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Experiences and correlates of HIV self-testing among men who have sex with men in Jiangsu Province, China

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Abstract

Substantial numbers of Chinese men who have sex with men (MSM) do not access facility-based HIV testing. Self-testing could promote testing uptake among this population. We describe experiences and identify correlates of self-testing among Chinese MSM. A cross-sectional survey was conducted among MSM in Jiangsu from November 2013 to January 2014. Participants were recruited through time-location sampling and from online. Participants were asked a series of questions about HIV self-testing uptake and associated experiences. Logistic regression was used to identify correlates of having ever self-tested for HIV. Of 522 participants, 26.2% had ever self-tested. Finger stick was the most common self-testing modality (86.1%). A majority of participants reported that it was “very easy” (43.1%) or “somewhat easy” (34.3%) to perform self-testing while lower proportions reported “very confident” (24.1%) or “somewhat confident” (36.5%) in the accuracy of their test results. Having ever self-tested was significantly associated with having had 2 to 5 and 6 or more male anal sex partners in the past six months (AOR = 2.12, 95% CI: 1.00, 4.49; AOR = 4.95, 95% CI: 1.90, 12.87), having ever tested for HIV (AOR = 4.56, 95% CI: 1.66, 12.55), and having a friend or friends who self-tested (AOR = 7.32, 95% CI: 3.57, 15.00). HIV self-testing can reach untested Chinese MSM and / or increase testing frequency. Peer- or social network-based interventions could help further encourage self-testing. Monitoring systems should be strengthened to ensure the quality of self-testing kits and provision of essential support services, including post-test counseling and linkage-to-care.

Keywords

HIV; men who have sex with men; self-testing; testing and counseling; China

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INTRODUCTION

Significant proportions of sexually active men who have sex with men (MSM) in China have not been tested for HIV or do not seek routine testing (i.e., at least every 6 months for sexually active MSM). This results in high levels of unrecognized infection that continues to fuel the rapidly growing HIV epidemic among this population [1–3]. It was estimated that one-third of the 48,000 HIV new infections occurred in 2009 was attributed to male-to-male sexual contact [4]. A recent meta-analysis reported that the pooled prevalence of HIV in Chinese MSM was 6.5% (95% CI: 5.6% – 7.4%) [5]. Public health authorities, at national and local levels, are committed to address the HIV epidemic among Chinese MSM and have made impressive progress [6]. For example, HIV testing is offered for free at voluntary counseling and testing sites, which have been expanded significantly in the past decade; health workers from local Centers of Disease Control and Prevention conduct rapid HIV testing for patrons at gay bars, clubs and bathhouses on a regular schedule; community-based organizations have been receiving more support and assistance from authorities to reach out to MSM communities. Nonetheless, many MSM do not access these facility-based HIV testing services. Concerns of confidentiality, fear of being tested HIV-infected and subsequently discriminated against, and experiences of gay-related stigma at testing sites are among the most notable barriers to accessing HIV voluntary and counseling testing sites [7].

HIV self-testing, in which an individual collects his or her own oral fluid or blood specimen and conducts a rapid point-of-care test at a convenient location of his or her own choice, may help Chinese MSM overcome some of these barriers (e.g., self-testing does not entail disclosure of sexual minority status) [8, 9]. A systematic review of HIV self-testing among key populations in other countries found that acceptability of and preference for self-testing was very high and confidentiality and privacy were among the key facilitators of self-testing [10]. A recent study conducted among an online sample of Chinese MSM found that 20.3% of participants have ever self-tested for HIV [11]. One of the concerns of HIV self-testing is that individuals without training or supervision may incorrectly understand test instructions, incorrectly collect the specimens and incorrectly interpret the test results [10]. In fact, self-testing kits have been shown to be less accurate among self-testers when unsupervised or unassisted. For example, OraSure Technologies has reported that OraQuick's sensitivity in detecting established, antibody-positive HIV infection is substantially lower among unobserved users as compared with the same test administered by trained providers [12]. To the best of our knowledge, no previous studies of Chinese MSM have examined experiences associated with HIV self-testing, such as levels of difficulty performing the test and confidence in results accuracy.

