

Sexual identity, same-sex partners and risk behaviour among a community-based sample of young people in Australia

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Keywords

Young people; sexual orientation; sexuality; alcohol consumption; substance use; sexual behaviour.

Abstract

Introduction:

Young people who are same-sex attracted report higher rates of substance use, sexual risk behaviour, and mental health problems. Numerous studies have shown that sexual identity, sexual behaviour and sexual attraction do not always correspond, particularly among young people. We describe sexual identity, sexual partners, and associations between sexual identity and risk in a community-based sample of young people.

Methods:

From 2011-2013, young people (16-29 years) were recruited at a music festival in Melbourne, Australia to self-complete a questionnaire. We describe sexual identity and gender of anal/vaginal sex partners in the past year. Secondly, we assess associations between risk behaviours, health outcomes and gay/lesbian/bisexual/queer/questioning (GLBQQ)-identity using multivariable logistic regression.

Results:

Among 3,793(91%) participants with complete data, 115(9%) males and 266(11%) females were GLBQQ-identifying.

Among GLBQQ-identifying males, 23% reported only same-sex partners, 34% reported both sex partners, 26% reported only opposite-sex partners, 5% reported no sex partners in the past year, and 12% had never had sex.

Among GLBQQ-identifying females, 10% reported only same-sex partners, 22% reported both sex partners, 48% reported only opposite-sex partners, 3% reported no sex partners in the past year, and 17% had never had sex.

Controlling for age and gender, significant ($p < 0.05$) associations with GLBQQ-identity included: recent drug use (adjusted odds ratio [AOR] 1.7, 95%CI 1.3-2.2); ever injected drugs (AOR 5.7, 95%CI 3.3-9.7); young age at first sex (AOR 1.8, 95%CI 1.3-2.3); ≥ 11 lifetime sex partners (AOR 1.5, 95%CI 1.1-2.0); multiple sex partners in the past year (AOR 1.9, 95%CI 1.5-2.5); and rating mental health as fair/poor (AOR 3.0, 95%CI 1.9-4.6).

Conclusion:

Young people with GLBQQ-identity commonly engage in high risk behaviours and are more at risk relative to their heterosexual-identifying peers. Targeted interventions to promote the health and wellbeing of this group should account for the complexities of identity and behaviour.

Introduction

It is widely reported that same-sex attracted young people report more risk behaviours, victimisation and poorer health outcomes than their heterosexual peers. In particular, young people who are same-sex attracted or report same-sex partners report higher rates of illicit drug use, harmful alcohol consumption, smoking, suicidal ideation and behaviour, and verbal, physical and sexual harassment and violence (Fergusson, Horwood, Ridder, & Beautrais, 2005; Garofalo, Wolf, Kessel, Palfrey, & DuRant, 1998; Hillier, De Visser, Kavanagh, & McNair, 2003; e.g. Lea, Reynolds, & de Wit, 2013b; Leonard et al., 2012; Marshal et al., 2008; Robin et al., 2002; Russell & Joyner, 2001; Smith, Lindsay, & Rosenthal, 1999; Wichstrom & Hegna, 2003). Risky sexual behaviours are also more commonly reported, including earlier age at first sex, more sex partners, and sexually transmitted infections (STIs) (e.g. Garofalo et al., 1998; Goodenow, Netherland, & Szalacha, 2002; Grulich, de Visser, Smith, Rissel, & Richters, 2003; Kuyper & Vanwesenbeeck, 2011; Lewis et al., 2012; McNair, Szalacha, & Hughes, 2011). These risks may affect subgroups of same-sex attracted or behaving young people differently; for example, numerous studies have identified highest risk behaviour among bisexual young people (Marshal et al., 2008; Robin et al., 2002; Russell, Driscoll, & Truong, 2002; Saewyc et al., 2007).

Young people are an important group in which to study experiences and issues pertaining to sexual attraction, identity and behaviour. Firstly, same-sex attraction, questioning identity, or sexual experience with same-sex partners is not uncommon in this age group. In Australian national data of young people aged 16-19 and 20-24 years, 1.7% and 6.9% of males and 10.2% and 11.9% of females, respectively, reported any homosexual experience in their lifetime, including anal sex, oral sex, touching or kissing (Grulich et al., 2003). In a cohort of women aged 25-30 years, 8.6% reported identifying as bisexual, lesbian, or mainly heterosexual (McNair et al., 2011), while Australian studies of secondary school students have found that 9-11% of young people are same-sex attracted or questioning their identity (Hillier, Warr, & Haste, 1996; Smith, Agius, Mitchell, Barrett, & Pitts, 2009; Smith et al., 1999).

Secondly, awareness of sexual orientation commonly occurs during late adolescence or early adulthood, and the age of awareness may be decreasing; a national survey of gay, lesbian, bisexual and transgender (GLBT) Australians found that the mean age of first awareness of sexual orientation was 12 to 13 years for 16-24 year homosexual men and women compared to 15 to 21 years for homosexual men and women aged 60 years and older (Leonard et al., 2012).

