

COMPREHENSIVE CLINICAL PAEDIATRIC ASSESSMENT OF CHILDREN AND ADOLESCENTS SENTENCED TO DETENTION IN WESTERN AUSTRALIA

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ABSTRACT

Objectives

To describe the comprehensive clinical paediatric assessment of a representative sample of children and adolescents (young people) sentenced to detention in Western Australia (WA) and participating in the first Fetal Alcohol Spectrum Disorder (FASD) prevalence study.

Settings

Individuals with FASD have lifelong difficulties with memory, attention, communication, emotional regulation and social skills with associated risk of engagement with juvenile justice. We found prevalence of FASD in 36% of young people sentenced to juvenile detention in WA. This paper describes the comprehensive clinical paediatric assessment of all young people participating in this study.

Participants

All young people aged 10–17 years 11 months and sentenced to detention in WA were eligible. All assessments were completed by a multidisciplinary team comprising a speech and language pathologist, occupational therapist, neuropsychologist and a paediatrician.

Results

In all, 103 young people completed the comprehensive clinical paediatric assessment, with maximum number of males (93%) and Aboriginal Australians (73%). One in two participants reported someone close to them, or themselves, having experienced a frightening event with associated symptoms of post-traumatic stress. One-third (36%) of participants had experienced suicide of a family member. Half of the young people had one or no parent (53%), an incarcerated sibling (44%) or an incarcerated family member (57%). One-fifth of participants talked about experiences of emotional neglect (20%), physical neglect (19%), physical abuse (21%) and suicidal ideation (18%). More than half (60%) of participants were 1 year or more behind their school-year grade according to their chronological age, and 73% reported waking tired. Polysubstance use was common, including cigarettes (82%), marijuana (76%), alcohol (66%) and methamphetamine (36%). Almost two-thirds (64%) had abnormal neuromotor findings, 47% reported head injury without hospitalisation, 38% had prior musculoskeletal injuries, 29% had impaired motor skills and 15% had abnormal visual fields.

Conclusion

Comprehensive clinical paediatric assessment of young people sentenced to detention in WA found significant psychosocial and physical difficulties. The findings of multiple and serious impairments and health issues, through completion of comprehensive clinical paediatric and multidisciplinary health and neurodevelopmental assessments for this study, support their routine provision to all young people on entry to systems of juvenile justice.

Keywords: adolescent; child; Fetal Alcohol Spectrum Disorder (FASD); juvenile justice; paediatric

BACKGROUND

Children and adolescents (young people) in detention have an elevated frequency of health problems when compared to young people not in detention.¹ In Australia, young people in detention are commonly from our most disadvantaged communities^{2–4} with shared experiences of early life and sustained adversity, intergenerational trauma and cross-sector disadvantages and disengagements.^{5–7} Young people in detention commonly experience a variety of detrimental social determinants of health (SDOH), including: impaired development,^{8–18} early school failure, early engagement in health risk behaviours,¹⁹ decreased social and occupational opportunities,^{20,21} and increasingly poor physical,^{11,22,23} mental,²⁴ cultural, social and material health.^{2,4} The confluence of each determinant provides a nexus for intractable social disadvantage and exclusion, and all increase risk for anhedonia and offending behaviours.^{25,26} An additional and

important factor contributing to over-representation of Aboriginal and Torres Strait Islanders in detention in Australia is the effect of intergenerational harms seeded at colonisation.^{27–30} Incarceration and detention of any child or adolescent is a significant adverse determinant and traumatic to the individual and their family. These adverse childhood experiences (ACEs) and intergenerational trauma correlate with worse health and social outcomes across their life course,^{8,9,20,31–34} with each of these determinants being of critical importance.³⁵ The definition of health for this study is intentionally aligned with the following definition outlined by Aboriginal and Torres Strait Islander Health Committee of the Royal Australasian College of Physicians (RACP):

To us health is so much more than simply not being sick. It's about getting a balance between physical, mental, emotional, cultural and spiritual health. Health and

healing are interwoven, which means that one can't be separated from the other.

