# Sexual risk behaviors among apps-using young men who have sex with men in Hong Kong

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**Abstract**

This study is among the first to examine the sexual risk behaviors and attendant factors of young men who have sex with men (YMSM) in Hong Kong using location-aware gay social networking mobile applications ("gay apps"). Among the 213 YMSM (Mage = 21.52, SD = 2.29 years, range 17–25) who reported their recent (past six months) sexual history with male partners and gay apps use, inconsistent condom use (ICU) during anal sex was fairly common (60.2% regular partners, 45.8% non-regular partners). One-fifth of the sample reported condomless internal ejaculation (CIE) during anal sex (19.3% insertive, 19.8% receptive). Frequent "Grindr" and "Jack'd" users were less likely to report anal sex, and hence ICU, with regular [adjusted odds ratio (AOR) = 0.72] and non-regular (AOR = 0.62) partners, respectively. Sexual partnering via apps doubled the odds of ICU with both regular (AOR = 1.99) and non-regular (AOR = 2.17) partners. The odds of ICU with regular partners also increased with relationship status (AOR = 2.86 exclusive, AOR = 3.23 non-exclusive) but reduced for those who never had STI/HIV testing (AOR = 0.27). With non-regular partners, YMSM's likelihood of ICU increased with more recent partners (AOR = 3.25) and drug use (AOR = 3.79), but reduced with group sex (AOR = 0.15). The odds of receptive CIE increased with alcohol consumption (AOR = 4.04), non-exclusive relationship (AOR = 4.10), and more recent partners (AOR = 2.47), but reduced with group sex (AOR = 0.15) and older age (AOR = 0.84). For insertive CIE, the odds increased with bisexual YMSM (AOR = 2.89), exclusive relationship (AOR = 3.97), and longtime apps-use (AOR = 1.81). The findings identify meaningful differences among YMSM app-users that inform sexual health intervention and suggest attention on alcohol or drug use during sex and condomless sex with non-exclusive regular partners.

Young men who have sex with men (YMSM) are dis- proportionately affected by HIV in Hong Kong. Men who have sex with men (MSM) aged 25 years or younger were 39 times more likely to contract HIV than non-MSM in the same age group and comprised 31% of newly reported HIV infections among MSM in 2014, an increase of 10% compared with 2013 (Unpublished data, Hong Kong Department of Health, 2014).

Accompanying the recent rise in HIV incidence among YMSM in Hong Kong is the proliferation of location-aware gay social networking mobile appli- cations ("gay apps") which provide a quick and convenient means to locate and connect with other MSM nearby. Prior studies have found that MSM app-users report a younger age (Bien et al., 2015; Grosskopf, LeVasseur, & Glaser, 2014; Phillips et al., 2014; Rudy et al., 2012) and greater numbers of sex partners com- pared to non-users (Bien et al., 2015; Lehmiller & Ioerger, 2014; Rudy et al., 2012). MSM who use apps to meet sex partners tended to report a range of HIV risk behaviors, including drug or alcohol use during sex, and greater incidence of condomless anal sex and STI (Landovitz et al., 2012; Lehmiller & Ioerger, 2014; Rudy et al., 2012; Winetrobe, Rice, Bauermeister, Petering, & Holloway, 2014).

While there is no conclusive evidence on whether apps use promote sexual risk behaviors (Lehmiller & Ioerger, 2014), it is clear from extant literature that YMSM app-users represent an important target group for HIV intervention (Holloway et al., 2013; Lau, Lau, Cheung, & Tsui, 2008; Winetrobe et al., 2014). To better inform sexual health intervention, the present study examines the characteristics of YMSM app-users in Hong Kong, the extent to which they engage in inconsistent condom use (ICU) and condomless internal ejaculation (CIE) during anal sex (the highest-risk sexual behaviors for HIV trans- mission), and the significant predictors of these two behaviors.

## Methods

**Data collection**

Data were collected through a questionnaire survey con- ducted between November 2014 and February 2015. Eligibility criteria included being male or transgendered, born between 1989 and 1997, have had sexual contact with men, living in Hong Kong, and have used a gay app during the past six months. Participants were recruited via gay apps, a gay online forum, the Hong Kong Pride Parade, gay bars, and social service organizations serving MSM. Those who completed the paper survey received HK$50 (US$6.5) in cash or voucher while those completing the online survey could enter a draw to win vouchers worth HK$5,000 (US$650). All procedures were approved by the authors' institutional review board.

**Measures**

**Demographics and STI/HIV testing.** Participants were asked to report their age, race/ethni- city, education level, sexual orientation, relationship status, and whether they have ever been tested positive for any STI (including HIV).

