

Facilitators and Barriers of HIV Self-Testing Among Chinese Men Who Have Sex With Men: A Qualitative Study

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Abstract

HIV self-testing (HIVST) could increase HIV testing. However, HIVST uptake rate among Chinese men who have sex with men (MSM) is low. We conducted qualitative interviews with 23 MSM, 4 workers from community-based organizations, and 7 officials from both provincial Centers for Disease Control and Prevention and affiliated city-level Centers for Disease Control and Preventions to explore facilitators and barriers of HIVST among Chinese MSM. Eight barriers were identified, including fear of being duped by a fake test, concern for cost, fear of disclosing sexual orientation, limited access, lack of consulting services, biosafety concerns, lack of policy support, and concern for lost opportunities to link men to care. Five facilitators were identified, including convenience, confidentiality, easy operation, partner HIV testing, and peers' influence. Officials and scholars should urgently address structural barriers and provide accessible, affordable, and high-quality HIVST services that are accompanied by counseling to develop culturally appropriate HIVST guidelines.

Key words: barriers, facilitators, HIV self-testing, men who have sex with men, qualitative study

China's HIV prevalence has shifted from a drug-driven epidemic to a sexual activity-driven epidemic, with an especially rapid increase in the number of HIV infections among men who have sex with men (MSM; Meng et al., 2013; Xu et al., 2016). However, a

considerable number of Chinese MSM have not been tested for HIV. Data from the Joint United Nations Programme on HIV and AIDS (UNAIDS) revealed that only 58.5% of Chinese MSM had had HIV tests in the past 12 months by the end of 2018 (UNAIDS, 2020). Inadequate access to HIV testing and frequency of HIV testing, multiple sexual partners, and high frequency of high-risk sexual contact have the potential to aggravate the HIV epidemic among the MSM population. Furthermore, considering that 70% of MSM are married to women because of the Chinese cultural context of "filial piety," which emphasizes heterosexual marriage and delivering children to pass down the family name (Zhang, Li, Shi, Yang, & Zhang, 2002), there is also the risk of the epidemic expanding beyond the MSM population into the general population through sexual relations with women (Wang et al., 2015; Zou et al., 2010).

With timely HIV testing and the initiation of anti-retroviral therapy (ART), HIV-related deaths have been greatly reduced, and the risk of HIV transmission could also decrease because of the strategy of "treatment as prevention" (UNAIDS, 2017). A longitudinal study among serodiscordant gay couples indicated that the HIV transmission risk was zero for people living with HIV (PLWH) who were virologically suppressed despite engaging in unprotected sex (Rodger et al., 2019). Conversely, late diagnosis and delayed access to ART remain the main reasons for the increasing numbers of HIV-related deaths in China and other areas of the world

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(Croxford et al., 2017; Han et al., 2015; Lakoh, Jiba, Kanu, Poveda, & Yendewa, 2019). Thus, it is essential to scale up HIV testing to identify more PLWH and link them to ART. Improving HIV testing is also an essential step to achieve the “90-90-90” goals set by the World Health Organization (WHO; UNAIDS, 2017).

Globally and especially in China, fear of stigma and discrimination associated with HIV and homosexuality, extensive geographic distance to a test site, and/or long waiting times for testing results have been identified as the biggest barriers for MSM to access facility-based HIV testing (Liu et al., 2015; UNAIDS, 2014). HIV self-testing (HIVST) has the potential to overcome those barriers because of its convenience and privacy; with HIVST, people collect their own specimens, perform their own HIV tests, and read the testing results by themselves (WHO, 2017). A literature review indicated that most high-risk populations reported high acceptability for HIVST (67%; Figueroa, Johnson, Verster, & Baggaley, 2015).

The WHO issued a guideline to advocate for HIVST and partner notification to promote HIV testing globally (WHO, 2017). This encourages countries to develop their own practical, culturally appropriate approaches to implementing HIVST. China is currently expanding HIV testing by integrating the HIVST approach into routine facility-based HIV testing services (General Office of the State Council of China, 2017). However, the uptake rate of HIVST among Chinese MSM has remained low, ranging from 6.1% to 26.2% (Han et al., 2014; Wong, Tam, Chan, & Lee, 2015; Yan et al., 2015). An in-depth understanding of experiences of HIVST is needed to develop an appropriate approach to promote HIVST and to scale up HIV testing among MSM in China. Thus, this qualitative study was conducted to explore the facilitators and barriers of HIVST among Chinese MSM.