Thirdly, research suggests that young people experience greater harm relating to alcohol (Chikritzhs & Pascal, 2004; Livingston & Room, 2009; Teesson et al., 2010), drug use (Dietze, Jolley, & Cvetkovski, 2003; Sara, Burgess, Harris, Malhi, & Whiteford, 2011) and sexual risk behaviour (Department of Health and Ageing, 2013; Lewis et al., 2012) than the older general population, and thus young people are an important group in which to understand and prevent risk.

Numerous studies have shown that sexual identity, sexual behaviour and sexual attraction do not always correspond, particularly among young people (Coker, Austin, & Schuster, 2010; Goodenow et al., 2002; Robin et al., 2002; Saewyc et al., 2004). However, many studies focus on only one construct of sexual orientation, thus underestimating diversity and obscuring differences in risk and health needs (Mayer et al., 2008; Saewyc et al., 2004). In this study, we consider multiple constructs of sexual orientation, including differentiating between young people with same-sex and

both sex partners, and considering disparities in identity and behaviour. We recruit from a community setting, thus giving us a broader age range than school-based studies (Hillier et al., 1996; Smith et al., 2009) and allowing us to better capture early school-leavers or non-attendees (Faden et al., 2004), particularly given that same-sex attracted young people may be more likely to experience homophobic bullying and miss school, change schools, or drop out of school (Hillier et al., 2010; Robinson, Bansel, Denson, Ovenden, & Davies, 2014). Unlike other Australian studies focused on same-sex attracted young people recruited through community spaces and online (Hillier et al., 2010; Leonard et al., 2012; Robinson et al., 2014), recruiting young people from a music festival allowed us to draw a comparative sample of gay/lesbian/bisexual/queer/questioning (GLBQQ) and heterosexual young people from the same setting. According to Australian Bureau of Statistics 2009-2010, 45 percent of young people aged 18-24 years attended a popular music concert within the previous twelve months (ABS, 2010). Music festivals may attract large numbers of young people who report recent illicit drug use, harmful alcohol consumption, and high-risk sexual behaviour, and thus are a suitable venue to recruit young people for study into illicit drug use, alcohol consumption, and sexual behaviour (Lim, Hellard, Aitken, & Hocking, 2007; Lim, Hellard, Hocking, Spelman, & Aitken, 2010; Sheridan et al., 2008).

In this study, we aim to assess the prevalence of same-sex identity and same-sex partners in a community-based sample of young people, and report on differences between identity and behaviour. Further, we compare risk behaviours and health outcomes according to sexual identity. An understanding of the associations between sexual identity and risk will help inform health and well-being programs, policy and education targeting young people.

Methods

Participants and procedure

Participants were recruited at the Melbourne Big Day Out (BDO), a one-day music festival held in January each year in Melbourne, Victoria, as part of an ongoing behavioural surveillance system that has been undertaken at the BDO since 2005 (Lim, Hellard, Aitken, & Hocking, 2009; Lim et al., 2007; Lim et al., 2010). The BDO survey intends to measure and monitor annual trends in alcohol, drug and sexual risk behaviours in a group of young people recruited from the community. Each year, approximately 20 trained researchers recruited a convenience sample of young people aged 16-29 years. Participants were invited to complete the survey by researchers in and around a study market stall in the food and market area of the festival. Once the survey was explained, participants self-completed the questionnaire, taking approximately ten minutes.

Questionnaire

A core set of questions pertaining to drug and alcohol use and sexual risk behaviours has been asked annually in the BDO survey (Lim et al., 2009; Lim et al., 2010) since 2005 in addition to a subset of questions that vary each year. For three consecutive years (2011 to 2013) participants were asked about sexual identity. Also, two versions of the survey with slight variations were randomly circulated in 2011-2013 to maximise the information collected. The following questions were only asked in half of surveys in the specified years: recreational income (2012); smoking (2012-2013); mental health (2012-2013). Injecting drug use was not assessed in 2013 and mental health was not assessed in 2011.

Measures

To assess sexual identity, participants were asked “how do you identify yourself?”; results were dichotomised for analysis as heterosexual-identifying (self-identified as heterosexual/straight) and GLBQQ-identifying (self-identified as gay, homosexual, lesbian, bisexual, queer, or questioning). Participants responding to sexual identity as “other” were excluded from analysis (n=42) due to difficulty in categorising responses or potential false answers; examples of other responses were: “I don’t label”, “awesome”, “whatever”, “asexual”, “a person”, “bestiality”. Two responses specifying transgender were also excluded because the survey was not designed to effectively capture transgender identity. Past year sex partners refers to anal and/or vaginal sex partners and was categorised as opposite-sex partners only, same-sex partners only, or both sex partners (reports male and female sex partners).

