

Published in *AIDS and Behavior*

<http://link.springer.com/article/10.1007/s10461-013-0613-y>

**Prevalence and correlates of sexual partner concurrency  
among Australian gay men aged 18-39 years**

Anthony Lyons <sup>1</sup>

Warwick Hosking <sup>2</sup>

<sup>1</sup> Australian Research Centre in Sex, Health and Society, La Trobe University

<sup>2</sup> Psychology Discipline, College of Arts, Victoria University

**Running head:**

Sexual concurrency among Australian gay men

**Correspondence:**

Anthony Lyons  
Australian Research Centre in  
Sex, Health and Society  
La Trobe University  
215 Franklin Street  
Melbourne, Victoria, 3000  
Australia

Phone: +61 3 9479 8719  
Fax: +61 3 9479 8711  
Email: [a.lyons@latrobe.edu.au](mailto:a.lyons@latrobe.edu.au)

**Acknowledgements:**

This study was funded by the Australian Government Department of Health and Ageing.

## Abstract

Mathematical models predict higher rates of HIV and sexually transmitted infections (STIs) in populations with higher rates of concurrent sexual partnerships. Although gay men and other men who have sex with men (MSM) have disproportionately high rates of HIV/STIs, little is known about the prevalence and correlates of sexual concurrency in these populations. This paper reports findings from a national community-based survey of 1,034 Australian gay-identified men aged 18-39 years, who gave detailed information about their sexual partners over the past 12 months. In all, 237 (23%) reported two or more concurrent sexual partners. For their most recent period of concurrency, 44% reported three or more partners and 66% reported unprotected sex with one or more of their partners. A multivariate logistic regression found sexual concurrency was significantly more likely among men on higher incomes ( $P=0.02$ ), who first had anal sex at a relatively young age ( $P=0.03$ ), and who reported a large number of partners in the past 12 months ( $P<0.001$ ). Age, education, HIV status, and other sociodemographic and sexual behavior variables were not significant correlates. However, men who reported sexual concurrency were significantly more likely to have been diagnosed with an STI in the past 12 months ( $P=0.04$ ). Findings from this study suggest sexual concurrency is common among younger Australian gay men. With many of these men not always using condoms, health agencies should consider the potential impact of concurrency on HIV/STI epidemics among gay men and other MSM.

## Keywords

Sexual concurrency; concurrent sexual partnerships; gay men; men who have sex with men; HIV; sexually transmitted infections

## Introduction

Sexual partner concurrency refers to overlapping sexual partnerships in which an individual has sex with one or more partners while continuing to have sex with at least one other partner. Mathematical models of HIV/STI epidemics consistently predict more numerous infections in populations that have a high number of concurrent sexual partnerships and a low number of serially monogamous partnerships [1-4]. This is largely due to individuals serving as possible links for viral transmission between their concurrent partners, particularly if safer sex is not always practiced. It has also been suggested that sexual concurrency can involve frequent switching between partners, which may allow viruses to spread quickly before individuals become aware of having been infected [5-7]. HIV, for example, is highly infectious when it is newly acquired [8].

Sexual concurrency may be an important issue for gay men. In most studies, approximately 40-50% report being in a regular relationship [9-11], but many of these relationships are likely to be non-monogamous. For example, open relationships, whereby men negotiate agreements with their primary partner to allow one or both of them to have sex with other men, appear to be more common than among heterosexual men and women [12-14]. Gay men also account for the largest proportion of HIV infections in developed countries [15] and have disproportionately high rates of other STIs [16, 17]. Given that large numbers continue to engage in unprotected sex with casual partners [18-21], the impact on current and future epidemics from partnership patterns such as sexual concurrency could be considerable [10, 12, 22, 23]. Despite this, relatively little is known about the prevalence of sexual concurrency and its correlates among gay men.

Of studies conducted so far, we know of only three that have examined concurrency in gay male and other populations of men who have sex with men (MSM), all of which were recently carried out in the United States. Two found high rates of concurrency, with 45% of a

national sample reporting concurrency during the past six months [24] and 78% of a San Francisco sample during the past 12 months [25]. A third study compared patterns between 18-39 year old MSM and heterosexual men and women in several major cities and found MSM to be two to three times more likely to report sexual concurrency [26]. It therefore appears likely that concurrency is common among gay men, at least in the United States. Engaging in unprotected anal sex may also be more likely among those who report concurrent partners [24, 25]. Apart from differences identified between some ethnic groups [24, 25], there is little data available on other correlates of concurrency among gay men, and nothing to our knowledge outside the United States. To accurately predict HIV/STI epidemics among gay men, health agencies, policymakers, and mathematical modelers need detailed information not only on the prevalence of concurrency among gay men, but also on its sociodemographic, sexual behavior, and sexual health correlates, including links between concurrency and STIs.

