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# Predictors of specialist referral for developmental and behavioural problems in a Queensland urban Aboriginal and Torres Strait Islander community: a cross-sectional study

## Background

The prevalence of developmental and/or behavioural problems is greater among Aboriginal and Torres Strait Islander children, compared with their non-Indigenous counterparts. We aimed to identify predictors of specialist paediatric referral for these problems that could enable primary health professionals to identify at-risk children and implement early interventions.

## Methods

A cross-sectional study of urban Aboriginal and Torres Strait Islander children aged 0–14 years having annual child health checks from September 2010 to February 2012 was undertaken. Predictors of paediatric referral were identified using univariable and multivariable analyses.

## Results

Of the 183 eligible children, 30% were referred to a paediatrician. Parental/carer mental illness was self-reported in 36% of cases and these children were more likely to be referred (OR = 3.07; 95% CI: 1.44, 6.57).

## Discussion

The strong association between paediatric referral for behavioural and/or developmental problems and self-reported parental/carer mental illness highlights the intergenerational nature of health and social disadvantage.

## Keywords

Australia; Oceanic Ancestry Group; referral and consultation; population groups; developmental disabilities; child behaviour disorders

*Advances in the science of early childhood development are changing perceptions of population health, health promotion and disease prevention across the lifespan.<sup>1</sup> Adverse experiences and associated chronic stress have a negative impact on child development, educational achievement and adult health and wellbeing, contributing to inequality within and between populations.<sup>2</sup>*

The health, social and economic disparity experienced by Aboriginal and Torres Strait Islander peoples needs to be considered in this context. They experience a higher prevalence of perinatal risk factors, exogenous exposures (environmental toxins), chronic stress and socioeconomic disadvantage, which contribute to the increased prevalence of developmental and/or behavioural problems.<sup>3,4</sup> Furthermore, a recent study identified that the divergence in developmental progress commences very early in childhood, and Aboriginal and Torres Strait Islander children show significantly slower than expected overall developmental progress.<sup>5</sup>

Developmental and behavioural problems are not distinct disorders and are often present in the same child. Identification of children at risk of developing these problems enables the initiation of interventions to prevent or ameliorate their impact.<sup>6</sup> Therefore, this study aimed to identify children at risk of specialist paediatric referral for developmental and/or behavioural problems.

## Methods

### Setting and data collection

This cross-sectional study used data from the routinely conducted annual child health checks

(CHCs) at the Inala Indigenous Health Service (IIHS). The IIHS is a Queensland Government general practice situated in south-western Brisbane that provides primary healthcare to Aboriginal and Torres Strait Islander peoples.<sup>7</sup> A paediatrician conducts two clinics a week at the IIHS, enabling integrated primary/secondary care for children requiring specialist paediatric care.

The CHC is a comprehensive health assessment for Aboriginal and Torres Strait Islander children aged 0–14 years (inclusive). The CHC includes preventive healthcare, identification of new diagnoses and commencement of appropriate management.<sup>8</sup> The IIHS aims to conduct a CHC annually on all eligible children attending the clinic; an electronic alert, reminder and recall system supports this aim.

CHC information is entered directly into computerised templates by child health nurses and general practitioners (GPs) and is attached to the patient's electronic medical record. The data also automatically populate a Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA) for research purposes.<sup>9</sup>

## Participants

All children who had had a CHC between September 2010 and February 2012, and whose parents/carers consented to participation in the research were eligible for this study. For children having more than one CHC during the study period, only data from the first CHC were included in the analysis.

## Statistical analysis

The paediatrician reviewed the GPs' referral letters to ascertain our key outcome variable

– paediatric referral for developmental and/or behavioural problems. These problems included parental or GP concerns about gross motor skills, self-care and social interaction, hearing and language, hand–eye coordination, cognition, academic performance and problems with conduct, hyperactivity or inattention.

Variables in the CHC associated with developmental and/or behavioural problems were imported into statistical software Stata version 11 (Stata Corp, College Station, Tex, USA) for analysis. Variables included age and gender of the child, history of middle ear disease or snoring (parental/carer report), self-reported parental/carer physical and mental ill health, and socio-demographic characteristics including single-parent households, parental employment and number of people in the household.

