Criminology Research Grants

The intergenerational transmission of criminal offending behaviours

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Abbreviations

AEDC	Australian Early Development Census
ANZSOC	Australian and New Zealand Standard Offence Classification
CHeReL	Centre for Health Record Linkage
MCS	Middle Childhood Survey
NSW-CDS	New South Wales Child Development Study
RL1	Record Linkage 1
RL2	Record Linkage 2
SDQ	Strengths and Difficulties Questionnaire
SEIFA	Socio-Economic Index for Areas

Abstract

Background: Parental offending is associated with a wide-range of adverse outcomes in offspring, but the emphasis has been on examining the role of fathers on offspring offending in adolescence and adulthood. Little intergenerational research has been conducted in Australia on the relationship between maternal and paternal offending and diverse offspring developmental vulnerabilities in childhood.

Aim: To determine the associations between parental offending histories and offspring developmental outcomes in a large population-based study of Australian children. This study focused on child outcomes in early and middle childhood, which are key developmental periods for intervention and prevention of antisocial behaviour and aggression.

Method: Data were drawn from the New South Wales Child Development Study (NSW-CDS) cohort of 87,026 New South Wales children. The NSW-CDS is an intergenerational data linkage study combining information from cross-sectional surveys at age five and 11 years with administrative records. Analyses were conducted on the first two waves of record linkage conducted to date. Firstly, data were analysed from Record Linkage 1, to determine relationships between parental offending and a range of early childhood (age 5 years) offspring outcomes (i.e., social competence; emotional maturity; language and cognitive development; communication and general knowledge; physical health and wellbeing; and, aggressive behaviour). Secondly, using data from Record Linkage 2, the associations between parental offending and offspring conduct problems in middle childhood (age 11 years) were examined.

Findings: Mothers with a history of offending experienced greater risk factors (e.g., socioeconomic disadvantage, mental illness, and offending partners) compared to non-offending mothers. Analyses revealed associations between parental offending and offspring vulnerabilities across a range of developmental domains in early childhood and conduct problems in middle childhood. In early childhood, associations were greatest for cognitive outcomes. Violent and frequent offending had a greater magnitude of association compared to nonviolent and infrequent offending. Both maternal and paternal offending histories were associated with adverse offspring outcomes at both developmental periods. Maternal offending initially seemed to have greater associations compared to paternal offending; however, once both parents' offending was included in the models, the associations were similar. High levels of assortative mating were observed; the majority of mothers with a history of offending had a partner with a history of offending.

Conclusions and Implications: Prevention and intervention efforts should start early in development, include mothers and fathers, and target both behavioural and cognitive problems in children. Future research should examine assortative mating among offending parents and how this influences the development of antisocial behaviour among offspring.

Literature Review

Intergenerational Transmission of Crime and the Concentration of Crime in Families

Extensive research has demonstrated that the experiences, life events, and decisions made by members of one generation can significantly impact those of the next. Intergenerational transmission is defined as the continuity of a pattern of behaviour of interest over subsequent generations, that is, how members of one generation (i.e., children) are similar to members of another generation (i.e., their parents) with respect to the particular behaviour pattern (Boyd et al. 1999; Thornberry 2009). A well-established example of this phenomenon is the intergenerational pattern of antisocial behaviour and criminality, with criminal parents tending to have criminal children (Farrington & Welsh 2007). Improving our understanding of the extent of intergenerational transmission of behaviour at key developmental periods can potentially help inform preventative interventions for children who may be at risk of delinquency.

The very nature of the intergenerational transmission of crime implies a high concentration of criminality within families, as multiple criminal family members are required for the transmission to take place (van de Weijer et al. 2015). In criminology, seminal longitudinal cohort studies have consistently established that a disproportionate amount of crime is committed by a small number of people (e.g., DeLisi 2005; DeLisi & Piquero 2011; Fox & Tracy 1988; Moffitt 1993; Piquero 2000; Wolfgang, Figlio & Sellin 1972). Similarly, intergenerational research has also found that a small proportion of families account for a large proportion of crimes. In the Cambridge Study in Delinquent Development, six percent of families accounted for half of all convictions in the cohort (Farrington, Barnes & Lambert 1996), and in the Pittsburgh Youth Study, approximately eight percent of families accounted for almost 43 percent of arrests (Farrington et al. 2001). More recently, data from the US National Longitudinal Study of Adolescent Health revealed that five percent of all families accounted for 53 percent of all arrests (Beaver 2013).

The intergenerational transmission of antisocial and criminal behaviour is not limited to high-crime families; simply having a parent with a history of antisocial behaviour or offending increases the risk of antisocial behaviour or offending in offspring across the life-course. In the past, criminological studies tended to focus on the antisocial behaviour or criminality of fathers (Farrington 1979; Loeber & Stouthamer-Loeber 1986; Walters 1992). One of the primary reasons for this focus is likely the fact that antisocial and criminal behaviour occurs less frequently in females (Lauritsen, Heimer & Lynch 2009). However, subsequent studies have increasingly examined the role of mothers, revealing that there is a relationship between maternal antisocial behaviour and a range of offspring outcomes at different developmental periods including: early childhood aggression (Tzoumakis, Lussier & Corrado 2012), childhood externalising behaviour (Thornberry, Freeman-Gallant & Lovegrove 2009), juvenile delinquency (Bijleveld & Wijkman 2009), and violent offending (Frisell, Lichtenstein & Langstrom 2011). Although the intergenerational transmission of antisocial behaviour is increasingly acknowledged as beginning in the earliest development periods (DeLisi & Vaughn 2014; Tremblay 2015), much of the research examining the impact of parental offending has focused on the offspring outcomes in adolescence and adulthood rather than childhood (e.g., Farrington, Barnes & Lambert 1996; Farrington et al. 2001; Loeber & Stouthamer-Loeber 1986; van de Rakt, Nieuwbeerta & de Graaf 2008). The next sections review the literature examining the impact of parental offending on offspring outcomes in adulthood, adolescence, and childhood.

Parental Offending and Offspring Outcomes in Adolescence and Adulthood

Glueck and Glueck (1950) were some of the earliest to examine the relationship between parental offending and offspring outcomes in a sample of boys in Boston, Massachusetts. They found that 66 percent of delinquent boys had a criminal father, compared to 32 percent of non-delinquents, and 45 percent of delinquents had a criminal mother, compared with 15 percent of non-delinquents. Similarly, in a sample of 1,349 boys in Glasgow, Ferguson (1952) demonstrated that having a family member with a criminal record predicted a boy's likelihood of delinquency independently of other factors that were associated with crime (i.e., poor housing, overcrowding & low school attainment). Furthermore, the percentage of boys with a criminal record increased as the number of other criminal family members increased (0=9%, 1=15%, 2=30%, 3+=44%).

Since these early studies, several key longitudinal studies have examined the intergenerational continuity in antisocial behaviour and offending on offspring outcomes (for reviews, see Loeber & Stouthamer-Loeber 1986; van de Rakt, Nieuwbeerta & de Graaf 2008). The Cambridge Study in Delinquent Development, which followed 411 males from age eight to adulthood and now includes three generations, has conducted a number of studies on the intergenerational transmission of offending (Farrington, Ttofi & Crago 2017). By the time the men in the Cambridge Study were in their early 20s, 48 percent of males with a convicted father and 54 percent of males with a convicted mother had a conviction (Farrington, Coid & Murray 2009). Data from this study also showed that adult males with a criminal parent or sibling were significantly more likely to have been arrested than males without a criminal parent, and that having a convicted parent by the age of ten years was the strongest predictor of criminal offending up until the age of 50 years (Farrington, Coid & West 2009). This continuity of offending between parents and children is not limited to official convictions. For example, in the Pittsburgh Youth Study of 1,517 boys, the relationship between parental offending and offspring juvenile delinquency was established for arrests, convictions, and self-reported offending (Farrington et al. 2001).

Though many early prospective longitudinal studies focused on males, studies are increasingly including females. For instance, there are several studies that are limited to fathers in the first generation, but include both sons and daughters in the second generation (e.g., Besemer 2014; Hjalmarsson & Lindquist 2012; van de Rakt, Nieuwbeerta & de Graaf 2008). These studies indicate that paternal criminality is a risk factor for the development of criminality among both male and female adult offspring. Other studies have included mothers, fathers, sons and daughters (e.g., Frisell, Lichtenstein & Langstrom 2011; Kendler et al. 2015; van de Rakt, Nieuwbeerta & Apel 2009). Some of these studies have found that paternal offending had a greater impact on offspring offending compared to maternal offending (Farrington, Coid & Murray 2009; Farrington et al. 2001). However, others found that the risk conferred was similar for fathers and mothers (Beaver 2013). Moreover, there is some evidence that the mechanisms by which mothers and fathers transmit offending to their children differ (Auty, Farrington & Coid 2017; Thornberry, Freeman-Gallant & Lovegrove 2009). These findings underline the importance of understanding the impact of offending of both parents on their children, and whether these influences may operate differentially in different periods of development.