The present paper addresses these knowledge gaps by reporting on the prevalence and correlates of sexual concurrency from a national cross-sectional online survey of Australian gay men aged 18-39 years. A study of younger men is particularly warranted. In Australia, the incidence of STIs is considerably higher in this age group than in older groups [16] and recent increases in new HIV infections have been greatest among 20-29 year old gay men and other MSM [16]. In addition, the younger generation is particularly known for embracing ideas around having sex with friends (commonly referred to as “friends-with-benefits”) [27], which may encourage sexual concurrency. The present study had two main objectives: 1) to provide data on 12-month prevalence of sexual concurrency in a national online sample, including unprotected sex with concurrent partners, and; 2) to identify sociodemographic, sexual behavior, and sexual health correlates of concurrency.

## Methods

### Participants

This study originally involved 1,177 men from all major areas of the country, including regional and rural areas. Of these, 17 were aged over 39 years and were excluded from analyses. A further 38 identified as heterosexual and 88 reported a sexual or gender identity other than gay or homosexual. These men were also excluded from analyses. The remaining 1,034 men comprised the sample for analysis. These men were aged between 18 and 39 years, with a mean age of 26.8 years (SD=6.27).

### Survey

This paper presents data from a larger survey that we conducted on the health and well-being of young Australian gay men. The first section of the survey covered demographics. Men were asked for their age, highest educational attainment, income, residential location (capital city, regional town, or rural area), country of birth, whether they were in an ongoing relationship and, if so, the length of that relationship and whether it was monogamous. Using four categories (none, a little, some, a lot), they also indicated the degree to which they felt connected with the gay community.

The next section covered sexual health and sexual behavior. Specifically, men reported on their HIV status (positive, negative, or unknown), whether they had been tested for an STI in the past 12 months and, if so, whether they had tested positive for an STI. For this latter question, men indicated whether they had been diagnosed with chlamydia, gonorrhoea, syphilis, pubic lice or crabs, candida or thrush, genital herpes, genital warts, non-specific urethritis, or some other STI. For the purposes of this paper, a variable was computed to indicate whether or not those who received an STI test in the past 12 months tested positive for any STI. The men then reported on whether they had ever had sex, ever had anal

sex and, if so, their age at first anal sex. For age at first sex, a dichotomous variable was computed to indicate whether or not men reported having anal sex at 15 years or younger. We used this age cutoff given that age of consent laws in most states and territories of Australia specify 16 years and older as the legal age of consent. Following this, men provided the number of sexual partners they had in the past 12 months and reported on whether they had anal sex at their most recent sexual encounter and, if so, whether they used a condom.

The final section covered sexual concurrency. Men in this study reported whether there were any occasions over the previous year in which they had overlapping sexual partnerships. Specifically, they were asked, “In the past 12 months, did you have more than one recurring sexual partner during the same period of time? In other words, was there any period during which you went back and forth between more than one sexual partner?” Those who indicated having had concurrent sexual partners in the past 12 months were then asked to report on their most recent period of concurrency. For this, they indicated the number of concurrent partners, the gender of these partners, and whether unprotected sex occurred with one or more of the partners.

### **Data collection**

The survey was first piloted among gay-identified men in our professional networks. The feedback these men gave was used to ensure that survey questions were worded clearly and targeted appropriately, including the question on concurrency. The survey was then conducted online from July to September, 2012. Recruitment occurred by way of notifications sent to gay and lesbian organizations, by word of mouth, and through advertising on Facebook, which has a large cross-section of younger gay men. An email was also sent to a large national database of gay men and men living with HIV. At the start of the survey, men were informed that their responses would be anonymous and kept confidential,

and were required to indicate that they had read this information before proceeding.

Completing the survey took an average of 23 minutes. There were no incentives offered in this study. All participation was voluntary. The study was granted ethical approval by the La Trobe University Human Ethics Committee.

### **Data analysis**

We first computed numbers and percentages of men who reported having had at least one period involving concurrent sexual partners during the past 12 months, followed by the number of concurrent partners, the gender of the partners, and use of condoms during the most recent period of concurrency. We then examined correlates of reported concurrency. Separate univariate logistic regressions were conducted with sexual concurrency as an outcome variable and each sociodemographic, sexual behavior, and sexual health variable as predictor variables. A multivariate logistic regression was then conducted to identify significant independent correlates of reported concurrency. Variables that were associated with sexual concurrency at  $P < 0.10$  in the univariate analyses were entered into the multivariate regression. The overall effect of each predictor variable was assessed using Wald tests. Odds ratios and 95% confidence intervals were also computed for the categories in each predictor variable. Chi-square analyses were used in follow-up analyses. Variables that were associated with reported sexual concurrency at  $P < 0.05$  were treated as statistically significant. Stata 11.1 was used for all analyses.

