Disclosure of sexual orientation to health professionals in China: results from an online cross-sectional study

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Abstract

Background: Many men who have sex with men (MSM) in China are “in the closet.” The low rate of disclosure may impact sexual behaviours, testing for HIV and other sexually transmitted infections (STIs), and diseases transmission. This study examines factors associated with overall sexual orientation disclosure and disclosure to healthcare professionals.

Methods: A nationwide cross-sectional online survey was conducted from September 2014 to October 2014 in China. Participants completed questions covering socio-demographic information, sexual behaviours, HIV/STI testing history, and self-reported HIV status. We defined healthcare professional disclosure as disclosing to a doctor or other medical provider.

Results: A total of 1819 men started the survey and 1424 (78.3%) completed it. Among the 1424 participants, 62.2% (886/1424) reported overall disclosure, and 16.3% (232/1424) disclosed to healthcare professionals. In multivariate analyses, the odds of sexual orientation disclosure were 56% higher among MSM who used smartphone-based, sex-seeking applications [adjusted odds ratio (aOR) = 1.56, 95% CI: 1.25–2.95], but were lower among MSM reporting sex while drunk or recreational drug use. The odds of disclosure to a healthcare professional were greater among MSM who had ever tested for HIV or STIs (aOR = 3.36, 95% CI: 2.50–4.51 for HIV, and aOR = 4.92, 95% CI: 3.47–6.96 for STIs, respectively) or self-reported as living with HIV (aOR = 1.59, 95% CI: 0.93–2.72).

Conclusion: Over 80% of MSM had not disclosed their sexual orientation to health professionals. This low level of disclosure likely represents a major obstacle to serving the unique needs of MSM in clinical settings. Further research and interventions to facilitate MSM sexual orientation disclosure, especially to health professionals, are urgently needed.

Keywords: China; disclosure; healthcare professional; men who have sex with men (MSM); sexual behaviours; sexual orientation disclosure

Introduction

Many men who have sex with men (MSM) in low- and middle-income countries (LMICs) are “in the closet,” or have not disclosed their sexual orientation [1,2]. We define sexual orientation disclosure as having ever disclosed one’s sexual orientation to anyone other than a sexual partner, and healthcare professional disclosure as disclosing to a doctor or other medical provider. The large cloistered MSM population in LMICs is likely related to social and cultural pressures of the local environment. MSM in these countries are subject to prejudice, stigma, and social discrimination by their communities [3]. As a result of these sociocultural pressures, MSM may face informal social condemnation, loss of employment, and loss of social standing [4,5]. In addition, the benefits of sexual orientation disclosure may be limited. Among men who disclose their sexual orientation, social support and MSM-specific clinical services are difficult to identify [6]. Nonetheless, sexual orientation disclosure among MSM has been associated with lower rates of depression [7], good peer support, and improved access to prevention services [8].

Much of the literature on MSM disclosure has come from high-income settings where local environments are often less harsh towards homosexuality [9]. The focus of these studies is usually to emphasize the potential benefits of disclosing sexual orientation to healthcare providers and to focus on ways to promote disclosure, social support, and reduction of stigma and discrimination [6,10,11]. In LMICs, there is less research on MSM sexual orientation disclosure [12]. The limited existing research has focused on MSM who are seen in clinics, overlooking a large number of men who do not disclose their sexual orientation to clinicians working in other settings or research staff.

Despite entrenched homophobia in many parts of China [13], there are slow cultural changes underway that create new opportunities for MSM sexual orientation disclosure.
Over the last three decades, there have been progressive movements, liberalizing the country socially, culturally and economically, leading to more open and inclusive attitudes towards MSM [14]. As a result, there is growing recognition of the importance of clinical services tailored to meet the needs of MSM [15]. At the community level, there is an increasing number of community-based organizations (CBOs) focusing on promotion of sexual health among MSM [16] and MSM-friendly HIV testing programmes [17]. These developments may encourage Chinese MSM to disclose their sexual orientation. This study examined Chinese MSM sexual orientation disclosure and disclosure to healthcare professionals.