Methods

Study Design

This was a descriptive qualitative study. A socioecological framework was adopted to guide the exploration of the barriers and facilitators on HIVST from individual, interpersonal, and healthcare system levels, and thereby, provided a comprehensive understanding of the multilevel factors influencing health promotion or disease prevention programs (Ruisseñor-Escudero et al., 2017). This study was reported following Standards for Reporting Qualitative Research (see text document, Supplemental Digital Content 1, <http://links.lww.com/JNC/A6> shows Standards for Reporting Qualitative Research checklist).

Participants

To obtain a situational understanding of facilitators and barriers in relation to HIVST, participants were classified into the following three groups of individuals: MSM, representatives from gay-friendly community-based organizations (CBOs) in China, and representatives from the provincial- and city-level Centers for Disease Control and Prevention (CDC).

To be included in the study, MSM needed to meet the following criteria: (a) be 18 years or older, (b) have had condom-less sexual intercourse with men during the past year, (c) have heard about HIVST, (d) currently be a resident in Hunan Province of China and have been so for at least 6 months, and (e) be able to give verbal informed consent. Recruitment flyers for MSM participants were posted at gay-friendly CBO sites (in the entrance halls), HIV treatment sites, gay bars and gay recreation centers (bath centers), and on social networking media (WeChat, QQ, and Blued). In addition, MSM participants were recruited through referral by CBO workers.

Community-based organization members who participated in the study (a) were working in the Hunan Province, (b) had delivered HIVST kits before and/or had been involved in distribution programs for HIVST kits, and (c) were able to give verbal informed consent. The inclusion criteria for CDC officers were (a) working in the Hunan provincial CDC or affiliated city-level CDCs, (b) be in charge of the HIV testing program or HIV prevention program among MSM, (c) be able to give verbal informed consent. CBO and CDC participants were contacted via email.

Study Settings

Four cities in Hunan Province of China were selected as the study locations. The Hunan Provincial CDC recorded 33,518 HIV cases as of the end of 2018, and of these, approximately 6,000 were new infections in 2018 (Hunan Provincial Health Commission, 2018). In total, 95.3% of new infections in Hunan were through sexual contact, with 17.8% from male-to-male sexual behaviors. A gay-friendly CBO was the collaborative organization for this study; it had sublocations in each of the four cities.

Data Collection

Data were collected through semistructured in-depth interviews with MSM, a focus group discussion (FGD) with CBO workers, and a separate FGD with CDC

officers. Before the interviews, all MSM participants were asked to complete a brief sociodemographic information sheet, which covered age, race, marital status, educational background, income, employment status, and HIV testing experience. The semistructured in-depth interview guide focused on MSM's perceptions of barriers and facilitators in relation to HIVST. Each of the in-depth interviews lasted between 30 and 60 min (see text document, Supplemental Digital Content 2, <http://links.lww.com/JNC/A7> shows Interview Guide for MSM, CBO Workers, and CDC Officers).

A sociodemographic sheet for each CBO participant and each CDC participant was also administered ahead of the interview; it included age, race, marital status, educational background, and work experience. The FGD interview guide for CBO workers mainly focused on approaches to the delivery of HIVST kits, support services after using HIVST kits, and facilitators and barriers for MSM to use HIVST. The FGD interview guide for CDC officers mainly focused on the current policy and strategies for the implementation of HIVST and facilitators and barriers to use of self-testing kits for MSM (see text document, Supplemental Digital Content 2, <http://links.lww.com/JNC/A7> shows Interview Guide for MSM, CBO Workers, and CDC Officers). The FGDs for CBO workers and CDC officers lasted for approximately 1.5 hr.

