

# Educational outcomes following injury in early childhood

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# Context: the project

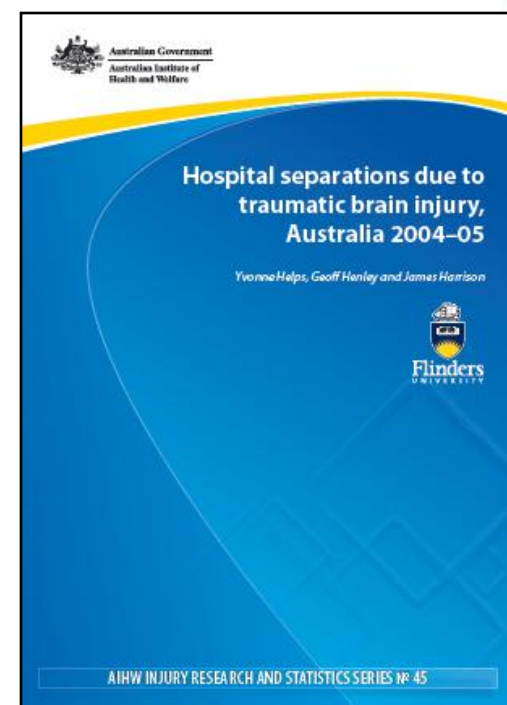
- This is one of the projects comprising the Early Childhood Development (ECD) demonstration project
- David Engelhardt's presentation has described the ECD project as a whole
- This presentation focuses on
  - TBI as the subject for a data linkage project
  - Our approach to studying it

# Context: the topic

- Traumatic Brain Injury (TBI):
  - is common
  - has diverse adverse effects
  - ...which can be debilitating
  - ...and persistent

# Hospitalised TBI

- Overall:
  - est 22,710 cases
  - Male >> Female
  - Peaks: M 15-24y; M&F 85y+
- At 0-9y:
  - Male  $\approx$  Female
  - c  $60/10^5$  pop/y (of which PrDx in  $50/10^5$  pop/y)
  - Of all cases: 64% ‘concussion’, 17% ‘intra-cranial inj.’



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# TBI: types of consequences

- Acute:
  - Loss of consciousness (complete or partial)
  - Risk of intracranial bleeding
  - Amnesia
  - Headache
- Chronic:
  - Severe & obvious: e.g. can't talk, can't walk, can't see
  - Less obvious: e.g. “short fuse”; aggressive; poor attention span; insensitivity to social norms & cues.

# TBI: persistence of effects

- Most improve during initial weeks-months
  - State 6 months after injury is often a guide to the long term.
- Severe TBI:
  - rarely return to fully normal functioning.
  - typical case: a young man in transition to adulthood.  
TBI is a major disruption to development and maturation.
- ‘Minor’ TBI:
  - Often return to “population normalcy” – but is the individual performing as well as before?
    - Often very hard to tell if scores are with ‘normal’ range

# Existing evidence

- Taylor et al. (2008). "Traumatic brain injury in young children: Postacute effects on cognitive and school readiness skills." *Journal of the International Neuropsychological Society* 14(5): 734-745.
  - Children 3-6 years with mild, moderate, or severe TBI (n=99)
  - Control group; children with orthopaedic injuries (n=117)
  - *Adverse effects of TBI in early childhood on postacute cognitive and school readiness skills ~ 12 months post-injury*
- Catroppa et al. (2008) "Outcome and predictors of functional recovery 5 years following pediatric traumatic brain injury (TBI)." *Journal of Pediatric Psychology* 33(7): 707-718.
  - Children 2-6 years with mild, moderate, or severe TBI (n=48)
  - Healthy control group (n=17)
  - *5-year outcomes in education performance best predicted by injury severity*
- McKinlay et al. (2010). "Long-term behavioural outcomes of pre-school mild traumatic brain injury." *Child Care Health and Development* 36(1): 22-30.
  - Children < 5 years with mild TBI (n=76; 21 admitted to hospital, 55 outpatient)
  - Control group; remaining members of birth-cohort without history of TBI (n=852)
  - *Psychosocial developmental deficits apparent up to 8 years post-injury, deficits may not appear until some years after the injury*