Fetal Alcohol Spectrum Disorder (FASD) is recognised as a common ailment among young people in detention.^{12,36–42} Moreover, inadequate SDOH combined with adverse childhood experiences place youth with any neurodevelopmental condition at high risk of severe and persistent mental illness, incarceration, homelessness, unemployability and years of productive life lost. The recent Western Australian (WA) study conducted at Banksia Hill Youth Detention Centre determined the feasibility of diagnosing the prevalence of FASD among a representative sample of sentenced young people;^{43,44} 36% of sentenced young people participating in the study were diagnosed with FASD,^{43,44} and 89% had at least one domain of severe neurodevelopmental impairment (at or below -2 standard deviation [SD]) and 65% had three or more domains of impairment. Only two children had their diagnosis of FASD completed through prior participation in FASD research and none had been identified through prior routine health, education and child protection services (CPS). This paper describes findings of the comprehensive clinical paediatric assessment completed with all the young people sentenced to detention in WA who had participated in the FASD prevalence study.^{43–49}

ETHICS AND GOVERNANCE

Ethical approval was provided by the WA Aboriginal Health Ethics Committee (approval No. 582) and the University of Western Australia (UWA) Human Research Ethics Committee (approval No. RA/4/1/7116). Research approval was granted by the former Department of Corrective Services (DCS; project ID 335) and the former Department for Child Protection and Family Support (DCPFS; approval No. 2015/8981). Representatives of consumer and community reference group, steering group and reference group of DCS and DCPFS provided advice and guidance to the research team.⁴⁴

METHODS

Papers describing the study design have been published.^{44–47,50} Recruitment was conducted by a research officer (RO; second author, JF), who worked at the detention centre during weekdays. The research officer was permitted to approach eligible young people. (“young people” is the preferred terminology of the WA Department of Justice (DoJ) to define children and adolescents.) Young people approached for this study were aged 10–17 years 11 months, and sentenced to detention. The research officer provided verbal and written information about the study to engage young people. Study participation required three levels of assent and consent: voluntary verbal and signed assent was required from the young participant; then signed consent was required from the young person's caregiver; and the final consent for participation was provided by the Department of Juvenile Justice, which could decline a young person's participation even if they had given assent and parent or guardian had given consent. The research officer then completed a standardised psychosocial questionnaire with the participating young person and their caregiver. Findings from the standardised psychosocial questionnaire were considered along with findings of the comprehensive clinical paediatric assessment. Results were summarised as (i) the comprehensive paediatric medical history and (ii) comprehensive paediatric clinical examination.

SETTINGS

Banksia Hill Detention Centre (BHDC) is the only juvenile remand and detention centre in WA.

Participants

Eligibility was open to male and female young people aged 10–17 years 11 months and sentenced to detention at the BHDC, WA. Of the 154 assenting young people, responsible adults of 113 persons (73%) gave written consent for participation.

The remaining 108 underwent assessment (96% of those consented); 103 completed the comprehensive clinical paediatric assessment (91% of those consented) and 99 completed a full multidisciplinary assessment (88% of those consented; 60% of the 166 approached to participate).

Assessment

All clinical assessments were completed at BHDC WA. Ethical considerations of the prevalent study methodology called for to have no standardised interview questions to screen for adverse childhood/life experiences and lived trauma. The comprehensive clinical paediatric assessment included a shortened psychosocial interview with some questions on adverse childhood experiences, a medical history interview and clinical examination. The paediatrician completing the clinical assessments had specialist RACP qualifications in general paediatrics, respiratory paediatrics, community and developmental paediatrics, and had contributed to the research and development of the Australian diagnostic guidelines for FASD. Additional neurodevelopmental assessments were completed by a speech and language pathologist, an occupational therapist and a neuropsychologist.^{43,44,47-49} The paediatrician and allied specialists constituted a multidisciplinary team (MDT) to study prevalence of FASD. The MDT considered all outcomes of their collated assessments for diagnostic formulation and individual recommendations.

The comprehensive clinical paediatric assessment was completed over 90 min in a room either located at the medical centre or in the admissions area of BHDC. Young persons were accompanied to and from assessment room by a custodial officer. The custodial officer remained outside the clinical assessment room, except on two occasions if current behaviours of young persons were considered a risk to staff. The door of the paediatric assessment room was closed but never locked. A glass window allowed visual inspection by the custodial officers at any time along with a camera for inspection located at a distance.

