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

Stacy Tzoumakis, PhD
Lecturer in Criminology
School of Social Sciences
University of New South Wales

NSW CHILD DEVELOPMENT STUDY

# Outline

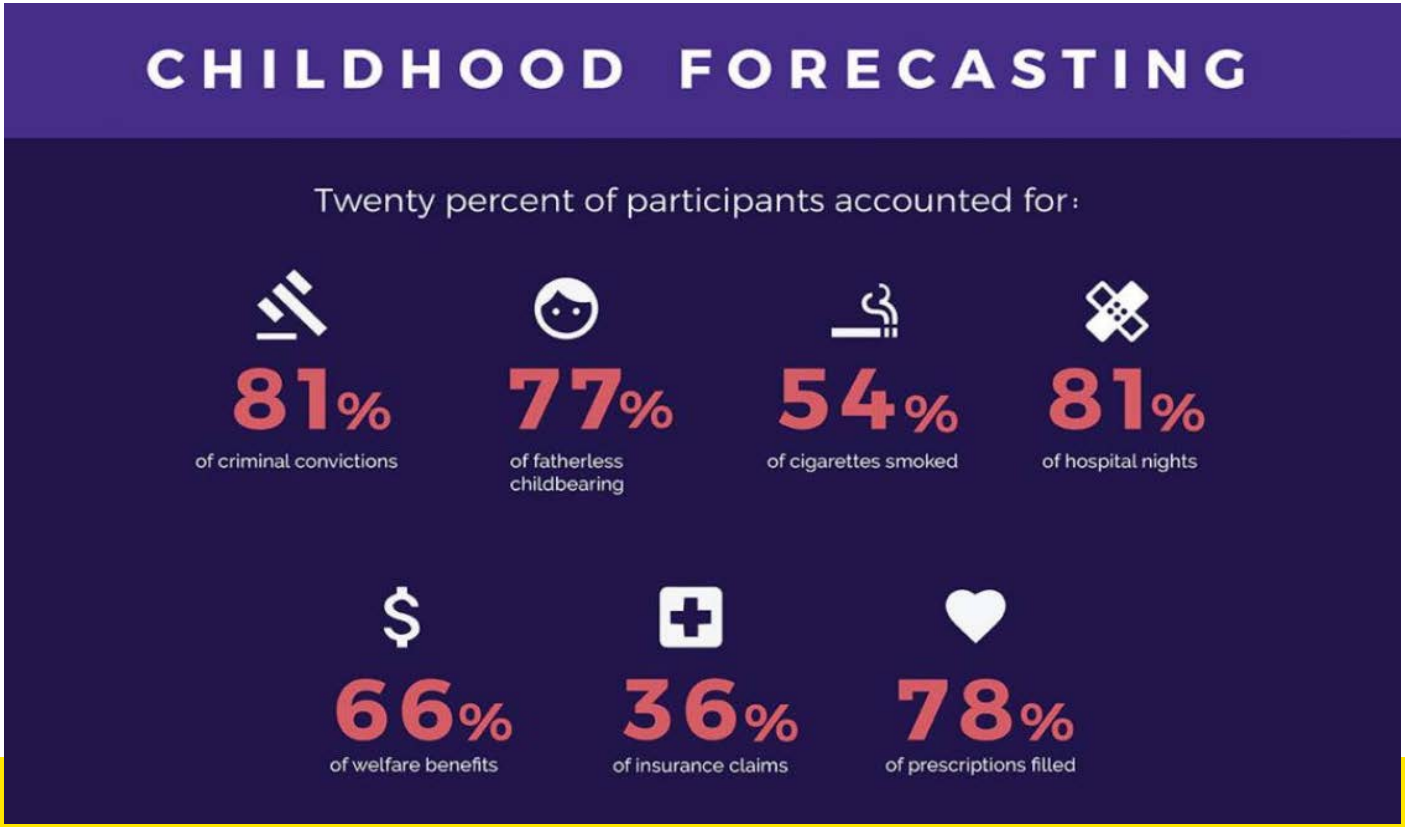
- Record linkage & criminology
- Overview of the NSW Child Development Study
- Findings from Record Linkage 1 (children aged 5 years)
  - Parental offending and offspring aggression (Tzoumakis et al., 2017)
  - Prenatal smoking, parental offending, and offspring behavioural and cognitive outcomes (Tzoumakis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




https://today.duke.edu/2016/12/adults-most-costly-problems-could-be-spotted-preschool

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# 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