Interviews and FGDs were conducted in convenient and confidential locations to protect participants' privacy. A research assistant was assigned to each interview and FGD to monitor the process and assist the interviewer (e.g., making the appointment with the interviewee, preparing the digital recorder, and adding probing questions). Data collection and analyses were conducted simultaneously. The sample size was determined by the data generated and development of themes (Braun & Clarke, 2006). All communication with participants was in Mandarin. All interviews were recorded using a digital recorder after obtaining verbal informed consent, and all audio recordings were transcribed verbatim into word files as soon as possible after the interview. All identifiers of the transcripts were omitted. NVivo 11.0 software was used to help organize data and manage data analysis.

Data Analysis

The sociodemographic data were summarized for simple description. The transcripts were analyzed using the six-step approach to thematic analysis recommended by Braun and Clarke (2006). After becoming familiar with the data by listening to the digitally recorded interviews

and reading the verbatim transcripts repeatedly, two investigators (X.L., C.Z.) performed initial coding independently. Facilitators and barriers to the implementation of HIVST among Chinese MSM were identified. Then, we developed a list of codes that identified noteworthy and interesting features. The codes were examined and grouped into different themes and reviewed by a third investigator (H.W.). Analysis ceased when a consistent pattern in each theme was formed. Discrepancies among two reviewers were discussed with a third investigator (H.W.) until agreement was reached. Themes were named based on their content. Representative examples of quotations for each theme were translated into English by the first author (C.Z.) and back translated by the fifth (H.W.) author. Discrepancies were resolved by discussion with the second author (X.L.).

Several methods were performed to ensure the trustworthiness of this study. Credibility was ensured by the following approaches. First, member checks were used by sending the transcripts back to participants, and all participants approved the transcripts. Second, all researchers received qualitative methodology training. Third, scheduling allowed for adequate interview time (30–60 min for in-depth individual interviews; 1.5 hr for FGD) to collect data; understand participants' culture, language, and ideas; and check the accuracy of provided information. Fourth, diverse participants with varied experiences (e.g., MSM, CDC officers, CBO workers, PLWH, people without HIV, single MSM, and married MSM) were recruited to ensure comprehensive information. Dependability was demonstrated by stepwise replication. Two independent investigators performed data analysis, and discrepancies were resolved by discussion with a third investigator. Confirmability was ensured by audit trails, including memos and transcripts. Transferability was established by explicitly describing the social and cultural context in relation to the findings (e.g., study setting, participants, and procedures).

Ethical Consideration

Ethical approval was obtained from the Institutional Review Board of the University of California at Los Angeles (Approval No. 17-000664-CR-00002) and the Institutional Review Board for Behavioral and Nursing Research of Central South University, Xiangya School of Nursing (Approval No. 2018002). Verbal informed consent was obtained before each interview and after participants had a full understanding of the study purpose, the topics to be discussed, and the risks and

benefits. Participants were provided with an option to review the audio recordings and had the right to erase all or some of the information. The digital and word files were destroyed after verification of accuracy of the verbatim transcriptions.

Results

Participant Characteristics

All interviews were conducted from January to August 2018. Analysis of the interview transcripts from 23 MSM, 4 CBO workers, and 7 officials from both provincial- CDC and affiliated city-level CDCs led to a clear

definition of the scope and content of each theme (Braun & Clarke, 2006). All MSM participants had received HIV tests before, and 82.6% (19 of 23) had performed HIVST; specifically, 68.4% had used blood-based finger-prick HIVST kits, and 31.6% had used oral-based HIVST kits. Five of the 23 MSM participants who had used HIVST in the past reported receiving positive self-testing results. Sociodemographic characteristics of participants are presented in Table 1. Among MSM participants, most had a college education and were permanently employed. Most of the CBO worker participants, and all of the CDC participants had experience working in HIV prevention.

