Parental offending and children's emergency department presentations in New South Wales, Australia

Tyson Whitten^a, BPsych/BCCJ (Hons), PhD; Melissa J. Green^{a,b}, BA, MLitt, PhD; Kristin R. Laurens^{a,c}, BSc (Hons), PhD; Stacy Tzoumakis^d, BSc, MSc, PhD; Felicity Harris^a, BA, PGDipPsych, MClinEpi; Vaughan J. Carr^{a,b,e}, MB, BS, MD, FRCPC, FRANZCP; Kimberlie Dean^{a,f}, BMedSci (Hons), MBBS, MRCPsych, MSc, PhD, FRANZCP.

Affiliations: ^a School of Psychiatry, University of New South Wales, Sydney, NSW, Australia; ^b Neuroscience Research Australia, Sydney, NSW, Australia; ^c School of Psychology and Counselling, and Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, QLD, Australia; ^d School of Social Sciences, University of New South Wales, Sydney, NSW, Australia; ^e Department of Psychiatry, Monash, University, Melbourne, VIC, Australia; ^f Justice Health & Forensic Mental Health Network, Matraville, NSW, Australia.

Address correspondence to: Assoc. Prof. Kimberlie Dean, School of Psychiatry, University of New South Wales, Sydney, NSW, Australia [k.dean@unsw.edu.au], +61 438 655 174.

KEY MESSAGE

What's Known on This Subject? The children of parents with a history of criminal offending are at a greater risk of a range of poor outcomes, including potentially avoidable adverse health events.

What This Study Adds: In a population cohort of 72,772 children and their parents, parental criminal offending was associated with a higher incidence of child emergency department presentation for any reason and for potentially avoidable physical injury, even after accounting for key confounding factors.

ABSTRACT

Objectives: Children whose parents have a history of criminal offending may be at risk of higher rates of Emergency Department (ED) presentation, along with other adverse health outcomes. We used data from a large, population-based record linkage project to examine the association between maternal and paternal criminal offending and the incidence of ED presentations among child offspring.

Method: Data for 72,772 children with linked parental records were drawn from the New South Wales Child Development Study. Information on parental criminal offending (spanning 1994-2016) and child ED presentations (spanning 2005-2016; approximately ages 2-12 years) was obtained from linked administrative records. Cox Proportional Hazards regression analyses were conducted to examine the association between parental offending, and the incidence of children's ED presentations for any reason, and for physical injury, while accounting for important covariates.

Results: Child rates of ED presentation, particularly for physical injury, were higher among those with parental history of criminal offending, after adjusting for covariates. The magnitude of the association was higher for paternal criminal offending (*ED presentation for any reason*: HR = 1.44 [95% CI = 1.41-1.48]; *physical injury*: HR = 1.70 [95% CI = 1.65-1.75]) than maternal criminal offending (*any reason*: HR = 0.99 [95% CI = 0.95-1.03]; *physical injury*: HR = 1.05 [95% CI = 1.00-1.10]).

Conclusion: The children of parents, particularly of fathers, with a history of criminal offending have an increased incidence of ED presentation, including for potentially avoidable physical injury. These findings require replication and further research to understand the mechanisms underlying these associations.

There were 7.8 million Emergency Department (ED) presentations across Australia in 2017.¹ Young children aged 0-4 years, especially boys, are among the most common groups presenting to the ED, with presentations for unintentional or accidental injuries being particularly frequent in this age group.¹⁻² For some children, an ED presentation represents a potentially avoidable adverse health event for which the understanding of risk factors could inform preventative efforts.³

Children from families experiencing significant adversity, including parental mental illness⁴⁻⁵ and socioeconomic disadvantage,^{3,6} are at a higher risk of adverse health events, including preventable physical injuries that result in ED presentations.⁷⁻¹¹ Families that experience severe adversity are more likely to engage in unsafe behaviours, be less aware of child safety precautions, and, owing to barriers in accessing health services, are more likely to attend emergency departments as their usual source of health care.¹²⁻¹⁶ Parental offending is a known indicator of serious parental and family adversity¹⁷⁻¹⁸ that may also exacerbate factors that negatively impact offspring health.¹⁹⁻²⁰

Although relatively unexplored, parental contact with the Criminal Justice System (CJS) may be a marker for children at risk of adverse health events and ED presentations. To date, only one study has explored the association between parental criminal offending and offspring ED presentations in childhood and adolescence.²¹ This study found that state-recorded indicators of social adversity, including parental mental illness, poverty, and parental contact with the CJS, were independently associated with an increased risk of ED presentations that did not result in admission to hospital among children aged 17 years or less.