Prior to entering clinical assessment room, the paediatrician used language suitable for a 9-year-old young person to confirm that: (i) their participation was voluntary, (ii) their assent was given freely without coercion and (iii) they knew they could be asked to stop or leave without negative consequences. The paediatrician also used gesture, referring their own body, to explain how and where on the body the clinical assessment was to take place. The paediatrician emphasised that the young person's private anatomy would not be examined or touched.

The assessment took place by sitting at right angles to the young person and asking them to help draw their family tree. While drawing the genogram, the young person was asked about their life, home, school, recreation, drug use, their hopes and future plans. The genogram became embellished with information about places lived with family or in care, missing/unknown or deceased family, family in hospital, care, or prison, their schooling, substance use, and their partners and offspring. Drawing the genogram facilitated early reciprocity and empathic engagement. Histories of adverse childhood experiences and lived trauma were volunteered during the development of their genogram. Questions were also asked about their future hopes and dreams. After drawing the genogram, the paediatrician completed a structured health interview followed by a structured clinical examination and utilised a clinical-data form to ensure reproducibility. Observed communication abilities, attentional traits, mood, and short- and long-term memory difficulties of the young person were noted. Height was measured with a wall-mounted stadiometer and weight was taken using a digital floor-scale. Body Mass Index (BMI) was calculated with online age- and gender-specific BMI-calculator of Centers for Disease Control (CDC) (<https://zscore.research.chop.edu/>). Facial morphometry was completed manually using the University of Washington (UW) Lip Philtrum Guides 1 and 2 and palpebral fissure length rule. Ear and eye examinations were completed with a portable Welch Allyn otoscope and ophthalmoscope. Hearing was screened using the

Rinne and Weber technique and a 512-Hz tuning fork.^{51,52} Blood pressure was measured using a manual Welch Allyn sphygmomanometer and Littmann cardiology stethoscope; blood pressure reference tables used were from *Pediatrics* (June 2009), vol. 123(6), pp. e972–e974. Tendon reflexes were elicited with a Queens tendon hammer.

Statistical methods

Descriptive analyses were conducted using IBM SPSS Statistics for Windows, version 24.0, released 2016 (IBM Corp, Armonk, NY, USA). Denominator of the overall data varied as 103 young people (103/113, 91%) completed the comprehensive clinical paediatric assessment and 98 young people (98/113, 87%) completed interview with the research officer. If denominator varied or data were missing, then the variation was cleared in the results.

RESULTS

Comprehensive Paediatric Medical History

Demographics

A total of 166 young people were eligible for inclusion in the study. Of these eligible young people, 113 (68%) assented and consented for participation in the study. Of these 113, 103 young people (103/113, 91%) completed the comprehensive clinical paediatric assessment and 98 (98/113, 87%) completed the interview with the research officer.⁵⁰ Most of the participants were males (96/103, 93%), aged 13–17 years; 40% were aged less than 16 years; 3% were aged 13 years, 17% were aged 14 years, and 20% were 15 years old. Just over half of the young people (52%) lived in the Perth metropolitan area prior to sentencing. In all, 73 young people (73%) were Aboriginal. Language diversity was common; most of the participants spoke an Aboriginal language (70%), including Aboriginal English (52%) as their “home” language.⁴⁹ The age, sex and ethnic profile of participants was similar for all young people at BHDC at the time of the study.

Family of origin and carer were unknown for 12 young people at the time of study participation.

In all, 62 young people (62/103, 60%) were in the care of their parent, most commonly their mother (50%). Half of the young people had one or no parent (53%) and 27 young people (27/103, 26%) were in the care of a guardian, most often their grandmother (17%); 14 young people (14/98, 14%) were in the care of the Department for Child Protection and Family Services (now Department of Communities). Just over half of the young people (46/96; 51%) had siblings involved in juvenile justice, and more than half of the participants (57%) had an incarcerated family member.

