



Using cross-agency record linkage to examine the relationship between parental offending and offspring outcomes in childhood

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Outline

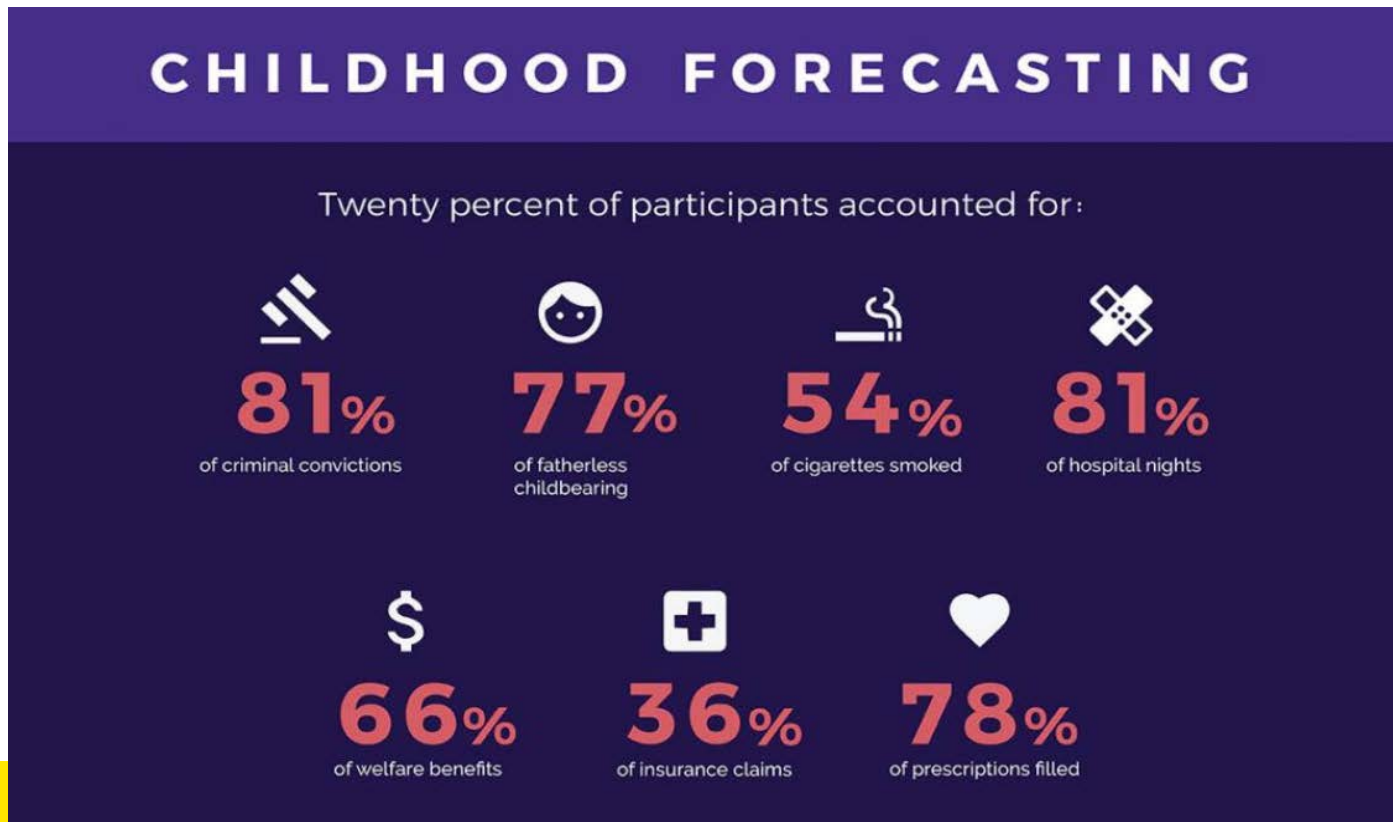
- Record linkage & criminology
- Overview of the NSW Child Development Study
- Findings from Record Linkage 1 (children aged 5 years)
 - Parental offending and offspring aggression (Tzoumakis et al., 2017)
 - Prenatal smoking, parental offending, and offspring behavioural and cognitive outcomes (Tzoumakis et al., 2018)
- Findings from Record Linkage 2 (children aged 11 years)
 - Parental offending and offspring conduct problems (Tzoumakis et al., 2018)
- Future plans

Administrative record linkage

- Sometimes referred to as **Big Data**, which is defined as
 - “the analysis of original datasets with large samples ranging from ~30,000 to one million participants to mine unexplored data” (DeLisi, 2016)
- Linked administrative data is under-utilized criminology and criminal justice research (DeLisi, 2016; Stewart et al. 2015)
- Remains somewhat controversial in criminology (2017 American Society of Criminology Presidential Address by James P Lynch)
- Cross-agency record linkage (linking datasets from different government departments) is even less common in criminal justice research
- **Key advantages:** relatively inexpensive way to conduct longitudinal research, large sample sizes, lack of attrition
- **Key disadvantages:** ethical and legal issues, access issues, quality concerns

Importance of cross-agency research

- Small number of offenders responsible for a large proportion of crime and other public services:
 - 9% of the population accounted for 53% of convictions, 16% of emergency department visits, 21% of prescription fills, 13% of injury claims, and 25% of welfare benefit months (Rivenbark et al, 2017)
- 80/20 rule - these individuals can be identified as early as 3 years old:



The New South Wales Child Development Study (NSW-CDS)



- Adopts a life-course epidemiological approach to identifying risk and protective factors for childhood and adolescent onset mental health problems, and other adverse outcomes (e.g., educational underachievement, welfare dependence, criminality).
- **Four main themes:** Mental Health, Education, Child Protection, Criminal Justice

Core Research Team at UNSW Sydney

- Professor Vaughan Carr, Lead Investigator and Chair of the NSW-CDS Scientific Committee
- Associate Professor Melissa Green, co-Chair of the NSW-CDS Scientific Committee
- Associate Professor Kristin Laurens
- Associate Professor Kimberlie Dean
- Dr Stacy Tzoumakis