In the current study, we aimed to establish the incidence of ED presentation in childhood for offspring of parents with a history of contact with the CJS, as well as the relative incidence of ED presentation for physical injury in particular, in a population cohort of children and their parents from New South Wales (NSW), Australia. We also considered the role of the sex of the parent and of the child, as well as accounting for a range of potential explanatory factors associated with child health, including

parental mental illness and socioeconomic status, as well as Aboriginal and/or Torres Strait Islander background,²² and mother's age at child's birth.²³ This work extends our previous studies of associations between parental contact with the CJS and child health and development outcomes using linked administrative data from the New South Wales Child Development Study (NSW-CDS).²⁴⁻²⁵

METHODS

Data were drawn from a population cohort of 91,635 children in the New South Wales Child Development Study (NSW-CDS; <http://nsw-cds.com.au/>), a longitudinal record linkage project based in the Australian state of NSW that combines data from multiple government agencies (i.e., health, education, justice, child protection services, and vital statistics) for children and their parents.²⁶⁻²⁷ Children in the NSW-CDS were born between 2003 to 2005, and encompasses 99.7% of children who entered full-time schooling (kindergarten) in NSW in 2009, at around 5 years of age. Record linkage was completed by the Centre for Health Record Linkage (<http://www.cherel.org.au/>) using probabilistic linkage methods that adhere to strict privacy protocols. The minimum matching variables used were name, date of birth, residential address, and sex.²⁶⁻²⁷ The majority of children were linked to the parental records of their mothers ($n = 75,184$, 82.0% of the cohort) and fathers ($n = 72,772$, 79.0% of the cohort) using data from the NSW Register of Births, Deaths, and Marriages - Birth Registration records. Demographic profiles indicate that the NSW-CDS cohort is comparable to the NSW population.^{26,28} For this study examining the association between parental criminal offending and children's incidence of ED presentation, data were limited to the 72,772 children who had linked records available for both their mother and father.

Measures

Emergency department presentation

The NSW Ministry of Health's Emergency Department Data Collection (EDDC) includes information on ED presentations from the majority of NSW public hospitals between January 1st 2005 and June 30th 2016. Public hospitals provide 93% of all emergency department services in Australia,¹ and, of the 150 ED centers in NSW, the largest 90 contribute data to the EDDC, covering the vast majority of the state population. Children's ED diagnoses were recorded by hospital staff at the point of care using the ICD-9CM (International Classification of Diseases-Clinical Modification), ICD-10AM (Australian Modification), or SNOMED (Systematized Nomenclature of Medicine) coding scheme. We harmonized the ICD-9CM and SNOMED codes with the ICD-10AM. In addition to data on ED presentations for any reason, ICD-10AM codes S00 through Y34, corresponding to physical injury diagnoses, were determined separately. Only the first diagnostic code was available for analysis. We were unable to identify ED presentations that occurred in infancy for most cases, as almost all children in the NSW-CDS were born 0-18 months before the commencement of the EDDC.

Parental criminal offending

Maternal and paternal criminal records were obtained from the NSW Bureau of Crime Statistics and Research (BOCSAR) Reoffending Database from January 1st 1994 to December 31st 2015; these records contain all finalized criminal legal matters dealt by the NSW CJS for individuals convicted of at least one offence. Based on the date of offence (or if unavailable, the date of arrest), we identified children whose mothers or fathers had committed a proven criminal offence of any type covered in the Australian and New Zealand Standard Offence Classification²⁹ after the child's birth, but before the first ED presentation identified in the records after 1st January 2005, for any reason and for physical injury.

Covariates

Maternal and paternal mental health service contact was obtained from the NSW Ministry of Health's Admitted Patient Data Collection (containing linked records from all NSW public and private hospitals, public psychiatric hospitals, and day procedure centers from July 1st 2000 to December 31st 2016), the NSW Mental Health Ambulatory Data Collection (containing linked records of public outpatient and community-based mental health services from January 1st 2000 to December 31st 2016), and the NSW EDDC. The children of mothers or fathers with a diagnosed mental disorder were identified if parents had at least one valid Chapter V (F00-F99) ICD-10AM primary or secondary diagnosis recorded in any of these data sets from January 1st 2000, to before the child's first ED presentation during the observation period.

