responses to two open-ended survey questions. Lastly, we examine whether themes that emerged from the responses to two open-ended survey questions are associated with the acceptability of mHealth interventions.

## Method

### Study Design

From September to November 2020, we conducted an online survey among young Korean SMM (ages 18–35) living in the Seoul Metropolitan area. Survey domains included demographic characteristics, psychological facilitators, stigma, sexual behaviors including HIV/sexually transmitted infections (STI) testing, condom use, PrEP uptake, technology use, and acceptability of an HIV prevention intervention. The survey concluded with two open-ended questions:

- (1) If you have any questions and comments about this survey, please write them here.
- (2) If you have any suggestions for the study team, please write them here.

Given the limited research among Korean SMM, these questions aimed to give respondents the opportunity to provide context for their answers and share feedback with the study team. The current study includes a thematic content analysis of the responses provided to these open-ended questions and results from survey questions regarding the perceived usefulness of informational topics for an mHealth HIV/AIDS prevention intervention and the perceived likelihood of using various mHealth intervention features.

### Recruitment and Eligibility

Respondents were recruited through advertisements on a geosocial networking dating application, Korea's largest gay community website, and a gay Korean influencer's YouTube channel. Eligible respondents were those who self-reported: (1) male sex assigned at birth and current male gender identity; (2) an age of 18 to 35 years; (3) living in the Seoul Metropolitan area; (4) Korean nationality; (5) sexual minority identity (gay, bisexual, queer, or other), and (6) an HIV-negative or HIV-unaware serostatus.

### Procedures

Individuals who responded to a study advertisement were directed to an eligibility screener hosted on Qualtrics. Those who screened eligible received an email with links to complete an electronic informed consent form and the survey. On average, survey respondents took approximately 25 minutes to complete the survey and received no financial incentives for their participation. Among 180 survey respondents, 67 provided responses in either of the two open-ended survey items.

## Measures

We developed two questions to assess acceptability and willingness to engage in mHealth interventions. For acceptability of mHealth interventions, we asked a question with nine different domains of content (e.g., “If an app provided information below, how helpful do you think it will be?”) using a 4-point scale (1 = “Not at all useful” to 4 = “Very useful”). Nine domains were (1) condom use, (2) PrEP use, (3) HIV testing, (4) living with HIV, (5) healthy living, (6) life skills, (7) love and relationships, (8) greater sex, and safer sex, and (9) creating change. For willingness to engage in mHealth intervention, we asked a question with eight different domains of intervention features (e.g., “If an HIV prevention app provided features below, how likely would you use each feature?”) using a 4-point scale (1 = “Very unlikely” to 4 = “Very likely”). The eight features were: (1) brief articles on health and wellness tailored for MSM, (2) HIV/STI/sex questions answered by the HIV care provider, (3) resources to trusted HIV testing and care services, (4) discussion boards where participants can communicate with each other anonymously, (5) HIV home-based testing order, (6) gamification features (i.e., earning points) which they can trade for rewards, (7) telehealth counseling, and (8) user-to-user messaging.

## Data Analysis

Descriptive statistics were used to summarize sociodemographic characteristics and acceptability and willingness to engage in mHealth HIV prevention interventions. We compared descriptive statistics between respondents who completed any of two open-ended questions and those who did not using chi-squared tests.

Qualitative analysis of open-ended questions was limited to those individuals who completed the open-ended survey items ( $n = 67$ ). The subsample who responded to the open-ended questions was more likely to be older than 25 years old (71.6%) compared to those who did not contribute to the open-ended questions (52.2%;  $p = 0.012$ ). There were no other differences in sociodemographic characteristics between the sample who responded to the open-ended questions and those who did not.

Thematic analysis was adopted to identify young Korean SMM’s acceptability of HIV prevention interventions based on respondents’ themes that emerged from open-ended questions. Due to the manageable number of the open-ended responses, manual coding of the qualitative data was chosen over computer-assisted analysis. Before conducting the analysis, the first author translated responses written in Korean to English. A codebook was created by the first author and senior author through an iterative process. An initial list of codes was generated, and the first author applied these codes to selected transcripts. Then, a senior author read coded narratives, followed by the entire study team. Discrepancies between coders

were resolved through discussion and study team consensus. Through an iterative process, the number of topics was consolidated. The final codebook had four domains that captured stigma, health service accessibility, informational accessibility, and lack of cultural adaptation. Quotations are used to illustrate the commonalities and breadth of each topic. Quotations were minimally edited to protect identities and omit extraneous words.

After coding, we examined whether each participant had mentioned a coded theme and entered these data into our SAS database (i.e., 0 = not mentioned, 1 = mentioned). Then, we examined associations between each coding theme and acceptability and willingness to engage in mHealth HIV prevention interventions using chi-squared tests.