# What makes this topic suitable for linkage?

- Long duration of condition
  - Conventional cohort design would require long follow-up (nb passage to adulthood)
- Interest in cases across TBI severity spectrum
  - Wide spectrum available via one source (cf. a hospital clinic)
- Consequences of TBI might complicate inclusion/retention in a conventional prospective cohort
  - Cognitive and behavioural effects of TBI; TBI as barrier to consent
- Relatively small numbers of moderate & severe cases
  - Whole-population inclusion helps with numbers
- Data sources exist with useful properties
  - Whole population coverage
  - Contemporaneous records (i.e. not dependent on recall)
  - Outcome measures recorded without effect of TBI being mind
  - Collected by independent sources (e.g. health, education)
- Burden of arranging access is spread across DataLink and many projects

# Project Outline

## **Aim:**

To assess the medium and long-term functional outcomes of (traumatic brain) injury in early childhood for young South Australians as measured by the AEDI and NAPLAN standardised testing programs.

## **Study groups:**

- Children presenting to ED due to head/brain injury (mild)
- Children presenting to ED due to other types of injury
- Children admitted to hospital due to head/brain injury (moderate & severe)
- Children admitted to hospital due to injuries of other types
- Non-injured children

Focus is on the children who were born in periods that imply participation in NAPLAN at Y1 or Y3 in 2008 or 2009 or in AEDI in 2009  
(i.e. years of birth 2000 to 2005)

# Project Datasets

## **SA-NT DataLink datasets:**

- Emergency department records
- Inpatient hospital records
- School enrolment census data
- Australian Early Development Index data,
- NAPLAN data
- Child & Youth Health (eCHIMS)
- Perinatal data

# Method

- **Study base:**
  - eCHIMS; Perinatal data; School enrolment census
- **Study groups:**
  1. Children 0–9 with mild head/brain injury—ED data, departure status = 1 (or 3?)
  2. Children 0–9 with mild other injury—ED data, departure status = 1 (or 3?)
  3. Children 0–9 with moderate or severe head/brain injury—ISAAC data\*, nature of separation ~= 'died'
  4. Children 0–9 with moderate or severe injuries of other types—ISAAC data\*, nature of separation ~= 'died'  
\* cross-reference with ED data, departure status = 2 or 4
  5. Children without injury recorded at ED or in admitted patient register
- **Outcomes:**
  - AEDI testing results for these subjects (2009+)
  - NAPLAN testing results for these subjects (2008+)
- **Covariates:**
  - All hospital and ED records for these subjects (2000+)
  - eCHIMS; Perinatal data; School enrolment census

# Method (2)

- Analysis will investigate association of TBI (according to ED and hospital records) with results of NAPLAN or AEDI administered at a date after injury.
  - Children with a history of TBI will be compared with:
    - Children who have sustained other serious injuries; and
    - Children who have sustained no serious injuries
  - To the extent allowed by the data we will assess effects of:
    - Severity of TBI (based on whether admitted; ICD codes; whether ICU; disposition)
    - Number of episodes of TBI
    - Duration between TBI and NAPLAN or AEDI
  - We will use available data to identify and adjust for other predictors of NAPLAN and AEDI results (e.g. SES, age at school commencement, health profile.)

# Summary

- TBI is common.
- Severe cases clearly have lasting consequences.
- Most cases are 'mild' – but might have non-trivial lasting effects. These are difficult to study ('in the normal range').
- DataLink provides an opportunity to study effects of mild, moderate and severe TBI in early childhood in terms of literacy & numeracy and the AEDI.
- Further development of DataLink, completion of more rounds of NAPLAN by the children to be studied this time, and the addition of cohorts of younger children will add to the potential of the approach.
- Findings may have implications for:
  - Management of children who have experienced TBI
  - Cost-benefit of increased investment in TBI prevention