Four socio-demographic factors were included in multivariate analyses of the association between parental offending and child ED presentations: (i) the child's sex (male/female) and (ii) Aboriginal and/or Torres Strait Islander background (yes/no) were derived from all available information among the linked record sets, (iii) Socio-Economic Index for Areas (SEIFA) was derived from the mother's residential postcode recorded in the NSW Ministry of Health's Perinatal Data Collection (PDC), and (iv) mother's age at the child's birth (three levels: ≤ 25 years vs. 25-35 years vs. >35 years) was derived from the PDC or the NSW Registry of Births Deaths and Marriages – Birth Registration records.

Statistical Analysis

All children with a linked mother and father record ($n=72,772$) were followed from birth to their first ED presentation for (i) any reason and (ii) physical injury occurring after the 1st of January 2005, or the end of the follow-up period (June 30th 2016), whichever came first. Children without a recorded ED presentation during the study period were right censored ($n = 13,318$) and comprised the comparison group for all analyses. Kaplan-Meier analyses using log rank chi-square tests were conducted to examine the impact of prior paternal and maternal criminal offending on days to any offspring ED presentation, and days to ED presentation for physical injury specifically. Unadjusted incident rates were computed for

exposure groups, as well as accompanying cumulative survival curves. Univariate and multivariate Cox Proportional Hazards regression analyses were conducted to test the relationships between maternal and paternal criminal offending and rates of children's ED presentation, accounting for the proposed covariate factors. Paternal and maternal criminal offending and mental illness were treated as time-varying factors, while all other covariates were fixed at the start of follow-up. All covariates indicated proportionality of hazards. For the Cox regression models, we report the Hazard Ratios (HR) and the 95% Confidence Intervals (95% CI) as measures of effect size and precision, respectively. Results were considered statistically significant if the 95% CI did not cross 1.00, with HR of 1.00 to 1.86 (or 1.00 to 0.54) interpreted as small in magnitude, 1.86 to 3.00 (or 0.54 to 0.33) as medium, and >3.00 (or <0.33) as large.³⁰ Due to reporting restrictions required to protect privacy, results were omitted for cells with fewer than 15 children. Analyses were conducted in IBM SPSS 24.³¹

Ethical Standards

This research was conducted with ethical approval from the NSW Population and Health Services Research Ethics Committee (PHSREC AU/1/289807 and PHSREC AU/1/1AFE112), and data custodian approvals granted by the relevant government departments. All procedures contributing to this work comply with the Helsinki Declaration of 1975, as revised in 2008.

RESULTS

Descriptive statistics

The descriptive statistics in Table 1 indicate that slightly more than half of the children in the cohort were male (51.7%), around one-fifth of children were born in areas classified as having high levels of socio-economic disadvantage (18.9%), most mothers (62.6%) were aged between 26 and 35 years at their child's birth, and relatively few children were identified as Aboriginal and/or Torres Strait Islander

(6.5%). The majority of children had at least one ED presentation for any reason during the period of observation (81.7%, $n = 59,454$). The most common reason for children's first ED presentation during the observation period were: *injury, poisoning and other external causes* (18.1%); *disease of the respiratory system* (16.6%), and; *abnormal clinical and laboratory findings* (10.6%) (see Supplementary Table S1 for ICD-10AM diagnoses at ED presentation). Children with at least one ED presentation for a physical injury comprised just under half the sample (44.2%, $n = 32,194$). The most common reasons for children's first ED presentation for physical injury during the study period were: *transport accidents*¹ (20.0%); *injuries to the head* (18.2%), and; *injuries to the wrist and hand* (12.7%) (see Supplementary Table S2 for ICD-10AM diagnoses for physical injury).