Socio-demographics indicators

A range of self-reported socio-demographic indicators were assessed. Higher education was defined as completed or in the process of completing any post-high school education. Area of residence was classified from Australian residential postcodes using the Australian Standard Geographical Classification (ASGC) Remoteness Areas system and grouped as major and non-major city (Australian Bureau of Statistics, 2006). Recreational income was defined as the amount of money available to spend on self for recreational purposes in a normal week and grouped as <\$120 and ≥\$120 (AUD).

Risk behaviour

A variety of measures of alcohol-related risk encompassing quantity, frequency, and related harm were assessed based on consumption in the past 12 months. Frequent alcohol-related memory loss was defined as experiencing alcohol-related memory loss at least monthly during the past 12 months. Ever experienced or caused alcohol-related injury was based on lifetime experience. Current smoker was defined as reporting currently smoking daily, weekly, or less than weekly. Recent drug use was defined as reporting using illicit drugs (illegal drugs and prescription drugs if taken not as directed, or prescribed to someone else) in the past month.

Measures of risky sexual behaviour included age of first sex, lifetime number of partners, and partners and condom use in the past 12 months. Consistent condom use was defined as reporting always using condoms with regular, casual, and new partners in the past 12 months.

Sexual health knowledge was assessed based on six true or false statements regarding STI testing, treatment, and consequences, such as: “Gonorrhoea, syphilis and chlamydia can all be easily treated with antibiotics”. Responses were grouped as correct or incorrect (includes the response, “don’t know”). The proportion answering all knowledge questions correctly is reported. Measures of sexual health care access assessed were discussing sex with a general practitioner (GP) or doctor in the past year and STI testing history (last having an STI test within the past year, more than 12 months ago, or never tested).

Measures of mental health assessed were reporting any mental health problems in the past six months (including problems not discussed with or diagnosed by a health professional) and rating overall mental health as fair or poor versus good, very good or excellent

Analysis

Data were entered into a Microsoft Access database and statistical analysis was conducted in Stata version 11 (StataCorp, 2009). All analyses used a significance level of 0.05.

Firstly, we assessed data completeness and differences in completeness by sex using chi-square test of proportions. All subsequent analysis was limited to participants with complete data on sexual identity and past year sex partners. Secondly, we described socio-demographic characteristics, sexual identity and sexual behaviour for participants from 2011 to 2013; differences by sex were assessed using chi-square tests of proportions. Thirdly, changes over time in demographic and key outcome variables were assessed using univariable logistic regression with year of survey as a continuous independent variable and controlling for age and sex. Fourthly, logistic regression was used to assess demographic, behavioural and health associations with reporting a GLBQQ-identity. The multivariable model included variables found significant in univariable analysis, controlling for age group and gender. Odds ratios (OR) and adjusted odds ratios (AOR) with 95% confidence intervals (CI) and p-values are reported. Variables not asked in all years (current smoker, injecting drug use and mental health) are not included in the final multivariable model; these variables were run in separate models controlling for age group and sex only.

Results

Data completeness

From 2011-2013, 4,157 16-29 year olds participated. Among 1,496 males and 2,661 females, 61 (4%) and 73 (3%), respectively, had incomplete data on sexual identity ($p=0.02$) and 159 (11%) and 127 (5%), respectively, had incomplete data on past year sex partners ($p<0.01$). Analysis was limited to 1,305 (87%) males and 2,488 (94%) females with complete data on sexual identity and past year sex partners.

Sample characteristics

Of 3,793 participants with complete data, 66% were female (table 1). The median age was 18.9 years and significantly decreased from 2011-2013 ($p<0.01$); overall, 61% were aged 16-19 years. There were some changes in the socio-demographic profile of participants over recruitment years (table 1), including: change in proportion of participants aged 16-19 years (2011-2013: 56.3%, 65.5%, 61.5%); decrease in participants born in Australia (92.4%, 92.9%, 86.8%); variability in participants with higher education (45.0%, 40.5%, 45.6%); and decrease in participants reporting \$120 or more per week available for recreational spending (30.5%, 21.7%, 19.4%).

Sexual identity and sexual behaviour

Sexual identity

Overall, 381 (10%) young people reported a GLBQQ identity, which did not change from 2011-2013 ($p= 0.96$) (table 1).

Among 1,305 males, 115 (9%) reported a GLBQQ identity, of which 43 (37%) identified as homosexual/gay, 38 (33%) identified as bisexual, eight (7%) identified as queer, and 25 (22%) identified as questioning.

Among 2488 females, 266 (11%) reported a GLBQQ identity, of which 29 (11%) identified as homosexual/gay/lesbian, 153 (58%) identified as bisexual, 13 (5%) identified as queer, and 70 (26%) identified as questioning (table 2).