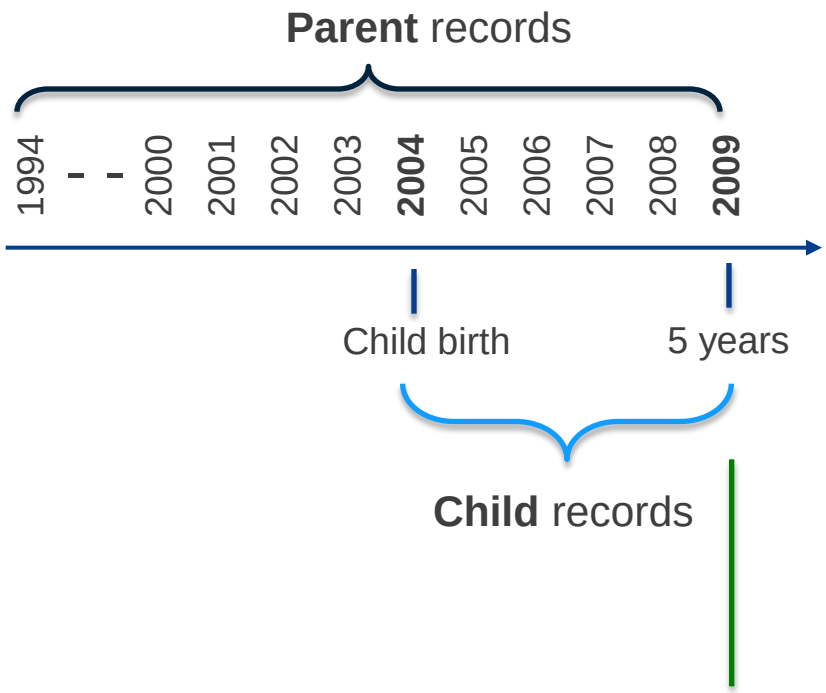
Open Access Cohort profile

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

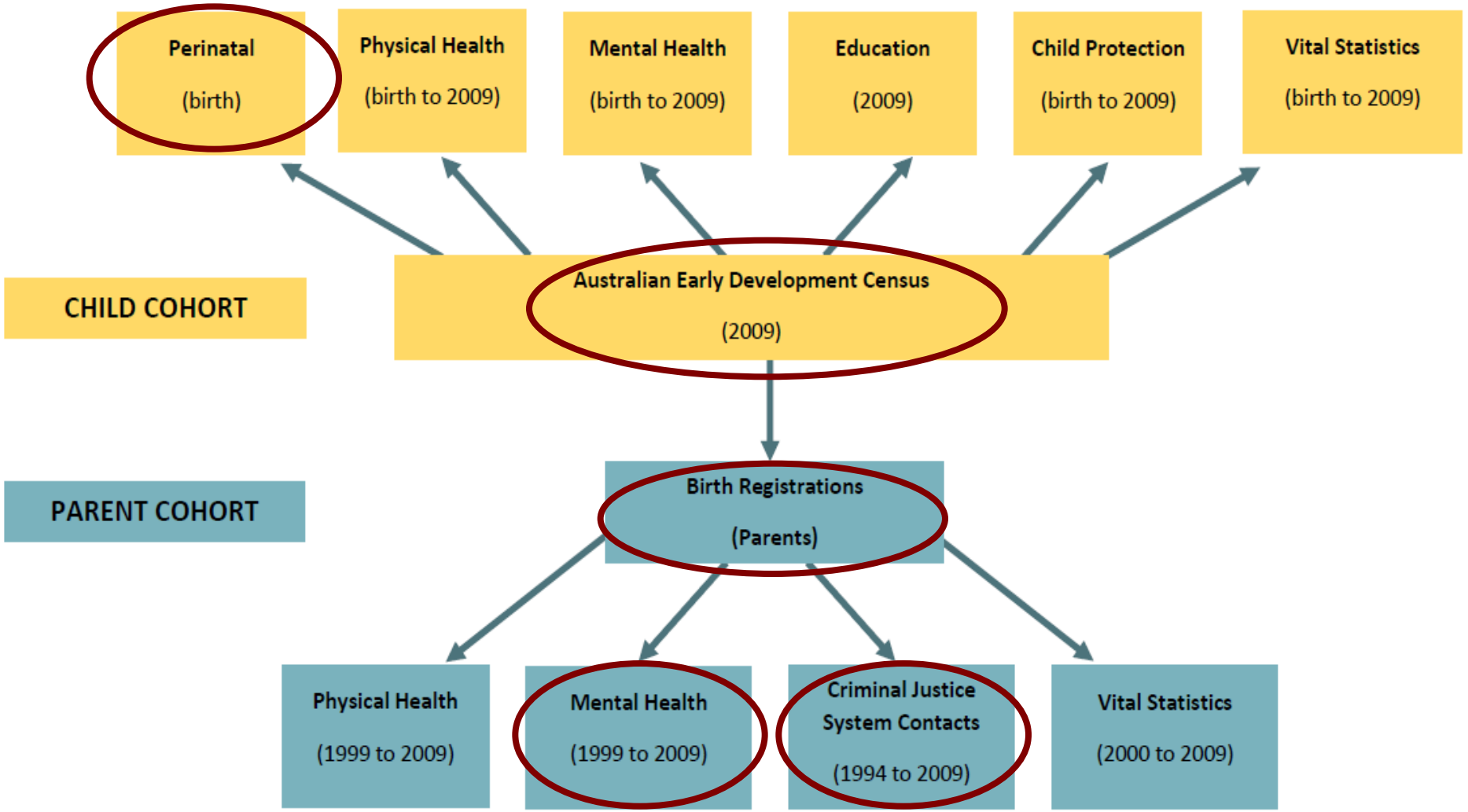
**Department of Education**

- Best Start Kindergarten Assessment
- Australian Early Development Census

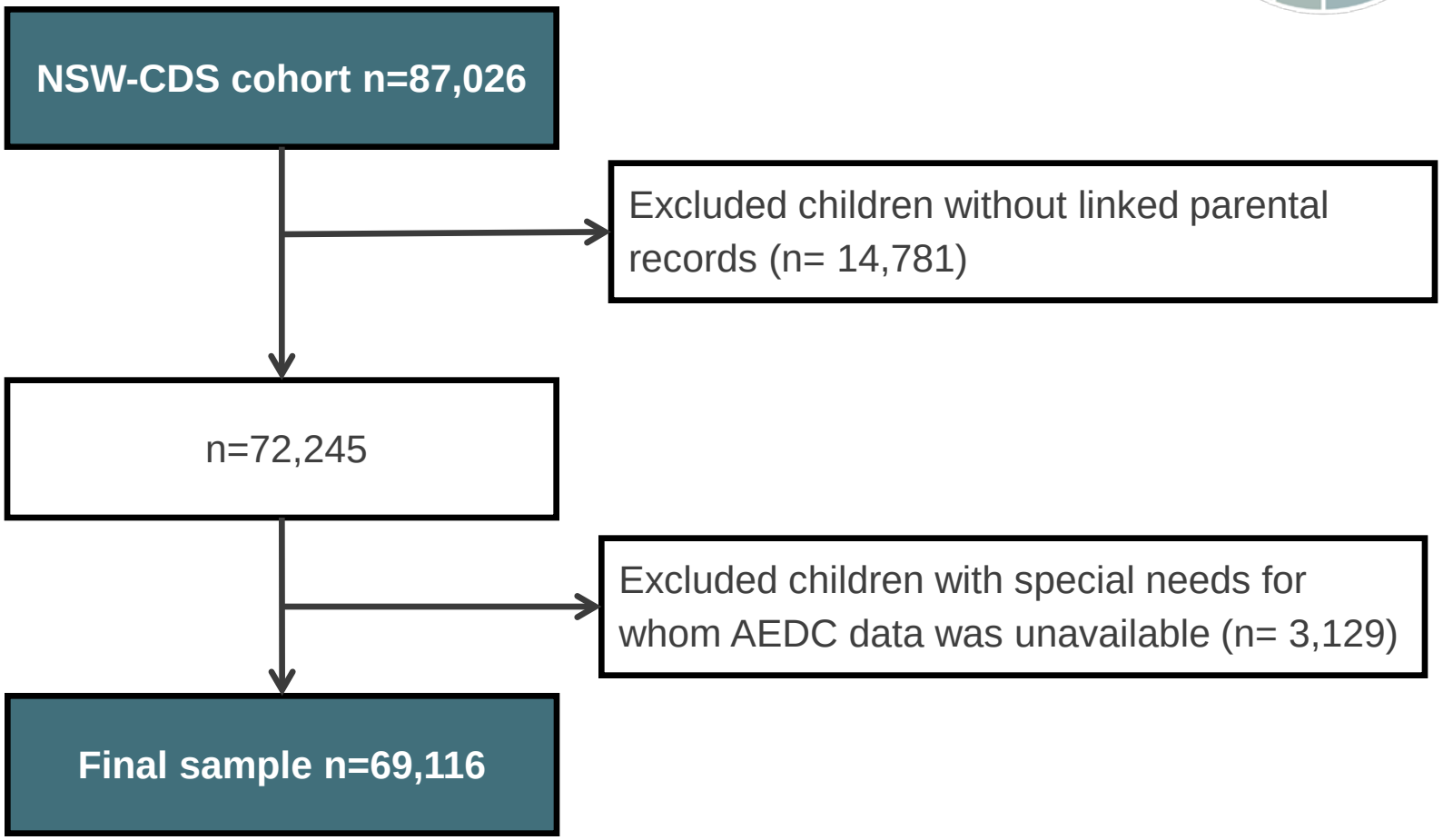
**NSW Family and Community Services**

- 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:<br>• None<br>• Minor (traffic, vehicle, public safety offences)<br>• Nonviolent (theft, fraud, drug offences)<br>• Violent (homicide, assault, robbery)<br>Frequency:<br>• 0<br>• 1<br>• 2 to 5<br>• ≥6 offences |
| Australian Early Development Census (AEDC) | Child sex | • Female<br>• Male |
| | Child English as a second language | • Not ESL<br>• ESL |
| | Socio-Economic Index for Areas | • three least disadvantaged quintiles<br>• two most disadvantaged |
| NSW Register of Births, Deaths, and Marriages | Maternal age at child's birth | • <26 years of age<br>• ≥26 years of age |

