Complex policy and practice questions require complex evidence integration - The case of early child health and development in Australia

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Australian Government
National Health and Medical Research Council
NHMRC

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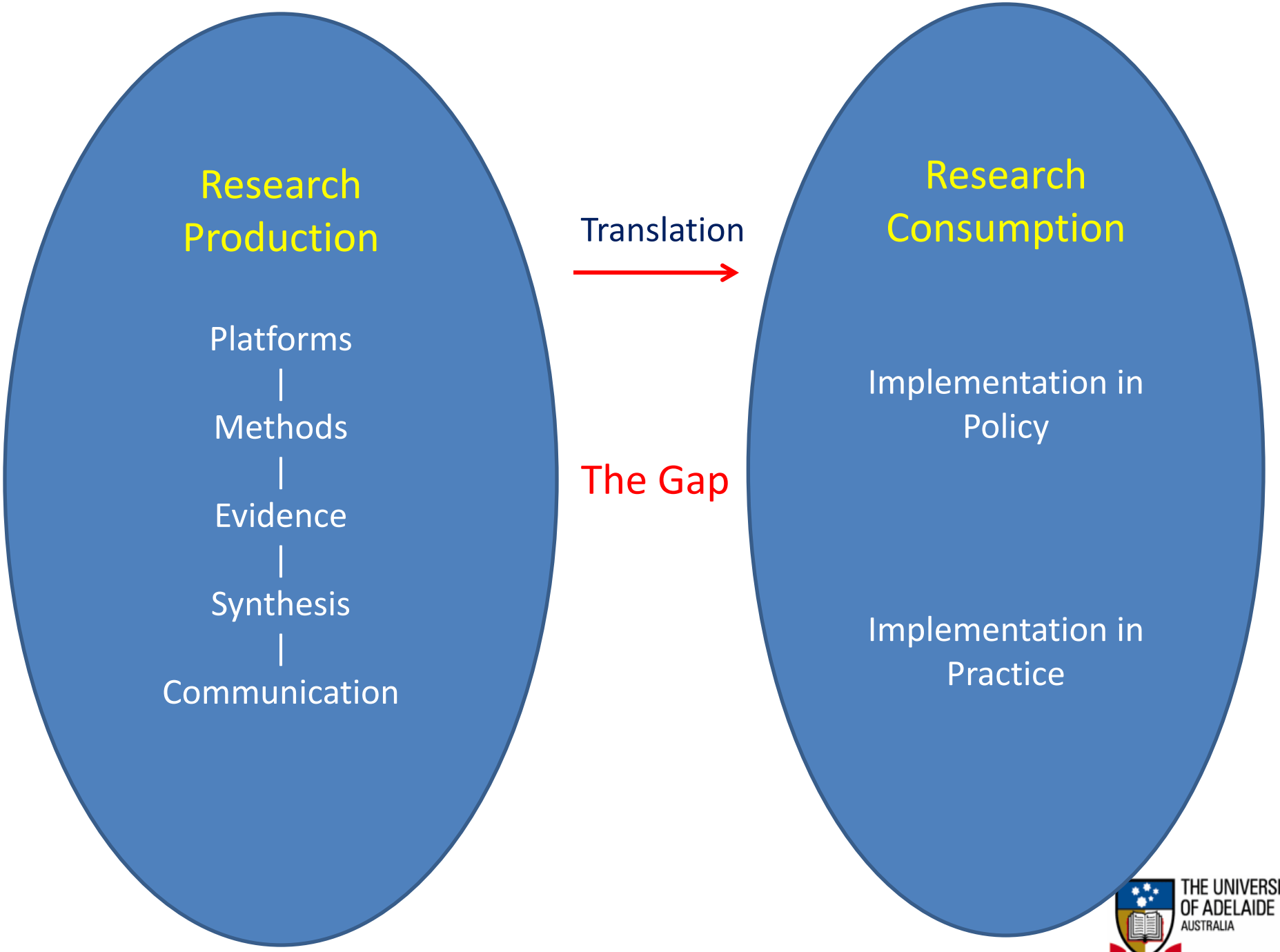

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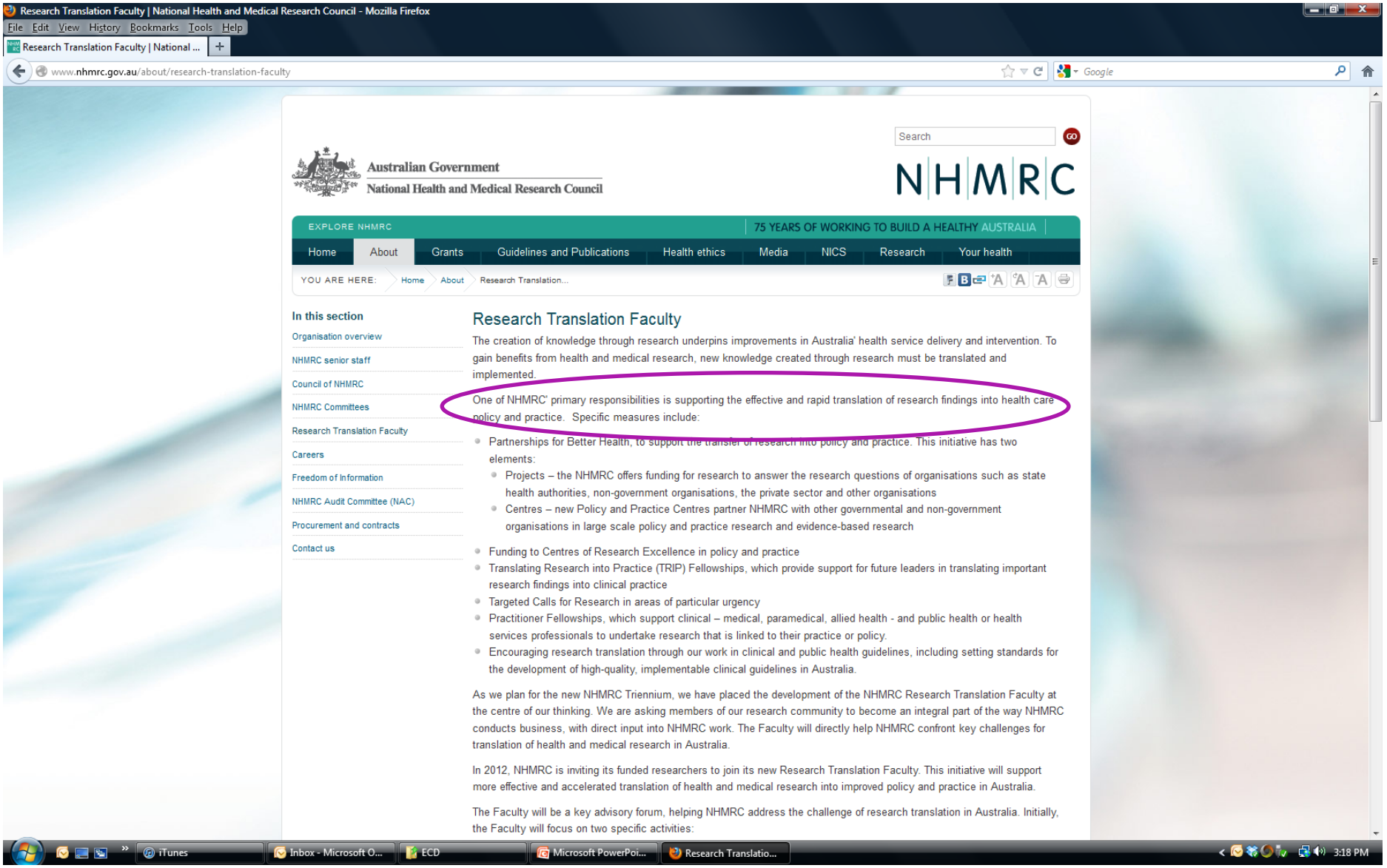

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Closing the gap between evidence and action: The need for knowledge translation in the field of drug policy research

BRITISH JOURNAL OF PSYCHIATRY (2000), 176, 407–411

Thomas Kerr[a,b,*], Ev

Power Of Information: Closing The Gap Between Research And Policy

When it comes to conveying complex information to busy policy-makers, a picture is truly worth a thousand words.

by Richard Sorian and Terry Baugh

h and mental health policy

SINGH

c Health Association

Introduction

Bridging the Gap

Research Informing Practice and Policy

Frank J. Chaloupka, PhD, Lloyd D. Johnston, PhD

President's column: How can we reduce the knowledge gap between public health research and policy/practice?

Research findings in public health a published primarily for the researc community. However, quite often the do not reach policy makers and pract tioners. To successfully communicat important research knowledge to thes communities it needs to be translate into recommendations for actual polic

TY

Translation Anxiety

My question is: "Are we making an impact?"

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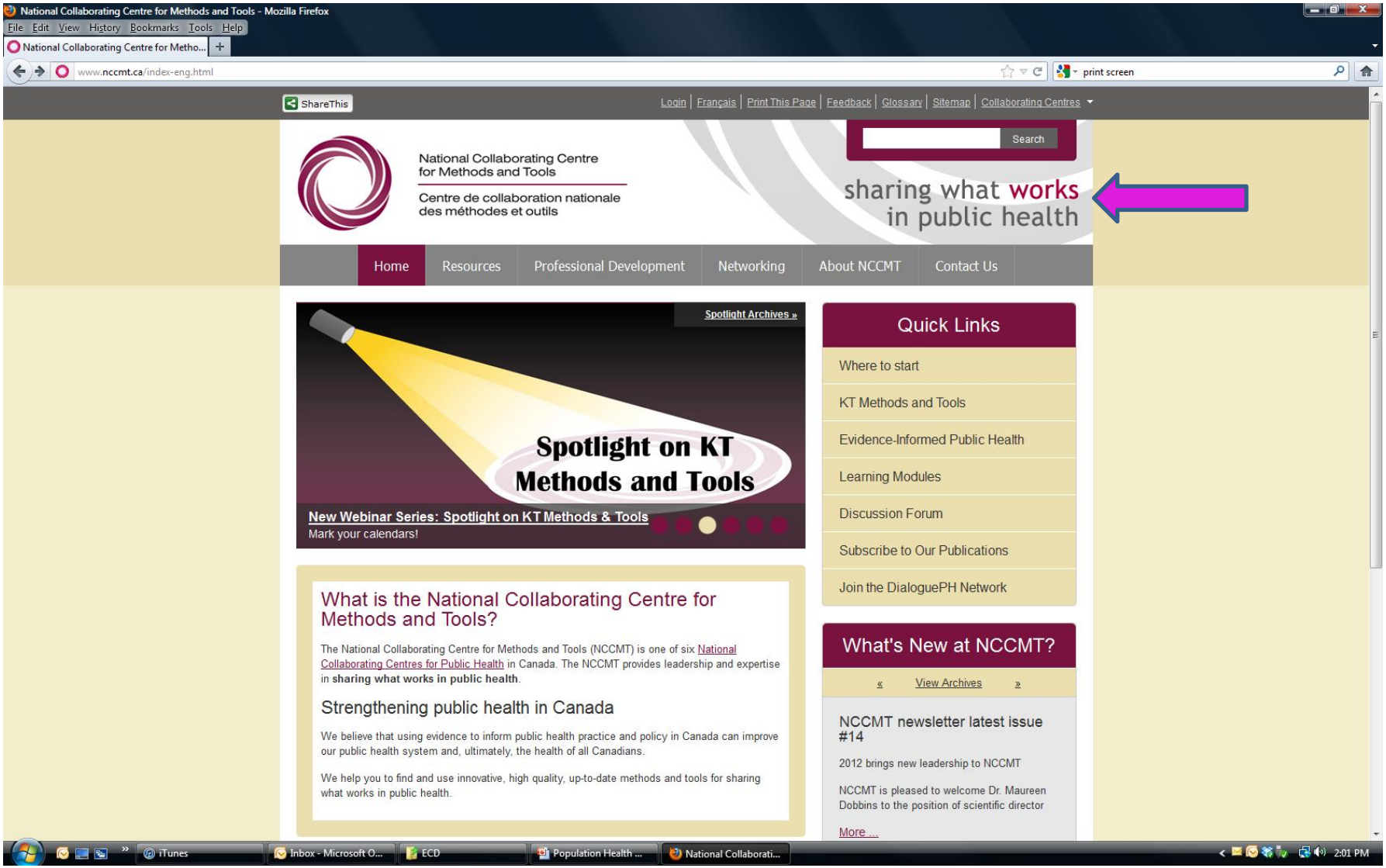
National Collaborating Centre for Methods and Tools (Public Health Agency of Canada)



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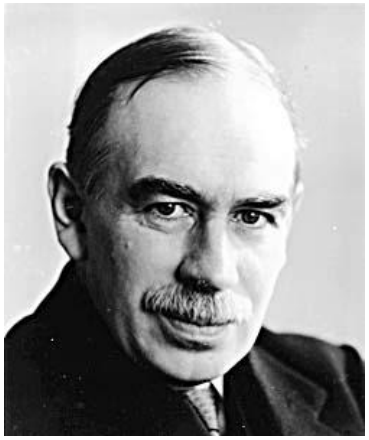

”…there is nothing a government hates more than to be well-informed; for it makes the process of arriving at decisions much more complicated and difficult.”

John Maynard Keynes

Skidelsky. *John Maynard Keynes: a biography. Vol. 2: the economist as saviour, 1920-1937* (1992) *London, p630*

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Some Historical Examples of

Research Translation in Health

THE
Method of Curing Wounds
made by Gun-ſhot.
Alſo by Arrowes and Darts, with their Accidents.
Written by AMBROSE PARIE *of* Laual, *Counſellor and chiefe Chirurgean to the French King.*
Faithfully done into Engliſh out of the French Copie, by *Walter Hamond* Chirurgean.

London printed by Iſaac Iaggard, and are to be ſold in Barbican. 1617.

Ambrose Paré 1575

Treating wounds with boiling oil did more harm than good. Ligatures were more effective but 100 years before it was widely accepted

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- Scurvy

Beneficial effects of citrus known for centuries, but Lind showed via an experiment on 12 sailors in 1747 how oranges and lemons eliminated scurvy, but 1864 before British Board of trade used citrus for all sailors

- Smoking

In 1950 Doll showed smoking and lung cancer linked but advertizing not completely banned in UK until 2002, US (2003), and Australia (1998).

