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Gay apps for seeking sex partners in China: Implications for MSM sexual health

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Abstract

Anti-gay stigma and harsh local environments in many low and middle-income countries (LMIC) encourage men who have sex with men (MSM) partner-seeking mobile application (gay app) use. To investigate the sexual risk profiles of gay app users and guide future HIV prevention programs, we conducted a cross-sectional online survey among 1,342 MSM in China examining associations between gay app use and sexual behaviors, including HIV and sexually transmitted disease (STD) testing. Compared to non-app users, app users were more likely to be younger, better educated, “out” about their sexual orientation, and single. They were also more likely to report multiple recent sex partners and HIV testing, but there was no difference in condomless sex between the two groups. Future research among MSM in LMIC is needed to characterize gay app use and explore its potential for future public health interventions.

Keywords

mobile apps; men who have sex with men; HIV; sexually transmitted diseases; China

Introduction

In the 1980s men who had sex with men (MSM) at gay bathhouses had an increased risk of acquiring HIV infection. Gay bathhouses were one of a number of possible venues that exacerbated the spread of HIV at that time by providing a physical risk environment where

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MSM could easily identify and have anonymous sex with multiple sex partners [1]. In the late 1990s, MSM began to find sex partners using the Internet, a virtual environment that permitted additional opportunities for seeking anonymous sex partners [2]. In China, the country with the largest number of Internet users worldwide, the Internet is quickly replacing traditional locations such as gay saunas and bars as the preferred site for MSM to find sex partners. A recent cross-sectional study of nearly 50,000 MSM across 61 Chinese cities found that 45% of MSM use the Internet to find sex partners [3].

In recent years, the proliferation of GPS-equipped smartphones and the development of mobile phone applications (apps) have created new potential risk environments because men can identify anonymous sex partners who are geographically nearby in real-time. A number of smartphone apps have been developed specifically for MSM social and sexual networking (gay apps), including as Grindr, Blued, and Jack'd. Increased use may facilitate seeking multiple sex partners or unsafe sex [4]. Many of these applications are available only through mobile phones and do not offer computer access, which reflects the increasing influence of smartphones in modern society [5]. In China, 92% of individuals 18–29 years old access the Internet or own a smartphone and increasing numbers of individuals are using smartphones as their primary mode of internet access [6]. Gay app use among MSM remains poorly understood even as smartphone use continues to grow rapidly and some evidence suggests that gay and bisexual men are adopting these mobile technologies more rapidly than the general population [5].

Despite the Chinese government's initiatives to improve sexual health services for MSM, the incidence of HIV and other sexually transmitted diseases (STD) among MSM continues to increase [7, 8]. Understanding the demographic and risk profiles of MSM who are using gay apps could inform HIV prevention measures in two broad ways. First, additional information about the sexual risk profiles of MSM who use gay apps can increase our understanding as to what extent these users are engaging in risk behaviors and may warrant focused outreach. Second, this information could be used to guide the growing body of Internet- and mobile phone-based health promotion efforts such as education and testing campaigns. The purpose of this study is therefore to examine socio-demographics and sexual behaviors among Chinese MSM who use gay apps compared to MSM who do not use gay apps in order to better guide future public health prevention efforts at the specific sexual risk factors in both populations.

Methods

In May 2013, we conducted an online survey of Chinese MSM hosted by two large MSM website in southern China. Participants were recruited via banner advertisements to join the "Men's Sexual Health Survey" over the course of one month. The survey was both voluntary and anonymous. To be eligible, participants had to be born biologically male, 16 years of age or older (age of consent in China), and report a history of having anal sex with another man. No personal identifying data was obtained. Ethics review committees in China and the US provided study approval and participants completed an online informed consent process.

Survey development

To inform survey development, we conducted 60 individual interviews with MSM and local stakeholders and partnered with sociologists from the Chinese national survey of sexual behavior. Local MSM community-based organization members reviewed a draft survey and we conducted a pilot survey of 201 MSM prior to the main survey launch (data not included in final analysis). A checklist for reporting results of Internet e-surveys (CHERRIES) was used during development to ensure sufficient survey quality.

Measures

We collected socio-demographic data including age, education level, marital status, employment, and income. Participants were also asked about their sexual orientation, disclosure of sexual orientation to others, number of sex partners in the past three months (none, one, or more than one), condomless sex with male and female partners in the past three months (none, once, or more than once), and HIV and STD lifetime testing histories. Participants were asked if they had ever used gay apps to seek sex partners and indicated which gay apps they had used from a generated list of the most popular gay apps, with a write-in option for unlisted apps. Only gay apps were included in the analysis, excluding general social networking apps.