In this paper, we describe experiences and identify correlates of HIV self-testing among Chinese MSM in Jiangsu, China.

METHODS

Study Design and Recruitment

We conducted a cross-sectional behavioral survey study of MSM in Jiangsu Province, China between November and January 2014. This survey was the baseline data collection for a

longitudinal cohort study designed to assess the effects of a social marketing intervention to increase HIV testing uptake among MSM in the province. To be eligible for the study, participants had to: 1) be biologically male; 2) be 18 years old or older; 3) be living in Jiangsu province; 4) have had oral or anal sex with another male in the past year; and 5) self-report being HIV uninfected or unknown. In addition, since this was part of a cohort study, we asked eligible participants to provide their contact information during the informed consent process. We employed two sampling methods to recruit participants: time-location sampling (TLS) and online convenience sampling.

Time-location sampling (TLS)—TLS is used to sample MSM populations through creation of a sampling frame that comprises the universe of venues, days, and time periods where and when the population can be found to congregate. The methodology has been described in detail elsewhere [13]. Briefly, a formative phase constructed an up-to-date universe or sampling frame of venues frequented by MSM, including bars, dance clubs, bathhouses and cruising areas and the days and time periods of attendance in Nanjing, the capital city of Jiangsu Province. From the roster of all possible venue-day-time (VDT) periods, a random sample of VDT was drawn. At the randomly selected VDT, the attendance of all potentially eligible subjects was counted and men entering or exiting the venue or crossing a predetermined line are intercepted, assessed for eligibility, and invited to participate.

During assessment, recruiters briefly described the study to men and asked if they were willing to participate. Men who had not previously participated were referred to an interviewer who administered the eligibility screener. Eligibility screening occurred in a private area of the venue or in a designated interviewing space near the venue. In addition to the above eligibility criteria, participants recruited through TLS also had to be consecutively approached by the staff at the randomly selected VDT (i.e., they could not approach staff on their own or at a later time). Once participants were determined eligible, staff went over informed consent with them using a tablet computer and addressed questions. To consent to the study, participants had to click the “Agree” button on the electronic informed consent. Staff then oriented participants to the tablet computer-assisted interview. Once participants were familiar with the operation of the tablet computer, they completed the self-administered survey.

Participants were recruited during 23 randomly selected venue-day-time periods from November to December 2013. Staff enumerated 777 men from 10 venues, consecutively approached 478, screened 342 (71.5% eligibility determination), found 290 to be eligible (84.8% eligibility), and 261 (90.0% participation) consented to the study.

Online convenience sampling—We posted our study advertisement on the most popular provincial gay-oriented website to invite participation in our survey. By clicking on the advertisement, interested MSM were taken to the Internet-based survey webpage. The same eligibility screening and informed consent procedures were implemented for the online survey component as the TLS. To prevent duplicate participation, a feature within the survey software program (“Prevent Box Stuffing,” www.qualtrics.com) was enabled, which would not allow potential participants to access the survey more than once from the same Internet

Protocol (IP) address. Furthermore, our staff double-checked the contact information provided by participants before giving out incentives for completing the survey. From mid November 2013 to mid January 2014, 985 potential participants clicked on our online survey advertisement or link. Of these, 941 entered the eligibility screening page and 823 answered all eligibility questions (87.5% eligibility determination), 592 met the eligibility criteria (71.9% eligibility), and 271 (45.8% participation) consented to the study.

The study was approved by the University of California – San Francisco’s Committee on Human Research and Jiangsu Provincial Center for Disease Control and Prevention’s Institutional Review Board.

Measures

Participants were asked about their age, legal marital status, relationship status (whether or not had a main male partner), official residential status (*hukou*), educational level, employment status, and monthly gross income (1 USD \approx 6 RMB), sexual orientation, and if they had disclosed their gay or bisexual identity to anyone. In terms of sexual behaviors, participants reported on the number of male anal sex partners in the past six months, and whether or not condoms were used consistently with these male anal sex partners when engaging in insertive and / or receptive anal intercourses. They were also asked if they had ever been tested for HIV. Descriptive norms around HIV testing were assessed by asking participants the proportion of their MSM friends who had an HIV test (“None,” “Very few,” “Less than half,” “More than half,” and “All”).

