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The early sexual experiences of teenage heterosexual males in Australia: a cross sectional survey

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ABSTRACT

Objective: There are limited data on the patterns of early sexual behaviours among Australian teenage heterosexual males. This study describes the nature and onset of early sexual experiences in this population through a cross-sectional survey.

Design: A cross-sectional survey between 2014 and 2015

Setting: Major sexual health clinics and community sources across Australia

Participants: Heterosexual males aged 17-19 years

Results: There were 191 males in the study with a median age of 19.1 years. Median age at first oral sex was 16.4 years (IQR: 16.2-16.8) and 16.9 years (IQR: 16.5-17.2) for first vaginal sex. Most males had engaged in oral sex (90%) and vaginal sex (92%) in the previous 12 months with 33% reporting condom use at last vaginal sex. Of the total lifetime female partners for vaginal sex reported by men as a group (*n*=1187): 54% (*n*=645) were aged within one year of the man, 28% (*n*=336) were ≥1 year younger, and 17% (*n*=206) were ≥1 year older. Prior anal sex with females was reported by 22% with 47% reporting condom use at last anal sex. Median age at first anal sex was 18.2 years (IQR: 17.7-18.5). Anal sex with a female was associated with earlier age at first vaginal sex and having >5 lifetime female sexual partners.

Conclusions: These data provide insights into the trajectory of sexual behaviours experienced by teenage heterosexual males following sexual debut, findings which can inform programs promoting sexual health among teenage males.

ARTICLE SUMMARY

Strengths and limitations of this study

- The findings of this study are from 191 young heterosexual males aged 17-19 years recruited in both clinic-based and community-based settings.
- This is the first Australian study provides data on the early sexual experiences of teenage heterosexual males in Australia including the sequence and timing of first oral, vaginal and anal sex experiences with females.
- The majority of males were recruited from sexual health clinics which may have biased towards more sexually active males.

INTRODUCTION

Early sexual experiences among teenagers may have longer-term influences on individuals' sexual lives and sexual health. Risk taking, which is part of the normal development process and experience among adolescents,[1] may expose young people to sexually transmitted infections (STI) and unintended pregnancy. Some studies have linked early initiation of sexual activity among adolescents with higher rates of unintended pregnancy, experiences of sexual violence, higher numbers of sexual partners, STIs, and engagement in anal sex[2-4]. Australian surveillance reports have shown that the prevalence of chlamydia is high among adolescents aged 16-19 years (4.7% in males and 8.0% in females)[5]. Young people are one of the key priority populations targeted in the third Australian National STI Strategy and thus the factors associated with sexual behaviours and their concomitant outcomes are critical.

Age at first sexual experience among young people in Australia has fallen over time. The Second Australian Study of Health and Relationships (ASHR2) showed a decline in the median age at first vaginal sex over time: from 19 years among males born 1942-44, to 18 years among males born 1945-54, and 17 years among males born 1985-1997[2]. Furthermore, the proportion of males aged 16-19 years who had ever had oral sex increased from 50% to 64%, and vaginal sex increased from 59% to 65% between ASHR1 in 2001-02 and ASHR2 in 2012-13[2].

Most studies have used an arbitrary age cut-off to define early sexual intercourse, ranging from 13 years in the U.S. Youth Risk Behaviour Survey,[6] to 16 years in Australian, Swiss[2] and British surveys[7]. It has been suggested that there is a temporal order for the first experience of different sexual activities among teenagers, for instance, that teenagers initiate oral sex first, followed by vaginal sex[8 9]. However, there have been few published data to support this. To our knowledge, no previous studies have examined the temporal order of, and the average time interval between, first oral, vaginal and anal sex among teenage heterosexual males. Understanding the patterns of early sexual behaviours of teenage males could inform public health messages and programs aimed at improving the sexual health of young people. The aim of this study was to provide data on the early sexual experiences of heterosexual males in Australia including the trajectory of first, specific sexual acts.

METHODS

Study participants

Males were eligible for the study if they (1) were aged between 17 and 19 years; (2) reported no sexual contact with another man in the previous 12 months; and (3) were resident in Australia from the age of 12 or younger. All males in this study were participants in the Impact of HPV Vaccination Research Study (IMPRESS) which aimed to determine the change in prevalence of penile HPV genotypes among teenage males following the introduction of male vaccination[10].

Study design and setting

This study employed both clinic-based and community-based recruitment to establish a more representative sample. Clinic-based recruitment took place at sexual health, family planning and youth (Headspace) clinics in Victoria (Melbourne), New South Wales (Sydney), Western Australia (Perth), South Australia (Adelaide), Tasmania and Queensland (Cairns). Community-based recruitment sources in Victoria included placement of promotional posters across university and Technical and Further Education (TAFE) campuses, peer-led promotion at youth oriented events such as music festivals, and use of university student online message boards. Potential participants could register interest on the study website which serves as a screening tool for eligibility criteria. All potential participants would be contacted by the research nurse to confirm the eligibility via telephone. Participants could complete a self-administered paper-based questionnaire either attending the clinic or requesting a study pack sent to them. Written informed consent was obtained from all participants.

The questionnaire contained questions about demographic characteristics (e.g. age, education level), and sexual behaviours. Questions on sexual behaviours were stratified according to three sexual practices: oral (fellatio), vaginal, and anal sex. Questions included the age of first sex (year and month), the time since last episode of sex, number of partners in their lifetime and in the previous 12 months, and condom use at last episode of sex. In order to investigate sexual mixing patterns by age[11] [12], males who reported vaginal sex were also asked how many female partners they had had vaginal sex with who were (1) the same age; (2) more than one year younger; and (3) more than one year older. The questionnaire took approximately 10 minutes to complete. All participants received a AU$ 20 gift voucher for their participation.

Ethical approval was obtained from the six Human Research and Ethics Committees governing recruitment sites: the Alfred Hospital Ethics Committee (503/13), South Eastern Sydney Local Health District Ethics Human Research Ethics Committee (14/253), South Metropolitan Health Services Human Research Ethics Committee (14/76), Royal Adelaide Hospital Committee

(HREC/14/RAH/441), Tasmania Health & Medical Human Research Ethics Committee (H0014507) and Far North Queensland Human Research Ethics Committee (HREC/14/QCH/119-940).

Statistical analyses

Median and interquartile ranges (IQR) were reported for all continuous variables such as age and number of partners. Proportions were reported for all categorical variables such as condom use. Univariate logistic regression analyses were conducted to examine the potential predictors for anal sex among teenage males. Potential predictors included country of birth (Australia *versus* overseas), age (continuous), number of lifetime female partners for oral and vaginal sex (≤5 versus >5), and age at first oral and vaginal sex (continuous). Odds ratios (OR) and 95% confidence intervals (CIs) were calculated. Multivariate logistic regression analyses were not performed because only two variables were significant in univariate analyses. Kaplan-Meier survival curves were constructed in order to present the cumulative probability by age of males having had first sex for oral, vaginal and anal sex. All statistical analyses were conducted using Stata version 13 (Stata Corporation, College Station, TX, US).

RESULTS

Participant characteristics

A total of 191 males were recruited into the study (Table 1). The median age of participants was 19.1 years (IQR: 18.4-19.6 years). Ninety-two (48%) males were enrolled in tertiary studies at the time of recruitment, and 170 (89%) were born in Australia. 145 (76%) males were recruited from clinics, and 46 (24%) were recruited from community-based sources. Eleven (6%) males reported no previous sexual contact (oral, vaginal or anal sex) with a female in their lifetime; three were aged 17, five were aged 18 and three were aged 19.

Age and sequence at first sexual experiences

The median age at first oral sex was 16.4 years (IQR: 16.2-16.8), first vaginal sex was 16.9 years (IQR: 16.5-17.2), and first anal sex was 18.2 years (IQR: 17.7-18.5) (Table 1). The majority of males followed a sequence of initial oral sex, followed by vaginal sex (*n*=77, 46%) (Figure 1a), and the median time interval for those who followed this sequence was 7 months. The next most common (*n*=69, 41%) was first oral and first vaginal sex occurring at the same time. Fewer males first experienced vaginal sex before first oral sex (*n*=22, 13%), and the median time interval who followed this sequence was 3.5 months.