# Indicators

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

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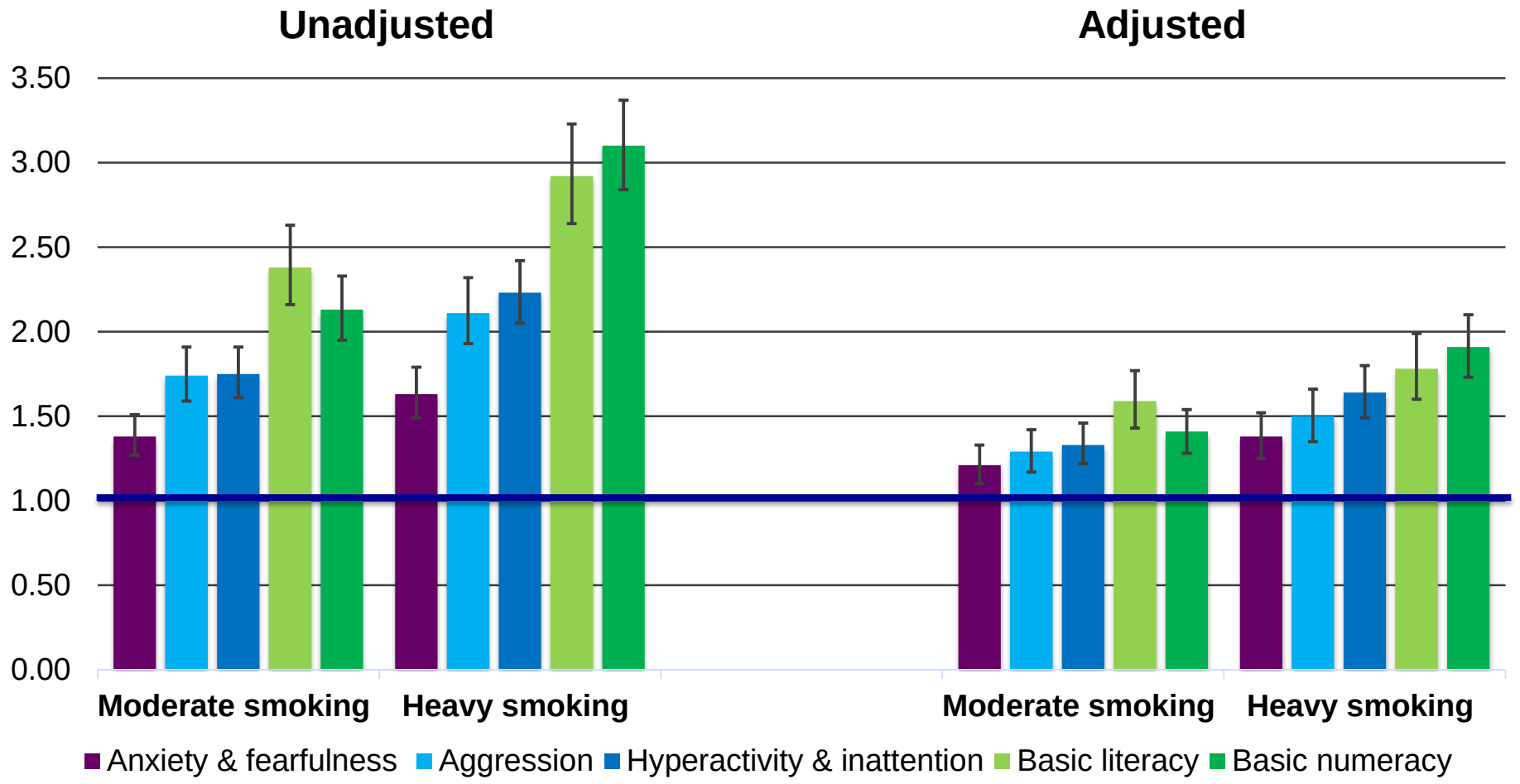
# What are the characteristics of mothers who smoke during pregnancy?

| | Total sample (n=66,523) | Maternal prenatal smoking | | |
|---|---|---|---|---|
| | | 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.