A series of questions examined participants’ uptake and experiences with HIV self-testing. They were first asked if they had ever heard of HIV self-testing. For those who replied affirmatively, they were asked if they had ever administered an HIV self-test to themselves, whether the self-testing was performed using finger stick or oral fluid, and through which channel they purchased or obtained the self-testing kits. Furthermore, self-testers were asked to rate level of difficulty in performing self-testing (5-point Likert scale, from “Very easy” to “Very difficult”), level of confidence in the accuracy of their self-testing results (5-point Likert scale, from “Very confident” to “Very uncertain”), and their perceived accuracy of self-testing as compared to CDC or hospital provided testing (“More accurate,” “About the same,” and “Less accurate”). Finally, they were asked if they had a friend or friends who also self-tested for HIV.

Analysis

The sample for analysis included only those who responded to self-testing related questions. Furthermore, potential duplication between TLS and online participants was examined by comparing the contact information provided by participants. Frequencies and percentages were used to describe socio-demographic characteristics and experiences of HIV self-testing of the sample. To identify correlates of having ever self-tested for HIV among participants, bivariate logistic regression analysis was first conducted. Variables that were significantly associated with having ever self-tested for HIV in the bivariate analysis ($p < 0.10$) were then entered into a multivariable logistic regression model. All analyses were conducted in STATA version 12.0.

RESULTS

Sample Characteristics

After checking for duplication where 7 records were excluded from analysis, 522 MSM participants (255 from TLS and 267 from online) answered the self-testing questions. Table 1 presents socio-demographic characteristics of the sample. About one third of participants were between the ages of 18 and 25 (30.1%), 26 and 35 (36.9%), and 36 and older (33.0%), respectively. A majority were single (57.4%), 20.5% were married, and 22.1% were divorced, separated, or widowed. Most participants were official residents (*hukou*) of Jiangsu province including the capital city of Nanjing (79.3%). Just under half had a college degree or higher (42.1%), and 43.3% completed high school or technical school. Most were employed full-time (83.0%), and well over half reported having a monthly income of 3,000RMB to 4,999RMB (37.9%) and 5,000 RMB or more (28.4%). About two thirds of participants self-identified as gay (67.2%) while the rest self-identified as bisexual, heterosexual or were not sure (33.8%).

HIV Self-testing Uptake and Experiences

Table 2 presents uptake and experiences of HIV self-testing among participants. Of all participants, 70.9% had heard of HIV self-testing. Among these, 37.2% had ever administered HIV self-testing (26.2% of the entire sample) and 48.1% reported that they had a friend or friends who self-tested for HIV. The Internet was the most common channel (32.9%) where participants obtained or purchased self-testing kits, followed by community-based organization (32.1%), pharmacy (10.2%), a friend (9.5%), and sexual partner or boyfriend (6.6%). The most common type of self-testing kits used by participants was finger stick (86.1%).

A majority of participants reported that it was “very easy” (43.1%) or “somewhat easy” (34.3%) to perform self-testing while very few reported “very difficult” (0.7%) or “somewhat difficult” (3.7%). In terms of level of confidence in the perceived accuracy of self-testing results (i.e., accurately interpret the test result), 24.1% reported “very confident,” 36.5% “somewhat confident,” and 30.7% reported “neutral.” About three quarters of (72.8%) participants perceived that self-testing was less accurate compared to CDC or hospital provided testing while 22.6% perceived the accuracy to be about the same.