## Results

### Demographic Characteristics

Full demographics ( $n = 180$ ) are presented in Table 1 to describe the makeup of the full sample as well as those who responded to the open-ended questions and those who did not. The mean age of respondents was 26.5 years ( $SD = 4.2$ ). Just over half (52.8%) of the sample were university graduates, while only 41.9% reported an income greater than minimum wage. Most identified as gay (91.7%); less than half (42.2%) reported having a partner in a relationship or sexual partner; and two-thirds (67.2%) had tested for HIV in their lifetime.

### Acceptability and Willingness to Engage in mHealth HIV Prevention Interventions

Among the full survey sample ( $n = 180$ ), respondents were asked which HIV prevention topics would be useful in an mHealth HIV prevention intervention. In a “select all that apply” response, all response options were endorsed by more than half of the sample: HIV testing (92.7%), PrEP use (92.7%), living with HIV (86.0%), healthy living (79.2%), safer sex (75.3%), condom use (71.9%), creating social change (69.7%), love and relationships (57.3%), and life skills (52.3%).

When asked to select features that would be important in an mHealth HIV prevention intervention, respondents chose the ability to: ask HIV/STI/sex questions of HIV care providers (84.3%), locate trusted HIV testing and care resources (79.8%), order in-home HIV tests (79.2%), engage in online-delivered psychological counseling (79.2%), participate in anonymous discussion boards (71.4%), direct message other users (70.2%), and read brief articles on health and wellness tailored for SMM (56.2%). Less than half prioritized gamification features (42.7%).

There were no significant differences in acceptability and willingness to engage in mHealth HIV prevention interventions

**Table 1** Descriptive statistics by engagement in open-ended questions

	Total (N= 180)	Not answered open-ended questions (N= 113)	Answered open-ended questions (N= 67)	P-value
<i>Age, n (%)</i>				
18–24	73 (40.6)	54(47.8)	19 (28.4)	<b>0.012</b>
25–35	107 (59.4)	59 (52.2)	48 (71.6)	
<i>Sexual identity, n (%)</i>				
Other	15 (8.3)	10 (8.9)	5 (7.5)	1.00
Gay	165 (91.7)	103 (91.1)	62 (92.5)	
<i>Education, n (%)</i>				
Less than college degree	85 (47.2)	57 (50.4)	28 (41.8)	0.283
College degree	95 (52.8)	56 (49.6)	39 (58.2)	
<i>Income, n (%)</i>				
Less than minimum wage	104 (58.1)	69 (61.1)	35 (53.0)	0.347
Over minimum wage	75 (41.9)	44 (38.9)	31 (7.0)	
<i>Lifetime HIV testing, n (%)</i>				
No	59 (32.8)	41 (36.3)	18 (26.9)	0.250
Yes	121 (67.2)	72 (63.7)	49 (73.1)	
<i>Current partner, n (%)</i>				
No	104 (57.8)	64 (56.6)	40 (59.7)	0.756
Yes	76 (42.2)	49 (43.4)	27 (40.3)	
<i>Usefulness of HIV/AIDS prevention app</i>				
Condom use, n (%)	128 (71.9)	85 (75.9)	43 (65.2)	0.167
PrEP use, n (%)	165 (92.7)	105 (93.8)	60 (90.9)	0.555
HIV testing, n (%)	165 (92.7)	103 (2.0)	62 (93.9)	0.770
Living with HIV, n (%)	153 (86.0)	99 (88.4)	54 (81.8)	0.266
Healthy Living, n (%)	141 (79.2)	88 (78.6)	53 (80.3)	0.850
Life skills, n (%)	93 (52.3)	56 (50.0)	37 (56.1)	0.443
Love and relationships, n (%)	102 (57.3)	58 (51.8)	44 (66.7)	0.061
Greater sex, safer sex, n (%)	134 (75.3)	86 (76.8)	48 (72.7)	0.591
Creating change, n (%)	124 (69.7)	77 (68.8)	47 (71.2)	0.866
<i>Likely to use HIV/AIDS prevention app</i>				
Brief articles on health and wellness tailored for MSM, n (%)	100 (56.2)	65 (58.0)	35 (53.0)	0.535
HIV/STI/sex questions answered by the HIV care provider, n (%)	150 (84.3)	95 (84.8)	55 (83.3)	0.833
Resources to trusted HIV testing and care services, n (%)	142 (79.8)	90 (80.4)	52 (78.8)	0.848
Anonymous discussion boards, n (%)	127 (71.4)	84 (75.0)	43 (65.2)	0.173
HIV home-based testing order, n (%)	141 (79.2)	90 (80.4)	51 (77.3)	0.703
Gamification features, n (%)	76 (42.7)	45 (40.2)	31 (47.0)	0.434
Telehealth counseling, n (%)	141 (79.2)	90 (80.4)	51 (77.3)	0.703
User-to-user messaging, n (%)	125 (70.2)	81 (72.3)	44 (66.7)	0.498

between the sample who contributed to the open-ended questions ( $n = 67$ ) and those who did not ( $n = 113$ ). This underscores the high acceptability and willingness to engage in an mHealth HIV prevention intervention regardless of respondents' responses to those two questions. However, in textual analyses, we found critical considerations and adaptations that researchers need to consider when conducting HIV prevention research in Korea.

