BMJ Open

Fetal alcohol spectrum disorder and youth justice: a prevalence study among young people sentenced to detention in Western Australia

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To cite: Bower C, Watkins RE, Mutch RC, *et al*. Fetal alcohol spectrum disorder and youth justice: a prevalence study among young people sentenced to detention in Western Australia. *BMJ Open* 2018;**8**:e019605. doi:10.1136/bmjopen-2017-019605

► Prepublication history for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2017-019605).

Received 14 September 2017
Revised 4 December 2017
Accepted 21 December 2017

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ABSTRACT

Objectives To estimate the prevalence of fetal alcohol spectrum disorder (FASD) among young people in youth detention in Australia. Neurodevelopmental impairments due to FASD can predispose young people to engagement with the law. Canadian studies identified FASD in 11%–23% of young people in corrective services, but there are no data for Australia.

Design Multidisciplinary assessment of all young people aged 10–17 years 11 months and sentenced to detention in the only youth detention centre in Western Australia, from May 2015 to December 2016. FASD was diagnosed according to the Australian Guide to the Diagnosis of FASD.

Participants 99 young people completed a full assessment (88% of those consented; 60% of the 166 approached to participate); 93% were male and 74% were Aboriginal.

Findings 88 young people (89%) had at least one domain of severe neurodevelopmental impairment, and 36 were diagnosed with FASD, a prevalence of 36% (95% CI 27% to 46%).

Conclusions This study, in a representative sample of young people in detention in Western Australia, has documented a high prevalence of FASD and severe neurodevelopmental impairment, the majority of which had not been previously identified. These findings highlight the vulnerability of young people, particularly Aboriginal youth, within the justice system and their significant need for improved diagnosis to identify their strengths and difficulties, and to guide and improve their rehabilitation.

Strengths and limitations of this study

- Study conducted in the only youth detention centre in the Western Australia.
- Representative sample of young people in detention in Western Australia.
- Comprehensive, multidisciplinary assessment, using Australian diagnostic criteria for fetal alcohol spectrum disorder.
- Inability to obtain information on prenatal alcohol exposure for some young people.
- Did not assess the domain of affect regulation and limited formal assessment of domain of adaptive behaviour for some young people.

INTRODUCTION

Fetal alcohol spectrum disorder (FASD) is characterised by severe, pervasive neurodevelopmental impairment due to prenatal alcohol exposure. Impairment in executive function, memory, language, learning and attention in young people with FASD can result in a range of difficulties including understanding cause and effect, learning from past experiences and decision making.[1–3] These impairments can, in turn, lead and contribute to problems at school and with employment, mental health, social exclusion, substance misuse and early and repeated engagement with the law.[4] In the Fetal Alcohol Follow-up Study of the University of Washington Fetal Alcohol and Drug Unit, of 415 individuals assessed by dysmorphologists to have fetal alcohol syndrome or fetal alcohol effects (median age at follow-up was 14 years of age), 60% had been in trouble with the law and 35% had been incarcerated for a crime.[4]

There are limited data on the prevalence of FASD among young people in correctional systems. A systematic review published in 2011[5] identified three studies, all from Canada[6–8] and a more recent systematic review[9] identified one additional Canadian study.[10] Only one of these studies involved active case ascertainment using clinical assessment to identify FASD using described diagnostic criteria for fetal alcohol syndrome and fetal alcohol effects[11] among 287 youth

Table 1 Australian diagnostic criteria and categories for fetal alcohol spectrum disorder (FASD)[27]

Diagnostic criteria	Diagnostic categories	
	FASD with 3 sentinel facial features*	FASD with <3 sentinel facial features
Prenatal alcohol exposure	Confirmed or unknown	Confirmed
Neurodevelopmental domains ► Brain structure/neurology ► Motor skills ► Cognition ► Language ► Academic Achievement ► Memory ► Attention ► Executive function, including impulse control and hyperactivity ► Affect regulation ► Adaptive behaviour, social skills or social communication	Severe impairment† in at least three neurodevelopmental domains	Severe impairment† in at least three neurodevelopmental domains
Sentinel facial features ► Short palpebral fissure ► Smooth philtrum ► Thin upper lip	Presence of 3 sentinel facial features	Presence of 0, 1 or 2 sentinel facial features

