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Blocking and being blocked on gay dating apps among MSM attending a sexual health clinic: An observational study

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Abstract

Background

While studies on blocking, a behavior on dating apps, and men who have sex with men (MSM) health outcomes have been conducted in other nations, albeit limited and mostly using qualitative techniques, no such study has been conducted in China, despite its large MSM population and relationship between Chinese MSM gay app use and health outcomes. We studied the correlates of blocking on the world's largest gay dating app among Chinese MSM (N=208).

Methods

We conducted a cross-sectional survey as part of an HIV testing intervention in Guangzhou, China, May - December 2019. Using logistic regression models, we estimated the correlates of blocking.

Results

MSM had a mean age of 27.9 years (SD=7.1) and median of 1 sexual partner in the last three months. About 62% had blocked someone in their lifetime and 46% had been blocked in their lifetime. Each additional male partner was associated with an 87% (aOR=1.87, 95%CI= 1.03, 3.40) increased chance of being blocked.

Conclusions

Number of male partners may be associated with blocking behavior, with implications for the design of online sexual health interventions.

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Keywords: men who have sex with men; dating apps; blocking; HIV; social networks

Introduction

Although most men who have sex with men (MSM) in China do not disclose their sexual orientation to anyone [1], there is a rich and expanding digital social life for these men [2, 3]. The world's largest gay social networking app, Blued, is based in China and provides news, health services, shopping, and gaming [2, 3]. MSM spend an average of 80 minutes a day on such apps [4]. Blocking, both being blocked and blocking someone, are social network ties produced when MSM use gay apps. Blocking someone is when users select a function on an app to prevent another user from contacting them and being blocked is when someone is prevented from contacting another user [5]. Users may block others because of harassment, lack of attractiveness, screening for time-wasters, racism (individuals blocking users who might be/have been racist towards them), perceived HIV risk, privacy and safety concerns [5, 6, 7, 8]. Blocking can be a protective behavior for the person doing the blocking and also a negative behavior associated with increased anxiety, distress, isolation for the person who was blocked [5, 6]. In addition, while blocking may have protective aspects, it may increase HIV risk among MSM by facilitating the formation of segregated groups with greater sexual risk when men block others as a protective mechanism against racism and discrimination [7]. For example, if Black MSM block white MSM for racism, this may create a segregated group of Black MSM - a demographic with higher HIV prevalence [9]. Similar scenarios may occur in other contexts e.g. closeted Chinese MSM blocking MSM who are "out", thus creating a segregated group of closeted MSM - another demographic with a higher HIV prevalence [10]. However, we note that this is a highly complex issue and are not necessarily proposing greater mixing between sexual networks. We note that the reduced racism experienced by having sex with one's ethnic group only can improve mental health outcomes [11], which in turn has implications for safer sex and the transmission of HIV and other STIs. Overall, blocking behaviors can cascade through social networks [12, 13] and thus the correlates of blocking warrant future study.

App-based health interventions among MSM are becoming increasingly common

[14, 15], but several features on such apps, such as blocking, and their public health implications are not well understood. Such understudied features may have unintended consequences on MSM sexual networks and HIV risk [7]. There are about 780,000 people living with HIV in China [16], with sexual contact being the most common mode of transmission [17]. Chinese MSM are a high-risk population for HIV infection [18] and there are about 21 million MSM in China [19]. Moreover, the HIV prevalence is swiftly rising, from 0.9% in 2003 to 7.3% in 2013 [18]. Use of gay apps among Chinese MSM is linked to risky sexual behaviors and may facilitate HIV transmission [20, 21]. While studies have explored the relationship between app use and MSM sexual risk, the relationship between specific in-app behaviors, such as blocking, has not been detailed. While studies on blocking and MSM health outcomes have been conducted in other nations, albeit limited and mostly using qualitative techniques [6, 7], no such study has been conducted in China, despite its large MSM population [3] and relationship between Chinese MSM gay app use and health outcomes [20]. We conducted an exploratory analysis to explore the factors that may contribute to blocking behavior, allowing us to better understand blocking and its association with health outcomes.