XXX TABLE 1 ABOUT HERE XXX

Survival analyses

Kaplan-Meier analyses indicate that the median days to ED presentation for any reason was significantly fewer amongst children with a history of paternal (median = 997 days; $\chi^2 = 3,095.11$, $p < .001$) or maternal (median = 1,021 days; $\chi^2 = 955.95$, $p < .001$) criminal offending, compared to those children without a history of paternal (median = 1,325 days) or maternal (median = 1,289 days) criminal offending, respectively. This translates to an incident rate of around 250 ED presentations per 1,000 person years for children with a father with a history of criminal offending, and 245 ED presentations per 1,000 person years for children with a mother with a history of criminal offending (See Table 2). The median days to ED presentation for physical injury was also significantly fewer amongst children with a history of paternal

¹ Transport accidents (ICD-10 AM code V01-V99) correspond to injuries either resulting from (i) collision between a vehicle and another vehicle(s), cyclist, pedestrian, or stationary object, or ; (ii) injuries resulting from a non-collision vehicle accident.

(median = 2,465 days; $\chi^2 = 4,442.55$, $p < .001$) or maternal (median = 2,422 days; $\chi^2 = 1,688.09$, $p < .001$) criminal offending, relative to children whose fathers (median = 3,549 days) or mothers (median = 3,464 days) had no history of criminal offending (incident rates of 151 and 150 ED presentations per 1,000 person years, respectively, for physical injury).

The univariate associations in Table 2 indicate that all covariates were significantly associated with higher incidence rates of ED presentation, both for any reason and for physical injury, with larger effect sizes observed for the latter outcome. Children's rate of ED presentation for *any reason* was more than one and a half times higher if they had a history of paternal (HR = 1.71 [95% CI = 1.67-1.74]) or maternal (HR = 1.60 [95% CI = 1.56-1.65]) criminal offending. Furthermore, rates of ED presentation for *physical injury* were more than twice as high if fathers (HR = 2.26 [95% CI = 2.21-2.32]) or mothers (HR = 2.12 [95% CI = 2.04-2.19]) had a history of criminal offending (see Supplementary Figures S1-4 for the one minus cumulative survival curves).

XXX TABLE 2 ABOUT HERE XXX

The results of the multivariate analyses on the incidence of children's first ED presentation during the observation period for *any reason* are presented in Table 3. After adjusting for all covariates, paternal criminal offending remained significantly associated with a greater incidence of child ED presentation (HR = 1.44 [95% CI = 1.41-1.48]), and the association was stronger than for any of the included covariates (with the difference reflected in the presence of non-overlapping confidence intervals). After adjustment, maternal criminal offending was no longer significantly associated with child ED presentation (HR = 0.99 [0.95-1.03]). A comparable pattern of multivariate associations, albeit with larger effect sizes, was observed for rates of child ED presentation for *physical injury* (Table 3). Taking into account all covariates, children's rate of ED presentation remained higher for those with a history of paternal criminal offending

(HR = 1.70 [95% CI = 1.65-1.75]), and again paternal criminal offending appeared to be the strongest predictor in the multivariate model. Maternal criminal offending was also significantly associated with ED presentation for physical injury but the effect size was small (HR = 1.05 [95% CI = 1.00-1.10]).

A post-hoc sensitivity analysis revealed that co-occurring paternal criminal offending accounted for much of the association between maternal criminal offending and incidence of ED presentation. Specifically, maternal criminal offending had a stronger effect on children's rates of ED presentation for any reason (HR = 1.17 [95% CI = 1.12-1.21]) and physical injury (HR = 1.32 [95% CI = 1.26-1.38]) when paternal criminal offending was excluded from the adjusted model.

XXX TABLE 3 ABOUT HERE XXX

DISCUSSION

This study demonstrates a higher incidence of ED presentations for children of fathers with a history of criminal offending, even after accounting for potential confounding factors. Paternal criminal offending was even more strongly associated with incidence of child ED presentation for physical injury; a potentially preventable adverse health outcome in young children. These findings are broadly consistent with one previous study that included child ED presentation as a health outcome of interest in relation to parental criminal offending²¹. The finding that paternal criminal offending conferred the highest incidence of child ED presentation relative to other measures of family adversity and socio-demographic disadvantage may indicate that paternal criminal offending is a particularly important indicator of familial risk for poor child health outcomes.