Partner Organisations

- NSW Ministry of Health
- NSW Department of Education
- NSW Department of Family and Community Services

The New South Wales Child Development Study (NSW-CDS)



- State-wide prospective, longitudinal, population-based study (<http://nsw-cds.com.au>)
- Uses record linkage of administrative data from multiple sources since birth (health, crime, education, welfare)
- Linkage conducted by the *Centre for Health Record Linkage* (www.cherel.org.au)
- Cohort is defined by the 2009 *Australian Early Development Census* (AEDC):
 - teacher-reported cross-sectional survey
 - 99.9% of the eligible New South Wales (NSW) children (N = 87,026) who entered kindergarten at approximately 5 years of age
 - a validated measure of childhood developmental vulnerability and school readiness

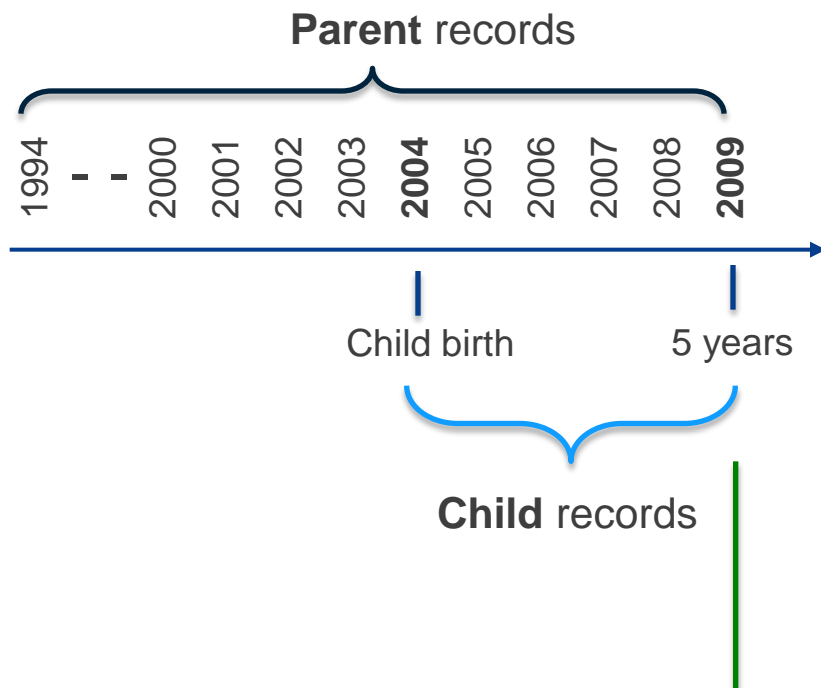
Open Access

Cohort profile

BMJ Open New South Wales Child Development Study (NSW-CDS): an Australian multiagency, multigenerational, longitudinal record linkage study

Vaughan J Carr,^{1,2,3} Felicity Harris,^{1,2} Alessandra Raudino,^{1,2} Luming Luo,^{1,2} Maina Kariuki,^{1,2} Enwu Liu,^{1,2} Stacy Tzoumakis,^{1,2} Maxwell Smith,⁴ Allyson Holbrook,⁴ Miles Bore,⁵ Sally Brinkman,^{6,7,8} Rhoshel Lenroot,¹ Katherine Dix,⁹ Kimberlie Dean,^{1,10} Kristin R Laurens,^{1,2} Melissa J Green^{1,2}

NSW-CDS Record Linkage 1



**Australian Early Development
Census (AEDC; N=87,026)**
Early Childhood Developmental Vulnerability

Parent Records (1994-2009)

NSW Health

- Admitted Patients Data
- Mental Health Ambulatory
- Emergency Department Data
- Perinatal Data
- Births, Deaths, Marriages

NSW Bureau of Crime Statistics and Research

- Criminal Court Appearances

Child Records (birth-2009)

NSW Health

- Perinatal Data
- Admitted Patients Data
- Emergency Department Data
- Births, Deaths, Marriages