Table 1. Sociodemographic Characteristics of Participants

Demographic	MSM (<i>n</i> = 23)	CBO workers (<i>n</i> = 4)	CDC officers (<i>n</i> = 7)
Age, year	30.0 (10.6)	32.5 (6.56)	48.3 (3.50)
Race			
Han	21 (91.4)	4 (100.0)	7 (100.0)
Other	2 (8.6)	0 (0.0)	0 (0.0)
Educational background			
High school or vocational school	1 (4.3)	0 (0.0)	0 (0.0)
College level	21 (91.4)	4 (100.0)	6 (85.7)
Master's and above	1 (4.3)	0 (0.0)	1 (14.3)
Marital status			
Single	16 (69.7)	3 (75.0)	0 (0.0)
Married	6 (26.0)	0 (0.0)	7 (100.0)
Divorced	1 (4.3)	1 (25.0)	0 (0.0)
Income per month, USD			
No income	4 (17.4)	NA	NA
<\$300	2 (8.7)		
\$300–\$699	8 (34.8)		
\$700–\$1,399	6 (26.1)		
\$1,400 or higher	3 (13.0)		
Employment status			
Permanently employed	16 (69.7)	4 (100.0)	7 (100.0)
Temporarily employed	1 (4.3)	0 (0.0)	0 (0.0)
Student	5 (21.7)	0 (0.0)	0 (0.0)
Retired	1 (4.3)	0 (0.0)	0 (0.0)

Note. Data were presented as *M* (*SD*) or *n* (%). CBO = community-based organizations; CDC = Centers for Disease Control and Prevention; MSM = men who have sex with men; NA = not applicable.

Barriers to HIV Self-Testing

Eight major themes were identified as barriers to HIVST; they are presented in Figure 1. Two barriers were classified as being at the individual level: fear of being duped by a fake test and concern for cost. One barrier was at the interpersonal level: fearing disclosure of sexual orientation. Five barriers were at the healthcare system level: limited access, lack of consulting services, biosafety concerns, lack of policy support, and concern for lost opportunities to link men to care.

Individual Level

Fear of being duped by a fake test. Many participants expressed fear because of concerns about the quality of HIVST kits. For example, participants were afraid that they may end up buying fake kits because of the lack of regulation of the online market.

I will not buy (kits) through the internet again. I worry about the quality of kits bought online because the quality was not guaranteed. I mean you cannot tell the quality of HIVST kits sold online. (45-year-old, divorced, HIV-negative, having taken HIVST)

They were uncertain about the reliability and accuracy of the results of HIVST kits purchased online. One participant did an experiment by simultaneously testing with two kits; inconsistent results eroded his trust in either product.

I once performed two self-tests at the same time. However, there were two different testing results. One was a positive result, and the other was a negative result. I will never believe the testing results (sensitivity) of HIVST kits. (21-year-old, single, HIV-positive, having taken HIVST)

Another sought assurance of the accuracy of the HIVST kit results by contacting the company, but this only increased lack of trust.

When I first used HIVST kits, I was a little suspicious of the accuracy of the HIVST kit results because I did not know how accurate the kits were. I consulted online with customer service, and she told me that the accuracy rate was not a 100% and recommended me to try different brands of kits. (40-year-old, married, without HIV, having taken HIVST)

Concern for cost. Most participants believed that the price of the kits sold online was much higher than that they expected, especially for economically vulnerable populations, such as students who were MSM. CBO staff members also expressed their concerns for the high price of kits in some pilot pharmacies (before promoting HIVST kits in all pharmacies, some pharmacies were selected as pilot pharmacies to check the feasibility of selling HIVST kits in pharmacies).

It is expensive to buy kits online. A variety of brands, including domestic and imported brands, differ in price. I think that it will be appropriate if the price is limited to 30 Yuan (3 dollars) or so. However, there is none (product less than 3 dollars). For some brands, kits are 100 Yuan (about 14.2 dollars). (22-year-old, single, without HIV, not taking HIVST)