## **Results**

### **Sample profile**

Table 1 displays numbers and percentages of men for all sociodemographic, sexual behavior, and sexual health variables. As shown in Table 1, around two-thirds were aged 29 years or

younger. Most reported having some form of tertiary education and most had incomes at or below the national median. A large majority were also living in capital cities. Around half reported an ongoing relationship, of which 45% said they had agreed to a monogamous relationship, 21% to a non-monogamous relationship, and 34% had no agreement either way. A majority felt little or no connection with the gay community. Almost all (95%) reported ever having had sex. Of this group, 18% reported first having anal sex at 15 years or younger. A majority reported multiple sexual partners in the past 12 months and, of those who reported ever having had sex, 38% reported unprotected anal intercourse at their most recent sexual encounter. In the past 12 months, around half reported receiving STI testing, with 73 (7%) diagnosed with an STI. While 3% reported living with HIV, a further 28% were either untested or were unsure of their status.

[Insert Table 1 here]

### **Concurrent sexual partnerships in the past 12 months**

As displayed in Table 1, 237 men reported at least one period involving concurrent sexual partnerships in the past 12 months. This represents 37% of those who reported having two or more sexual partners in the past 12 months, 27% of those who reported one or more sexual partners in the past 12 months, or 23% of the whole sample. For the men who reported sexual concurrency in the past 12 months, Table 2 displays further information about their most recent period of concurrency. As shown, 44% reported three or more concurrent sexual partners. In almost all cases, all of the concurrent partners were male. Finally, two-thirds (66%) reported having unprotected intercourse with one or more of their concurrent sexual partners.



[Insert Table 2 here]

### **Univariate correlates of sexual concurrency**

Table 3 displays the results of a series of univariate logistic regressions conducted for each sociodemographic, sexual behavior, and sexual health variable. All analyses were confined to men who reported having had two or more sexual partners in the past 12 months (N=637). As shown, 12-month prevalence of sexual concurrency was significantly greater among those who were on higher incomes ( $\chi^2_3=12.65$ ,  $P=0.005$ ) or were not in ongoing relationships ( $\chi^2_2=7.24$ ,  $P=0.03$ ). Sexual concurrency was also significantly more likely to be reported among those who first had anal sex when they were younger than 16 ( $\chi^2_2=8.74$ ,  $P=0.01$ ) and also those who reported larger numbers of sexual partners in the past 12 months ( $\chi^2_2=92.81$ ,  $P<0.001$ ). In addition, men who reported sexual concurrency were more likely to report having been diagnosed with an STI in the past 12 months ( $\chi^2_2=16.98$ ,  $P<0.001$ ). Although the prevalence of sexual concurrency was higher among men aged 35-39 than among younger men (OR=1.66, 95% CI=1.05-2.61), the overall effect of this variable was not significant ( $\chi^2_3=6.70$ ,  $P=0.08$ ). Likewise, the prevalence of sexual concurrency was significantly lower among men who had never tested for HIV or did not know of their status (OR=0.62, 95% CI=0.41-0.93), but the overall effect of this variable was also not quite significant ( $\chi^2_2=5.58$ ,  $P=0.06$ ).

[Insert Table 3 here]

### **Multivariate correlates of sexual concurrency**

A multivariate logistic regression was conducted to identify independent correlates of sexual concurrency. As reported in Table 3, men were significantly more likely to report a period of

sexual concurrency in the past 12 months if they had a higher income ( $\chi^2_3=9.96$ ,  $P=0.02$ ), had anal sex when they were younger than 16 ( $\chi^2_2=6.93$ ,  $P=0.03$ ), or had a large number of sexual partners in the past 12 months ( $\chi^2_2=65.44$ ,  $P<0.001$ ). Reporting a diagnosis for an STI in the past 12 months was also independently associated with sexual concurrency ( $\chi^2_2=6.29$ ,  $P=0.04$ ). Relationship status was no longer a significant correlate after taking into account other variables in the multivariate regression, but it was almost significant ( $\chi^2_2=5.35$ ,  $P=0.07$ ). Age and HIV status were also not significant independent correlates. To shed additional light on the association between income and sexual concurrency, we conducted a chi-square analysis of income and whether men in relationships agreed to monogamy. We found that those on incomes of \$50,000 or more were significantly less likely to have agreed to a monogamous relationship than those on lower incomes (38% vs. 52%;  $\chi^2_1=8.72$ ,  $P=0.003$ ).

## Discussion

Twelve-month prevalence of sexual concurrency was high in this online sample of 18-39 year old Australian gay men. Of those who had sex in the past 12 months, more than a quarter (27%; or 37% of those with two or more partners in the past year) reported at least one period involving concurrent sexual partners, with almost half having three or more partners during their most recent period of concurrency. To our knowledge, this is the first reported study on sexual concurrency among Australian gay men. However, recent population-based telephone surveys in the United States found similar rates despite differences in measuring concurrency. In these surveys, between 18% and 31% of MSM reported sexual concurrency in the past 12 months [26]. A recent online study in the United States found a somewhat higher rate of 45% among MSM [24]. Having concurrent sexual partners is clearly common among gay men, at least in Australia and the United States. It also appears to be much more common than among

heterosexual men and women. At least in the United States, heterosexual populations tend to report concurrency at prevalence rates of around 10% or less [26, 28]. There has also been some debate over the extent to which concurrency drives HIV infections in these populations, particularly in sub-Saharan Africa where HIV is more prevalent among heterosexual men and women [4, 29-32].