- Asbestos

In 1955 Doll demonstrated relationship between asbestos and lung cancer but asbestos manufacture not banned in Australia until 1987

- Childhood obesity

The first data about increases in childhood obesity appeared in the 1960s, certainly by the 1980s but still little systematic policy response to quell the 'obesogenic environment'

Large Scale Trials in CVD Prevention

- MRFIT (1972)

Individual RCT of those with CVD risk factors - 361,6[illegible]2 screened - 12,866 were eligible and randomized

- Nth Karelia Study (1972)

180K intervention and 100K comparis[illegible])

- Stanford 5 City Project (1978)

N = 300K with comparisc[illegible]

- Pawtucket Heart Healt[illegible]

N = 170K with cc[illegible]s

- Minnesota He[illegible]80)

N = 400K w[illegible]mmunities

No effects

- COMMIT (1989)

RCT of 22 communities involving 20K smokers

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Epidemiologic Reviews
Vol. 24, No. 1
Printed in U.S.A.

Community-based Health Intervention Trials: An Overview of Methodological Issues

Audie A. Atienza[1] and Abby C. King[1,2]

"The methodological issues we focus on here include randomization, statistical power, cohort versus cross-sectional assessments, secular trends, outcome measurement, and the role of conceptualization in methodological design.

Furthermore, the balance between scientific methodology and other practical issues (e.g., economic and sociopolitical issues) is discussed." pg. 72

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Harper, Lynch, Davey Smith. *Annual Reviews Public Health* (2011)

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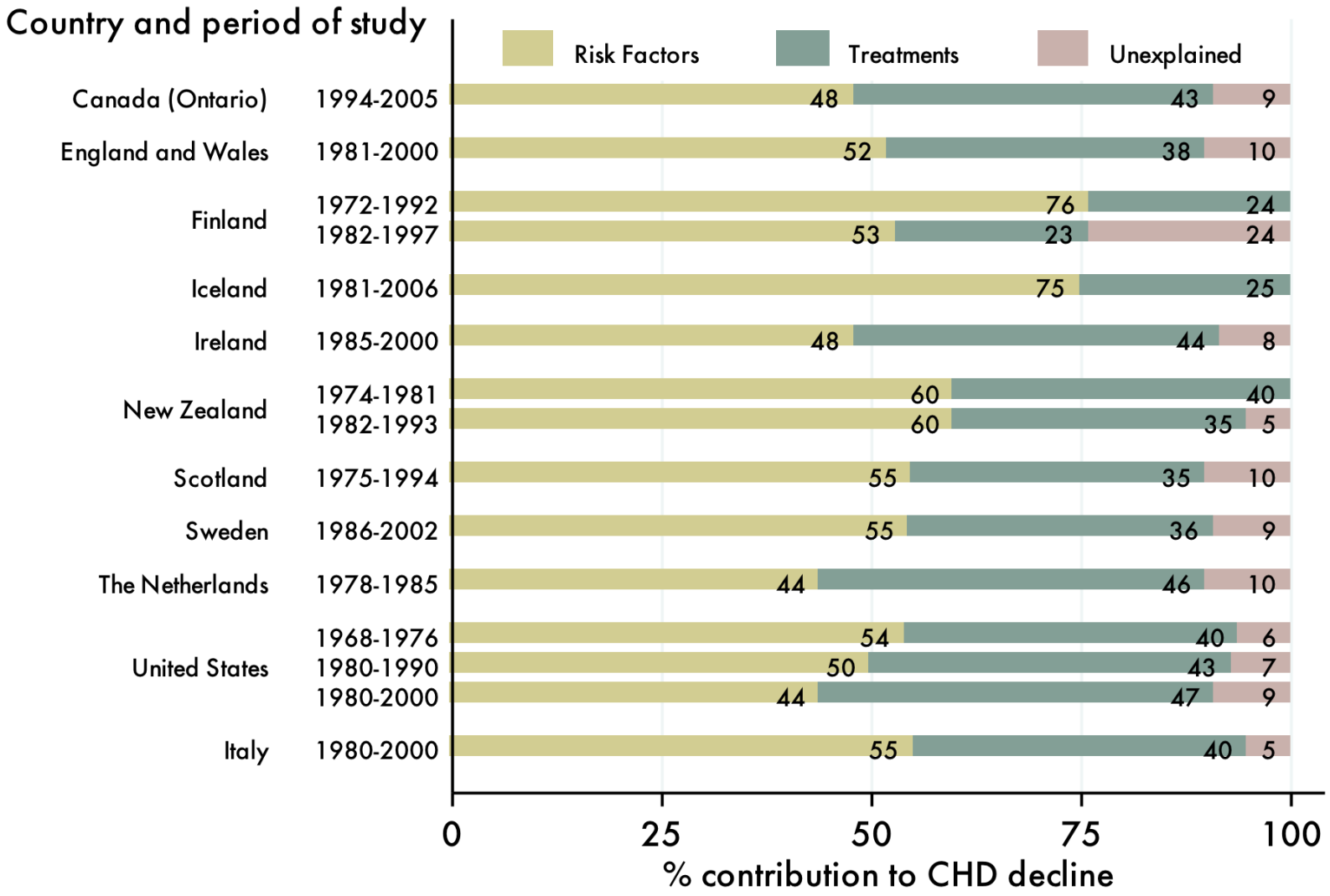

Figure 2. Estimated percentage contribution of changes in risk factors and treatments to declines in IHD mortality. Sources (refs. 3, 9, 11, 19, 20, 49, 70, 80, 141, 147)

Harper, Lynch, Davey Smith. *Ann Reviews Public Health* (2011)

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FIG. 1. Cartoonist's depiction of the likely impact of the diet–heart link on farms around New Zealand.

Source: *New Zealand Herald*, 16 May 1973.

ARACY

“We need to fill in the gaps in current knowledge about the complex issues facing children and young people as well as translate existing knowledge and evidence of 'what works' into practice and policy.”

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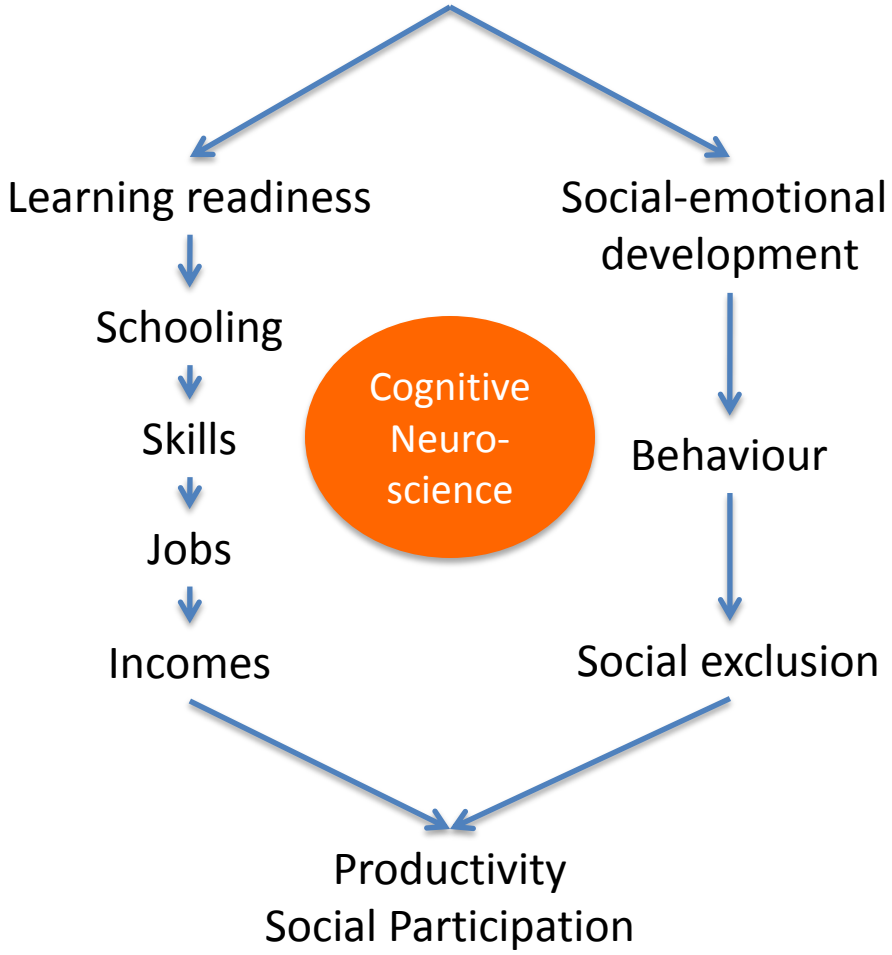
Policy Frameworks for Early Child Health and Development



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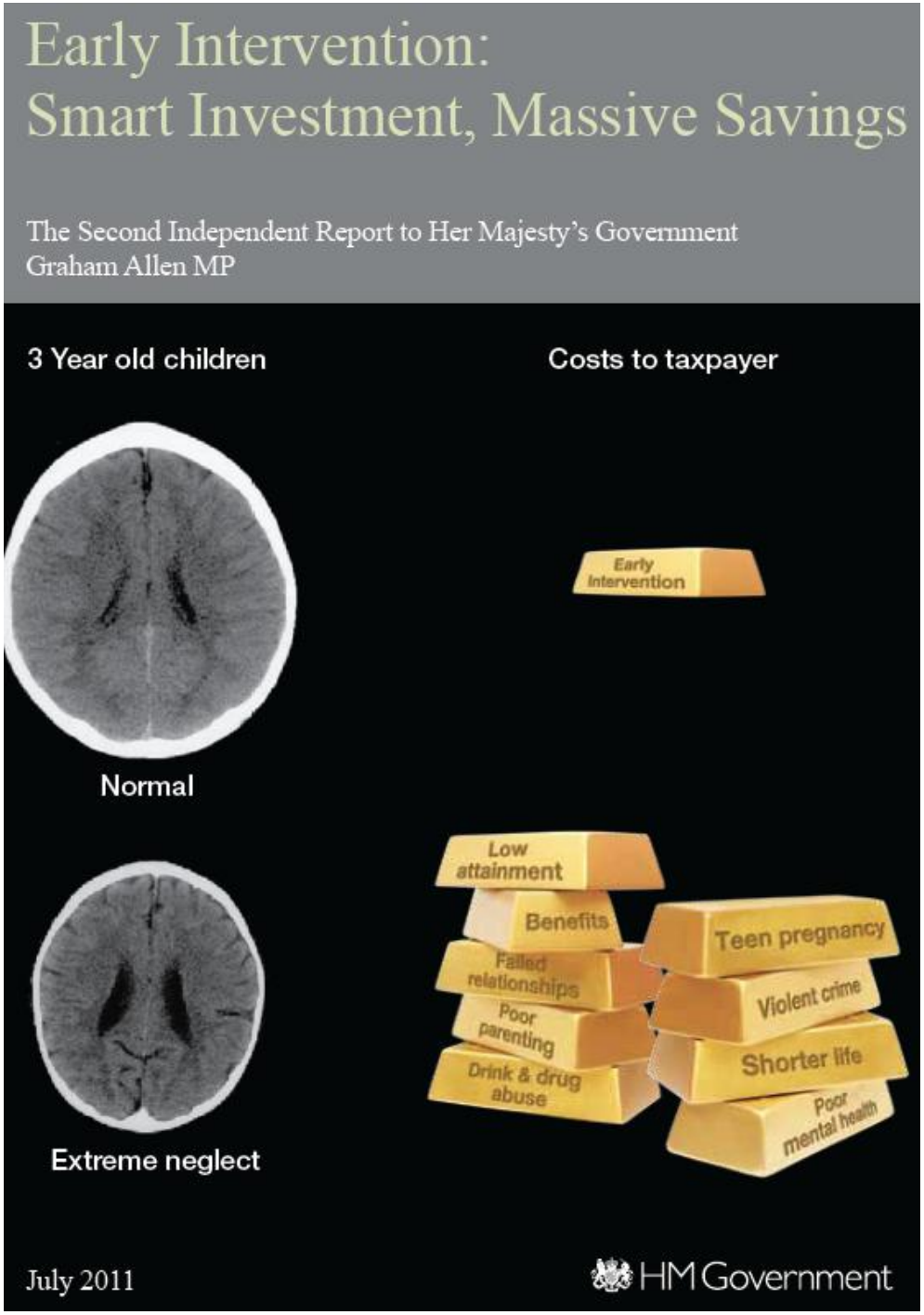

"My first Report detailed the immense penalties to society and to the individual of failing to provide a strong foundation of social and emotional capabilities early in life.

This second Report focuses more on addressing the vast financial and economic costs."