*FASD with 3 sentinel facial features similar to fetal alcohol syndrome.
†Severe impairment is defined as either a global score or a major subdomain score on a standardised validated neurodevelopmental scale that is ≤2 SD below the mean or <3rd percentile.

remanded to a forensic psychiatric assessment unit.[6] One sought mention of FASD (either formally diagnosed or suspected by a physician) in the records of 230 youth attending a sexual offender treatment programme[8] and the other two obtained information on FASD by self-report in a survey of youth in custody.[7 10] The identified prevalence of FASD was 10.9%,[8] 11.7%,[7] 21%[10] and 23.3%,[6] although the number of cases of undiagnosed FASD in custodial and correctional systems was thought to be high.

There is increasing concern regarding the forensic implications of FASD in Australia,[12 13] as the neuropsychological sequelae can affect all aspects of the legal proceedings, including the person understanding the expectations and providing credible evidence in forensic interviews, fitness to plead, capacity to stand trial and the process of sentencing.[13 14] There are no data on the prevalence of FASD in the justice system in Australia, but it is well-recognised that FASD is underdiagnosed in the general population,[15 16] and a high prevalence of intellectual disability and poor mental health has been identified among young people in the justice system. In a study of 65% of young people in eight juvenile justice centres in New South Wales (n=295), 45.8% had borderline or lower intellectual functioning, including 14% with an IQ<70.[17] Additionally, in a survey of 273 young people serving custodial orders in Victoria, 39% had depressive symptoms, 17% had a positive psychosis screen and 22% had engaged in deliberate self-harm in the past 6 months.[18] These findings highlight the possibility of undiagnosed FASD among these young people.

Based on currently available data, FASD is diagnosed more commonly and at higher rates in Aboriginal compared with non-Aboriginal children in Australia.[19–21] Of concern, Aboriginal young people are over 20 times more likely to be in detention compared with non-Aboriginal young people in Australia[22] and, in Western Australia between 2015 and 2016, 73% of youth in detention were Aboriginal.[23] Given the forensic implications of FASD and neurodevelopmental impairments, and in the absence of information on FASD in the Australian justice system, we undertook this study to assess the prevalence of FASD among young people in youth detention in Western Australia.

METHODS

A paper describing the full study protocol has been published[24] and is summarised here.

Setting

We conducted the study between May 2015 and December 2016, in the Banksia Hill Detention Centre (BHDC), the only youth detention centre in Western Australia. Males and females (94% male), aged 10–18 years, reside at the Centre either on remand or sentenced to detention, 73% are Aboriginal and, in 2015–2016, the average daily occupancy was 133 young people.[23] Sentenced youth spend approximately 130 days in detention. The main offences

Table 2 Diagnostic assessments used by multidisciplinary diagnostic team for each domain assessed

