

Sexually transmissible infections (STI) and HIV testing and diagnosis among Aboriginal and non-Aboriginal adolescents in contact with the Australian justice system: a cross-sectional study

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ABSTRACT

Background. It is unclear what factors are associated with sexually transmissible infections (STI) and HIV testing and diagnosis among justice-involved adolescents, and if these differ for Aboriginal or Torres Strait Islander peoples. **Methods.** A cross-sectional survey of 465 justice-involved adolescents (aged 14–17 years) from Australia was conducted between 2016 and 2018. Participants were asked about sexual behaviours, STI/HIV knowledge, and prior STI diagnoses and testing. **Results.** Approximately 38% ($n = 130$) of those sexually active had ever been screened for STI/HIV and 17.8% ($n = 23$) had been diagnosed with an STI. No participant reported living with HIV. For Aboriginal participants, being male (aOR 3.6, 95% CI 1.3–10.1) and having under three sexual partners in the past 12 months (aOR 3.1, 95% CI 1.2–8.0) was associated with never having had an STI/HIV test. For non-Aboriginal participants, being male (aOR 2.7, 95% CI 1.2–5.7), single (aOR 2.4, 95% CI 1.2–4.9), attending school (aOR 2.4, 95% CI 1.1–5.1), not having sought sexual health information (aOR 2.8, 95% CI 1.4–5.8), and having a lower STI/HIV knowledge score (aOR 2.3, 95% CI 1.1–5.0) were associated with never having had an STI/HIV test. Factors associated with STI diagnosis were non-heterosexual sexual orientation (aOR 5.6, 95% CI 1.1–28.2), transactional sex (aOR 11.2, 95% CI 3.0–41.3), and having sought sexual health information (aOR 3.5, 95% CI 1.0–12.5). **Conclusions.** Males, particularly Aboriginal male adolescents, should be engaged with sexual health promotion and testing services as soon as they come into contact with the justice system. Approaches should consider different cultural, gender and sexual orientations.

Keywords: Aboriginal, adolescents, Australia, justice-involved, sexual behaviours, sexual health, sexually transmissible infections, STI diagnosis, STI/HIV testing.

Introduction

Young people, those in custodial settings, and Aboriginal and Torres Strait Islander peoples (First Nations people, respectfully hereafter Aboriginal peoples) are recognised as priority populations in Australian national sexually transmissible infections (STI)¹ and HIV² strategies, with prevention and increasing testing rates identified as priority areas for action.^{1,2}

These groups are often-intersecting as Aboriginal peoples are substantially over-represented in the Australian juvenile detention population. One half (50%) of the young people in detention on an average night in the 2021 June quarter were Aboriginal, yet only 6% of the Australian population aged 10–17 years are Aboriginal.³ This is due to a wide range of complex factors linked to colonisation, including social and economic disadvantage, targeted police practices, and increased likelihood of conviction.⁴

Detained young people have poorer health than their community counterparts and this includes sexual health. A global scoping review found that the detained youth population had a younger age of sexual debut, were less consistent in using contraception or condoms and had a higher prevalence of sharing injecting equipment compared to their community counterparts, resulting in an increased prevalence of STIs.⁵ However, despite these risk behaviours, HIV diagnosis among detained youth was low in high-income countries.⁵

In Australia, the number of HIV diagnoses has been declining in recent years and is lower for young people compared to those aged 30 years and over.⁶ However, young people in Australia, aged 15–19 years, have higher STI notification rates per 100 000 population compared to the overall community (in the year 2021, these were 926.2 vs 362.7 for chlamydia and 136 vs 109.4 for gonorrhoea).⁶ While infectious syphilis rates have remained lower for the 15–19-year-old group compared to the overall population, these rates have been increasing in the past 10 years (17 per 100 000 population in 2021 compared to 1.4 in 2012 with a peak of 18.7 in 2019).⁶

Community surveys of adolescents in Australia indicated that 4.1% of school students in Years 10, 11 and 12 (normally aged between 15 and 18 years) had ever been tested for HIV (with no robust data on how many had ever been tested for STIs) and among those sexually active, 2.3% had ever been diagnosed with an STI.⁷ Over half (51%) of young Aboriginal Australians aged between 16 and 19 years reported being tested for STIs and among these, 15% had ever been diagnosed with an STI.⁸

Although there is literature on STI testing among young people in the wider community,^{7,9} including Aboriginal young peoples,^{8,10,11} in Australia and internationally, few studies have examined the sexual health of justice-involved adolescents. Justice-involved populations are typically under-represented in, or excluded from, mainstream community health surveys, particularly those based on household sampling methods. Additionally, previous studies on this population have mostly focused on sexual risk behaviours^{12–14} and/or estimating STI and HIV rates,^{15–20} and rarely examined factors associated with STI/HIV testing or diagnosis.