Sexual behaviour

Overall, 1,057 (81%) males and 1,851 (74%) females reported ever having sex, which when controlling for age, did not significantly change across waves of data collection (females: $p=0.09$, males: $p=0.49$) (table 1).

Among males reporting ever having sex, 919 (87%) reported only opposite-sex partners, 35 (3%) reported only same-sex partners, 58 (6%) reported both sex partners, and 45 (4%) reported no sex partners in the past year (table 2).

Among females reporting ever having sex, 1642 (89%) reported only opposite-sex partners, 31 (2%) reported only same-sex partners, 100 (5%) reported both sex partners, and 78 (4%) reported no sex partners in the past year (table 2).

Sexual identity and behaviour

Among GLBQQ-identifying participants, 26 (23%) males and 27 (10%) females reported only same-sex partners; 30 (26%) males and 127 (48%) females reported only opposite-sex partners; 39 (34%) males and 58 (22%) females reported both sex partners; 6 (5%) males and 8 (3%) females reported no sex partners in the past year, and 14 (12%) males and 46 (17%) females reported never having sex.

An additional 28 males and 46 females reported any same-sex partners in the past year but identified as heterosexual. Overall, 143 (11%) males and 312 (13%) females reported a GLBQQ identity and/or any same-sex partners in the past year ($p=0.15$).

Risk behaviour by sexual identity

At a univariable level, factors significantly associated with a GLBQQ identity were: consuming alcohol twice weekly or more; consuming six or more drinks at a time at least weekly; frequent alcohol-related memory loss; ever experiencing alcohol-related injury; ever consuming 11 or more drinks at a time in the past year; current smoker; ever using drugs and recent drug use; ever testing for STIs and tested within the past year; discussing sex with GP in past year; young or unknown age at first sex; 11 or more lifetime sex partners, multiple sex partners in the past year, reporting mental health problems, and rating mental health as fair or poor (table 3).

At a multivariable level, factors significantly associated with a GLBQQ identity were: female sex (AOR 1.4, 95% CI 1.1-1.9, $p=0.01$); aged 16-19 (AOR 1.3, 95%CI 1.0-1.8, $p=0.02$) compared to 20-29 years; current smoker (AOR 2.1, 95%CI 1.6-2.8, $p<0.01$); recent drug use (AOR 1.7, 95%CI 1.3-2.2, $p<0.01$); ever injected drugs (AOR 5.7, 95%CI 3.3-9.7, $p<0.01$); tested for STIs more than 12 months ago (AOR 1.9, 95%CI 1.3-2.8, $p=0.01$) or tested for STIs within the past year (AOR 1.9, 95%CI 1.4-2.6, $p<0.01$);

young age at first sex (AOR 1.8, 95%CI 1.3-2.3, $p < 0.01$) or unknown age at first sex (AOR 2.8, 95%CI 1.6-4.7, $p < 0.01$); 11 or more lifetime sex partners (AOR 1.5, 95%CI 1.1-2.0, $p = 0.02$); multiple sex partners in the past year (AOR 1.9, 95%CI 1.5-2.5); reports mental health problems in the past six months (AOR 2.7, 95%CI 1.8-4.1, $p < 0.01$); and rating mental health as fair or poor (AOR 3.0, 95%CI 1.9-4.6, $p < 0.01$)(table 3).

Discussion

In a large sample of young people attending a music festival, we found that 10% of young people reported a GLBQQ identity, which is consistent with other Australian studies from representative samples (Grulich et al., 2003; Hillier et al., 1996; Smith et al., 2009; Smith et al., 1999). Accounting for either identity or behaviour, this percentage increased to 12%.

Concordance between sexual identity and reported sexual partners in the past year varied. Over forty percent of GLBQQ-identifying young people reported only opposite-sex partners in the past year, and an additional 19% reported no sex partners. Conversely, a small ($n = 74$, 2.2%) group of young people identified as heterosexual but reported same-sex partners in the past year. Females with a GLBQQ identity were more likely than males to report only opposite-sex partners. However, this may be due to our assessment of only anal and vaginal sex, and not other sexual contact, and is a limitation of the study. Questioning identity was reported by one-quarter of those with a GLBQQ identity, and may further explain the incongruence between identity and behaviour. Discordance between sexual identity and behaviour may be due to delays in integrating behaviour and identity (Robin et al., 2002), experimentation (Garofalo et al., 1998) or social pressure to hide identity or suppress attraction and behaviour (Goodenow et al., 2002; Leonard et al., 2012; Robin et al., 2002). Given the discrepancies between sexual identity and same-sex behaviour, future research should include more than one measure of sexual orientation in health surveys (Saewyc et al., 2004). From a program perspective, when developing education, outreach, and support activities aimed at reducing risk amongst GLBQQ youth, it is important not to neglect young people who do not identify as GLBQQ; similarly, young people with a GLBQQ identity should have access to programs regardless if they are currently sexually active or having sex with same-sex partners.