However, as recent mathematical modeling suggests, populations that clearly have higher rates of concurrent sexual partnerships and lower rates of serially monogamous partnerships are likely to face HIV/STI epidemics that are larger and spread faster [33, 34]. This is especially the case if there are also high rates of unprotected sex. In our study, two-thirds reported having unprotected sex with one or more of their concurrent sexual partners. Men who reported sexual concurrency in the past 12 months were also significantly more likely to report an STI diagnosis in the same period. One potential underlying factor may involve sexual adventurism [35]. Men who tend toward higher-risk sexual behavior, and who are therefore more vulnerable to infection, may also be less inclined toward having monogamous partnerships. Another potential underlying factor relates to the network characteristics of sexual concurrency. Given the high prevalence of concurrency we found in this study, it is likely that some of those who were in concurrent partnerships were having sex with men who were also in concurrent partnerships. This is particularly the case if they are in open relationships where both they and their partner have sex with other men. The denser a sexual network, the more likely it is for STIs to spread quickly [36, 37], particularly if men are switching frequently between partners, not always practicing safer sex, and not getting tested between partners [7]. This may explain why concurrency significantly predicted STI diagnoses independently of the overall reported number of sexual partners. That is, large numbers of serially monogamous partners may be less risky than large numbers of concurrent partners.

There were other correlates of sexual concurrency identified in the present study, which may provide additional guidance to those wishing to understand or address the potential impact of concurrency on HIV/STI epidemics. One such correlate was age at first anal sex, with concurrency at higher rates among those who reported having first anal sex when they were younger than 16 years. This finding is consistent with a recent study of Australian gay men [38], which found strong links between age at first anal sex and several higher-risk sexual behaviors, such as having large numbers of sexual partners, group sex, and receptive anal sex. Those who report younger age at first anal sex were also more likely to be HIV-positive and to have been recently diagnosed with an STI. With age at first anal sex appearing to be a powerful marker for tendencies toward sexual adventurism, it is perhaps not surprising that those who reported younger age at first anal sex were also more likely to report having had concurrent partnerships. In all, these findings make a strong case for providing sex education that is relevant to young same-sex attracted men. With numerous links found between age at first anal sex and sexual behavior patterns later in life, including concurrency, it may be necessary for sex education to be delivered during adolescence before or around the time when most gay or bisexual men become sexually active.

A second correlate was income, with men on higher incomes more likely to report sexual concurrency, even after controlling for age and other sociodemographics. This finding is in contrast with outcomes from studies of heterosexual men and women, which have generally found no significant link between income and concurrency [28, 39]. A recent study of relationship arrangements among gay men also found no link between income and whether men were in monogamous or non-monogamous relationships [13]. These studies, however, were conducted in the United States and there may be differences between the two countries. One possible explanation is that, in Australia, people on lower incomes are more likely to be living in outer suburban areas, where fewer opportunities exist for meeting other gay men

compared to inner urban areas. Conducting open relationships, for example, may be more difficult. We also found that those on lower incomes were less likely to agree to non-monogamous relationships. Again, this may be due to those on lower incomes living in outer urban areas, which are generally thought to be more socially conservative and perhaps therefore more likely to favor traditional relationship structures [40]. Of course, much of this is speculative and more research is needed to both corroborate our findings and to fully account for the link we found between income and concurrency, perhaps by collecting more detailed data on the intersection between income, residential location, and social attitudes. In the meantime, the present study suggests that health agencies wishing to address sexual concurrency are likely to capture a large number of men in concurrent partnerships by targeting communities in higher income areas.

There were some limitations to this study. One issue concerns the measurement of sexual concurrency. We used a direct measure by asking participants to report on whether they had overlapping sexual partners. While a number of other studies used similar measures [25, 41-43], some employed what is commonly referred to as a calendar method in which participants provide dates for the beginning and end of each sexual partnership [24, 26, 28, 39, 44, 45]. Overlapping dates are then treated as concurrency. There has been some uncertainty about the relative accuracy of each method [46]. However, two recent studies compared the methods and both concluded that the direct method more effectively minimizes missing data and appears to detect more instances of concurrency [46, 47]. This is particularly the case for participants with large numbers of partners who may have difficulty remembering precise dates. That said, it is possible that some participants misinterpret what it means to have concurrent partners and incorrectly report the presence or absence of concurrency. In our study, we gave a straightforward explanation of concurrency before participants answered the question, so it seems unlikely that there would have been a large

number of inaccurate responses. It is also worth noting that, while any inaccuracies may slightly alter the reported prevalence of concurrency, correlates of concurrency are unlikely to be affected, as there is little reason to suspect inaccuracies to be unevenly distributed through the sample. Even so, future studies that seek to replicate our findings could consider using multiple measures for assessing concurrency, especially when measuring prevalence.

