

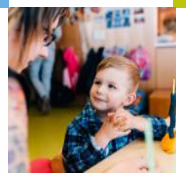

Predicting low literacy at age 10 in the Longitudinal Study of Australian Children

Dr Catherine Taylor

Principal Research Fellow

Australian Early Literacy Summit

8 March 2016, Canberra

TELETHON KIDS INSTITUTE
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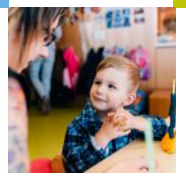
THE UNIVERSITY OF WESTERN AUSTRALIA





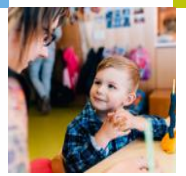
Literacy is a tool for life

- Children's language development builds the foundation for literacy and all the benefits that follow from being literate

- In the LSAC (K cohort) risks for low literacy at age 10:
  - Children with low school readiness at age 4
  - Aboriginal &/or Torres Strait Islander children
  - Children with low language at age 4, 6 or 8
  - Children with low self-regulation at age 4

- Consistent with evidence presented on Day 1 about the enduring effects of risk factors for literacy in early childhood

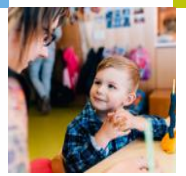
Why prediction is important



- The earlier we can predict into the future – the earlier we can intervene to change children's development for the better

- Longitudinal studies offer a rare panoramic view of the future





My colleagues

Stephen Zubrick[1, 2]

Daniel Christensen[1]

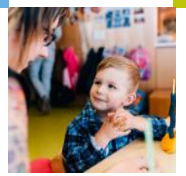
David Lawrence[1, 2]

Francis Mitrou[1]

[1] Telethon Kids Institute

[2] The University of Western Australia



Research questions

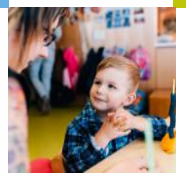
1. What are the patterns of language and literacy development 4-10 years?

2. How accurately can we predict these patterns?

3. What are the implications for early childhood policies and services?


Longitudinal Study of Australian Children (LSAC)

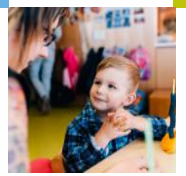




- National coverage
- Baby cohort – 5000 children (recruited at 8 months)
- Kindergarten cohort – 5000 children (recruited at age 4)
- Information collected every 2 years since 2004
- 7 Waves of data collected so far
- Data linkage (e.g., NAPLAN)

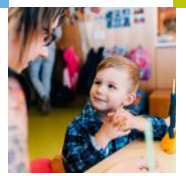
Longitudinal Study of Australian Children (LSAC)





- Baby cohort 4-10 years of age 2006-2014
- Kindergarten cohort 4-10 years (2004-2010)
- LSAC children have grown up with the policies and services of their time
- LSAC broadly representative of the Australian population living in urban and regional Australia
- LSIC – Longitudinal study of Aboriginal &/or Torres Strait Islander Children