Illicit drug use, sexual risk-taking behaviours and mental health problems were markedly more common among GLBQQ-identifying participants than heterosexual-identifying participants and correlated with GLBQQ identity. Some previous studies propose that health and risk disparities between heterosexual and GLBQQ identifying or behaving young people are due to *minority stress* – that is, that the stigma, discrimination, and violence experienced by GLBQQ identifying or behaving young people leads to stress, thus predisposing illness, disease and potentially substance use - which may be used to relieve or escape stress (Hershberger SL & AR, 1995; Hillier et al., 2003; Leonard et al., 2012; Marshal et al., 2008; Meyer, 2003). Alternatively, in the case of high substance use, differences may be related to the environment of venues often used by GLBQQ to socialise (Lea, Reynolds, & de Wit, 2013a; Russell, Franz, & Driscoll, 2001), the normalisation of recreational drug use within certain communities and peer influence (Hillier et al., 2003), or disposition to risk-taking (Robin et al., 2002). Research suggests that some sub-groups, such as youth with bisexual behaviour, may have greater exposure to risks and harm (e.g. Marshal et al., 2008). While we were unable to adequately assess associations between subgroups of youth with GLBQQ identity or behaviour and risk behaviour and harm, future research should avoid dichotomising sexual

orientation and behaviour and consider subgroups of GLBQQ separately, within the means of the study scope.

The illustrated differences between GLBQQ- and heterosexual-identifying young people are not the only cause for concern; the absolute prevalence of risk behaviours should also be considered, with directly implications on wellbeing, morbidity, and other risk taking behaviours. Over forty per cent of GLBQQ-identifying young people reported recent drug use and nearly ten per cent reported ever injecting drugs. Implications of drug use in young people may include reduced educational achievement, dependence, increased risk of mental health and psychological problems, other illicit drug use, overdose, and in the case of injecting drug use, infection with blood-borne viruses (Degenhardt et al., 2013; Loxley, Toumbourou, & Stockwell, 2004; Macleod et al., 2004). Although we did not identify an association between harmful alcohol consumption and sexual identity when controlling for other behaviours, frequent and excessive alcohol consumption was commonly reported by young people, with relatively higher rates in GLBQQ-identifying participants, and has direct effects on both alcohol-related morbidity and mortality (Rehm et al., 2009) as well as potentially influencing sexual risk practices (Connor, Gray, & Kypri, 2010; Standerwick, Davies, Tucker, Sheron, & Sheron, 2007). Health promotion, education and structural interventions are needed to reduce the harm related to these risk behaviours. As previously noted by Smith et al. (1999), health promotion initiatives targeting drug and alcohol use in young people should account for the overrepresentation of GLBQQ youth in their target audience and accordingly not presume heterosexuality in the language or imagery used.

Sexual behaviours posing increased risk of STI acquisition were commonly reported by young people. Report of consistent condom use was low in both GLBQQ- and heterosexual identifying young people, while young age at first sex, high number of lifetime partners, and multiple sex partners in the past year were associated with GLBQQ identity. While a higher proportion of participants with same-sex and both sex partners reported a recent STI test compared to their heterosexual peers, which could suggest some recognition of higher risk, the overall proportion being tested was still low. Greater effort is needed to encourage and facilitate testing among young people in general, as well as targeting higher risk sub-groups. Given that adolescence corresponds with the onset of sexual activity and the formation of sexual identity for most young people, it is important that both during and prior to this time, the school environment and sex education is made to be safe, supportive, relevant and informative to young people with GLBQQ attraction or behaviour (Hillier, Harrison, & Dempsey, 1999; Hillier et al., 2010; Hillier & Mitchell, 2008; Jones & Hillier, 2012). Current efforts to develop standardised sex education through an Australian national Health and Physical Education syllabus have been criticised for neglecting sexual health and not including minimum content for teaching students of all ages on sexuality, sexual and gender identity, relationships and homophobia (Australian Curriculum Assessment and Reporting Authority (ACARA), 2012; Family Planning Victoria, 2013).