This study was also limited to a self-selected online sample. We cannot be conclusive about the representativeness of the sample, particularly given that the population parameters of gay men in Australia remain unknown due to a lack of census data [48]. That said, almost all Australian men aged 18-39 years have Internet access at home [49]. Large numbers also visit sites such as Facebook. In addition, our sample was large and diverse. There were men from all major areas of the country and large numbers in most of the key demographics. Nevertheless, researchers in the future may wish to consider using additional recruitment strategies and survey modes. It will also be necessary for studies to include gay men aged over 39 years. In the multivariate analyses we conducted, age was not a significant correlate of sexual concurrency, so it is possible that large proportions of men in older age groups also have concurrent partnerships.

## **Conclusion**

Few national studies have examined concurrency among gay men and other MSM. To our knowledge, the present study, involving a large sample of 18-39 year old Australian gay men, is the first outside the United States. We found a high prevalence of sexual concurrency. A majority also reported not using a condom with one or more of their concurrent partners. These findings, and the link we found between concurrency and recent STI diagnoses, suggest that concurrency is likely to play a role in shaping HIV/STI epidemics among gay men. Thus, health agencies and policymakers seeking to prevent or control epidemics in gay

male populations may wish to consider the potential impact of sexual concurrency. While concurrency did not appear to vary with age, education, or a range of other factors examined in our study, it was linked with income and age at first anal sex. These findings could be used to further improve mathematical models of HIV/STI epidemics and to guide future health and education strategies aimed at reducing current epidemics and preventing new outbreaks.

## References

1. McCreesh N, O'Brien K, Nsubuga RN, Shafer LA, Bakker R, Seeley J, et al. Exploring the potential impact of a reduction in partnership concurrency on HIV incidence in rural Uganda: a modeling study. *Sex Transm Dis.* 2012;39:407-13.
2. Morris M, Kurth AE, Hamilton DT, Moody J, Wakefield S. Concurrent partnerships and HIV prevalence disparities by race: linking science and public health practice. *Am J Pub Health.* 2009;99:1023-31.
3. Doherty IA, Shiboski S, Ellen JM, Adimora AA, Padian NS. Sexual bridging socially and over time: a simulation model exploring the relative effects of mixing and concurrency on viral sexually transmitted infection transmission. *Sex Transm Dis.* 2006;33:368-73.
4. Mah TL, Halperin DT. Concurrent sexual partnerships and the HIV epidemics in Africa: evidence to move forward. *AIDS Behav.* 2010;14:11-6.
5. Steward WT, Remien RH, Higgins JA, Dubrow R, Pinkerton SD, Sikkema KJ, et al. Behavior change following diagnosis with acute/early HIV infection—a move to serosorting with other HIV-infected individuals. The NIMH Multisite Acute HIV Infection Study: III. *AIDS Behav.* 2009;13:1054-60.
6. Eaton JW, Hallett TB, Garnett GP. Concurrent sexual partnerships and primary HIV infection: a critical interaction. *AIDS Behav.* 2011;15:687-92.
7. Hudson CP. Concurrent partnerships could cause AIDS epidemics. *Int J STD AIDS.* 1993;4:249-53.
8. Pilcher CD, Tien HC, Eron JJ, Jr., Vernazza PL, Leu S-Y, Stewart PW, et al. Brief but efficient: acute HIV infection and the sexual transmission of HIV. *J Infect Dis.* 2004;189:1785-92.



9. Lyons A, Pitts M, Grierson J. Growing old as a gay man: psychosocial wellbeing of a sexual minority. *Res Aging*. 2013;35:275-95.
10. Lyons A, Pitts M, Smith G, Grierson JW, Smith A, McNally S, et al. Versatility and HIV vulnerability: investigating the proportion of Australian gay men having both insertive and receptive anal intercourse. *J Sex Med*. 2011;8:2164-71.
11. Lyons A, Pitts M, Grierson JW, Thorpe R, Power J. Ageing with HIV: health and psychosocial well-being of older gay men. *AIDS Care*. 2010;22:1236-44.
12. Hosking W. Satisfaction with open sexual agreements in Australian gay men's relationships: the role of perceived discrepancies in benefit. *Arch Sex Behav*. 2012. Published online ahead of print.
13. Parsons JT, Starks TJ, DuBois S, Grov C, Golub SA. Alternatives to monogamy among gay male couples in a community survey: implications for mental health and sexual risk. *Arch Sex Behav*. 2013;42:303-12.
14. Hosking W. Agreements about extra-dyadic sex in gay men's relationships: exploring differences in relationship quality by agreement type and rule breaking behaviour. *J Homosex*. 2013;60:711-33.
15. Beyrer C, Baral SD, van Griensven F, Goodreau SM, Chariyalertsak S, Wirtz AL, et al. Global epidemiology of HIV infection in men who have sex with men. *Lancet*. 2012;380:367-77.
16. The Kirby Institute. HIV, Viral Hepatitis and Sexually Transmitted Infections in Australia: Annual Surveillance Report 2012. Sydney, Australia: Kirby Institute; 2012.
17. Wolitski RJ, Fenton KA. Sexual health, HIV, and sexually transmitted infections among gay, bisexual, and other men who have sex with men in the United States. *AIDS Behav*. 2011;15 Suppl 1:S9-17.