Brain structure/neurology	Comprehensive medical history, and psychosocial and clinical examination including health, well-being, substance use and at-risk behaviours, mood, vision, hearing, motor and sensation.
Motor skills	Movement Assessment Battery for Children second edition, age band 3[41] Beery Buktenica Developmental Test of Visual Motor Integration sixth edition, including subtests Visual Perception and Motor Coordination[42] Quick Neurological Screening Test third edition[43] Handwriting screen (informal)* Motor speech diadochokinetic rate* Observation of articulation*
Cognition	Wechsler Abbreviated Scale of Intelligence second Edition[31] Wechsler Non-Verbal Test of Intelligence[32]
Language	Clinical Evaluation of Language Fundamentals, fourth Edition, Australian[44] Non-word repetition task (informal) Self and/or caregiver report (informal) Oral narrative (informal)* Receptive and expressive language tasks (informal)*
Academic achievement	Comprehensive Test of Phonological Processing second Edition, Elision subtest[45] Wide Range Achievement Test, Fourth Edition[46]– Reading Comprehension, Word Reading, Sentence Comprehension, Math Computation, Spelling Written narrative (informal)*
Memory	Wide Range Assessment of Memory and Learning second Edition, Screening Memory Index[47]
Attention	Delis-Kaplan Executive Function System[48]—Colour-Word Interference (Colour Naming and Word Reading), Trail Making (Visual Scanning, Number/Letter Switching+errors) Wechsler Non-Verbal Test of Intelligence[32] Spatial Span Forwards Sensory Profile Adolescent/Adult Self-Questionnaire[49]*
Executive function (including impulse control and hyperactivity)	Delis-Kaplan Executive Function System[48]-Colour-Word Interference (Inhibition, Inhibition/Switching+errors), Trail Making (Number Sequencing and Letter Sequencing) and Category fluency Wechsler Non-Verbal Test of Intelligence[32] Spatial Span Backwards subtest WASI-II[31] -Similarities and Matrix Reasoning subtests Behaviour Rating Inventory of Executive Functioning[50]
Adaptive Behaviour, Social Skills/ Communication	Vineland Adaptive Behaviour Scales (Parent/Caregiver and Teacher versions), second Edition[28] Social communication checklist (informal)*

*Supplementary information to the primary diagnostic measure/s.

committed by youth offenders in Western Australia are theft, unlawful entry with intent and acts intended to cause injury.[25]

Governance

A Consumer and Community Reference Group, a Steering Group and a Reference Group of Department of Corrective Services (DCS) and Department of Child Protection and Family Support (DCPFS) representatives provided advice and guidance to the research team.

Participants

All young people sentenced to detention within BHDC, aged 10–17 years 11 months were eligible to participate. To allow sufficient time for completion of the assessment, only those young people with at least two further weeks of detention from the time they were invited to participate were included.

Recruitment

Participants were recruited by a face-to-face approach from the project research officer, who identified eligible young people from the Centre census each week, up to a maximum of four per week (the capacity of the assessment team, given assessments were restricted to only 2 days per week). If a young person expressed interest in being involved in the study, the research officer explained the purpose of the study using simple language and pictorial information sheets and assent forms. When a young person gave assent, written consent was then sought from their identified responsible adult or, in the case of young people in the care of DCPFS, consent was sought directly from the DCPFS case manager responsible for that young person.

Data collection

The research officer used standardised forms to collect and record information from the participant (psychosocial checklist), the responsible adult or the child protection case managers (background history, prenatal alcohol exposure, adaptive behaviour, executive functioning), detention centre teachers (adaptive behaviour, executive functioning) and youth

Table 3 Demographic characteristics of young people who completed the full fetal alcohol spectrum disorder assessment compared with those assenting but written consent not obtained

	Completed assessment (N=99), n (%)	Assented but not consented (N=41), n (%)	Statistical test result
Gender*			Fisher's exact test P=0.7
Male	92 (93)	40 (98)	
Female	6 (6)	1 (2)	
Age (years)			χ^2 = 0.5; P=0.97
17	33 (33)	15 (37)	
16	23 (23)	10 (24)	
15	23 (23)	9 (22)	
14	16 (16)	5 (12)	
13	4 (4)	2 (5)	
Ethnicity			χ^2=1.5; P=0.5
Australian non-Aboriginal	16 (16)	9 (22)	
Australian Aboriginal	73 (74)	30 (73)	
Other†	10 (10)	2 (5)	
Place of residence			χ^2 = 0.1; P=0.7
Metropolitan	50 (51)	22 (54)	
Rural/regional/remote	49 (49)	19 (46)	
Legal guardian			χ^2 = 3.5; P=0.2
Parent	62 (63)	24 (58)	
Guardian	24 (24)	15 (37)	
Child protection‡	13 (13)	2 (5)	

*Excludes those who identify as transgender.
†Includes young people of New Zealand, Asian, African ethnicity.
‡Child Protection and Family Support Services.

custodial officers (adaptive behaviour, social skills, social communication).