To address this gap, we analysed data from the first Australian survey on the sexual and reproductive health needs of justice-involved adolescents to examine factors associated with not getting STI/HIV tested and a prior STI diagnosis. In this study, the term justice-involved refers to those who had come into contact with the police or the courts and were living in the community at the time of the survey. By examining these factors this study can contribute to understanding need for Aboriginal and non-Aboriginal adolescents, and to connecting and tailoring STI prevention education and services to this priority population.

Materials and methods

Design

The Juvenile Offender Sexual Health Survey is a cross-sectional survey, using a non-random sampling strategy. The survey took place between June 2016 and August 2018 in Queensland (Qld) and Western Australia (WA).

Participants

Justice-involved adolescents, 14–17 years old from Qld and WA, and living in the community were recruited to participate in the study in one of two ways: (1) referral by program coordinators from community-based organisations and youth drop in centres, referral by project coordinators of drug and alcohol services operated by the Western Australia Department of Health or referral by administrators, principals and teachers of independent or flexi-learning schools or colleges: institutions that aim to re-engage young people who had been out of the formal school system (397 participants were recruited using this approach); or (2) by recruiting young people outside of Magistrates' Court in Qld and from the Children's Court in WA (68 participants were recruited using this approach). As part of the recruitment process, flyers were put up in waiting rooms in youth centres and flexi-schools and presentations about the project were delivered to staff and adolescents. All participants, excluding those recruited from the Children's Court in WA, were given AUD\$50 in cash or as a gift card upon completion of the survey as reimbursement for their time.

Survey instrument

A computer assisted telephone interview was used by a trained interviewer. The survey collected information on socio-demographics, history of contact with the justice system, mental health history, reproductive health, sexual health, knowledge of HIV, STI and hepatitis, human papillomavirus (HPV) vaccination, alcohol and drug use and tobacco smoking.

At the end of the survey, participants were given exit interviews to ensure they had not been negatively affected by the questions. Referrals for mental health or sexual health services were given as needed/requested (for more details about the debrief process, see the Changing Direction report).²¹

Outcome variables

The two outcome variables – STI/HIV testing and STI/HIV diagnosis – were measured by asking participants whether they had ever had an STI/HIV test or had ever been diagnosed with an STI or HIV. Response options for these questions were 'yes, in the last year', 'yes, more than a year

ago', 'no' and 'prefer not to say'. Those who indicated the latter were excluded from analyses. The first two response options were combined to indicate whether someone ever had an STI/HIV test or had ever been diagnosed. Lifelong testing and diagnosis were chosen as outcome variables over testing and diagnosis in the past year due to the young age of the population involved in this study (14–17 years old). For those who reported being diagnosed with STI/HIV, a follow-up question allowed them to choose which infections they had been diagnosed with among chlamydia, gonorrhoea, syphilis, trichomoniasis, herpes, HPV, HIV/AIDS and/or other.

Covariates and explanatory variables

Covariates included: gender (male/female), age (in years or in months, specified in the analysis), Aboriginal status (Aboriginal/non-Aboriginal), Accessibility/Remoteness Index of Australia (ARIA – city and major regional centre/regional centres and other regional areas),^A ever been in juvenile detention (yes/no), current legal status (on a sentence or order/not on a sentence or order), currently attending school (yes/no), sexual orientation (heterosexual/non-heterosexual), relationship status (single/in a relationship) and ever had sex (yes/no).

The explanatory variables included: age when first had sex (under 14/14 years and over), number of sexual partners in the past 12 months (under three/three and over), condom use in the past 12 months (all of the time/not all of the time), drunk or high last time had sex (yes/no), unwanted sex last time had sex (yes/no), had transactional sex for drugs or money (yes/no), worked as a sex worker (yes/no), used the internet to look for potential sexual partners (yes/no), met face-to-face with potential sexual partner that you first met on the internet (yes/no), sought sexual information from a person, service or agency (yes/no), sought sexual information from internet (yes/no), STI/HIV knowledge score (higher score nine points and above/lower score eight points and below – 12 true/false statements, each correct answer was assigned a point), used any drugs (yes/no), injected any drugs (yes/no) and current alcohol use disorder (yes/no – using the Mini International Neuropsychiatric Interview for children and adolescents).²²

A more detailed explanation of the recoding of these variables is included in the supplementary material.

Statistical analysis

Categorical data are presented as frequencies and proportions, and continuous data as medians, unless recoded dichotomously. Categorical data stratified by Aboriginal status are presented with the chi-squared or Fisher's exact

test significance values (if more than 20% of cells had expected counts of less than 5). To compare medians stratified by Aboriginal status, the K samples median test was used.