Health History

Sleep difficulties were common (Table 1). Prior to detention, young people reported frequent waking up feeling tired (74/103, 73%) and 36% reported falling asleep at school. When in detention, around half had trouble in falling asleep (45/103, 44%) and reported symptoms of depressed mood and rumination associated with delayed onset of sleep (49/96, 51%). Prior to detention, over a quarter used substances to induce sleep (29/103, 28%). While in detention, nearly half had gastrointestinal symptoms (44/103, 43%) and one-quarter had dental pain (24/103, 23%). One-fifth had difficulty in identifying letters and words (21/103, 20%), difficulty in hearing normal talks (19/103, 18%), with aggravation from and hypersensitivity to loud noise (22/103, 21%). In all, 20% affirmed that they had daily cough and 20% had skin rashes at the time of the study (Table 1).

All female participants in this study (7/103, 1%) mentioned about their common experiences of sexual violence; male participants had no such experiences. One female disclosed multiple miscarriages in association with repeated episodes of gender-based violence. All females reported inconsistent use of barrier contraception not always by their choice. Two of the seven females (29%) reported about having diagnosed with a sexually transmitted disease. Five of the seven females (71%) reported having a long-acting contraceptive implant (Implanon™) inserted in their arm while in detention; 4/5 (80%)

TABLE 1 Medical History.

	N = 103 (%)		N = 103 (%)
Sensory		Skin	
Blurred vision	17 (17)	Rashes	17 (17)
Trouble in identifying letters and numbers	21 (20)	Hair loss	3 (3)
Bright light aggravates	15 (15)	Dental: toothache	24 (23)
Trouble hearing normal talking	19 (18)	Heart	
Earache	17 (17)	Knew that they have a rheumatic heart	5 (5)
Problems with loud noise	22 (21)	Respiratory	
Dizziness		Daily cough	17 (17)
Any reason	31 (30)	Asthma	13 (13)
Postural hypotension	14 (14)	Allergies	13 (13)
Sleep		Gastrointestinal symptoms	44 (43)
Trouble falling asleep	45 (44)	Kidney	
Depression, preventing sleep	49 (51)	Know they have a kidney problem	3 (3)
PTSD nightmares	20 (34)	Head	
Pain wakes from sleep	22 (21)	Ever been knocked out?	48 (47)
Told snores	24 (24)	Knocked out once	29 (28)
Really tired all the time	56 (55)	Knocked out twice	7 (7)
Wakes, still feeling tired	74 (73)	Knocked out thrice or more times	7 (75)
Falls asleep at school	37 (36)	Knocked out frequency unknown	5 (15)
Pain, wakes from sleep	22 (21)	Hospital	
Headaches wake you from sleep	18 (17)	Ever been to hospital	82 (80)
High fevers at night	13 (13)	Ever had surgery for injuries	44 (43)
Used substances to fall asleep prior to detention			29 (28)
Seizures and epilepsy		Gynaecology (n = 7 of the 103 participants)	
Told has epilepsy	3 (3)	Menorrhagia	4/7 (57%)
Told has seizures*	6 (6)	Dysmenorrhoea	4/7 (57%)

PTSD: post-traumatic stress disorder.

had associated menorrhagia and dysmenorrhoea following insertion, and at the time of interview were not receiving moderating oral hormonal adjuvants or iron replacement.

Sixteen young people (16/96, 17%) mentioned about receiving regular prescribed medication in detention, including oral medication for mood stabilisation (7/16), inducing sleep (3/16), and treating toothache (1/16), and topical medication for the skin

and ears (3/16), asthma prophylaxis (1/16) and rheumatic heart disease prophylaxis (1/16).

Young people affirmed being knocked out (48/103, 47%), with seven reporting for being knocked unconscious for three or more times (7/103, 15%) prior to detention. Most (82/103, 80%) of the young people had been to hospital at least in one case prior to detention, and 43% (44/103, 43%) had completed surgery for injuries prior to detention.

Injuries included fractures, wounds from environmental objects such as fence posts or adapted weapons (knives, bats and sticks), burns from using motorcycles, and injuries sustained from “play fighting” or “intentional fighting.” Young participants pointed to marks of injuries, recounting how they were sustained, for instance, breaking and entering through glass windows, climbing metal fences and avoiding arrest. Ongoing difficulties from these injuries included abnormal shape and swelling over old fracture sites and associated difficulties because of abnormal functioning.