Statistical Analysis

Data was cleaned and re-coded using Microsoft Excel and SAS 9.2 (SAS Institute Inc., Cary, NC). Bivariate and multivariable logistic regression analyses were conducted using SPSS version 22 to identify significant correlates of gay app use among participants. We calculated variance inflation factors for employment, income, and education to assess for multicollinearity. Variables that were significant ($p < 0.05$) in the bivariate analysis were entered into the multivariable model.

Results

A total of 1,935 MSM fulfilled eligibility criteria, of which 1,342 (69.4%) completed the online survey. Details of participants' socio-demographic and behavioral characteristics can be found in Table 1. Over half the participants were between the ages of 26 and 35 years old (55.5%) and had graduated from college (53.4%). Most MSM were single (84.5%), and self-identified as gay (73.1%).

We found 805 (60.5%) MSM reported having tested at least once for HIV in their lifetime, and 49 MSM (3.7%) reporting knowing they were currently HIV-positive. Among MSM who reported having ever tested for any STD other than HIV, 21% had received a positive test (111/519).

In our sample, most men (93.6%) owned smartphones, and 40.6% had used at least one gay app. Reported gay apps used included Jack'd (39.0%), Grindr (3.5%), Blued (1.8%), and Boyahoy (0.2%). Table 2 presents bivariate and multivariable correlates of gay app use. In the multivariable analysis, compared to MSM who did not use gay apps, users were more likely to be younger, single, students or to have completed at least some college, self-

identify as gay, and to be “out” to at least one person compared to MSM who did not use gay apps. In addition, gay app users were more likely to have tested at least once for HIV in the past (aOR 1.539, 95% CI 1.198–1.978) and less likely to have had condomless sex with women in the past three months (aOR 0.617, 95% CI 0.389–0.979). Compared to MSM who did not use gay apps, MSM who used gay apps were nearly two times more likely to have had at least two male anal sex partners in the past three months (aOR 1.873, 95% CI 1.350–2.597). Condomless anal sex with men in the past three months was not associated with gay app use.

Discussion

Gay apps have rapidly expanded social networking and partner-seeking opportunities among MSM. Whereas computer-based Internet use permits anonymous sex partner seeking in a virtual environment, GPS-enabled mobile apps grant users increased flexibility to find nearby partners in real time. Data on gay app use among MSM are limited and have been primarily conducted among small samples of MSM in high-income settings [4, 9]. Our study extends this literature by including a large sample from a low and middle-income country (LMIC) setting where most MSM do not disclose their sexual orientation. We intentionally chose to use an anonymous online survey in an attempt to minimize much of the impact of anti-gay stigma on participants willingness to disclose sensitive information about MSM behaviors and gay app use. We found that 40.6% of MSM used gay apps, highlighting the emergence of gay apps as a primary method for seeking male sex partners in LMIC.

In our sample, gay apps users were more likely to have multiple male sex partners compared with non-users, but app use was not associated with condomless sex. These findings are consistent with research from Hong Kong [9] and the United States [4] showing that seeking partners via gay apps was associated with increased number of sex partners, but not with greater likelihood of condomless anal sex.

Gay app use was associated with having tested at least once for HIV, suggesting that app users may utilize sexual health resources at a higher rate than non-users. Despite higher testing rates, we found no association between app use and self-reported HIV or other STD infection. Pilot data from the US has demonstrated that gay app users may be more amenable to mobile HIV interventions and risk-reduction strategies and gay apps can be used to recruit MSM for HIV research [10]. Given willingness among many MSM to access e-health resources, further research on the use of mobile apps for HIV prevention is warranted.

Our finding that app users are younger and more likely to be “out” as to their sexuality and/or MSM behaviors suggests that we are capturing generational shifts in technology use in general and social and sexual networking among MSM in particular. In contrast, the non-app using cohort was more closeted, and less well educated, suggesting that they may not have had as much exposure to prevention messages and efforts compared to app users. Future programs targeting MSM could consider utilizing smartphone technology as a way to reach younger MSM, while being aware that such efforts may miss older, less well-educated MSM subpopulations. Shifting attitudes towards openness of sexual identity in the next

generation of MSM suggests new campaigns might go beyond education to further organize and mobilize this subpopulation. With lower testing rates as well as higher levels of condomless sex with women among non-app users, renewed efforts in condom promotion and testing uptake promotion campaigns would benefit this subpopulation. As they are not using gay apps, these messages will need to be emphasized through more traditional channels (e.g. Internet-based, venue-based, social marketing).