Letter to the Prime Minister, David Cameron, July 2011

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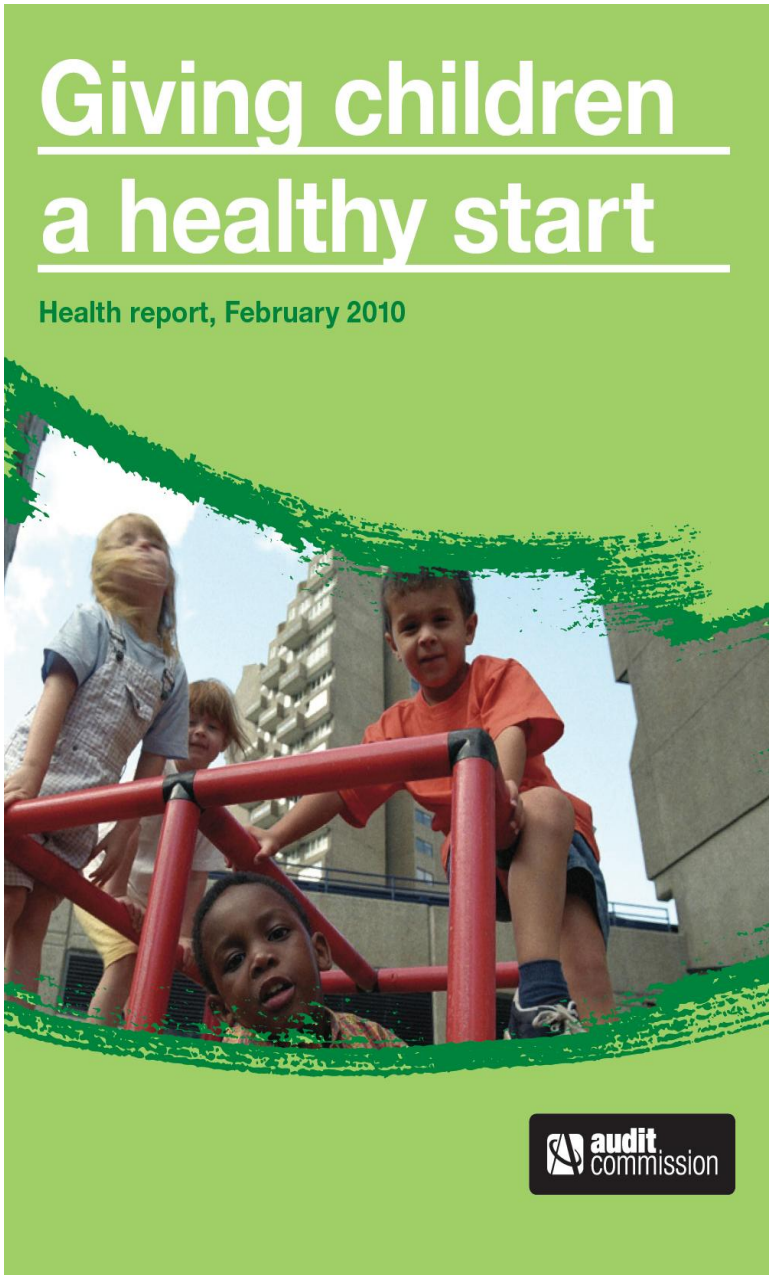

- Since 1999, there have been 20 national policies (approximately one every 6 months) aimed at improving the health of under-5s.

- In the last 10 years, £10.9 billion has been invested in programs aimed at improving the health of the under-5s, but this has not produced widespread improvements in health outcomes.

- Policy can be a problem, but here the big problem is implementation – getting quality on the ground

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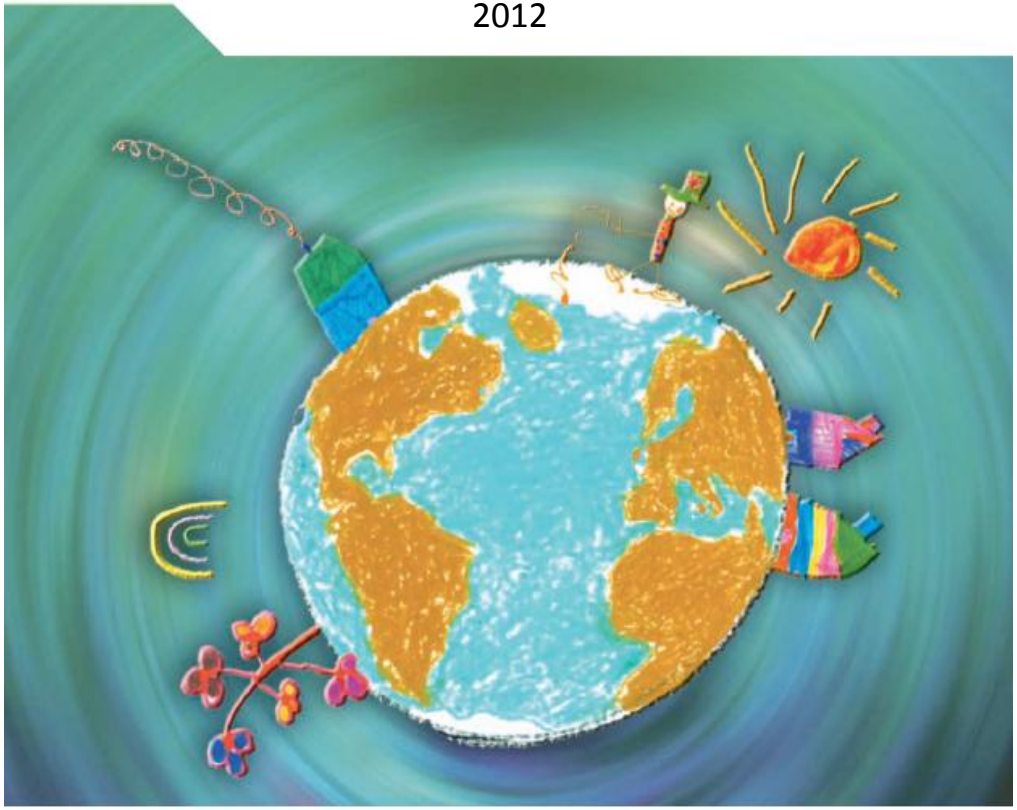
Quality Matters in Early Childhood Education and Care

NEW ZEALAND

Miho Taguma, Ineke Litjens and Kelly Makowiecki

2012



OECD

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BELONGING, BEING & BECOMING

The Early Years Learning Framework for Australia

DEEWR (2009)

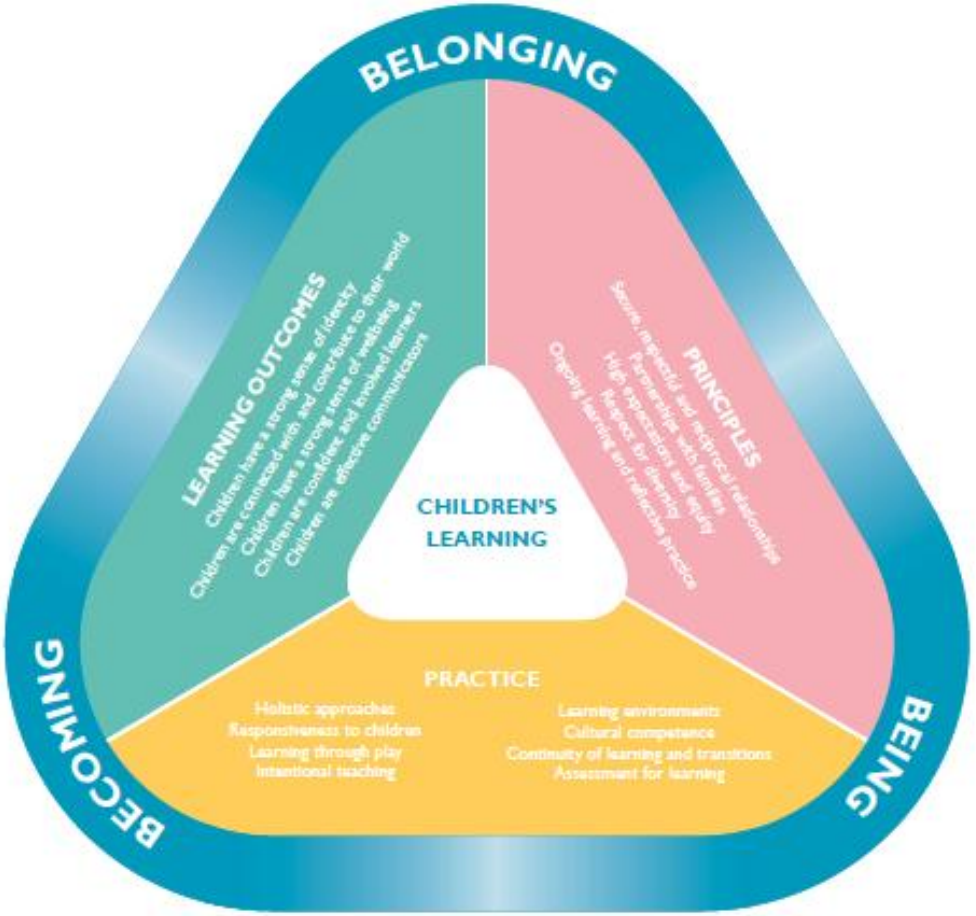

Figure 1: Elements of the Early Years Learning Framework

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Government of South Australia
Department for Education and Child Development

2012

HAVE YOUR SAY

Every chance for every child

Nurture. Learn. Achieve.

Policy discussion paper four

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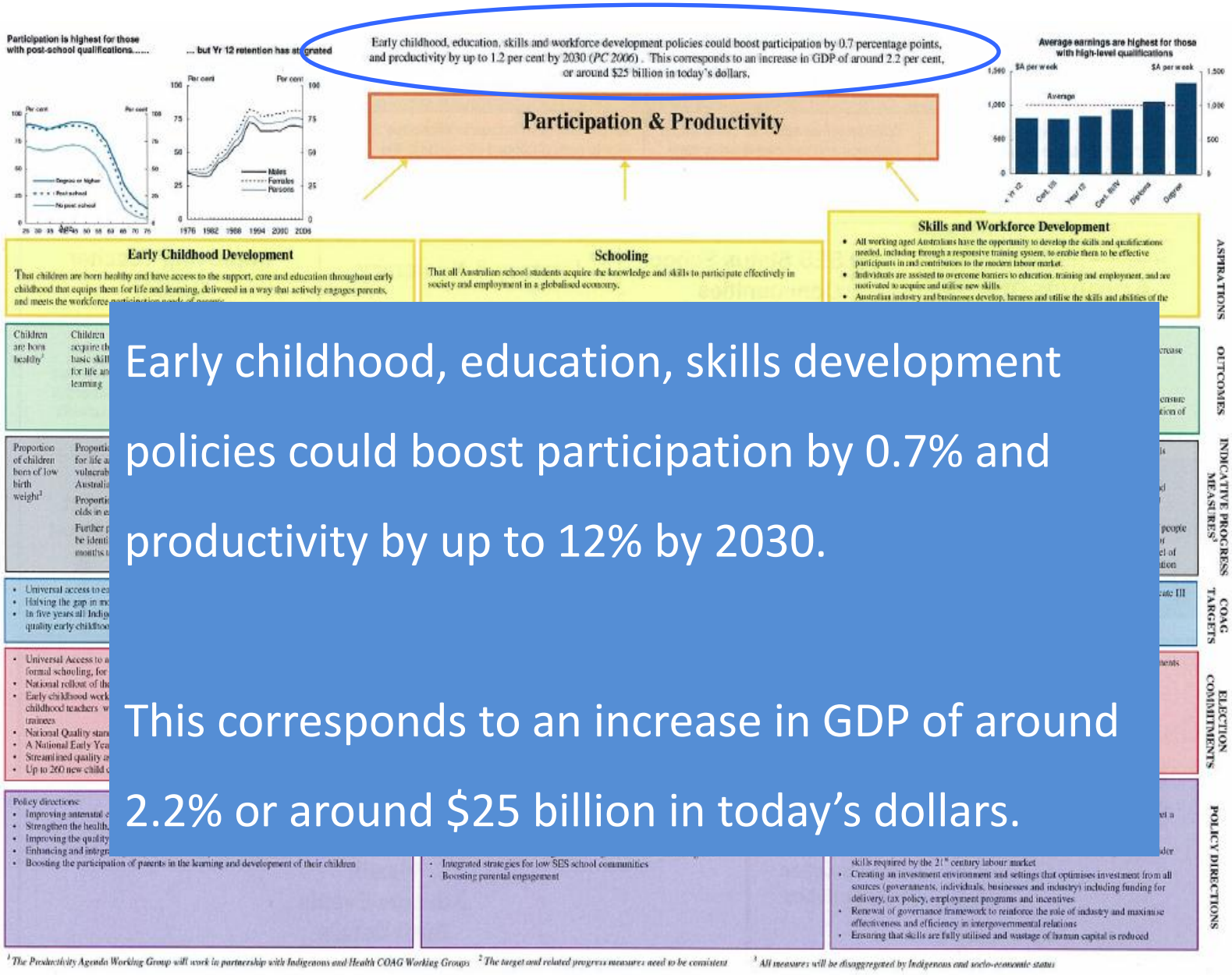
The Participation and Productivity Policy Environment



Early childhood, education, skills development policies could boost participation by 0.7% and productivity by up to 12% by 2030.

This corresponds to an increase in GDP of around 2.2% or around $25 billion in today's dollars.

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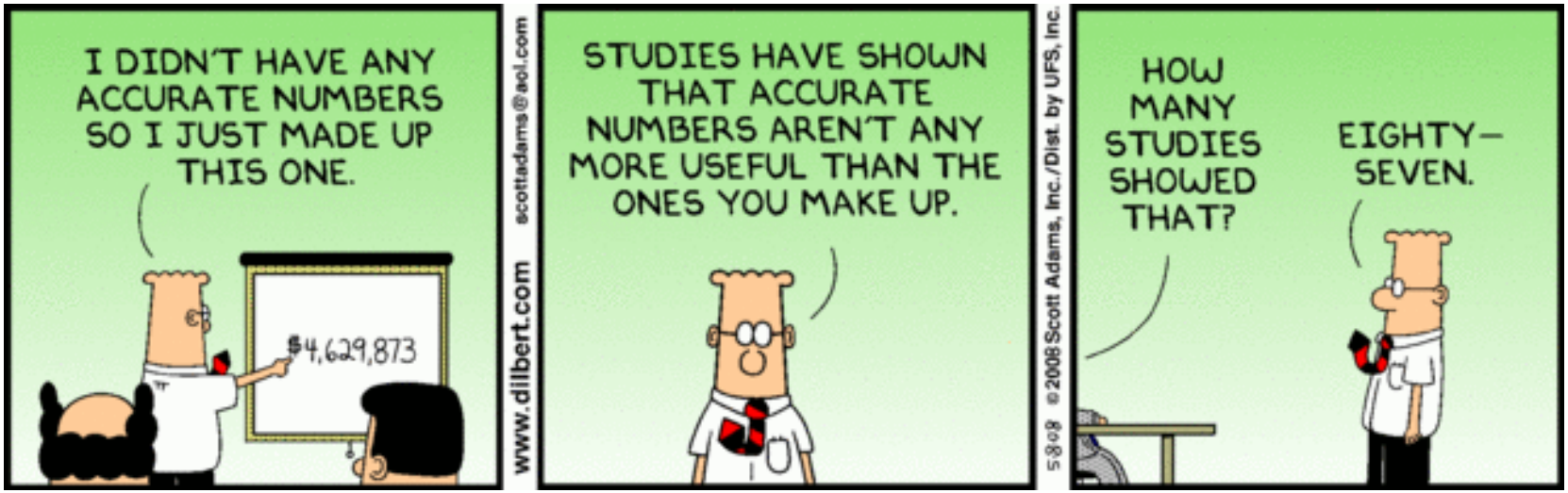

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PERSPECTIVE

Skill Formation and the Economics of Investing in Disadvantaged Children

James J. Heckman

This paper summarizes evidence on the effects of early environments on child, adolescent, and adult achievement. Life cycle skill formation is a dynamic process in which early inputs strongly affect the productivity of later inputs.