The Alcohol Use Disorders Identification Test-Consumption (AUDIT-C)[26] questions were used to assess prenatal alcohol exposure if the young person's birth mother was their responsible adult. When this was not possible, other evidence of exposure was sought from the responsible adult, such as observation of alcohol use during pregnancy. Prenatal alcohol exposure was categorised according to the Australian Guide to the Diagnosis of FASD[27] as: (i) no exposure, if there was confirmed absence of prenatal alcohol; (ii) confirmed exposure, if the AUDIT-C score was 1–4, or there was confirmed use but the level of exposure was not known; (iii) confirmed high-risk exposure, if the AUDIT-C score was 5+ or it was reliably known that exposure was at a high level (such as consumption of 5 or more standard drinks on at least one occasion in pregnancy) or (iv) unknown exposure, if there was no or inconsistent information on whether there was prenatal alcohol exposure.

Diagnostic criteria

We used the criteria contained in the Australian Guide to the Diagnosis of FASD (table 1).[27] These criteria were confirmed only after the study protocol was designed and, as affect regulation was added as a domain of neurodevelopmental impairment in the new criteria, this domain was not formally assessed in this study.

We intended to assess the adaptive functioning/social skills/social communication domain using the Vineland Adaptive Behaviour Scales—parent/caregiver rated and teacher rated forms,[28 29] the Life Skills Checklist and an informal social skills and communication questionnaire.[30] However, this was not possible for 81 young people. Reasons included informants not knowing the participants for long enough, and non-return of or incomplete forms.

Clinical assessments

A multidisciplinary team (paediatrician, occupational therapist, speech pathologist, provisional neuropsychologists with supervision) conducted the clinical assessment, blind to information on prenatal alcohol exposure. For participants who spoke English as an additional language, language assessment was conducted informally by the speech pathologist working in collaboration with accredited interpreters. Table 2 lists the assessment tools used by the clinicians. On completion of the assessment, the multidisciplinary

Table 4 Prenatal alcohol exposure for all young people completing the full fetal alcohol spectrum disorder (FASD) assessment

Prenatal alcohol exposure	Total completing FASD assessment (N=99), n (%)	Diagnosed with FASD (N=36), n (%)	Not diagnosed with FASD (N=63), n (%)
Confirmed	47 (47)	36 (100)	11 (17)
Confirmed high risk	28 (28)	22 (61)	6 (10)
No exposure	39 (39)	0	39 (62)
Exposure unknown	13 (13)	0	13 (21)

team met to review the findings and carefully consider the results of all the assessments, together with identified comorbidities (such as attention-deficit/hyperactivity disorder, intellectual disability) and history (such as cultural background, lived trauma, disrupted attachment, schooling history) for each participant. If there was confirmed prenatal alcohol exposure and the young person had three or more domains severely impaired (≥2 SD), and there were no other causes identified that would account for the impairments, then a diagnosis of FASD was ascribed. A diagnosis of FASD was always made conservatively and only assigned when diagnostic criteria were fulfilled and other causes were considered not to account for the measured difficulties.

The team prepared a report for every participant, which detailed the results of the assessments and recommendations for supporting and working with the young person, using the young person's identified strengths. This report served to establish a baseline to monitor progress, and provided guidance regarding health and medical needs, the development of appropriate educational or occupational goals, factors to consider for interventions, compensatory strategies and overall case management. When possible, members of the research team discussed the report with the young person using simple verbal feedback combined with simple visual aids as needed. The young person received a paper copy of the report on release from detention. The reports were also provided to the young person's responsible adult and, with consent, to staff in youth justice services (including health and psychological services), lawyers and other agencies as indicated.

Pilot study

We conducted a pilot study in May 2015 with 11 young people. As only minor modifications were made to the processes for enrolment and assessment based on the pilot study, these 11 cases were included in the full study, which ran until December 2016.

Statistical methods

Descriptive analyses were conducted using IBM SPSS Statistics for Windows, V.24, Armonk, New York, USA, released 2016.