Psychosocial history

Adverse SDOH were common among young people in the study. Mental health symptoms were acknowledged by nearly every second participant (Table 2) at the time of questioning about their psychosocial history. Half reported adverse childhood experiences (Table 3), including something frightening happening to them (48/92, 52%) or to someone close to them (47/90, 52%) and had persistent symptoms in keeping with criteria of post-traumatic stress disorder (PTSD; 48/103, 47%). Prevalence of attention deficit hyperactivity disorder (ADHD) symptoms were high among participants, including inattention as assessed by difficulty in concentrating (62/96; 65%) and distractibility (47/96, 49%); impulsivity as assessed by interruptions by people (47/96, 49%); and hyperactivity as assessed by not able to sit still (64/96, 67%). Young people affirmed that they had anger (60/96, 63%), sadness (39/96, 41%) and hopelessness (41/89, 46%) when asked “yes” or “no” about these emotions. Over one-third had experienced suicide of a family member (35/89, 39%) and 18% had suicidal ideation (16/91).

EDUCATION HISTORY

Most of the 98 young people interviewed by the research officer asserted that they liked school (62/96, 65%; Table 4). Of these participants, 59 attended school prior to detention (59/96, 61%) and

TABLE 2 Mental Health Symptoms.

Symptoms (variable n)	Number (%)
Difficulty in concentrating	62/96 (65%)
Interrupts people	47/96 (49)
Cannot sit still	64/96 (67)
Worries over and over	52/96 (54)
Gets distracted easily	47/96 (49)
Can't relax	47/96 (49)
Sadness	39/96 (41)
Anger	60/96 (63)
Hopeless	41/89 (46)
Family member committed suicide	35/89 (39)
Suicidal ideation	16/91 (18)
PTSD: adverse event to self	48/92 (52)
PTSD: adverse event to someone close	47/90 (52)

PTSD: post-traumatic stress disorder.

TABLE 3 Derived Adverse Childhood Experiences*.

	Number (%)
Incarcerated household member	59/103 (57)
One or no parent absent (deceased, missing, no contact)	55/103 (53)
Alcohol or other substance user in the house	46/103 (45)
Chronic mentally ill family member	29/103 (28)
Emotional neglect	21/103 (20)
Recurrent physical abuse	21/103 (21)
Physical neglect	20/103 (19)
Mother treated violently	14/103 (14)
Recurrent emotional abuse	13/103 (13)
Contact sexual abuse	4/103 (4)

**The basis of this information is a short psychosocial questionnaire and knowledge volunteered by participants when genogram was drawn. It was not collected using a standardised trauma scale but categorised in a similar manner.*

of these, 34 attended school on daily basis (34/59, 58%). For nearly half of the young participants (45/93, 48%), the last school grade attended was 2 years or more behind their expected schooling year

of their chronological age. The majority (87%) had been suspended for at least one time, two-thirds had left school permanently by the end of year 9 (63/96, 67%) and few were attending up to year 12 (4%).

TABLE 4 Education History.

Learning difficulties (n = 103)	Number (%)
Difficulty remembering new things	54/103 (53)
Told, has memory problems	39/103 (38)
Told, has learning problems	38/103 (37)
Told has ADHD	5/103 (5)
Education (n = variable)	
Has been suspended at least once	85/98 (87)
Likes school	62/96 (61)
Had been attending school before Banksia	59/96 (61)
Last attended school in their primary years	4/96 (4)
Last attended school in year 7	10/96 (10)
Last attended school in year 8 or 9	49/96 (50)
Last attended school in year 10, 11, or 12	34/96 (35)
Difference between expected school year and last grade attended (n = 98)	
No difference	23 (23)
1 year behind	27 (28)
2 years behind	22 (22)
3 years behind	12 (12)
4 and more years behind	9 (9)
Unknown	10 (10)

ADHD: attention deficit hyperactivity disorder.

Nearly two-thirds had difficulty in concentrating (62/96, 65%) and sitting still (64/96, 67%). Two-thirds (69%) affirmed that their elevated energy got them into trouble. Over half of the participants acknowledged that they had difficulty remembering new things (54/103, 53%). Nearly half of them accepted that they had trouble waiting for a turn (47/96, 49%) and interrupting people (47/96, 49%). Although five had been diagnosed with ADHD prior to detention, none was receiving medication at the time of participating in the study.