Methods
Study design and sampling methods
From September 2014 to October 2014, the University of North Carolina Project-China conducted a nationwide, online, cross-sectional study among Chinese MSM. Banner ads to the online survey were put on three gay websites targeting geographically disparate regions in China in order to recruit MSM from across the nation. Participants entered the survey by clicking on banner links. The three websites were Danlan Gongyi from Northern China (http://www.danlan.org), Yunnan Tongzhi from Southern China (http://www.yntz.net), and Jiangsu Tongzhi from Eastern China (http://www.jstz.org). We used a standardized checklist for reporting internet trial results [18].

Detailed study recruitment procedures have been reported elsewhere [19]. Participants who clicked the survey links on the websites were directed to the online survey that was hosted by Qualtrics (Provo, Utah). The first three questions of the survey screened for eligibility. Eligibility criteria included 16 years or older, born male, and ever having engaged in anal sex with a man. Eligible participants were then required to give informed consent prior to beginning the survey.

Measures
The online survey was anonymous and collected information on socio-demographic information and sexual risk behaviours. Socio-demographic information included age (as a continuous variable and further categorized into three groups: less than 20, 20–29, or 30 and above), occupation (student or not), marital status (never married or ever married), education (high school or below, college/bachelors, or post-graduate), and annual income (less than $3000 USD, $3001–6000 USD, $6001–10,000 USD, $10,001–15,000 USD, or more than $15,000 USD). Models were built using the results of a literature search and prior knowledge from previous work of the study group and collaborators to select potential confounders. A universal directed acyclic graph (DAG) was drawn using this data. Finally, based on this selection process, age, residence, educational level and annual income were included in the final models.

All data analyses were completed using SAS 9.4 (SAS int. Cary, NC, USA). We used similar methods to evaluate the factors correlated with sexual orientation disclosure to healthcare professionals.

Ethical statement
Ethical approval was attained from the ethics review committees at the Guangdong Provincial Center for Skin Diseases and STI Control (Guangzhou, China), University of North Carolina at Chapel Hill (North Carolina, USA), and the University of California, San Francisco (California, USA) prior to the launch of the survey.

Results
A total of 1819 men started the survey and a total of 1424 (78.3%) participants met the inclusion criteria completed the online survey.
Socio-demographics and sex behaviours

The mean age of the 1424 participants was 25.6 ± 6.8 years old, the majority of whom (77.5%, n = 1104) were under 30 years old. Overall, 25.9% (n = 369) of men had completed less than high school and 16.2% (n = 230) of them were married. In addition, 43.7% (n = 511) of participants were currently enrolled as full-time or part-time students, and the majority of participants (81.9%, n = 1166) had an annual income of less than $10000 USD (Table 1).

In total, 62.2% of participants (n = 886) reported ever disclosing their sexual orientation to anyone other than their partners. From this subgroup of participants who had disclosed their sexual orientation, 11.1% of participants (n = 158/1424) disclosed to their parents, 12.9% (n = 184/1424) disclosed to siblings or other family members, 52.2% (n = 743/1424) disclosed to friends or classmates, 11.0% (n = 157/1424) disclosed to co-workers, and 16.3% (n = 232/1424) disclosed to a doctor or other healthcare professional.

Among all the participants, 49.4% (n = 703) reported having ever tested for HIV, and 32.0% reported ever testing for HIV self-reported living with HIV.

Factors associated with sexual orientation disclosure to healthcare professionals

Our study also evaluated factors correlated with disclosure of sexual orientation to healthcare professionals. Univariate and multivariate models found similar relationships between factors associated with disclosure of sexual orientation to healthcare professionals (Table 3). The likelihood of disclosure to a healthcare professional was greater among MSM who had ever tested for HIV or STIs (aOR = 3.36, 95% CI: 2.50–4.51 for HIVm and aOR = 4.92, 95% CI: 3.47–6.96 for STIs, respectively) and who reported living with HIV (aOR = 1.59, 95% CI: 0.93–2.72). While condomless sex with a woman in the last 3 months was a significant correlate of sexual orientation disclosure to health professionals in univariate analysis, after adjusting for age, residence, income, and education, it was no longer significantly correlated. In both univariate and multivariate logistic regression models, self-reported living with HIV was positively associated with sexual orientation disclosure to health professionals, with a crude OR of 1.61 (95% CI: 0.95–2.73) and an aOR of 1.59 (95% CI: 0.93–2.72).