Forty-two males (22%) reported previous anal sex with females (Figure 1b), and 95% of these males had first vaginal sex preceding their first experience of anal sex. The sequence and timing of first oral, vaginal and anal sex acts varied among those who had ever engaged in all three sexual acts (*n*=37).

The most common sequence (*n*=19, 51%) was first oral sex and first vaginal sex occurring at the same time, followed by anal sex after a median of 1.6 years. The next most common (*n*=13, 35%) followed a sequence of first oral sex, followed by first vaginal sex after a median of 3 months, then anal sex a median of one year after first vaginal sex.

Figure 2 shows the cumulative probability of men in the study and age at first oral, first vaginal and first anal sex. For oral sex, 54.8% had ever engaged in oral sex by age 17. This increased to 75.5% by the age of 18, 92.1% by the age of 19, and 96.8% by the age of 20. For vaginal sex, 47.3% had ever engaged in vaginal sex by the age of 17. This increased to 69.4% by the age of 18, 90.4% by the age of 19, and 97.7% by the age of 20. For anal sex, 2.7% had ever engaged in anal sex by the age of 17. This increased to 7.6% by the age of 18, 19.4% by the age of 19, and 28.3% by the age of 20.

Sexual practices during the previous 12 months and over lifetime

Of the 180 males who had ever had any sexual contact with a female: 131 (72.8%) had ever had both oral and vaginal sex; 42 (23.3%) oral, vaginal and anal sex; four (2.2%) vaginal sex only; and three (1.7%) oral sex only. 178 (98.9%) males reported having sex with a female in the previous 12 months: 131 (73.6%) had both oral and vaginal sex; 37 (20.6%) oral, vaginal and anal sex; seven (3.9%) vaginal sex only; and three (1.7%) oral sex only (Figure 3). None had anal sex only.

Among those who had ever engaged in oral sex, the median number of female partners for oral sex was four (IQR: 2-8) over their lifetime. Of the 171 (90%) males who had had oral sex in the previous 12 months, the median number of female partners for oral sex over the previous 12 months was two (IQR: 1-4).

Among those who had ever engaged in vaginal sex, the median number of female partners for vaginal sex was the same as for oral sex: four (IQR: 2-8) over their lifetime. Of the 175 (92%) males who had vaginal sex in the previous 12 months, 57 (33%) used a condom at their last episode of vaginal sex, and the median time since last vaginal sex was 7 (IQR: 3-35) days.

Among those who had ever engaged in anal sex with females, the median number of female partners for anal sex was one (IQR: 1-2) over their lifetime. Of the 37 (19%) males who had anal sex in the previous 12 months, the median number of female anal sex partners was one (IQR: 1-1). Only 18 (49%) males used a condom at their last episode of anal sex and the median time since the last episode of anal sex was 70 (IQR: 21-182) days. Males who had ever engaged in anal sex were significantly more likely to have had ≥5 lifetime female sex partners (OR: 2.03; 95% CI: 1.01-4.10) compared to males who had <5 partners. The odds of engaging in anal sex decreased by 26% for each additional

year of age at first vaginal sex (OR: 0.74; 95% CI: 0.57-0.95). Country of birth, age of males, and age of first oral sex were not significant associated with anal sex.

Age of female partners

A total of 1187 female partners were reported by 169 males who ever had vaginal sex with a female: 645 (54%) of the female partners were the same age as the man; 336 (28%) were ≥1 year younger than the man (median of one year younger); and 206 (17%) were ≥1 year older than the man (median of two years older).

DISCUSSION

This is the first study that provides data on the early sexual experiences of teenage heterosexual males in Australia including the sequence and timing of first oral, vaginal and anal sex experiences with females. We found most teenage males, who had a median age of 19, followed a pattern of engaging in oral sex first followed by vaginal sex some months later, or initiating both sexual acts at the same time. This contrasts with the early sexual experiences reported by older Australians where first oral sex usually occurred six years after first vaginal sex[13]. Around one in five males reported previously engaging in anal sex with females. This was more likely among those who had higher numbers of lifetime sex partners and those who experienced first vaginal sex at a younger age.

There are several limitations to this study that should be noted. The majority of males were recruited from sexual health clinics in Australia which may have biased towards more sexually active males, hence the reported behaviours may not be representative of all teenage heterosexual males in Australia. Our study showed that >90% of sexually active teenage males have had oral and/or vaginal sex by the age of 19. The proportion of males ever having oral and vaginal sex in our study is higher than the national community-based surveys that have been conducted in Australia and the UK. The Second Australian Study of Health and Relationships (ASHR2) survey reported that 65% of 16-19 year old male participants had vaginal sex and 64% had oral sex[14]. In addition, the nature of the relationships between men and their female sexual partners was not collected, that is, whether they were regular partners, girlfriends or casual sexual contacts. Sexual practices and condom use with regular or casual partners may be different and further studies are required. Lastly, self-reporting and recall bias may have occurred in this study which requires participants to recall their first sexual activity.

One in five males in our study had engaged in anal sex in the previous 12 months, which is similar to the proportion reported by female university students aged 17-21 years in Melbourne (20%)[15]. This is also similar to results reported in surveys from Singapore (23%, males aged 14-19 years)[16] and the

U.K. (19%, aged 16-24 years)[7]. Our finding that anal sex is associated with a higher number of partners has also been noted in studies from North America[17]. A UK study found males who engage in anal sex mainly do so for sexual pleasure while females most frequently view it as painful[18]. Some teenage females consider anal sex as a way of avoiding pregnancy[19]. Generally, where anal sex is practiced by young heterosexual males, it is as part of a greater sexual repertoire that includes vaginal and/or oral sex. This finding is consistent with a previous study in Baltimore[20]. Some studies have shown engagement in anal sex among teenagers is influenced by viewing pornography[21 22], in which condoms are also largely absent[23]. Unprotected anal sex may increase the risk of HIV and rectal STI. Half the males in our study did not use a condom during their last episode of anal sex. Low condom use for anal sex by teenagers may be due to the fact that most consider condoms as a form of contraception rather than as protection against HIV and STI[24]. In a study of girls aged 14-19 years attending a sexual health service in Los Angeles, the positivity rate of rectal chlamydia or gonorrhoea was 21%[25]. As extra-genital STI screening for heterosexuals is not currently recommended in most STI screening guidelines, it is possible that females with rectal STIs are not being diagnosed or treated.

The median interval between first oral sex and first vaginal sex among men in our study is similar to that seen in a U.S. study of teenage boys aged 16-19 years showing oral and vaginal sex are mostly initiated simultaneously or within six months of each other, and oral sex usually occurs before vaginal sex[9]. Many young people do not consider oral sex as 'sex'[26]. Non-coital sexual experiences such as oral sex may be a means to develop trust and comfort within a relationship, and demonstrate sexual skills before first vaginal sex[8 27]. This appears to be the 'normal' sequence of the sexual trajectory[8].

In Australia, school-based sex education is primarily delivered between Year 7 (aged 12-13 years) and Year 10 (aged 15-16 years). However, sex education information in Australia is mainly focused on biology and contraception[28], with less focus on STIs, relationships and sexuality. Furthermore, sexual practices other than penile-vaginal sex, such as oral and anal sex, may be considered taboo and hence are not covered in current sex education programs despite the frequency with which young people engage in these activities, and the risks they may pose[28]. Due to the lack of knowledge acquired at school, teenagers may seek more information themselves by viewing pornography[22]. Non-school-based sex education, improved school-based programs and safer sex promotion using campaigns and social media targeted young people are necessary[29].