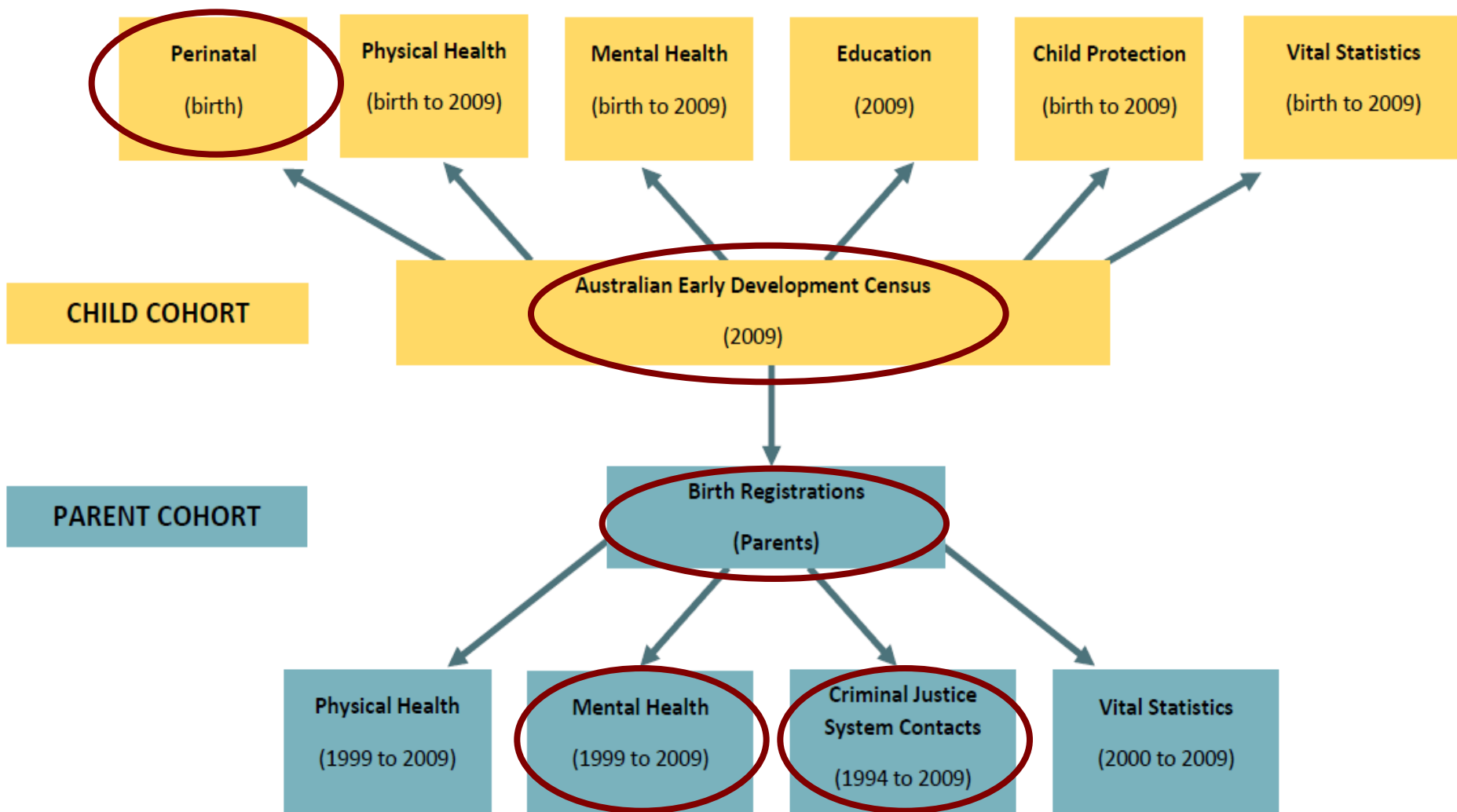
Department of Education

- Best Start Kindergarten Assessment
- Australian Early Development Census**

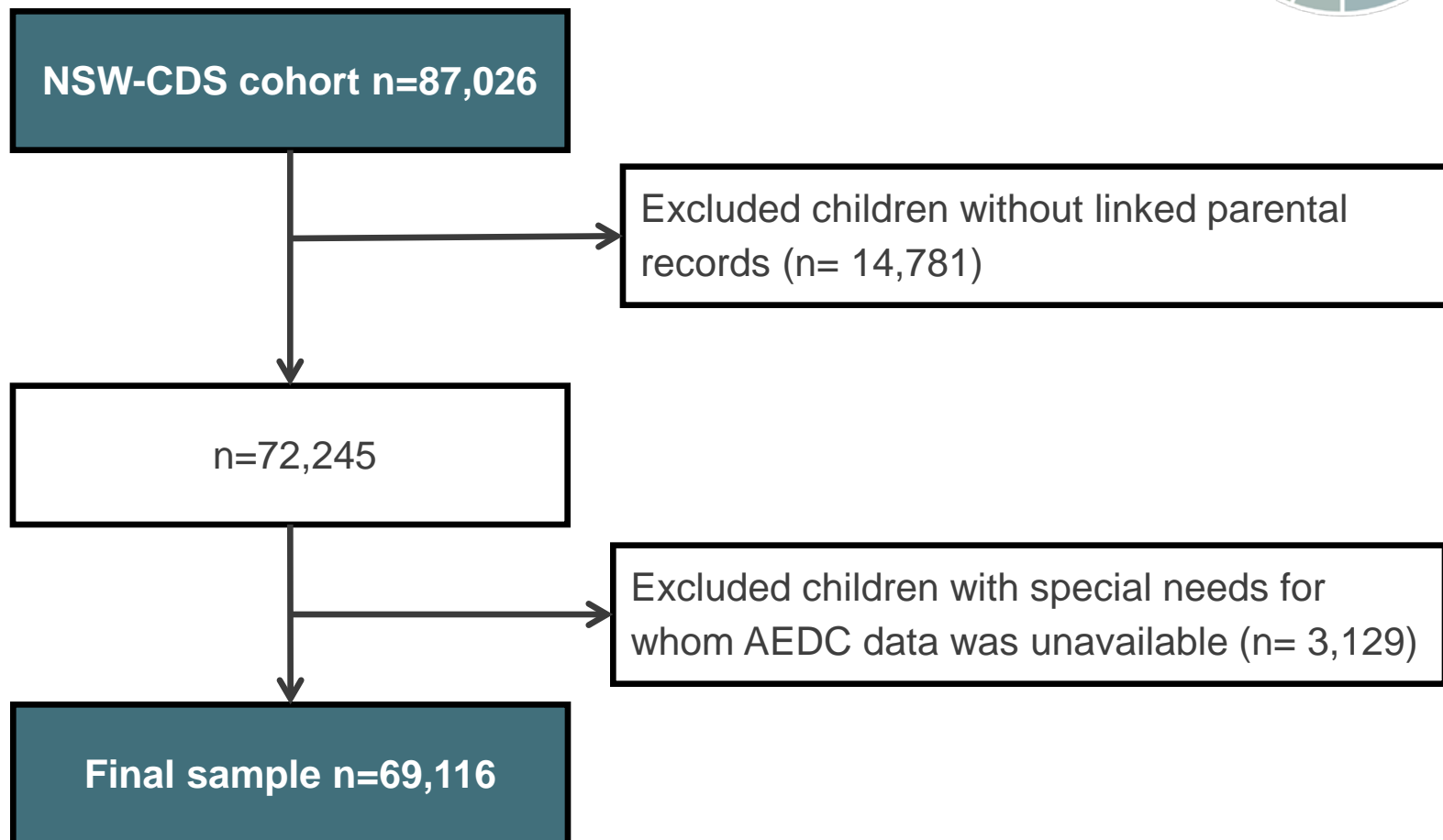
NSW Family and Community Services

- Child Protection (substantiated reports)
- Out of Home Care

NSW-CDS Record Linkage 1 (2014)