Discussion

Sexual orientation disclosure is closely correlated with increased social support, which could potentially increase self-esteem and psychological adjustment among MSM [20]. This, in turn, promotes linkage and retention to care [21]. Many existing studies focused on sexual orientation disclosure among MSM in high-income settings. This study adds to the current literature by using online recruitment methods to recruit participants from demographically and economically disparate regions throughout China (over 270 cities from 30 provinces), not requiring in-person disclosure of sexual orientation, and providing data on correlations between disclosure and HIV/STI testing. Our findings indicate that sexual orientation disclosure is positively associated with HIV and STI testing, but negatively associated with alcohol or recreational drug use.

We found that only one-sixth of Chinese MSM had ever disclosed their sexual orientation to a doctor or other healthcare professional. This disclosure rate is slightly lower than clinic-based data findings from Beijing [22], and similar data from other low- and middle-income countries is not available [2,23]. In comparison, this rate is much higher in high-income countries, where local environments are more receptive to MSM life. For example, in the United States, 70–90% of MSM had disclosed their sexual orientation to primary care provider [6,11] and in the United Kingdom, this rate is as high as 40% [24]. Low rates of MSM sexual orientation disclosure to health professionals in China may be due inadequate initial assessment, poor retention in care, insufficient social and psychological support, and health professional discrimination [25]. Strategies to improve sexual orientation disclosure to healthcare professionals are needed, especially as the social environment continues to evolve.

Our study showed that disclosure of sexual orientation to a healthcare professional was associated with gay app use.
Table 1. Demographic characteristics and behaviours among Chinese MSM, 2014 (N = 1424).  