Four core concepts important to devising sound social policy toward early childhood have emerged from decades of independent research in economics, neuroscience, and developmental psychology (*1*). First, the architecture of the brain and the process of skill formation are influenced by an interaction between genetics and individual experience. Second, the mastery of skills that are essential for economic success and the development of their underlying neural pathways follow hierarchical rules. Later attainments build on foundations that are laid down earlier. Third, cognitive, linguistic, social, and emotional competencies are interdependent; all are shaped powerfully by the experiences of the developing child; and all contribute to success in the society at large. Fourth, although adaptation continues throughout life, human abilities are formed in a predictable sequence of sensitive periods, during which the development of specific neural circuits and the behaviors they mediate are most plastic and therefore optimally receptive to environmental influences.

A landmark study concluded that "virtually every aspect of early human development, from the brain's evolving circuitry to the child's capacity for empathy, is affected by the environments and experiences that are encountered in a cumulative fashion, beginning in the prenatal period and extending throughout the early childhood years" (*2*). This principle stems from two characteristics that are intrinsic to the nature of learning: (i) early learning confers value on acquired skills, which leads to self-reinforcing motivation to learn more, and (ii) early mastery of a range of cognitive, social, and emotional competencies makes learning at later ages more efficient and therefore easier and more likely to continue.

Early family environments are major predictors of cognitive and noncognitive abilities. Research has documented the early (by ages 4 to 6) emergence and persistence of gaps in cognitive and noncognitive skills (*3*, *4*). Environments that do not stimulate the young and fail to cultivate these skills at early ages place children at an early disadvantage. Disadvantage arises more from lack of cognitive and noncognitive stimulation given to young children than simply from the lack of financial resources.

This is a source of concern because family environments have deteriorated. More U.S. children are born to teenage mothers or are living in single parent homes compared with 40 years ago (*5*). Disadvantage is associated with poor parenting practices and lack of positive cognitive and noncognitive stimulation. A child who falls behind may never catch up. The track records for criminal rehabilitation, adult literacy, and public job training programs for disadvantaged young adults are remarkably poor (*3*). Disadvantaged early en

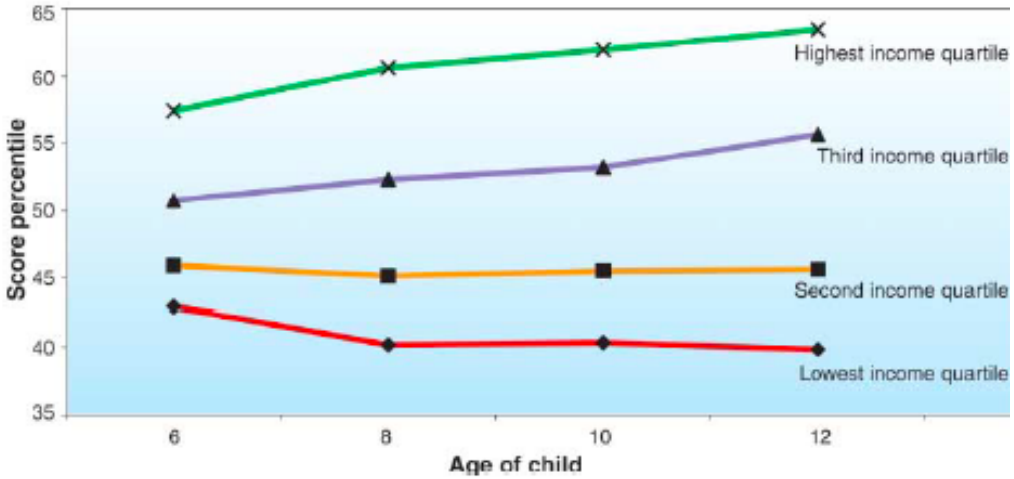

Fig. 1. Average percentile rank on Peabody Individual Achievement Test–Math score by age and income quartile. Income quartiles are computed from average family income between the ages of 6 and 10. Adapted from (*3*) with permission from MIT Press.

Department of Economics, University of Chicago, Chicago, IL 60637, USA. Department of Economics, University College Dublin, Dublin 4, Ireland. E-mail: jjh@uchicago.edu

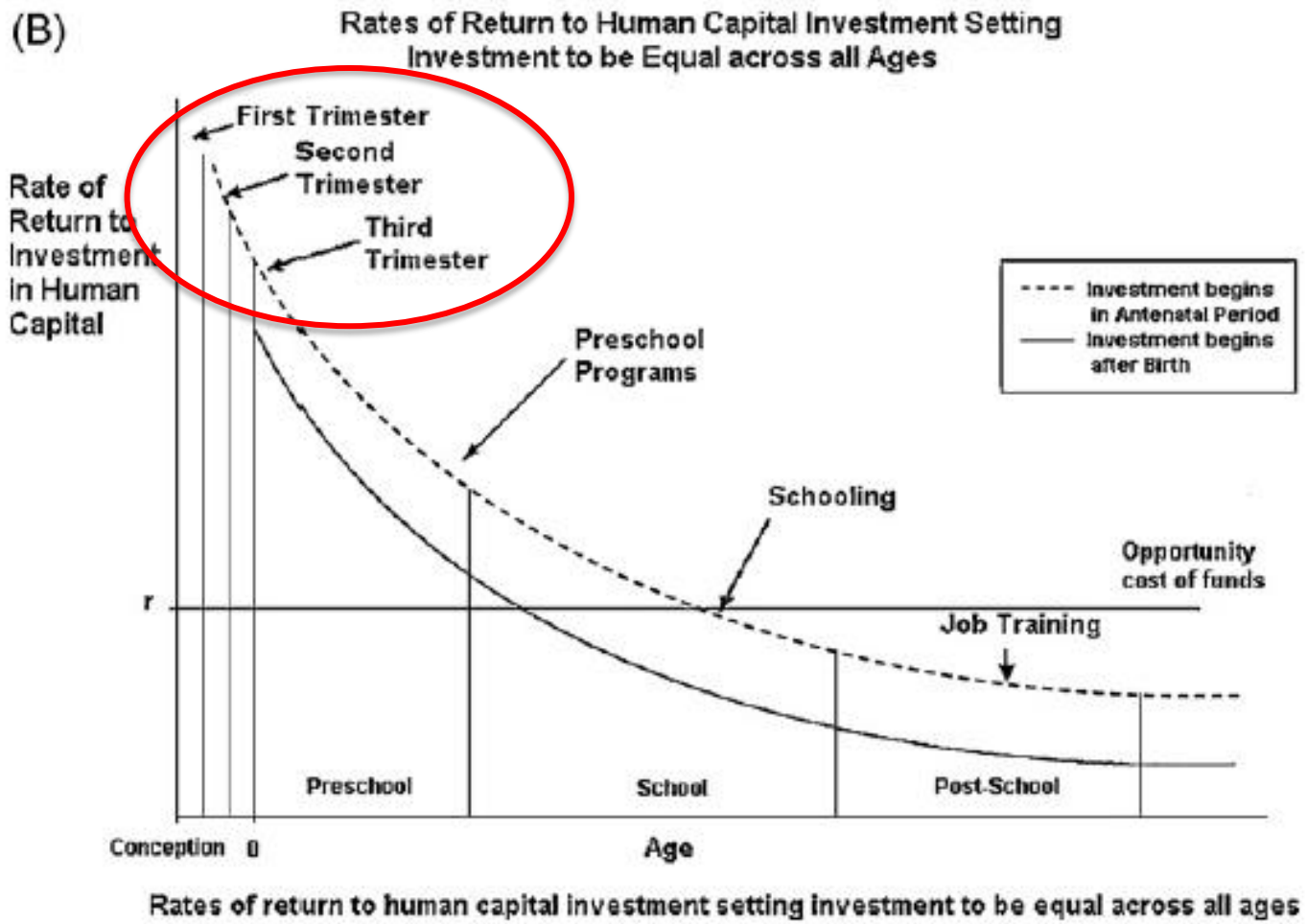

Fig. 2. Rates of return to human capital investment.

Doyle et al. *Economics Human Biol* (2009)

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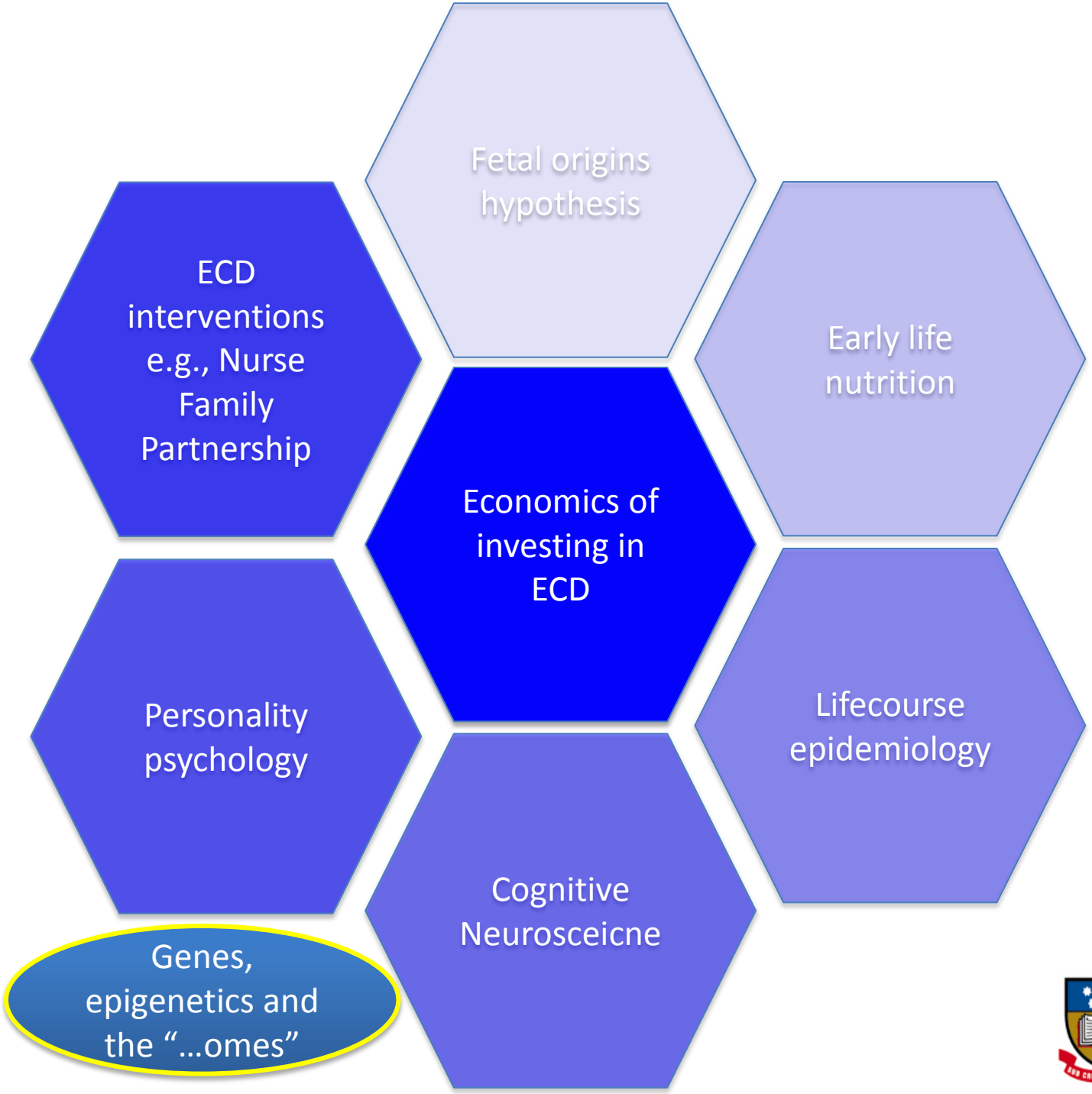

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Requires more than evidence synthesis (combining - e.g., meta-analysis)

Requires complex evidence integration (making whole - e.g., simulation)