Contact with the CJS may signal a variety of familial, social, and economic hardships.^{3,6,17,32} The adversities experienced by families who come into contact with the CJS may be particularly severe due to the social stigma associated with offending and the barriers to accessing support.³³⁻³⁴ Families who

experience severe adversity may also have problems with parenting, be less aware of the need to implement child safety precautions, reside in more hazardous environments, and have inadequate access to quality information on child ill-health and injury prevention.¹²⁻¹⁴ Such disadvantaged families are known to be more likely to attend emergency departments as their first source of health care, owing to barriers accessing primary and secondary healthcare services.¹⁵⁻¹⁶

The differences in the strength of association between parental offending and child ED presentation according to the sex of the parent, as revealed in this study (stronger for paternal criminal offending), may be at least partially explained by patterns of offending among males and females, in that male offenders tend to commit more frequent and serious offences over a longer period of time.³⁵ Previously we have reported that the strength of the association between parental criminal offending and early childhood developmental functioning at age 5 years was greater for mothers with a history of criminal offending compared to fathers.²⁴ The impact of the offending parent's sex might therefore depend on the nature of the child outcome and the developmental period in which it is measured.

To reduce the risk of children's ED presentations and adverse health events, parents in contact with the CJS may require targeted parenting and other support services. One possibility is to adapt current evidence-based child health promotion and disease prevention policies for this group.³⁶ More specific interventions could include family and community-based programs that aim to improve parenting practices, and positive relationships within the family, such as the Triple P-Positive Parenting Program³⁷ and the Nurse-Family Partnership³⁸, both of which appear effective at improving the well-being and welfare of children born to parents with a history of offending.³⁹⁻⁴⁰

The present findings also have implications for improving the routine identification of children at-risk of high rates of contact with health services. A significant proportion of children requiring preventative interventions for avoidable health contacts miss out on such interventions because of the difficulties associated with consistently identifying high-risk children in the community and in clinical settings.⁴¹⁻⁴²

Cross-agency linkage of routinely collected administrative data may improve the efficacy and efficiency of child risk assessment to identify vulnerable children (such as those who have a history of parental offending) for detailed health screening and assessment. However, this approach may be challenging for governments bound by privacy legislation that precludes data sharing among multiple government agencies across different states and jurisdictions. The privacy of individuals and families that may be detected by these means deserves further ethical consideration, given the potential reluctance to seek help from health care services if criminal histories became known to health care practitioners during the course of data sharing.

Our research has the advantage of being nested within a large longitudinal record-linkage cohort that is representative of the general population, thus reducing the risk of sampling (selection and attrition) and information (recall and observer) biases²⁶. However, this study was not without limitation. First, diagnoses recorded in the EDDC were coded by personnel at the point of care who were not necessarily trained in clinical coding. The order in which diagnoses or reasons for presentation were recorded varied in the data and, since we received only the first listed diagnostic code for each ED presentation, some “diagnoses” were erroneously coded as a symptom, cause of injury/illness, or were missing. This was the case for 13,475 children (22.7%), some of whom may have had an ED presentation for physical injury. Second, EDDC records were only available from January 1st 2005 onwards and did not capture children who had an ED presentation before this time; early ED presentations for the older children in our sample might therefore have been missed. Third, not all ED services in NSW contributed to the EDDC, with smaller, rural services more likely to be missed. The exact number and locations of these services were unavailable to the research team, and therefore, it is possible that an unknown portion of children in our study attended an ED service that was not captured by the EDDC. Finally, we were unable to examine many of the possible mechanisms underlying the association between parental offending and child ED presentations, such as the availability of health care, child maltreatment, and more direct indices of

socioeconomic disadvantage (such as family income and parental employment). The absence of these factors increases the risk that unmeasured confounders may have influenced our findings.

CONCLUSION

Future research should explore the mechanisms underlying the association between parental, particularly paternal, criminal offending and child ED presentation, in the context of other related risk factors. The potential influence of severity and frequency of parental offending on child ED presentation, and the role of timing of exposure in relation to offspring development, deserves particular attention. Understanding the scope of the impact of parental offending on children's ED presentations is crucial for the development and implementation of intervention programs that aim to improve vulnerable children's health and mitigate their risk for future adversity.