Correlates of HIV Self-testing

Table 3 presents bivariate and multivariable correlates of HIV self-testing. Variables significantly associated with having ever self-tested for HIV in the bivariate analysis included monthly income, sexual orientation, number of male anal sex partners in the past six months, having ever tested for HIV, having had a friend who self-tested for HIV, and descriptive norm around HIV testing. In the multivariable model, participants who did not have official Jiangsu residential status (*hukou*) had 2.55 greater odds (95% CI: 1.02, 6.38; $p = 0.045$) of ever self-testing for HIV compared to those who were official Nanjing resident. Participants who had 2 to 5 and those who had 6 or more male anal sex partners in the past six months had 2.12 (95% CI: 1.00, 4.49; $p = 0.049$) and 4.95 greater odds (95% CI: 1.90, 12.87; $p = 0.001$) of having ever self-tested for HIV compared to those with 1 or less male

anal sex partner, respectively. Participants who had ever tested for HIV and those who had a friend who self-tested for HIV had 4.56 (95% CI: 1.66, 12.55; $p = 0.003$) and 7.32 greater odds (95% CI: 3.57, 15.00; $p < 0.001$) of having administered HIV self-testing compared to those who had never tested for HIV and those who did not have a friend who self-tested for HIV, respectively. Finally, descriptive norm around HIV testing was marginally associated with having ever self-tested for HIV.

DISCUSSION

In this study, we found that a majority of MSM participants in Jiangsu Province, China, where there is a relatively high burden of HIV infections among this population [14], had heard of HIV self-testing and 26.2% had ever self-tested for HIV, a figure similar to a previous study [11]. A majority of participants reported that performing self-testing was “somewhat easy” or “very easy.” However, participants’ confidence in the accuracy of their self-testing results was much lower where only 24.1% said they were “very confident.” In addition, a majority of participants perceived that HIV self-testing was less accurate compared to CDC or hospital provided testing. These findings can be attributed to several factors. First, participants perceived that they might have incorrectly performed self-testing and/or incorrectly interpreted the test results. Second, although some HIV rapid testing kits are evaluated annually by the National Center for AIDS/STD Prevention and Control [15], not all vendors comply with the national regulatory guidelines governing the safety and quality of such kits, which could directly affect their sensitivity and specificity. Furthermore, there is a lack of regulatory systems in place that monitor all the testing kits been sold. Third, while HIV self-testing kits can be readily purchased in China, pre and post-test counseling and other support services are either non-existent or inadequately provided, especially among vendors on the Internet which was the most common channel where participants obtained the kits.

With these important issues and limitations in mind, we still see the potential utility of HIV self-testing in reaching untested Chinese MSM and/or increasing testing frequency among this population. We found that, among our sample of participants, those who ever tested for HIV were over 4 times more likely to have self-tested for HIV. It is possible that some participants obtained their first HIV test through HIV self-testing. It is also possible that MSM who were previously tested at community- and clinic-based facilities were more accepting of self-testing and subsequently self-tested. Although we were not able to assess the directionality between these two events and did not ask self-testers if their first HIV test was using self-testing kits, this finding suggests that HIV self-testing can increase testing uptake and/or frequency among Chinese MSM. When the original home specimen collection HIV test was first available in the US, it was reported that uptake was strong among never-tested individuals [16]. A study of urban non-monogamous US MSM reported that over-the-counter availability of self-tests would increase the frequency of testing in this population [17]. Thus, even with limitations such as lower sensitivity and not being able to detect HIV infection during the “window period,” HIV self-testing can have significant public health impact in terms of reducing HIV transmissions among MSM if it can reach more never-tested individuals and increase testing frequency among self-testers [18].

To do so, strategies are needed to encourage and expand adoption. We found that participants were over 7 times more likely to have self-tested when they had a friend or friends who also self-tested. Although descriptive norms around HIV testing was weakly associated with self-testing, these results indicate that peer- or social network-based interventions could potentially help increase self-testing uptake. For example, experienced self-testers can be identified and trained in pre and post-test counseling, provided with free or low-cost self-testing kits, and promote self-testing within their social networks. Such peer- or social-network-based strategies may alleviate some of the drawbacks of self-testing where peers or social-network members can provide assistance or supervision during testing especially for individuals who have limited health literacy, ensure that newly diagnosed individuals receive some counseling, seek confirmatory testing, and are subsequently linked to care.