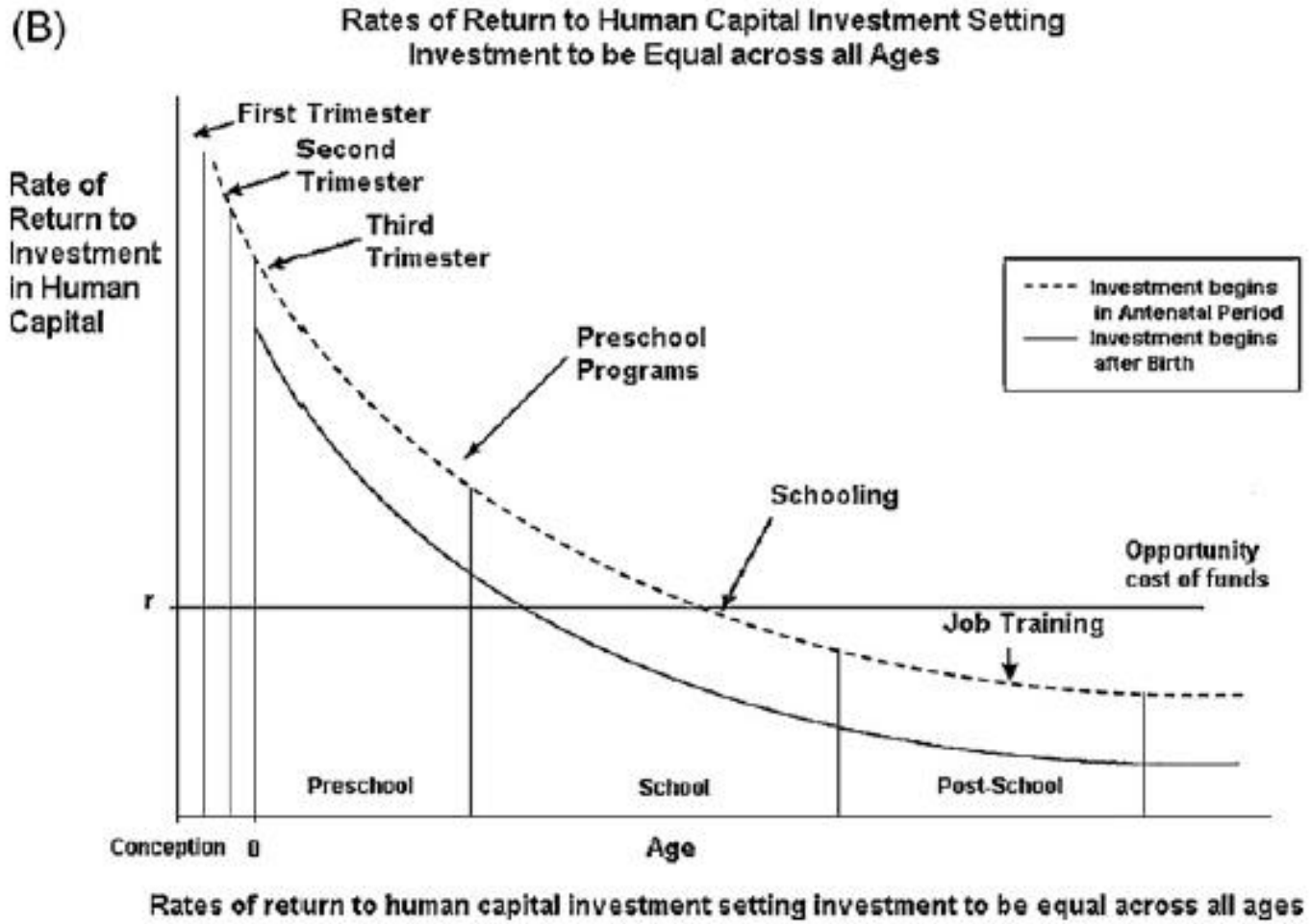

Fig. 2. Rates of return to human capital investment.

Doyle et al. *Economics Human Biol* (2009)

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An evidence jigsaw

for child health and development

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0 4wks 2 5 6 8 10 12 14 17 25

Early childhood

Parents
Carers

Midwives
OBGYN

Child Health
Nurses

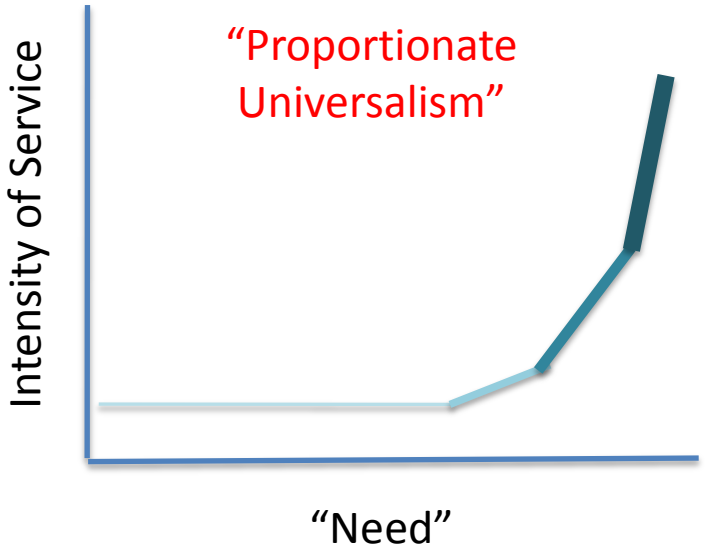
General Practice / Pediatrics

Child Care

Preschool

Teachers

Child Protection and Social Work



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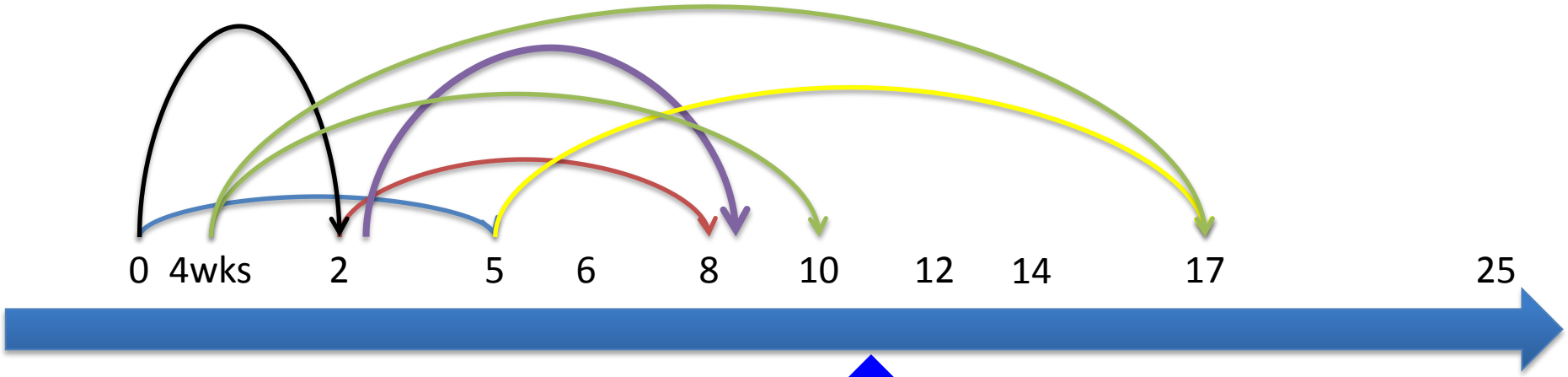

Perinatal factors and child health and develo

Family support programs

Child care and cognitive developm

Early life diet and cognitive, s nal development, and CVD risk factor

Early life self regulation e, social emotional development

Early life social di , self regulation and school achievement, health behaviours D risk

Social inequality

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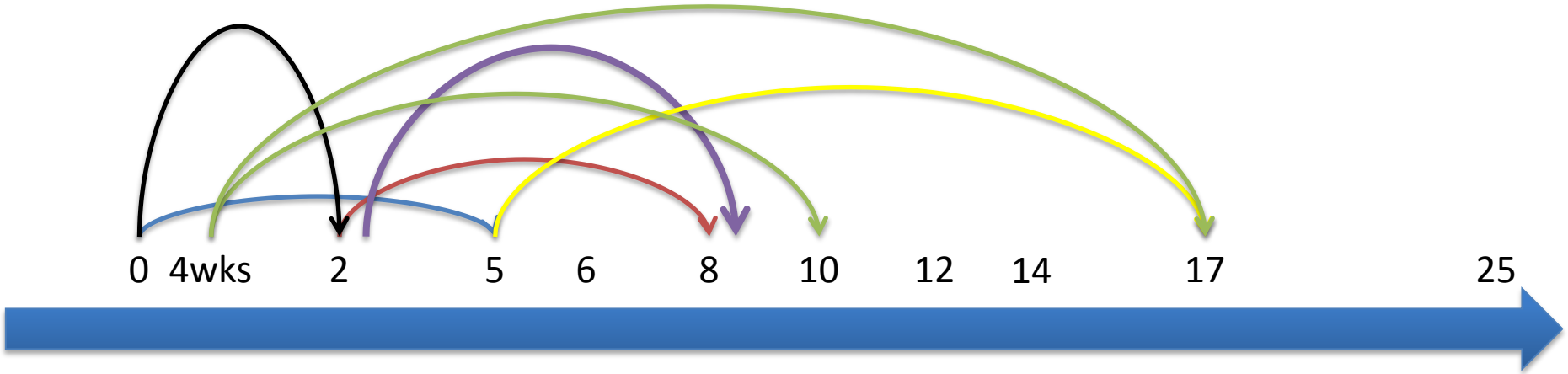

Perintal factors and child health and development

Data linkage

Family support programs

Pragmatic RCTs and screening predictive validity

Child care and cognitive development

Cohorts studies - LSAC

Early life diet and cognitive, social emotional development, and CVD risk factors

Early life self regulation and cognitive, social emotional development

Cohorts studies -ALSPAC

Self regulation and school achievement, health behaviours and CVD risk

Data linkage and cohorts

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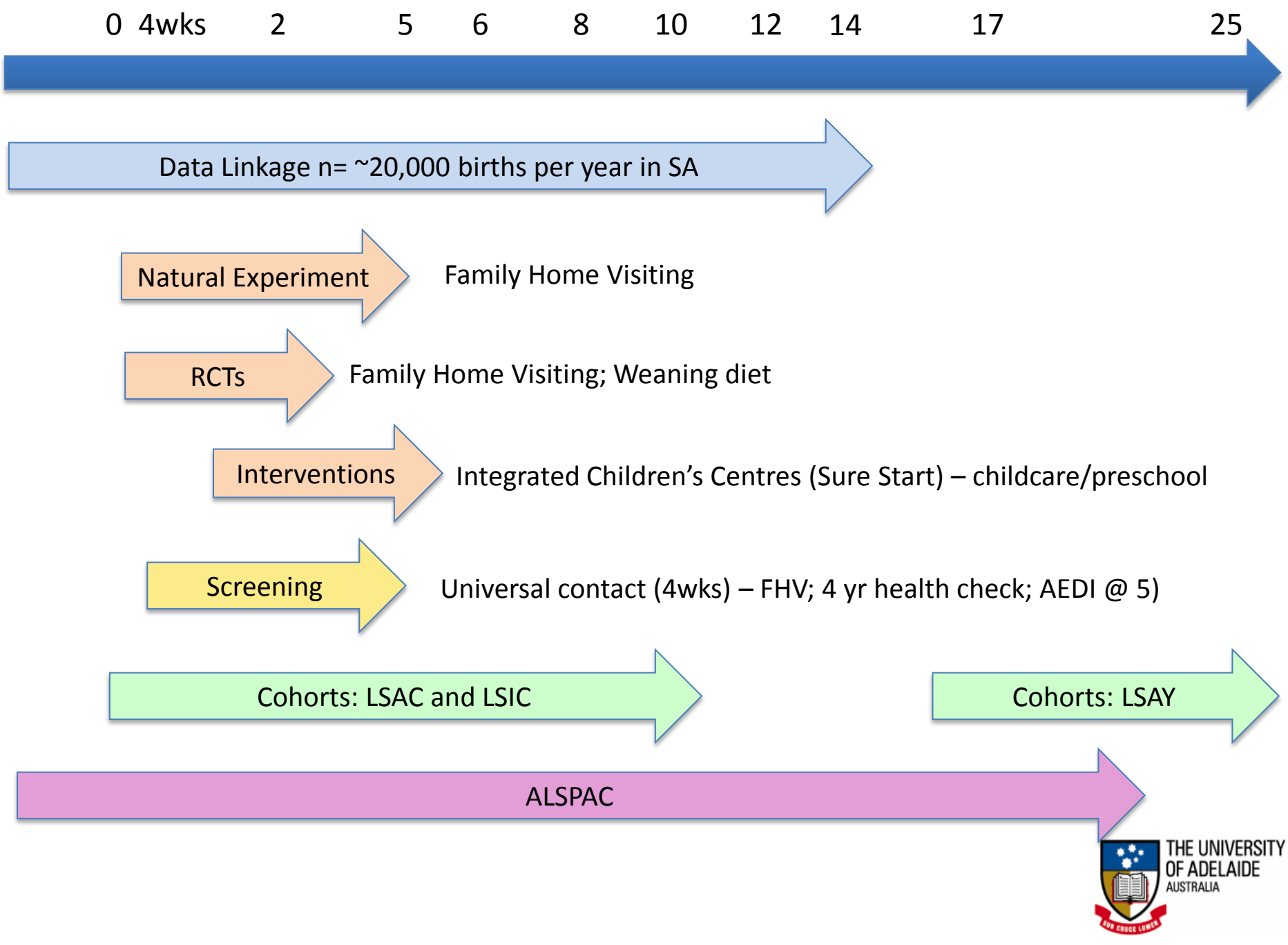

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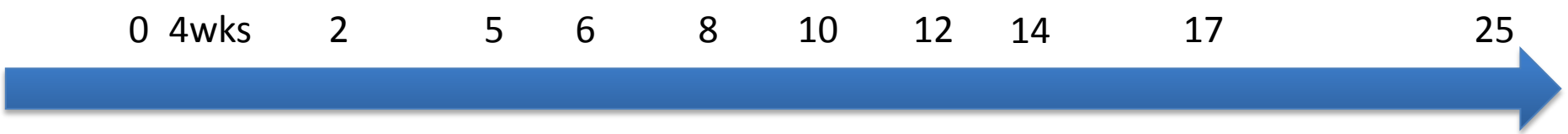

Data Linkage n= ~20,000 births per year

- Perinatal (pregnancy) includes depression
- Universal Contact Visit (age 4-6 weeks) includes depression, weight, height, etc
- Age 4 – preschool health check includes height, weight
- AEDI (age 5) physical, language, social, emotional, communication
- NAPLAN (ages 8, 10, 12 14) reading, writing, literacy, numeracy
- Hospitalizations
- Emergency Dept

- Child care and preschool

- General Practice?