| Characteristic                          | Disclosers (n = 886) | Non-disclosers (N = 538) | Overall (N = 1424) |
|----------------------------------------|----------------------|--------------------------|--------------------|
| **Frequency**                          | **Per cent (95% CI)**| **Frequency**            | **Per cent (95% CI)**| **Frequency**            | **Per cent** |
| **Age**                                |                      |                          |                    |
| <20                                    | 147                  | 16.6 (14.1, 19.0)        | 59                 | 11.0 (8.3, 13.6)         | 206          | 14.5          |
| 20–29                                  | 561                  | 63.3 (60.1, 66.5)        | 337                | 62.6 (58.5, 66.7)        | 898          | 63.1          |
| ≥30                                    | 178                  | 20.1 (17.4, 22.7)        | 142                | 26.4 (22.7, 30.1)        | 320          | 22.5          |
| **Marital status**                     |                      |                          |                    |
| Never married                          | 776                  | 87.6 (85.4, 89.8)        | 418                | 77.7 (74.2, 81.2)        | 1194         | 83.8          |
| Ever married                           | 110                  | 12.4 (10.2, 14.6)        | 120                | 22.3 (18.8, 25.8)        | 230          | 16.2          |
| **Residence**                          |                      |                          |                    |
| Urban                                  | 799                  | 90.2 (88.2, 92.1)        | 467                | 86.8 (83.9, 89.7)        | 1266         | 88.9          |
| Rural                                  | 87                   | 9.8 (7.9, 11.8)          | 71                 | 13.2 (10.3, 16.1)        | 158          | 11.1          |
| **Education**                          |                      |                          |                    |
| High school or below                   | 228                  | 25.7 (22.8, 28.6)        | 141                | 26.2 (22.5, 29.9)        | 369          | 25.9          |
| College/Bachelors                      | 610                  | 68.8 (65.8, 71.9)        | 359                | 66.7 (62.7, 70.7)        | 969          | 68.0          |
| Masters or PhD                         | 48                   | 5.4 (3.9, 6.9)           | 38                 | 7.1 (4.9, 9.2)           | 86           | 6.0           |
| **Student**                            |                      |                          |                    |
| Yes                                    | 391                  | 44.1 (40.9, 47.4)        | 120                | 22.3 (18.8, 25.8)        | 511          | 43.7          |
| No                                     | 495                  | 55.9 (52.6, 59.2)        | 164                | 30.5 (26.6, 34.4)        | 659          | 56.3          |
| **Annual income**                      |                      |                          |                    |
| <$3000 USD                             | 250                  | 28.2 (25.2, 31.2)        | 120                | 22.3 (18.8, 25.8)        | 370          | 26.0          |
| $3000–6000USD                          | 256                  | 28.9 (25.9, 31.9)        | 164                | 30.5 (26.6, 34.4)        | 420          | 29.5          |
| $6001–10000USD                         | 218                  | 24.6 (21.8, 27.4)        | 158                | 29.4 (25.5, 33.2)        | 376          | 26.4          |
| $10001–15000USD                        | 107                  | 12.1 (9.9, 14.2)         | 64                 | 11.9 (9.2, 14.6)         | 171          | 12.0          |
| > $15000USD                            | 55                   | 6.2 (4.6, 7.8)           | 32                 | 6.0 (3.9, 8.0)           | 87           | 6.1           |
| **Ever tested for STIs except HIV**    |                      |                          |                    |
| Yes                                    | 318                  | 35.9 (32.7, 39.1)        | 138                | 25.6 (22.0, 29.4)        | 456          | 32.0          |