Several limitations of our study should be noted. First, our participants were recruited from MSM venues and online. Thus, our findings may not be generalizable to MSM who do not frequent these venues or visit the website. Second, participants could have responded to some questions in a socially desirable manner and were subject to recall bias. However, our self-interview mode of administration and six-month recall period should have mitigated these biases. Third, participants in health surveys may be more health conscious and hence our study might have overestimated the rate of self-testing among MSM. Finally, we did not ask if and what types of errors might have occurred during performing self-testing among participants. Future studies should identify the most common errors that could affect self-testing accuracy among Chinese MSM. Furthermore, studies to measure and compare the sensitivity and specificity of self-testing kits among users under supervised versus unsupervised or unassisted conditions, and to compare the accuracy of self-testing to facility-based testing are needed.

Despite these limitations, this is the first study to document Chinese MSM's experiences and perceptions of HIV self-testing. Our study suggests that HIV self-testing could expand HIV testing among MSM in China. To realize and maximize the potential benefits of self-testing in controlling the HIV epidemic among Chinese MSM, monitoring systems that enforce compliance with national regulatory guidelines should be strengthened in order to ensure the quality of self-testing kits and provision of essential support services, including post-test counseling and linkage-to-care.

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Table 1

Socio-demographic characteristics among men who have sex with men in Jiangsu, China, 2013–2014 (N = 522)

	N (%)
Age	
18 – 25	156 (30.1%)
26–35	191 (36.9%)
>=36	171 (33.0%)
Marital status	
Single	299 (57.4%)
Married	107 (20.5%)
Divorced/Separated/Widowed	115 (22.1%)
Hukou^a	
Nanjing	198 (37.9%)
Jiangsu	216 (41.4%)
Other province	108 (20.7%)
Education	
Middle school or less	76 (14.6%)
High school/Technical	226 (43.3%)
College or higher	220 (42.1%)
Employment	
Full-time	433 (83.0%)
Other	89 (17.0%)
Monthly income (RMB)^b	
2,999	176 (33.7%)
3,000 – 4,999	198 (37.9%)
5,000	148 (28.4%)
Sexual orientation	
Gay	351 (67.2%)
Bisexual/Heterosexual/Not sure	171 (32.8%)

Note:

^a Official residential status;

^b 1 USD ≈ 6 RMB.

Table 2

Experiences of HIV self-testing among men who have sex with men in Jiangsu, China, 2013–2014 (N = 522)

	N (%)
Heard of self-testing	
Yes	370 (70.9%)
No	152 (29.1%)
Have ever self-tested	
Yes	137 (37.2%)
No	231 (62.8%)
Where obtained self-testing	
Pharmacy	14 (10.2%)
Internet	45 (32.9%)
Friend	13 (9.5%)
Sexual partner or boyfriend	9 (6.6%)
Community organization	44 (32.1%)
Other	12 (8.8%)
Self-test modality	
Finger stick	118 (86.1%)
Oral fluid	19 (13.9%)
Level of difficulty performing self-testing	
Very easy	59 (43.1%)
Somewhat easy	47 (34.3%)
Neutral	25 (18.2%)
Somewhat difficult	5 (3.7%)
Very difficult	1 (0.7%)
Level of confidence in results accuracy	
Very confident	33 (24.1%)
Somewhat confident	50 (36.5%)
Neutral	42 (30.7%)
Somewhat uncertain	10 (7.3%)
Very uncertain	2 (1.5%)
Perceived accuracy of self-testing compared to CDC or hospital provided testing	
More accurate	17 (4.6%)
About the same	83 (22.6%)
Less accurate	268 (72.8%)
Have a friend who self-tested	
Yes	177 (48.1%)
No	191 (51.9%)

Correlates of HIV self-testing among men who have sex with men in Jiangsu, China, 2013–2014 (N = 522)