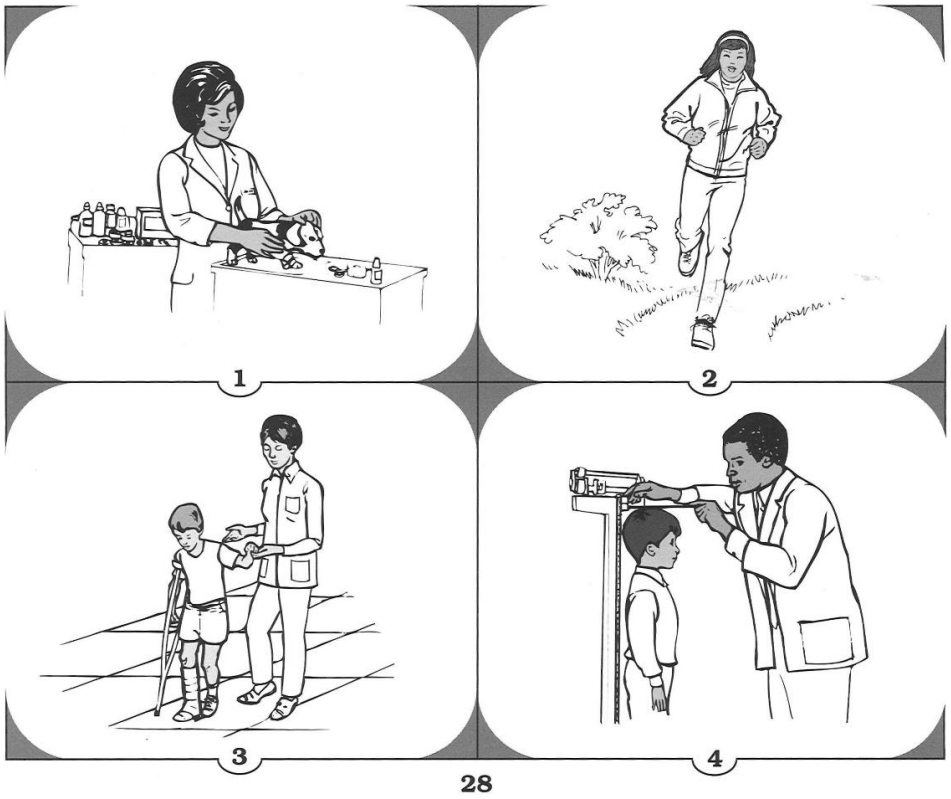


LSAC predictors

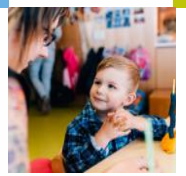
- Child
- Parents
- Family
- Home learning environment
- Neighbourhood
- Early childhood education and care
- School (including linkage to NAPLAN)

LSAC language measure
Ages 4, 6 & 8

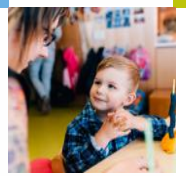


- Adapted Peabody Picture Vocabulary Test (PPVT)
- Receptive vocabulary
- Bottom 15% = ‘low language’









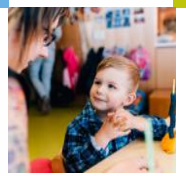
LSAC literacy measure at age 10

Teacher rates the child on a five-point Academic Rating Scale:

- Conveys ideas when speaking
- Understands and interprets
- Uses strategies to gain information
- Reads fluently
- Comprehends text
- Composes stories
- Clarifies and elaborates writing
- Corrects written drafts
- Uses computer for reports, stories

Scale: 1 = ‘not yet proficient’ to 5 = ‘proficient’