To identify factors associated with never tested for STI/HIV and STI/HIV diagnosis, separate univariate and multivariate logistic regression models were conducted. Analysis of factors associated with never having had an STI/HIV test was restricted to participants who had had sex.

After conducting univariate logistic regressions (Tables A and B in the Supplementary material), variables with a significance level lower than or equal to 0.2 ($P \leq 0.2$) were entered into the multivariate logistic regression models. In addition, key demographic variables such as gender, age, Aboriginal status and ARIA were also included and kept in the multivariate regression models regardless of the significance level. Backwards stepwise logistic regression with a threshold of statistical significance of 0.05 was then used to arrive at the best models for predicting never having had an STI/HIV test and STI/HIV diagnosis.

The final models present the adjusted odds ratios (aOR), the 95% confidence interval (95% CI) and corresponding *P*-values.

Separate multivariate analyses for Aboriginal and non-Aboriginal samples were performed for never had an STI/HIV test. The same could not be done for the STI/HIV diagnosis model as the number of events was too small.

Data analyses were conducted in IBM SPSS Statistics 26.

Ethics approval and consent

Research ethics approval was sought and given for participants to be treated as mature minors.²³ Nevertheless, prospective participants were asked by recruiters if they could contact their parents/guardians for permission to allow them to participate in the survey. Most participants refused this request preferring to give consent themselves. Recruiters were required to administer a Gillick Competency checklist to ensure that all respondents met the criteria of a mature minor.²⁴ This manner of obtaining consent has been used in other studies.^{25,26}

Approval for the study was obtained from the University of New South Wales Sydney Human Research Ethics Committee (HC13308), the Western Australia Aboriginal Health Ethics Committee (WAAHEC 625), and Curtin University (HRE0133). Permission was also granted in Western Australia by the North Metropolitan Health Service Mental Health Research Ethics Committee (22_2016), the North Metropolitan and East Metropolitan Health Services' Research Governance, and the Department of the Justice Research Application Advisory Committee (ref 2016/02161).

^AThe 'city and major regional centre' category includes Brisbane, Perth, the Gold Coast and the Sunshine Coast. The 'regional centres and other regional areas' category includes all other locations in Queensland and Western Australia.

Results

Participant characteristics (Table 1)

Overall, 463 participants were included in the analysis. The majority (63.1%) were male, and the median age was 16 years (IQR 15–16). Aboriginal participants represented approximately 44% ($n = 202$) of the sample. Most (91.2%) identified as heterosexual, followed by bisexual (6.2%) and gay/lesbian/queer/unsure (2.6%). Almost one in three (28.1%) indicated that they had been in juvenile detention and over one third (36.2%) said that at the time of the survey, they were on a sentence or order. Nearly two thirds (63.3%) reported that they were attending school.

Approximately three quarters ($n = 346$) of participants indicated that they had had sex. Among those, 41.0% ($n = 142$) had sex for the first time before turning 14 years old. The median number of sexual partners in the past 12 months was two (IQR 1–4) and 42.2% of participants said they had always used a condom in those past 12 months. Among those who had sex, there was a high degree of concordance between self-reported heterosexuality and the gender of their sexual partners in the past 12 months (99% of heterosexual males and 98% of heterosexual females only had sex with partners of the opposite sex). The last time they had sex, 38.8% reported being high or drunk at the time and 8.5% said it was unwanted. Just under one third (30.3%) of participants had sought sexual health information with just over one in 10 (12.6%) through online sources. Almost one quarter (22.5%) received a higher STI/HIV knowledge score. Most participants (80.8%) used drugs, 7.3% had injected drugs, and just under half (43.2%) were assessed as having a current alcohol use disorder. Over one third ($n = 130$) of the sexually active participants had ever been screened and 17.8% ($n = 23$) of these said they had been diagnosed with an STI. No participant reported being diagnosed with HIV.

Aboriginal participants were more likely than non-Aboriginal participants to be younger (median age 15 years vs 16 years; $P = 0.002$) and live in a regional centre or other regional area (31% vs 15.9%; $P < 0.001$). Aboriginal participants were more likely to be single (74.3% vs 64.6%; $P = 0.026$) and to have always worn a condom in the past 12 months (52.5% vs 36.1%; $P = 0.004$) compared to non-Aboriginal participants. However, they were less likely to have had sex (66.2% vs 83.7%; $P < 0.001$), had transactional sex (2.3% vs 9.0%; $P = 0.014$), used the internet to look for sexual health information (7.6% vs 16.5%; $P = 0.005$), and have a higher STI/HIV knowledge score (15.3% vs 28.1%; $P = 0.001$). Non-Aboriginal participants were more likely to have used drugs (85.1% vs 75.2%; $P = 0.008$), have injected drugs (10.0% vs 4.0%; $P = 0.014$) and to have an alcohol use disorder (51.4% vs 32.5%; $P < 0.001$) compared to their Aboriginal counterparts.