LIST OF TABLE

Table 1. Characteristics and sexual behaviours reported by heterosexual teenage males

Demographic characteristics	
Age, median (IQR)	19.1 (18.4-19.6)
Education, *n* (%)	
Have not completed Year 12	23 (12%)
Completing Year 12	27 (14%)
Completed year 12	49 (26%)
Current tertiary study	92 (48%)
Country of birth, *n* (%)	
Australia	170 (89%)
Other	21 (11%)
Circumcised^, *n* (%)	
Yes	28 (15%)
No	161 (85%)
Sexual behaviours	
Age at first sexual behaviours with a women, median (IQR)	
*Oral sex**	16.4 (15.5-17.7)
Vaginal sex	16.9 (16.0-18.0)
Anal sex	18.2 (17.3-18.8)
Number of partners in lifetime, median (IQR)$^{\Phi}$	
*Oral sex**	4 (2-8)
Vaginal sex	4 (2-8)
Anal sex	1 (1-2)
Number of partners in the previous 12 months, median (IQR)$^{\Phi}$	
*Oral sex**	2 (1-4)
Vaginal sex	2 (1-4)
Anal sex	1 (1-1)
Condom use at last episode of vaginal sex, *n* (%)$^{\Phi}$	
Yes	57 (33%)
No	118 (67%)
Condom use at last episode of anal sex, *n* (%)$^{\Phi}$	
Yes	18 (49%)
No	19 (51%)

^Two males did not report the circumcision status.
*Oral sex is defined as oral-penile sex (i.e. fellatio)
$^{\Phi}$Males who had not engaged in certain types of sexual activity were excluded.

LIST OF FIGURES

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CONTRIBUTORS

The Impress Study investigators include Marcus Chen, Christopher Fairley, Catriona Bradshaw, John Kaldor, Sepehr Tabrizi, Suzanne Garland, Jane Hocking, David Regan, Julia Brotherton, Anna McNulty, Darren Russell, Lewis Marshall and Louise Owen.

Eric Chow and Rebecca Wigan performed the data analyses. Eric Chow, Rebecca Wigan and Marcus Chen wrote the first draft of the manuscript. All authors helped to interpret results and reviewed the manuscript for intellectual content and approved the final version of the manuscript.

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COMPETING INTERESTS

EPFC has received educational grants from Seqirus and bioCSL to assist with education, training and academic purposes in the area of HPV. CKF has received honoraria from CSL Biotherapies and Merck, and research funding from CSL Biotherapies. CKF owns shares in CSL Biotherapies, which is the manufacturer of Gardasil. MYC has been the principal investigator on Merck Investigator Initiated Studies and received funding to conduct HPV studies under these programs. CKF, CSB, DGR, JB, AM, DR, LM and LO are co-investigators on Merck Investigator Initiated Studies. All other authors have no conflicts of interest to declare.

PATIENT CONSENT

Obtained.

ETHICS APPROVAL

Ethical approval was obtained from the six Human Research and Ethics Committees governing recruitment sites: the Alfred Hospital Ethics Committee (503/13), South Eastern Sydney Local Health District Ethics Human Research Ethics Committee (14/253), South Metropolitan Health Services Human Research Ethics Committee (14/76), Royal Adelaide Hospital Committee (HREC/14/RAH/441), Tasmania Health & Medical Human Research Ethics Committee (H0014507) and Far North Queensland Human Research Ethics Committee (HREC/14/QCH/119-940).

DATA SHARING STATEMENT

No additional data are available.

REFERENCES

1. Igra V, Irwin CE. Theories of Adolescent Risk-Taking Behavior. In: DiClemente RJ, Hansen WB, Ponton LE, eds. Handbook of Adolescent Health Risk Behavior. Boston, MA: Springer US, 1996:35-51.
2. Rissel C, Heywood W, de Visser RO, et al. First vaginal intercourse and oral sex among a representative sample of Australian adults: the Second Australian Study of Health and Relationships. Sex Health 2014;**11**(5):406-15.
3. Kaestle CE, Halpern CT, Miller WC, et al. Young age at first sexual intercourse and sexually transmitted infections in adolescents and young adults. Am J Epidemiol 2005;**161**(8):774-80.
4. Baumgartner JN, Waszak Geary C, Tucker H, et al. The influence of early sexual debut and sexual violence on adolescent pregnancy: a matched case-control study in Jamaica. Int Perspect Sex Reprod Health 2009;**35**(1):21-8.
5. Yeung AH, Temple-Smith M, Fairley CK, et al. Chlamydia prevalence in young attenders of rural and regional primary care services in Australia: a cross-sectional survey. Med J Aust 2014;**200**(3):170-5.
6. Sneed CD. Sexual risk behavior among early initiators of sexual intercourse. AIDS Care 2009;**21**(11):1395-400.
7. Mercer CH, Tanton C, Prah P, et al. Changes in sexual attitudes and lifestyles in Britain through the life course and over time: findings from the National Surveys of Sexual Attitudes and Lifestyles (Natsal). Lancet 2013;**382**(9907):1781-94.
8. Lewis R, Marston C, Wellings K. Bases, Stages and 'Working Your Way Up': Young People's Talk About Non-Coital Practices and 'Normal' Sexual Trajectories. Sociological Research Online 2013;**18**(1):1.
9. Song AV, Halpern-Felsher BL. Predictive relationship between adolescent oral and vaginal sex: results from a prospective, longitudinal study. Arch Pediatr Adolesc Med 2011;**165**(3):243-9.
10. Machalek DA, Chow EP, Garland SM, et al. Human papillomavirus prevalence in unvaccinated heterosexual males following a national female vaccination program. J Infect Dis 2016;**215**(2):202-08.
11. Chow EP, Cornelisse VJ, Read TR, et al. Risk Practices in the Era of Smartphone Apps for Meeting Partners: A Cross-Sectional Study Among Men Who Have Sex with Men in Melbourne, Australia. AIDS Patient Care STDS 2016;**30**(4):151-4.
12. Chow EP, Fairley CK. Association between sexual mixing and genital warts in heterosexual men in Australia: the herd protection from the female human papillomavirus vaccination program. Sex Health 2016;**13**(5):489-90.
13. Rissel CE, Richters J, Grulich AE, et al. Sex in Australia: first experiences of vaginal intercourse and oral sex among a representative sample of adults. Aust N Z J Public Health 2003;**27**(2):131-7.

14. Rissel C, Badcock PB, Smith AM, et al. Heterosexual experience and recent heterosexual encounters among Australian adults: the Second Australian Study of Health and Relationships. Sex Health 2014;**11**(5):416-26.

15. Fethers KA, Fairley CK, Morton A, et al. Early sexual experiences and risk factors for bacterial vaginosis. J Infect Dis 2009;**200**(11):1662-70.

16. Ng JY, Wong ML, Chan RK, et al. Gender Differences in Factors Associated With Anal Intercourse Among Heterosexual Adolescents in Singapore. AIDS Educ Prev 2015;**27**(4):373-85.

17. Erickson PI, Bastani R, Maxwell AE, et al. Prevalence of anal sex among heterosexuals in California and its relationship to other AIDS risk behaviors. AIDS Educ Prev 1995;**7**(6):477-93.

18. Marston C, Lewis R. Anal heterosex among young people and implications for health promotion: a qualitative study in the UK. BMJ Open 2014;**4**(8):e004996.

19. Halperin DT. Heterosexual anal intercourse: prevalence, cultural factors, and HIV infection and other health risks, Part I. AIDS Patient Care STDS 1999;**13**(12):717-30.

20. Ompad DC, Strathdee SA, Celentano DD, et al. Predictors of early initiation of vaginal and oral sex among urban young adults in Baltimore, Maryland. Arch Sex Behav 2006;**35**(1):53-65.

21. Harkness EL, Mullan B, Blaszczynski A. Association between pornography use and sexual risk behaviors in adult consumers: a systematic review. Cyberpsychol Behav Soc Netw 2015;**18**(2):59-71.

22. Lim MS, Carrotte ER, Hellard ME. The impact of pornography on gender-based violence, sexual health and well-being: what do we know? J Epidemiol Community Health 2016;**70**(1):3-5.

23. Grudzen CR, Elliott MN, Kerndt PR, et al. Condom use and high-risk sexual acts in adult films: a comparison of heterosexual and homosexual films. Am J Public Health 2009;**99 Suppl 1**:S152-6.

24. Flood M. Lust, trust and latex: Why young heterosexual men do not use condoms. Culture, Health & Sexuality 2003;**5**(4):353-69.