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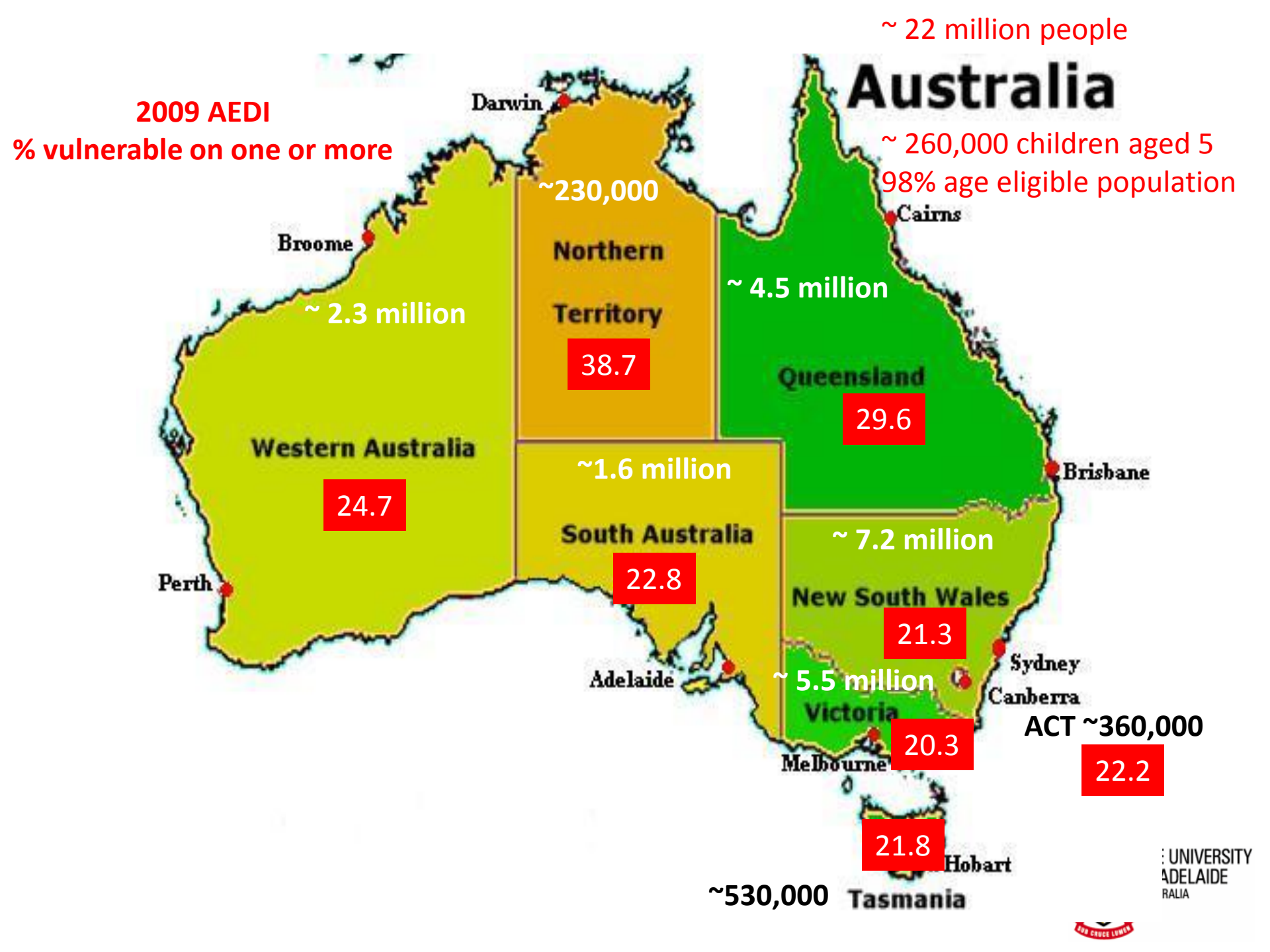
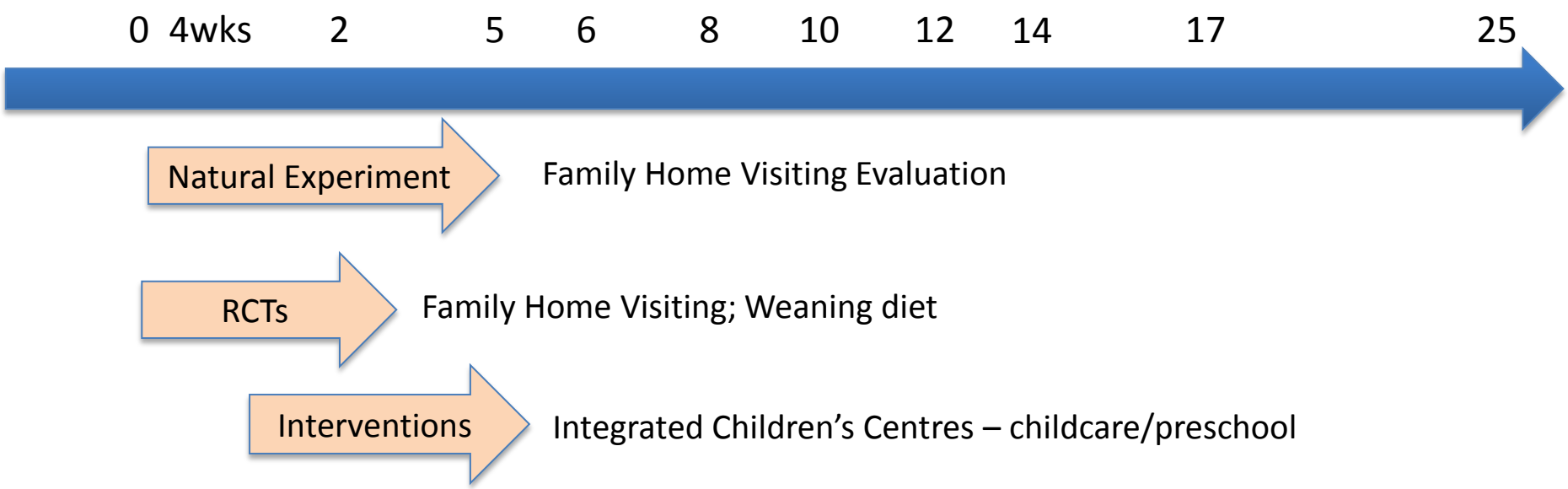

~ 22 million people
Australia
~ 260,000 children aged 5
98% age eligible population
2009 AEDI
% vulnerable on one or more
Darwin
Broome
Cairns
Brisbane
Perth
Adelaide
Sydney
Canberra
Melbourne
Hobart
~230,000
Northern
Territory
38.7
~ 4.5 million
Queensland
29.6
~ 2.3 million
Western Australia
24.7
~1.6 million
South Australia
22.8
~ 7.2 million
New South Wales
21.3
~ 5.5 million
Victoria
20.3
ACT ~360,000
22.2
21.8
~530,000
Tasmania



Family Home Visiting (FHV)

- Evaluation of natural experiment roll-out 2009-2011, follow-up to 2014
- Pragmatic trial of universal contact visit
- Planned RCT of 'next gen' FHV

Weaning Diet Trial – obesity prevention

Evaluation of Intervention

- Children's Centres – integrate quality child care and preschool (Sure Start)

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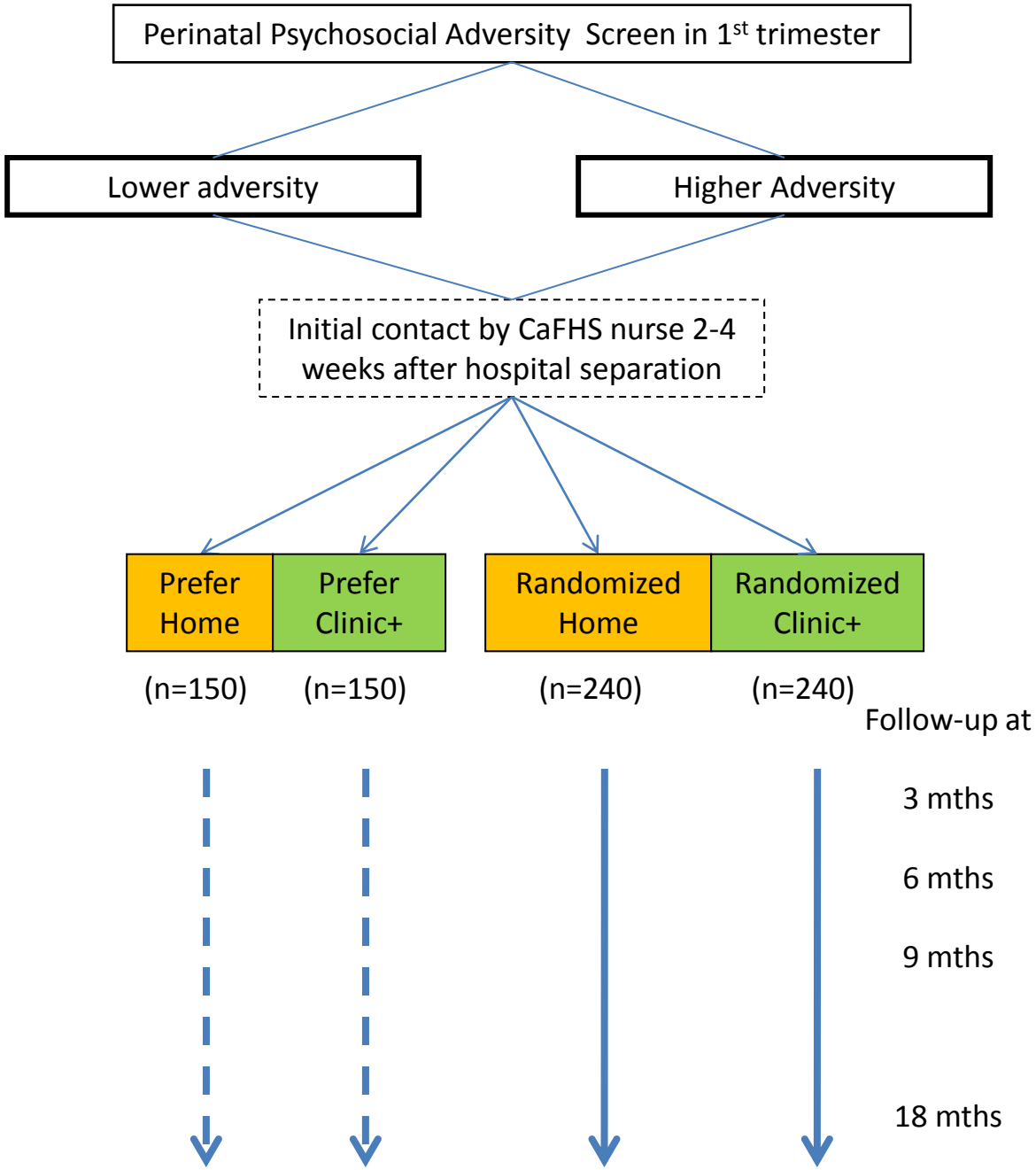
Pragmatic Randomized Preference Equivalence Trial of Nurse Home Visiting



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"Proportionate Universalism" – but who gets more intensive support?

Screening for FHV at 3-4 weeks postpartum
- Risk stratification

3-4 Year Old Health Check
- Done by both GPs and Child Family Health Nurses (@ 4 yr immunization)
- Care pathways?

AEDI at age 5
- Risk stratification
- Care pathways?

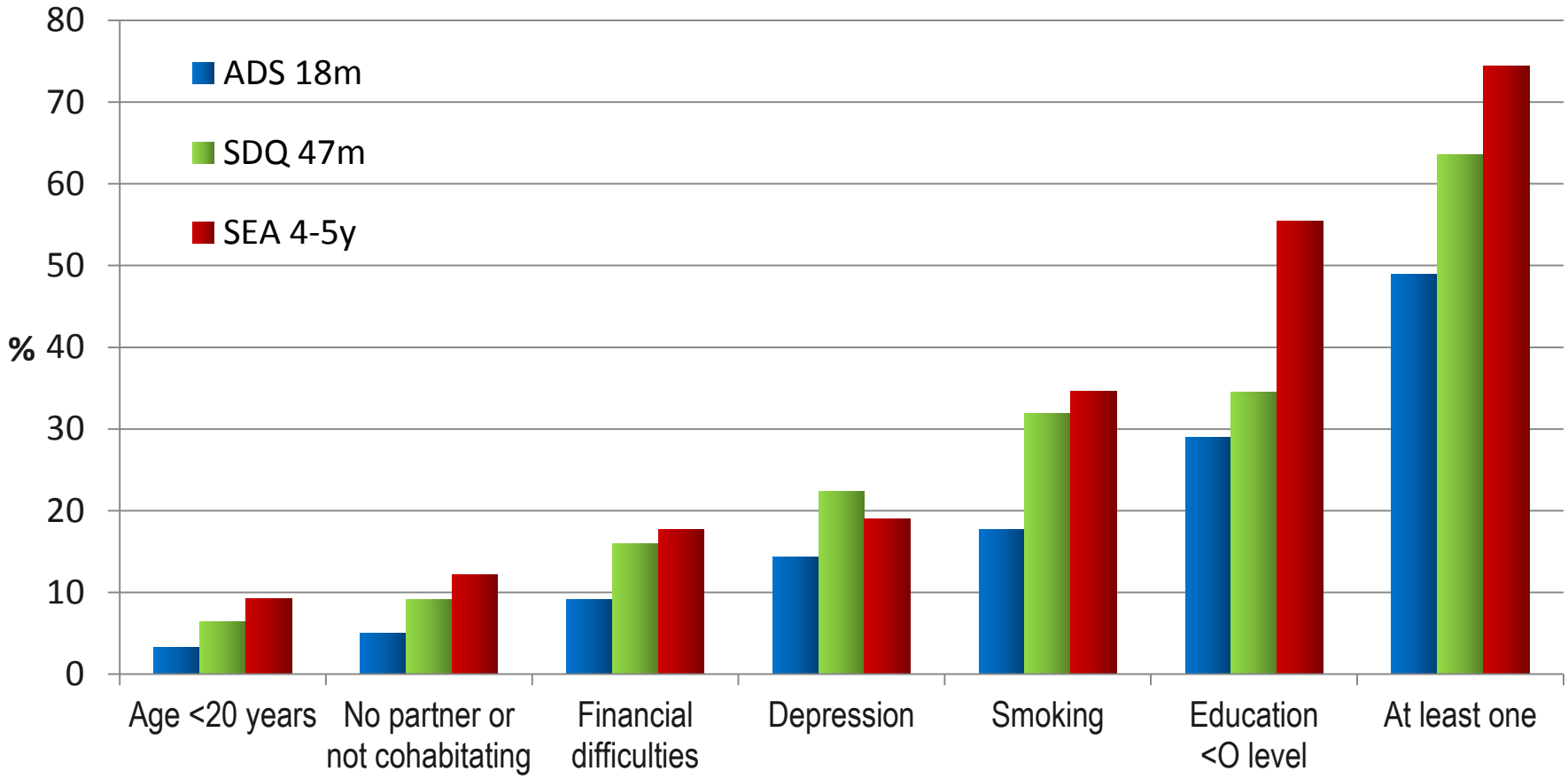
PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

