

provide a better understanding of oropharyngeal gonorrhoea transmission. Past studies have examined same-sex kissing partners among MSM^{13,18–20} or opposite-sex kissing partners among heterosexuals.^{21,22} Some MSM would also have sex with women and it is unclear how commonly MSM would kiss women with and without sex. Given oropharyngeal gonorrhoea is mostly asymptomatic⁹ and MSM have a high prevalence of oropharyngeal gonorrhoea,^{8,23} it is possible that gonorrhoea can be transmitted between MSM and women via kissing in the absence of sex. This study aimed to examine the kissing practices among MSM who kissed men and women.

Methods

We conducted a cross-sectional survey named ‘Annual Sexual Practices and Activities (ASAP)’ at the Melbourne Sexual Health Centre (MSHC) between March and April 2019.^{22,24,25} The MSHC is the largest public sexual health clinic in Victoria, Australia, and it provided approximately 50 000 consultations in 2019. Clients attending the MSHC are asked to complete a series of questions on demographic characteristics and sexual practices via computer-assisted self-interviewing (CASI) as part of routine care and management. After completing CASI, men aged ≥ 16 years and who reported having sex with another man in the previous 12 months were invited to participate in the ASAP survey. The ASAP survey collected data on sexual practices that were not asked as part of the routine care (e.g. kissing). Participation was voluntary. Eligible men who agreed to participate in the ASAP survey were asked to provide consent by selecting ‘yes’ before commencing the ASAP survey. Men who declined to participate could select ‘no’ via CASI to discontinue. Ethics approval was obtained from the Alfred Hospital Ethics Committee, Melbourne, Australia (571/17).

Kissing was defined as tongue-kissing in the ASAP survey. Men were asked to report the number of partners in the previous 3 months in the following three categories: (1) kissing-only partners; (2) kissing-with-sex partners; and (3) sex-only partners. Kissing-only partner was defined as tongue-kissing a person without having sex. Kissing-with-sex partner was defined as tongue-kissing and having sex with the same person. Sex-only partner was defined as having sex with a person without tongue-kissing. Men were asked to report the number of male and female partners separately.

Demographic characteristics (i.e. age and country of birth) were extracted from routinely collected data for analysis. We also extracted data on whether men were tested for oropharyngeal gonorrhoea on the day when they completed the survey and its testing results. During the study period, oropharyngeal gonorrhoea was diagnosed using an Aptima

Combo 2[®] Assay (Hologic Panther system; Hologic, San Diego, CA, USA).

Descriptive statistics (e.g. frequency, proportion, mean and s.d.) were calculated for the six outcomes (i.e. male kissing-only partners, male kissing-with-sex partners, male sex-only partners, female kissing-only partners, female kissing-with-sex partners, and female sex-only partners). Proportional 3-Venn diagrams were used to illustrate relationships among the three categories of partners. Each ellipse in the Venn diagram represents the number of men who reported a specific category of partners, the overlapping region represents the number of men who had both categories of partners and the regions that do not overlap represent the number of men who only had one category of partner. Violin plots were used to illustrate the distribution of the number of partners. All statistical analyses were conducted in R (ver. 4.1.1; R Foundation for Statistical Computing, Vienna, Austria).

Results

A total of 2053 MSM completed the routine questions on CASI and were invited to participate in ASAP, of which 357 (17.2%) consented to participate. There were no significant differences in mean age and the proportion who were Australia-born between men who participated and those who did not. Furthermore, the proportion of MSM who also had sex with women in the previous 3 months did not differ between men who participated (11.8%) and those who did not (11.7%).

Among the 357 men who completed the survey, the mean age was 32.9 (s.d. = 10.9) years, and half (51.5%, $n = 184$) of the men were born in Australia. Ten (2.8%) men reported neither kissing nor having sex with a male partner in the previous 3 months. Of the 347 men who had either kissed or had sex with a male partner in the previous 3 months (Fig. 1, Table S1), most (93.4%, $n = 324$) had male kissing-with-sex partners, with the mean number of partners being 5.5 (s.d. = 6.6) (Fig. 2). Two-thirds (66.0%, $n = 229$) had male kissing-only partners, and the mean number of partners was 5.0 (s.d. = 6.6). Less than half (48.1%, $n = 167$) had male sex-only partners, and the mean number of partners was 3.9 (s.d. = 4.3). There was a small proportion who only had male kissing-only partners (1.2%, $n = 4$) and male sex-only partners (3.7%, $n = 13$).