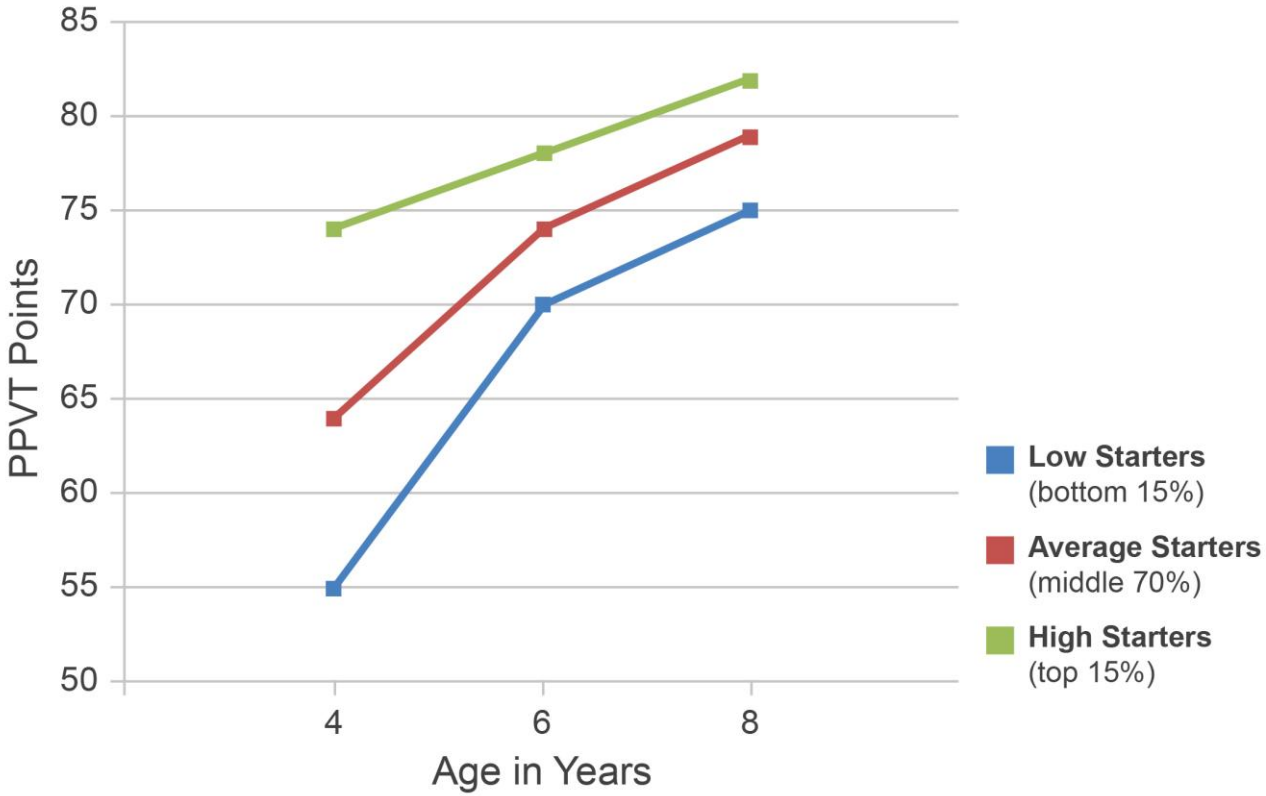


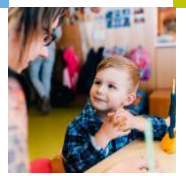
Putting language and literacy on the same scale

- Converted PPVT and Academic Rating Scale scores to age-standardised z scores:
  - Bottom 15% on PPVT = ‘low language’
  - Bottom 15% on ARS = ‘low literacy’


Language patterns ages 4-8

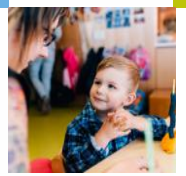
3332 children (K cohort)





‘Lows’ gained ground but do not catch up to the other groups in the first 6 years of full-time school (5-10 years)





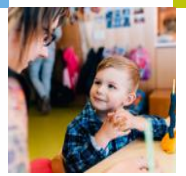
Language 4-8 years

4332 children (K cohort)

	Mean PPVT Score		
	Age 4	**Age 6**	**Age 8**
Low starters	55	70	75
Middle starters	64	74	79
High starters	74	78	82

- Children who start behind have to develop faster than children who are on-track in order to catch-up
- ECEC has to accelerate typical development



Language 4-8 years

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	Mean PPVT Score		
	Age 4	**Age 6**	**Age 8**
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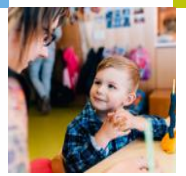
‘Lows’ gained more points than ‘highs’ but did not close the gap





Language at age 4

4332 children (K cohort)

	Mean PPVT Score		
	Age 4	**Age 6**	**Age 8**
Low starters	55	70	75
Middle starters	64	74	79
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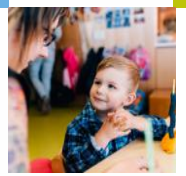
‘The ‘lows’ finished close to where ‘highs’ started after 6 years of full-time school (5-10 years)

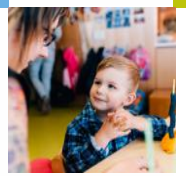


The effect of risk factors on language growth from 4-8 years

Risk factors	Age 4 Months behind in language growth	Age 8 Months behind in language growth
Maternal NESB	-16	-4





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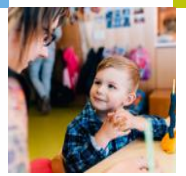

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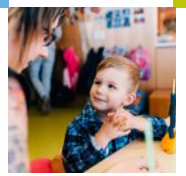

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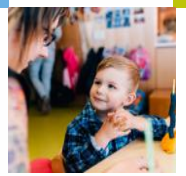

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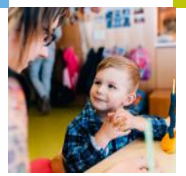
Siblings 4+	-10	-8
Low family income	-7	-3





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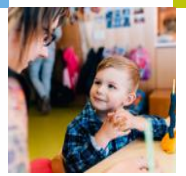

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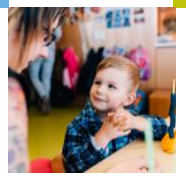

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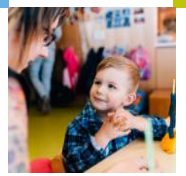
Low family income	-7	-3
Low birthweight	-6	-4
Low maternal education	-6	-6
Maternal mental health distress	-5	-0.3





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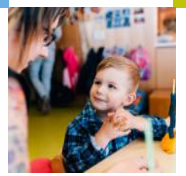
Low birthweight	-6	-4
Low maternal education	-6	-6
Maternal mental health distress	-5	-0.3
Low maternal parenting consistency	-5	-2