Research examining the relationship between parental and offspring offending has often focused on an aggregate measure of offending (i.e., "any" offending), which includes a heterogeneous range of behaviours (e.g., burglary, assault, fraud etc.) that are likely associated with

different trajectories of offending. van de Weijer, Bijleveld and Blokland (2014) proposed that focusing on specific types of crime, which may share certain skills and characteristics, may be useful in understanding the aetiology of the intergenerational transmission of crime. Using criminal record data from the Netherlands, across five generations, they found that the intergenerational transmission of offending from fathers to sons was stronger for violent compared to non-violent offending (van de Weijer, Bijleveld & Blokland 2014). Other studies have also made a distinction between violent and non-violent offences, with findings suggesting some specificity in the transmission of violent criminal offending (Besemer 2012; Kendler et al. 2015) and sexual offending (Långström et al. 2015). A large Swedish study including 12.5 million men and women found much continuity between violent crime in families, reporting that first-degree relatives (i.e., parents and siblings) were 4.3 times more likely to engage in violent crime than matched controls (Frisell, Lichtenstein & Langstrom 2011). The findings from these studies suggest that considering specific types of offenses may reveal different patterns in the intergenerational transmission of offending.

There are few intergenerational Australian studies that include data on antisocial behaviour or offending in parents and children. Kinner et al. (2007) used data from the Mater-University of Queensland Study of Pregnancy birth cohort (n=2,399) to examine the relationship between fathers' arrests and imprisonment and offspring externalising behaviour at age 14 years. However, the prevalence of paternal arrest and imprisonment in this study was low (7.6% and 5.7% respectively), which is likely due to the measurement of this indicator (i.e., maternal report at the children's 14-year follow-up). The authors found that, after adjusting for social and family factors, there was no relationship between paternal arrest and imprisonment and externalising behaviour for male or female offspring (Kinner et al. 2007). A small Tasmanian study identified six extended families with known criminal offending histories across several generations (Goodwin & Davis 2011), and found that minor offending in parents was not associated with offspring's convictions, while more serious parental offending did increase the likelihood of offspring conviction. Moreover, paternal conviction history was more important than maternal convictions (Goodwin & Davis 2011). It is possible that, due to the small sample, the analyses were underpowered to detect differences among females.

Parental Offending and Offspring Outcomes in Childhood

Relatively few intergenerational studies have investigated the impact of parental offending on offspring outcomes in childhood. Some studies have examined the relationship between parental antisocial or offending behaviour and childhood conduct or externalising problems (Bailey et al. 2009; Kim et al. 2009; Raudino et al. 2013; Rhule, McMahon & Spieker 2004; Thornberry et al. 2003; van Meurs et al. 2009). For instance, Raudino et al. (2013) found continuity between parent and childhood conduct problems (at age 7 to 9 years) in the Christchurch Health and Development Study. Similarly, both maternal and paternal offending were related to conduct problems in boys (aged 8 to 10 years) in the Cambridge Study in Delinquent Development, with the number of antisocial parents being more influential than parent gender (Smith & Farrington 2004). Fewer studies have examined the effects of parental antisocial behaviour and offending on offspring during early childhood (ages 0 to 5 years). Research during this early developmental period has found that maternal offending is associated with high levels of aggression in children (Tremblay et al. 2004; Tzoumakis, Lussier & Corrado 2014). Others however, have not found strong evidence of intergenerational transmission of antisocial behaviour in childhood, or have reported continuity that is entirely mediated by parenting behaviour and other factors (e.g., Cairns et al. 1998; Cohen et al. 1998; Conger et al.

2003). An intergenerational study of 57 young mothers and their offspring observed intergenerational continuity more consistently for cognitive development than it was for aggressive development in childhood (Cairns et al. 1998).

Parental Offending and Other Offspring Outcomes

The effect of parental antisocial behaviour and offending is not limited to externalizing behaviour problems, with several studies finding effects on internalizing problems (e.g., Coley, Carrano & Lewin-Bizan 2011; Herndon & Iacono 2005; van Meurs et al. 2009), social competence (Rhule, McMahon & Spieker 2004) and cognitive abilities (e.g., Cairns et al. 1998; Latvala et al. 2015). In one study, paternal antisociality during children's preschool years was a significant predictor of internalising behaviour problems in early childhood, but the relationship was not sustained into middle childhood (Coley, Carrano & Lewin-Bizan 2011). Another study found that both fathers' and mothers' antisocial behaviour impacted children's risk of developing internalising disorders by age 11 years, even when accounting for the co-parent's antisociality (Herndon & Iacono 2005). Furthermore, this study reported that by age 17, having an antisocial father increased the likelihood of alcohol abuse and drug use in offspring (Herndon & Iacono 2005).

A few studies have investigated the relationship between parental offending and cognitive functioning of offspring. A study using Swedish register data of over a million male military conscripts and their fathers found an association between paternal criminal convictions and their sons' cognitive ability at age 18 years (Latvala et al. 2015). In contrast, using data from the Pittsburgh Youth Study of over one thousand youth, Murray, Loeber and Pardini (2012) found that parental criminality was not related to poor academic performance in offspring aged 7-16 years. Better understanding of the relationship between parental offending and offspring cognition is important, as childhood cognitive ability is also a robust predictor of early onset and persistent offending up to age 18 years (McGloin & Pratt 2003).

Aims

Parents' involvement with the criminal justice system has been shown to contribute to antisocial behaviour among their children. Much of the research on the influence of parental offending on children has focused on the role of fathers rather than mothers, and few studies have included both parents. Moreover, previous emphasis has been on offspring outcomes in adolescence and adulthood, despite increasing evidence of the early childhood origins of antisocial behaviour (DeLisi & Vaughn 2014; Tremblay 2015). For example, children who are highly aggressive when they start school are at high risk of continuing on a high-aggression trajectory that manifests in offending in adolescence (Broidy et al. 2003). Furthermore, few studies have used a sufficiently large sample to examine more serious offending in mothers (i.e., frequent, violent offending). The findings presented here focus on the intergenerational transmission of antisocial behaviour and examine the association between parental offending and offspring aggression and conduct problems. Other offspring outcomes such as cognitive and physical vulnerabilities in early childhood were also investigated. The aim of this report is therefore to examine the association between parental offending and offspring developmental outcomes at ages 5 and 11 years using data from a record linkage study of a population cohort of New South Wales children. First, an overview of the sample and methods used to conduct the research is provided, followed by a summary of the findings on the early childhood outcomes (Record Linkage 1; RL1) and on the middle childhood outcomes

(Record Linkage 2; RL2). The report concludes with a discussion of the policy implications of the findings and plans for future research.

Method

Procedures

Data were drawn from a large, Australian, multi-agency, intergenerational record linkage study of a population cohort of children and their parents: the NSW-CDS (http://nsw-cds.com.au/; Carr et al. 2016; Green et al, 2018). The NSW-CDS adopts a life-course epidemiological approach to examine the risk and protective factors associated with the development of mental illness, antisocial behaviour, and other outcomes from birth to adolescence and early adulthood. The NSW-CDS is a state-wide longitudinal, population-based study that uses successive waves of record linkage of administrative data collections from New South Wales. It is also an intergenerational study that includes both child and parent records. The NSW-CDS is unique, as it combines data linkage of administrative records from multiple sources (e.g., health, crime, welfare, and education) with information from two cross-sectional surveys conducted at key developmental periods: early and middle childhood. It includes a teacher-reported cross-sectional survey at approximately age five years and a self-reported cross-sectional survey at approximately age 11 years.

An independent agency, the Centre for Health Record Linkage (CHeReL; www.cherel.org.au) conducted the record linkages using probabilistic data linkage methods in accordance with strict privacy protection protocols. Therefore, the researchers were not privy to the identities of the participants; all data received by the research team was de-identified. The CHeReL linked the child and parent records using name, date of birth, residential address, and sex. Matches with probabilities above 0.75 were considered as 'true matches', and those below 0.25 were considered as 'false matches'. Clerical reviews were performed on all pairs with probabilities between 0.75 and 0.25. False positive linkages in the NSW-CDS were low for both linkages conducted to date, with a rate of 3/1,000 persons (0.3%) associated with linkage of child data collections, and 5/1,000 persons (0.5%) for the linkage of parents to their children.

Record Linkage 1 (RL1) - Data and Participants

RL1 was conducted in 2014 and brought together records from pre-birth up to when the children were approximately five years old. It included: children's birth, mortality, health, school and child protection records; their mothers' perinatal records; and both parents' mortality, health, and criminal records. The following data collections were used to derive variables for the present analysis:

- NSW Bureau of Crime Statistics and Research Reoffending Database (1994-2009)
- Commonwealth Department of Education (AEDC; 2009)
- NSW Registry of Births, Deaths and Marriages Birth Registrations (2000-06)
- NSW Registry of Births, Deaths and Marriages Death Registrations (2000-09)
- Australian Coordinating Registry Cause of Death Unit Record File [2000-09; including Australian Bureau of Statistics Death Registrations (2000-06)]
- NSW Ministry of Health Perinatal Data Collection (2000-06)
- NSW Ministry of Health Admitted Patient Data Collection (2005-09)
- NSW Ministry of Health Mental Health Ambulatory (2001-09)

The RL1 cohort was defined by the 2009 Australian Early Development Census (AEDC), a census of 99.7 percent of children entering their first year of formal schooling (kindergarten) in the state of New South Wales in 2009 (n=87,026) (Brinkman et al. 2014). The children were approximately five years of age when they were assessed by their kindergarten teachers, who had known the child for a minimum of one month (and generally, for five months). The AEDC includes 96 items that contribute to 16 subdomains within five broad domains. The five domains that index early childhood developmental functioning consist of: 'social competence'; 'emotional maturity'; 'language and cognitive development'; 'communication and general knowledge'; and, 'physical health and wellbeing' (see Appendix A for a list of the subdomains; for individual items within each domain see Brinkman et al. 2014). The aggression subdomain (e.g., physical fights, kicks, bites, hits, etc.) was examined separately as it is of particular interest in examining the intergenerational transmission of antisocial behaviour. The psychometric properties of the AEDC have been demonstrated in Australia and internationally (Janus, Brinkman & Duku 2011: 292). Moreover, the AEDC's predictive validity has been established in association with middle childhood literacy and numeracy, and peer relations (Brinkman et al. 2013: 703; Guhn et al. 2016: 81). Children were considered *developmentally vulnerable* on the domains and subdomains if they scored in the bottom 10 percent of the national AEDC population distribution.