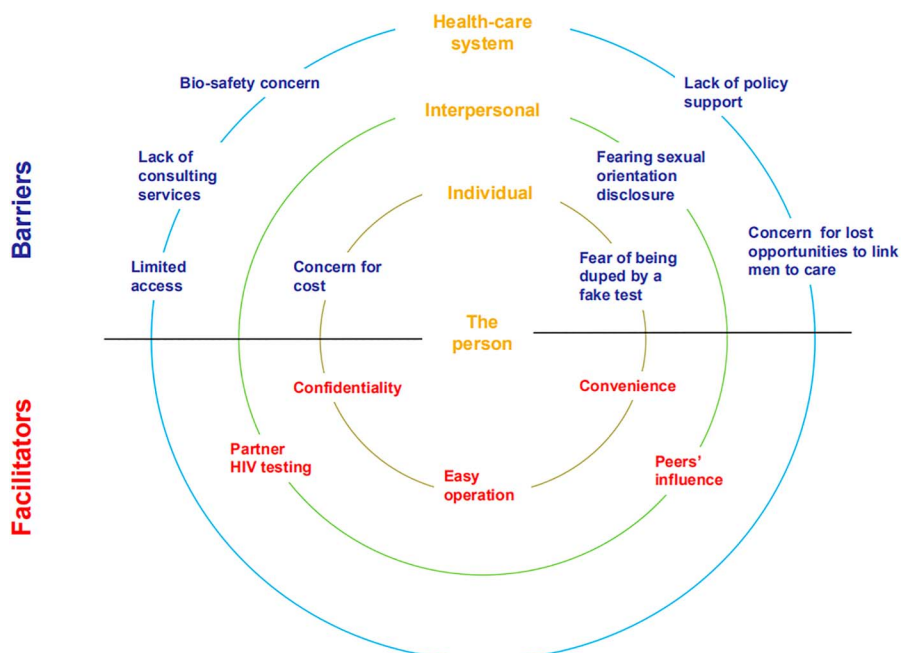


Figure 1. Multilevel barriers and facilitators of HIV self-testing among Chinese men who have sex with men. This figure is available in color online www.janacnet.org.

HIV self-testing kits sold in some pilot pharmacies are very expensive, with 200–300 Yuan (28.4–42.7 dollars) per kit. (40-year-old, divorced, CBO staff)

Interpersonal Level

Fearing disclosure of sexual orientation. Because traditional Chinese cultural norms reject and stigmatize homosexuality, participants expressed fears about the disclosure of their sexual orientation if the kits were found by others. This was especially the case for married MSM and students and workers who were living in dormitories. Without independent living spaces, it was difficult to find a place to store kits or perform testing.

I am married, so it is inconvenient (to store kits or conduct self-testing at home). She (his wife) knows what time I go to work, what time I get off work, and what places I go. She knows all of these. She knows everything. If there is any difference, she will ask me and figure out why things are changed. There is no space to store or use kits at home. I am afraid to be known (my sexual orientation) by her. (40-year-old, married, without HIV, having taken HIVST)

I live in the dormitory with my classmates. It is difficult to find a place to store HIVST kits. And it is impossible to perform HIVST in the dormitory...Once roommates find the kits or see you are using HIVST kits, it will be terrible! They will know you are a gay and guess you have sex with many men. Otherwise, why do you need to test for HIV? (21-year-old, single, without HIV, not taking HIVST)

Healthcare System Level

Limited access. The most common way to get kits was to purchase them online. MSM could also access HIVST kits in some pilot pharmacy stores and gay-friendly CBOs. However, participants reported that there was no regular official supply of HIVST kits available in the public or private sector healthcare systems. This was problematic for participants.

In the pilot project last time, we (CBO) distributed about 380 kits (to MSM free of charge)... CDC (of China) does not provide HIVST kits... There are no kits sold in pharmacies in my city. Only some pilot pharmacies provide kits, such as pharmacies in S Y and B cities. (40-year-old, divorced, CBO staff)

I do not know where to buy HIVST kits...I have asked some of my friends. They said HIVST kits could be bought in some pharmacies. But they did not know which pharmacy sold HIVST kits. (26-year-old, single, without HIV, not taken HIVST)

Lack of consulting services. Some participants believed that the lack of health consulting on HIVST kept them from deciding to use HIVST. Participants

expressed their needs for information related to HIV testing results, HIV prevention strategies, plus linkage to care and information about treatment regimens before and after HIV testing.

If I have time, I prefer to come here (the CBO which provides rapid HIV testing service) to test (for HIV). We can chat with staff members about some information related to HIV testing. Also, I can learn some information about the current HIV prevalence. If I have questions (related to HIV or testing), I can consult with them face to face and get feedback immediately. (33-year-old, single, HIV-negative, having taken HIVST)

In addition, some participants expressed that they feared facing positive results alone and preferred a professional worker to be present with them during testing and to provide psychological consulting services.