Substance use history

Substance misuse began from a young age for many of the study participants (Table 5). The earliest reported age for starting smoking cigarettes was 5 years. Marijuana and alcohol were used from the age of 8 years. The majority were smoking cigarettes (78/94, 83%) and using marijuana (73/94, 78%) in the month prior to detention; and two-thirds reported their daily use (62% and 67%, respectively). Children as young as aged 10 years had used methamphetamine. One-third had used methamphetamine (35/94, 37%) in the month prior to detention, and of these, half used on daily basis (49%), and most had shared needles.

Comprehensive Paediatric Clinical Examination

The 103 young participants who completed clinical examination had no acute medical issues.

TABLE 5 Self-Reported Substance Use in the Month Prior to Detention.

	Alcohol N (%)	Cigarettes N (%)	Marijuana N (%)	Amphetamine N (%)	Others N (%)
Any substance use reported	63/95 (66)	78/94 (83)	73/94 (78)	35/94 (37)	18/94 (20)
Daily	3/63 (5)	48/78 (62)	49/73 (67)	17/35 (49)	1 (6)
2–3 days/week	19/63 (30)	15/78 (19)	4/73 (5)	2/35 (6)	0 (0)
4–6 days/week	3/63 (5)	1/78 (1)	4/73 (5)	1/35 (3)	0 (0)
Weekly	12/63 (19)	4/78 (5)	7/73 (10)	3/35 (9)	3 (17)
Monthly	15/63 (24)	4/78 (5)	4/73 (5)	4/35 (11)	2 (11)
Occasionally	10/63 (16)	4/78 (5)	3/73 (4)	5/35 (14)	7 (39)
Unknown	1/63 (2)	2/78 (3)	1/73 (1)	3/35 (1)	5/18 (3)

All participants who met criteria for an FASD diagnosis (N = 36) had less than three sentinel facial features⁴⁸: 26% of the young participants had railroad track ears, 18% had camptodactyly, 5% had clinodactyly, and 13% had a hockey stick palmar crease. Musculoskeletal changes associated with prenatal alcohol exposure, such as restricted supination (28%) and pronation (10%), were also detected.

Chronic health conditions were determined in many of the participants. Almost one-fifth (18%) had acanthosis nigricans and 14% had elevated blood pressure relative to normal parameters for their age. Ten participants were obese, seven had striae and two had an enlarged liver. Nearly two-thirds (63%) had dental caries. Four had tenderness of the kidneys on palpation; two had a symptom history and clinical manifestations consistent with an active urinary tract infection; and two had symptom history and manifestations consistent with active pelvic inflammatory disease.

Musculoskeletal and skin manifestations were identified in a number of participants. Twenty of the young participants (19%) were determined clinically hypermobile on examining the range of movement of their hands, wrists, elbows and knees. More than one-third (38%) had abnormal musculoskeletal shape and scarring at sites of previous injury. The size and nature of the skin-scarring was consistent with a corroborative history of delayed and complicated wound-healing. Skin infections included fungal onychomycoses (10%) and tinea corporis (5%), cystic acne (8%), active scabies (2%) and active head lice (2%). Fifteen young participants had tattoos (14%), yet only 3 of the 15 (20%) had their tattooing completed professionally.

Abnormal neurological examination findings were common (64%). Half (50%) had persistent soft neurological manifestations (Physical and Neurological Examination for Soft Signs [PANESS]) and 6% had a persistent crossed adductor reflex. Rinne and Weber screening for conductive and sensorineural hearing was abnormal in case of 20 young participants. The majority of participants

passed screening of their visual acuity, with a few demonstrating refractory error or astigmatism, and 15 had asymmetrical visual fields. Five young people had one or more café-au-lait markings, yet none met criteria for neurofibromatosis.

Fluctuating mood, difficulty in sustaining attention, hyperactivity, impulsivity, and hyper-vigilance were commonly observed in participants and noted by the paediatrician during comprehensive clinical examination. Cognitive impairment and communication difficulties were also noted by the paediatrician at the time of comprehensive clinical examination. A total of 23 young participants completing full multidisciplinary assessment were proven to have one or two domains of severe impairment and 65 had three or more domains of severe impairment. Over half of the young people were found having impaired attention (55%), impaired executive function (54%), and also language impairment (45%) not attributable to low English proficiency.