25. Javanbakht M, Gorbach P, Stirland A, et al. Prevalence and correlates of rectal Chlamydia and gonorrhea among female clients at sexually transmitted disease clinics. Sex Transm Dis 2012;**39**(12):917-22.

26. Sanders SA, Reinisch J. Would you say you "had sex" if . . . ? JAMA 1999;**281**(3):275-77.

27. Lewis R, Marston C. Oral Sex, Young People, and Gendered Narratives of Reciprocity. J Sex Res 2016;**53**(7):776-87.

28. Mitchell A, Patrick K, Heywood W, et al. 5th National Survey of Australian Secondary Students and Sexual Health 2013. Melbourne, Australia: Australian Research Centre in Sex, Health and Society, La Trobe University, 2014.

29. Yonker LM, Zan S, Scirica CV, et al. "Friending" teens: systematic review of social media in adolescent and young adult health care. J Med Internet Res 2015;**17**(1):e4.

LICENCE STATEMENT

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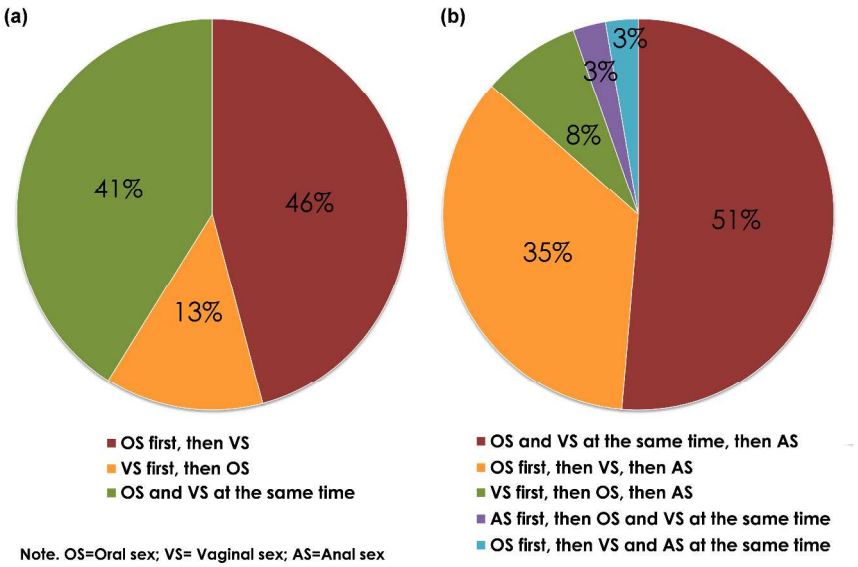

Figure 1. Proportion of teenage males reporting different sexual trajectories among (a) 168 males who ever had oral and vaginal sex; and (b) 37 males who ever had oral, vaginal and anal sex with females.

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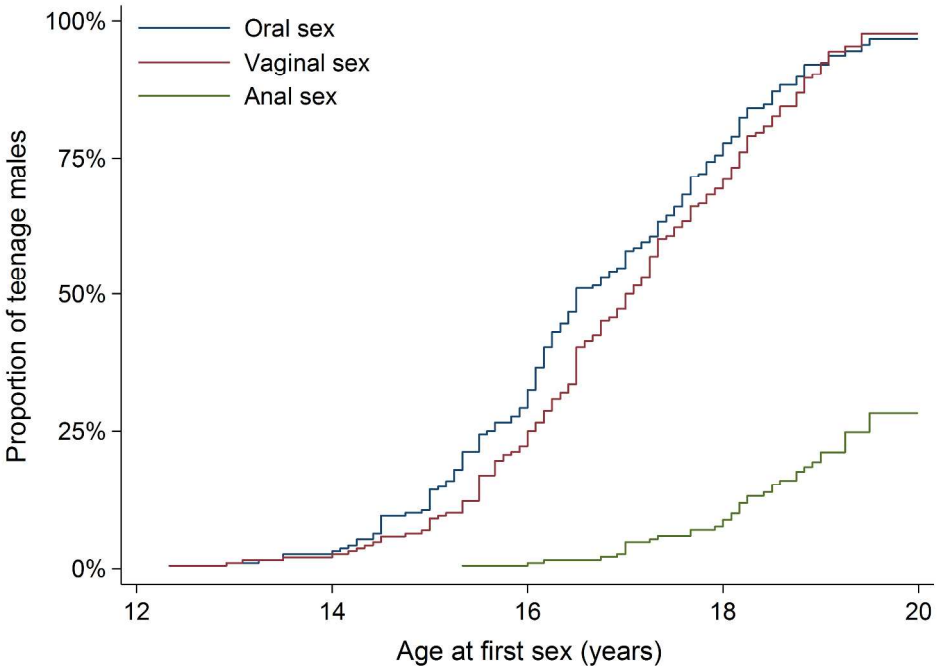

Figure 2. Cumulative probability of teenage heterosexual males and age at first oral, first vaginal, and first anal sex with females.

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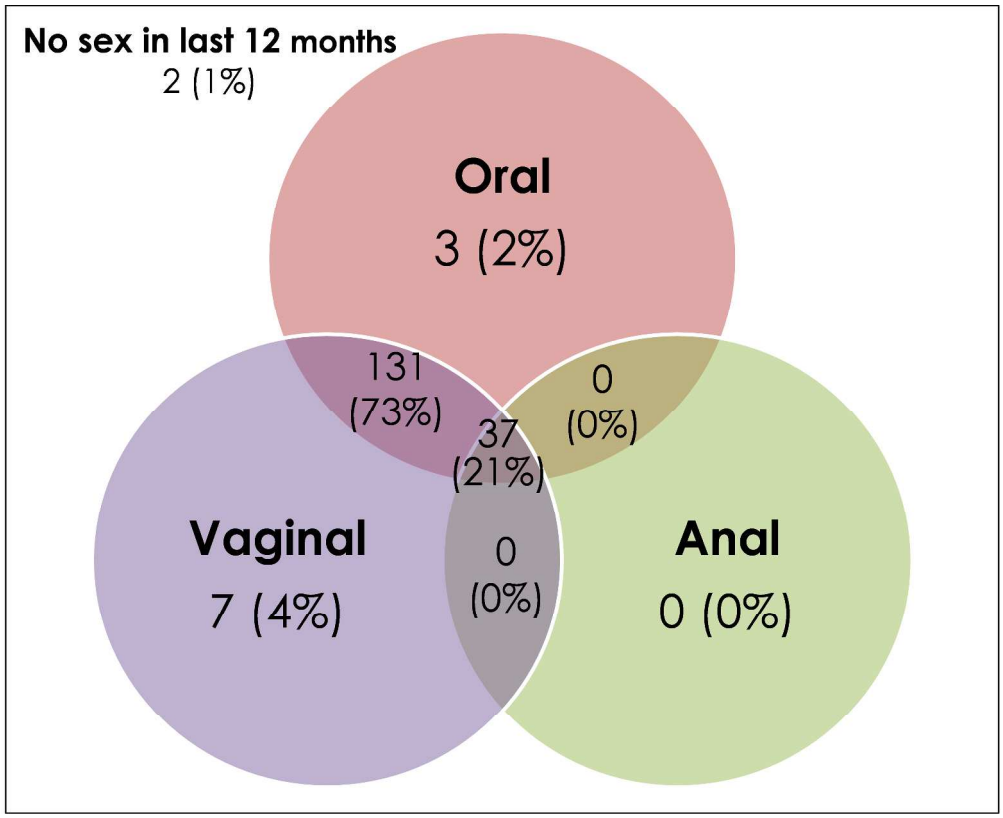

Figure 3. Venn diagram illustrating the overlap of oral, vaginal and anal sex practices in the last 12 months among 180 teenage males.

1160x941mm (96 x 96 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Reported
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1, 3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 1, 3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 5
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Page 9
Study size	10	Explain how the study size was arrived at	Page 7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 7
		(*b*) Describe any methods used to examine subgroups and interactions	Page 7
		(*c*) Explain how missing data were addressed	Page 7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 7
		(*e*) Describe any sensitivity analyses	Page 7
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 7
		(b) Give reasons for non-participation at each stage	N/A. Only eligible participants were recruited.