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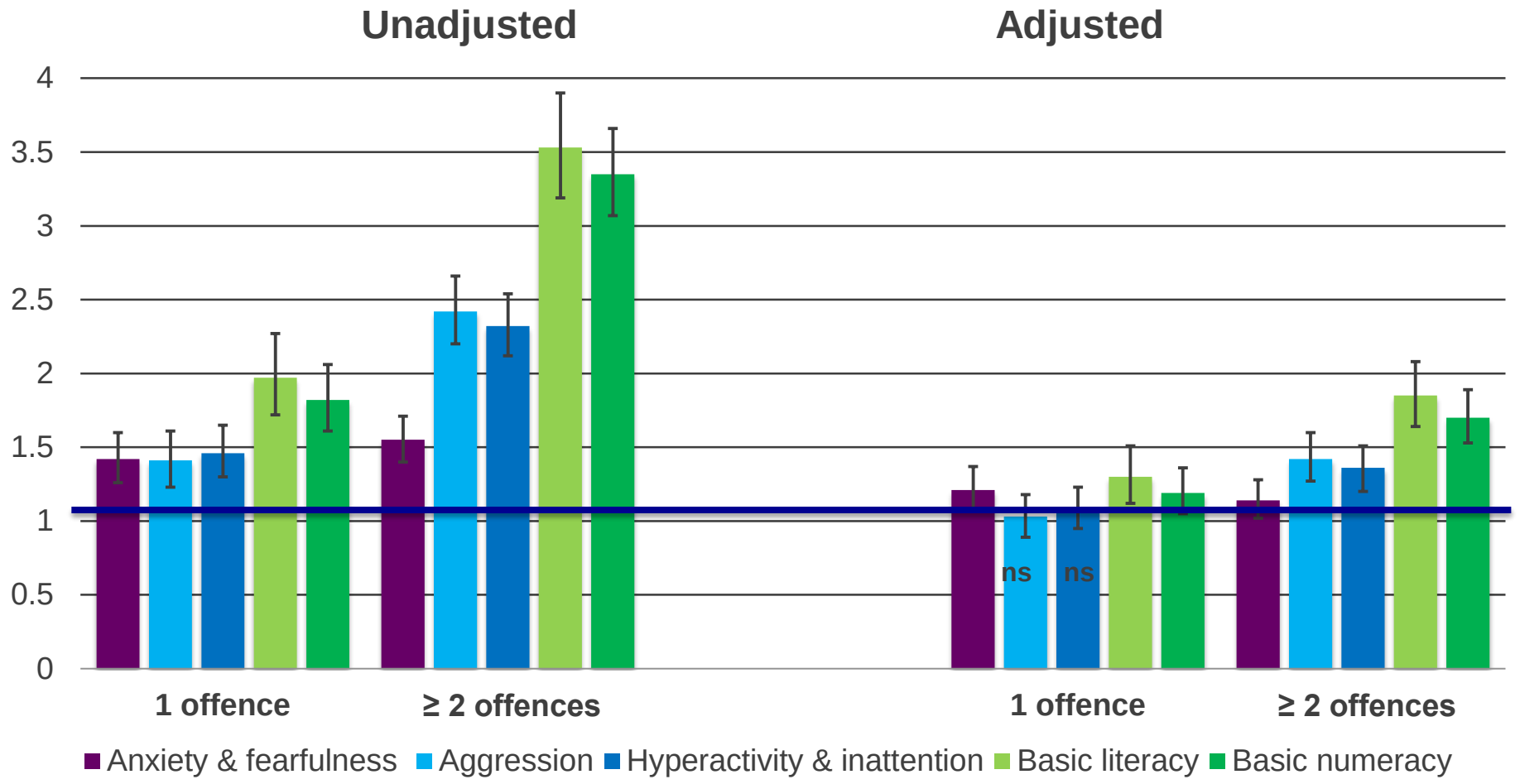
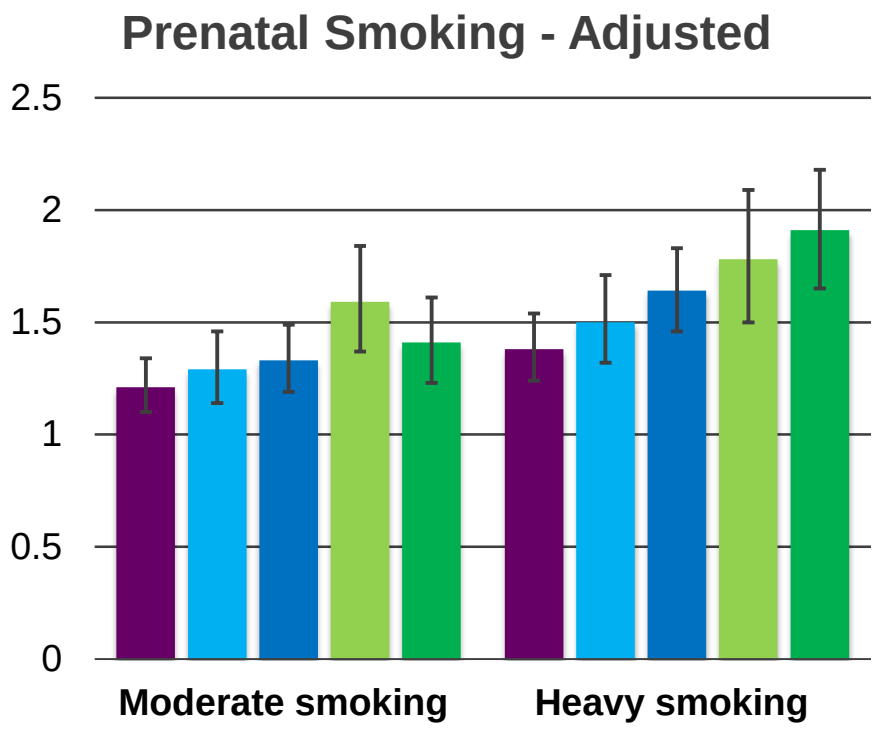
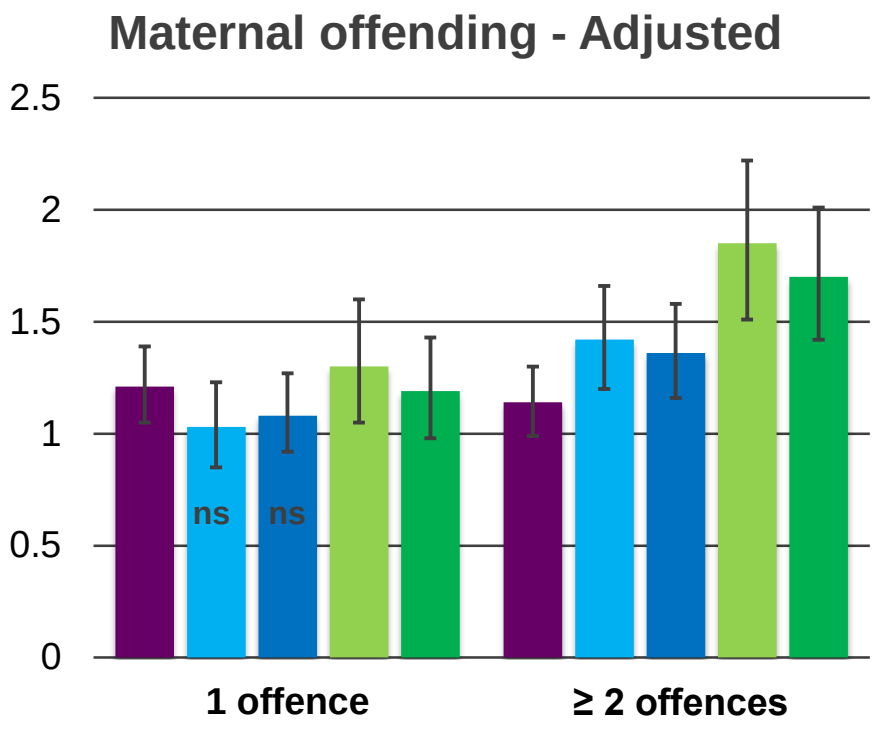
# What is the relationship between maternal offending and offspring outcomes?