| No                                     | 568                  | 64.1 (60.9, 67.3)        | 400                | 74.6 (70.6, 78.0)        | 968          | 68.0          |
| **Ever tested for HIV**                |                      |                          |                    |
| Yes                                    | 490                  | 53.3 (52.0, 54.6)        | 213                | 39.6 (35.4, 43.7)        | 703          | 49.4          |
| No                                     | 396                  | 44.7 (42.4, 47.0)        | 325                | 60.4 (56.3, 64.6)        | 721          | 50.6          |
| **Self-reported living with HIV**      |                      |                          |                    |
| Yes                                    | 44                   | 5.9 (4.9, 7.0)           | 24                 | 3.4 (2.5, 4.4)           | 68           | 9.7           |
| No                                     | 446                  | 91.0 (88.5, 93.6)        | 189                | 88.7 (84.5, 93.0)        | 635          | 90.3          |
| **Transgender individuals**            |                      |                          |                    |
| Yes                                    | 851                  | 96.0 (94.7, 97.3)        | 512                | 95.2 (93.4, 97.0)        | 1363         | 95.7          |
| No                                     | 35                   | 4.2 (3.2, 5.3)           | 26                 | 4.8 (3.9, 5.8)           | 61           | 4.3           |
| **Currently have a main sexual partner** |                      |                          |                    |
| Yes                                    | 444                  | 50.1 (46.8, 53.4)        | 247                | 45.9 (41.7, 50.1)        | 691          | 48.5          |
| No                                     | 442                  | 49.9 (46.6, 53.2)        | 291                | 51.1 (47.9, 54.3)        | 733          | 51.5          |
| **Ever had vaginal or anal sex with women** |                      |                          |                    |
| Yes                                    | 197                  | 22.4 (19.5, 25.0)        | 217                | 40.3 (36.2, 44.5)        | 414          | 29.1          |
| No                                     | 689                  | 77.6 (75.1, 80.4)        | 321                | 59.7 (55.5, 63.8)        | 1010         | 70.9          |
| **Had condomless sex with women in the last 3 months** |                      |                          |                    |
| Yes                                    | 82                   | 9.3 (7.3, 11.2)          | 100                | 18.6 (15.3, 21.9)        | 182          | 12.8          |
| No                                     | 804                  | 90.7 (88.8, 92.7)        | 438                | 81.4 (78.1, 84.7)        | 1242         | 87.2          |
| **Prefer insertive or receptive anal sex with men** |                      |                          |                    |
| Insertive                              | 288                  | 32.5 (29.4, 35.6)        | 236                | 43.9 (39.7, 48.1)        | 524          | 36.8          |
| No preference                          | 428                  | 48.3 (45.0, 51.6)        | 193                | 35.9 (31.8, 39.9)        | 621          | 43.6          |
| receptive                              | 170                  | 19.2 (16.6, 21.8)        | 109                | 20.3 (16.8, 23.7)        | 279          | 19.6          |
This finding is consistent with the limited literature on gay app use and sexual orientation disclosure [26]. One potential explanation for this phenomenon is that gay apps may increase social support. Gay apps allow MSM to connect with other men with similar backgrounds or experience, potentially providing a source of online social support [27]. The existing literature also suggests that social media use could augment the search for social support in online MSM communities (i.e. gay apps), which in turn promotes disclosure of sexual orientation to others, including healthcare professionals [27].