### Comments and Suggestions on HIV Research

The following section reports our qualitative analysis of the responses to the two open-ended questions that asked for comments and suggestions on HIV research. Through our textual coding and analysis, we identified four primary themes: the centrality of stigma, health service accessibility, informational accessibility, and cultural adaptation. Below we describe the respondents' comments and suggestions by theme and

additional representative quotes are presented in Table 2. Then, we compare whether thematic coding differences exist between respondents who mentioned topics related to the four themes and those who did not.

## Stigma

Among the 67 respondents who responded to either of the open-ended questions, 20 respondents mentioned stigma-related content. Respondents' suggestions for conducting HIV-related studies in Korea commonly included themes related

to internalized, anticipated, and experienced stigma. Several respondents reported that they could not answer the survey questions that asked about discrimination because they did not disclose their sexual identity to others. Due to social stigma toward sexual minority populations, respondents hid their sexual identity in their daily lives. For example, a 27-year-old gay man (study id = 46) wrote,

In the beginning, it was difficult to answer some questions about society's perception of MSM or sexual behaviors because there are sexual minorities who do not come

**Table 2** Exemplar quotes of comments and suggestions on HIV prevention research in Korea

Theme	Quotes
<i>Stigma</i>	
Disclose sexual identity	Most sexual minorities in Korea do not disclose their sexual identities at their jobs, military, or heterosexual friends. So, it was difficult to answer some of the questions (ex. there is no reason to be harmed when I did not reveal my sexual tendency)
Social rejection	There is concern over the direction of the research because keywords like 'MSM,' 'sexual minority men,' and 'STI,' carry highly negative connotation in Korea
Isolation	I don't have any friends who are the same sexual tendency
Abandonment	I think Korean institutes including family, neighborhood, and government don't want to be integrated with LGBTs. So if you are ready for developing something for us, you should hold on it. At least in Korea, anything like that can't be successful
<i>Health service accessibility</i>	
PrEP	In Korea, PrEP cost must drop, become more accessible, and easy to purchase. Currently, I have seen people buy PrEP from Thailand through unofficial (illegal) routes
Self-testing	To decrease health imbalance, I think there must be more online sellers of Oraquick or PrEP. I think the solution to the current societal perception is to create an environment where people can personally take care of their health rather than having a specialist directly care for it because the reason for the health imbalance is due to the concern over 'what if someone knows about this.'
<i>Informational accessibility</i>	
HIV	I think that all countries, not just Korea, have a low alertness of HIV. I don't use a condom because I don't think there is a chance of infection from sex between HIV-negative people but people must be aware of the fact that you could be infected from certain partners and it is dangerous
STI	I think the issue of STI compose a big part of MTM. It would be good if you can reveal whether if gay sex is the only way that statistically increases the likelihood of contracting STIs or if it is just another stereotype
Identity, sex, dating life	There is no organization or media that officially informs about a sexual minority individual's healthy and safe sex life or how to make appropriate social connections. I am 25 years old but I am still practically uninformed about douche, STI testing, prevention methods, and others. I think I will be really grateful if you can also research ways to increase information accessibility
<i>Cultural adaptation</i>	
Western-centric perspective	I strongly felt that most of the questions were focused on Western countries like the USA and Northern Europe that offer greater sexual minority rights
Translation errors	There are some items with questions and answers don't match, making it seem like it was translated from English to Korean with a program. So there are some I answered arbitrarily
Top-bottom expression	Isn't thinking of top or bottom as a man's or woman's role a heterosexual-centric view? Being on bottom does not mean taking a woman's role, it means the one who is being inserted into. You should not think that the two are one and the same



out - and hide them. For example, questions about being sexually harassed in the military or facing hardship in getting hired are difficult to answer for most gay people in the Seoul Metropolitan Area who hide the fact that they are sexual minorities.

Similarly, some respondents noted their inability to answer items regarding LGBTQ community attachment since they do not know if their friends shared the same sexual and gender identity. In addition, respondents were generally wary of the social sanctions and rejections related to homosexuality. These concerns led to negative predictions about the perceived usefulness/effectiveness of HIV prevention research among sexual and gender minority populations. A 23-year-old gay man wrote, *“I think Korean societal structures including family, neighborhood, and government don't want to be connected to LGBTs. So if you are developing something for us, you should hold on it. At least in Korea, anything like that won't be successful.”*

Responses acknowledged a lack of civil rights among sexual minority populations in Korea. In the context of persistent, oppressive social stigma, respondents also described a sense of hopelessness about the future. The following passage illustrates how hopelessness could act as a barrier to engaging in HIV-related research or interventions.