DISCUSSION

Results of the comprehensive clinical paediatric assessment of a representative sample of young people sentenced to detention in WA confirmed known vulnerabilities of these people involved in juvenile justice services.^{5-7,10-13,53-56} Young people in this study had complex, chronic and legally important health, social, cultural, educational, and neurodevelopmental requirements. All had important factors of driving risk to, allowing mitigation and supporting diversion from juvenile justice;^{20,57,58} 40% of the young people involved in this study were aged less than 16 years.^{20,57,58}

The paediatric assessment commonly determined chronic sleep difficulties, including delayed onset of sleep and poor sleep quality, which were detrimental to learning and memory ability, metabolism and mental health. Early onset of social difficulties and early school failure were also common. Self-regulation and attentional difficulties, and comprehension and communication difficulties

were readily observed by the paediatrician at the time of comprehensive clinical paediatric assessment. In routine comprehensive clinical paediatric practice, any child or adolescent with these histories, examination and clinical findings, would be referred through their education and health providers to complete a comprehensive neurodevelopmental assessment.

Interview of young participants and their carers confirmed early onset of behavioural and learning difficulties, yet few obtained contemporary referrals for comprehensive assessment to determine education and rehabilitation vulnerabilities: 42% were found to be 2 years or more behind their expected schooling year of their chronological age; 89% of participants were suspended from school at least for one time; and 59% had disengaged from school by the end of 9 years of age. Failure to complete comprehensive health and neurodevelopmental assessments precluded the development of individualised education programme (IEP) and behaviour management plans. Individualised plans enable a child and adolescent to experience educational and social success, learn and remain in school, and improve esteem and hope. Individualised education and behavioural plans would have facilitated school retention and diverted them from risk and juvenile justice.

Abnormal musculoskeletal manifestations associated with previous injuries were suggestive of unmet rehabilitation requirements. Rehabilitation was still required for some of these young participants in this study during their detention. As we did not have access to health records, the nature of recommended care for injuries and adherence to treatment remained unknown.

The prevalence of traumatic brain injury (TBI), not requiring hospitalisation, among the young people (47% ever, and 15% multiple episodes) in this study was higher than reported among a New South Wales (NSW) cohort of incarcerated young people (32% ever, and 13% multiple episodes).²³ In all, 36% of young participants of this study had FASD,^{43,44,48} and 65% had three or more domains

of neurodevelopmental impairment. Case histories, including TBI, as well as study test outcomes were carefully considered when FASD diagnoses and other brain-based impairments were deemed present.^{43,44,48}

The findings of polysubstance use by the young participants of this study was consistent with Australian surveys of secondary school students^{59,60} and young people involved in justice.^{61,62} Use of methamphetamine (37%) and alcohol consumption (66%) prior to detention was less prevalent among young people in WA than use and consumption reported in NSW (41% and 97%, respectively).^{63–65}

Lived trauma was common to the young participants of this study as victims and as members of families with intergenerational disadvantage, trauma, and colonisation (Tables 2 and 3). Types of lived-trauma were consistent with previous studies,^{5–7,10–13,16,17,23,33,53–56,61,62} yet the prevalence was lower than encountered in a survey of young people in juvenile detention in NSW (81% females and 57% males).⁶⁵ Lower rate in the WA study could be because the authors could ask only a limited number of approved questions, and a standardised trauma screening tool was not approved for use. The prevalence of mental health requirements among the WA participants was equal to the findings in NSW.^{8,61,65} Suicidal ideation among detained young people in WA was higher than found in Victoria. Victorian studies had determined that 16% of young people had self-harmed in the prior 6 months, and of those almost a quarter had self-harmed with suicidal intent;^{8,65} differences may exist relative to methodology.

The psychosocial findings reported in this paper were obtained by research officer and paediatrician using direct questions and contrast to the positive themes identified through a culturally appropriate qualitative methodology of yarning employed with the same young people.⁴⁵ Culturally appropriate engagement with the young people, completed by an Aboriginal research officer (seventh author, SH), gave voice to the young people's hopes and dreams, and emphasised the importance and power of culturally appropriate ways of working and being with

any person.^{45,46,66} Culturally appropriate engagement revealed positive stories and hope among the young people even after they had witnessed complex and traumatic events. Standardised methods of direct questioning were like a barrier to revealing their post-traumatic growth.