Sample – Record Linkage 1



Offspring outcomes at age 5 years



- From the AEDC - kindergarten teacher-report
- Dichotomous outcomes reflecting child "vulnerability" - bottom 10% of the national AEDC

Australian Early Development Census (AEDC) subdomains

Aggression	7 items including: kicks, bites, hits; bullies or is mean
Hyperactivity and inattention	6 items including: restless; distractible
Anxiety and fearfulness	5 items including: worries; cries a lot
Basic literacy	8 items including: identifies letters; writes own name
Basic numeracy	7 items including: counts to 20; recognizes 1-10

Indicators



Data source	Measure	Coding
NSW Bureau of Crime Statistics	Maternal and paternal offending (court appearances)	Type: <ul style="list-style-type: none"> • None • Minor (traffic, vehicle, public safety offences) • Nonviolent (theft, fraud, drug offences) • Violent (homicide, assault, robbery) Frequency: <ul style="list-style-type: none"> • 0 • 1 • 2 to 5 • ≥6 offences
Australian Early Development Census (AEDC)	Child sex	<ul style="list-style-type: none"> • Female • Male
	Child English as a second language	<ul style="list-style-type: none"> • Not ESL • ESL
	Socio-Economic Index for Areas	<ul style="list-style-type: none"> • three least disadvantaged quintiles • two most disadvantaged
NSW Register of Births, Deaths, and Marriages	Maternal age at child's birth	<ul style="list-style-type: none"> • <26 years of age • ≥26 years of age

Indicators



Data source	Measure	Coding
NSW Mental Health Admitted Patients & Mental Health Ambulatory	Contacts with services for mental illness	<ul style="list-style-type: none"> • Yes/No mental illness • Yes/No substance use disorders
NSW Ministry of Health Perinatal Data Collection	<p>prenatal smoking quantity</p> <p>maternal pregnancy complications</p> <p>child gestational age</p> <p>child birth weight</p> <p>number of weeks pregnant at first antenatal visit</p>	<ul style="list-style-type: none"> • None: 0 cigarettes/day • Moderate: 1-10 cigarettes/day • Heavy: >10 cigarettes/day • Yes / No: any maternal diabetes, gestational diabetes, hypertension, pre-eclampsia • <37 weeks / ≥37 weeks • <2500g / ≥2500g • Continuous

What are the characteristics of children with mothers who are involved in offending?

	Total sample (n=69,116)	Maternal offending frequency			
		0 offences (n=63,341)	1 offence (n=2,459)	2-5 offences (N=2,134)	≥6 offences (N=1,182)
Child aggression	8%	8%	11%	15%	21%
Male child	51%	51%	51%	50%	49%
Child ESL	16%	16%	13%	10%	6%
Mother <26 yrs at child's birth	22%	20%	40%	49%	51%
Socioeconomic disadvantage	45%	43%	59%	67%	72%
Paternal offending	26%	22%	54%	66%	73%
Maternal mental illness	11%	9%	22%	35%	64%
Paternal mental illness	6%	5%	14%	21%	32%

What is the relationship between parental offending frequency and offspring aggression?

	Block 1	Block 2	Block 3	Block 4
	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Male child	3.1***	3.1***	3.1***	3.1***
English second language child	0.8***	0.9***	0.9**	0.9**
Mother <26 years at child's birth	1.7***	1.6***	1.4***	1.4***
Socioeconomic disadvantage	1.3***	1.3***	1.2***	1.2***
Maternal offending frequency ^a 1		1.3***	1.1	1.1
2-5		1.7***	1.4***	1.3***
≥6		2.7***	2.1***	1.7***
Paternal offending frequency ^a 1			1.3***	1.3***
2-5			1.4***	1.4***
≥6			1.7***	1.6***
Maternal mental illness				1.4***
Paternal mental illness				1.3***

N=68,655. **p<.01; ***p<.001 ^a Reference group is non-offending parents.

What is the relationship between parental offending type and offspring aggression?

	Block 1	Block 2	Block 3	Block 4
	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Male child	3.1***	3.1***	3.1***	3.1***
English second language child	0.8***	0.9***	0.9***	0.9***
Mother <26 years at child's birth	1.7***	1.6***	1.4***	1.4***
Socioeconomic disadvantage	1.3***	1.3***	1.2***	1.2***
Maternal offending type ^a Minor		1.3**	1.2	1.1
Nonviolent		1.6***	1.4***	1.2***
Violent		2.3***	1.9***	1.6***
Paternal offending type ^a Minor			1.3***	1.3***
Nonviolent			1.4***	1.4***
Violent			1.6***	1.5***
Maternal mental illness				1.4***
Paternal mental illness				1.3***