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CONTRIBUTORS STATEMENT

Dr. Tyson Whitten conducted the analyses, interpreted the findings, and drafted the initial manuscript. Prof. Melissa J. Green, Assoc. Prof. Kristin R. Laurens, Dr. Stacy Tzoumakis, Ms. Felicity Harris, and Prof. Vaughn J. Carr all coordinated and supervised data collection, research methodology, and reviewed the manuscript. Assoc. Prof. Kimberlie Dean provided a substantial contribution to the conception and design of the study, interpretation of the findings, and reviewed the manuscript. All authors approve the final manuscript as submitted and agree to be accountable for all aspects of the work.

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COMPETING INTERESTS

None declared.

DATA SHARING STATEMENT

NSW-CDS data set is not publicly available.

PATIENT CONSENT

The NSW-CDS qualifies for a waiver of consent because it is impractical to obtain consent from the 91,635 children and their parents, involvement in the research carries no more than low risk, and there is sufficient protection of the privacy of participant data. Furthermore, we will have no direct contact with participants, as we seek to use secondary data only.

ETHICAL STATEMENT

This research was conducted with ethical approval from the NSW Population and Health Services Research Ethics Committee (PHSREC AU/1/289807 and PHSREC AU/1/1AFE112), and data custodian approvals granted by the relevant government departments. All procedures contributing to this work comply with the Helsinki Declaration of 1975, as revised in 2008.

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Table 1. Sample description

Covariate		Total Sample (N = 72,772)	Children With at Least 1 ED Presentation	
			Any Reason (N = 59,454)	Physical Injury (N = 32,194)
Maternal offending before ED presentation	No	-	52,982 (89.1%)	28,275 (87.9%)
	Yes	-	4,603 (7.7%)	3,196 (9.9%)
Paternal offending before ED presentation	No	-	41,493 (69.8%)	21,716 (67.5%)
	Yes	-	14,704 (24.7%)	9,319 (29.0%)
Maternal mental disorder diagnosis before ED presentation	No	-	48,924 (82.3%)	26,167 (81.3%)
	Yes	-	6,373 (10.7%)	4,391 (13.6%)
Paternal mental disorder diagnosis before ED presentation	No	-	51,764 (87.1%)	28,322 (88.0%)
	Yes	-	3,459 (6.0%)	2,818 (8.8%)
Child sex	Female	35,113 (48.3%)	27,630 (46.5%)	14,055 (43.7%)
	Male	37,659 (51.7%)	31,824 (53.5%)	18,139 (56.3%)
Aboriginal and/ or Torres Strait Islander Status	No	68,072 (93.5%)	55,259 (92.9%)	29,532 (91.7%)
	Yes	4,700 (6.5%)	4,195 (7.1%)	2,662 (8.3%)
SEIFA	5 th quintile (least disadvantaged)	21,146 (29.1%)	16,557 (27.8%)	8,287 (25.7%)
	4 th quintile	7,957 (10.9%)	6,492 (10.9%)	3,459 (10.7%)
	3 rd quintile	15,639 (21.5%)	13,127 (22.1%)	7,293 (22.7%)
	2 nd quintile	14,222 (19.5%)	11,961 (20.1%)	6,988 (21.7%)
	1 st quintile (most disadvantaged)	13,778 (18.9%)	11,294 (19.0%)	6,158 (19.1%)
Maternal age at birth	≤ 25years	12,762 (17.5%)	11,130 (18.7%)	6,501 (20.2%)
	26-35 years	45,546 (62.6%)	37,014 (62.3%)	19,929 (61.9%)
	> 35 years	14,382 (19.8%)	11,249 (19.0%)	5,736 (17.8%)
Median age at ED presentation		-	2.69 years	6.55 years

Note: ED = Emergency Department; SEIFA = Socioeconomic Index for Areas

Table 2. Hazard Ratios (HR; with 95% confidence intervals [CI]) for child's Emergency Department (ED) presentation for (i) any reason and (ii) physical injury (univariate associations with parental offending and covariate factors)