**Gay apps use.** Participants were asked about their frequency of using the two most downloaded gay apps in Hong Kong ("Jack'd" and "Grindr") and when they started using gay apps. Participants also indicated their rate of sexual partnering via apps by indicating the number of male sex partners that were met through gay apps during the past six months.

**Sexual behaviors.** Participants were asked to report the total number of men they have, during the past six months, had sexual contact, and condom use consistency during anal sex with regular and non-regular partners. The questionnaire also assessed whether participants have, during the past six months, had insertive condomless anal sex with internal ejaculation (ICIE), receptive condomless anal sex with internal ejaculation (RCIE), group sex, alcohol consumption and drug use (including poppers) before or during anal sex.

**Data analysis.** All analyses were conducted using SPSS v22. The descriptive characteristics of the sample regarding demographics, STI/HIV testing, sexual behaviors, and apps use were first examined. Four multivariate logistic regression models then investigated which variables were independently associated with ICU with regular partners, ICU with non-regular partners, ICIE, and RCIE respectively.

## Results

### Participants' Characteristics

The final sample comprises 213 YMSM with a mean age of 21.52 years (SD = 2.29), mostly identified as Chinese (96.7%), homosexual (74.6%), and single (63.2%). About one-tenth (9.4%, n = 15) of the 160 YMSM who had been tested for STI/HIV reported having had a positive result (Table 1). Most sexually active YMSM (127/ 186, 68.3%) reported at least one recent app-met partner (Table 2). Among YMSM with recent anal sex encounters, ICU was reported by 60.2% (74/123) with regular partners and 45.8% (54/118) with non-regular partners. Nearly one-fifth of participants have recently had ICIE (19.3%, n = 41) and RCIE (19.8%, n = 42) (Table 3).

### Predicting Inconsistent Condom Use and Condomless Internal Ejaculation

**Demographics.** The odds of YMSM having RCIE decreased with increasing age [adjusted odds ratio (AOR) = 0.84]. Compared to YMSM identified as homosexual, YMSM identified as bisexual were nearly three times more likely to report ICIE (AOR = 2.89).

**Relationship status and STI/HIV testing.** YMSM in a relationship were about three times more likely to report ICU with regular partners and about four times more likely to report CIE than those who are single. Compared to YMSM who have ever tested positive for STI/HIV, YMSM who have never been tested were significantly less likely to report ICU with regular partners (AOR = 0.27).

**Apps use.** Higher frequency of using Jack'd and Grindr reduced the odds of ICU with non-regular (AOR = 0.62) and regular (AOR = 0.72) partners, respectively. The lower odds largely indicate that frequent users of Jack'd and Grind were less likely to report anal sex with non-regular and regular partners, respectively. Higher rates of sexual partnering via apps doubled YMSM's odds of reporting ICU with regular (AOR = 1.99) and non-regular (AOR = 2.17) partners but had no significant effect on CIE. A longer history of using gay apps increased the odds of ICIE (AOR = 1.81).

**Sexual behaviors.** Greater numbers of recent sex partners increased YMSM's odds

of ICU with non-regular partners (AOR= 3.25), ICIE (AOR = 4.40), and RCIE (AOR = 2.47). Nevertheless, YMSM who reported having group sex were significantly less likely to report ICU with non- regular partners and RCIE (AOR = 0.15). YMSM who reported drug use and alcohol consumption before or during anal sex were about four times more likely to report ICU with non-regular partners (AOR = 3.79) and RCIE (AOR = 4.04), respectively (Table 4).

## Discussion

In this study, the percentages of YMSM who reported consistent condom use during recent anal sex encounters were 39.8% (49/123) with regular partners and 54.2% (64/118) with non-regular partners. These figures were considerably lower than a sample of general MSM population in Hong Kong whose rates of condom use with the last anal sex partner were 76.7% with regular partner and 79.5% with non-regular partner (Department of Health, 2014). Relationship status was singularly the strongest predictor of YMSM's ICU with regular partners. In contrast, the odds of ICU with non-regular partners increased with drug use, greater numbers of recent sex partners, and higher rates of sexual partnering via apps. YMSM in a relationship, regardless of exclusivity, were significantly more likely to report ICU during anal sex with their regular partners and CIE. There are two plausible explanations for this finding. First, a recent study indicates that condomless anal sex is overwhelmingly reserved for romantic partners and holds important symbolic meanings – exclusivity, commitment, intimacy, possession – that may override or eliminate risk concerns among YMSM in Hong Kong (Yeo & Fung, in press). Second, the engagement in risker behaviors may be predicated on testing history given that YMSM who had never been tested for STI/HIV were less likely to report ICU with their regular partners, suggesting a pattern of negotiated safety practiced by YMSM with their regular partners.