I will recommend others to test for HIV in the CDC. Because if their self-testing results were positive, I fear some of them could not accept (the positive results) and might do some irrational things such as committing suicide. I used to consider committing suicide because my self-testing result was positive and no one accompanied me and provided consultation. (29-year-old, single, HIV-positive, having taken HIVST)

Biosafety concerns. The concerns of the CDC workers were more related to the lack of knowledge of how to handle the biosafety risks and potential pollution to the environment because of the used kits, including the lack of strategic plans for how to dispose of the dangerous remains of a used kit to protect the public.

For biosafety, how are we to deal with the used kits if the self-tester has a positive result? ...If you (the user) throw it away without any disinfectant, this might result in environmental pollution. So this is a problem. (46-year-old, CDC staff)

Some MSM participants had related concerns of their own; however, their concerns were more personal. For example, one participant was concerned about the possibility of unknowingly using an “infected” needle that had been already used by PLWH. Another described a friend who expressed fear about the blood that would be on a used needle. Some MSM said that they feared malicious HIV spread via unclean needles and how this might infect them.

Once I invited my friend to have a test (using blood-based kits), and he feared that there was something wrong with the needle. He feared that the needle itself had been infected by HIV or had been used by others before. (21-year-old, single, without HIV, having taken HIVST)

Lack of policy support. Centers for Disease Control and Prevention staff members stated that no HIVST products had been approved by the Chinese FDA, and there were no relevant guidelines to support the

implementation of HIVST kits in China; this hindered the promotion of HIVST.

In China, there are no instructions on the use of HIVST. Existing instructions are on rapid HIV testing kits and targeted for specialized persons. We need to revise the instructions (for rapid HIV testing kits) into the HIVST version, which is suitable for the general population. We need to make our instructions for HIVST easily understood. (48-year-old, CDC staff)

Most of the HIVST kits sold online were rapid HIV testing kits that were solely for professional use rather than for use by general populations.

The kits sold online are rapid testing kits, which could only be used by health professionals at labs, they are not approved (by Chinese FDA) to be used as a self-testing kit. However, they (manufacturers of HIVST kits in China or the online stores) might not know it clearly. (51-year-old, CDC staff)

Concern for lost opportunities to link men to care.

Centers for Disease Control and Prevention staff members expressed their concern about how to link men who had positive HIVST results to care. This was problematic because HIVST kits were used anonymously, and thus, it was hard to identify those with positive results. This hindered the implementation and promotion of HIVST kits.

It is hard for us to supervise the implementation of HIVST kits. For example, if 100 kits were sold to individuals, we could not identify the person who took this test or identify how many persons had positive results among the 100 testers...The supervision and evaluation for HIVST is difficult for us. (53-year-old, CDC staff)

Facilitators to HIV Self-Testing

Five major themes were identified as facilitators of HIVST, which are presented in Figure 1. Three facilitators were classified as being at the individual level: convenience, confidentiality, and easy operation. Two facilitators were at the interpersonal level: partner HIV testing and peers' influence.

Individual Level

Convenience. Many participants believed that HIVST could save them the trouble of commuting back and forth to site-based testing locations.

If I can buy HIVST kits in Taobao (an online shopping software of Alibaba), it is not necessary to go to the hospital (to have HIV testing). Because hospitals are far from my residence, and it will take a lot of time to get there. It may also take a long time to wait in line to take the test. It is more convenient to buy kits in

Taobao, considering time and efficiency. (27-year-old, single, HIV-negative, having taken HIVST)

They also appreciated that the results of HIVST could be obtained in a short time instead of waiting several days in the CDC or hospitals. Most participants worked from Monday to Friday, which usually conflicted with office hours in the CDC or hospitals. Thus, participants believed that the use of HIVST kits provided flexibility in time.

I have an HIV test every 3 months regularly. It is much more convenient to use HIVST kits. Because I need to go to work on weekdays and sometimes cannot spare time to go to hospitals or the CDC, it is a good choice to use HIVST kits. (30-year-old, married, HIV-negative, having taken HIVST)

Confidentiality. Most participants believed that confidentiality was a great facilitator for HIVST. They said that HIVST kits could be delivered anonymously and used in private rooms, which could eliminate the possibility of disclosing homosexual orientation and could avoid gay-related and/or HIV-related stigma.