18. Hensel DJ, Rosenberger JG, Novak DS, Reece M. Sexual event-level characteristics of condom use during anal intercourse among HIV-negative men who have sex with men. *Sex Transm Dis.* 2012;39:550-5.
19. Neville S, Adams J. Condom use in men who have sex with men: a literature review. *Contemp Nurse.* 2009;33:130-9.
20. Prestage G, Jin F, Grulich A, de Wit J, Zablotska I. Gay men are less likely to use condoms with casual sex partners they know 'well'. *AIDS Behav.* 2012;16:664-8.
21. Rosenberger JG, Reece M, Schick V, Herbenick D, Novak DS, Van Der Pol B, et al. Condom use during most recent anal intercourse event among a U.S. sample of men who have sex with men. *J Sex Med.* 2012;9:1037-47.
22. Lyons A, Pitts M, Grierson J. Versatility and HIV vulnerability: patterns of insertive and receptive anal sex in a national sample of older Australian gay men. *AIDS Behav.* 2013;17:1370-7.
23. Prestage G, Down I, Grulich A, Zablotska I. Sex partying among gay men in Sydney, Melbourne and Brisbane, Australia. *AIDS Behav.* 2011;15:298-304.
24. Rosenberg ES, Khosropour CM, Sullivan PS. High prevalence of sexual concurrency and concurrent unprotected anal intercourse across racial/ethnic groups among a national, Web-based study of men who have sex with men in the United States. *Sex Transm Dis.* 2012;39:741-6.
25. Bohl DD, Raymond HF, Arnold M, McFarland W. Concurrent sexual partnerships and racial disparities in HIV infection among men who have sex with men. *Sex Transm Infect.* 2009;85:367-9.
26. Glick SN, Morris M, Foxman B, Aral SO, Manhart LE, Holmes KK, et al. A comparison of sexual behavior patterns among men who have sex with men and heterosexual men and women. *J Acquir Immune Defic Syndr.* 2012;60:83-90.

27. Bisson MA, Levine TR. Negotiating a friends with benefits relationship. *Arch Sex Behav.* 2009;38:66-73.
28. Adimora AA, Schoenbach VJ, Doherty IA. Concurrent sexual partnerships among men in the United States. *Am J Pub Health.* 2007;97:2230-7.
29. Epstein H, Morris M. Concurrent partnerships and HIV: an inconvenient truth. *J Int AIDS Soc.* 2011;14:13.
30. Lurie MN, Rosenthal S. The concurrency hypothesis in sub-Saharan Africa: convincing empirical evidence is still lacking. Response to Mah and Halperin, Epstein, and Morris. *AIDS Behav.* 2010;14:34-7.
31. Mah TL, Halperin DT. The evidence for the role of concurrent partnerships in Africa's HIV epidemics: a response to Lurie and Rosenthal. *AIDS Behav.* 2010;14:25-8.
32. Sawers L, Stillwaggon E. Concurrent sexual partnerships do not explain the HIV epidemics in Africa: a systematic review of the evidence. *J Int AIDS Soc.* 2010;13:34.
33. Goodreau SM. A decade of modelling research yields considerable evidence for the importance of concurrency: a response to Sawers and Stillwaggon. *J Int AIDS Soc.* 2011;14:12.
34. Mah TL, Shelton JD. Concurrency revisited: increasing and compelling epidemiological evidence. *J Int AIDS Soc.* 2011;14:33.
35. Kippax S, Campbell D, Van de Ven P, Crawford J, Prestage G, Knox S, et al. Cultures of sexual adventurousness as markers of HIV seroconversion: a case control study in a cohort of Sydney gay men. *AIDS Care.* 1998;10:677-88.
36. Smith A. Sexual concurrency: driver or passenger in the spread of sexually transmissible infections? *Sex Health.* 2012;9:203-4.