The NSW-CDS is representative of New South Wales and Australian populations in terms of sex, socioeconomic status and geographic remoteness (Carr et al. 2016). Parents were identified via linkage of the child's AEDC record with New South Wales birth registration records; as a result, it was possible to link parental records for 72,245 children (83.0% of the cohort) whose births were registered in New South Wales. Comparisons between the full cohort (n=87,026) and the cohort with linked parental data (n=72,245) were completed for child age, sex, English as second language, socioeconomic status, and AEDC measures, and no substantive differences were found (see Carr et al. 2016, Supplementary Tables 1-X and 2-X).

Of the 72,245 children for whom it was possible to link parental records, valid AEDC data were available for 69,116 children, as children with special needs were excluded. These children were identified as having special needs by their teachers, based on medical diagnosis, if they required special assistance due to chronic medical, physical, or intellectually disabling conditions. After then excluding children whose parents had non-criminal regulation offences only (e.g., speeding fines or debts), the final sample included 66,477 children. Therefore, the RL1 results in the present report are based on 66,477 children and their parents.

Record Linkage 2 (RL2) - Data and Participants

RL2 was conducted in 2016 and brings together records from pre-birth up to when the children were 11/12 years old, covering the period from birth to middle childhood (Green et al., 2018). A key feature of RL2 is the addition of the Middle Childhood Survey (MCS), a cross-sectional assessment of the children's mental health and wellbeing, completed in 2015 for a subset of the sample.

The 2015 Middle Childhood Survey (MCS)

The MCS enabled the combination of administrative records with a cross-sectional self-report assessment of mental health and wellbeing in middle childhood. The aim of the MCS was to

follow-up with as many of the 87,026 original children from the initial AEDC cohort as possible. Active consent procedures were not feasible due to the large number of potential participants. Additionally, active parental consent has the potential to bias the sample as it can reduce the participation of disadvantaged individuals, decrease response rates, and underrepresent those involved in antisocial behaviour (Courser et al. 2009). Collection of the MCS data thus employed an opt-out consent model where parents could opt-out their children from participating in the MCS, and the children could choose not to participate.

The MCS was an online self-report survey that was administered to students in Year Six (their final year of primary school) during class time (Laurens et al. 2017a). All New South Wales schools (government and non-government) with Year Six enrolments (n=2,371) were targeted for participation. Of the 2,371 eligible schools, 829 administered the MCS and a total of 27,808 children completed the survey (31.4% of eligible children). Opt-outs were few; 816 children and 573 parents opted out of the MCS. The representativeness of the MCS to the New South Wales population was demonstrated on a range of demographic indices (Laurens et al. 2017a).

The survey consisted of 116 items including children's demographic and social, emotional, and behavioural indicators; for a complete list see Laurens et al. (2017a). The key child outcome used in the present analyses is the Strengths and Difficulties Questionnaire (SDQ) Conduct Problems scale (Goodman 1997). The SDQ is widely used in longitudinal research of child development and the psychometric properties of the SDQ are well-established internationally (Goodman 2001). The SDQ Conduct Problems scale includes the following five items:

1) I get very angry and often lose my temper
2) I usually do as I am told (reverse scored)
3) I fight a lot
4) I am often accused of lying or cheating
5) I take things that are not mine from home, school or elsewhere

These items were measured on the following three-point scale: "Not True" (scored 0); "Somewhat True" (scored 1); and "Certainly True" (scored 2). The five items were summed to create a total score ranging from 0 to 10. Internal consistency of the Conduct Problems scale in the MCS was high (ordinal α=.80) (Laurens et al. 2017a). Normative categories were then created based on UK population-based norms as follows: "Normal" (defined as ~80%: score of 0 to 3), "Borderline" (~10%: score of 4), and "Abnormal" (~10%: score of 5 to 10) (Goodman 1997).

Of the 27,792 children who started the MCS, 27,458 children completed the SDQ Conduct Disorder questions, and it was possible to identify mothers for 22,639 children and fathers for 21,956 children via New South Wales birth registration records. Therefore, the RL2 results in the present report are based on 21,956 to 22,639 children and their parents.

Ethical Approvals

Ethical approvals for RL1 and RL2 were obtained from the NSW Population and Health Services Research Ethics Committee (HREC/11/CIPHS/14 and HREC/15/CIPHS/21), with data custodian approvals granted by the relevant Government Departments. Ethical approval for the MCS was obtained from the University of New South Wales Human Research Ethics Committee (UNSW HREC reference HC14307).

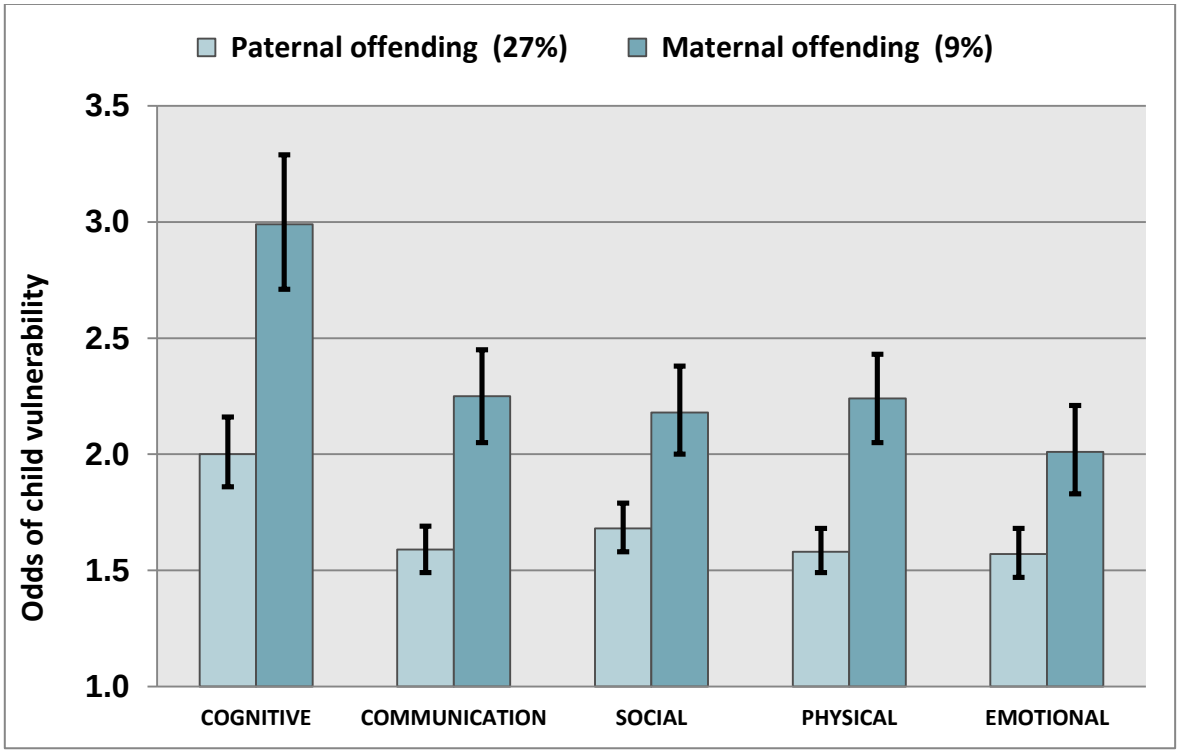
Record Linkage 1 Results

The following section summarises findings from RL1 on the relationship between parental offending and offspring outcomes at age five years.

Does Parental Offending History Influence a Diverse Range of Early Childhood Outcomes?

The relationship between parental offending and a range of early childhood developmental vulnerabilities were examined. A series of logistic regression analyses were conducted to determine the association between mothers' and fathers' offending on the five broad domains of the AEDC (i.e., Social, Emotional, Physical, Cognitive, and Communication) (Laurens et al. 2017b). These analyses focused on any type of offending by mothers (9% of sample) and fathers (27% of sample). Figure 1 below provides odds ratios of offspring vulnerability on each domain after adjusting for the following covariates: child sex, age, English as a second language, socioeconomic disadvantage, and maternal age at child's birth.

Figure 1: Associations between parental offending and child vulnerability at age 5 years



Note: n=66,477. Bars are odds ratios and error bars the 95% confidence intervals. Models adjusted for child sex, age, English as a second language, socioeconomic disadvantage, and maternal age at child's birth. All models were considered statistically significant as the 95%CIs did not cross 1.00. Figure adapted from Laurens et al. (2017b).