Factors associated with never having had an STI/HIV test (Table 2)

Factors significantly associated with never having had an STI/HIV test for the entire sample included: being male (uOR 1.8, 95%CI 1.2–2.7; aOR 2.8, 95% CI 1.5–5.0), single (uOR 2.7, 95% CI 1.8–4.2; aOR 2.4, 95% CI 1.4–4.3), never having been in juvenile detention (uOR 2.2, 95% CI 1.4–3.5; aOR 2.0, 95% CI 1.1–3.6), attending school (uOR 2.6, 95% CI 1.7–4.0; aOR 2.0, 95% CI 1.1–3.5), having had less than three sexual partners in the past 12 months (uOR 2.1, 95% CI 1.3–3.3; aOR 2.0, 95% CI 1.1–3.4), not engaging in transactional sex (uOR 4.9, 95% CI 1.9–12.8; aOR 4.0, 95% CI 1.3–12.7), never having sought sexual health information (uOR 3.0, 95% CI 2.0–4.7; aOR 2.4, 95% CI 1.4–4.2), and having a lower STI/HIV knowledge score (uOR 3.3, 95% CI 2.1–5.3; aOR 2.3, 95% CI 1.3–4.2). The model for Aboriginal participants saw being male (aOR 3.6, 95% CI 1.3–10.1) and having had less than three sexual partners in the past 12 months (aOR 3.1, 95% CI 1.2–8.0) as the only significant factors retained. The model for the non-Aboriginal sample saw being male (aOR 2.7, 95% CI 1.2–5.7), single (aOR 2.4, 95% CI 1.2–4.9), attending school (aOR 2.4, 95% CI 1.1–5.1), never having sought sexual health information (aOR 2.8, 95% CI 1.4–5.8) and having a lower STI/HIV knowledge score (aOR 2.3, 95% CI 1.1–5.0) significantly associated with never having had an STI/HIV test.

Factors associated with STI diagnosis (Table 3)

As no participant reported ever being diagnosed with HIV, the following model refers to STI diagnosis only. After adjusting for gender, age, Aboriginal status and ARIA, factors significantly associated with an STI diagnosis were non-heterosexual sexual orientation (uOR 3.0, 95% CI 1.0–9.3; aOR 5.6, 95% CI 1.1–28.2), transactional sex for drugs or money (uOR 9.0, 95% CI 2.9–28.0; aOR 11.2, 95% CI 3.0–41.3), and having sought sexual health information online (uOR 2.7, 95% CI 1.0–7.2; aOR 3.5, 95% CI 1.0–12.5).

Discussion

This study aimed to describe the sexual behaviours of a sample of justice-involved adolescents in Australia (WA and Qld), and examine the factors associated with never having been tested for STI/HIV and ever having an STI diagnosis, as self-reported by the participants.

Just over one third (37.9%) of the participants who reported being sexually active had ever been tested for STIs or HIV. Australian guidelines for STI testing recommend that all sexually active young people should be offered STI testing at least annually.²⁷ Even fewer participants (31.2%) indicated they had been tested for STIs or HIV in the year

Table 1. Participant characteristics by Aboriginal status.

	Overall (n = 463)	Aboriginal (n = 202)	Non-Aboriginal (n = 261)	P-value ^A
Gender				
Male	292 (63.1)	124 (61.4)	168 (64.4)	0.510
Female	171 (36.9)	78 (38.6)	93 (35.6)	
Age (years)				
Median (IQR)	16 (15–16)	15 (14–16)	16 (15–17)	0.002
ARIA				
Cities and major regional centres	348 (77.5)	136 (69.0)	212 (84.1)	<0.001
Regional centres and other regional areas	101 (22.5)	61 (31.0)	40 (15.9)	
Juvenile detention				
Ever been	130 (28.1)	54 (26.7)	76 (29.1)	0.571
Current legal status				
On a sentence or order	165 (36.2)	78 (39.2)	87 (33.9)	0.239
School				
Currently attending	293 (63.3)	137 (67.8)	156 (59.8)	0.075
Sexual orientation				
Heterosexual	414 (91.2)	183 (92.9)	231 (89.9)	0.262
Other (homosexual, lesbian, bisexual, queer, unsure/undecided)	40 (8.8)	14 (7.1)	26 (10.1)	
Relationship status				
Single	318 (68.8)	150 (74.3)	168 (64.6)	0.026
In a relationship	144 (31.2)	52 (25.7)	92 (35.4)	
Sex				
Ever had sex	346 (76.0)	131 (66.2)	215 (83.7)	<0.001
Sexual health information				
Sought sexual health information – not from internet	137 (30.3)	52 (26.4)	85 (33.3)	0.112
Sought sexual health information from internet	57 (12.6)	15 (7.6)	42 (16.5)	0.005
STI/HIV knowledge				
Higher score	101 (22.5)	30 (15.3)	71 (28.1)	0.001
Lower score	348 (77.5)	166 (84.7)	182 (71.9)	
Drugs				
Ever used any drugs	374 (80.8)	152 (75.2)	222 (85.1)	0.008
Ever injected any drugs	34 (7.3)	8 (4.0)	26 (10.0)	0.014
Alcohol				
Current alcohol use disorder	196 (43.2)	64 (32.5)	132 (51.4)	<0.001
For those who have had sex	Overall (n = 346)	Aboriginal (n = 131)	Non-Aboriginal (n = 215)	P-value^A
Age when first had sex				
Under 14 years	142 (41.3)	61 (46.9)	81 (37.9)	0.097
14 years and over	202 (58.7)	69 (53.1)	133 (62.1)	
Median (IQR)	14 (13–14)	14 (13–14)	14 (13–15)	0.350
Number of sexual partners in the past 12 months				
Under three	183 (53.4)	72 (55.4)	111 (52.1)	0.556
Three and over	160 (46.6)	58 (44.6)	102 (47.9)	
Median (IQR)	2 (1–4)	2 (1–4)	3 (1–4)	0.623