This study has several limitations. Although participants were recruited from various online and physical channels, our sample might not be fully representative of Hong Kong's apps-using YMSM or general YMSM population. YMSM who are less socially connected to the gay community or from minority groups might be underrepresented. Participants'

self-reported behaviors were open to recall and social desirability biases. To minimize recall bias and memory lapse, most questions were time-anchored to the past six months. This design also allows us to relate patterns of apps use with sexual behaviors that occur during the same period. The cross-sectional data, however, prevent us from making any assessment of the temporality of events or inferences about causality. Sexual partnering via apps was not com- pared with other means of meeting sex partners. Future research should make such comparisons and also examine the differences across older and younger app-users. Despite these limitations, this study has identified several meaningful differences among YMSM app-users that could inform more targeted sexual health intervention. Specifically, our findings suggest that outreach efforts should pay greater attention to bisexual YMSM, those in a relationship, longtime app-users, and heavy Grindr users. In addition, intervention messages should highlight the adverse impact of alcohol consumption and drug use on sexual decision-making, and the risks involved with condomless anal sex among non-exclusive regular partners.

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**Table 1.** Participants' demographics and STI/HIV testing history (*N*=213)

| | *n* | % |
|---|---|---|
| **Age** | *M* = 21.52 | SD = 2.29 |
| **Race/ ethnicity** | | |
| Chinese | 206 | 96.7 |
| Others | 7 | 3.3 |
| **Education level** | | |
| High school or below | 47 | 22.2 |
| Some college | 54 | 25.5 |
| Bachelor's or above | 111 | 52.4 |
| **Sexual orientation** | | |
| Homosexual | 159 | 74.6 |
| Bisexual | 39 | 18.3 |
| Heterosexual/others | 15 | 7.0 |
| **Relationship status** | | |
| Single | 134 | 63.2 |
| Exclusive relationship | 58 | 27.4 |
| Non-exclusive relationship | 20 | 9.4 |
| **Ever tested positive for STI (including HIV)** | | |
| Yes | 15 | 7.1 |
| No | 145 | 68.4 |
| Never been tested | 49 | 23.1 |
| Prefer not to say | 3 | 1.4 |

**Table 2.** Apps use in the past six months and overall history (*N* = 213).

| | *n* | % |
|---|---|---|
| **Frequency of using Jack'd** | | |
| Never | 12 | 5.6 |
| Less than once a day | 98 | 46 |
| 1–4 times a day | 67 | 31.5 |
| 5 or more times a day | 36 | 16.9 |
| **Frequency of using Grindr** | | |
| Never | 88 | 41.7 |
| Less than once a day | 65 | 30.8 |
| 1 to 4 times a day | 38 | 18 |
| 5 or more times a day | 20 | 9.5 |
| **History of using gay apps** | | |
| Less than 6 months | 27 | 12.8 |
| 6 months to less than 1 year | 29 | 13.7 |
| 1 year to 2 years | 52 | 24.6 |
| More than 2 years | 103 | 48.8 |
| **Sexual partnering via apps** | | |
| 0 | 86 | 40.4 |
| 1-3 | 91 | 42.7 |
| >3 | 36 | 16.9 |

**Table 3.** Sexual history with male partners in the past six months (*N*=213).

|  | *N* | % |
|---|---|---|
| **Number of recent sex partners** | | |
| 0 | 27 | 13.2 |
| 1-3 | 118 | 57.8 |
| >3 | 59 | 28.9 |
| **Inconsistent condom use during anal sex with regular partners** | | |
| Yes | 74 | 34.7 |
| No | 49 | 23.0 |
| No anal sex with regular partners | 90 | 42.3 |
| **Inconsistent condom use during anal sex with non-regular partners** | | |
| Yes | 54 | 25.4 |
| No | 64 | 30.0 |
| No anal sex with non-regular partners | 95 | 44.6 |
| **Condomless insertive anal sex with internal ejaculation** | | |
| No | 171 | 80.7 |
| Yes | 41 | 19.3 |
| **Condomless receptive anal sex with internal ejaculation** | | |
| No | 170 | 80.2 |
| Yes | 42 | 19.8 |
| **Group sex (with 2 or more partners at the same time)** | | |
| No | 184 | 86.8 |
| Yes | 28 | 13.2 |
| **Drug use (including poppers) before or during anal sex** | | |
| No | 195 | 92.0 |
| Yes | 17 | 8.0 |
| **Alcohol consumption before or during anal sex** | | |
| No | 181 | 85.4 |
| Yes | 31 | 14.6 |