Results from these analyses indicate that having a parent with a history of offending was associated with offspring vulnerability on the full range of AEDC developmental outcomes. The greatest association was between parental offending and offspring cognitive functioning. After accounting for the demographic covariates, children whose mothers had a history of any offending were three times more likely to be vulnerable on the AEDC cognitive domain compared to children with non-offending mothers. The adjusted odds ratio for paternal offending was lower; children with offending fathers were two times more likely to have cognitive vulnerability compared to children with non-offending fathers. The smallest association was on the emotional domain. Mothers'

offending involvement tended to have a larger magnitude of association with children's vulnerability across the five domains compared to fathers. Importantly, this was despite the fact that they were involved in offending less frequently (9% of mothers compared to 27% of fathers). Additional analyses not presented here, examined parental violent offending (e.g., murder, manslaughter, assault, sexual assault, aggravated robbery; see Laurens et al. 2017b). Similar patterns of association were identified for violent offending, but the magnitudes of the associations between violent parental offending and the AEDC vulnerabilities were greater than those observed for any parental offending. Across the five domains, the odds ratios for paternal violent offending ranged from 1.8 to 2.6, and those for maternal violent offending ranged from 2.5 to 4.2 after adjusting for demographics (Laurens et al. 2017b).

What Are the Characteristics of Children with Mothers Who Have a History of Offending?

A descriptive profile of the children with offending mothers was derived for the sample, stratified by maternal offending frequency. Due to the skewed distribution of the data, the following indicator for maternal offending frequency was created: no offences (91.3%); one offence (3.6%); two-to-five offences (3.2%); and six or more offences (1.8%). Results are presented in Table 1 below.

Table 1: Characteristics of children and families with a history of maternal offending

	Total sample	**Maternal offending frequency**			
		0	1	2-5	≥6
	(n=66,477)	(n=60,702)	(n=2,459)	(n=2,134)	(n=1,182)
Child vulnerable on AEDC aggression	8%	8%	11%	15%	21%
Male child	51%	51%	51%	50%	49%
Child English as a second language	16%	16%	13%	10%	6%
Mother <26 years at child's birth	22%	20%	40%	49%	51%
Socioeconomic disadvantage [a]	45%	44%	59%	67%	72%
Paternal offending	27%	23%	54%	66%	73%
Maternal mental illness	11%	9%	22%	35%	64%
Paternal mental illness	7%	5%	14%	21%	32%

[a] Reflects the two most disadvantaged quintiles of the Socio-Economic Index for Areas (SEIFA), which is a measure of relative disadvantage based on the average income and employment status for each residential postcode in Australia (Pink 2013). Table adapted from Tzoumakis et al. (2017).

Table 1 shows that the children of offending mothers had higher levels of aggression in kindergarten. Furthermore, the greater a mother's offending frequency, the higher the prevalence their child was to also have a father who was involved in offending and to have a parent with mental illness. Frequent offending mothers were younger at their child's birth, and their families experienced more socioeconomic disadvantage. Among children whose mothers had a history of six or more offences, 72 percent lived in the most disadvantaged areas in New South Wales, 73 percent had a father with a history of offending, and 64 percent had a mother with mental illness, compared to 44 percent, 23 percent and nine percent of children with non-offending mothers, respectively.

Is Maternal Offending Associated with Child Aggression at Age Five Years After Accounting for Key Risk Factors?

To examine the relationship between maternal offending frequency and child aggression further, a multivariate logistic regression analysis was conducted, accounting for several key covariates including paternal offending (Tzoumakis et al. 2017). An indicator of paternal offending frequency was created as follows: no offences (91.3%); one offence (9.5%); two-to-five offences (10.1%); and six or more offences (6.9%). Results of this analysis are presented in Table 2 below.

Table 2: Associations between parental offending frequency and offspring aggression at age 5

		OR (95% CI)
Child sex		
	Female	1
	Male	3.09(2.90-3.29)
Child English as a second language		
	No	1
	Yes	0.89(0.82-0.97)
Maternal age at child's birth		
	≥26 years	1
	<26 years	1.42(1.33-1.51)
Socioeconomic status		
	Least Disadvantaged	1
	Most Disadvantaged [a]	1.21(1.14-1.28)
Maternal offending frequency		
	0 offences	1
	1 offence	1.07(0.94-1.23)
	2-5 offences	1.33(1.16-1.52)
	≥6 offences	1.74(1.48-2.05)
Paternal offending frequency		
	0 offences	1
	1 offence	1.29(1.18-1.42)
	2-5 offences	1.38(1.27-1.51)
	≥6 offences	1.57(1.41-1.74)
Maternal mental illness		
	No	1
	Yes	1.41(1.30-1.53)
Paternal mental illness		
	No	1
	Yes	1.29(1.16-1.42)

[a] Reflects the two most disadvantaged quintiles of the Socio-Economic Index for Areas, which measures the average income and employment status for each residential postcode in Australia (Pink 2013). Note: n=66,044; OR=odds ratio; CI=confidence interval. Results were considered statistically significant as the 95%CIs did not cross 1.00. Table adapted from Tzoumakis et al. (2017).

The results in Table 2 show an association between maternal offending frequency and child aggression accounting for child sex, child English as second language, young maternal age at child's birth, socioeconomic disadvantage, paternal offending and parental mental illness. The

results showed that young maternal age at the child's birth, socioeconomic disadvantage, and being male were all associated with vulnerability on the AEDC aggression subdomain. Boys were over three times more likely to show high levels of aggression at age five years compared to girls. Maternal history of one offence was not significantly associated with offspring aggression when accounting for these risk factors, but mothers with more frequent offending histories (i.e., 2 to 5 offences and 6 or more offences) were more likely to have aggressive children. All frequency categories of fathers' offending were associated with childhood aggression, as were maternal and paternal history of mental illness. The results showed that associations between mothers' and fathers' offending and offspring aggression were similar in magnitude.

Record Linkage 2 Results

The following section provides a detailed summary of parental offending data relating to children in RL2 who completed the MCS, when the children in the cohort were aged approximately 11 years. It also provides findings on the relationship between parental offending and offspring conduct problems. Analyses in this section are based on 22,639 children for whom linked data parental was available and who completed the SDQ Conduct Problems items in the MCS.

What is the Prevalence of Parental Offending in RL2?

Parental offending data were obtained from NSW Bureau of Crime Statistics and Research Reoffending Database (1994-2009), which includes information on each parent who was convicted of a criminal offence in New South Wales and their subsequent criminal court appearance data. Table 3 provides the distribution of offence types of offending parents with children in the cohort, based on the 16 Divisions of the Australian and New Zealand Standard Offence Classification (Pink 2011).

Table 3: Distribution of offence types for children with an offending mother and father by the Australian and New Zealand Standard Offence Classification (ANZSOC) Divisions

ANZSOC Division	Maternal offending	Paternal offending
	Offspring (n)	*Offspring (n)*
01 Homicide and related offenses	≤15	24
02 Acts intended to cause injury	740	2,328
03 Sexual assault and related offences	≤15	107
04 Dangerous or negligent acts endangering persons	211	1,004
05 Abduction, harassment and other offences against the person	39	212
06 Robbery, extortion and related offences	35	151
07 Unlawful entry with intent/burglary, break and enter	105	439
08 Theft and related offences	743	1,150
09 Fraud, deception and related offences	369	574
10 Illicit drug offences	365	1,078
11 Prohibited and regulated weapons and explosive offences	29	337
12 Property damage	319	1,157
13 Public order offences	427	1,301
14 Traffic and vehicle regulatory offences	1,200	3,964
15 Offences against justice procedures, government security & government operations	554	1,656
16 Miscellaneous offences	106	280

Note: Frequencies reported are for the number of children with offending mothers and fathers. ANZSOC codes are missing for 6 children with offending mothers and 7 children with offending fathers; Ethical restrictions on the reporting of data for cell-sizes <15 have precluded reporting data that would otherwise exist in these cells.

Table 3 shows that the most common ANZSOC offence division for both maternal and paternal offending was traffic and vehicle offences (n=1,200 children with an offending mother; n=3,964 children with an offending father). For maternal offending, the next most common offence division was theft (n=743 children with an offending mother), followed by acts intended to cause injury (n=740). For paternal offending, the most common offense division after traffic offences was acts intended to cause injury (n=2,328), followed by offences against justice procedures, government security and operations (n=1,656). Very few children had parents who were involved in serious offences such as homicide or sexual assault.

To create mutually exclusive types of parental offending, maternal and paternal indicators were computed using the following hierarchical assignment based on most serious type of offence: 0) none: no offences; 1) minor: at least one offence of minor type (e.g., traffic and vehicle offences,

public health, and safety offences); 2) nonviolent: at least one offence of nonviolent type (e.g., theft, burglary, fraud, and drug offences); and, 3) violent: at least one violent offence (e.g., homicide, assault, aggravated robbery, and sexual assault). Table 4 provides descriptive statistics for any offending and type of parental offending.