I am used to just hiding it or not revealing my sexual side while living alongside regular people. The society I've seen will not improve, we will continue to live the same lives, suffer discrimination, and while this will sometimes become an issue, it will again quiet down. We just won't be able to climb into the light from the dark. It has been quite some time since the rights of the sexual minority have disappeared. While these surveys are nice, I always think to myself, 'I wish they would stop making an issue out of this. I just want to live quietly in this society pretending to be normal.' (Age 31, gay)

Respondents' feedback highlights manifested stigma in the Korean society which results in concealing their sexual identity, experiencing social rejection and isolation, and feeling abandoned. Moreover, among respondents who mentioned stigma-related topics in their open-ended questions ( $n = 20$ ), more than half of them indicated that they would find the following topics useful in an mHealth HIV/AIDS prevention intervention (see Table 3): HIV testing (100%), PrEP use (90.0%), living with HIV (75.0%), healthy living (75.0%), safer sex (70.0%), condom use (60.0%), creating social change (55.0%), love and relationships (55.0%), and life skills (50.0%). When asked to select features that would be important in an mHealth HIV prevention intervention, respondents chose the ability to: order in-home HIV tests (85.0%), ask HIV/STI/sex questions of HIV care providers (80.0%), locate trusted HIV testing and care resources (75.0%), engage in online-delivered psychological counseling (75.0%), participate in anonymous discussion boards (70.0%),

directly message other users (60.0%), utilize gamification features (55.0%), and read brief articles on health and wellness tailored for SMM (40.0%).

## Health Service Accessibility

A second theme we identified among responses to the open-ended questions could be described as the accessibility of healthcare services (including cost and the services themselves). Approximately 10% of respondents ( $n = 7$ ) mentioned this theme among those who responded to the open-ended questions. Respondents understood the need for care, but did not know the details of how to act on this perceived need. As one individual reported,

In order to increase the sexual minority's accessibility to medical services, they must be very meticulously informed about the cost and processes to follow during the medical services. Simply telling them to confer with a doctor will not be helpful. (Age 26, bisexual)

Many respondents raised accessibility challenges specifically related to PrEP. These challenges focused primarily on the cost of being on PrEP and the limited availability of providers who prescribe PrEP. One respondent illustrated the intersection of these problems and recounted their use of a Gilead-supported medical assistance program for PrEP. Their experience trying to find options for continuing PrEP beyond the one-year support program prompted the following reflection:

...Although Korean medical services are quite advanced and PrEP is approved, I think the focus should be on the fact that accessibility to the above is very low and that the insurance charge and support programs are not properly established....Therefore, if this research is factoring in improving the public's perception of the Korean sexual minority population, especially about sex among MSM, please acknowledge the above information and work for the dissemination of PrEP. (Age 23, gay)

While PrEP costs were generally considered prohibitive, some respondents mentioned creative solutions to obtain and circumvent PrEP costs. For example, one 30-year-old gay man, wrote, *“In Korea, PrEP cost must drop, become more accessible, and easy to purchase. Currently, I have seen people buy PrEP from Thailand through unofficial (illegal) routes.”* Respondents also described how participation in research studies was another method for obtaining PrEP for free.

...As an anecdote, I currently am on an one-year support program by Korea Medical Assistance Foundation/Gilead at Seoul Asan Hospital. It expires soon and I will move on to the support program by the infectious disease division at Sinchon Severance Hospital. I don't think it's very good that people must search hard to receive selective support. (Age 23, gay)

**Table 3** Differences in sociodemographic characteristics and acceptability and willingness to use in mHealth HIV prevention interventions by themes ( $N=67$ )