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



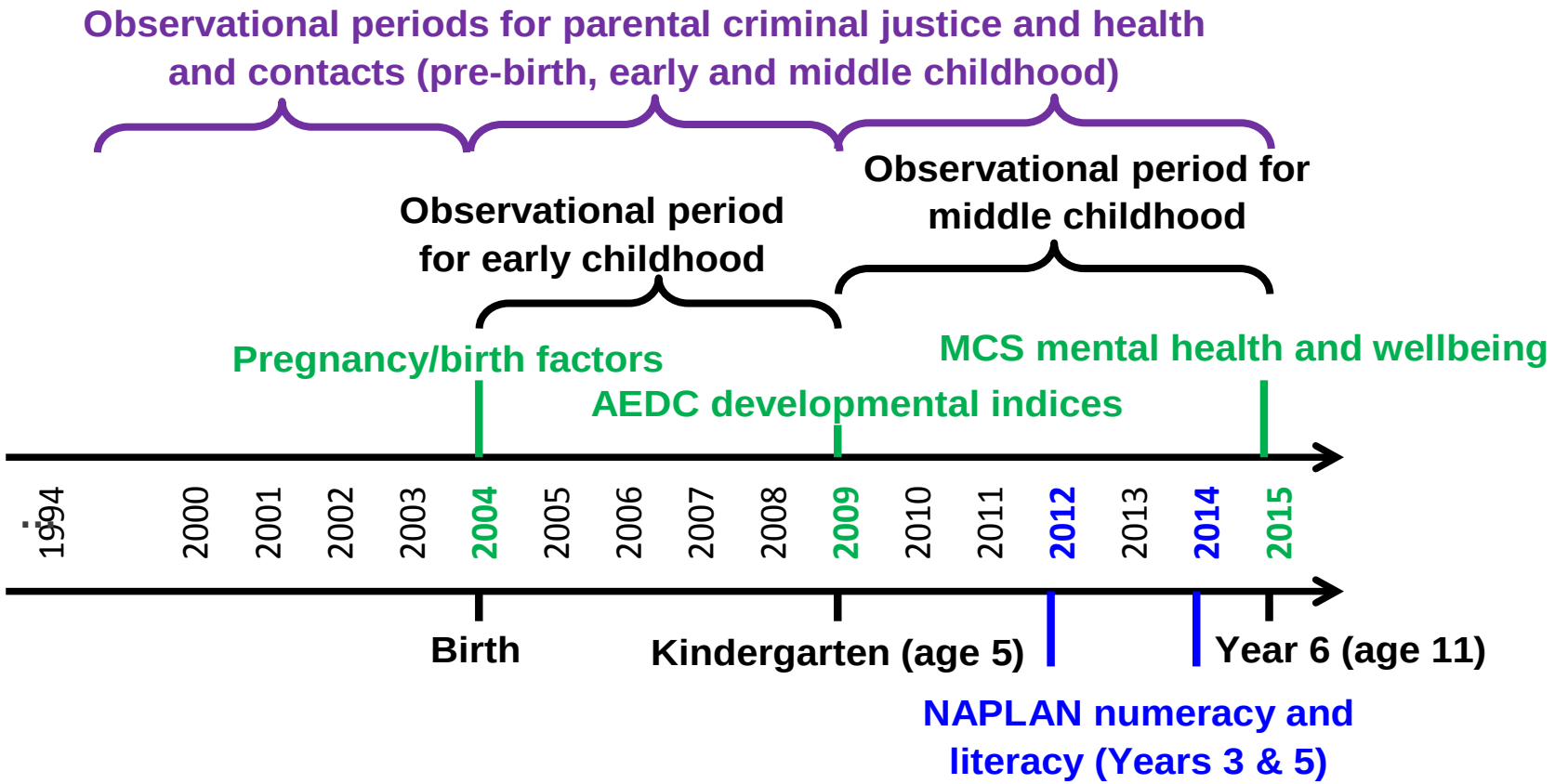
# What are the population attributable fractions (PAFs) for maternal offending and prenatal smoking?