RESULTS

Participation

Between May 2015 and December 2016, 213 young people were identified as eligible for inclusion; however, 47 were not approached due to our inability to undertake more than four assessments per week. Of those approached, 154 young people assented to participate (93%) and 12 young people declined. Of the 154 assenting young people, the

Table 5 Total number of severely impaired neurodevelopmental domains among all young people completing the full fetal alcohol spectrum disorder (FASD) assessment

Number of domains severely impaired	Total completing FASD assessment (N=99), n (%)	Diagnosed with FASD (N=36), n (%)	Not diagnosed with FASD (N=63), n (%)
0	11 (11)	0	11 (17)
1	13 (13)	0	13 (21)
2	10 (10)	0	10 (16)
3	26 (26)	9 (25)	17 (27)
4	16 (16)	12 (33)	4 (6)
5	11 (11)	5 (14)	6 (10)
6	6 (6)	5 (14)	1 (2)
7	6 (6)	5 (14)	1 (2)
8	0	0	0
9	0	0	0

The domains assessed were: brain structure/neurology; motor skills; cognition; language; academic achievement; memory; attention; executive function; adaptive behaviour, social skills or social communication.

Table 6 Diagnostic features of young people completing full fetal alcohol spectrum disorder (FASD) assessment

	Total completing FASD assessment (N=99), n (%)	Diagnosed with FASD N=36, n (%)	Not diagnosed with FASD N=63, n (%)
Neurodevelopmental domains impaired*			
Academic achievement	61 (62)	31 (86)	30 (48)
Attention	54 (55)	26 (72)	28 (44)
Executive function	53 (54)	28 (78)	25 (40)
Language	45 (45)	25 (69)	20 (32)
Memory	38 (38)	20 (56)	18 (29)
Motor skills	29 (29)	18 (50)	11 (17)
Cognition	21 (21)	13 (36)	8 (13)
Communication†	6 (6)	4 (11)	2 (3)
Brain structure/neurology	1 (1)	0	1 (2)
Number of sentinel facial features			
0	73 (74)	21 (58)	52 (83)
1	14 (14)	9 (25)	5 (8)
2	12 (12)	6 (17)	6 (9)
3	0	0	0

*Domains according to the Australian Guide to the Diagnosis of FASD, excluding affect regulation.[27]
†Twenty-nine young people with FASD and 52 without FASD did not have this domain assessed.

responsible adult for 113 of them gave written consent for their participation (73%). Consent was declined for 3 young people, 10 responsible adults gave verbal but not written consent (written consent was a requirement of the study), 14 young people either turned 18 or were released before written consent was obtained and we were unable to contact the responsible adult for the remaining 14 young people, despite repeated attempts. Following assent and consent, five young people were released before assessment. The remaining 108 underwent assessment (96% of those consented); 99 of whom completed a full assessment (88% of those consented; 60% of the 166 approached to participate).

Characteristics of participants

The majority of young people with a completed assessment were male (92; 93%) and Aboriginal (73; 74%), and a third were aged 17 years (table 3). The responsible adult for most young people assessed was a parent (62; 63%), 24 (24%) had another person as their guardian (frequently a grandmother) and 13 (13%) were in the care of the DCPFS. Half the young people lived in the metropolitan area. There were no significant differences between these proportions and those for young people assented but not consented (table 3).

Diagnosis of FASD

A total of 36 young people were diagnosed with FASD, a prevalence of 36% (95% CI 27% to 46%). All diagnoses were in the category of FASD with <3 sentinel facial features; two were non-Aboriginal (FASD prevalence=8%; 95% CI 1% to 25%), 34 were Aboriginal (FASD prevalence=47%; 95% CI 35% to 58%). Two young people had an FASD diagnosis prior to entering the study. One was diagnosed 5–6 years previously and one was a more recent diagnosis but had not had all domains assessed at that time. Both young people had the diagnosis of FASD confirmed using the new Australian criteria.[27]

Prenatal alcohol exposure

Prenatal alcohol exposure among fully assessed young people was confirmed for 47 (47%), 28 (28%) of whom had documented high-level exposure. Prenatal exposure was unknown for 13 young people (13%) and 39 were confirmed as not exposed to prenatal alcohol (39%) (table 4).