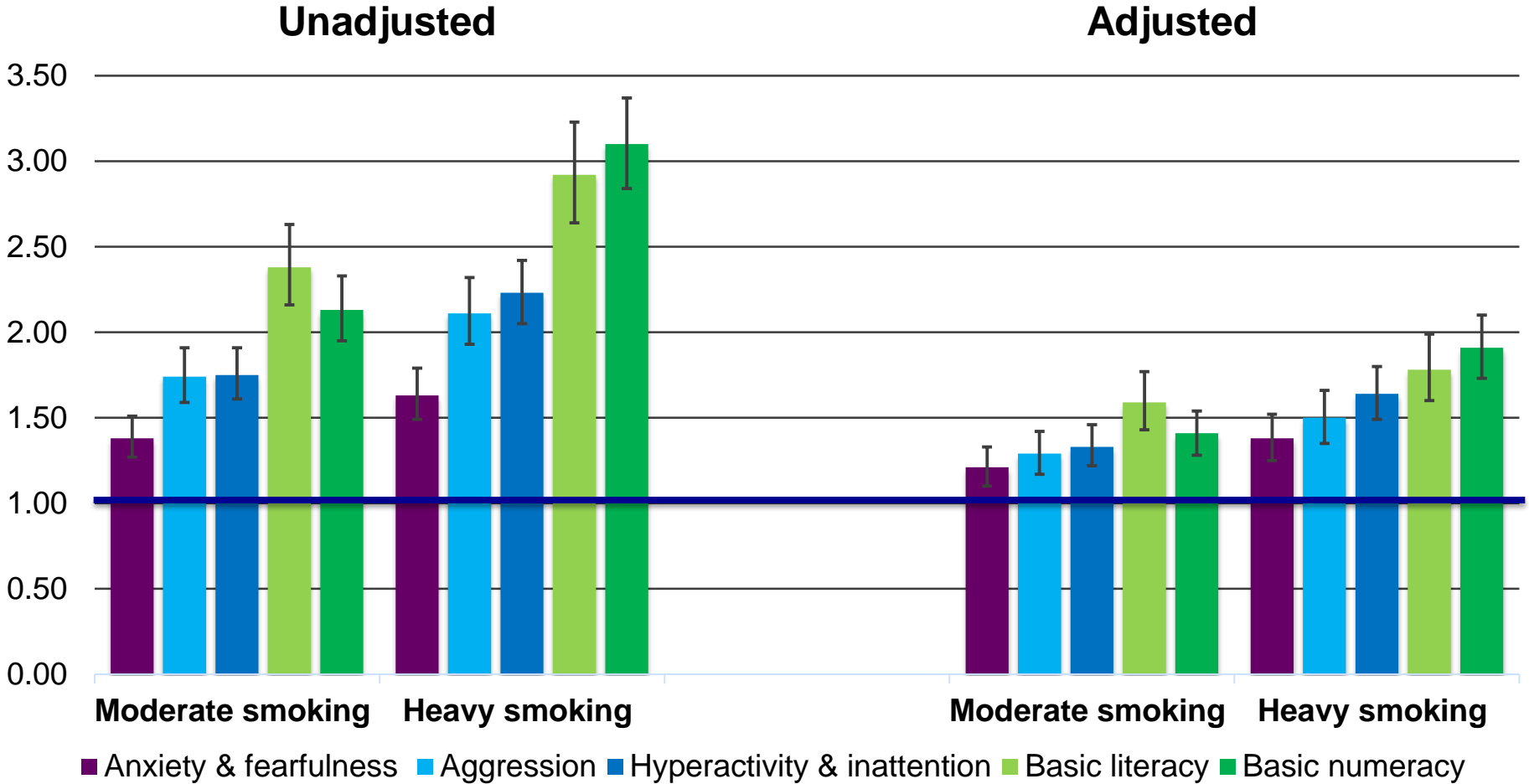
N=68,639. **p<.01; ***p<.001 ^a Reference group is non-offending parents.

What are the characteristics of mothers who smoke during pregnancy?



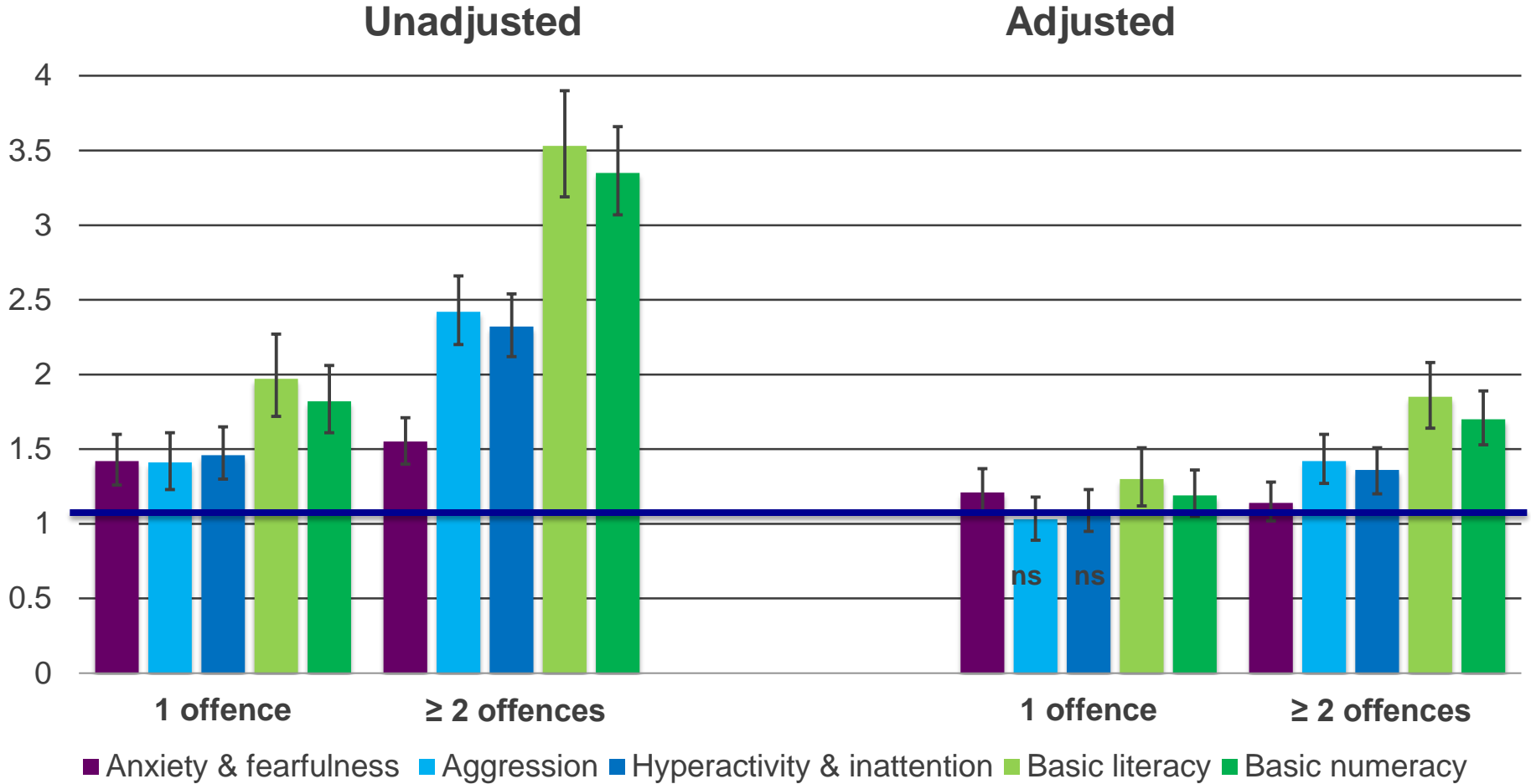
	<u>Total sample</u> (n=66,523)	<u>Maternal prenatal smoking</u>		
		None (86.7%; n=57,490)	Moderate (7.2%; n=4,794)	Heavy (6.0%; n=3,992)
Mean number of weeks pregnant at first antenatal visit	12.7	12.5	13.5	14.7
Maternal offending history				
None	92%	95%	74%	67%
1 offence	4%	3%	9%	9%
≥ 2 offences	5%	3%	17%	24%
Maternal pregnancy complications	11%	11%	8%	8%
Prematurity (<37 weeks)	5%	4%	7%	9%
Low birth weight (<2500g)	4%	3%	7%	10%
Mother <26 years at child's birth	22%	19%	43%	40%
Male child	51%	51%	51%	49%
Socioeconomic disadvantage	24%	22%	34%	40%
Maternal substance use problems	3%	1%	11%	19%
Paternal history of offending	26%	22%	51%	56%