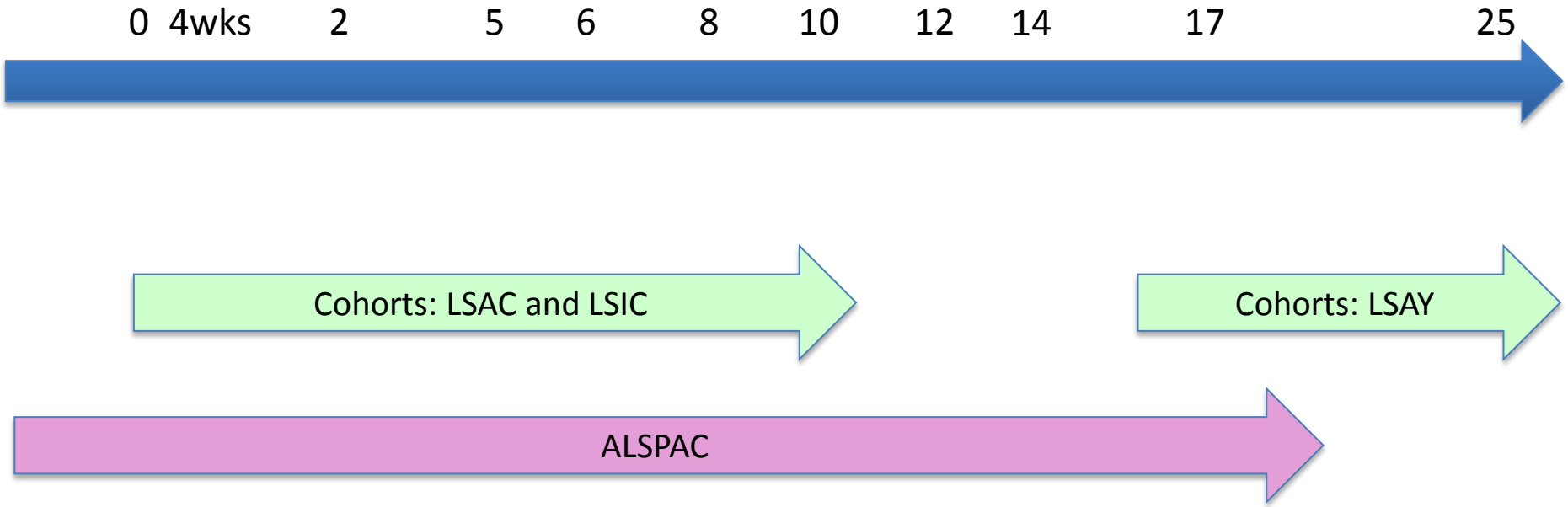
Young Maternal Age and Poor Child Development: Predictive Validity From a Birth Cohort

Catherine R. Chittleborough, Debbie A. Lawlor and John W. Lynch

Pediatrics; originally published online May 2, 2011;
DOI: 10.1542/peds.2010-3222

Proportion of child outcome cases identified with each predictor





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0

25

horts: LSAY

National

: 1995

• ages 0-1

= ~12,000

n=10,000

es PISA sample

• ages 1-4

ons from school

• behavio

• LSAC sir

Table 1 Measures included in the Outcome Index in each cohort at Waves 1, 2 and 3

Domain	Subdomain	Aged 0–1	Aged 2–3	Aged 4–5	Aged 6–7 and 8–9
Health/ Physical	Health	Overall rating of health Special health care needs Health problems	Overall rating of health Special health care needs Health problems Weight status	Overall rating of health Special health care needs Health problems Weight status	Overall rating of health Special health care needs Health problems Weight status
	Motor		PedsQL Physical Health	Pedsql Physical Health	Gross motor coordination PedsQL Physical Health
Social/ Emotional	Internalising	STSI Approach STSI Irritability STSI Cooperativeness	Factor-analysed BITSEA Internalising	SDQ Emotional Symptoms	SDQ Emotional Symptoms
	Externalising		Factor-analysed BITSEA Externalising	SDQ Conduct Problems SDQ Hyperactivity	SDQ Conduct Problems SDQ Hyperactivity
	Social Competence		Factor-analysed BITSEA Social Competence	SDQ Peer Problems SDQ Prosocial	SDQ Peer Problems SDQ Prosocial
Learning/ Academic	Language and Literacy	CSBS Total Standardised Score	Child's communication skills MCDI-III Vocabulary MCDI-III Grammatical Markers	WAI PPVT	PPVT ARS Language and Literacy
	Numeracy and Cognition			Teacher rating of numeracy skills	WISC-IV Matrix Reasoning ARS Mathematical Thinking

Notes: PedsQL = Pediatric Quality of Life inventory; STSI = Short Temperament Scale for Infants; BITSEA = Brief Infant Toddler Social Emotional Adjustment scale; SDQ = Strengths and Difficulties Questionnaire; CSBS = Communication and Symbolic Behaviour Scale; MCDI-III = MacArthur Communicative Development Inventory, Level III; WAI = Who Am I? test; PPVT = Peabody Picture Vocabulary Test; ARS = Academic Rating Scale; WISC-IV = Wechsler Intelligence Scale for Children IV.

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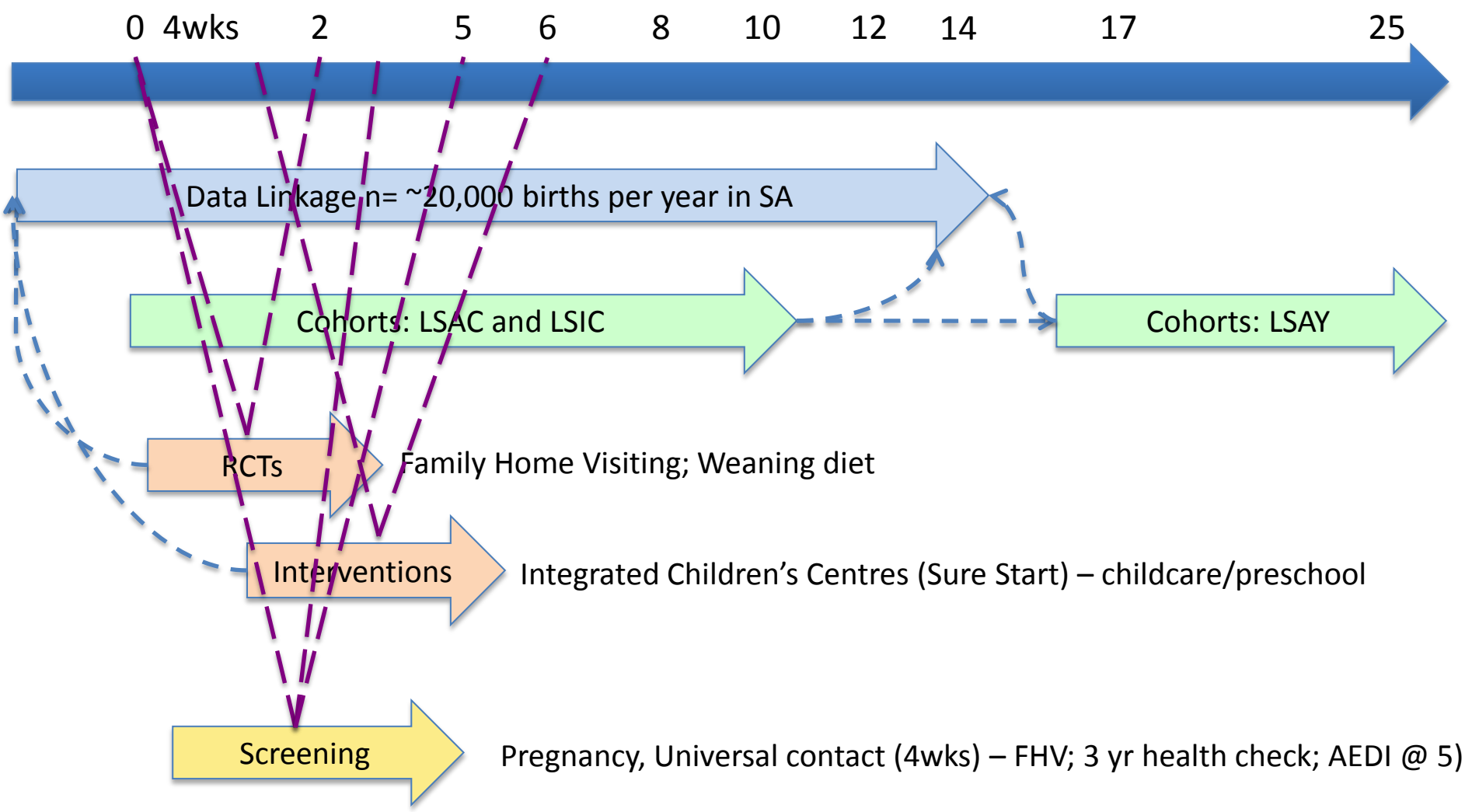

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Requires more than evidence synthesis (combining)

Requires complex evidence integration (making whole)

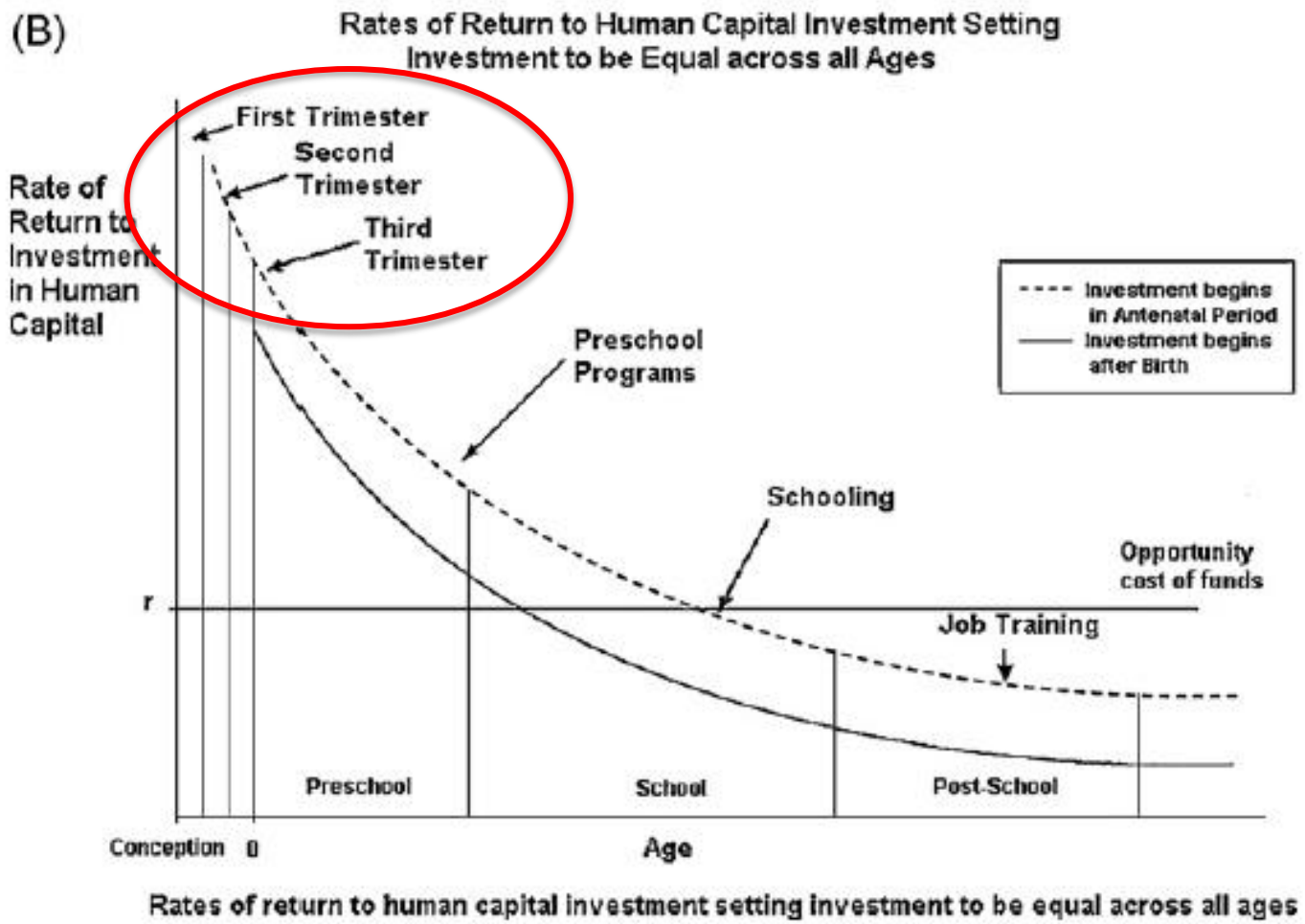

Fig. 2. Rates of return to human capital investment.