37. Wohlfeiler D, Potterat JJ. Using gay men's sexual networks to reduce sexually transmitted disease (STD)/human immunodeficiency virus (HIV) transmission. *Sex Transm Dis.* 2005;32:S48-52.
38. Lyons A, Pitts M, Grierson JW, Smith A, McNally S, Couch M. Age at first anal sex and HIV/STI vulnerability among gay men in Australia. *Sex Transm Infect.* 2012;88:252-57.
39. Manhart LE, Aral SO, Holmes KK, Foxman B. Sex partner concurrency: measurement, prevalence, and correlates among urban 18-39-year-olds. *Sex Transm Dis.* 2002;29:133-43.
40. Jost JT, Nosek BA, Gosling SD. Ideology: its resurgence in social, personality, and political psychology. *Perspect Psychol Sci.* 2008;3:126-36.
41. Beyrer C, Trapence G, Motimedi F, Umar E, Iipinge S, Dausab F, et al. Bisexual concurrency, bisexual partnerships, and HIV among Southern African men who have sex with men. *Sex Transm Infect.* 2010;86:323-7.
42. Senn TE, Carey MP, Venable PA, Coury-Doniger P, Urban M. Sexual partner concurrency among STI clinic patients with a steady partner: correlates and associations with condom use. *Sex Transm Infect.* 2009;85:343-7.
43. Hess KL, Gorbach PM, Manhart LE, Stoner BP, Martin DH, Holmes KK. Risk behaviours by type of concurrency among young people in three STI clinics in the United States. *Sex Health.* 2012;9:280-7.
44. Cassels S, Pearson CR, Walters K, Simoni JM, Morris M. Sexual partner concurrency and sexual risk among gay, lesbian, bisexual, and transgender American Indian/Alaska natives. *Sex Transm Dis.* 2010;37:272-8.
45. Doherty IA, Schoenbach VJ, Adimora AA. Condom use and duration of concurrent partnerships among men in the United States. *Sex Transm Dis.* 2009;36:265-72.

46. Glynn JR, Dube A, Kayuni N, Floyd S, Molesworth A, Parrott F, et al. Measuring concurrency: an empirical study of different methods in a large population-based survey and evaluation of the UNAIDS guidelines. *AIDS*. 2012;26:977-85.
47. Nelson SJ, Manhart LE, Gorbach PM, Martin DH, Stoner BP, Aral SO, et al. Measuring sex partner concurrency: it's what's missing that counts. *Sex Transm Dis*. 2007;34:801-7.
48. Prestage G, Ferris J, Grierson J, Thorpe R, Zablotska I, Imrie J, et al. Homosexual men in Australia: population, distribution and HIV prevalence. *Sex Health*. 2008;5:97-102.
49. Australian Bureau of Statistics. Household Use of Information Technology, Australia, 2010-2011. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8146.02010-11?OpenDocument>. Accessed 10 Apr 2013.
50. Australian Bureau of Statistics. Employee earnings, benefits and trade union membership, August 2011. Canberra: Australian Bureau of Statistics; 2012.

**Table 1** Sample profile (N=1,034)

	No.	%
<b>Age</b>		
18-24	448	43
25-29	236	23
30-34	176	17
35-39	174	17
<b>Education</b>		
Secondary or below	401	39
Non-university tertiary	250	24
University - undergraduate	267	26
University - postgraduate	112	11
<b>Income (Australian dollars)<sup>a</sup></b>		
0-19,999	263	27
20,000-49,999	295	30
50,000-99,999	332	34
100,000+	79	8
<b>Residential location</b>		
Capital city	858	84
Regional town or city	125	12
Rural	42	4
<b>Country of birth</b>		
Australia	855	84
Overseas	168	16
<b>In an ongoing relationship</b>		
No	535	52
Yes, for less than 1 year	152	15
Yes, for 1 year or more	343	33
<b>Relationship agreement<sup>b</sup></b>		
Agreed to monogamy	223	45
Agreed to non-monogamy	104	21
No agreement	167	34
<b>Feel connected to the gay community</b>		
None	228	22
A little	424	41
Some	286	28
A lot	89	9
<b>Ever had sex</b>		
No	47	5
Yes	984	95
<b>Age at first anal sex<sup>c</sup></b>		
Younger than 16 years	173	18
16 years or older	756	77
Never had anal sex	50	5
<b>Number of sexual partners in past 12 months</b>		
0	139	13
1	252	24
2-5	308	30
6-10	148	14
11+	181	18
<b>Unprotected anal intercourse at most recent sexual encounter<sup>c</sup></b>		
No	605	62
Yes	372	38
<b>HIV status</b>		
Positive	34	3
Negative	710	69

Unknown	290	28
Diagnosed with an STI in past 12 months		
No	427	42
Yes	73	7
Not tested	522	51
Concurrent sexual partners in past 12 months <sup>d</sup>		
No	400	63
Yes	237	37

<sup>a</sup> Annual pre-tax income. Around the time of this survey, the median income for all employed Australians was AUD\$46,800 [50]. <sup>b</sup> Of those who reported being in an ongoing relationship (N=495); <sup>c</sup> Of all men in the sample who reported ever having had sex (N=984); <sup>d</sup> Of those who reported having had two or more sexual partners in the past 12 months (N=637).