What is the relationship between prenatal smoking and offspring outcomes?



Note: Adjusted for maternal offending, child sex, SES, maternal age at child's birth, pregnancy complications, birth weight, maternal substance use, paternal offending; n=65,794 to 66,061.

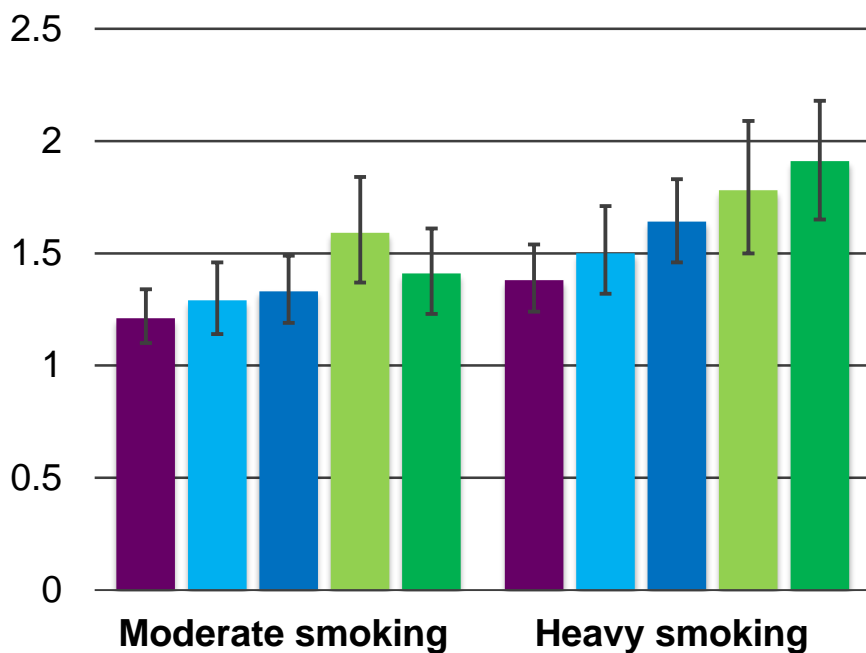
What is the relationship between maternal offending and offspring outcomes?



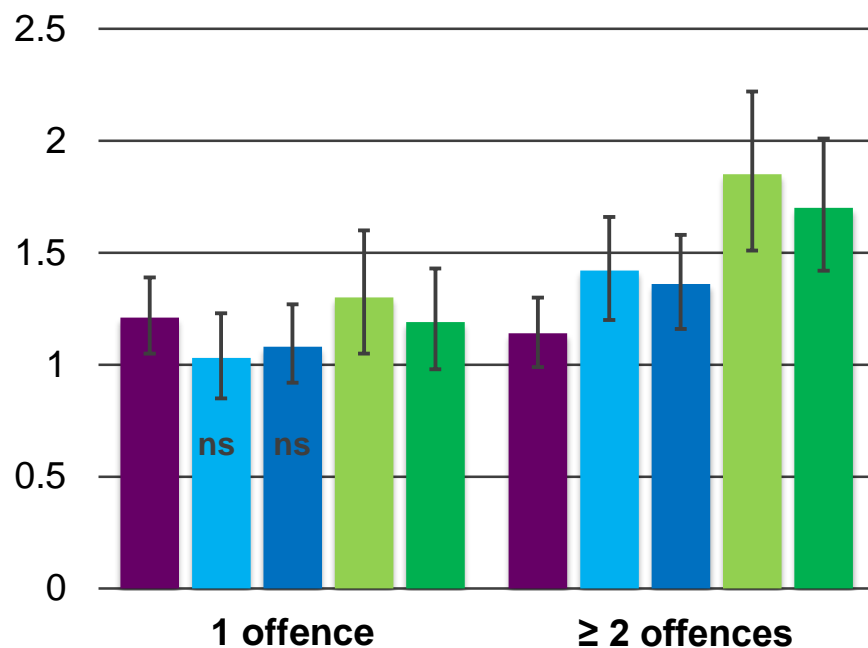
Note: Adjusted for prenatal smoking, child sex, SES, maternal age at child's birth, pregnancy complications, birth weight, maternal substance use, paternal offending; n=65,794 to 66,061.

Comparing the influence of prenatal smoking and maternal offending

Prenatal Smoking - Adjusted



Maternal offending - Adjusted



What are the population attributable fractions (PAFs) for maternal offending and prenatal smoking?