Table 4: Prevalence of children with offending parents

	Maternal offending % (n)	Paternal offending % (n)
Any offending	10.8 (2,452)	28.4 (6,229)
Type of offending		
None	89.2 (20,187)	71.7 (15,727)
Minor	2.7 (612)	8.0 (1,747)
Nonviolent	4.8 (1,087)	9.8 (2,153)
Violent	3.3 (747)	10.6 (2,322)

Note: Number of children with data for mothers is 22,639 and 21,956 children for fathers. ANZSOC codes are missing for 6 children with offending mothers (n=22,633) and 7 children with offending fathers (n=21,949).

Table 4 shows that maternal prevalence of offending in the sample was less than 11 percent and paternal offending was over 28 percent; fathers were two and half times more likely to be involved in offending compared to mothers. Approximately three percent of mothers had a history of at least one violent offence, compared to 10.6 percent of fathers. Less than five percent of mothers and less than ten percent of fathers had at least one nonviolent offence.

To determine the co-occurrence of offending among children with mothers and children with fathers involved in offending, chi-square tests were conducted. The first chi-square test (see Table 5) shows the overlap between maternal and paternal offending for any offending.

Table 5: Results of chi-square test and descriptive statistics for paternal offending (any) by maternal offending (any)

Any paternal offending	Any maternal offending No %(n)	 Yes %(n)
No	76.2 (15,082)	29.9 (644)
Yes	23.8 (4,716)	70.1 (1,513)
Chi-square test	$X^2(1)=2051.86$, $p<.001$ $\phi=0.31$	

Note: n=21,956. Within column percentages and frequencies are reported.

Table 5 shows that the co-occurrence of paternal offending in the sample was high for maternal offending; 70 percent of children whose mothers had a history of offending also had a father with an offending history. The chi-square test was statistically significant, and the strength of the association was moderately strong ($\phi=0.31$). The cross tabulation for fathers (not shown) was lower; 24.3 percent of children whose fathers had a history of offending also had a mother with an offending history. To determine whether this co-occurrence was specific to offence type, a second chi-square test (see Table 6) was conducted for parental offending type (i.e., none, minor, nonviolent, and violent).

Table 6: Results of chi-square test and descriptive statistics for paternal offending type by maternal offending type

Type of paternal offending	Type of maternal offending			
	None %(n)	Minor %(n)	Nonviolent %(n)	Violent %(n)
None	76.2 (15,082)	42.3 (240)	30.3 (292)	18.1 (112)
Minor	7.8 (1,551)	13.2 (75)	7.7 (74)	7.4 (46)
Nonviolent	8.7 (1,720)	20.4 (116)	22.3 (215)	16.3 (101)
Violent	7.3 (1,439)	24.1 (137)	39.8 (384)	58.2 (360)
Chi-square test	$X^2(9)=3302.58$, p<.001 Cramer's V=0.22			

Note: n=21,944. Within column percentages and frequencies are reported.

Table 6 shows that the co-occurrence of paternal offending in the sample was high for maternal violent offending; 58 percent of children whose mothers had a history of violent offending also had a father with a violent offending history. Among children whose mothers had a history of nonviolent offending, approximately 40 percent had a father with a violent offending history and 22 percent had a father with a nonviolent offending history. The chi-square test was statistically significant, and the strength of the association between offending types was moderate (Cramer's V=0.22). The cross tabulation for fathers (not shown) indicated that this overlap was lower for fathers; 15.5 percent of children whose fathers had a history of violent offending also had a mother with a violent offending history.

What are the Characteristics of the Children in the Sample?

Child data were obtained from the MCS, which was conducted when the children were in their final year of primary school (Year 6) in New South Wales. Table 7 provides descriptive statistics for the 22,639 children for whom linked parental data and SDQ Conduct Problems data were available.

Table 7: Descriptive statistics for the children in the sample

Demographic indicators	%(n)	Missing
Sex		
Male	50.5 (11,439)	0
Female	49.5 (11,200)	
Age		
<12 years	58.2 (13,181)	
>=12 years	41.8 (9,458)	0
Aboriginal or Torres Strait Islander		
Yes	4.7 (1,010)	
No	95.3 (20,330)	1,299
English as a second language		
Yes	91.3 (20,630)	
No	8.7 (1,970)	39
Country of birth		
Australia	99.7 (21,412)	
Other	0.3 (54)	1173
Accessibility/Remoteness Index of Australia		
Major cities	72.9 (16,498)	
Regional or remote	27.1 (6,141)	0
Socio-Economic Index for Areas (SEIFA)		
Quintile 1 (Most disadvantaged)	18.3 (4,141)	
Quintiles 2 to 5	81.7 (18,498)	0

Note: n=22,639

Table 7 shows that just over half of the sample was male and 58 percent were less than 12 years of age. Less than five percent of the children were Aboriginal or Torres Strait Islander. Almost the entire sample was born in Australia, and 8.7 percent spoke English as a second language. Based on the Accessibility/Remoteness Index of Australia (ARIA) (Department of Health and Aged Care [Australian Government] 2001), approximately three quarters of the sample lived in a major city. Socioeconomic disadvantage was measured using the Socio-Economic Index for Areas (SEIFA), a measure of relative disadvantage that is based on the average income and employment status for each residential postcode in Australia (Pink 2013). A dichotomous indicator was created by recoding the national quintiles into the most disadvantaged (Quintile 1) and less disadvantaged (Quintiles 2 to 5); 18.3 percent of the sample was in the most disadvantaged quartile.

Since offspring conduct problems were the key outcome measure used in these analyses, detailed information on the SDQ Conduct Problems items and normative categories are provided in Table 8.

Table 8: Descriptive statistics for children's Conduct Problems (SDQ; Strengths and Difficulties Questionnaire)

SDQ Conduct Problems items	%(n) Not True	%(n) Somewhat True	%(n) Certainly True
I get very angry and often lose my temper	62.1 (14,054)	26.6 (6,031)	11.3 (2,554)
I usually do as I am told (R)	3.2 (725)	43.8 (9,911)	53.0 (12,003)
I fight a lot. I can make other people do what I want	83.3 (18,858)	14.0 (3,166)	2.7 (615)
I am often accused of lying or cheating	62.7 (14,197)	26.3 (5,951)	11.0 (2,491)
I take things that are not mine from home, school or elsewhere	88.3 (19,986)	9.6 (2,179)	2.1 (475)
	Normal	Borderline	Abnormal
SDQ Conduct Problems normative categories	82.9 (18,776)	7.8 (1,768)	9.3 (2,095)

Note: n=22,639. (R) denotes that the item that was subsequently reversed in the computation of the normative categories.

As shown in Table 8, the majority of children in the sample answered "Not True" (~53% to 88%) to the conduct problems items and few children answered "Certainly True" (~2% to 11%). The normative categories were calculated based on the total score of the five items, and approximately nine percent of children were categorised in the "Abnormal" category, eight percent in "Borderline", and 83 percent in the "Normal" category.

What is the Association between Parental Offending and Offspring Conduct Problems at age 11 Years?

Bivariate analyses were first completed to investigate the association between parental offending and the SDQ Conduct Problems categories for offspring. Table 9 presents the results of the chi-square test for offspring conduct problems by maternal offending.

Table 9: Results of chi-square test and descriptive statistics for offspring conduct problems by maternal offending

SDQ Conduct Problems	**Type of maternal offending** None %(n)	Minor %(n)	Nonviolent %(n)	Violent %(n)
Normal	84.3 (17,011)	75.3 (461)	73.5 (799)	67.1 (501)
Borderline	7.4 (1,503)	10.1 (62)	10.5 (114)	11.8 (88)
Abnormal	8.3 (1,673)	14.5 (89)	16.0 (174)	21.2 (158)
Chi-square test	$X^2(6)=282.39$, $p<.001$ Cramer's V=0.08			

Note: n=22,633. Within column percentages and frequencies are reported.

Table 9 shows that approximately 21 percent of mothers with a history of violent offending had children who were categorised in the "Abnormal" category of the SDQ Conduct Problems, compared to only around eight percent of non-offending mothers. Overall, there is somewhat higher prevalence of children in the "Borderline" and "Abnormal" categories when mothers had an offending history. The chi-square test was statistically significant and the strength of the association was weak (Cramer's V=0.08). Table 10 provides the chi-square test results for conduct problems by paternal offending.

Table 10: Results of chi-square test and descriptive statistics for offspring conduct problems by paternal offending

SDQ Conduct Problems	Type of paternal offending			
	None %(n)	Minor %(n)	Nonviolent %(n)	Violent %(n)
Normal	85.9 (13,504)	80.4 (4,781)	79.4 (1,710)	71.7 (1,666)
Borderline	6.9 (1,092)	9.0 (158)	8.2 (177)	11.0 (256)
Abnormal	7.2 (1,131)	10.5 (184)	12.4 (266)	17.2 (400)
Chi-square test	$X^2(6)=367.78$, $p<.001$ Cramer's V=0.09			

Note: n=21,949. Within column percentages and frequencies are reported.

Table 10 indicates that the results for paternal offending were similar to those for maternal offending (Table 9); there was a somewhat higher prevalence among fathers with a history of offending to have children in the "Borderline" and "Abnormal" categories compared to the "Normal" category. The chi-square test was statistically significant and the strength of the association was weak for paternal offending (Cramer's V=0.09).