	Stigma		Health service accessibility		Informational accessibility		Cultural adaptation	
	No ( $N=47$ )	Yes ( $N=20$ )	No ( $N=60$ )	Yes ( $N=7$ )	No ( $N=54$ )	Yes ( $N=13$ )	No ( $N=47$ )	Yes ( $N=20$ )
<i>Age, n (%)</i>								
18–24	14 (29.8)	5 (15.0)	16 (26.7)	3 (42.9)	12 (22.2)	7 (53.8)	15 (31.9)	4 (20.0)
25–35	33 (70.21)	15 (75.0)	44 (73.3)	4 (57.1)	42 (77.8)	6 (46.2)	32 (68.1)	16 (80.0)
<i>Sexual identity, n (%)</i>								
Other	4 (8.5)	1 (5.0)	4 (6.7)	1 (14.3)	4 (7.4)	1 (7.7)	4 (8.5)	1 (5.0)
Gay	43 (91.5)	19 (95.0)	56 (93.3)	6 (85.7)	50 (92.6)	12 (92.3)	43 (91.5)	19 (95.0)
<i>Education, n (%)</i>								
Less than college degree	20 (42.6)	8 (40.0)	27 (45.0)	1 (25.0)	<b>19 (35.2)</b>	<b>9 (69.2)</b>	<b>24 (51.1)</b>	<b>4 (20.0)</b>
College degree	27 (57.4)	12 (60.0)	33 (55.0)	6 (75.0)	<b>35 (64.8)</b>	<b>4 (30.8)</b>	<b>23 (48.9)</b>	<b>16 (80.0)</b>
<i>Income, n (%)</i>								
Less than minimum wage	22 (47.8)	13 (65.0)	32 (54.2)	3 (42.9)	27 (50.9)	8 (61.5)	24 (52.2)	11 (55.0)
Over minimum wage	24 (52.2)	7 (35.0)	27 (45.8)	4 (57.1)	26 (49.1)	5 (38.5)	22 (47.8)	9 (45.0)
<i>Lifetime HIV testing, n (%)</i>								
No	12 (25.5)	6 (30.0)	16 (26.7)	2 (28.6)	<b>10 (18.5)</b>	<b>8 (61.5)</b>	13 (27.7)	5 (25.0)
Yes	35 (74.5)	14 (70.0)	44 (73.3)	5 (71.4)	<b>44 (81.5)</b>	<b>5 (38.5)</b>	34 (72.3)	15 (75.0)
<i>Current partner, n (%)</i>								
No	26 (55.3)	14 (70.0)	36 (60.0)	4 (57.1)	31 (57.4)	9 (69.2)	27 (57.5)	13 (65.0)
Yes	21 (44.7)	6 (30.0)	24 (40.0)	3 (42.9)	23 (42.6)	4 (30.8)	20 (42.6)	7 (35.0)
<i>Usefulness of HIV/AIDS prevention app</i>								
Condom use, n (%)	31 (67.4)	12 (60.0)	37 (62.7)	6 (85.7)	33 (62.3)	10 (76.9)	31 (67.4)	12 (60.0)
PrEP use, n (%)	42 (91.3)	18 (90.0)	53 (89.8)	7 (100.0)	49 (92.5)	11 (84.6)	41 (89.1)	19 (95.0)
HIV testing, n (%)	42 (91.3)	20 (100.0)	55 (93.2)	7 (100.0)	50 (94.3)	12 (92.3)	43 (93.5)	19 (95.0)
Living with HIV, n (%)	39 (84.8)	15 (75.0)	49 (83.1)	5 (71.4)	44 (83.0)	10 (76.9)	36 (78.3)	18 (90.0)
Healthy living, n (%)	38 (82.6)	15 (75.0)	48 (81.4)	5 (71.4)	42 (79.3)	11 (84.6)	38 (82.6)	15 (75.0)
Life skills, n (%)	27 (58.7)	10 (50.0)	33 (55.9)	4 (57.1)	31 (58.5)	6 (46.2)	26 (56.5)	11 (55.0)
Love and relationships, n (%)	33 (71.7)	11 (55.0)	41 (69.5)	3 (42.9)	36 (67.9)	8 (61.5)	30 (65.2)	14 (70.0)
Greater sex, safer sex, n (%)	34 (73.9)	14 (70.0)	43 (72.9)	5 (71.4)	39 (73.6)	9 (69.2)	33 (71.7)	15 (75.0)
Creating change, n (%)	36 (78.3)	11 (55.0)	43 (72.9)	4 (57.1)	40 (75.5)	7 (53.9)	31 (67.4)	16 (80.0)
<i>Likely to use HIV/AIDS prevention app</i>								
Brief articles on health and wellness tailored for MSM, n (%)	27 (58.7)	8 (40.0)	31 (52.5)	4 (57.1)	27 (50.9)	8 (61.5)	23 (50.0)	12 (60.0)
HIV/STI/sex questions answered by the HIV care provider, n (%)	39 (84.8)	16 (80.0)	50 (84.8)	5 (71.4)	43 (81.1)	12 (92.3)	39 (84.8)	16 (80.0)
Resources to trusted HIV testing and care services, n (%)	37 (80.4)	15 (75.0)	46 (78.0)	6 (85.7)	41 (77.4)	11 (84.6)	37 (80.4)	15 (75.0)
Anonymous discussion boards, n (%)	29 (63.0)	14 (70.0)	37 (62.7)	6 (85.7)	34 (64.2)	9 (69.2)	32 (69.6)	11 (55.0)
HIV home-based testing order, n (%)	34 (73.9)	17 (85.0)	44 (74.6)	7 (100.0)	41 (77.4)	10 (76.9)	34 (73.9)	17 (85.0)
Gamification features, n (%)	20 (43.5)	11 (55.0)	27 (45.8)	4 (57.1)	25 (47.2)	6 (46.2)	24 (52.2)	7 (35.0)
Telehealth counseling, n (%)	36 (78.3)	15 (75.0)	45 (76.3)	6 (85.7)	40 (75.5)	11 (84.6)	36 (78.3)	15 (75.0)
User-to-user messaging, n (%)	32 (69.6)	12 (60.0)	40 (67.8)	4 (57.1)	33 (62.3)	11 (84.6)	31 (67.4)	13 (65.0)

Note. Significant associations are denoted by bold letters

A noteworthy finding from respondents' feedback was the inaccessibility of PrEP. Respondents had a high interest in PrEP, but barriers to care prevented them from receiving a PrEP prescription.