**Table 4.** Multivariate logistic regression models predicting inconsistent condom use and

condomless internal ejaculation during anal sex.

| | Inconsistent condom use | | | | Condomless internal ejaculation | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Regular partners | | Non-regular partners | | Insertive | | Receptive | |
| | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI |
| Age | 1.03 | 0.89, 1.20 | 1.05 | 0.88, 1.25 | 0.88 | 0.72, 1.07 | 0.84*** | 0.70, 1.01 |
| Race/ethnicity | 3.21 | 0.57, 18.15 | 2.84 | 0.48, 16.74 | 2.30 | 0.32, 16.28 | 1.38 | 0.24, 7.91 |
| Sexual orientation | | | | | | | | |
|   Homosexual | Referent | | Referent | | Referent | | Referent | |
|   Bisexual | 0.79 | 0.32, 1.93 | 0.70 | 0.24, 2.04 | 2.89** | 1.01, 8.25 | 0.90 | 0.30, 2.74 |
|   Heterosexual/others | 0.69 | 0.16, 2.90 | 1.25 | 0.26, 6.03 | 1.43 | 0.23, 9.06 | 0.53 | 0.10, 2.83 |
| Education level | 1.12 | 0.74, 1.69 | 1.08 | 0.66, 1.74 | 0.96 | 0.57, 1.64 | 0.97 | 0.60, 1.59 |
| Relationship status | | | | | | | | |
|   Single | Referent | | Referent | | Referent | | Referent | |
|   Exclusive relationship | 2.86* | 1.35, 6.04 | 0.64 | 0.25, 1.64 | 3.97* | 1.47, 10.74 | 1.51 | 0.60, 3.80 |
|   Non-exclusive relationship | 3.23** | 1.12, 9.36 | 1.55 | 0.46, 5.15 | 2.07 | 0.57, 7.48 | 4.10** | 1.28, 13.17 |
| Ever tested positive for STI (including HIV) | | | | | | | | |
|   Yes | Referent | | Referent | | Referent | | Referent | |
|   No | 0.42 | 0.12, 1.49 | 1.25 | 0.31, 5.00 | 1.48 | 0.34, 6.45 | 0.65 | 0.17, 2.52 |
|   Never been tested | 0.27*** | 0.07, 1.10 | 2.67 | 0.60, 11.85 | 0.66 | 0.12, 3.72 | 0.59 | 0.13, 2.74 |
|   Prefer not to say | 0.44 | 0.02, 8.58 | 0.00 | -- | 0.00 | -- | 0.00 | -- |
| Frequency of using Jack'd | 1.13 | 0.72, 1.77 | 0.62*** | 0.35, 1.10 | 1.35 | 0.77, 2.36 | 0.68 | 0.37, 1.23 |
| Frequency of using Grindr | 0.72*** | 0.49, 1.06 | 1.42 | 0.91, 2.21 | 1.04 | 0.66, 1.64 | 1.23 | 0.76, 1.99 |
| History of using gay apps | 1.15 | 0.82, 1.60 | 0.98 | 0.68, 1.43 | 1.81** | 1.10, 2.99 | 0.98 | 0.66, 1.47 |
| Number of recent sex partners | 1.00 | 0.47, 2.15 | 3.25* | 1.38, 7.70 | 4.40* | 1.63, 11.89 | 2.47** | 1.00, 6.12 |
| Sexual partnering via apps | 1.99** | 1.01, 3.86 | 2.17** | 1.03, 4.57 | 0.67 | 0.31, 1.44 | 1.30 | 0.62, 2.73 |
| Group sex (with 2 or more partners at the same time) | 1.11 | 0.36, 3.40 | 0.15* | 0.04, 0.57 | 1.31 | 0.35, 4.88 | 0.15** | 0.03, 0.70 |
| Drug use (including poppers) before or during anal sex | 1.87 | 0.50, 6.99 | 3.79*** | 0.94, 15.28 | 1.82 | 0.43, 7.59 | 2.25 | 0.52, 9.68 |
| Alcohol consumption before or during anal sex | 1.26 | 0.51, 3.14 | 1.48 | 0.53, 4.12 | 2.58 | 0.88, 7.59 | 4.04* | 1.47, 11.13 |

Notes: AOR = adjusted odds ratio; CI = confidence interval.
*p < .01.
**p < .05.
***p < .10.