Our research has several limitations. First, we recruited an online sample of MSM who may be different from the general MSM population. However, Internet penetration is high among Chinese MSM and studies have shown similar risk profiles among online and non-online Chinese MSM [11]. Second, approximately 30% of those who started the survey did not complete the survey. While high, this completion rate is similar to other online surveys [12] and the sociodemographic characteristics and sexual risk behaviors of those who completed the survey and those who did not complete the survey were similar (data not shown). As we did not collect unique identifiers, we were unable to exclude participants from taking the survey more than once. However, eligibility criteria required participants to indicate that they had not previously taken the survey, and the survey was entirely voluntary with no monetary incentives given, disincentivizing repeat participation. Finally, HIV/STD self-report may present a bias towards underestimating disease history.

The emergence of gay app use represents the most recent evolution of sexual risk environments from physical venues, (bars, parks, clubs and bathhouses) to computers and now smartphones. While we did not find gay app users to have increased sexual risk profiles compared to non-app users, increased smartphone access and lack of data on gay app use, especially among MSM in LMIC, highlight the need for further research. Our preliminary data suggest that gay apps may be leveraged to promote HIV testing among younger MSM. Continued HIV prevention program development is also warranted for the non-app using MSM who may have less education. Future research should continue to investigate risk factors and behaviors associated with gay app use as well as explore potential sexual health interventions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Disman C. The San Francisco bathhouse battles of 1984: civil liberties, AIDS risk, and shifts in health policy. *J Homosex.* 2003; 44:71–129. [PubMed: 12962179]

2. Bolding G, Davis M, Hart G, Sherr L, Elford J. Gay men who look for sex on the Internet: is there more HIV/STI risk with online partners? *Aids*. 2005; 19:961–968. [PubMed: 15905678]
3. Wu Z, Xu J, Liu E, et al. HIV and Syphilis Prevalence Among Men Who Have Sex With Men: A Cross-Sectional Survey of 61 Cities in China. *Clinical Infectious Diseases*. 2013; 57:298–309. [PubMed: 23580732]
4. Lehmiller JJ, Joerger M. Social Networking Smartphone Applications and Sexual Health Outcomes among Men Who Have Sex with Men. *PLoS ONE*. 2014; 9:e86603. [PubMed: 24466166]
5. Grov C, Breslow AS, Newcomb ME, et al. Gay and Bisexual Men's Use of the Internet: Research from the 1990s through 2013. *Journal of Sex Research*. 2014; 51:390–409. [PubMed: 24754360]
6. Aki A. Youth at Forefront of Global Internet Use. *Voice of America: Techtonics*. 2014 Mar 7. <http://blogs.voanews.com/techtonics/2014/03/07/youth-at-forefront-of-global-internet-use>.
7. Chow EP, Tucker JD, Wong FY, et al. Disparities and Risks of Sexually Transmissible Infections among Men Who Have Sex with Men in China: A Meta-Analysis and Data Synthesis. *PLoS One*. 2014; 9:e89959. [PubMed: 24587152]
8. Yang HT, et al. Worsening epidemic of HIV and syphilis among men who have sex with men in Jiangsu Province, China. *Clin Infect Dis*. 2014; 58(12):1753–1759. [PubMed: 24647017]
9. Lee SS, Lam AN, Lee CK, Wong NS. Virtual versus physical channel for sex networking in men having sex with men of sauna customers in the City of Hong Kong. *PLoS One*. 2012; 7:e31072. [PubMed: 22348038]
10. Burrell ER, Pines HA, Robbie E, et al. Use of the location-based social networking application GRINDR as a recruitment tool in rectal microbicide development research. *AIDS Behav*. 2012; 16:1816–1820. [PubMed: 22851153]
11. Zhang D, Bi P, Lv F, Zhang J, Hiller JE. Differences between Internet and community samples of MSM: implications for behavioral surveillance among MSM in China. *AIDS Care*. 2008; 20:1128–1137. [PubMed: 18825519]
12. Lim SH, et al. Factors associated with unprotected receptive anal intercourse with internal ejaculation among men who have sex with men in a large Internet sample from Asia. *AIDS Behav*. 2012; 16(7):1979–1987. [PubMed: 22714116]

Table 1

Socio-demographic and HIV/STD history of Chinese MSM participants (N =1342)

	<i>N (%)</i>
Age in years	
16–25	317 (23.6)
26–35	745 (55.5)
36–45	231 (17.2)
>45	49 (3.7)
Marital Status	
Single	1120 (84.5)
Married	206 (15.5)
Education	
High school or below	202 (15.2)
Some college	418 (31.4)
College or above	711 (53.4)
Sexual Orientation	
Gay	974 (73.1)
Bisexual	352 (26.4)
Heterosexual	7 (0.5)
Sexual Orientation Disclosure	
Never told anyone	665 (49.7)
Told someone	673 (50.3)
Employment	
Unemployed/part-time/retired	113 (10.0)
Full-time employed	1063 (80.3)
Student	128 (9.7)
Annual Income (USD)	
< \$6000	374 (28.0)
\$6000 – \$16000	684 (51.2)
> \$16000	279 (20.9)
Self-reported HIV Status	
Not HIV-infected or unknown	1281 (96.3)
HIV infected	49 (3.7)
Self-reported history of STDs	
No	1167 (88.1)
Yes	157 (11.9)
HIV testing, lifetime	
No	525 (39.5)
Yes	805 (60.5)
STD testing (excluding HIV), lifetime	
No	796 (60.3)
Yes	524 (39.7)