When asked to select the usefulness of an mHealth HIV/AIDS prevention intervention, (see Table 3) respondents who had comments on health service accessibility ( $n=7$ ) chose

the topics related to: HIV testing (100%), PrEP use (100%), condom use (85.7%), living with HIV (71.4%), healthy living (71.4%), safer sex (71.4%), creating social change (57.1%), and life skills (57.1%). Less than half prioritized love and relationships (42.9%). More than half of respondents who mentioned health service accessibility-related topics selected features that would be important in the following: order in-home HIV tests (100%), locate trusted HIV testing and care resources (85.7%), engage in online-delivered psychological counseling (85.7%), participate in anonymous discussion boards (85.7%), ask HIV/STI/sex questions to HIV care providers (71.4%), directly message other users (57.1%), utilize gamification features (57.1%), and read brief articles on health and wellness tailored for SMM (57.1%).

### Informational Accessibility

In addition to service and cost-related health accessibility, 19% ( $n = 13$ ) of respondents elevated the need for informational accessibility, including accurate information on HIV and PrEP, STI, sexual identity, sexual behavior, and dating. As one man described:

There is no organization or media that officially informs about a sexual minority individual's healthy and safe sex life or how to make appropriate social connections. I am 25 years old but I am still practically uninformed about douche, STI testing, prevention methods, and others. I think I will be really grateful if you can also research ways to increase information accessibility. (Age 23, gay)

The limited availability of trustworthy information and exposure to misinformation appeared to be affecting risk behavior. As one respondent described,

I don't use a condom because I don't think there is a chance of infection from sex between HIV-negative people but people must be aware of the fact that you could be infected from certain partners and it is dangerous. (Age 29, gay)

Respondents' feedback also suggested that the lack of sexual health information for sexual minority populations translated to the underuse of available prevention services and subsequently, health disparities. For example, as respondent 174 described, few people were aware that the OraQuick® rapid HIV test could be purchased online:

To decrease health imbalance, I think there must be more online sellers of OraQuick® or PrEP. I think the solution to the current societal perception is to create an environment where people can personally take care of their

health rather than having a specialist directly care for it because the reason for the health disparity is due to the concern over 'what if someone knows about this.' (Age 31, gay)

This response underscores the importance of having reliable information and self-administered health resources within a highly stigmatized societal context.

When asked to select the usefulness of an mHealth HIV/AIDS prevention intervention, respondents who had comments on health service accessibility chose topics related to: HIV testing (92.3%), PrEP use (84.6%), healthy living (84.6%), condom use (76.9%), living with HIV (76.9%), safer sex (69.2%), love and relationships (61.5%), and creating social change (53.9%) (see Table 3). Less than half prioritized life skills (46.2%). When asked to select features that would be important in an mHealth HIV prevention intervention, respondents chose the ability to: ask HIV/STI/sex questions of HIV care providers (92.3%), locate trusted HIV testing and care resources (84.6%), engage in online-delivered psychological counseling (84.6%), directly message other users (84.6%), order in-home HIV tests (76.9%), participate in anonymous discussion boards (69.2%), and read brief articles on health and wellness tailored for SMM (61.5%). Less than half prioritized gamification features (46.2%).

Respondents who discussed informational accessibility in their open-ended questions ( $n = 13$ ) had lower educational attainment (69.2%) and lower HIV testing rates (38.5%) compared to those who did not discuss informational accessibility in their open-ended questions ( $n = 54$ ; 35.2%,  $p = 0.03$ ; 81.5%,  $p = 0.004$ , respectively) (see Table 3). However, we did not find differences in acceptability of an HIV prevention intervention and perceived usefulness of intervention features between respondents who mentioned stigma-related responses and those who did not in their open-ended questions.

### Lack of Cultural Adaptation

Respondents ( $n = 20$ ) reported a lack of cultural adaptation in the survey we administered, including Western-centric perspectives and concepts, inappropriate translations, and survey measures that were not culturally appropriate or pertinent to Korean sexual minority populations. For example, one self-identified queer man wrote,

I felt strongly that most of the questions were focused on Western countries like the United States and Northern Europe that offer greater sexual minority rights. (Age 28, Queer)

In addition, this participant felt that the questions asking about their HIV prevention behaviors, such as PrEP uptake, HIV testing, and condom use, were not tailored appropriately



to Korean respondents. Most of the scales regarding the aforementioned behaviors were developed in Western countries, but in Korea, there are considerable differences in health services for LGBT people and the acceptance of LGBT people. In another example, a 30-year-old gay man wrote, “*I felt that the survey questions put the focus on US-centric medical/health discourse.*”

In addition to the Western-centric perspective, respondents pointed out inappropriate translations of English terms into Korean. Given that there were no universal or Korea-specific measures for the majority of our survey constructs, we translated measurements widely used in the USA without conducting psychometric analyses. In some cases, this resulted in confusion or discomfort. As one respondent explained,

It was hard to understand some prompts due to usage of unfamiliar words that were not words or expressions regularly used among the actual sexual minority. (Age 32, gay)