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Table 1. (Continued).

For those who have had sex	Overall (n = 346)	Aboriginal (n = 131)	Non-Aboriginal (n = 215)	P-value ^A
Gender of sexual partners in the past 12 months				
Heterosexual males	201	73	128	
Female	199 (99)	73 (100)	126 (98)	<0.001
Male	1 (0.5)	0	1 (1)	
Male and female	1 (0.5)	0	1 (1)	
Heterosexual females	88	36	51	
Male	86 (98)	35 (97)	50 (98)	<0.001
Female	1 (1)	1 (3)	0	
Male and female	1 (1)	0	1 (2)	
Condom use in the past 12 months				
All of the time	135 (42.2)	62 (52.5)	73 (36.1)	0.004
Drunk or high last time had sex	128 (38.8)	47 (37.3)	81 (39.7)	0.663
Did not want to have sex last time had sex	28 (8.5)	15 (12.1)	13 (6.4)	0.072
Ever had transactional sex (for drugs or money)	22 (6.5)	3 (2.3)	19 (9.0)	0.014
Ever worked as sex worker	3 (0.9)	1 (0.8)	2 (0.9)	1.000
Used the internet to look for potential sexual partners	41 (12.9)	13 (11.1)	28 (13.9)	0.479
Met face-to-face with a potential sexual partner that you first met on the internet	25 (61.0)	8 (61.5)	17 (60.7)	0.960
STIs/HIV				
Ever tested (STI/HIV)	130 (37.9)	47 (35.9)	83 (39.2)	0.544
In the past year	107 (31.2)	41 (31.3)	66 (31.1)	0.457
Over a year ago	23 (6.7)	6 (4.6)	17 (8.0)	
Ever diagnosed (STI)	23 (17.8)	5 (10.6)	18 (22.0)	0.106

Data presented as numbers and percentage of those who answered each question. Populations do not necessarily add to total due to missing values.

Bold P-value indicates statistical significance ($P \leq 0.05$).

^AP-value used for comparison between Aboriginal and non-Aboriginal samples.

Table 2. Factors associated with never having had an STI/HIV test.

	Overall		Overall		Aboriginal		Non-Aboriginal	
	uOR (95% CI)	P-value	aOR (95% CI)	P-value	aOR (95% CI)	P-value	aOR (95% CI)	P-value
Gender								
Female	Ref		Ref		Ref		Ref	
Male	1.80 (1.19, 2.73)	0.005	2.75 (1.53, 4.96)	0.001	3.63 (1.31, 10.07)	0.013	2.65 (1.23, 5.69)	0.012
Age (in months)	0.95 (0.94, 0.97)	<0.001	0.98 (0.96, 1.00)	0.068	0.98 (0.95, 1.02)	0.394	0.97 (0.94, 1.00)	0.089
Aboriginal status								
Aboriginal	1.54 (1.01, 2.34)	0.043	Ref		A		A	
Non-Aboriginal	Ref		1.21 (0.69, 2.12)	0.501				
ARIA								
Regional centres/other regional areas	Ref		Ref		Ref		Ref	
Cities/major regional centres	1.14 (0.70, 1.87)	0.59	1.37 (0.73, 2.59)	0.327	1.94 (0.76, 4.96)	0.164	0.84 (0.33, 2.13)	0.713
Sexual orientation								
Non-heterosexual	Ref		Ref		Ref		Ref	
Heterosexual	2.22 (1.15, 4.29)	0.018	1.50 (0.58, 3.91)	0.406	1.50 (0.26, 8.58)	0.647	1.61 (0.50, 5.21)	0.426

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Table 2. (Continued).