Table 2

Correlates of gay app use among Chinese MSM (N = 1342)

Correlates of Gay app use						
Age in years	App Users/Total MSM (%)	OR (95% CI)	P	aOR	P	
16–25	156/317 (49.2)	4.306 (2.022–9.170)	<0.001	3.607 (1.592–8.171)	0.002	
26–35	318/745 (42.7)	3.310 (1.583–6.920)	<0.001	2.915 (1.313–6.471)	0.009	
36–45	62/231 (26.8)	1.631 (0.748–3.555)	0.219	1.854 (0.798–4.309)	0.151	
>45	9/49 (18.4)	1		1		
Marital Status						
Married	44/206 (21.4)	1		1		
Single	497/1120 (44.4)	2.937 (2.063–4.182)	<0.001	1.616 (1.045–2.499)	0.031	
Education						
High school or below	62/202 (30.7)	1		1		
Some college	162/418 (38.8)	1.429 (0.999–2.044)	0.051	1.511 (1.021–2.237)	0.039	
College or above	316/711 (44.4)	1.806 (1.294–2.522)	<0.001	1.749 (1.210–2.528)	0.003	
Sexual Orientation						
Bisexual	115/352 (32.7)	1		1		
Gay	428/974 (43.9)	1.615 (1.250–2.087)	<0.001	1.191 (0.882–1.607)	0.254	
Heterosexual	1/7 (14.3)	0.343 (0.041–2.887)	0.325	0.577 (0.069–5.664)	0.637	
Sexual Orientation Disclosure						
Never told anyone	212/665 (31.9)	1		1		
Told someone	333/673 (49.5)	2.093 (1.676–2.614)	<0.001	1.697 (1.327–2.171)	<0.001	
Employment						
Unemployed/part-time/retired	46/133 (34.6)	1		1		
Full-time employed	430/1063 (40.5)	1.285 (0.881–1.874)	0.194	1.388 (0.913–2.109)	0.125	
Student	65/128 (50.8)	1.951 (1.186–3.210)	0.008	1.650 (0.939–2.900)	0.082	
Annual Income (USD)						
< \$6000	143/374 (38.2)	1				
\$6000 – \$16000	285/684 (41.7)	1.154 (0.891–1.494)	0.277			
> \$16000	115/279 (41.2)	1.133 (0.825–1.555)	0.441			

Anal intercourse with male partner in past 3 months[†]

Correlates of Gay app use		App Users/Total MSM (%)	OR (95% CI)	p	aOR	p
Age in years						
0 partners		95/262 (36.3)	1		1	
1 partner		165/532 (31.0)	0.790 (0.579–1.079)	0.139	0.718 (0.515–1.002)	0.051
2 or more partners		283/537 (52.7)	1.959 (1.446–2.653)	<0.001	1.873 (1.350–2.597)	<0.001
Condomless anal sex with men in past 3 months ¹						
0 partners		344/868 (39.6)	1			
1 partner		129/296 (43.6)	1.177 (0.901–1.537)	0.232		
2+ partners		72/174 (41.4)	1.075 (0.772–1.497)	0.667		
Condomless sex with women in past 3 months ²						
None reported		506/1169 (43.3)	1			
Reported		36/160 (22.5)	0.380 (0.258–0.561)	<0.001	0.617 (0.389–0.979)	0.040
Self-reported HIV Status						
Not HIV-infected or unknown		522/1281 (40.7)	1			
HIV infected		20/49 (40.8)	1.003 (0.561–1.792)	0.993		
Self-reported history of STDs						
No		465/1167 (39.8)	1			
Yes		74/157 (47.1)	1.346 (0.963–1.881)	0.082		
HIV testing, lifetime						
No		174/525 (33.1)	1			
Yes		368/805 (45.7)	1.699 (1.352–2.135)	<0.001	1.539 (1.198–1.978)	0.001
STD testing (excluding HIV), lifetime						
No		319/796 (40.1)	1			
Yes		225/524 (42.9)	1.125 (0.900–1.407)	0.301		

¹ Anal intercourse with men refers to both insertive and receptive anal intercourse

² Intercourse with women refers to both vaginal and anal intercourse