		(c) Consider use of a flow diagram	N/A.
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 7
		(b) Indicate number of participants with missing data for each variable of interest	Page 7
Outcome data	15*	Report numbers of outcome events or summary measures	Page 7-9
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 7-9
		(*b*) Report category boundaries when continuous variables were categorized	N/A. Continuous variables were not categorized.
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A.
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 7-9
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 9
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 9-10
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 9-10
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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The early sexual experiences of teenage heterosexual males in Australia: a cross sectional survey

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The early sexual experiences of teenage heterosexual males in Australia: a cross sectional survey

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Keywords: Sexual behaviours, sexual trajectory, first sex, heterosexual, teenage, adolescent

ABSTRACT

Objective: There are limited data on the patterns of early sexual behaviours among Australian teenage heterosexual males. This study describes the nature and onset of early sexual experiences in this population through a cross-sectional survey.

Design: A cross-sectional survey between 2014 and 2015

Setting: Major sexual health clinics and community sources across Australia

Participants: Heterosexual males aged 17-19 years

Results: There were 191 males in the study with a median age of 19.1 years. Median age at first oral sex was 16.4 years (IQR: 16.2-16.8) and 16.9 years (IQR: 16.5-17.2) for first vaginal sex. Most males had engaged in oral sex (90%) and vaginal sex (92%) in the previous 12 months with 32.6% reporting condom use at last vaginal sex. Of the total lifetime female partners for vaginal sex reported by men as a group (*n*=1187): 54.3% (*n*=645) were aged within one year of the man, 28.3% (*n*=336) were ≥1 year younger, and 17.4% (*n*=206) were ≥1 year older. Prior anal sex with females was reported by 22% with 47% reporting condom use at last anal sex. Median age at first anal sex was 18.2 years (IQR: 17.7-18.5). Anal sex with a female was associated with having ≥5 lifetime female sexual partners for oral and vaginal sex.

Conclusions: These data provide insights into the trajectory of sexual behaviours experienced by teenage heterosexual males following sexual debut, findings which can inform programs promoting sexual health among teenage males.

ARTICLE SUMMARY

Strengths and limitations of this study

- The findings of this study are from 191 young heterosexual males aged 17-19 years recruited in both clinic-based and community-based settings.
- This is the first Australian study provides data on the early sexual experiences of teenage heterosexual males in Australia including the sequence and timing of first oral, vaginal and anal sex experiences with females.
- The majority of males were recruited from sexual health clinics which may have biased towards more sexually active males.

INTRODUCTION

Early sexual experiences among teenagers may have longer-term influences on individuals' sexual lives and sexual health. Risk taking, which is part of the normal development process and experience among adolescents,[1] may expose young people to sexually transmitted infections (STI) and unintended pregnancy. Some studies have linked early initiation of sexual activity among adolescents with higher rates of unintended pregnancy, experiences of sexual violence, higher numbers of sexual partners, STIs, and engagement in anal sex[2-4]. Australian surveillance reports have shown that the prevalence of chlamydia is high among adolescents aged 16-19 years (4.7% in males and 8.0% in females)[5]. Young people are one of the key priority populations targeted in the third Australian National STI Strategy and thus the factors associated with sexual behaviours and their concomitant outcomes are critical.

Most studies have used an arbitrary age cut-off to define early sexual intercourse, ranging from 13 years in the U.S. Youth Risk Behaviour Survey,[6] to 16 years in Australian, Swiss[2] and British surveys[7]. It has been suggested that there is a temporal order for the first experience of different sexual activities among teenagers, for instance, that teenagers initiate oral sex first, followed by vaginal sex[8 9]. However, there have been few published data to support this. To our knowledge, no previous studies have examined the temporal order of, and the average time interval between, first oral, vaginal and anal sex among teenage heterosexual males. Understanding the patterns of early sexual behaviours of teenage males could inform public health messages and programs aimed at improving the sexual health of young people. The aim of this study was to provide data on the early sexual experiences of heterosexual males in Australia including the trajectory of first, specific sexual acts.

METHODS

Study participants

Males were eligible for the study if they (1) were aged between 17 and 19 years; (2) reported no sexual contact with another man in the previous 12 months; and (3) were resident in Australia from the age of 12 or younger. All males in this study were participants in the Impact of HPV Vaccination Research Study (IMPRESS) which aimed to determine the change in prevalence of penile HPV genotypes among teenage males following the introduction of male vaccination[10].

Study design and setting

This study employed both clinic-based and community-based recruitment to establish a more representative sample. Clinic-based recruitment took place at sexual health, family planning and youth (Headspace) clinics in Victoria (Melbourne), New South Wales (Sydney), Western Australia (Perth), South Australia (Adelaide), Tasmania and Queensland (Cairns). Community-based recruitment sources in Victoria included placement of promotional posters across university and Technical and Further Education (TAFE) campuses, peer-led promotion at youth oriented events such as music festivals, and use of university student online message boards. Potential participants could register interest on the study website which serves as a screening tool for eligibility criteria. All potential participants would be contacted by the research nurse to confirm the eligibility via telephone. Participants could complete a self-administered paper-based questionnaire either attending the clinic or requesting a study pack sent to them. Written informed consent was obtained from all participants.

The questionnaire contained questions about demographic characteristics (e.g. age, education level), and sexual behaviours. Questions on sexual behaviours were stratified according to three sexual practices: oral (fellatio), vaginal, and anal sex. Questions included the age of first sex (year and month), the time since last episode of sex, number of partners in their lifetime and in the previous 12 months, and condom use at last episode of sex. In order to investigate sexual mixing patterns by age[11] [12], males who reported vaginal sex were also asked how many female partners they had had vaginal sex with who were (1) the same age; (2) more than one year younger; and (3) more than one year older. The questionnaire took approximately 10 minutes to complete. All participants received a AU$ 20 gift voucher for their participation.

Ethical approval was obtained from the six Human Research and Ethics Committees governing recruitment sites: the Alfred Hospital Ethics Committee (503/13), South Eastern Sydney Local Health District Ethics Human Research Ethics Committee (14/253), South Metropolitan Health Services Human Research Ethics Committee (14/76), Royal Adelaide Hospital Committee

(HREC/14/RAH/441), Tasmania Health & Medical Human Research Ethics Committee (H0014507) and Far North Queensland Human Research Ethics Committee (HREC/14/QCH/119-940).

Statistical analyses

Median and interquartile ranges (IQR) were reported for all continuous variables such as age and number of partners. Proportions were reported for all categorical variables such as condom use. Univariate logistic regression analyses were conducted to examine the potential predictors for anal sex among teenage males. Potential predictors included country of birth (Australia *versus* overseas), age (continuous), number of lifetime female sexual partners for oral and vaginal sex (≤5 versus >5), and age at first oral and vaginal sex (<16 *versus* ≥16). The number of lifetime female sexual partners for oral and vaginal sex were categorised using the sample median as a cut-off; while age at first oral and vaginal sex were categorised based on the age of consent in Australia. Odds ratios (OR) and 95% confidence intervals (CIs) were calculated. Multivariate logistic regression analyses were not performed because only one variable was significant in univariate analyses. Kaplan-Meier survival curves were constructed in order to present the cumulative probability by age of males having had first sex for oral, vaginal and anal sex. All statistical analyses were conducted using Stata version 13 (Stata Corporation, College Station, TX, US).

RESULTS

Participant characteristics

A total of 191 males were recruited into the study (Table 1). The median age of participants was 19.1 years (IQR: 18.4-19.6 years). Ninety-two (48.2%) males were enrolled in tertiary studies at the time of recruitment, and 170 (89.0%) were born in Australia. 145 (75.9%) males were recruited from clinics, and 46 (24.0%) were recruited from community-based sources. Eleven (5.8%) males reported no previous sexual contact (oral, vaginal or anal sex) with a female in their lifetime; three were aged 17, five were aged 18 and three were aged 19.