This study has a number of limitations. Firstly, the results are based on a convenience-sample and may not be representative of young people in Australia. While rates of reporting GLBQQ identity were comparable to previous studies (Grulich et al., 2003; Hillier et al., 1996; Smith et al., 2009; Smith et al., 1999), we have previously shown that participants of the BDO survey report higher alcohol, drug and sexual risk behaviours than in the general population (Lim et al., 2010)(Lim, Bowring, Gold, Aitken, & Hellard, 2012). Secondly, due to cross-sectional design we cannot

determine causation between sexual identity and risk. Thirdly, questions on past year sex partners only ascertained penetrative anal and vaginal sex partners. The discount of other forms of sexual contact has likely underestimated the proportion of young people with same-sex partner experience, and may account for discrepancies between GLBQQ identity and sexual behaviour. Because of this, we did not include analysis of associations between same-sex sex partners and risk behaviours. Fourthly, data were self-reported and questionnaires were completed in a relatively public environment; social-desirability bias may have led to under- or over-reporting. Fifthly, participant numbers do not represent unique individuals, which may undermine assumptions of independence in analysis; no identifying information was collected, so we could not identify individuals who repeated the survey in subsequent years. In 2012 and 2013, 81 (6%) and 124 (9%) reported having ever completed a BDO survey before, respectively, although this may refer to a survey year prior to the years included in this analysis. Finally, a number of risk behaviours were not asked about every year, and in order to preserve number of observations, these variables could not be included in the final multivariable model. The omission of these variables may have affected associations between sexual identity and risk.

In conclusion, we found that drug use, sexual risk behaviours, and mental health problems are associated with GLBQQ identity in young people. Discordance between identity and behaviour and questioning identity were relatively common. Targeted interventions, school programs and educational campaigns aimed at promoting health, wellbeing and reducing risk in young people should be inclusive and account for the complexities of identity, attraction, and behaviour.

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Authors contributions

The following co-authors have contributed to the work: AB in data collection, data analysis, manuscript preparation and manuscript review; AV in data collection, data analysis and manuscript review; LD in study design and manuscript review; MH in study design and manuscript review; MSCL in data collection, study design and manuscript review.

Table 1 Sample description by year of survey

	2011		2012		2013		p-value ⁶
	n	%	n	%	n	%	
TOTAL	1,286		1,173		1,334		
Sex							0.26
Male	473	36.8	384	32.7	448	33.6	
Female	813	63.2	789	67.3	886	66.4	
Median age (IQR)	19.3	(17.7-22.4)	18.6	(17.3-21.2)	19 ¹	(17-21)	<0.01
16-19 years	724	56.3	768	65.5	821	61.5	
20-29 years	562	43.7	405	34.5	513	38.5	
Born in Australia							<0.01
No	98	7.6	83	7.1	176	13.2	
Yes	1,187	92.4	1,089	92.9	1,156	86.8	
Area of residence ²							0.13
Non-major city	381	30.7	388	34.1	371	29.0	
Major city	859	69.3	750	65.9	908	71.0	
Higher education ³							<0.01
No	698	55.0	694	59.5	724	54.4	
Yes	572	45.0	472	40.5	606	45.6	
Lives with parent/s							<0.01
No	410	32.4	286	24.9	417	31.3	
Yes	857	67.6	862	75.1	917	68.7	
Lives with partner							<0.01
No	1,128	89.1	1,069	93.1	1,179	88.4	
Yes	138	10.9	79	6.9	155	11.6	
Recreational income ⁴							<0.01
<\$120 per week	874	69.5	458	78.3	1,068	80.6	
≥\$120 per week	383	30.5	127	21.7	257	19.4	
Ever had sex							0.07
No	215	16.7	350	29.8	319	23.9	
Yes	1,070	83.3	823	70.2	1,015	76.1	
Sexual identity							0.96
Heterosexual identity	1,158	90.1	1,056	90.0	1,198	89.8	
GLBQQ identity ⁵	128	10.0	117	10.0	136	10.2	

¹In 2013, only month and year of birth were collected, so calculation of exact age was not possible.

²*Area of residence* classified from Australian postcodes of residence using the Australian Standard Geographical Classification (ASGC)

³*Higher education* defined as having completed or in process of completing any post-high school education

⁴*Recreational income* defined as amount of money available to spend on self for recreational purposes in a normal week. Only asked in half of surveys in 2012.

⁵*GLBQQ identity* defined as self-identifying as gay, homosexual, lesbian, bisexual, queer, or questioning

⁶p-value for change over recruitment year controlling for age and sex.

Table 2 Sexual identity and sexual behaviour by sex, reported overall for 2011-2013

	Male		Female		p-value ¹
	n	%	n	%	
TOTAL	1,305		2,488		
Sexual identity					
Heterosexual identity	1,190	91.2	2,222	89.3	0.07
GLBQQ identity	115	8.8	266	10.7	
Homosexual/gay/lesbian	43	37.4	29	10.9	<0.01
Bisexual	38	33.0	153	57.5	
Questioning	25	21.7	70	26.3	
Queer	8	7.0	13	4.9	
Sexual behaviour					
Never had sex	247	18.9	637	25.6	<0.01
Ever had sex	1,057	81.1	1,851	74.4	
Opposite-sex partners only	919	86.9	1,642	88.7	0.04
Same-sex partners only	35	3.3	31	1.7	
Both sex partners	58	5.5	100	5.4	
No sex partners	45	4.3	78	4.2	

¹ p-values shown from chi-square tests of proportion comparing prevalence estimates between males and females.