Our results also showed that disclosure of sexual orientation to healthcare professionals is positively correlated with testing for HIV or other STIs. To the best of our knowledge, this is the first study that explores these associations among MSM in an LMIC setting. This finding is

| Table1. (Continued) | Disclosers (n = 886) | Non-disclosers (N = 538) | Overall (N = 1424) |
|----------------------|----------------------|--------------------------|-------------------|
|                      | Frequency | Per cent (95% CI) | Frequency | Per cent (95% CI) | Frequency | Per cent |
| Had condomless sex with men during the last sexual act in the last 6 months | No | 474 | 53.5 [50.2, 56.8] | 279 | 51.8 [47.6, 56.1] | 753 | 52.9 |
|                      | Yes | 196 | 22.1 [19.4, 24.9] | 102 | 19.0 [15.6, 22.3] | 298 | 20.9 |
| Drunk alcohol during or prior to sex in the last 3 months | No anal sex | 216 | 24.4 [21.5, 27.2] | 157 | 29.2 [25.3, 33.0] | 373 | 26.2 |
|                    | Yes | 58 | 6.6 [4.9, 8.2] | 66 | 12.3 [9.5, 15.0] | 124 | 8.7 |
| Ever participated in group sex in the last 12 months | No | 828 | 93.4 [91.8, 95.1] | 472 | 87.7 [85.0, 90.5] | 1300 | 91.3 |
|                     | Yes | 82 | 9.3 [7.3, 11.3] | 59 | 11.0 [8.3, 13.6] | 141 | 9.9 |
| Had sex in exchange for gifts or money in the last 12 months | No | 804 | 90.7 [88.8, 92.7] | 479 | 89.0 [86.4, 91.7] | 1283 | 90.1 |
|                      | Yes | 49 | 5.5 [4.0, 7.0] | 33 | 6.1 [4.1, 8.2] | 82 | 5.8 |
| Found partner through gay app in the last 6 months | No | 837 | 94.5 [93.0, 96.0] | 535 | 93.9 [91.8, 95.9] | 1372 | 96.3 |
|                      | Yes | 558 | 63.0 [59.8, 66.2] | 266 | 49.4 [45.2, 53.7] | 824 | 57.9 |
| Found partner through internet (except gay apps) in the last 6 months | No | 328 | 37.0 [33.8, 40.2] | 272 | 50.6 [46.3, 54.8] | 600 | 42.1 |
|                      | Yes | 452 | 51.1 [47.8, 54.4] | 261 | 48.5 [44.3, 52.7] | 713 | 50.1 |
| Found partner through in person in the last 6 months | No | 433 | 48.9 [45.6, 52.2] | 277 | 51.5 [47.2, 55.7] | 710 | 49.9 |
|                      | Yes | 91 | 10.3 [8.3, 12.3] | 71 | 13.2 [10.3, 16.1] | 162 | 11.4 |
| Used recreational drugs in the last 12 months | No | 795 | 89.7 [87.7, 91.7] | 467 | 86.8 [83.9, 89.7] | 1262 | 88.6 |
|                      | Yes | 226 | 25.5 [22.6, 28.4] | 98 | 18.2 [14.9, 21.5] | 324 | 22.8 |
|                      | No | 660 | 74.5 [71.6, 77.4] | 440 | 81.8 [78.5, 85.1] | 1100 | 77.2 |
consistent with the results of a study conducted among MSM in the USA [28]. Similarly, we found that living with HIV was positively associated with disclosure of sexual orientation to health professionals. As HIV positive test results are reported to the Center for Disease Control, disclosure of sexual orientation may be part of mandatory case reporting. Conversely, MSM may be driven to test for HIV because of their sexual orientation. While it is not clear whether sexual orientation disclosure promotes HIV testing or if HIV testing promotes sexual orientation disclosure, promoting the two together could be useful [29], especially as rates of both are sub-optimal among MSM in China [30].