Methods

Study Design and Participants

We conducted a quasi-experimental study among MSM in Guangzhou, China that sought to promote male partner testing through social network-based distribution of HIV self-test (HIVST) kits in a cohort study, where participants were offered HIV self-test kits and asked to distribute kits to their social network contacts [22]. MSM were recruited from May 2019 to December 2019 through a social media account run for MSM-centric studies via posts within the account, and through an MSM-friendly clinic at the Guangdong Provincial Center for Skin Diseases and Sexually Transmitted Infection (STI) Control via approaching participants who came for STI testing. MSM were first recruited for the treatment arm and once recruitment for the treatment arm had been completed, MSM were recruited for the control arm. Participants interested

in HIV testing at the clinic could book appointments online or enroll in the study at the clinic. MSM were screened for the following criteria: 1) aged ≥ 18 years; 2) presumed male at birth (transgender women were not able to participate in the study); 3) ever had sex with men; 4) willing to be surveyed at baseline and follow-up. Eligible participants were provided with study information, such as, potential risks, benefits, procedures, and outcomes. Informed consent was obtained from all subjects. A baseline survey was administered to eligible participants via a QR code they could scan and thereby complete the survey on their mobile device. The datasets used and analyzed during the current study available from the corresponding author on reasonable request.

Survey items We collected participants' baseline data such as, sociodemographic characteristics, sexual behavior, HIV testing history, social network data and blocking behavior (survey instrument in Supplement).

Independent variables

Sexual behavior items included number of male partners in the last three months, and main sexual role. Examples of sexual behavior items were: in the past three months, with approximately how many different male sexual partners did you have anal sex? your main sexual role is (pick one) insertive/receptive/both. To represent sexual behavior disclosure to family and medical professional, we used the following item: if you have told others about your sexuality or sexual history with men, who are they? This item had the following options: medical professionals; family members; friends with no sexual relationship; coworkers; employers; other. We recoded the medical professionals option into a binary variable representing sexual behavior disclosure to medical professionals. We similarly recoded the family members option to a binary variable representing sexual behavior disclosure to one's family.

Social network survey items included name generator and descriptor questions to measure social network degree (number of people whom you have a social tie to) and weighted social network degree (social network degree weighted by the frequency of contact) [23]. Social network degree was based on the sum of people listed in the question: Besides your family members, who are the people you spend your free time

with? (list up to five). For example, if someone listed four people to the indicated question, their assigned social network degree was four. Weighted social network degree was based on the following item: How often do you contact the indicated person? This item had the options: once a year; once every 6 months; once a month; once a week; daily. We treated this as an ordinal variable (scale of 1-5) and summed the item across each social contact listed in the social network degree question. For example, if someone had a social network degree of four and contacted each person once a month, the weighted social network degree was $3+3+3+3=12$. These items were based on validated instruments used to measure social network characteristics [23].

Dependent variables

Blocking items included likelihood of engaging in blocking, both directed and undirected behavior, and level of distress caused by being blocked. Directed blocking behavior refers to blocking behavior that was targeted i.e. person A blocked person B (being blocked) or person A got blocked by person B (being blocked). Undirected blocking behavior is the sum of total blocking behaviors i.e. if person A blocked someone and also reported being blocked, they would have a total of two undirected blocking behaviors in that time period. Examples of questions were: Have you ever blocked someone on a Blue? Have you ever been blocked by someone else on Blue?

Ethical review

Participant anonymity was maintained during the entire project. No identifying information was collected. IRB approval was obtained from the Dermatology Hospital of Southern Medical University (GDDHLS-20180503) and the University of North Carolina at Chapel Hill (18-1358). All methods were carried out in accordance with relevant guidelines and regulations.

Statistical analysis

We calculated descriptives (Table 1) using data obtained from all MSM surveyed. Missing data on the variables of interest ranged from 0% to 42% (see Table 1). To account for nontrivial missing data, multiple imputation was conducted using multiple imputation with chained equations (MICE) to fill missing values with logistic regres-

sion imputation methods [24]. Data was assumed to be missing at random (MAR)
 and we imputed values based on key independent and dependent variables included in
 the final model. Forty-two imputed datasets were generated to ensure the number of
 imputed datasets was at least as large as the percentage of incomplete information for
 the main outcomes or the parameter-specific fraction of missing data for all parameters
 used in the final models, whichever was higher [25]. We modeled blocking behavior
 (undirected blocking behavior, blocking someone, being blocked) using multivariate
 logistic regression and reported adjusted odds ratio estimates for each independent
 variable. We adjusted for the following factors and intervention assignment. Inde-
 pendent variables represented sexual behavior [sexual role, number of male partners
 in the past three months, condom use, disclosure of MSM sexual behavior to family,
 disclosure of MSM sexual behavior to medical professional, prior HIV test], participant
 social network structure (social network degree, weighted social network degree), and
 sociodemographic categories (income, age). The Income variable was denominated in
 the survey as RMB/month and we converted it to USD/year for clarity. Social network
 degree and weighted social network degree were calculated as indicated in the Survey
 Items section, and all other variables were used unaltered from the survey instrument.
 Analysis was conducted in R [26].