Neurodevelopmental domains with severe impairment

Eleven of the fully assessed young people had no domains of severe neurodevelopmental impairment (11%), 23 had one or two domains severely impaired and the remaining 65 had three or more domains severely impaired (table 5). Just over half the young people diagnosed with FASD had three or four domains severely impaired, the remainder had five or more severely impaired domains. The individual domains that were severely impaired are shown in table 6. The majority of young people with FASD had severe impairment in the academic (86%), attention (72%), executive functioning (78%) and/or language (69%) domains. Severe impairment in memory (56%), motor skills (50%) and cognition (36%) were also commonly found in the young people with FASD. Severe impairment in these domains was also seen among the young people without an FASD diagnosis, but at lower levels. Only one young person (who did not have FASD) was identified with a severe impairment in the brain structure/neurology domain. Overall, 24 young

people (24%) were assessed to have an IQ score at or below 70, using the Wechsler Abbreviated Scale of Intelligence second Edition (WASI-II) or Wechsler Non-Verbal Test of Intelligence (WNV)[31 32]; nine without FASD (14%) and 15 with FASD (42%).

Of the 13 young people with unknown prenatal alcohol exposure, there were 9 with three or more severely impaired domains. If they had been exposed to alcohol prenatally, then a diagnosis of FASD may have been indicated. Additionally, among eight young people with known exposure to prenatal alcohol who did not have an FASD diagnosis but whose adaptive functioning/social skills/social communication domain had not been assessed, four had two domains meeting severe impairment. Hence, for these four young people, if they had severe impairment in adaptive functioning, a diagnosis of FASD is also possible.

Sentinel facial features

The majority of young people (73; 74%) had no characteristic facial features of FASD and none had all three facial features (table 6). One young person (without FASD) had a palpebral fissure length ≤2SD, 19 had a lip philtrum rank 4 or 5 (13 of whom had FASD) and 18 had an upper lip rank 4 or 5 (8 with FASD).

DISCUSSION

This is the first study to estimate the prevalence of FASD in youth detention in Australia. We found that 36% of 99 young people aged 13–17 years were diagnosed with FASD. Study diagnoses were made according to the Australian diagnostic criteria[27]—all cases received a diagnosis of FASD with less than three sentinel facial features. This is the highest reported prevalence of FASD in a youth justice setting worldwide. There are four other studies, all from Canada,[6–8 10] with FASD prevalence ranging from 10.9% to 23.3%, all outside the lower 95% CI of this study's estimate. Only one of these studies clinically assessed young people to make the diagnosis[6] using diagnostic criteria[11] that differ from the Australian Guide,[27] while the others used self-report or record review to identify cases and differing criteria for inclusion as an FASD. Hence, they may underestimate the true prevalence, although two of these studies were in special groups (sexual offenders,[8] young people in a psychiatric unit[6]) in which FASD may be more common.

However, for several reasons, our prevalence of 36% may also be an underestimate. First, we did not formally assess the domain of affect regulation, and self-reported mental health problems are common among youth in custody in Australia.[17 18] The affect regulation domain was included for the first time in the new Canadian guidelines for FASD diagnosis[3] and the Australian Diagnostic Guide,[27] both of which were published after our study had started. Second, we estimate that a possible further four cases of FASD may have been identified had we been able to formally assess the adaptive functioning/social skills/social communication domain and found it impaired in young people with prenatal alcohol exposure and two other impaired domains. This was not possible because we were unable to obtain formal measures of adaptive functioning for the majority of young people, although, informally, the fact of being in detention suggests impaired adaptive functioning. Third, we were not able to determine whether there had been prenatal alcohol exposure for 13 young people and, of these, 9 had three or more domains of impairment, so they may also have met the diagnostic criteria had they been exposed to alcohol prenatally. Fourth, the brain structure/neurology domain was only assessed clinically—no neuroimaging was undertaken, so impairment in this domain may also be underestimated.