- PAFs measure the incidence of early childhood vulnerability in the population that “might” be prevented by effective elimination of the exposure

Exposures	Anxiety & fearfulness	Aggression	Hyperactivity & inattention	Basic literacy	Basic numeracy
Any prenatal smoking (n=9,318)	5.3%	9.3%	9.5%	15.8%	14.6%
Any maternal offending (n=5,652)	3.4%	6.6%	6.1%	11.8%	10.1%

Note: n=65,819 to 66,333

NSW-CDS Record Linkage 2 (2017)



Observational periods for parental criminal justice and health and contacts (pre-birth, early and middle childhood)



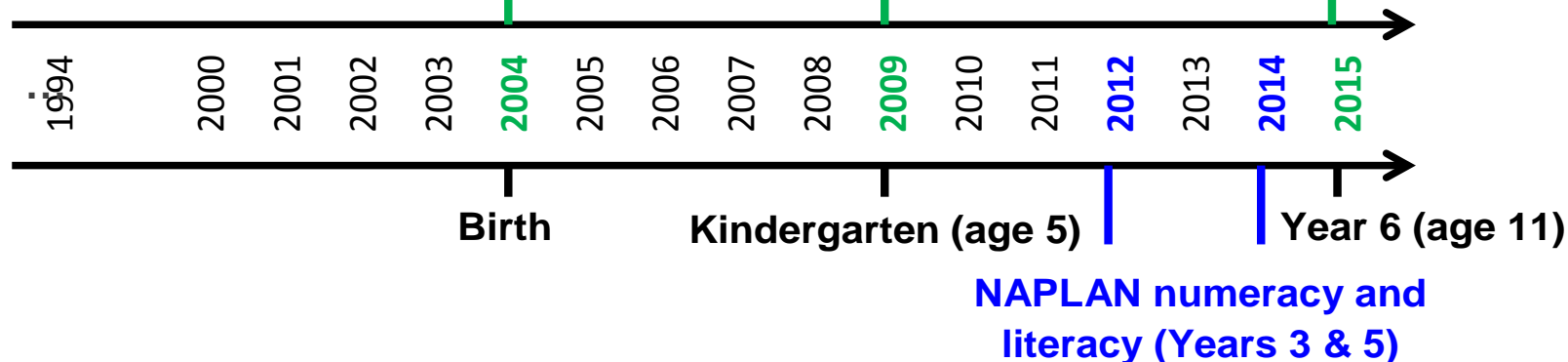
Observational period for early childhood

Observational period for middle childhood

Pregnancy/birth factors

AEDC developmental indices

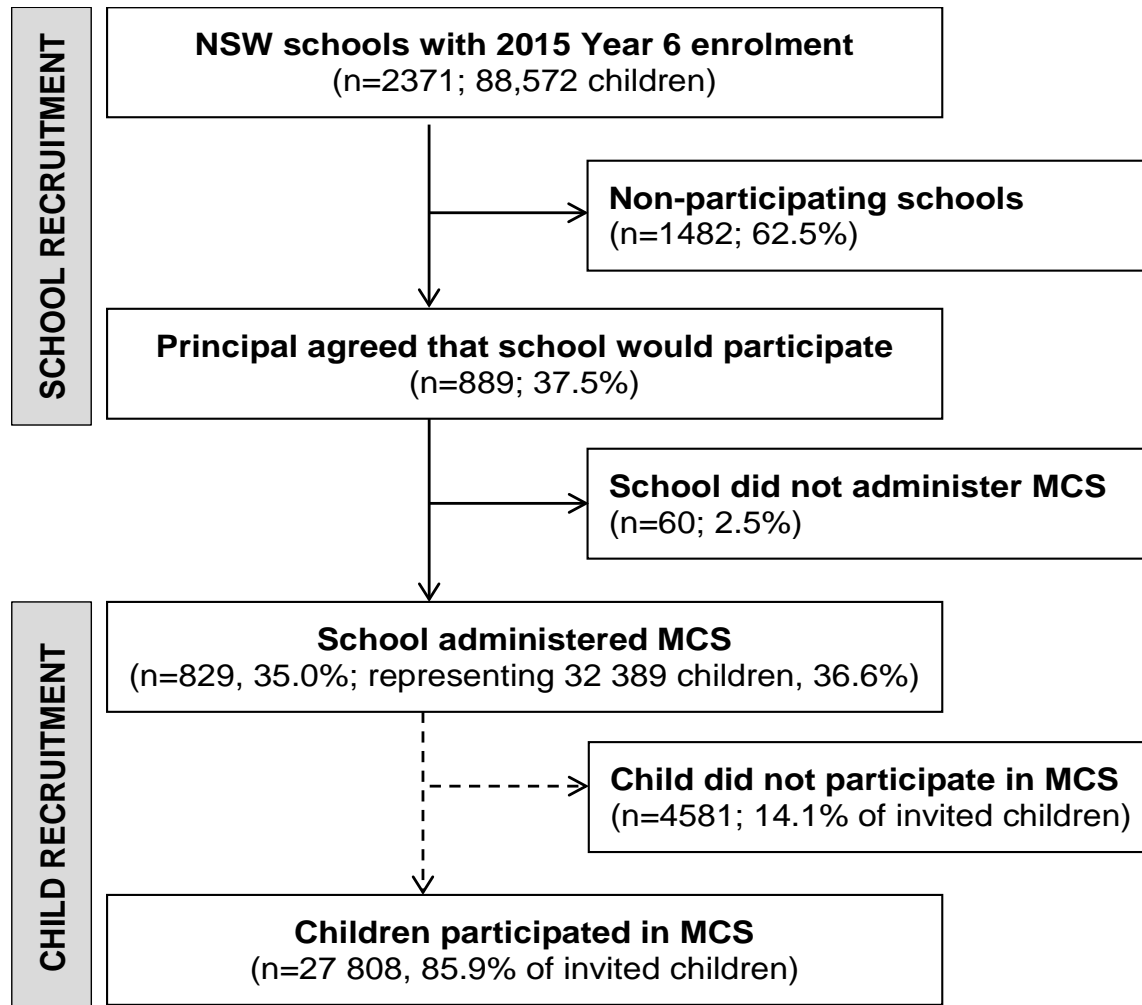
MCS mental health and wellbeing



2015 Middle Childhood Survey (MCS)

- Online self-report survey of children's mental health and wellbeing at ~11 years of age
- Targeted same cohort of children assessed within the AEDC in 2009 - all Year 6 students enrolled at government and non-government schools in NSW during 2015

2015 Middle Childhood Survey (MCS)



How many mothers also have an offending partner?