Age and sequence at first sexual experiences

The median age at first oral sex was 16.4 years (IQR: 16.2-16.8), first vaginal sex was 16.9 years (IQR: 16.5-17.2), and first anal sex was 18.2 years (IQR: 17.7-18.5) (Table 1). The majority of males followed a sequence of initial oral sex, followed by vaginal sex (*n*=63, 36.0%) (Table 2), and the median time interval for those who followed this sequence was 7 months. The next most common (*n*=49, 28.0%) was first oral and first vaginal sex occurring at the same time. Fewer males first experienced vaginal sex before first oral sex (*n*=19, 10.9%), and the median time interval who followed this sequence was 3.5 months. In addition, some males (*n*=19; 10.9%) first experienced oral and vaginal sex at the same time then followed by anal sex after a median of 1.6 years. A small

proportion of males (*n*=13, 7.4%) followed a sequence of first oral sex, followed by first vaginal sex after a median of three months, then anal sex a median of one year after first vaginal sex.

Figure 1 shows the cumulative probability of men in the study and age at first oral, first vaginal and first anal sex. For oral sex, 54.8% had ever engaged in oral sex by age 17. This increased to 75.5% by the age of 18, 92.1% by the age of 19, and 96.8% by the age of 20. For vaginal sex, 47.3% had ever engaged in vaginal sex by the age of 17. This increased to 69.4% by the age of 18, 90.4% by the age of 19, and 97.7% by the age of 20. For anal sex, 2.7% had ever engaged in anal sex by the age of 17. This increased to 7.6% by the age of 18, 19.4% by the age of 19, and 28.3% by the age of 20.

Sexual practices during the previous 12 months and over lifetime

Of the 191 males, 180 (94.2%) who had ever had any sexual contact with a female over their lifetime: 131 (68.6%) had ever had both oral and vaginal sex; 42 (22.0%) oral, vaginal and anal sex; four (2.1%) vaginal sex only; and three (1.6%) oral sex only (Table 1).

Of the 191 males, 178 (98.9%) males reported having sex with a female in the previous 12 months: 131 (68.6%) had both oral and vaginal sex; 37 (19.4%) oral, vaginal and anal sex; seven (3.7%) vaginal sex only; and three (1.6%) oral sex only (Figure 2). None had anal sex only (Figure 2).

Among those who had ever engaged in oral sex, the median number of female partners for oral sex was four (IQR: 2-8) over their lifetime. Of the 171 (90%) males who had had oral sex in the previous 12 months, the median number of female partners for oral sex over the previous 12 months was two (IQR: 1-4).

Among those who had ever engaged in vaginal sex, the median number of female partners for vaginal sex was the same as for oral sex: four (IQR: 2-8) over their lifetime. Of the 175 (91.6%) males who had vaginal sex in the previous 12 months, 57 (32.6%) used a condom at their last episode of vaginal sex, and the median time since last vaginal sex was 7 (IQR: 3-35) days.

Among those who had ever engaged in anal sex with females, the median number of female partners for anal sex was one (IQR: 1-2) over their lifetime. Of the 37 (19.4%) males who had anal sex in the previous 12 months, the median number of female anal sex partners was one (IQR: 1-1). Only 18 (48.6%) males used a condom at their last episode of anal sex and the median time since the last episode of anal sex was 70 (IQR: 21-182) days. Males who had ever engaged in anal sex were significantly more likely to have had ≥5 lifetime female partners for oral and vaginal sex (OR: 2.03; 95% CI: 1.01-4.10) compared to males who had <5 partners for oral and vaginal sex. Country of birth, age of males, and age of first oral or vaginal sex were not significant associated with anal sex.

Age of female partners

A total of 1187 female partners were reported by 169 males who ever had vaginal sex with a female: 645 (54.3%) of the female partners were the same age as the man; 336 (28.3%) were ≥1 year younger than the man (median of one year younger); and 206 (17.4%) were ≥1 year older than the man (median of two years older).

DISCUSSION

This is the first study that provides data on the early sexual experiences of teenage heterosexual males in Australia including the sequence and timing of first oral, vaginal and anal sex experiences with females. We found most teenage males, who had a median age of 19, followed a pattern of engaging in oral sex first followed by vaginal sex some months later, or initiating both sexual acts at the same time. This contrasts with the early sexual experiences reported by older Australians where first oral sex usually occurred six years after first vaginal sex[13]. Around one in five males reported previously engaging in anal sex with females. This was more likely among those who had higher numbers of lifetime sex partners for oral and vaginal sex.

There are several limitations to this study that should be noted. The majority of males were recruited from sexual health clinics in Australia which may have biased towards more sexually active males, hence the reported behaviours may not be representative of all teenage heterosexual males in Australia. Our study showed that >90% of sexually active teenage males have had oral and/or vaginal sex by the age of 19. The proportion of males ever having oral and vaginal sex in our study is higher than the national community-based surveys that have been conducted in Australia and the UK. The Second Australian Study of Health and Relationships (ASHR2) survey reported that 65% of 16-19 years old male participants had vaginal sex and 64% had oral sex[14]. In addition, the nature of the relationships between men and their female sexual partners was not collected, that is, whether they were regular partners, girlfriends or casual sexual contacts. Sexual practices and condom use with regular or casual partners may be different and further studies are required. Lastly, self-reporting and recall bias may have occurred in this study which requires participants to recall their first sexual activity.

One in five males in our study had engaged in anal sex in the previous 12 months, which is similar to the proportion reported by female university students aged 17-21 years in Melbourne (20%)[15]. This is also similar to results reported in surveys from Singapore (23%, males aged 14-19 years)[16] and the U.K. (19%, aged 16-24 years)[7]. Our finding that anal sex is associated with a higher number of partners for oral and vaginal sex has also been noted in studies from North America[17]. A UK study

found males who engage in anal sex mainly do so for sexual pleasure while females most frequently view it as painful[18]. Some teenage females consider anal sex as a way of avoiding pregnancy[19]. Generally, where anal sex is practiced by young heterosexual males, it is as part of a greater sexual repertoire that includes vaginal and/or oral sex. This finding is consistent with a previous study in Baltimore[20]. Some studies have shown engagement in anal sex among teenagers is influenced by viewing pornography[21 22], in which condoms are also largely absent[23]. Unprotected anal sex may increase the risk of HIV and rectal STI. Half the males in our study did not use a condom during their last episode of anal sex. Low condom use for anal sex by teenagers may be due to the fact that most consider condoms as a form of contraception rather than as protection against HIV and STI[24]. In a study of girls aged 14-19 years attending a sexual health service in Los Angeles, the positivity rate of rectal chlamydia or gonorrhoea was 21%[25]. As extra-genital STI screening for heterosexuals is not currently recommended in most STI screening guidelines, it is possible that females with rectal STIs are not being diagnosed or treated.

The median interval between first oral sex and first vaginal sex among men in our study is similar to that seen in a U.S. study of teenage boys aged 16-19 years showing oral and vaginal sex are mostly initiated simultaneously or within six months of each other, and oral sex usually occurs before vaginal sex[9]. Many young people do not consider oral sex as 'sex'[26]. Non-coital sexual experiences such as oral sex may be a means to develop trust and comfort within a relationship, and demonstrate sexual skills before first vaginal sex[8 27]. This appears to be the 'normal' sequence of the sexual trajectory[8].

In Australia, school-based sex education is primarily delivered between Year 7 (aged 12-13 years) and Year 10 (aged 15-16 years). However, sex education information in Australia is mainly focused on biology and contraception[28], with less focus on STIs, relationships and sexuality. Furthermore, sexual practices other than penile-vaginal sex, such as oral and anal sex, may be considered taboo and hence are not covered in current sex education programs despite the frequency with which young people engage in these activities, and the risks they may pose[28]. Non-school-based sex education, improved school-based programs and safer sex promotion using campaigns and social media targeted young people are necessary[29].