Frequencies and percentages were calculated and, where possible, participants’ socio-demographics were compared with national data.<sup>10</sup> Univariable logistic regression determined the relationships between the independent and outcome variables, and variables with a  $P < 0.1$  were included in the multivariable analysis. We assessed for non-response bias using multivariable logistic regression to compare participants in the complete-case analyses with those who were excluded but had values for key demographic variables and the outcome variable ( $n = 244$ ). A  $P < 0.05$  was used to determine statistical significance all multivariable analyses.

The study had ethical approval from the Metro South Health Services District Human Research Ethics Committee (approval number HREC/10/QPAH/242 Amendment 2) and the support of

the Inala Aboriginal and Torres Strait Islander Community Jury for Health Research.

## Results

Of the 276 children having CHCs in the study period, parental/carer consent to participate in the research was gained for 215 children (78%); 183 children (66%) had data for all variables of interest and were included in this study. Of these, 90 children (49%) were aged 0–5 years and 110 (60%) were male. Participants were Aboriginal (93%), Torres Strait Islander (4%) or both Aboriginal and Torres Strait Islander (3%) (*Table 1*). Compared with national figures,<sup>10</sup> our study had higher rates of single-parent households (53%, compared with 23% Aboriginal and Torres Strait Islander children nationally) and parents or carers with self-reported mental health problems (38%, compared with 21% for non-

**Table 1. Individual, familial and socioeconomic characteristics of eligible children**

Paediatrician referral					
	Overall n (%)	Yes n (%)	No n (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<b>Gender</b>					
Female	73 (40)	8 (15)	65 (50)	1.00 (reference)	1.00 (reference)
Male	110 (60)	46 (85)	64 (50)	5.84 (2.56, 13.34)*	5.44 (2.26, 13.09)*
<b>Age (years)</b>					
0–5	90 (49)	20 (37)	70 (54)	1.00 (reference)	1.00 (reference)
6–10	68 (37)	29 (54)	39 (30)	2.60 (1.30, 5.20)*	2.18 (1.00, 4.75)*
11–14	25 (14)	5 (9)	20 (16)	0.88 (0.29, 2.63)	0.89 (0.27, 2.96)
<b>Snoring</b>					
No	128 (70)	30 (56)	98 (76)	1.00 (reference)	1.00 (reference)
Yes	55 (30)	24 (44)	31 (24)	2.53 (1.29, 4.95)*	1.95 (0.91, 4.16)
<b>Number of people in the house</b>					
2–6	198 (76)	41 (76)	99 (77)	1.00 (reference)	1.00 (reference)
7–12	62 (24)	13 (24)	30 (23)	1.05 (0.50, 2.21)	1.46 (0.63, 3.46)
<b>Experience of stressful event</b>					
No	112 (61)	29 (54)	83 (64)	1.00 (reference)	1.00 (reference)
Yes	71 (39)	25 (46)	46 (36)	1.56 (0.82, 2.96)	1.33 (0.63, 2.82)
<b>Self-reported parental/carer mental health problems</b>					
No	118 (64)	25 (46)	93 (72)	1.00 (reference)	1.00 (reference)
Yes	65 (36)	29 (54)	36 (28)	3.00 (1.55, 5.79)*	3.07 (1.44, 6.57)*
Eligible children had had Child Health Checks at Inala Indigenous Health Service ( $n = 183$ ), partitioned by whether they had been referred to the paediatrician ( $n = 54$ ) or not ( $n = 129$ ) and crude and adjusted odds ratios (OR) with associated 95% confidence intervals (CIs) for predictors of paediatric referral estimated from logistic regression; * $P < 0.05$					

Indigenous children nationally). Paediatric referrals for developmental and/or behavioural problems were received for 54 (30%) participants. One child was referred to the paediatrician during this period for management of medical problems and was excluded from this analysis.