	Overall		Overall		Aboriginal		Non-Aboriginal	
	uOR (95% CI)	P-value	aOR (95% CI)	P-value	aOR (95% CI)	P-value	aOR (95% CI)	P-value
Relationship status								
In a relationship	Ref		Ref		Ref		Ref	
Single	2.71 (1.77, 4.15)	<0.001	2.42 (1.37, 4.25)	0.002	2.36 (0.88, 6.34)	0.09	2.39 (1.16, 4.91)	0.018
Ever been in juvenile detention								
Yes	Ref		Ref		Ref		Ref	
No	2.23 (1.44, 3.45)	<0.001	2.01 (1.11, 3.64)	0.022	2.53 (0.93, 6.86)	0.069	1.72 (0.78, 3.76)	0.177
Currently going to school								
No	Ref		Ref		Ref		Ref	
Yes	2.63 (1.73, 4.00)	<0.001	1.97 (1.10, 3.53)	0.022	1.80 (0.70, 4.60)	0.22	2.35 (1.08, 5.13)	0.031
Number of sexual partners in the past 12 months								
Three or more	Ref		Ref		Ref		Ref	
Under three	2.09 (1.34, 3.26)	0.001	1.95 (1.11, 3.41)	0.02	3.07 (1.17, 8.03)	0.022	1.51 (0.73, 3.13)	0.271
Transactional sex for drugs or money								
Yes	Ref		Ref		^B		Ref	
No	4.86 (1.85, 12.77)	0.001	4.02 (1.27, 12.73)	0.018			2.85 (0.83, 9.74)	0.095
Sought sexual health information – not from internet								
Yes	Ref		Ref		Ref		Ref	
No	3.36 (1.90, 5.92)	<0.001	2.43 (1.39, 4.24)	0.002	2.10 (0.82, 5.39)	0.121	2.83 (1.38, 5.80)	0.004
STI/HIV knowledge score								
Higher	Ref		Ref		Ref		Ref	
Lower	3.31 (2.08, 5.26)	<0.001	2.32 (1.28, 4.21)	0.006	2.45 (0.85, 7.03)	0.097	2.34 (1.10, 4.98)	0.028
Condom use past 12 months								
Not all of the time	Ref		Ref		Ref		Ref	
All of the time	1.92 (1.21, 3.05)	0.006	1.23 (0.69, 2.18)	0.48	0.54 (0.20, 1.43)	0.212	2.03 (0.94, 4.38)	0.073
Used internet to look for potential sexual partners								
Yes	Ref		Ref		Ref		Ref	
No	2.24 (1.20, 4.19)	0.012	1.26 (0.55, 2.92)	0.588	2.68 (0.52, 13.89)	0.241	0.97 (0.34, 2.73)	0.952
Sought sexual health information from internet								
Yes	Ref		Ref		Ref		Ref	
No	3.36 (1.90, 5.92)	<0.001	1.62 (0.73, 3.60)	0.238	1.40 (0.29, 6.69)	0.677	1.71 (0.64, 4.59)	0.283
Ever used drugs								
Yes	Ref		Ref		Ref		Ref	
No	3.81 (1.84, 7.88)	<0.001	1.37 (0.57, 3.29)	0.478	1.28 (0.37, 4.43)	0.693	1.22 (0.32, 4.59)	0.77
Ever injected drugs								
No	3.82 (1.85, 7.87)	<0.001	Ref		Ref		Ref	
Yes	Ref		1.01 (0.40, 2.57)	0.987	0.43 (0.07, 2.58)	0.358	1.33 (0.43, 4.11)	0.625
Current alcohol use disorder								
Yes	Ref		Ref		Ref		Ref	
No	2.75 (1.81, 4.19)	<0.001	1.27 (0.73, 2.21)	0.396	1.18 (0.47, 2.97)	0.725	1.38 (0.67, 2.85)	0.384

Bold P-value indicates statistical significance ($P \leq 0.05$).

The aOR and 95% CI values of the variables that were not significant and excluded from the final model (*in italics*) were obtained by adding and then removing each non-significant variable from the final model.

uOR, unadjusted odds ratio; aOR, adjusted odds ratio; CI, confidence interval; Ref, reference group.

^AModels for Aboriginal and non-Aboriginal samples exclude Aboriginal status as a variable in the analysis.

^BNumber of events too low.

Table 3. Factors associated with STI diagnosis.