There were 57 (16.0%) men who had either kissed or had sex with a female partner in the previous 3 months; this included 42 (11.8%) men who had sex with a female partner and 15 (4.2%) men who had only kissed a female partner without sex (Fig. 1, Table S1). Of the 37 (64.9%) men who had female kissing-only partners, the mean number of partners was 4.2 (s.d. = 6.9) (Fig. 2). Of the 38 (66.7%) men who had female kissing-with-sex partners, the mean number of partners was 3.8 (s.d. = 4.9). Of the

and five (17.2%) tested positive for oropharyngeal gonorrhoea. These five men had a total number of 11 female kissing-only partners.

Discussion

This cross-sectional study provides novel data showing that approximately one in six MSM had kissed or had sex with a female partner. Of these men, almost two-thirds kissed at least one female partner without sex and these men had a relatively high prevalence of oropharyngeal gonorrhoea (17%). If kissing did transmit gonorrhoea, these women would have been infected by their male partners who are MSM via kissing in the absence of sex. Most public health information does not list kissing as a risk factor for gonorrhoea and so these individuals would not consider themselves at risk of either transmitting or acquiring gonorrhoea.^{26,27}

There are several limitations to the study. First, this study was conducted among MSM attending a sexual health clinic in Melbourne and therefore our results may not be generalised to the wider MSM population. Second, we were unable to examine the variations in kissing by age and ethnicity due to the limited sample size. Past studies have reported that kissing practices among heterosexual men who kiss women vary by age and ethnicity.²¹ Third, our participation rate was low and it is possible that the sample who answered the questionnaire were different from those who did not despite having a similar age, country of birth and the proportion of men who had sex with both men and women. Last, we did not collect sexual identity data and therefore we were unable to distinguish the kissing practices between self-identified gay and bisexual men in this study.

To the best of our knowledge, there have been no other studies examining the kissing practices of female partners of MSM. One study assessed kissing practices of male partners of 3677 MSM and found that the number of kissing-only partners decreases with increasing age, whereas the number of sex-only partners increases with increasing age, but the number of kissing-with-sex partners did not change with age.¹³ This observation is also applied to heterosexual men where younger heterosexual men have a higher number of female kissing-only partners than older men.²¹ We did not explore why MSM kiss women in our study, but past studies have shown that some heterosexual individuals reported same-sex kissing because of sexual exploration, social bonding and demonstration of close friendship,²⁸ and these may be similar to the reasons why MSM kiss female partners, but further research will be required to explore this.

Our data showed that kissing practices between the male and female partners of MSM were similar, with one exception; only 1% of the male partners were kissing-only partners, whereas 26% of the female partners were kissing-only partners. If kissing is not considered a risk factor for

gonorrhoea, then men and women will not consider that they are at risk of transmitting or acquiring gonorrhoea, but may inadvertently be transmitting infection.

Our findings provide novel data showing some MSM also kiss a female without sex and thus gonorrhoea may be transmitted via kissing between MSM and females. This is also supported by a previous case series of a network of seven men and women attending a music festival in Melbourne; seven individuals all kissed and six of them were diagnosed with oropharyngeal gonorrhoea subsequently, but none with urogenital gonorrhoea.¹⁴ This suggests that these individuals were likely to acquire gonorrhoea via oropharynx–oropharynx contacts (i.e. kissing) than oropharynx–genital contacts (i.e. fellatio or cunnilingus). Other data also support kissing as a route of transmission, including mathematical models and genomic sequencing analysis showing gonorrhoea with the same sequence seen in MSM partners without genital infection.^{29–31} With the concern of antimicrobial resistance to *Neisseria gonorrhoeae*,^{32,33} effective interventions are required to prevent and control gonorrhoea in addition to testing. To date, there have been no effective vaccines against *N. gonorrhoeae* despite much effort being spent on gonorrhoea vaccine development over decades.³⁴ New Zealand introduced a national meningococcal B vaccine (MeNZB) immunisation program for individuals aged up to 20 years in 2004–08.³⁵ A retrospective case-control study in New Zealand has shown that the MeNZB vaccine reduced the incidence of gonorrhoea by 31% over 10 years;³⁶ however, the effectiveness against oropharyngeal gonorrhoea is unknown. Additionally, the use of antiseptic mouthwash has also been proposed as a novel intervention for gonorrhoea,^{29,37–41} however, several clinical trials have demonstrated that daily use of antiseptic mouthwash fails to prevent gonorrhoea acquisition and is an ineffective prevention and treatment.^{42–46} Given that kissing practices are common, a public health message is important to reinforce the awareness that gonorrhoea can be transmitted through kissing.

Supplementary material

Supplementary material is available [online](#).

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Data availability. The data that support this study are available in the article and accompanying online supplementary material.

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