In the unadjusted analyses, males were nearly six times more likely than females to be referred (odds ratio (OR) 5.84; 95% confidence interval (CI) 2.56, 13.34) and children of parents/carers with self-reported mental illness were three times more likely to be referred (OR 3.00; 95% CI 1.55, 5.79; *Table 1*). Children aged 6–10 years were more than twice as likely to be referred as children in the referent age group (children aged 0–5 years; OR 2.6; 95% CI 1.30, 5.20). After adjustment, the relationship between paediatric referral and self-reported parental/carer mental illness was stronger (OR 3.07; 95% CI 1.44, 6.57). There were no differences in gender, age or paediatric referral rates between those included in the analysis and those excluded (*Table 2*).

## Discussion

We found that referral to a paediatrician for developmental and/or behavioural issues was

associated with being male, aged 6–10 years (compared with younger children), having more than six people in the household and self-reported parental/carer mental illness. One-third of parents/carers reported mental health problems and their children were more than three times more likely to be referred to the paediatrician than other children.

The main strength of our study is the use of routinely collected clinical information, thus eliminating the customary burden of research participation. However, there were also some limitations. The primary purpose of the CHC is clinical care of individual patients rather than research, so the clinical needs of the child and time pressures on the parent/carer and clinical staff influence whether a CHC is done, and the completeness of the data collection. The cross-sectional nature of our inquiry prevents any determination of causality and the small number of participants precluded any comparison of issues between age groups.

This study was restricted to data obtained from the CHCs and therefore analyses of the outcomes of the paediatric review were beyond the study's remit. The paediatrician categorised the reasons for

the referrals, which determined who was included in this study, on the basis of her clinical experience; this may have introduced bias. Furthermore, referral depended on preliminary assessment by the GP of the existence of behavioural and/or developmental problems, which may have introduced errors of commission or omission. However, the GPs and the paediatrician are experienced clinicians and consequently, it is unlikely that either of these issues would have fundamentally altered the results of this study.

This study was conducted in one primary health service and the results may not be generalisable to other urban contexts or Indigenous primary healthcare services, although there is little reason to assume significant differences in results.<sup>11</sup>

Overuse of alcohol in the household, particularly by the parent/carer, has been shown to be associated with the likelihood of being at high risk of clinically significant emotional or behavioural difficulties.<sup>4,5</sup> Although household alcohol consumption is assessed in the CHC, the high level of missing data precluded its inclusion in the analysis. Alcohol misuse by the parent/carer may be a symptom or cause of mental illness and its omission from our analysis may have been a confounding factor. Despite these limitations, our results do highlight the need for primary healthcare providers to identify and address parent/carer mental illness before it has an impact on the child's development and behaviour.

We assessed parental/carer mental illness through self-reporting or subjective assessment by the child health nurse, resulting in possible categorisation errors. Aboriginal and Torres Strait Islander peoples across Australia have significantly higher rates of psychological distress, compared to their non-Indigenous counterparts,<sup>10</sup> suggesting the self-reported rates of mental illness identified in our study, although alarmingly high, are not surprising.

The strong relationship between self-reported parental/carer mental illness and paediatric referral for developmental or behavioural problems that we identified is not unexpected and there is a well-documented interplay between maternal and child distress,<sup>12</sup> which has important implications for clinical practice. Parental mental illness may increase the risk of negative child health outcomes via its known associations with increased risk of poverty, social isolation and involvement with the child protection system, or by compromising the way

**Table 2. Multivariable respondent analysis showing the likelihood of being included in the study**

Characteristics	Included OR (95% CI), n = 233
<b>Gender</b>	
Female	1.00 (reference)
Male	1.00 (0.55, 1.83)
<b>SES tertiles</b>	
Low	1.00 (reference)
Medium	1.13 (0.56, 2.25)
High	2.40 (1.12, 5.10)
<b>Indigenous ancestry</b>	
Both parents	1.00 (reference)
Mother only	0.88 (0.46, 1.70)
Father only	0.96 (0.47, 1.96)
<b>Outcome</b>	
Paediatric referral	
No	1.00 (reference)
Yes	1.04 (0.52, 2.10)
NB: The analysis compared the group included in the study (n = 183) with those not included due to not responding to predictors (n = 61). A further 32 non-responders were excluded from this analysis due to levels of missing data prohibitive for multivariable analysis.	

parents interact with and care for their child.<sup>13,14</sup> Therefore, assessing adult mental health, parent–child interactions and child mental health in the CHC could be beneficial, but these benefits may not compensate for the concomitant increase in length of the health check and could result in more missing data.