- 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

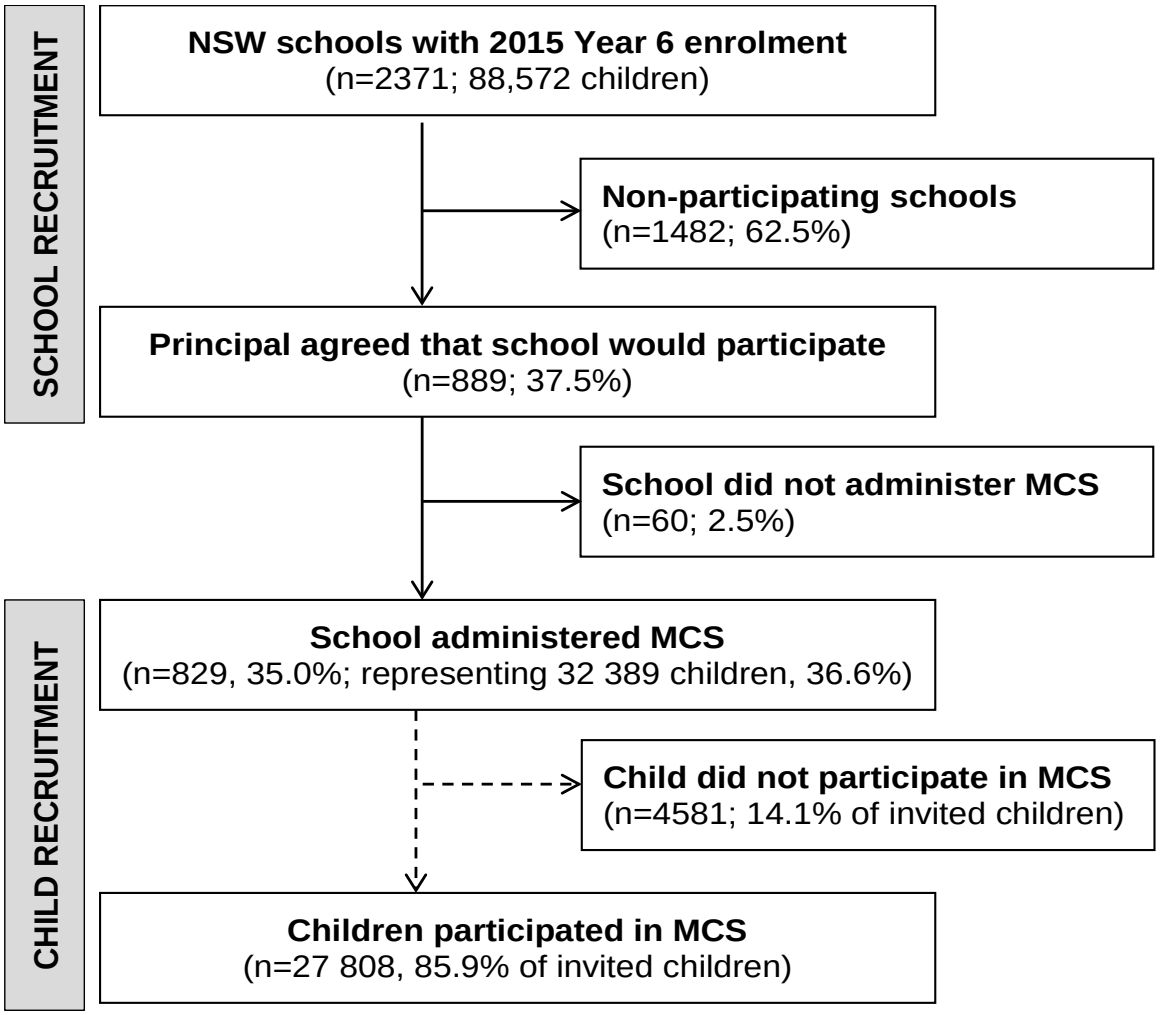
# NSW-CDS Record Linkage 2 (2017)