The most common mistranslation pointed out by respondents was how we chose to convey “top” and “bottom.” In the commonly accepted American English usage, a “top” is defined as someone who prefers the insertive role in sexual intercourse and a “bottom” is someone who prefers a receptive role. In our translation, we adopted common terminology used in Korean media, translating “top” as “man’s role” and “bottom” as “woman’s role.” Respondents expressed discomfort at this translation and recommended using the English words “top” and “bottom” as loanwords. For example, a 27-year-old gay man (study id = 57) wrote, “*Woman’s role/man’s role are expressions that are almost never used and are discomforting. I think it’s better to just write bottom/top.*”

More than half of respondents who mentioned stigma-related contents would find the following topics useful in an mHealth HIV/AIDS prevention intervention (see Table 3): HIV testing (95.0%), PrEP use (95.0%), living with HIV (90.0%), creating social change (80.0%), healthy living (75.0%), safer sex (75.0%), love and relationships (70.0%), condom use (60.0%), and life skills (55.0%). When asked to select features that would be important in an mHealth HIV prevention intervention, respondents chose the ability to: order in-home HIV tests (85.0%), ask HIV/STI/sex questions of HIV care providers (80.0%), locate trusted HIV testing and care resources (75.0%), engage in online-delivered psychological counseling (75.0%), directly message other users (65.0%), read brief articles on health and wellness tailored for SMM (60.0%), and participate in anonymous discussion boards (55.0%). Less than half prioritized gamification features (35.0%).

Respondents who discussed the lack of cultural adaptation in their open-ended questions ( $n = 20$ ) had higher educational attainment (80.0%) compared to those who did not discuss cultural adaptation in their open-ended questions ( $n = 47$ ; 48.9%;  $p = 0.03$ ) (see Table 3). We did not find differences in

acceptability of an HIV prevention intervention or perceived usefulness of intervention features between respondents who mentioned cultural adaptation responses and those who did not in their open-ended questions.

## Discussion

Our findings highlight the need for, and interest in, HIV prevention research and interventions among young Korean SMM. mHealth interventions are a promising place to start, given the high level of societal stigma and the hidden identity of many SMM. Respondents emphasized the lack of actionable information for SMM around accessing healthcare services, online resources, and adopting individual-level self-protective behaviors. In advancing the HIV research and intervention agenda for Korean SMM, respondents were very clear that using a cultural adaptation lens is essential for conducting appropriate, acceptable research that avoids imposing a Western-centric frame of reference.

In Korea, high levels of stigma exist for sexual and gender minorities. Given that complex stigma is associated with a higher risk of negative health outcomes, including psychological distress, substance use, suicidality, and engagement in sexual risk behaviors (Bogart et al., 2011, 2013; Maulsby et al., 2014), rigorous efforts are needed to reduce internalized stigma, social rejection, and isolation among this population in Korea. Moreover, social isolation and lack of community attachment among SMM in Korea are particularly concerning given the complex role of LGBTQ community attachment and connectedness as a resilience source that also buffers HIV risk behaviors (Lee et al., 2021; Meanley et al., 2021; Moody et al., 2018). Improving individual empowerment and community empowerment reduces the negative effects of stigma and social isolation on health outcomes (Fergus & Zimmerman, 2005; Herrick et al., 2014). Empowerment is a psychosocial process that helps individuals make decisions. Also, sexual empowerment encompasses emotional support (Choi et al., 2021a, 2021b; Choi et al., 2021a, 2021b). Therefore, it is essential to connect sexual and gender minorities to each other for social support. Previous intervention studies have shown the effectiveness of empowerment-based interventions on stigma reduction. For example, a randomized trial of an online HIV risk reduction intervention utilizing empowerment reduced stigma and discrimination and sexual risk behavior of young MSM (Hightow-Weidman et al., 2011, 2015b, 2018; Muessig et al., 2015). Given the effects of empowerment-based interventions on stigma reduction, future empowerment-based intervention studies are warranted for young SMM in Korea.

mHealth interventions are promising for health promotion demands among sexual minority populations, given their appeal and broad reach. However, to our knowledge, there are no current mobile health intervention studies available for sexual and gender minority populations in Korea. We highlight the high

acceptability and feasibility of mobile health HIV prevention interventions among young SMM in Korea regardless of their participation in two open-ended questions. In the Korean context, a mobile health intervention focusing on communication with healthcare providers could reduce informational inaccessibility. Discussing sexual activities and sexual health with a healthcare provider is an ideal option for Korean SMM and may improve access to health care. However, there remains the risk of discomfort expressed by SMM when discussing their concerns with healthcare providers. Our study also emphasizes the need for mobile health interventions for young SMM, particularly in terms of communication with healthcare providers. When young Korean SMM were asked about HIV prevention intervention features, the most popular feature was the ability to ask HIV- and sex-related questions to care providers. Moreover, a cross-sectional survey of people living with HIV in 25 countries (Okoli et al., 2021) further underscores the need for communication with healthcare providers among sexual and gender minorities in Korea. According to the study, only 38% of Koreans discussed the “Undetectable Equals Untransmittable” or “U=U” campaign with their healthcare provider, the lowest rate among the 25 observed countries.