COVARIATE		ED PRESENTATION FOR ANY REASON (N = 59,454)		ED PRESENTATION FOR PHYSICAL INJURY (N = 32,194)	
		Incident rate (per 1000 person years)	HR (95% CI)	Incident rate (per 1000 person years)	HR (95% CI)
Maternal offending before ED presentation	No	142.75	1.00 Reference	80.99	1.00 Reference
	Yes	244.89	1.60 (1.56-1.65)	151.03	2.12 (2.04-2.19)
Paternal offending before ED presentation	No	139.09	1.00 Reference	78.14	1.00 Reference
	Yes	249.54	1.71 (1.67-1.74)	149.91	2.26 (2.21-2.32)
Maternal mental disorder diagnosis before ED presentation	No	140.13	1.00 Reference	79.47	1.00 Reference
	Yes	237.46	1.58 (1.54-1.62)	142.23	2.02 (1.95-2.08)
Paternal mental disorder diagnosis before ED presentation	No	142.23	1.00 Reference	81.91	1.00 Reference
	Yes	210.42	1.38 (1.34-1.43)	133.64	1.79 (1.73-1.87)
Child sex	Female	134.03	1.00 Reference	74.85	1.00 Reference
	Male	158.67	1.16 (1.14-1.18)	91.99	1.26 (1.23-1.29)
Aboriginal and/or Torres Strait Islander Status	No	143.59	1.00 Reference	81.58	1.00 Reference
	Yes	191.63	1.30 (1.26-1.35)	116.01	1.50 (1.44-1.56)
SEIFA	5 th quintile (least disadvantaged)	129.80	1.00 Reference	70.62	1.00 Reference
	4 th quintile	147.16	1.16 (1.13-1.19)	82.48	1.19 (1.14-1.24)
	3 rd quintile	160.53	1.16 (1.13-1.18)	91.66	1.34 (1.30-1.38)
	2 nd quintile	152.43	1.22 (1.19-1.25)	91.78	1.34 (1.30-1.38)
	1 st quintile (most disadvantaged)	151.48	1.13 (1.09-1.16)	88.14	1.28 (1.24-1.32)
Maternal age at birth	≤ 25years	183.09	1.39 (1.36-1.43)	106.67	1.57 (1.52-1.63)
	26-35 years	143.44	1.10 (1.08-1.13)	81.94	1.17 (1.13-1.20)
	> 35 years	128.88	1.00 Reference	71.40	1.00 Reference

Note: SEIFA = Socioeconomic Index for Areas

Table 3. Multivariate Hazard Ratios (HR) for child's Emergency Department (ED) presentation for (i) any reason and (ii) physical injury adjusted for all covariate factors

COVARIATES	ED PRESENTATION FOR ANY REASON	ED PRESENTATION FOR PHYSICAL INJURY
	HR (95% CI)	HR (95% CI)
Maternal offending before ED presentation	.99 (.95-1.03)	1.05 (1.00-1.10)
Paternal offending before ED presentation	1.44 (1.41-1.48)	1.70 (1.65-1.75)
Maternal mental disorder diagnosis before ED presentation	1.25 (1.21-1.29)	1.37 (1.32-1.42)
Paternal mental disorder diagnosis before ED presentation	.90 (.86-.94)	.97 (.92-1.01)
Male child	1.13 (1.11-1.15)	1.18 (1.15-1.20)
Aboriginal and/or Torres Strait Islander Status	1.08 (1.03-1.12)	1.09 (1.04-1.14)
SEIFA		
5 th quintile	1.00 Reference	1.00 Reference
4 th quintile	1.11 (1.08-1.15)	1.16 (1.11-1.20)
3 rd quintile	1.13 (1.10-1.16)	1.20 (1.16-1.24)
2 nd quintile	1.05 (1.03-1.08)	1.18 (1.14-1.22)
1 st quintile	1.06 (1.03-1.09)	1.15 (1.11-1.19)
MATERNAL AGE AT CHILD BIRTH		
≤ 25years	1.24 (1.20-1.28)	1.26 (1.21-1.31)
26-35 years	1.08 (1.05-1.10)	1.11 (1.08-1.15)
> 35 years	1.00 Reference	1.00 Reference

Note: SEIFA = Socioeconomic Index for Areas.