# 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** | $X^2(1)=2051.86$, $p<.001$<br>$\varphi=0.31$ | |

# 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

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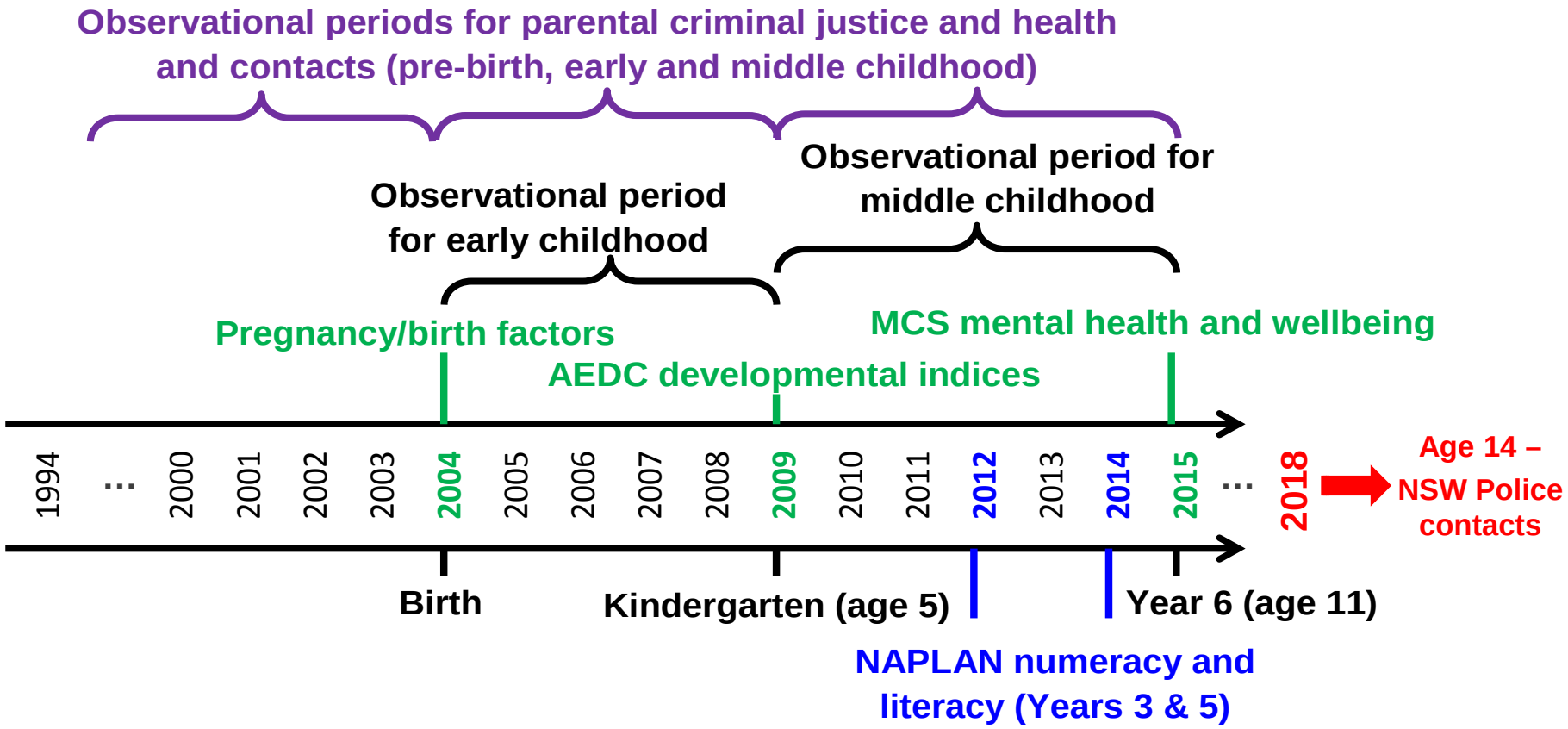
# Summary of findings

- 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



# 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

# Acknowledgments

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- Australian Research Council
- National Health and Medical Research Council
- Australian Rotary Health

This research was conducted using population data owned by the NSW Commonwealth Department of Education; NSW Bureau of Crime Statistics and Research; NSW Ministry of Health; NSW Registry of Births, Deaths and Marriages; and, the Australian Bureau of Statistics. However, the information and views contained in this study do not necessarily, or at all, reflect the views or information held by these Departments.

**CONTACT:**
Stacy Tzoumakis, PhD
School of Social Sciences
UNSW Sydney, Australia
s.tzoumakis@unsw.edu.au

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