	Overall			
	uOR (95% CI)	P-value	aOR (95% CI)	P-value
Gender				
Female	2.03 (0.81, 5.10)	0.132	Ref	
Male	Ref		1.08 (0.29, 4.10)	0.907
Age (in months)	0.99 (0.95, 1.03)	0.69	0.96 (0.92, 1.01)	0.142
Aboriginal status				
Aboriginal	Ref		Ref	0.406
Non-Aboriginal	2.36 (0.82, 6.85)	0.113	1.75 (0.47, 6.61)	
ARIA				
Cities and major regional centres	Ref		Ref	
Regional centres and other regional areas	1.32 (0.46, 3.77)	0.608	1.33 (0.36, 4.93)	0.67
Sexual orientation				
Heterosexual	Ref		Ref	
Non-heterosexual	3.02 (0.98, 9.25)	0.054	5.63 (1.13, 28.16)	0.035
Transactional sex for drugs or money				
No	Ref		Ref	
Yes	9.00 (2.89, 28.01)	<0.001	11.20 (3.04, 41.32)	<0.001
Sought sexual health information from internet				
No	Ref		Ref	
Yes	2.73 (1.04, 7.20)	0.042	3.54 (1.00, 12.53)	0.05
Condom use in the past 12 months				
All of the time	Ref		Ref	
Not all of the time	4.10 (1.15, 14.69)	0.03	3.31 (0.80, 13.71)	0.1
STI/HIV knowledge score				
Lower	Ref		Ref	
Higher	2.03 (0.82, 5.06)	0.126	2.73 (0.79, 9.39)	0.111
Current sentence or order				
Yes	Ref		Ref	
No	2.24 (0.82, 6.14)	0.118	1.80 (0.51, 6.37)	0.361
Number of sexual partners in the past 12 months				
Under three	Ref		Ref	
Three or more	2.44 (0.89, 6.66)	0.083	2.29 (0.68, 7.76)	0.183
Used internet to look for potential sexual partners				
No	Ref		Ref	
Yes	2.54 (0.84, 7.72)	0.1	1.95 (0.50, 7.50)	0.334
Sought sexual health information – not from internet				
No	Ref		Ref	
Yes	1.95 (0.78, 4.90)	0.154	1.57 (0.45, 5.48)	0.481

Bold P-value indicates statistical significance ($P \leq 0.05$).

The aOR and 95% CI values of the variables that were not significant and were excluded from the final model (*in italics*) were obtained by adding and then removing each non-significant variable from the final model.

uOR, unadjusted odds ratio; aOR, adjusted odds ratio; CI, confidence interval; Ref, reference group.

prior to interview. While our study is looking at STI and HIV testing rates combined, this is higher than STI testing rates in the Australian general population in 2019 where 14.9% of

15–29-year-olds had at least one chlamydia/gonorrhoea test in the prior year,²⁸ but lower than testing rates in the Aboriginal community where 41.0% of sexually active

16–19-year-olds reported being tested for an STI in the year prior to interview.⁸ In our study, we found no significant differences in self-reported STI/HIV testing rates between Aboriginal and non-Aboriginal participants. Considering a large proportion of our sample reported not always using a condom (almost 60%), had their sexual debut before 14 years of age (41.3%), and had multiple sexual partners in the past 12 months (46.6%), increasing testing in this population is crucial for reducing STI transmission rates and preventing possible infertility issues caused by leaving these infections untreated.

Male participants were approximately two and a half times more likely to have never been tested for STI/HIV compared to female participants. These odds increased to three and a half times for Aboriginal male participants. This finding is consistent with previous research showing that males, regardless of age or justice-involved status, were less likely than females to get tested^{29–31} possibly due to having less contact with health services in general. Additionally, previous research suggests young men are more worried about the STI testing procedures than young women.³² For testing rates to increase, sexual health services need to better engage with justice-involved males before or as soon as they come into contact with the justice system. As proposed by previous studies, wider involvement from family, school and community might also play an important role in engaging adolescents with sexual health services.³³ Additionally, community-based sexual health education programs that consider culture and gender might help increase testing and reduce STI rates among Aboriginal adolescents.³⁴ Sexual health education should not only focus on the medical aspects, but also try to tackle perceptions of stigma, with regards to STI testing and diagnosis. Stigma has been identified as an important factor for both Aboriginal³⁵ and non-Aboriginal populations.³²

Being single was significantly associated with never having had an STI/HIV test for the non-Aboriginal sample. Previous community-based research looking at STI testing in students at a regional NSW university reported similar findings – those in *de facto* relationships had the highest STI testing rates.³⁶ In certain relationships, young women have less power to negotiate safe sex practices and therefore may use STI testing as an alternative.³⁷ Similarly, US-based research on heterosexual young adults indicated that mistrust and miscommunication were prevalent for those in exclusive sexual partnerships, and STI testing was commonly used as a risk reduction strategy after exposure to risky sexual behaviours.³⁸

Those who have never been to juvenile detention were more likely to have never had an STI/HIV test. This is probably due to the fact that on admission to Australian youth detention centres, young people undergo a health screening and are offered testing for HIV and some STIs.³⁹ However, due to the cross-sectional nature of this study, we

cannot determine whether testing occurred prior, during or after a detention episode.