I am afraid that others [will] know I have HIV testing or my sexual orientation. So I choose to take HIVST on my own. (21-year-old, single, HIV-negative, having taken HIVST)

I think using HIVST is very private. If you take HIV tests in CDC, you need to provide your name. For HIVST, you can buy it online, and the seller will send it to you without any information related to HIV, AIDS, or testing in the package. And you can perform it on your own and avoid being identified by others. (24-year-old, single, HIV-negative, having taken HIVST)

Easy operation. Many participants said that the HIVST kits were simple to use, tests were not difficult to perform, and the actual reading of the results was clear. Thus, they found no problems in actually using the HIVST kit.

It is easy to operate an HIVST kit. What you need to do is to collect your blood into the kit bar, and the result will come out after several minutes. And the result is easy to read: one red bar means a negative result; two red bars mean a positive result. (22-year-old, single, HIV-negative, having taken HIVST)

Using HIVST kits is an easy procedure and only requires a few minutes. Then just to wait and you will have the testing result. (33-year-old, single, HIV-negative, having taken HIVST)

Interpersonal Level

Partner HIV testing. Many participants indicated that if they wanted to have sex with causal partners or tried to establish a regular relationship, they expected to know their partners' HIV serostatus. They said partner HIV testing facilitated their own HIVST use. It also motivated them to encourage their partners to conduct HIVST,

especially when their partners were unwilling to get a test at a site-based HIV testing organization.

But would my friend (causal partner) like to come here to take tests? No. So I take kits to him and we performed HIVST together (before having sex). (29-year-old, single, HIV-negative, having taken HIVST)

When I engaged with a boyfriend, I wanted to know his HIV serostatus. And I bought HIVST kits online easily. We did tests together to show each other we are clean. (45-year-old, divorced, HIV-negative, having taken HIVST)

Peer's influence. Participants believed that they would be more likely to use HIVST if a friend who had used HIVST before introduced or recommended kits to them.

The kit I first used was from my friend. He had used HIVST kits and recommended me to use it. (26-year-old, single, HIV-negative, having taken HIVST)

An evaluation based on their peer's good experience helped build their trust and confidence in HIVST. Participants tended to choose HIVST especially when their friends' self-testing results were positive, which made them more aware of their susceptibility to HIV and led them to believe that HIVST had the capacity to detect HIV infection.

My ex-boyfriend performed HIVST, and the testing result was HIV-positive! It made me realize that the HIV infection was so close to me. This experience motivated me to buy the HIVST kits. (21-year-old, single, HIV-negative, having taken HIVST)

Discussion

Our study is one of very few that have qualitatively explored the facilitators and barriers to use of HIVST among Chinese MSM. Based on the analyses of data from interviews with MSM, CBO workers, and CDC staff, our results provide insight into the factors that influenced our sample's uptake of HIVST at various levels, including the health care system, interpersonal, and individual levels. Multidimensional understanding of usage experience of HIVST provides evidence to Chinese policy makers to increase HIV testing and achieve the first goal of the "90-90-90" global target.

Our findings expand the common barriers summarized in a systematic review (Bernard et al., 2019) by demonstrating the importance of structural barriers related to limited accessibility of kits and biosafety concerns about HIVST that deter the promotion of HIVST in China. Strategies to increase accessibility of HIVST kits were pilot tested in China, including delivering kits in vending machines (Du, 2018), selling kits in pilot

pharmacies (Wu, 2017), and providing kits in gay-friendly CBOs (Zuoan gay-friendly community organization, 2020); however, these approaches have not been scaled up in China. The HIVST kits sold online currently are mainly rapid HIV kits, which are targeted at professionals' use instead of general people's use. There was only one type of urine-based HIVST kit approved by the Chinese government in October, 2019 (Ministry of Science and Technology of the People's Republic of China, 2019). At the same time, the Chinese government issued a step-by-step instruction manual designed for the general population and specific to urine-based HIVST kits (Chinese Center for Disease Control and Prevention and STD/AIDS Prevention and Control Center, 2019); however, this was not user friendly because the popular types of HIVST kits used by MSM are oral-based and blood-based kits. Thus, policy support is urgently needed to issue guidelines on implementing oral-based or blood-based HIVST kits, which should be approved by the China FDA and delivered with rigid market supervision to ensure the quality of HIVST kits.