Many participants reported sleep difficulties aggravated by disrupted mood and autonomic arousal. Young participants described rumination delaying their onset of sleep, including perseverated thoughts about missing family, friends and country. These symptoms were more frequent than discovered in previous studies and could be seen as consistent with dysphoric arousal, a known association with trauma⁶⁷ as well as miswiring of the amygdala and limbic brain regions found in FASD. Sleep difficulties could be used as an adjunct for identifying mental health difficulties from lived trauma⁶⁷ as well as FASD. Sleep difficulties had negative impact on memory abilities, language development, cognitive function, immune and metabolic health.⁶⁸ Medicating onset of sleep neither improves quality and length of sleep nor mitigates the lived-trauma and mental health requirements contributing to delayed onset of sleep, except in the case of clonidine—an alpha-adrenergic agonist that can down-regulate sympathetic overdrive. Understanding along with sleep hygiene education is required an individual's specific mental health and physical health risks for poor sleep.

This study found nearly half (44%) of the young people sentenced to detention in WA had a sibling already involved in justice services. These findings provide evidence for the routine proposition of comprehensive clinical paediatric health and neurodevelopmental assessments for every young person involved in juvenile justice services along with their siblings. Augmenting diagnostic and therapeutic health and social support to families experiencing engagement of their child with juvenile justice can provide opportunities for diverting the index child, and any siblings with shared risks, into health and rehabilitation services.^{20,57,58} Neurodevelopmental assessments of every young person involved in

juvenile justice services can inform and support therapeutic engagement with young person and may mitigate involved risks and harm.⁶⁹

Comprehensive diagnostic assessments, individualised treatments and culturally safe healing initiatives can mitigate risks, build skills and divert young people away from statutory services, including juvenile justice.^{20,57,58,70–74} There is a suggestion that an episode of juvenile justice detention may be the occasion for any child or adolescent to complete a comprehensive MDT health assessment to address previously unmet physical and mental health requirements. For efficacy, the MDT must include, as a minimum requirement, a neuropsychologist, speech and communication therapist, paediatrician, occupational therapist and a cultural navigator.^{32,74,75} Opportunity for therapeutic intervention and healing based on outcomes of a comprehensive MDT assessment could be transformative for the child and adolescent, their family and their community.^{57,74,76}

Limitations

It was beyond the scope of this study to conduct pathology or imaging requests. Such measures would have extended clinical findings and provided further evidence to inform treatment for neurodevelopmental, metabolic, infectious, musculoskeletal, dermal, visual, dental, renal, cardiovascular and sexual health requirements. Standardised screening questions to determine lived trauma (i.e., ACEs questionnaire) could have better informed diagnostic formulations and recommendations. All would have allowed comparison to similar studies of vulnerable young people, so better to inform policy.

All conditions diagnosed for young people were notified to the appropriate staff of detention centre, yet there was no provision within the research framework to permit follow-up of outcomes by the research team.

Aboriginal and Torres Strait Island young people were overrepresented in WA's Juvenile Justice System. This study had variable and culturally

appropriate ways of working with young people and had implications for the study findings.

CONCLUSION

Young people sentenced to detention in WA have high rates of unrecognised and unmet health and wellbeing requirements, including undiagnosed FASD. They are sentenced to detention for unacceptable behaviours, likely to be associated, at least in part, with their neurodevelopmental difficulties, lived and iterative trauma. SDOH play a significant role in their lives, including access to diagnostic and treatment services, appropriate IEP supports in schools, and culturally relevant services. Comprehensive clinical paediatric MDT for health and neurodevelopmental assessments in this study identified multiple and serious impairments and health issues. These findings support routine comprehensive clinical paediatric MDT assessments of all young people at BHDC entry in order to identify their immediate and long-term requirements and to guide and improve their rehabilitation. Key to the success of these efforts is translation of outcomes through ongoing reassessment of systems of care as well as education and training of staff at BHDC.

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