Results

Sociodemographic characteristics

INSERT TABLE 1 HERE

Two hundred and eight MSM enrolled in the study. We presented descriptive
 statistics in Table 1. MSM had a mean age of 27.9 years (SD=7.1) and median of 1
 sexual partner in the last three months. Participants had a mean of 2.3 social ties
 (SD=1.1) and a mean weighted social network degree of 8.5 (SD=4.2). MSM generally
 fell into two yearly income groups; USD5,171 - USD10,342 (35.1 %) and USD10,342
 - USD17,236 (30.8 %). In the last three months, most MSM (62.3 %) used condoms
 every time during anal sex with men. Most had not disclosed sexual behavior to their

167 family (77.1 %), but had disclosed sexual behavior to their medical professional (66.3
 168 %). Most had a prior HIV test (83.7 %). Blocking was a common behavior. Most
 169 MSM (75 %) had engaged in undirected blocking behavior in their lifetime i.e. they
 170 had blocked someone or had been blocked. About 62 % had blocked someone in their
 171 lifetime and 46 % had been blocked in their lifetime.

172

173 **Multivariate analyses of blocking correlates among Chinese MSM**

174

INSERT TABLE 2 HERE

175 We presented multivariate analyses in Table 2. Each additional male partner was
 176 associated with an 87% (aOR=1.87, 95%CI= 1.03, 3.40) increased chance of being
 177 blocked. Reporting a versatile sexual role was related with a 90% (aOR=0.10, 95%CI=
 178 0.02, 0.45) decreased likelihood of blocking behavior and an 86% (aOR= 0.14, 95%CI=
 179 0.04, 0.46) reduced chance of being blocked. Results without MICE are indicated in
 180 Supplementary Table 1.

181

Discussion

182 Our exploratory analysis detailed that having more male partners was associated
 183 with an increased likelihood of getting blocked. There is limited empirical research on
 184 blocking [6, 7], and none on the public health implications of blocking. Blocking is
 185 likely associated with health outcomes, both positive and negative, but its correlates are
 186 unclear. Moreover, studies on blocking are predominantly conducted in high income
 187 nations, but not in low- and middle-income nations such as China, where there is
 188 a large MSM HIV burden [27]. Men with more male partners may be viewed as
 189 promiscuous or having STIs [28]. Upon finding out this information, other men may
 190 decide to block individuals with more partners. We suggest in-app messaging that
 191 de-stigmatizes having multiple partners, especially if safer sex is practiced.

192 Overall, with more detailed epidemiological data, we suggest that future work ex-
 193 pand on the correlates of blocking. While we are uncertain on the direction of causality,
 194 designing interventions on gay dating apps to target certain behaviors and demographic

groups may ensure that blocking is mostly used for positive purposes such as limiting racism and discrimination [6, 7] without creating self-segregated groups with greater HIV risk. An example of such an intervention may be cautioning users who block excessively within a certain time frame, a technique previously used on social media to reduce racism [29]. Users can be sent a message indicating that while blocking can have protective effects, excessive use may not be advisable. Mitigating excessive blocking may reduce the likelihood of MSM forming closed groups with greater HIV risk [6, 7], keeping in mind the benefits of sexual exclusivity within a certain group [11].

Limitations

Unmeasured factors, such as time of blocking event and reciprocal blocking may have driven our results. Participants might have reported lower amounts of blocking than experienced, and over-reported blocking someone. We were unable to control for such effects but plan future study to use data drawn directly from apps rather than relying on participant self-report. It is possible our results were driven by MSM making more attempts at contacting others, thus increasing the rejections (getting blocked) they are likely to receive. Thus, future qualitative work can detail the underlying factors behind our results. Studies of online rejection - including but not exclusively in the context of racism - have found that the effects of sexual health are mediated by the effects of those experiences on mental health [30, 31]. Future work can thus explore how mental health is related to blocking and sexual health outcomes. Data was collected at sites catered to MSM STI testing. Such site selection may have limited our sample to MSM connected with community-based organizations and perhaps more likely to engage in sexual behavior disclosure. Generalizability of findings may be limited outside the Chinese MSM context.

Conclusions

Number of male partners may be associated with blocking behavior, with implications for the design of online sexual health interventions.

222 **Declarations**

223 **Ethical Approval and Consent to participate**

224 Participant anonymity was maintained during the entire project. No identifying
 225 information was collected. IRB approval was obtained from the Dermatology Hospi-
 226 tal of Southern Medical University (GDDHLS-20180503) and the University of North
 227 Carolina at Chapel Hill (18-1358). All methods were carried out in accordance with
 228 relevant guidelines and regulations.

229 **Consent for publication**

230 All authors approved submission.

231 **Availability of data and materials**

232 The datasets used and analyzed during the current study available from the corre-
 233 sponding author on reasonable request.