Table 11 presents the results of three multinomial regression models examining the association between maternal offending type and offspring conduct problems. Model 1 provides the results of an unadjusted model, where the reference category for SDQ Conduct Problems is the "Normal" category and the reference category for the maternal offending type is no offending. Model 2 was adjusted for two demographic variables: child sex and socioeconomic status. Considering the high co-occurrence of maternal and paternal offending, Model 3 also adjusts for paternal offending.

Table 11: Associations between maternal offending type and offspring conduct problems

	SDQ Conduct Problems			
	Borderline		Abnormal	
	OR	(95% CI)	OR	(95% CI)
Model 1: Unadjusted				
Maternal offending				
Minor	1.41	(1.05-1.88)	1.96	(1.54-2.50)
Nonviolent	1.63	(1.32-2.02)	2.11	(1.75-2.53)
Violent	2.01	(1.56-2.60)	3.43	(2.80-4.19)
Model 2: Adjusted for demographic covariates				
Maternal offending				
Minor	1.37	(1.03-1.84)	1.89	(1.48-2.41)
Nonviolent	1.57	(1.27-1.95)	1.99	(1.65-2.40)
Violent	1.99	(1.53-2.57)	3.32	(2.71-4.07)
Child male sex	1.69	(1.53-1.87)	1.86	(1.69-2.05)
Socioeconomic disadvantage	1.25	(1.10-1.41)	1.44	(1.28-1.61)
Model 3: Adjusted for demographic covariates and paternal offending				
Maternal offending				
Minor	1.23	(0.91-1.65)	1.55	(1.21-1.98)
Nonviolent	1.36	(1.09-1.69)	1.54	(1.27-1.86)
Violent	1.64	(1.26-2.14)	2.41	(1.95-2.97)
Child male sex	1.70	(1.53-1.88)	1.88	(1.71-2.07)
Socioeconomic disadvantage	1.21	(1.07-1.37)	1.36	(1.21-1.52)
Any paternal offending	1.41	(1.26-1.58)	1.81	(1.64-2.01)

Note: n=21,951. Reference category is "Normal" for SDQ Conduct Problems. Reference category is 'no offending' for the maternal offending type. OR=odds ratio, CI=confidence interval. Results considered statistically significant if the 95% CIs do not cross 1.

The unadjusted associations (Table 11, Model 1) show that the magnitude of association was greatest between maternal violent offending and offspring being categorised in the "Abnormal" category for SDQ Conduct Problems (OR=3.43; 95% CI=2.80-4.19). Overall, the ORs for "Borderline" Conduct Problems were lower than the ORs for the "Abnormal" category. The strength of the associations observed between maternal offending type and Conduct Problems increased in the pattern: minor < nonviolent < violent offending. These patterns held when adjusting for demographic covariates (Table 11, Model 2), although the ORs decreased somewhat. After adjusting for paternal offending in addition to the demographic indicators (Table 11, Model 3), the ORs decreased again, and maternal history of minor offending was no longer statistically significant for "Borderline" Conduct problems. Male children and children experiencing socioeconomic disadvantage were more likely to be in the "Abnormal" and "Borderline" categories of the SDQ Conduct Problems. Table 12 provides the results for same analyses but with paternal offending as the key exposure.

Table 12: Associations between paternal offending type and offspring conduct problems

	SDQ Conduct Problems			
	Borderline		Abnormal	
	OR	(95% CI)	OR	(95% CI)
Model 1: Unadjusted				
Paternal offending				
Minor	1.39	(1.17-1.66)	1.56	(1.33-1.85)
Nonviolent	1.28	(1.08-1.51)	1.86	(1.61-2.14)
Violent	1.90	(1.64-2.20)	2.87	(2.53-3.25)
Model 2: Adjusted for demographic covariates				
Paternal offending				
Minor	1.39	(1.16-1.66)	1.56	(1.32-1.84)
Nonviolent	1.27	(1.07-1.50)	1.82	(1.57-2.10)
Violent	1.88	(1.62-2.18)	2.80	(2.47-3.18)
Child male sex	1.70	(1.54-1.89)	1.88	(1.71-2.07)
Socioeconomic disadvantage	1.22	(1.08-1.38)	1.37	(1.22-1.54)
Model 3: Adjusted for demographic covariates and maternal offending				
Paternal offending				
Minor	1.36	(1.14-1.62)	1.50	(1.27-1.77)
Nonviolent	1.21	(1.02-1.43)	1.67	(1.44-1.93)
Violent	1.70	(1.46-2.00)	2.35	(2.05-2.69)
Child male sex	1.70	(1.53-1.88)	1.88	(1.70-2.07)
Socioeconomic disadvantage	1.21	(1.06-1.37)	1.34	(1.20-1.51)
Any maternal offending	1.33	(1.13-1.57)	1.63	(1.42-1.88)

Note: n=21,949. Reference category is "Normal" for SDQ Conduct Problems. Reference category is no offending for the maternal offending type. OR=odds ratio, CI=confidence interval. Results considered statistically significant if the 95% CIs do not cross 1.

Similar results were found when examining the association between paternal offending type and offspring conduct problems (Table 12). The highest magnitude of association was found between paternal violent offending and offspring in the "Abnormal" SDQ Conduct Problems category (OR=2.87; 95% CI=2.53-3.25). The same increasing pattern of the strength of association was also found between offending type and Conduct Problems for fathers (i.e., minor < nonviolent < violent offending). ORs were also somewhat higher between paternal offending type and "Abnormal" SDQ Conduct Problems compared to "Borderline" SDQ Conduct Problems. After adjusting for covariates (Table 12, Models 2 and 3) the magnitude of the associations decreased, but for fathers all types of offending remained statistically significant. The unadjusted ORs for maternal offending initially seemed higher (Table 11, Model 1) compared to paternal offending (Table 12, Model 1); however, after adjusting for the other parents' offending (Model 3 in Table 11 and 12) the ORs were similar.

Discussion

This report described findings from the NSW-CDS on the associations between parental offending and offspring outcomes in early and middle childhood. Two key findings emerged from the analyses presented here. First, mothers with a history of offending tended to experience more disadvantage compared to non-offending mothers. Findings from childhood outcomes at age five years (RL1) showed that frequently offending mothers had a high prevalence of several risk factors such as socioeconomic disadvantage and mental illness. These mothers were also more likely to have partners with mental illness and offending histories. The co-occurrence of parental offending was particularly evident in the age 11 years (RL2) findings, where 70 percent of mothers with an offending history also had a partner with an offending history. Other studies have uncovered moderate to strong assortative mating for antisocial behaviour (Krueger et al. 1998: 180) and violent offending (Frisell et al. 2012). Beaver (2013) suggests that this type of assortative mating could mean that children are exposed to a "double dose" of risk factors, since they are at risk of inheriting genetic risk from parents as well as being exposed to social and environmental risk factors associated with antisocial behaviours. As the present study was not genetically informed, it was not possible to account for genetic risk owing to assortative mating. Few intergenerational studies include sufficient numbers of offending mothers and fathers to be able to examine the role of assortative mating in the intergenerational continuity of antisocial behaviour. More research is necessary on assortative mating and how this might influence parental offending trajectories and offspring development, as well as the mechanisms contributing to these findings.

A second key finding emerging from the study was the consistent association between maternal and paternal offending and offspring vulnerabilities in both early and middle childhood. At age five years, parental offending was not only associated with emotional-behavioural vulnerabilities, but also with a range of offspring outcomes, including cognitive vulnerability. At age 11 years, parental offending, and especially violent offending, was associated with children's conduct problems. Research on the intergenerational transmission of antisocial behaviour and offending has established that offending parents tend to have antisocial or offending children (Farrington, Coid & Murray 2009; Thornberry, Freeman-Gallant & Lovegrove 2009), and our findings demonstrate that this transmission begins to be evident from early in the life course. This study underlines the potential value of working with families at, or prior to, school entry to mitigate the development of later antisocial behaviour.

In both early and middle childhood, maternal offending initially seemed to have a greater magnitude of association, but once other risk factors were accounted for, associations were of similar magnitude for mothers and fathers. Other intergenerational studies that consider the influence of both parents on offspring outcomes in childhood have found that mothers and fathers conferred similar risk to their offspring (Beaver 2013) or have found that parent's gender was less important compared to having both parents involved in offending (Smith & Farrington 2004). This underlines the importance of considering the offending histories of both parents in examining the intergenerational transmission of antisocial behaviour. Moreover, while prior research has focused on emotional-behavioural offspring outcomes of parental offending, our findings demonstrate that the impact may be pervasive across multiple developmental outcomes. Early family/parent training programs are an effective evidence-based strategy for preventing antisocial behaviour and

delinquency (Piquero et al. 2016), and supporting vulnerable families during this period is also likely to help mitigate other developmental vulnerabilities.

Children whose mothers are involved with the criminal justice system represent a high-risk population. Disrupting the intergenerational transmission of antisocial behaviour needs to start early and target mothers as well as fathers. While women are traditionally less involved in offending and antisocial behaviour than men (Steffensmeier & Allan 1996), it is important to intervene and support female offenders when they become mothers, particularly those involved in frequent offending. Considering mothers that are more frequently involved in offending experience multiple and compounding disadvantages, there is compelling evidence to devise gender-specific support strategies for them. These interventions are a worthy subject of development and evaluation, given that rates of incarceration in Australia have been steadily increasing in the last ten years, with the number of female prisoners growing at a faster rate than male prisoners (Australian Bureau of Statistics 2017).