Stigma and discrimination also challenge HIV prevention and care accessibility in Korea. Given that speaking openly about sex and sexuality is taboo in Korea, information on sex and sexuality is hard to come by. We found that young SMM desire greater information accessibility, particularly among young SMM who had lower educational attainment. Local health centers used to provide free anonymous HIV testing and counseling in Korea. This service, however, has been suspended due to the COVID-19 pandemic, resulting in increased testing barriers. Therefore, encouraging HIV testing by promoting information on the physical locations of testing centers or by introducing alternative home-based testing is necessary in Korea. Testing locator interventions have been demonstrated to be an accessible, measurable, and effective method to connect people quickly and easily to HIV prevention, testing, mental health, and other services (Cozier & Gomez, 2011). In addition to testing locator interventions, future interventions can deliver accurate information regarding transmission (e.g., HIV and sexually transmitted infections), safer sex (e.g., using condoms and PrEP), sexuality (e.g., creating supportive environments for sexual and gender minorities), and partner seeking behaviors (e.g., dating).

Testing opportunities can also help bolster PrEP access and uptake among young SMM. In 2018, the Ministry of Food and Drug Safety in Korea approved the emtricitabine/tenofovir disoproxil fumarate (FTC/TDF) for use as PrEP. Mathematical modeling studies suggest that PrEP is a cost-effective way to reduce HIV incidence in South Korea among MSM (Choi

et al., 2020; Kim et al., 2014). However, our study highlighted the presence of stigma and lack of accessibility as barriers to PrEP despite its high demand. The national insurance reimbursement policy only exacerbates the problems arising from limited access to PrEP. Currently, Korea National Health Insurance reimburses 30–60% (depending on the pharmacy type) of the total cost for PrEP only if the patient is classified as part of a high-risk group, which includes anyone who has an HIV-infected partner. If they do not have a partner living with HIV or do not wish to disclose their partner’s status, individuals would have to pay the full cost of 13,474 won (approximately 11 US dollars) per pill. Taken together, these findings suggest the need to develop and test efficient and effective policies and implementation science strategies that may facilitate PrEP access and uptake in Korea (Glasgow et al., 2013; Sturke et al., 2020).

Our study highlights the need to consider cultural acceptability in transnational research. We translated questions widely used in Western countries; however, respondents pointed out a lack of cultural relevance regarding how Korean society conceptualizes LGBT prejudice and discrimination. Future research in Korea is needed to translate and cross-culturally adapt existing scales, as a culturally adapted scale helps make measurements more accurate and data more valid. The utilization of a youth advisory board is also suggested in future research. Youth advisory board members can provide feedback on developing culturally adapted instruments and intervention features and can suggest appropriate language. Future researchers can inform their research with youth advisory board feedback and build upon the gaps in this study which adopted language used in media rather than in the community.

## Limitations

Our study had several limitations. First, the study was developed for quantitative analysis, but we had meaningful results in two open-ended questions that we could not ignore. We analyzed responses to the two open-ended survey questions, but they are unlikely to support rigorous qualitative insights due to short responses. Because the data of this study were not collected during the interview process, but were suggestions in open-ended questions, our understanding of the context in which the suggestions were made is limited. Second, our study could not address the experienced HIV stigma among people living with HIV. This study discussed intersectional stigma, but this does not include experienced HIV stigma. Future research examining the experiences of people living with HIV is warranted. Third, this study was conducted during the COVID-19 pandemic which might affect people’s mental health and perspectives on care and needs. These results need to be interpreted while carefully considering this contextual factor. Fourth, the large sample size was recruited through a geosocial dating application. Dating applications have become a prominent venue for meeting sexual partners

among young SMM in the USA, but there is little information on online dating application usage among young SMM in Korea. Therefore, there is a possible lack of external validity, whether the study can generalize the findings from the sample to the population, in this study. Future research that includes various modes of participant recruitment is suggested.

## Conclusion

This is the first study to propose future directions in research for young SMM in Korea informed by members of the population. The HIV rate among sexual and gender minority men in Korea is increasing every year, and there is no doubt that HIV disparities exist among SMM. Our findings demonstrate the need for cross-national research to advance cultural adaptation and empowerment-based interventions to reduce stigma and increase access to care. While there is concern about conducting HIV prevention research among sexual minorities in Korea due to the stigma surrounding homosexuality, there is also the beginning of a positive societal movement toward greater rights for sexual and gender minority populations. Culturally adapted HIV interventions that address stigma, health service accessibility, and information accessibility have great potential for reducing HIV risk in Korea. Technology-based interventions are a particularly promising approach to mitigating risk and disseminating information and resources within a high stigma setting.

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**Availability of data and material** Not applicable.

## Declarations

**Conflict of interest** The author has no conflicts of interest.

**Ethical Approval** All study procedures were approved by the Institutional Review Board at the University of Pennsylvania (protocol #843154).

**Informed Consent** Informed consent was obtained from all individual-participants included in the study.

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