Table 3 Univariable and multivariable logistic regression assessing associations with GLBQQ identity.

	Sexual Identity				OR	Univariable		AOR	Multivariable ¹⁸	
	Heterosexual identity		GLBQQ identity			(95% CI)	p-value		(95% CI)	p-value
	n	%	n	%						
Sex										
Male	1190	91.2	115	8.8	1.0			1.0		
Female	2222	89.3	266	10.7	1.2	(1.0-1.6)	0.07	1.4	(1.1-1.9)	0.01
Age group										
20-29	1338	90.4	142	9.6	1.0			1.0		
16-19	2074	89.7	239	10.3	1.1	(0.9-1.4)	0.46	1.3	(1.0-1.8)	0.04
Born in Australia										
Yes	3089	90.0	343	10.0	1.0					
No	319	89.4	38	10.6	1.1	(0.8-1.5)	0.70			
Area of residence ¹										
Non-major city	1038	91.1	102	9.0	1.0					
Major city	2251	89.4	266	10.6	1.2	(0.9-1.5)	0.13			
Unknown	123	90.4	13	9.6	1.1	(0.6-2.0)	0.81			
Higher education ²										
Yes	1498	90.8	152	9.2	1.0					
No	1893	89.5	223	10.5	1.2	(0.9-1.4)	0.18			
Lives with parent/s										
No	997	89.6	116	10.4	1.0					
Yes	2379	90.3	257	9.8	0.9	(0.7-1.2)	0.53			
Lives with partner										
No	3041	90.1	335	9.9	1.0					
Yes	334	89.8	38	10.2	1.0	(0.7-1.5)	0.86			
Recreational income ³										
<\$120 per week	2172	90.5	228	9.5	1.0					
≥\$120 per week	682	88.9	85	11.1	1.2	(0.9-1.5)	0.20			

Frequency of alcohol consumption ⁴										
One per week or less	2211	91.0	218	9.0	1.0			1.0		
Twice weekly or more	1144	88.0	156	12.0	1.4	(1.1-1.7)	<0.01	1.0	(0.7-1.3)	0.73
Unknown	57	89.1	7	10.9	1.2	(0.6-2.8)	0.59	0.8	(0.3-2.7)	0.77
Consumes 6 or more drinks at a time weekly ⁴										
No	2609	91.1	256	8.9	1.0			1.0		
Yes	723	86.3	115	13.7	1.6	(1.3-2.1)	<0.01	1.0	(0.8-1.4)	0.83
Unknown	80	88.9	10	11.1	1.3	(0.7-2.5)	0.48	0.8	(0.3-1.9)	0.57
Highest number of drinks consumed ⁴										
Less than 11 at time	1559	91.6	143	8.4	1.0			1.0		
11 or more at a time	1678	88.7	213	11.3	1.4	(1.1-1.7)	<0.01	1.1	(0.8-1.4)	0.66
Unknown	175	87.5	25	12.5	1.6	(1.0-2.4)	0.06	1.2	(0.7-2.0)	0.48
Frequent alcohol-related memory loss ^{4,5}										
No	2799	90.9	280	9.1	1.0			1.0		
Yes	572	85.8	95	14.2	1.7	(1.3-2.1)	<0.01	1.2	(0.9-1.6)	0.21
Unknown	41	87.2	6	12.8	1.5	(0.6-3.5)	0.39	1.4	(0.4-5.4)	0.62
Ever experienced or caused alcohol-related injury										
No	2247	91.0	223	9.0	1.0			1.0		
Yes	1126	88.2	150	11.8	1.3	(1.1-1.7)	0.01	1.0	(0.8-1.3)	0.95
Unknown	39	83.0	8	17.0	2.1	(1.0-4.5)	0.07	1.9	(0.7-5.6)	0.23
Current smoker ^{6,7,17}										
No	1694	92.1	145	7.88	1.0			1.0		
Yes	595	84.8	107	15	2.1	(1.6-2.7)	<0.01	2.1	(1.6-2.8)	<0.01
Illicit drug use ⁸										
Never	1846	92.6	147	7.4	1.0			1.0		
Yes, but not in past month	600	89.8	68	10.2	1.4	(1.1-1.9)	0.02	1.3	(0.9-1.7)	0.18
Recent drug use	905	85.2	157	14.8	2.2	(1.7-2.8)	<0.01	1.7	(1.3-2.2)	<0.01
unknown	61	87.1	9	12.9	1.9	(0.9-3.8)	0.09	1.3	(0.6-2.8)	0.53
Ever injected drugs ^{9,17}										
No	2147	90.7	219	9.3	1.0			1.0		