Doyle et al. *Economics Human Biol* (2009)

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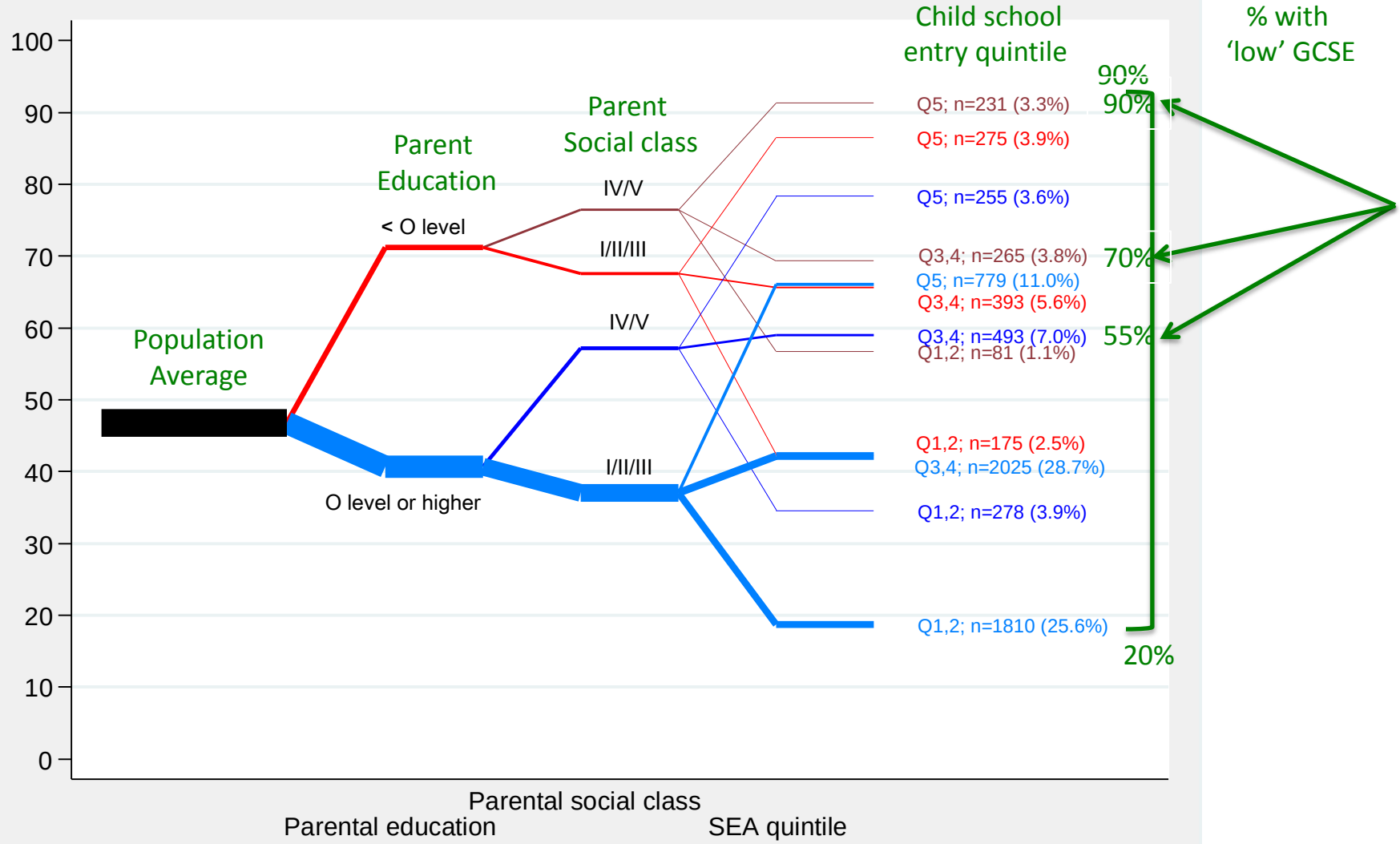
Evidence Integration

What if … ?



ALSPAC Data (unpublished)

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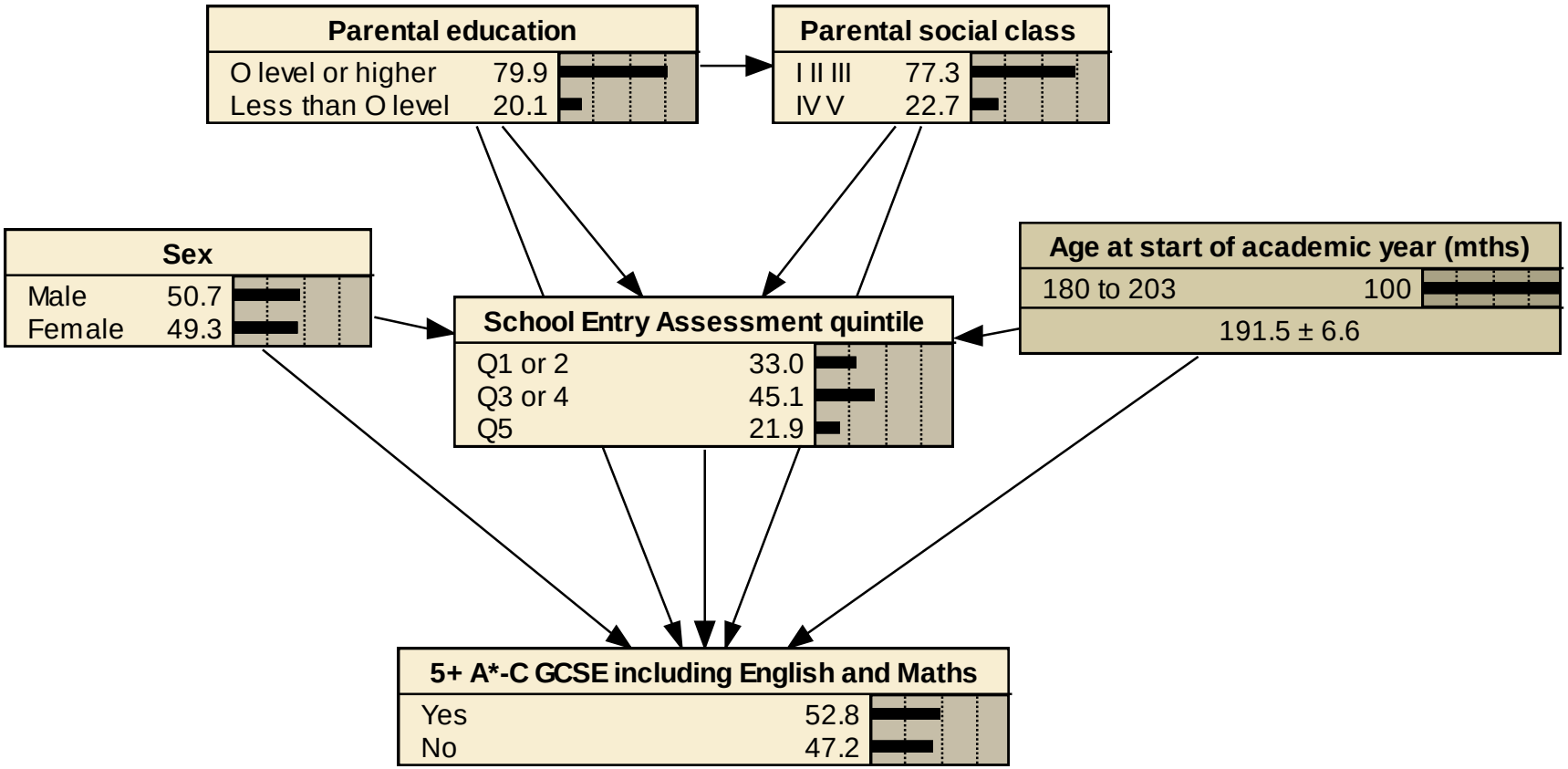

Bayesian Network

ALSPAC data, N=7060

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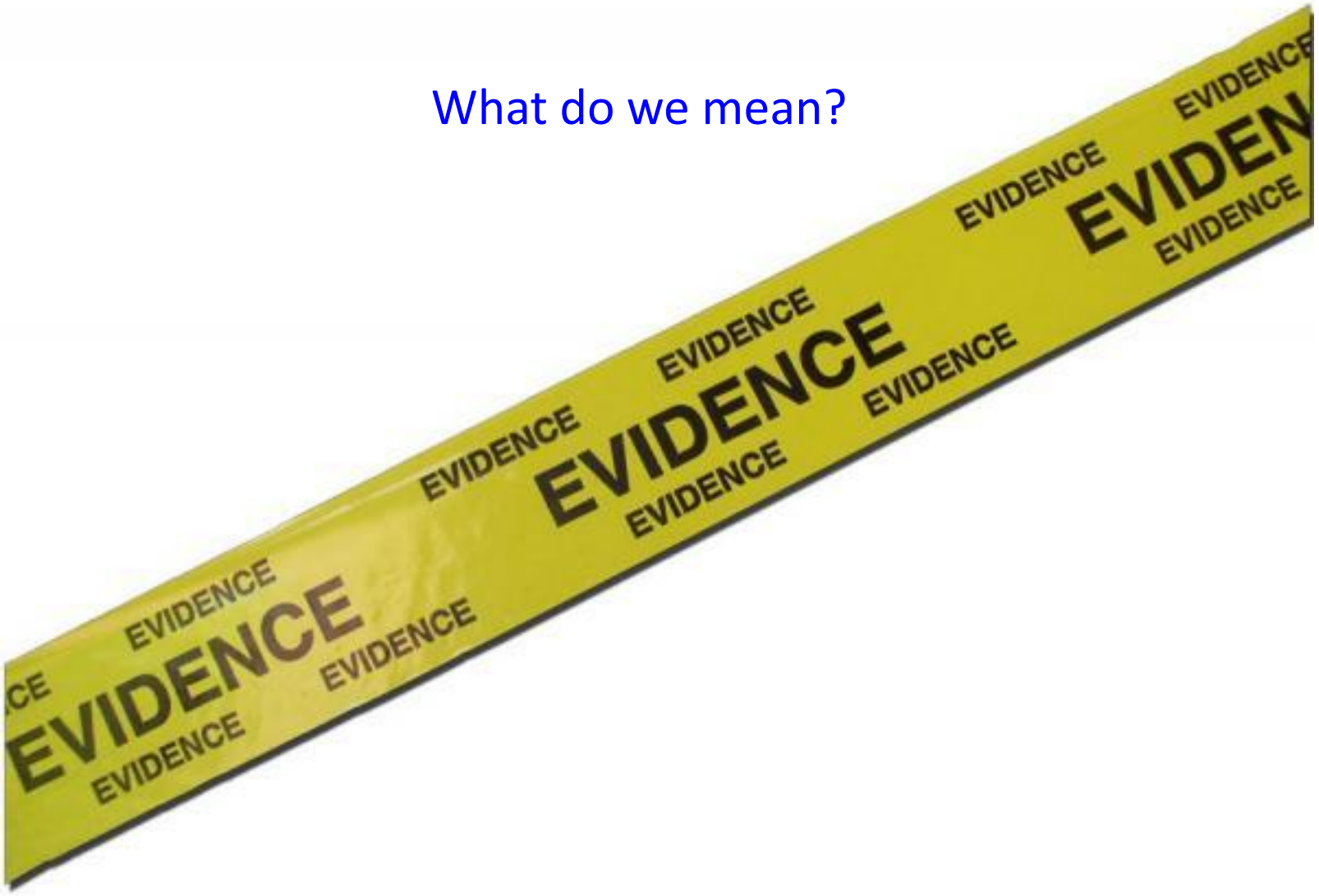
What do we mean?



The Gap

Research Production

Translation →

Research Consumption

Different concepts and uses of 'evidence'

"Statistics are like a drunk with a lamp post: used more for support than illumination."

Winston Churchill

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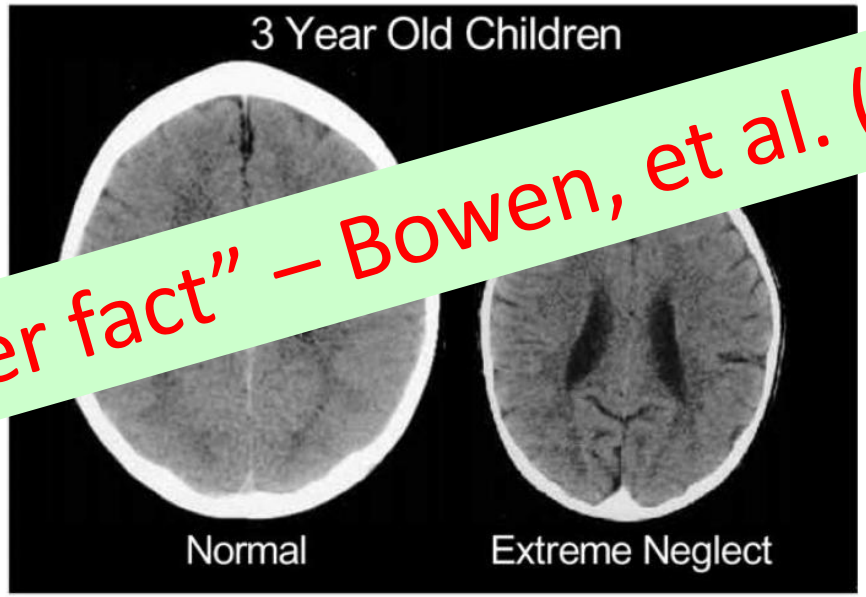
Brain and Mind **3:** 79–100, 2002.

Childhood Experience and the Expression of Genetic Potential: What Childhood Neglect Tells Us About Nature and Nurture

BRUCE D. PERRY
The ChildTrauma Academy, 5161 San Felipe, Suite 320, Houston, TX 77056, USA
(E-mail: ChildTrauma1@aol.com)



"Killer fact" – Bowen, et al. (2009)

Figure 1. Abnormal brain development following sensory neglect in early childhood. These images illustrate the negative impact of neglect on the developing brain. In the CT scan on the left is an image from a healthy three year old with an average head size (50th percentile). The image on the right is from a three year old child suffering from severe sensory-deprivation neglect. This child's brain is significantly smaller than average (3rd percentile) and has enlarged ventricles and cortical atrophy.

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guardian.co.uk

Iain Duncan Smith 'distorted' research on childhood neglect and brain size

Research focusing on effects of extreme abuse was 'grossly misrepresented' by former Tory leader, neuroscientist says

Paul Lewis and Sarah Boseley
guardian.co.uk, Friday 9 April 2010 18.27 BST

A larger | smaller

Iain Duncan Smith at an estate in Glasgow. His recent speeches have drawn a link between children's brain development and crime in later life. Photo: Murdo Macleod

Dr Perry was shown the transcript along with three other examples …

Dr. Perry concluded Duncan Smith's comments were an "oversimplification" that "greatly misrepresents the way we would explain the impact of neglect or trauma on the developing brain".

He added: "to oversimplify this way is, essentially, to distort".

Uncomfortable Science

John Tukey (1915-2000) - Princeton statistician

"Uncomfortable science" – when there is a need to draw an inference from a limited sample of data, where further samples influenced by the same cause system will not be available.

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"Far better an approximate answer to the right question, which is often vague, than an exact answer to the wrong question, which can always be made precise."

John Tukey. The future of data analysis. *Ann Math Stat* (1962)