| Table 2. Factors correlated with sexual orientation disclosure among Chinese MSM, 2014 (N = 1424). |
|---------------------------------------------|-------------------------------|------------|----------------|----------------|------------|
|                                         | Crude Model | Adjusted Model* |               |               |               |
|                                         | OR 95% Cls   | OR 95% Cls     |               |               |               |
| Ever tested for any STIs other than HIV |                |                |               |               |               |
| No                                        | Ref          | 1.62 1.28 2.06 | 1.87 1.46 2.39 |
| Yes                                       |              | 1.28 1.52 2.35 | 1.76 2.08      |
| Self-reported living with HIV             |                |                |               |               |               |
| No                                        | Ref          | 0.78 0.46 1.31 | 0.81 0.47 1.40 |
| Yes                                       |              | 0.46 0.95 1.72 | 0.83 1.43      |
| Student                                   |                |                |               |               |               |
| No                                        | Ref          | 1.37 1.10 1.70 | 1.09 0.83 1.43 |
| Yes                                       |              | 1.10 0.95 1.72 | 0.83 1.63      |
| Sexual Orientation                        |                |                |               |               |               |
| Bisexual                                  | Ref          | 3.34 2.62 4.25 | 3.25 2.53 4.18 |
| Homosexual                                |              | 2.62 1.94 3.37 | 2.35 1.82 3.01 |
| Currently have a main male/female sexual partner |            |                |               |               |               |
| No                                        | Ref          | 1.18 0.96 1.47 | 1.27 1.02 1.59 |
| Yes                                       |              | 0.96 0.82 1.15 | 1.02 0.87 1.21 |
| Preferred sexual role during anal sex      |                |                |               |               |               |
| Insertive                                  | Ref          | 1.82 1.43 2.31 | 1.64 1.27 2.10 |
| Receptive                                 |              | 1.43 1.21 1.67 | 1.27 1.05 1.51 |
| Both                                      |              | 1.28 0.95 1.72 | 1.20 0.89 1.63 |
| Ever had vaginal or anal sex with women   |                |                |               |               |               |
| No                                        | Ref          | 0.42 0.34 0.53 | 0.47 0.35 0.62 |
| Yes                                       |              | 0.34 0.27 0.42 | 0.35 0.24 0.48 |
| Engaged in condomless sex with women in the last 3 months |            |                |               |               |               |
| No                                        | Ref          | 0.45 0.33 0.61 | 0.55 0.39 0.79 |
| Yes                                       |              | 0.33 0.25 0.44 | 0.40 0.27 0.62 |
| Had condomless sex with men during the last sexual act in the last 6 months |            |                |               |               |               |
| No                                        | Ref          | 1.13 0.85 1.50 | 1.14 0.86 1.52 |
| Yes                                       |              | 0.85 0.65 1.10 | 0.86 0.61 1.27 |
| Drunk alcohol during or prior to sex in the last 12 months |            |                |               |               |               |
| No                                        | Ref          | 0.50 0.35 0.73 | 0.55 0.37 0.81 |
| Yes                                       |              | 0.35 0.25 0.50 | 0.37 0.25 0.55 |
| Participated in group sex in the last 12 months |            |                |               |               |               |
| No                                        | Ref          | 0.83 0.58 1.18 | 0.85 0.65 1.35 |
| Yes                                       |              | 0.58 0.36 0.90 | 0.65 0.42 0.96 |
| Had sex in exchange for gifts or money in the last 12 months |            |                |               |               |               |
| No                                        | Ref          | 0.90 0.57 1.41 | 0.85 0.53 1.36 |
| Yes                                       |              | 0.57 0.33 0.92 | 0.53 0.31 0.91 |
| Found partner through gay app in the last 6 months |            |                |               |               |               |
| No                                        | Ref          | 1.74 1.40 2.16 | 1.56 1.25 1.95 |
| Yes                                       |              | 1.40 1.09 1.80 | 1.25 0.96 1.64 |
| Found partner through internet in the last 6 months |            |                |               |               |               |
| No                                        | Ref          | 1.11 0.80 1.47 | 1.25 1.00 1.56 |
| Yes                                       |              | 0.80 0.57 1.17 | 1.00 0.76 1.31 |
| Found partner through person in the last 6 months |            |                |               |               |               |
| No                                        | Ref          | 0.75 0.54 1.05 | 0.85 0.60 1.20 |
| Yes                                       |              | 0.54 0.35 0.85 | 0.60 0.39 0.90 |
| Used recreational drugs in the last 12 months |            |                |               |               |               |
| No                                        | Ref          | 0.65 0.46 0.95 | 0.66 0.46 0.97 |
| Yes                                       |              | 0.50 0.34 0.75 | 0.50 0.33 0.74 |