When the children are age 11 years

Any paternal offending	Any maternal offending	
	No	Yes
No	76% (15,082)	30% (644)
Yes	24% (4,716)	70% (1,513)
Chi-square test	$X^2(1)=2051.86, p<.001$ $\phi=0.31$	

Does maternal offending type influence offspring conduct problems at age 11 years?

		Age 11 Conduct Problems	
		Borderline	Abnormal
Model 1: Unadjusted			
Maternal offending			
	Minor	1.4	2.0
	Nonviolent	1.6	2.1
	Violent	2.0	3.4
Model 2: Adjusted			
Maternal offending			
	Minor	1.2	1.6
	Nonviolent	1.4	1.5
	Violent	1.6	2.4
Child male sex		1.7	1.9
Socioeconomic disadvantage		1.2	1.4
Any paternal offending		1.4	1.8

Note: n=21,951. Reference category is "Normal" for SDQ Conduct Problems

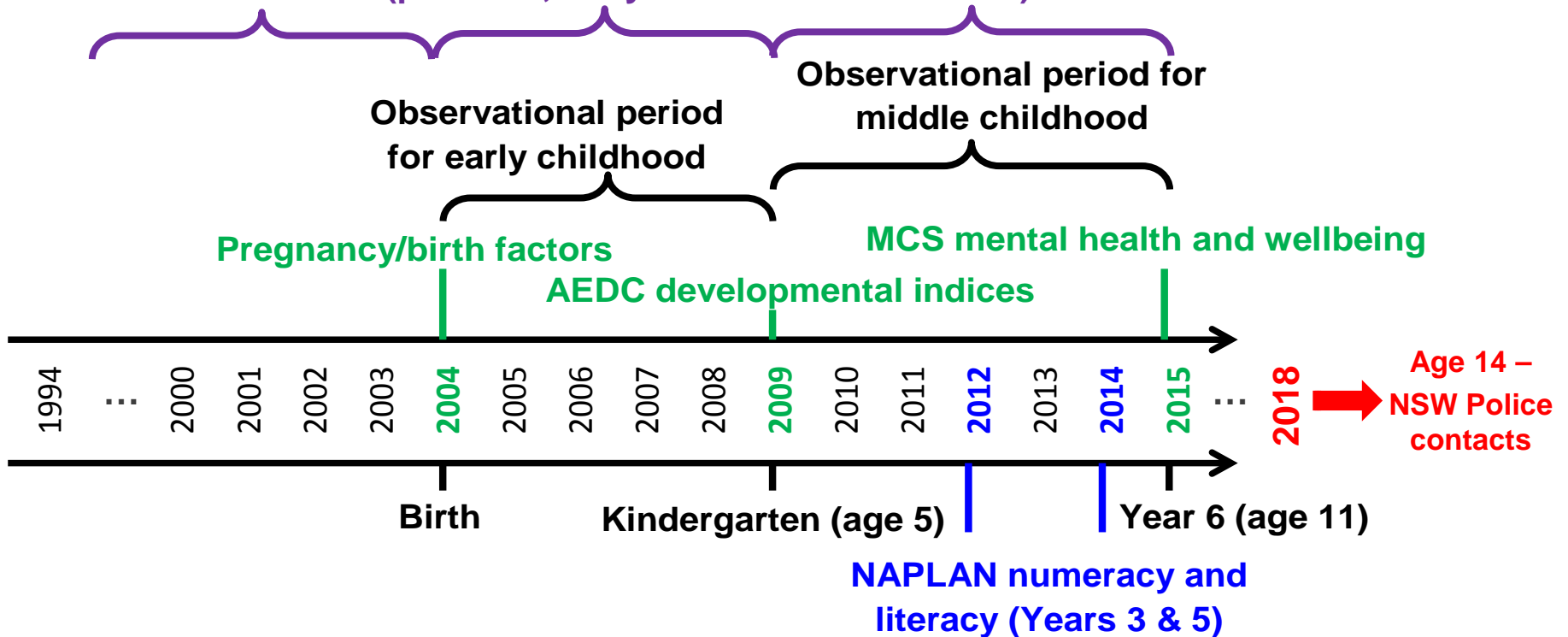
Summary of findings

- Frequent offending mothers more likely to be young, have mental illness, socioeconomic disadvantage, and have partners with a criminal history
- BOTH mothers' and fathers' offending matter – similar in magnitude
- Parental offending remains significant even after accounting for key risk factors
 - Highest effect → FREQUENT (≥ 6 offences) and VIOLENT parental offending
- Prenatal smoking as a “red flag” for poor health and social risk factors
 - Delayed antenatal care → heavy smokers two weeks later than non-smokers
- BOTH prenatal smoking and maternal offending associated pervasive offspring vulnerability
 - Prenatal smoking more robust
 - Dose-response relationship
 - Greatest influence on offspring cognitive outcomes
- High levels of “assortative mating” by the time children are age 11 years
- Influence of maternal offending on age 5 aggression and age 11 conduct problems are very similar

Future plans – NSW Police data



Observational periods for parental criminal justice and health and contacts (pre-birth, early and middle childhood)



Future Plans – Record Linkage 3



- We will be following the cohort via successive waves of record linkage
- Record Linkage 3 is planned for ~2020 when the children are 16 years old
- New data being added:
 - Commonwealth data
 - Pharmaceutical Benefits Scheme
 - Medicare Benefits Scheme
 - Centrelink
 - Year 7 & 9 NAPLAN
 - headspace data
 - Juvenile Justice data
 - Parental FACS data

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- Australian Institute of Criminology
- Australian Research Council
- National Health and Medical Research Council
- Australian Rotary Health

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