Yes	42	64.6	23	35.4	5.4	(3.2-9.1)	<0.01	5.7	(3.3-9.7)	<0.01
STI testing history										
Never tested	2488	92.4	206	7.7	1.0			1.0		
Tested more than 12 months ago	264	86.6	41	13.4	1.9	(1.3-2.7)	<0.01	1.9	(1.3-2.8)	<0.01
Tested within past year	644	83.2	130	16.8	2.4	(1.9-3.1)	<0.01	1.9	(1.4-2.6)	<0.01
Discussed sex with GP in past year										
No	2084	91.8	187	8.2	1.0			1.0		
Yes	1234	87.6	175	12.4	1.6	(1.3-2.0)	<0.01	1.0	(0.8-1.4)	0.75
Unknown	94	83.2	19	16.8	2.3	(1.3-3.8)	<0.01	1.6	(0.9-2.8)	0.10
All knowledge questions correct ¹⁰										
No	3093	90.0	343	10.0	1.0			1.0		
Yes	319	89.4	38	10.6	1.1	(0.8-1.5)	0.69	0.9	(0.6-1.4)	0.74
Age at first sex										
≥16 years ¹¹	2629	92.4	215	7.6	1.0			1.0		
<16 years	699	83.2	141	16.8	2.5	(2.0-3.1)	<0.01	1.8	(1.3-2.3)	<0.01
Unknown	83	76.9	25	23.2	3.7	(2.3-5.9)	<0.01	2.8	(1.6-4.7)	<0.01
Lifetime sex partners ¹²										
Less than 11	2946	91.6	272	8.5	1.0			1.0		
11 or more	426	80.7	102	19.3	2.6	(2.0-3.3)	<0.01	1.5	(1.1-2.0)	0.02
Unknown	40	85.1	7	14.9	1.9	(0.8-4.3)	0.12	1.2	(0.5-3.0)	0.63
Multiple sex partners in past year ¹²										
No	1585	92.6	126	7.4	1.0			1.0		
Yes	1003	83.7	195	16.3	2.4	(1.9-3.1)	<0.01	1.9	(1.5-2.5)	<0.01
Yet to experience sex	824	93.2	60	6.8	0.9	(0.7-1.3)	0.59	0.9	(0.5-1.6)	0.71
Consistent condom use ¹³										
Inconsistent condom use	1451	89.51	170	10.5	1.0			1.0		
Consistent condom use	846	88.22	113	11.8	1.1	(0.9-1.5)	0.31	1.7	(1.3-2.2)	<0.01
No sex partners in past year	962	92.15	82	7.9	0.7	(0.6-1.0)	0.02	2.1	(1.3-3.5)	0.01
Unknown	153	90.53	16	9.5	0.9		0.68	1.1	(0.6-1.9)	0.77
Mental health problems ^{14,15,17}										

No	831	92.3	69	7.7	1.0			1.0		
Yes	201	81.7	45	18.3	2.7	(1.8-4.0)	<0.01	2.7	(1.8-4.1)	<0.01
Mental health rating ^{15,16,17}										
At least good	884	92.1	76	7.9	1.0			1.0		
Fair, poor	143	79.4	37	20.6	3.0	(2.0-4.6)	<0.01	3.0	(1.9-4.6)	<0.01

¹Area of residence classified from Australian postcodes of residence using the Australian Standard Geographical Classification (ASGC)

²Higher education defined as having completed or in process of completing any post-high school education

³Recreational income was defined as the amount of money available to spend on self for recreational purposes in a normal week and grouped as <\$120 and ≥\$120 (AUD). Only asked in half of surveys in 2012.

⁴Based on alcohol consumption in the previous 12 months

⁵Frequent alcohol-related memory loss was defined as experiencing alcohol-related memory loss at least monthly during the past 12 months

⁶Current smoker defined as reporting currently smoking daily, weekly or less than weekly

⁷Question only asked in half of surveys in 2012-2013

⁸Illicit drug use refers to using illegal drugs and prescription drugs if taken not as directed, or prescribed to someone else. Recent drug use refers to drug use in the past month

⁹Question not asked in 2013

¹⁰Sexual health knowledge based on six true or false statements regarding sexually transmitted infections (STIs)

¹¹Age at first sex ≥16 years includes participants yet to experience sex

¹²Sex partners refers to anal or vaginal sex partners

¹³Consistent condom use was defined as reporting always using condoms with regular, casual, and new partners in the past 12 months

¹⁴Mental health problems defined as self-reporting any mental health problems in the past six months

¹⁵Question not asked in 2011 and only asked in half of surveys 2012-2013

¹⁶Mental health rating based on self-rating of mental health

¹⁷Variables not asked in all years are not included in the final multivariable model. AOR are controlled for gender and age group only.

¹⁸Hosmer-Lemeshow goodness-of-fit test, p=0.69, 3772 observations

GLBQQ: gay/lesbian/bisexual/queer/questioning; OR: odds ratio; AOR: adjusted odds ratio; GP: general practitioner

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