* Model adjusted for age (as a continuous variable), residence (urban or rural), education level (high school or below, college or bachelors, masters or PhD) and annual income (less than $3000 USD, $3001–6000 USD, $6001–10,000 USD, $10,001–15,000 USD, or more than $15,000 USD); $ Only limited to participants reported ever tested for HIV, n = 703.
challenging in China, use of community campaigns or gay apps to increase social support, and to address these two problems jointly is a promising route [29].

Our study has several limitations. First and foremost, this study was cross-sectional and no causal relationships can be inferred. Second, as an online survey, recruited participants were primarily MSM who were young and well educated [31], potentially excluding older MSM who may be more likely to be married. This older population may be less likely to disclose given a longer exposure to societal stigma. Third, as all collected data (socio-demographic, behaviours, and HIV testing results) were self-reported, social desirability bias may be present. However, we anticipate that this bias to be minimal as the survey was online and no face-to-face meetings were involved in the study. Fourth, as some potential

Table 3. Factors correlated with sexual orientation disclosure to healthcare professionals among Chinese MSM, 2014 (N = 1424).

|                         | Crude Model | Crude Model* |
|-------------------------|-------------|--------------|
|                         | OR 95% CLS  | OR 95% CLS   |
| Ever tested for HIV     |             |              |
| No                      | Ref         | Ref          |
| Yes                     | 3.54        | 2.65         |
|                         | 4.72        | 3.36         |
|                         | 2.50        | 1.59         |
|                         | 4.51        | 0.93         |
|                         | 2.72        | 1.59         |
| Self-reported living with HIV$ |         |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.61        | 0.95         |
|                         | 2.73        | 1.59         |
|                         | 0.93        | 1.59         |
|                         | 2.72        | 1.59         |
| Ever tested for any STIs other than HIV |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 5.12        | 3.65         |
|                         | 7.20        | 4.92         |
|                         | 3.47        | 6.96         |
| Student                 |             |              |
| No                      | Ref         | Ref          |
| Yes                     | 0.88        | 0.66         |
|                         | 1.18        | 1.16         |
|                         | 0.81        | 1.64         |
| Sexual Orientation      |             |              |
| Bisexual                | Ref         | Ref          |
| Homosexual              | 1.52        | 1.08         |
|                         | 2.14        | 1.56         |
|                         | 1.10        | 2.22         |
| Currently have a main male/female sexual partner |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.50        | 1.13         |
|                         | 1.99        | 1.44         |
|                         | 1.08        | 1.92         |
| Preferred sexual role during anal sex |        |              |
| Insertive               | Ref         | Ref          |
| Receptive               | 0.94        | 0.68         |
|                         | 1.30        | 1.04         |
|                         | 0.75        | 1.45         |
| Both                    | 1.42        | 0.97         |
|                         | 2.06        | 1.56         |
|                         | 1.06        | 2.28         |
| Ever had vaginal or anal sex with women |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.09        | 0.80         |
|                         | 1.48        | 0.90         |
|                         | 0.62        | 1.30         |
| Engaged in condomless sex with women in the last 3 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.06        | 0.70         |
|                         | 1.61        | 0.95         |
|                         | 0.60        | 1.51         |
| Had condomless sex with men during the last sexual act in the last 6 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.10        | 0.77         |
|                         | 1.56        | 1.12         |
|                         | 0.78        | 1.60         |
| Drunk alcohol during or prior to sex in the last 3 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.26        | 0.79         |
|                         | 2.02        | 1.16         |
|                         | 0.72        | 1.89         |
| Participated in group sex in the last 12 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 2.07        | 1.39         |
|                         | 3.10        | 1.90         |
|                         | 1.26        | 2.86         |
| Had sex in exchange for gifts or money in the last 12 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.48        | 0.86         |
|                         | 2.55        | 1.59         |
|                         | 0.92        | 2.76         |
| Found partner through gay app in the last 6 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.16        | 0.87         |
|                         | 1.54        | 1.18         |
|                         | 0.88        | 1.59         |
| Found partner through internet in the last 6 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.38        | 1.04         |
|                         | 1.84        | 1.33         |
|                         | 0.99        | 1.77         |
| Found partner through in person in the last 6 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 1.43        | 0.95         |
|                         | 2.15        | 1.26         |
|                         | 0.83        | 1.92         |
| Used recreational drugs in the last 12 months |       |              |
| No                      | Ref         | Ref          |
| Yes                     | 0.66        | 0.48         |
|                         | 0.90        | 0.68         |
|                         | 0.50        | 0.94         |

* Model adjusted for age (Continuous), residence (Urban or rural), education level (High school or below, college or bachelors, or masters or PhD) and annual income (less than $3000 USD, $3001-6000USD, $6001-10,000USD, $10,001-15,000USD, or more than $15,000USD); $ Only limited to participants reported ever tested for HIV, n = 703.
participants did not complete our survey, there may have been a selection bias as non-completers and participants may have had different socio-demographic characteristics and behaviours. However, as the data of the non-completers was excluded from our survey data, we were unable to compare these two groups. Fifth, for the purposes of this study, “healthcare professional” was a general term encompassing several types of care providers, including HIV clinics, hospitals, testing personnel, general medical practitioners, and more. As the role of each of these providers may vary, it is difficult to generalize our findings with any certainty. By considering the varied types of providers as one general category, we may have overlooked important information and the estimated associations may be skewed. Future studies should address this issue with subgroup analyses to provide more information on the topic. Finally, as many potential participants who clicked the survey link withdrew before eligibility screening, another selection bias may have also occurred. Regardless, our study provides preliminary evidence for the significance of promoting disclosure of sexual orientation, especially to healthcare professionals, among Chinese MSM.

Conclusion
Our study demonstrated that sexual orientation disclosure is correlated with HIV and other STI testing, and lower-risk sexual behaviours. As such, policies facilitating sexual orientation disclosure and testing are recommended. Specifically, policy makers, researchers, and the MSM community should work together to build a more supportive environment to facilitate sexual orientation disclosure. In addition, longitudinal prospective studies targeting how sexual orientation disclosure affects behavioural norms of MSM are needed to provide tailored interventions. Promoting MSM sexual orientation disclosure may be part of a comprehensive HIV intervention tailored to meet the needs of MSM in LMIC settings.

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Competing interests
The authors report no competing interests.

Authors’ contribution
JT and CW conceived the study, JT, CW, WT, JM, CL and TW designed the methods. WT did the analyses with the input from KM and MH. WT drafted the manuscript with inputs from JM, CL, BC, YZ, MH, KM (Katie Molian), CW and JT. TW, ST, YQ, BM, BY, WM, LH, BM, CW, and JT. All authors critically revised the manuscript.

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