**Table 2** Most recent period of sexual concurrency in the past 12 months <sup>a</sup>

	No.	%
Number of concurrent partners		
2 partners	133	56
3 partners	60	25
4 or more partners	44	19
Gender of concurrent partners		
Only men	233	98
Only women	1	0
Both men and women	3	1
Had unprotected sex with one or more concurrent partners		
No	81	34
Yes	155	66

<sup>a</sup> Of those who reported at least one period of sexual concurrency in the past 12 months (N=237)



**Table 3** Univariate and multivariate correlates of sexual concurrency in the past 12 months <sup>a</sup>

	Sexual concurrency in past 12 months <sup>b</sup>		Univariate		Multivariate	
	No.	%	OR (95% CI)	<i>P</i>	OR (95% CI)	<i>P</i>
Age				0.08		0.99
18-24	90	32	ref		ref	
25-29	54	38	1.28 (0.84-1.95)		1.00 (0.59-1.69)	
30-34	45	43	1.58 (1.00-2.51)		1.00 (0.54-1.85)	
35-39	48	44	1.66 (1.05-2.61)		1.03 (0.56-1.91)	
Education				0.98		-
Secondary or below	87	36	ref		-	
Non-university tertiary	60	38	1.08 (0.71-1.64)		-	
University - undergraduate	62	38	1.06 (0.71-1.61)		-	
University - postgraduate	27	38	1.09 (0.63-1.88)		-	
<b>Income (Australian dollars) <sup>c</sup></b>				<b>0.005</b>		<b>0.02</b>
0-19,999	46	30	0.58 (0.37-0.90)		0.51 (0.29-0.90)	
20,000-49,999	63	34	0.69 (0.46-1.04)		0.68 (0.42-1.09)	
50,000-99,999	90	43	ref		ref	
100,000+	28	54	1.55 (0.84-2.86)		1.73 (0.85-3.51)	
Residential location				0.72		-
Capital city	203	38	ref		-	
Regional town or city	24	34	0.85 (0.50-1.43)		-	
Rural	9	43	1.24 (0.51-3.01)		-	
Country of birth				0.75		-
Australia	195	37	ref		-	
Overseas	39	39	1.07 (0.69-1.66)		-	
<b>In an ongoing relationship</b>				<b>0.03</b>		<b>0.07</b>
No	161	41	ref		ref	
Yes, for less than 1 year	35	28	0.57 (0.37-0.89)		0.60 (0.36-0.99)	
Yes, for 1 year or more	41	34	0.73 (0.48-1.13)		0.66 (0.39-1.11)	
Feel connected to the gay community				0.51		-
None	41	34	0.97 (0.61-1.52)		-	
A little	93	35	ref		-	
Some	73	40	1.23 (0.83-1.82)		-	
A lot	29	43	1.37 (0.79-2.35)		-	
<b>Age at first anal sex</b>				<b>0.01</b>		<b>0.03</b>
Younger than 16 years	59	48	1.65 (1.11-2.45)		1.82 (1.13-2.93)	
16 years or older	175	35	ref		ref	
Never had anal sex	3	19	0.42 (0.12-1.49)		0.59 (0.15-2.41)	
<b>Number of sexual partners in past 12 months</b>				<b>&lt;0.001</b>		<b>&lt;0.001</b>
2-5	61	20	ref		ref	
6-10	63	43	3.00 (1.95-4.61)		2.99 (1.89-4.75)	
11+	113	62	6.73 (4.46-10.15)		6.39 (4.06-10.06)	
Unprotected anal intercourse at most recent sexual encounter				0.21		-
No	153	36	ref		-	
Yes	83	41	1.24 (0.88-1.75)		-	
HIV status				0.06		0.47
Positive	11	39	0.99 (0.45-2.15)		0.65 (0.27-1.59)	
Negative	185	40	ref		ref	
Unknown	41	29	0.62 (0.41-0.93)		1.27 (0.71-2.28)	
<b>Diagnosed with an STI in past 12 months</b>				<b>&lt;0.001</b>		<b>0.04</b>
No	129	40	ref		ref	
Yes	34	57	1.94 (1.11-3.38)		1.97 (1.05-3.69)	
Not tested	74	30	0.62 (0.44-0.88)		0.81 (0.50-1.31)	

Results are from univariate logistic regressions conducted for each sociodemographic, sexual behavior, and sexual health variable and a single multivariate logistic regression involving variables that were associated with reported sexual concurrency at  $P < 0.10$ . Variables that were significantly associated with concurrency are indicated by boldface; <sup>a</sup> Of those who reported having had two or more sexual partners in the past 12 months (N=637); <sup>b</sup> The number and percentage of men who reported having had at least one concurrent sexual partnership in the past 12 months. Percentages indicate the percentage of men who reported a concurrent partnership for each category of the sociodemographic, sexual behavior, and sexual health variables. For example, 32% of 18-24 year old men reported at least one period of sexual concurrency in the past 12 months; <sup>c</sup> Annual pre-tax income. Around the time of this survey, the median income for all employed Australians was AUD\$46,800 [50]; ref = reference category