LIST OF TABLE

Table 1. Characteristics and sexual behaviours reported by heterosexual teenage males

Demographic characteristics	
Age, median (IQR)	19.1 (18.4-19.6)
Education, *n* (%)	
Have not completed Year 12	23 (12.0%)
Completing Year 12	27 (14.1%)
Completed year 12	49 (25.7%)
Current tertiary study	92 (48.2%)
Country of birth, *n* (%)	
Australia	170 (89.0%)
Other	21 (11.0%)
Circumcised^, *n* (%)	
Yes	28 (14.8%)
No	161 (85.2%)
Sexual behaviours	
Age at first sexual behaviours with a women, median (IQR)	
*Oral sex**	16.4 (15.5-17.7)
Vaginal sex	16.9 (16.0-18.0)
Anal sex	18.2 (17.3-18.8)
Number of partners in lifetime, median (IQR)$^{\Phi}$	
*Oral sex**	4 (2-8)
Vaginal sex	4 (2-8)
Anal sex	1 (1-2)
Engagement in sexual behaviours in lifetime, *n* (%)	
No sexual contact	11 (5.8%)
*Oral sex only**	3 (1.6%)
Vaginal sex only	4 (2.1%)
*Oral and vaginal sex only**	131 (68.6%)
*Oral, vaginal and anal sex**	42 (22.0%)
Engagement in sexual behaviours in the previous 12 months, *n* (%)	
No sexual contact	13 (6.8%)
*Oral sex only**	3 (1.6%)
Vaginal sex only	7 (3.7%)
*Oral and vaginal sex only**	131 (68.6%)
*Oral, vaginal and anal sex**	37 (19.4%)
Number of partners in the previous 12 months, median (IQR)$^{\Phi}$	
*Oral sex**	2 (1-4)
Vaginal sex	2 (1-4)
Anal sex	1 (1-1)
Condom use at last episode of vaginal sex, *n* (%)$^{\Phi}$	
Yes	57 (32.6%)
No	118 (67.4%)
Condom use at last episode of anal sex, *n* (%)$^{\Phi}$	
Yes	18 (48.6%)

No	19 (51.4%)

^Two males did not report the circumcision status.

*Oral sex is defined as oral-penile sex (i.e. fellatio)

ΦMales who had not engaged in certain types of sexual activity were excluded.

Table 2. Patterns of sexual trajectories among 175 teenage males.

Patterns of sexual trajectories	N	Percent
OS only	3	1.7%
VS only	4	2.3%
OS first, then VS	63	36.0%
VS first, then OS	19	10.9%
OS and VS at the same time	49	28.0%
OS and VS at the same time, then AS	19	10.9%
OS first, then VS, then AS	13	7.4%
VS first, then OS, then AS	3	1.7%
AS first, then OS and VS at the same time	1	0.6%
OS first, then VS and AS at the same time	1	0.6%

Note. Of the 180 teenage males who had ever had any sexual contact, only 175 males reported the age at first oral, vaginal and anal sex.
OS: Oral Sex; VS: Vaginal Sex; AS: Anal Sex

LIST OF FIGURES

ACKNOWLEDGMENT

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CONTRIBUTORS

The Impress Study investigators include Marcus Chen, Christopher Fairley, Catriona Bradshaw, John Kaldor, Sepehr Tabrizi, Suzanne Garland, Jane Hocking, David Regan, Julia Brotherton, Anna McNulty, Darren Russell, Lewis Marshall and Louise Owen.

Eric Chow and Rebecca Wigan performed the data analyses. Eric Chow, Rebecca Wigan and Marcus Chen wrote the first draft of the manuscript. All authors helped to interpret results and reviewed the manuscript for intellectual content and approved the final version of the manuscript.

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COMPETING INTERESTS

EPFC has received educational grants from Seqirus and bioCSL to assist with education, training and academic purposes in the area of HPV. CKF has received honoraria from CSL Biotherapies and Merck, and research funding from CSL Biotherapies. CKF owns shares in CSL Biotherapies, which is the manufacturer of Gardasil. MYC has been the principal investigator on Merck Investigator Initiated Studies and received funding to conduct HPV studies under these programs. CKF, CSB, DGR, JB, AM, DR, LM and LO are co-investigators on Merck Investigator Initiated Studies. All other authors have no conflicts of interest to declare.

PATIENT CONSENT

Obtained.

ETHICS APPROVAL

Ethical approval was obtained from the six Human Research and Ethics Committees governing recruitment sites: the Alfred Hospital Ethics Committee (503/13), South Eastern Sydney Local Health District Ethics Human Research Ethics Committee (14/253), South Metropolitan Health Services Human Research Ethics Committee (14/76), Royal Adelaide Hospital Committee (HREC/14/RAH/441), Tasmania Health & Medical Human Research Ethics Committee (H0014507) and Far North Queensland Human Research Ethics Committee (HREC/14/QCH/119-940).

DATA SHARING STATEMENT

No additional data are available.

REFERENCES

1. Igra V, Irwin CE. Theories of Adolescent Risk-Taking Behavior. In: DiClemente RJ, Hansen WB, Ponton LE, eds. Handbook of Adolescent Health Risk Behavior. Boston, MA: Springer US, 1996:35-51.
2. Rissel C, Heywood W, de Visser RO, et al. First vaginal intercourse and oral sex among a representative sample of Australian adults: the Second Australian Study of Health and Relationships. Sex Health 2014;**11**(5):406-15.
3. Kaestle CE, Halpern CT, Miller WC, et al. Young age at first sexual intercourse and sexually transmitted infections in adolescents and young adults. Am J Epidemiol 2005;**161**(8):774-80.
4. Baumgartner JN, Waszak Geary C, Tucker H, et al. The influence of early sexual debut and sexual violence on adolescent pregnancy: a matched case-control study in Jamaica. Int Perspect Sex Reprod Health 2009;**35**(1):21-8.
5. Yeung AH, Temple-Smith M, Fairley CK, et al. Chlamydia prevalence in young attenders of rural and regional primary care services in Australia: a cross-sectional survey. Med J Aust 2014;**200**(3):170-5.
6. Sneed CD. Sexual risk behavior among early initiators of sexual intercourse. AIDS Care 2009;**21**(11):1395-400.
7. Mercer CH, Tanton C, Prah P, et al. Changes in sexual attitudes and lifestyles in Britain through the life course and over time: findings from the National Surveys of Sexual Attitudes and Lifestyles (Natsal). Lancet 2013;**382**(9907):1781-94.
8. Lewis R, Marston C, Wellings K. Bases, Stages and 'Working Your Way Up': Young People's Talk About Non-Coital Practices and 'Normal' Sexual Trajectories. Sociological Research Online 2013;**18**(1):1.
9. Song AV, Halpern-Felsher BL. Predictive relationship between adolescent oral and vaginal sex: results from a prospective, longitudinal study. Arch Pediatr Adolesc Med 2011;**165**(3):243-9.
10. Machalek DA, Chow EP, Garland SM, et al. Human papillomavirus prevalence in unvaccinated heterosexual males following a national female vaccination program. J Infect Dis 2016;**215**(2):202-08.
11. Chow EP, Fairley CK. Association between sexual mixing and genital warts in heterosexual men in Australia: the herd protection from the female human papillomavirus vaccination program. Sex Health 2016;**13**(5):489-90.
12. Chow EPF, Read TRH, Law MG, et al. Assortative sexual mixing patterns in male-female and male-male partnerships in Melbourne, Australia: implications for HIV and sexually transmissible infection transmission. Sex Health 2016;**13**(5):451-56.
13. Rissel CE, Richters J, Grulich AE, et al. Sex in Australia: first experiences of vaginal intercourse and oral sex among a representative sample of adults. Aust N Z J Public Health 2003;**27**(2):131-7.