In addition, our results are consistent with earlier reports on barriers to HIVST, including cost concerns, fear of being duped by a fake test, concerns for accuracy or sensitivity, lack of consulting services, and concern for lost opportunities to link men to care (Bernard et al., 2019; Frye et al., 2015). Income might impact the cost expectation of HIVST kits (Jennings et al., 2017), which should be taken into account for policy makers when promoting HIVST. Information dissemination on the reliability of HIVST might enhance trust on the accuracy and sensitivity of HIVST kits (Rooyen et al., 2015). How to integrate consulting services into HIVST implementation and how to link men who have positive HIVST results to care should be explored in further researches.

Research findings indicate that HIVST has the potential to reduce gay-related and HIV-related stigma and discrimination, which are experienced by many MSM when seeking facility-based HIV testing services (Bernard et al., 2019). However, our study showed that gay-related and HIV-related stigma could also be a barrier for married MSM or those living in dormitories because it was difficult for them to receive the delivered package and perform the test in a private room. The prominent Chinese culture characteristic is "family centered," and most MSM have to get married to women in their lifetimes. Currently, investigations show that 48.9% of single MSM intend to get married to women because of pressure from family and society (Wu et al., 2019). Most married MSM feared facing a marriage breakdown, verbal insults, and stigma from their spouses and family after disclosing their sexual orientation (Zhang et al., 2008).

In addition to the common facilitators of perceiving the benefit of confidentiality, convenience, and the easy operation of HIVST reported in the literature (Du, 2018; Lila, Abby, Rebecca, & John, 2019; Wu, 2017), partner HIV testing and peers' recommendations were found to be essential facilitators to HIVST uptake in our study. Another study among Chinese MSM similarly reported finding that peer's influence could promote HIV testing in facility-based testing services (Liu et al., 2015). Advocating partner HIV testing has the great potential for promoting HIVST globally. Previous literature showed that 79–91% of MSM were willing and found it acceptable to deliver kits to their partners (Sharma et al., 2017). Findings from a previous randomized controlled trial indicated that distribution of HIVST kits from antenatal and postpartum women to their sexual partners was a feasible strategy (Sharma et al., 2017).

There are several limitations of this study that should be considered. First, purposive sampling and convenience sampling strategies were used to recruit participants, which might lead to selection bias. Second, our study participants were MSM; thus, the barriers and facilitators for taking HIVST may not be generalizable to other populations when making relevant policy to promote HIVST in China. Third, most participants in this study were young (mean age = 30) and highly literate (95.7% of them were college level or above). Thus, results from our study may not be applicable to older and low literacy MSM populations. Fourth, this study was completed in only one province; thus, further research across China is also warranted to understand barriers and facilitators to HIVST among MSM.

In spite of these limitations, our study identified that barriers for HIVST uptake were mainly at the healthcare system level, although the facilitators were mainly at the individual and interpersonal levels. To respond to the WHO's call for issuing culturally appropriate HIVST guidelines in each country, it is important for Chinese officials and scholars to address the structural barriers and provide accessible, affordable, quality-guaranteed counseling along with HIVST services.

Disclosures

The authors report no real or perceived vested interests related to this article that could be construed as a conflict of interest.

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Key Considerations

- Barriers for HIVST uptake were mainly at the health care system level, while the facilitators were mainly at the individual and interpersonal levels.
- Limited access is identified as a barrier to use of HIVST. Despite promotion by some pilot projects, approaches to access HIVST kits remain limited in China.
- Lack of policy support impedes the promotion of HIVST. No officially approved blood-based and oral-based HIVST kits, popular among MSM, with instruction manuals, are available in China.
- Gay-related and HIV-related stigma could also be a barrier for married MSM to receive and perform HIVST kits.
- Partner HIV testing and peer's recommendation would facilitate the use of HIVST kits.
- Officials and scholars are urged to address structural barriers and provide accessible, affordable, and high quality HIVST services that are accompanied by counseling to develop culturally appropriate HIVST guidelines.

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