Strengths & Limitations

The NSW-CDS is the largest established Australian child sample for which successive waves of record linkage have been undertaken longitudinally. The study's design avoids recall biases and minimises selection and attrition biases. Importantly, it provides sufficient statistical power for detecting relatively rare exposures and outcomes (i.e., female offending; violent offending). However, the NSW-CDS uses data from administrative records that were not collected for research purposes. Potential misclassification errors could have occurred in their original recording. Parental offence records prior to 1994 were not captured; therefore, this study also underestimates parental offending. In addition, the use of official data underestimates offending by failing to capture non-charged offences, although evidence suggests that official and self-report offending measures over the life course are similar (Payne & Piquero 2016). The study is also limited by the absence of other important covariates such as parenting practices, parental contact with child, individual-level socio-economic status, and genetic information.

Future Research

To date, offending data in the NSW-CDS record linkages have been limited to that obtained from the NSW Bureau of Crime Statistics Reoffending and Research Database, which is based on court appearance data. The offending indicators used in the current study are therefore likely to reflect the most serious offences, or those individuals for whom there is the most evidence for prosecution to proceed. However, the NSW Police Force has administrative police contact data for all criminal incidents in New South Wales. This more detailed source of crime data will be added to the RL2 data collection in 2018. NSW Police Force records include detailed information regarding police contacts as a person of interest, witness, or victim. This will enable the identification of young people's pathways into offending. Obtaining victim contact data will be particularly relevant for understanding the development of female offending, since girls involved in offending tend to experience more victimisation compared to boys (Lanctôt 2015).

The NSW-CDS team has also designed a study in collaboration with Aboriginal and Torres Strait Islander health researchers, to specifically and sensitively examine the data for Aboriginal and Torres Strait Islander children and young people. This mixed-methods study seeks to understand not only differences with other children and young people, but protective factors, and recommended solutions identified by service providers, Elders, and parents. Such research is crucial given that

Aboriginal and Torres Strait Islander people are especially over-represented in data on almost every social and health indicator (Boulton 2016) including youth detention (Australian Institute of Health and Welfare 2015).

Future NSW-CDS record linkages will be completed with the overall goal to identify vulnerability and protective factors for a variety of health, justice, educational/vocational, social and wellbeing outcomes in adolescence and young adulthood. Ethical and data custodian liaison is currently underway to support a third record linkage when the offspring are adolescents.

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References

Australian Bureau of Statistics 2017. *Prisoners in Australia, 2016* Cat no. 4517.0. Canberra, ACT: ABS http://www.abs.gov.au/

Australian Institute of Health and Welfare 2015. *Youth detention population in Australia 2015*. Bulletin 131. Cat no. AUS 196. Canberra, ACT: AIHW

Auty KM, Farrington DP & Coid JW 2017. The Intergenerational Transmission of Criminal Offending: Exploring Gender-Specific Mechanisms. *British Journal of Criminology,* 57(1): 215-237

Bailey JA, Hill KG, Oesterle S & Hawkins JD 2009. Parenting practices and problem behavior across three generations: monitoring, harsh discipline, and drug use in the intergenerational transmission of externalizing behavior. *Developmental Psychology,* 45(5): 1214

Beaver KM 2013. The familial concentration and transmission of crime. *Criminal Justice and Behavior,* 40(2): 139-155

Besemer S 2012. Specialized versus versatile intergenerational transmission of violence: A new approach to studying intergenerational transmission from violent versus non-violent fathers: Latent class analysis. *Journal of Quantitative Criminology,* 28(2): 245-263

Besemer S 2014. The impact of timing and frequency of parental criminal behaviour and risk factors on offspring offending. *Psychology, crime & law : PC & L,* 20(1): 78-99

Bijleveld CCJH & Wijkman M 2009. Intergenerational continuity in convictions: A five-generation study. *Criminal behaviour and mental health,* 19(2): 142-155

Boulton J 2016. *Aboriginal Children, History and Health: Beyond Social Determinants*. New York: Routledge

Boyd SJ, Plemons BW, Schwartz RP, Johnson JL & Pickens RW 1999. The Relationship Between Parental History and Substance Use Severity in Drug Treatment Patients. *The American Journal on Addictions,* 8(1): 15-23

Brinkman SA et al. 2013. Associations between the early development instrument at age 5, and reading and numeracy skills at ages 8, 10 and 12: A prospective linked data study. *Child Indicators Research,* 6(4): 695-708

Brinkman SA, Gregory TA, Goldfeld S, Lynch JW & Hardy M 2014. Data resource profile: the Australian early development index (AEDI). *International Journal of Epidemiology,* 43(4): 1089-1096

Broidy LM et al. 2003. Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: a six-site, cross-national study. *Developmental Psychology,* 39(2): 222

Cairns RB, Cairns BD, Xie H, Leung MC & Hearne S 1998. Paths across generations: academic competence and aggressive behaviors in young mothers and their children. *Developmental Psychology,* 34(6): 1162-1174

Carr VJ et al. 2016. New South Wales Child Development Study (NSW-CDS): an Australian multiagency, multigenerational, longitudinal record linkage study. *British Medical Journal Open,* 6(2):

Cohen P, Kasen S, Brook JS & Hartmark C 1998. Behavior patterns of young children and their offspring: A two-generation study. *Developmental Psychology,* 34(6): 1202-1208

Coley RL, Carrano J & Lewin-Bizan S 2011. Unpacking links between fathers' antisocial behaviors and children's behavior problems: direct, indirect, and interactive effects. *Journal of Abnormal Child Psychology,* 39(6): 791-804

Conger RD, Neppl T, Kim KJ & Scaramella L 2003. Angry and aggressive behavior across three generations: A prospective, longitudinal study of parents and children. *Journal of Abnormal Child Psychology,* 31(2): 143-160

Courser MW, Shamblen SR, Lavrakas PJ, Collins D & Ditterline P 2009. The impact of active consent procedures on nonresponse and nonresponse error in youth survey data: Evidence from a new experiment. *Evaluation Review*

DeLisi M 2005. *Career criminals in society*. Thousand Oaks, CA: Sage Publications

DeLisi M & Piquero AR 2011. New frontiers in criminal careers research, 2000–2011: A state-of-the-art review. *Journal of Criminal Justice,* 39(4): 289-301
DeLisi M & Vaughn MG 2014. Foundation for a temperament-based theory of antisocial behavior and criminal justice system involvement. *Journal of Criminal Justice,* 42(1): 10-25
Department of Health and Aged Care [Australian Government] 2001. *Measuring remoteness: Accessibility/Remoteness Index of Australia (ARIA), Occasional Papers: New series No.14*.
Farrington DP 1979. Environmental stress, delinquent behavior, and convictions. *Stress and Anxiety,* 693-107
Farrington DP, Barnes GC & Lambert S 1996. The concentration of offending in families. *Legal and criminological psychology,* 1(1): 47-63
Farrington DP, Coid JW & Murray J 2009. Family factors in the intergenerational transmission of offending. *Criminal behaviour and mental health : CBMH,* 19(2): 109-124
Farrington DP, Coid JW & West DJ 2009. The development of offending from age 8 to age 50: Recent results from the Cambridge Study in Delinquent Development. *Monatsschrift fur Kriminologie und Strafrechtsreform,* 92(2-3): 160-173
Farrington DP, Jolliffe D, Loeber R, Stouthamer-Loeber M & Kalb LM 2001. The concentration of offenders in families, and family criminality in the prediction of boys' delinquency. *Journal of Adolescence,* 24(5): 579-596
Farrington DP, Ttofi MM & Crago RV 2017. Intergenerational Transmission of Convictions for Different Types of Offenses. *Victims & Offenders,* 12(1): 1-20
Farrington DP & Welsh BC 2007. *Saving children from a life of crime: Early risk factors and effective interventions*. Oxford Oxford University Press
Ferguson T. (1952) The young delinquent in his social setting: A Glasgow study. Cambridge, MA: Harvard University Press.
Fox JA & Tracy PE 1988. A measure of skewness in offense distributions. *Journal of Quantitative Criminology,* 4(3): 259-274
Frisell T, Lichtenstein P & Langstrom N 2011. Violent crime runs in families: a total population study of 12.5 million individuals. *Psychological Medicine,* 41(1): 97-105
Frisell T, Pawitan Y, Långström N & Lichtenstein P 2012. Heritability, assortative mating and gender differences in violent crime: results from a total population sample using twin, adoption, and sibling models. *Behavior Genetics,* 42(1): 3-18
Glueck S & Glueck E 1950. *Unraveling juvenile delinquency*. Cambridge Harvard University Press
Goodman R 1997. The Strengths and Difficulties Questionnaire: a research note. *Journal of child psychology and psychiatry,* 38(5): 581-586
Goodman R 2001. Psychometric properties of the strengths and difficulties questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry,* 40(11): 1337-1345
Goodwin V & Davis B 2011. Crime families: Gender and the intergenerational transfer of criminal tendencies. *Trends and Issues in Crime and Criminal Justice,* 414: 1-6
Guhn M, Gadermann AM, Almas A, Schonert-Reichl KA & Hertzman C 2016. Associations of teacher-rated social, emotional, and cognitive development in kindergarten to self-reported wellbeing, peer relations, and academic test scores in middle childhood. *Early Childhood Research Quarterly,* 3576-84
Green MJ et al. 2018. The New South Wales Child Development Study (NSW-CDS) – Wave 2 (Child age 13 years). International Journal of Epidemiology. doi: 10.1093/ije/dyy115
Herndon RW & Iacono WG 2005. Psychiatric disorder in the children of antisocial parents. *Psychological Medicine,* 35(12): 1815-1824
Hjalmarsson R & Lindquist MJ 2012. Like godfather, like son: Exploring the intergenerational nature of crime. *The Journal of human resources,* 47(2): 550-582
Janus M, Brinkman SA & Duku EK 2011. Validity and psychometric properties of the early development instrument in Canada, Australia, United States, and Jamaica. *Social indicators research,* 103(2): 283-297