14. Rissel C, Badcock PB, Smith AM, et al. Heterosexual experience and recent heterosexual encounters among Australian adults: the Second Australian Study of Health and Relationships. Sex Health 2014;**11**(5):416-26.
15. Fethers KA, Fairley CK, Morton A, et al. Early sexual experiences and risk factors for bacterial vaginosis. J Infect Dis 2009;**200**(11):1662-70.
16. Ng JY, Wong ML, Chan RK, et al. Gender Differences in Factors Associated With Anal Intercourse Among Heterosexual Adolescents in Singapore. AIDS Educ Prev 2015;**27**(4):373-85.
17. Erickson PI, Bastani R, Maxwell AE, et al. Prevalence of anal sex among heterosexuals in California and its relationship to other AIDS risk behaviors. AIDS Educ Prev 1995;**7**(6):477-93.
18. Marston C, Lewis R. Anal heterosex among young people and implications for health promotion: a qualitative study in the UK. BMJ Open 2014;**4**(8):e004996.
19. Halperin DT. Heterosexual anal intercourse: prevalence, cultural factors, and HIV infection and other health risks, Part I. AIDS Patient Care STDS 1999;**13**(12):717-30.
20. Ompad DC, Strathdee SA, Celentano DD, et al. Predictors of early initiation of vaginal and oral sex among urban young adults in Baltimore, Maryland. Arch Sex Behav 2006;**35**(1):53-65.
21. Harkness EL, Mullan B, Blaszczynski A. Association between pornography use and sexual risk behaviors in adult consumers: a systematic review. Cyberpsychol Behav Soc Netw 2015;**18**(2):59-71.
22. Lim MS, Carrotte ER, Hellard ME. The impact of pornography on gender-based violence, sexual health and well-being: what do we know? J Epidemiol Community Health 2016;**70**(1):3-5.
23. Grudzen CR, Elliott MN, Kerndt PR, et al. Condom use and high-risk sexual acts in adult films: a comparison of heterosexual and homosexual films. Am J Public Health 2009;**99 Suppl 1**:S152-6.
24. Flood M. Lust, trust and latex: Why young heterosexual men do not use condoms. Culture, Health & Sexuality 2003;**5**(4):353-69.
25. Javanbakht M, Gorbach P, Stirland A, et al. Prevalence and correlates of rectal Chlamydia and gonorrhea among female clients at sexually transmitted disease clinics. Sex Transm Dis 2012;**39**(12):917-22.
26. Sanders SA, Reinisch J. Would you say you "had sex" if . . . ? JAMA 1999;**281**(3):275-77.
27. Lewis R, Marston C. Oral Sex, Young People, and Gendered Narratives of Reciprocity. J Sex Res 2016;**53**(7):776-87.
28. Mitchell A, Patrick K, Heywood W, et al. 5th National Survey of Australian Secondary Students and Sexual Health 2013. Melbourne, Australia: Australian Research Centre in Sex, Health and Society, La Trobe University, 2014.

29. Yonker LM, Zan S, Scirica CV, et al. "Friending" teens: systematic review of social media in adolescent and young adult health care. J Med Internet Res 2015;**17**(1):e4.

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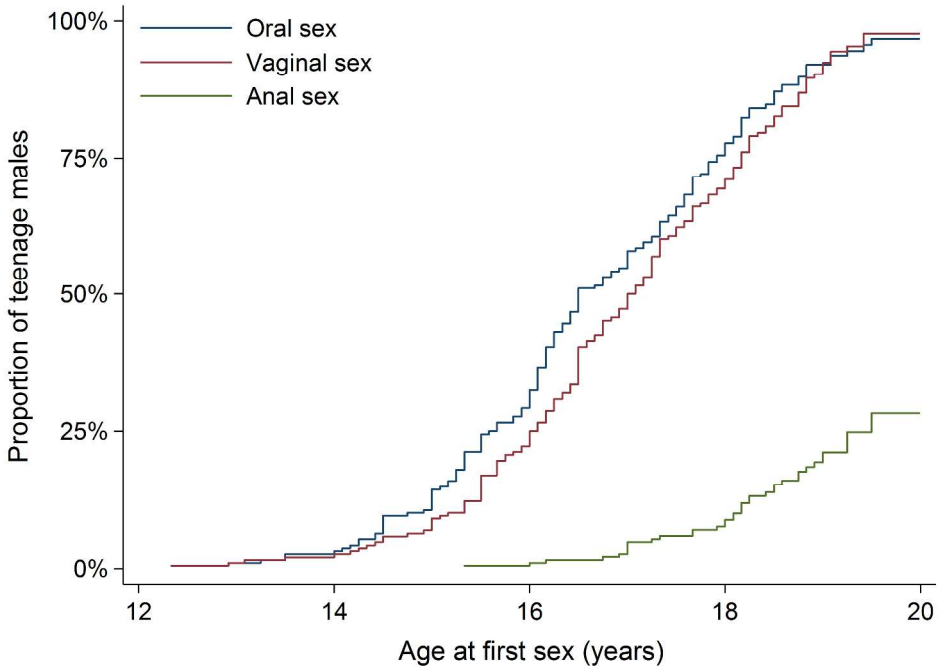

Figure 1. Cumulative probability of teenage heterosexual males and age at first oral, first vaginal, and first anal sex with females

362x260mm (300 x 300 DPI)

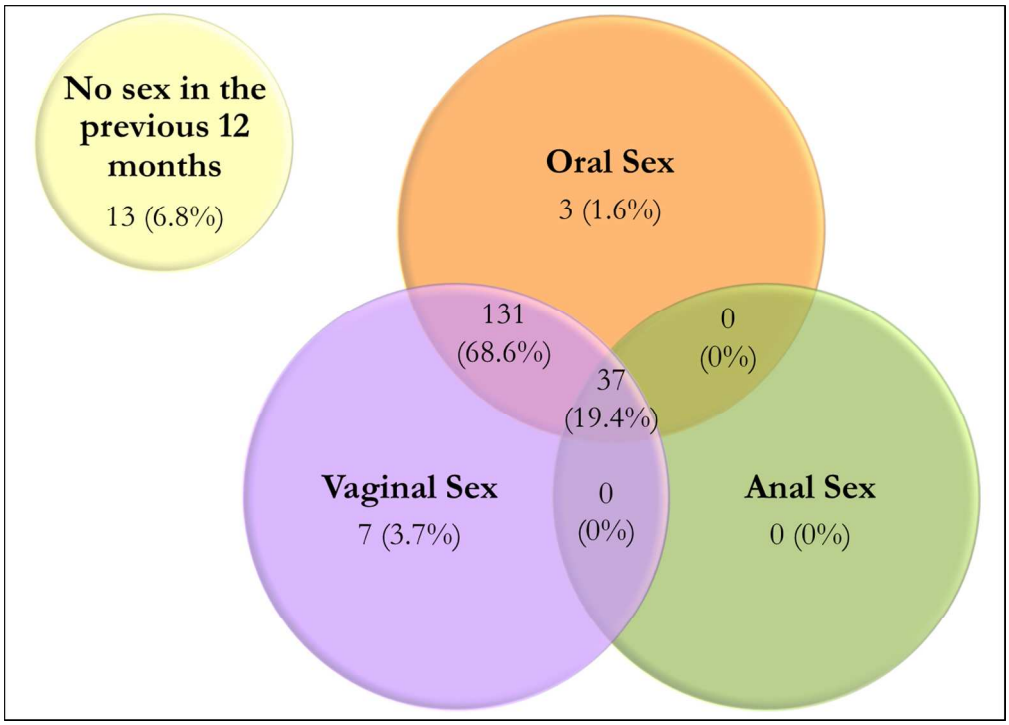

Figure 2. Venn diagram illustrating the overlap of oral, vaginal and anal sex practices in the last 12 months among teenage males

123x88mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Reported
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1, 3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 1, 3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 5
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Page 9
Study size	10	Explain how the study size was arrived at	Page 7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 7
		(*b*) Describe any methods used to examine subgroups and interactions	Page 7
		(*c*) Explain how missing data were addressed	Page 7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 7
		(*e*) Describe any sensitivity analyses	Page 7
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 7
		(b) Give reasons for non-participation at each stage	N/A. Only eligible participants were recruited.

		(c) Consider use of a flow diagram	N/A.
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 7
		(b) Indicate number of participants with missing data for each variable of interest	Page 7
Outcome data	15*	Report numbers of outcome events or summary measures	Page 7-9
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 7-9
		(*b*) Report category boundaries when continuous variables were categorized	N/A. Continuous variables were not categorized.
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A.
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 7-9
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 9
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 9-10
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 9-10
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.