Given the known high risk of young people with FASD engaging with the law,[4] it is not surprising that, in this study, the overall prevalence of FASD is greater than population estimates. The prevalence in Aboriginal youth was 47%, more than twice that of the highest population estimate of FASD in Australia of 19%, reported in a remote, mainly Aboriginal, population aged 7–8 years.[21] In the Canadian studies, FASD prevalence in Aboriginal youth ranged from 19% to 36%.[7 8 10] Corresponding prevalence in non-Aboriginal Canadian youth ranged from 4% to 6%, similar to our study of 8%, also much higher than general population estimates in Western Australia (0.03 per 1000 non-Aboriginal)[19] and the worldwide estimate of 7.7 per 1000.[33] Furthermore, the prevalence of severe neurodevelopmental impairment in our study is almost three times as high as the 31% found in the study by Fitzpatrick.[21]

The greater prevalence of FASD in Aboriginal populations corresponds with higher rates of high-level alcohol consumption in these populations,[34] but this observation fails to acknowledge the complex reasons for higher alcohol use. Past colonial policies such as the removal of Aboriginal children from their families and resultant dispossession from land, community and culture, as well as the historical role of the criminal justice system and Aboriginal incarceration are well documented.[35 36] In addition, these policies have left a legacy: high levels of family violence, drug and alcohol misuse, mental health problems, poverty, disadvantage, marginalisation, trauma and incarceration have been well documented as traversing generations of Aboriginal families.[35–38] High population rates of FASD in Aboriginal young people are likely to be directly responsible, in part, for the high rate of Aboriginal youth incarceration.

Our study has several strengths. It was conducted in the only youth detention facility in Western Australia, and there was a high level of engagement in the study—93% of the young people approached gave assent and 73% of their responsible adults gave written consent for participation. The age, sex and ethnic profile of the sample was similar to all young people in BHDC at the time of the study.[23] Thus, the sample is likely to

be representative of all young people in detention in Western Australia.

A further positive feature of the study was the assessment, by a multidisciplinary team, of nine neurodevelopmental domains and the development of a report specific to each young person. The report included recommendations for working with the young person based on their strengths and areas of difficulty, and feedback was given to the young people, their responsible adults, detention centre and other youth justice staff and staff from other relevant agencies, to help guide their management while in detention and on release. Importantly, impairment in domains such as language, executive function, memory and cognition may contribute to offending behaviours and/or difficulties in negotiating all aspects of the justice system.[39]

This assessment also identified a high level of severe neurodevelopmental impairment in participants, with only 11% of young people without at least one domain of severe neurodevelopmental impairment, regardless of a diagnosis of FASD. Twenty-four young people (25%) were assessed to have an IQ score <70, higher than the 14% with IQ <70 found in the study of young people in custody in New South Wales[17] and much higher than in the general population in Western Australia (1.7% overall; 3.9% in Aboriginal children).[40] Only two young people had been diagnosed with FASD prior to participation in this study, similar to the study by Fast *et al*,[6] where only three of 67 cases of FASD had been previously diagnosed. For many of these young people, this was the first time they had received a comprehensive assessment to examine their strengths and difficulties, despite attending school and, in many cases, prior engagement with child protection services and the justice system. These are missed opportunities for earlier diagnosis and intervention, which may have prevented or mitigated their involvement with justice services.

Youth Justice Services in Western Australia are responsible for the safety, security and rehabilitation of young people in custody and young people engaged with these services in the community.[23] The high burden of FASD and significant neurodevelopmental impairment we found among youth sentenced to detention highlights the need for policy and practice responses to efficiently identify these individuals in detention and the wider justice system; to provide appropriate rehabilitation and therapeutic interventions during detention and following release and to ensure the justice workforce is suitably skilled to work with individuals with significant neurodevelopmental impairment. Already, government agencies are working with members of our research team to explore how routine assessment of neurodevelopmental impairments among young people can be established within the detention centre and are also working with researchers implementing training resources to upskill staff in how best to manage and provide care for young people with neurodevelopmental impairments.