Table 3

		Have ever self-tested for HIV (n = 137, 26.2%)			
	n/N (%)	OR (95% CI)	p	AOR (95% CI)	p
Recruitment method					
TLS	69/255 (27.1%)	1.0			
Online	68/267 (25.5%)	0.92 (0.62, 1.36)	0.680		
Age					
18 – 25	47/156 (30.1%)	1.0			
26–35	48/191 (25.1%)	0.78 (0.49, 1.25)	0.300		
>=36	41/171 (24.0%)	0.73 (0.45, 1.19)	0.211		
Marital status					
Single	80/299 (26.8%)	1.0			
Married	24/107 (22.4%)	0.79 (0.47, 1.33)	0.380		
Divorced/Separated/Widowed	33/115 (28.7%)	1.10 (0.68, 1.78)	0.692		
Hukou^d					
Nanjing	43/198 (21.7%)	1.0		1.0	
Jiangsu	63/216 (29.2%)	1.48 (0.95, 2.32)	0.084	1.51 (0.74, 3.10)	0.261
Other province	31/108 (28.7%)	1.45 (0.85, 2.48)	0.174	2.55 (1.02, 6.38)	0.045
Education					
Middle school or less	18/76 (23.7%)	1.0			
High school/Technical	65/226 (28.8%)	1.30 (0.71, 2.38)	0.392		
College or higher	54/220 (24.6%)	1.05 (0.57, 1.93)	0.880		
Employment					
Full-time	120/433 (27.7%)	1.0		1.0	
Other	17/89 (19.1%)	0.62 (0.35, 1.09)	0.095	0.62 (0.22, 1.79)	0.378
Monthly income (RMB)^b					
2,999	36/176 (20.5%)	1.0		1.0	
3,000 – 4,999	59/198 (29.8%)	1.65 (1.02, 2.66)	0.039	0.82 (0.35, 1.89)	0.637

Have ever self-tested for HIV (n = 137, 26.2%)						
	n/N (%)	OR (95% CI)	P	AOR (95% CI)	P	
5,000	42/148 (28.4%)	1.54 (0.92, 2.57)	0.098	0.90 (0.34, 2.38)	0.838	
Sexual orientation						
Gay	103/351 (29.3%)	1.0		1.0		
Bisexual/Heterosexual/Not sure	34/171 (19.9%)	0.60 (0.38, 0.93)	0.022	0.79 (0.38, 1.65)	0.534	
Out to anyone						
No	54/238 (22.7%)	1.0		1.0		
Yes	83/284 (29.2%)	1.41 (0.95, 2.09)	0.092	0.80 (0.41, 1.57)	0.522	
Have a main male partner						
No	68/287 (23.7%)	1.0		1.0		
Yes	69/235 (29.4%)	1.34 (0.91, 1.98)	0.144	1.20 (0.63, 2.32)	0.577	
Number of male anal sex partners, past 6 months						
1	40/195 (20.5%)	1.0		1.0		
2 – 5	61/226 (27.0%)	1.43 (0.91, 2.26)	0.122	2.12 (1.00, 4.49)	0.049	
6	30/75 (40.0%)	2.58 (1.45, 4.61)	0.001	4.95 (1.90, 12.87)	0.001	
Any UAI, past 6 months						
No	81/289 (28.0%)	1.0				
Yes	45/177 (25.4%)	0.88 (0.57, 1.34)	0.539			
Any URAL, past 6 months						
No	94/324 (29.0%)	1.0		1.0		
Yes	32/142 (22.5%)	0.71 (0.45, 1.13)	0.148	0.74 (0.35, 1.54)	0.415	
Ever tested for HIV						
No	10/117 (8.6%)	1.0		1.0		
Yes	127/405 (31.4%)	4.89 (2.47, 9.66)	<0.001	4.56 (1.66, 12.55)	0.003	
Had a friend who self-tested for HIV						
No	29/177 (16.4%)	1.0		1.0		
Yes	108/191 (56.5%)	6.64 (4.07, 10.84)	<0.001	7.32 (3.57, 15.00)	<0.001	
Number of MSM friends who had an HIV test (descriptive norm)						
None/Very few	31/167 (18.6%)	1.0		1.0		

Have ever self-tested for HIV (n = 137, 26.2%)					
	n/N (%)	OR (95% CI)	P	AOR (95% CI)	P
Less than half	22/61 (36.1%)	2.47 (1.30, 4.75)	0.006	2.00 (0.79, 5.09)	0.144
More than half/All	53/146 (36.3%)	2.50 (1.49, 4.19)	<0.001	2.02 (0.94, 4.34)	0.071

Note:

^a Official residential status;

^b 1 USD ≈ 6 RMB;

TLS = time-location sampling; UIAI = unprotected insertive anal intercourse; URAI = unprotected receptive anal intercourse.