234 **Competing interests**

235 The authors declare that they have no competing interests.

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 242 data in the study.

243 **Author's contributions**

244 NK wrote the first draft. NK, KN, LF, TZ, YS, FY, LY, JDT, WT, MA contributed
245 to the manuscript write-up and review.

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351 538.

Table 1: Participant characteristics for 208 Chinese MSM, collected in a quasi-experimental study in Guangzhou, China

| Variable | Mean (SD) |
|---|--------------------------|
| Age | 27.9 (7.1) missing=0% |
| Number of male partners in the past three months | median=1 missing=42% |
| Social network degree | 2.3 (1.1) missing=0% |
| Weighted social network degree | 8.5 (4.2) missing=0% |
| | % |
| <i>Yearly income (USD/year)</i> | |
| Less than USD5,171 | 20.7 |
| USD5,171 - USD10,342 | 35.1 |
| USD10,342 - USD17,236 | 30.8 |
| More than USD17,236 | 13.5 |
| | n=208 missing=0% |
| <i>Condom use</i> | |
| Never used | 5.7 |
| Occasionally (Less than half of the time) | 7.4 |
| Often used (More than half of the time) | 24.6 |
| Every time | 62.3 |
| | n=122 missing=41% |
| <i>Sexual behavior disclosure to family</i> | |
| Yes | 22.9 |
| No | 77.1 |
| | n=166 missing=20% |
| <i>Sexual behavior disclosure to medical professional</i> | |
| Yes | 66.3 |
| No | 33.7 |
| | n=166 missing=2-% |
| <i>Prior HIV test</i> | |
| Yes | 83.7 |
| No | 16.4 |
| | n=208 missing=0% |
| <i>Sexual role</i> | |
| Insertive | 42.6 |
| Receptive | 20.5 |
| Versatile | 36.9 |
| | n=122 missing=41% |
| <i>Undirected blocking behavior</i> | |
| Yes | 74.6 |
| No | 25.4 |
| | n=181 missing=13% |
| <i>Blocked by someone</i> | |
| Yes | 46.4 |
| No | 53.6 |
| | n=181 missing=13% |
| <i>Blocked someone</i> | |
| Yes | 62.4 |
| No | 37.6 |
| | 181 missing=13% |

Note: Conversion rate of RMB 1 = USD 0.14 was used.

Table 2: Multivariate results of the relationship between blocking behaviors and income, age, sexual role, number of male partners in the past three months, condom use, sexual behavior disclosure, and prior HIV test

| Variable | aOR | P | (95% CI) | aOR | P | (95% CI) |
|--|------------------------------|--------|---------------|--------------------|--------|---------------|
| | Undirected blocking behavior | | | Blocked by someone | | |
| Income | 1.02 | p<0.01 | (0.50, 2.05) | 0.71 | 0.30 | (0.37, 1.37) |
| Age | 0.98 | 0.70 | (0.88, 1.09) | 1.02 | 0.72 | (0.93, 1.12) |
| Sexual role | | | | | | |
| Insertive | - | - | - | - | - | - |
| Receptive | 0.20 | 0.06 | (0.04, 1.06) | 0.40 | 0.15 | (0.12, 1.42) |
| Versatile | 0.10 | p<0.01 | (0.02, 0.45) | 0.14 | p<0.01 | (0.04, 0.46) |
| Number of male partners in the past three months | 2.02 | 0.07 | (0.94, 4.34) | 1.87 | 0.04 | (1.03, 3.40) |
| Condom use | 0.98 | 0.93 | (0.49, 1.92) | 0.82 | 0.51 | (0.45, 1.50) |
| Social network degree | 0.05 | 0.94 | (0.29, 3.83) | 1.29 | 0.65 | (0.43, 3.92) |
| Weighted social network degree | 1.05 | 0.77 | (0.76, 1.46) | 0.90 | 0.44 | (0.68, 1.19) |
| Sexual behavior disclosure to family | 2.66 | 0.17 | (0.65, 10.82) | 0.67 | 0.38 | (0.52, 5.30) |
| Sexual behavior disclosure to medical professional | 0.97 | 0.93 | (0.49, 1.92) | 0.06 | 0.92 | (0.36, 3.10) |
| Prior HIV test | 1.98 | 0.48 | (0.29, 13.49) | 7.90 | 0.05 | (0.99, 63.13) |
| Intervention | 1.83 | 0.31 | (0.57, 5.86) | 1.15 | 0.80 | (0.40, 3.40) |
| N | 208 | | | 208 | | |

Note: We estimated all aORs with logistic regression models. Adjusted Odds Ratios account for the above independent variables and intervention assignment. aOR=adjusted odds ratio.

Supplementary Files

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- [SupplementaryTable1.docx](#)