More broadly and of prime importance, policy and practice responses also need to prioritise health promotion to reduce alcohol use in pregnancy and hence address primary prevention of FASD.

CONCLUSIONS

This study, in a representative sample of young people in detention in Western Australia, has documented a high prevalence of FASD and severe neurodevelopmental impairment, the majority of which had not been previously identified. These findings highlight the vulnerability of young people within the justice system and their significant need for improved diagnosis to identify their strengths and difficulties, and to guide and improve their rehabilitation.

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Acknowledgements The authors thank all of the young people at Banksia Hill Detention Centre involved in the study and their families for their participation and support. The authors thank all members of the Consumer and Community Reference Group, the Steering Group and the Reference Group for their valuable input to the study. The authors thank the Department of Justice and the Department for Child Protection and Family Support for their support, and acknowledge all of their staff members involved with the study including all staff based at Banksia Hill Detention Centre. Any material published or made publicly available by the authors cannot be considered as either endorsed by the Department of Justice or an expression of the policies or view of the Department. Any errors of omission or commission are the responsibility of the researchers. The authors acknowledge Professor Jonathan Carapetis, Professor Stephen Zubrick, Peter Collins and Dr James Fitzpatrick for their input and support as Associate Investigators on the study. The authors also thank Heather Jones and Glenn Pearson for their contributions.

Contributors CB: literature search, study design, collaboration with stakeholders, data analysis, data interpretation, writing first draft. REW: literature search, study design, collaboration with stakeholders, data interpretation, writing. RCM: study design, collaboration with stakeholders, clinical assessments, data collection, data interpretation, writing. RM: collaboration with stakeholders, cultural guidance. JF: study design, collaboration with stakeholders, project management, data interpretation. NRK: study design, collaboration with stakeholders, clinical assessments, data collection, data interpretation, writing. BS: study design, collaboration with stakeholders, clinical assessments, data collection, data interpretation, writing. CP: study design, supervision of provisional neuropsychologists, data interpretation, writing. CSCC: study design, clinical assessments, data collection, data interpretation. HS: clinical assessments, data collection, data checking, data interpretation. LT: clinical assessments, data collection, data interpretation. AS: clinical assessments, collaboration with stakeholders, data collection, data interpretation. JT: clinical assessments, data collection, data interpretation. NW: collaboration with stakeholders, project management, data interpretation. EA: clinical assessments, data collection, data checking, data interpretation. SL: professional support to speech pathologist, collaboration with stakeholders, data interpretation, writing. SH: collaboration with

stakeholders, cultural guidance, writing. CC: data management, data checking, data analysis, data interpretation. HMP: collaboration with stakeholders, data interpretation, writing. RG: study design, collaboration with stakeholders, project management, data interpretation. All authors read and had the opportunity to contribute to drafts of the paper. All authors approve the final paper.

Funding This work was supported by: National Health and Medical Research Council (NHMRC) targeted call for research grant (#1072072); NHMRC Research Fellowship (#634341) (CB); Australian Postgraduate Award Scholarship (HMP); The University of Western Australia Safety Net Top-up Scholarship (#21806348) (HMP); Stan and Jean Perron Scholarship (HMP). CB, REW, RG, RCM are investigators on the NHMRC-funded FASD Research Australia Centre of Research Excellence (#1110341).

Competing interests None declared.

Patient consent Detail has been removed from this case description/these case descriptions to ensure anonymity. The editors and reviewers have seen the detailed information available and are satisfied that the information backs up the case the authors are making.

Ethics approval Ethics approval was given by the Western Australian Aboriginal Health Ethics Committee (approval number 582) and the University of Western Australia Human Research Ethics Committee (approval number RA/4/1/7116). The former Department of Corrective Services granted research approval (DCS; project ID 335). The former Department for Child Protection and Family Support (DCPFS) also gave approval for the research to include young people in their care (approval number 2015/8981).

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement The broader study is ongoing and we will not be making our data available at this time.

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*BMJ Open*2018 8:
doi: 10.1136/bmjopen-2017-019605