Supplementary Table S1. International Classification of Diseases (10th revision) Australian Modification diagnoses for first recorded Emergency Department presentations during the observation period for any reason (N=59,454)

ICD-10 AM code	Number of children (%)
Injury, poisoning and other external causes (S00-T98)	10,770 (18.1%)
Diseases of the respiratory system (J00-J99)	9,870 (16.6%)
Abnormal clinical and laboratory findings (R00-R99)	6,312 (10.6%)
Certain infections and parasitic diseases (A00-B99)	5,974 (10.0%)
External causes of morbidity and mortality (U50-U73, U90, V00-Y98)	4,248 (7.1%)
Diseases of the ear and mastoid process (H60-H95)	1,773 (3.0%)
Diseases of the digestive system (K00-K99)	1,451 (2.4%)
Diseases of the musculoskeletal system and connective tissue (M00-M99)	1,283 (2.2%)
Diseases of the skin and subcutaneous tissue (L00-L99)	1,279 (2.1%)
Factors influencing health status and health services (Z00-Z99)	801 (1.3%)
Diseases of the genitourinary system (N00-N99)	686 (1.1%)
Diseases of the eye and adnexa (H00-H59)	427 (.7%)
Conditions of the perinatal period (P00-P99)	381 (.6%)
Endocrine, nutritional and metabolic diseases (E00-E89)	292 (.5%)
Diseases of the nervous system (G00-G99)	177 (.3%)
Diseases of the circulatory system (I00-I99)	93 (.2%)
Mental and behavioural disorders (F00-F99)	62 (.1%)
Blood, blood-forming organs and immune mechanisms (D50-D89)	55 (.1%)
Neoplasms (C00-D49)	33 (<.1%)
Congenital and chromosomal abnormalities (Q00-Q99)	<15 ^a
Pregnancy, childbirth and puerperium (O00-O99)	<15 ^a
No specific diagnosis recorded ^b	13,475 (22.7%)
- Wrong primary diagnostic code listed	8,499 (14.3%)
- Missing	3,203 (5.4%)
- Code unable to be converted	1,773 (3%)

^aCannot report cell sizes < 15.

^bIt was not possible to describe the nature of injuries for those episodes of care erroneously coded to reflect a symptom or cause of injury, or a missing diagnosis, as the first or primary diagnostic code listed.

Supplementary Table S2. International Classification of Diseases (10th revision) Australian Modification (S00 to Y34) diagnoses for first recorded Emergency Department presentations during the observation period for physical injury (N=32,194)

ICD-10 AM code (S00 to Y34)	Number of children (%)
Transport accidents (V01-V99)	6,439 (20.0%)
Injuries to the head (S00-S09)	5,870 (18.2%)
Injuries to the wrist and hand (S60-S69)	4,095 (12.7%)
Injuries to the elbow and forearm (S50-S59)	3,642 (11.3%)
Injuries to the ankle and foot (S90-S99)	2,833 (8.8%)
Injuries to the unspecified part of trunk, limb, or body region (T08-T14)	2,332 (7.2%)
Injuries to the knee and lower leg (S80-S89)	1,747 (5.4%)
Injuries to the shoulder and upper arm (S40-S49)	1,705 (5.3%)
Effects of foreign body entering through natural orifice (T15-T19)	865 (2.7%)
Burns and corrosions (T20-T32)	647 (2.0%)
Other external causes of accidental injury (W00-W59)	396 (1.2%)
Poisoning by drugs, medicaments, and biological substances (T36-T50)	360 (1.1%)
Injuries to the neck (S10-S19)	251 (0.8%)
Injuries to the hip and thigh (S70-S79)	228 (0.7%)
Injuries to the abdomen, lower back, lumbar spine, and pelvis (S30-S39)	210 (0.6%)
Toxic effects of substances chiefly non-medical as to source (T51-T65)	203 (0.6%)
Complications of surgical and medical care (T80-T88)	130 (0.4%)
Injuries to the thorax (S20-S29)	88 (0.3%)
Injuries involving multiple body regions (T00-T07)	78 (0.2%)
Other and unspecified effects of external causes (T66-T75)	67 (0.2%)
Other (T79, Y10-Y34)	<15 ^a

^aCannot report cell sizes < 15.

Supplementary Figure S1. Cumulative survival curves of children's Emergency Department (ED) presentation for any reason by maternal offending status.

Supplementary Figure S2. Cumulative survival curves of children's Emergency Department (ED) presentation for any reason by paternal offending status.

Supplementary Figure S3. Cumulative survival curves of children's Emergency Department (ED) presentation for physical injury by maternal offending status.

Supplementary Figure S4. Cumulative survival curves of children's Emergency Department (ED) presentation for physical injury by paternal offending status.