Kendler KS, Ohlsson H, Morris NA, Sundquist J & Sundquist K 2015. A Swedish population-based study of the mechanisms of parent-offspring transmission of criminal behavior. *Psychological Medicine,* 45(5): 1093-1102

Kim HK, Capaldi DM, Pears KC, Kerr DCR & Owen LD 2009. Intergenerational transmission of internalising and externalising behaviours across three generations: Gender-specific pathways. *Criminal behaviour and mental health,* 19(2): 125-141

Kinner SA, Alati R, Najman JM & Williams GM 2007. Do paternal arrest and imprisonment lead to child behaviour problems and substance use? A longitudinal analysis. *Journal of child psychology and psychiatry, and allied disciplines,* 48(11): 1148-1156

Krueger RF, Moffitt TE, Caspi A, Bleske A & Silva PA 1998. Assortative mating for antisocial behavior: Developmental and methodological implications. *Behavior Genetics,* 28(3): 173-186

Lanctôt N 2015. Development of Antisocial Behavior in Adolescent Girls, in J Morizot & L Kazemian (eds.), *The development of criminal and antisocial behavior*. London: Springer

Långström N, Babchishin KM, Fazel S, Lichtenstein P & Frisell T 2015. Sexual offending runs in families: A 37-year nationwide study. *International Journal of Epidemiology,* 44(2): 713-720

Latvala A, Kuja-Halkola R, Langstrom N & Lichtenstein P 2015. Paternal antisocial behavior and sons' cognitive ability: A population-based quasiexperimental study. *Psychological Science,* 26(1): 78-88

Laurens K et al. 2017a. Cohort Profile. The 2015 Middle Childhood Survey (MCS) of mental health and wellbeing at age 11 years in an Australian population cohort. *BMJ Open*

Laurens KR et al. 2017b. Pervasive influence of maternal and paternal criminal offending on early childhood development: A population data linkage study. *Psychological Medicine,* 47(5): 889-901

Lauritsen JL, Heimer K & Lynch JP 2009. Trends in the gender gap in ivolent offending: New evidence from the national crime victimization survey *Criminology,* 47(2): 361-399

Loeber R & Stouthamer-Loeber M 1986. Family factors as correlates and predictors of juvenile conduct problems and delinquency. *Crime and justice,* 729-149

McGloin JM & Pratt TC 2003. Cognitive ability and delinquent behavior among inner-city youth: A life-course analysis of main, mediating, and interaction effects. *International Journal of Offender Therapy and Comparative Criminology,* 47(3): 253-271

Moffitt TE 1993. Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review,* 100(4): 674-701

Murray J, Loeber R & Pardini D 2012. Parental involvement in the criminal justice system and the development of youth theft, marijuana use, depression, and poor academic performance. *Criminology; an interdisciplinary journal,* 50(1): 255-302

Payne JL & Piquero AR 2016. The concordance of self-reported and officially recorded lifetime offending histories: Results from a sample of Australian prisoners. *Journal of Criminal Justice,* 46184-195

Pink B 2011. *Australian and New Zealand Standard Offence Classification (ANZSOC)*. ABS Catalogue No. 1234.0. Canberra, Australia: Australian Bureau of Statistics

Pink B 2013. *Socio-Economic Indexes for Areas (SEIFA) 2011: Technical paper*. ABS Catalogue no. 2033.0.55.001. Canberra: Australian Bureau of Statistics

Piquero AR 2000. Assessing the relationships between gender, chronicity, seriousness, and offense skewness in criminal offending. *Journal of Criminal Justice,* 28(2): 103-115

Piquero AR et al. 2016. A meta-analysis update on the effects of early family/parent training programs on antisocial behavior and delinquency. *Journal of Experimental Criminology,* 12(2): 229-248

Raudino A, Fergusson DM, Woodward LJ & Horwood LJ 2013. The intergenerational transmission of conduct problems. *Social Psychiatry and Psychiatric Epidemiology,* 48(3): 465-476

Rhule DM, McMahon RJ & Spieker SJ 2004. Relation of adolescent mothers' history of antisocial behavior to child conduct problems and social competence. *Journal of clinical child and*

adolescent psychology : the official journal for the Society of Clinical Child and Adolescent Psychology, American Psychological Association, Division 53, 33(3): 524-535
Smith CA & Farrington DP 2004. Continuities in antisocial behavior and parenting across three generations. *Journal of child psychology and psychiatry, and allied disciplines,* 45(2): 230-247
Steffensmeier D & Allan E 1996. Gender and crime: Toward a gendered theory of female offending. *Annual Review of Sociology*459-487
Thornberry TP 2009. The apple doesn't fall far from the tree (or does it?): Intergenerational patterns of antisocial behavior - the American Society of Criminology 2008 Sutherland Address. *Criminology,* 47(2): 297-325
Thornberry TP, Freeman-Gallant A, Lizotte AJ, Krohn MD & Smith CA 2003. Linked lives: The intergenerational transmission of antisocial behavior. *Journal of Abnormal Child Psychology,* 31(2): 171-184
Thornberry TP, Freeman-Gallant A & Lovegrove PJ 2009. Intergenerational linkages in antisocial behaviour. *Criminal behaviour and mental health : CBMH,* 19(2): 80-93
Tremblay RE 2015. Antisocial Behavior Before the Age-Crime Curve: Can Developmental Criminology Continue to Ignore Developmental Origins?, in J Morizot & L Kazemian (eds.), *The Development of Criminal and Antisocial Behavior*. Switzerland: Springer
Tremblay RE et al. 2004. Physical aggression during early childhood: Trajectories and predictors. *Pediatrics,* 114(1): e43-50
Tzoumakis S et al. 2017. The impact of parental offending on offspring aggression in early childhood: a population-based record linkage study. *Social Psychiatry and Psychiatric Epidemiology,* 52(4): 445-455
Tzoumakis S, Lussier P & Corrado R 2012. Female juvenile delinquency, motherhood, and the intergenerational transmission of aggression and antisocial behavior. *Behavioral Sciences and the Law,* 30(2): 211-237
Tzoumakis S, Lussier P & Corrado RR 2014. The persistence of early childhood physical aggression: Examining maternal delinquency and offending, mental health, and cultural differences. *Journal of Criminal Justice,* 42(5): 408-420
van de Rakt M, Nieuwbeerta P & Apel R 2009. Association of criminal convictions between family members: Effects of siblings, fathers and mothers. *Criminal Behaviour and Mental Health,* 19(2): 94-108
van de Rakt M, Nieuwbeerta P & de Graaf ND 2008. Like father, like son: the relationships between conviction trajectories of fathers and their sons and daughters. *The British journal of criminology,* 48(4): 538-556
van de Weijer SG, Besemer S, Bijleveld CCJH & Blokland AA 2015. The concentration of sex offenses within British and Dutch families, in A A Blokland & P Lussier (eds.), *Sex Offenders: A Criminal Career Approach*. Oxford: Wiley-Blackwell
van de Weijer SG, Bijleveld CC & Blokland AA 2014. The intergenerational transmission of violent offending. *Journal of family violence,* 29(2): 109-118
van Meurs I, Reef J, Verhulst FC & van der Ende J 2009. Intergenerational transmission of child problem behaviors: A longitudinal, population-based study. *Journal of the American Academy of Child and Adolescent Psychiatry,* 48(2): 138-145
Walters GD 1992. A meta-analysis of the gene-crime relationship. *Criminology; an interdisciplinary journal,* 30(4): 595-613
Wolfgang M, Figlio R & Sellin T 1972. *Delinquency in a birth cohort*. Chicago, IL: University of Chicago Press

Appendix

Appendix A. Description of Australian Early Development Census (AEDC) developmental domains

AEDC Domain	**Subdomain**
Social competence	• Overall social competence • Responsibility and respect • Approach to learning (e.g., works independently and adapts to routines) • Readiness to explore new things (e.g., books, toys, games)
Emotional maturity	• Pro-social and helping behaviours • Anxious and fearful behaviour • Aggressive behaviour • Hyperactivity and inattention
Language and cognitive skills	• Basic literacy • Advanced literacy • Basic numeracy • Interest in literacy, numeracy and memory
Communication skills and general knowledge	• Broad developmental competencies and skills in communication and general knowledge (e.g., understands and uses language effectively)
Physical health and wellbeing	• Gross and fine motor skills • Physical independence • Physical readiness for the school day (e.g., tired, hungry, or unkempt)