Attending school was associated with never having had an STI/HIV test for the non-Aboriginal sample, but not for the Aboriginal sample. This finding is difficult to interpret; however, past studies indicated that stigma plays a large role in stopping individuals from getting tested.³² In addition, structural barriers such as location and clinic opening times⁴⁰ might also affect testing accessibility for young people who attend school.

A factor associated with never having had an STI/HIV test in the Aboriginal sample was less than three sexual partners in the past 12 months. This is consistent with previous community-based studies from Australia,⁹ Canada⁴¹ and the US.⁴² It is hypothesised that those with less than three sexual partners do not feel at risk and thus believe STI/HIV testing would not be necessary. Similarly, those who never engaged in transactional sex are more likely to have never had an STI/HIV test.

Regarding STI/HIV knowledge, in the non-Aboriginal sample, those who have never sought information about sexual health and those who obtained a lower STI/HIV knowledge score were more likely to have never had an STI/HIV test. While the STI/HIV knowledge score factor did not reach statistical significance in the Aboriginal sample, the *P*-value was close to achieving statistical significance (*P* = 0.068). STI knowledge was identified as a factor associated with STI testing in past community-based Aboriginal¹⁰ and non-Aboriginal⁴³ research. Overall, these findings suggest that better STI knowledge is needed among justice-involved adolescents and that with better sexual health education, perhaps even those who do not consider themselves at risk of an STI would be more inclined to seek testing. Additionally, given the young age of sexual debut, this population should be engaged in education earlier than adolescents who are not involved with the justice system. In terms of sexual health education, STI prevention and testing, criminal justice and health agencies should work together to better support and provide appropriate health education and services to these young people. For Aboriginal adolescents, considering the disproportionate number who are justice-involved, sexual health delivery should be culturally appropriate and collaborations should include Aboriginal Community-Controlled health services who have expertise in providing culturally safe and accessible care for, and with Aboriginal communities.^{44,45} An example of a culturally appropriate campaign in the community is the Mary G 2014 campaign for Aboriginal young people in WA.⁴⁶ Successful collaborations across sectors would result in less STI community transmission and improved sexual health for justice-involved adolescents.

Nearly one in five (17.8%) participants reported ever having had a positive STI diagnosis, compared to 2.3% of secondary school students⁷ and 15.0% of 16–19-year-old Aboriginal Australians.⁸ In this respect, our sample appears

to be more similar to young Aboriginal Australians rather than Australian secondary school students, potentially due to the fact that Aboriginal adolescents are over-represented in the justice system. Participants reporting engagement in transactional sex for drugs or money, who identified as non-heterosexual and had sought sexual health information online were more likely to report a past STI diagnosis. Although some of the number of events was low for this analysis, some findings are consistent with previous US research on at-risk homeless youth which indicated that transactional sex was associated with STI diagnosis.⁴⁷ With regards to sexual orientation, our findings are consistent with Australian data which indicated that gay men and other men who have sex with men were more at-risk for an STI than heterosexual individuals.¹

Limitations

The findings of this survey are not generalisable to the entire population of justice-involved adolescents as non-random sampling was used. Causality cannot be inferred as the study was cross-sectional.

Response options to the question ‘have you ever been screened for STI or HIV’ did not allow for differentiation between being tested for STI and being tested for HIV. Therefore, we do not know if the ‘yes’ refers to only one of these (and which one) or both. Additionally, this survey used self-reported data, so there might be some under-reporting of sensitive issues.

Conclusion

This study examined the sexual behaviours, STI/HIV testing, and STI/HIV diagnosis reported by a sample of justice-involved adolescents. The findings support the need for sexual health services to work collaboratively across government sectors and with the Aboriginal community-controlled sector to provide appropriate education, testing and support. Engaging with young males, particularly young Aboriginal males, is important as STI/HIV testing rates were significantly lower than for young females in this study. Differences in STI diagnoses based on sexual orientation indicate that STI prevention and testing approaches should additionally be tailored to consider the different sexual orientations of adolescents. Collaboration between community-based organisations, the justice system and health agencies is required to increase education and testing in this population, and for reducing STI community transmission rates.

Supplementary material

Supplementary material is available [online](#).

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Data availability. The data that support this study cannot be publicly shared due to ethical or privacy reasons and may be shared upon reasonable request to Tony Butler (tbutler@unsw.edu.au).

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