Using routinely collected clinical data, our study identified factors associated with paediatric referral for developmental and/or behavioural problems in an urban Aboriginal and Torres Strait Islander context. In particular, the high prevalence of self-reported parental/carer mental illness and the strong association between this and specialist paediatric referral were particularly troubling. More support is needed for recognition and management of mental illness in this community and more research is needed to determine the best way to provide this support. We may still have some way to go to close the gap in social disadvantage affecting urban Aboriginal and Torres Strait Islander children in Australia.

## Implications for general practice

Self-reported parental/carer mental illness was extremely common in this study, and was significantly linked to paediatric referral of children for developmental and/or behavioural problems. Appropriate assessment, treatment and management are essential for the children being referred and their parents/carers, to make meaningful and sustained differences in this vulnerable and disadvantaged population.

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## References

1. Shonkoff JP, Garner AS. The lifelong effects of early childhood adversity and toxic stress. *Pediatrics* 2012;129:e232–46.
2. Walker SP, Wachs TD, Grantham-McGregor S, et al. Inequality in early childhood: risk and protective factors for early child development. *Lancet* 2011;378:1325–38.
3. Cappiello MM, Gahagan S. Early child development and developmental delay in indigenous communities. *Pediatr Clin North Am* 2009;56:1501–17.
4. Zubrick SR, Silburn SR, Lawrence DM, et al. The Western Australian Aboriginal Child Health Survey: The Social and Emotional Wellbeing of Aboriginal Children and Young People. Contract No.: ISBN 0 9579494 7 2 (v2). Perth: Curtin University of Technology and Telethon Institute for Child Health Research, 2005.
5. McDonald JL, Comino E, Knight J, Webster V. Developmental progress in urban Aboriginal infants: A cohort study. *J Paediatr Child Health* 2012;48:114–21.
6. Christopher Sheldrick RC, Merchant S, Perrin EC. Identification of developmental–behavioral problems in primary care: a systematic review. *Pediatrics* 2011;128:356–63.
7. Hayman NE, White NE, Spurling GK. Improving Indigenous patients' access to mainstream health services: the Inala experience. *Med J Aust* 2009;190:604–06.
8. Coleman JJ, Spurling GK, Askew DA, Hayman NE. Indigenous child health checks: the view from the city. *Med J Aust* 2011;194:535–36.
9. Spurling GK, Askew DA, Schluter PJ, Hayman NE. Implementing computerised Aboriginal and Torres Strait Islander health checks in primary care for clinical care and research: a process evaluation. *BMC Med Inform and Decis Mak* 2013;13:108.
10. Australian Institute of Health and Welfare. Aboriginal and Torres Strait Islander Health Performance Framework 2012 report: Queensland. Cat. no. IHW 85. Canberra: AIHW, 2013.
11. Rothman K, Greenland S. *Modern epidemiology*. 2nd ed. Philadelphia: Lippincott Williams & Wilkins, 1998.
12. Elgar FJ, McGrath PJ, Waschbusch DA, Stewart SH, Curtis LJ. Mutual influences on maternal depression and child adjustment problems. *Clin Psychol Rev* 2004;24:441–59.
13. Reupert A, Maybery D, Kowalenko, NM. Children whose parents have a mental illness: prevalence, need and treatment. *MJA Open* 2012;1(Suppl 1):7–9.
14. Kowalenko NM, Mares SP, Newman LK, Sved Williams AE, Powrie RM, van Doesum KTM. Family matters: infants, toddlers and preschoolers of parents affected by mental illness. *MJA Open* 2012;1(Suppl 1):14–17.

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