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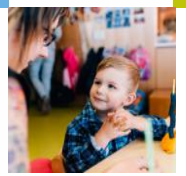
Maternal mental health distress	-5	-0.3
Low maternal parenting consistency	-5	-2
Low child self-regulation	-3	-2





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Low family income	-7	-3
Low birthweight	-6	-4
Low maternal education	-6	-6
Maternal mental health distress	-5	-0.3
Low maternal parenting consistency	-5	-2
High child temperament reactivity	-3	-2
High area socio-economic disadvantage	0.30 ns	-8





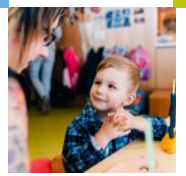
Stability & change patterns in language & literacy 4-10 years

2792 children (K cohort)

- The next series of slides show movement patterns of children 4-10 years who were grouped as ‘low’ or ‘middle-high’ at age 4

Movement pattern 4-6 years

2792 children

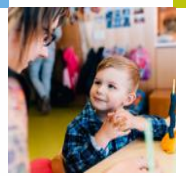


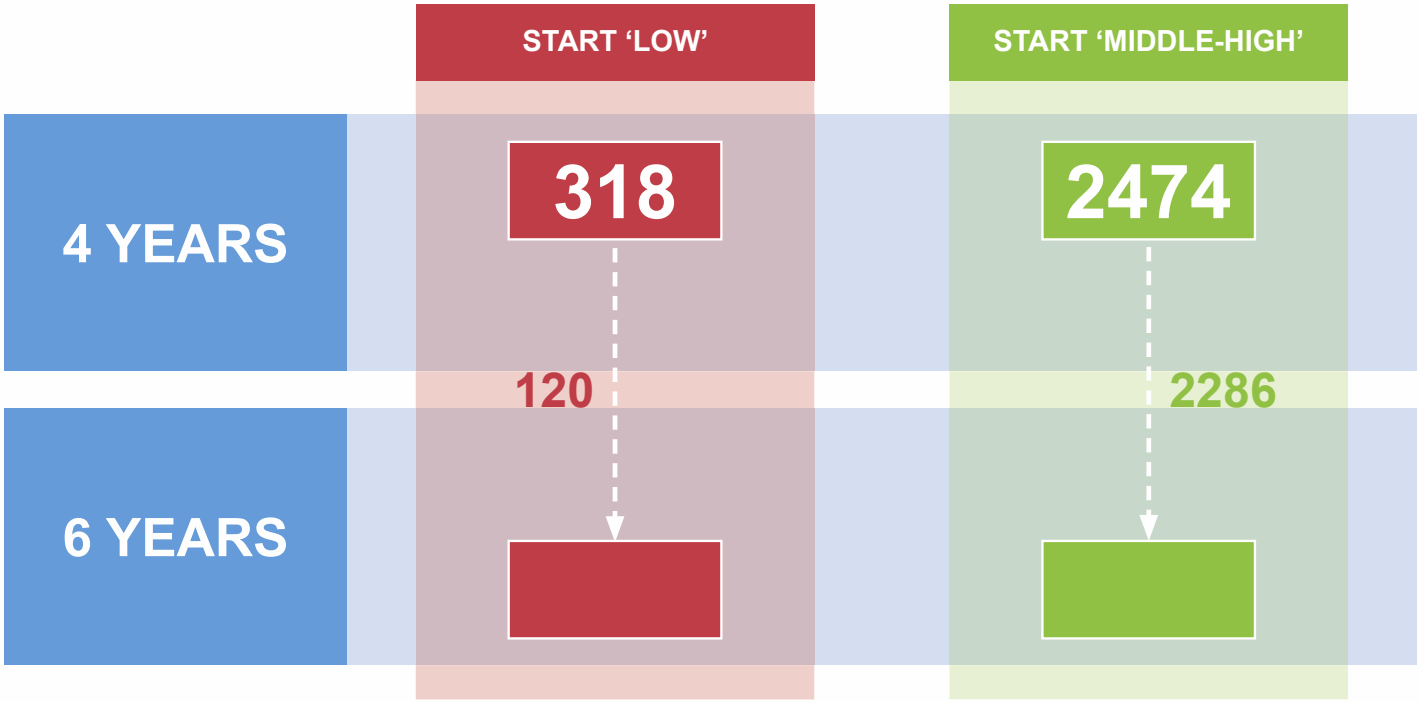
	START 'LOW'	START 'MIDDLE-HIGH'
4 YEARS	318	2474
6 YEARS		

Movement pattern 4-6 years

2792 children



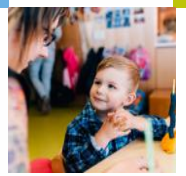


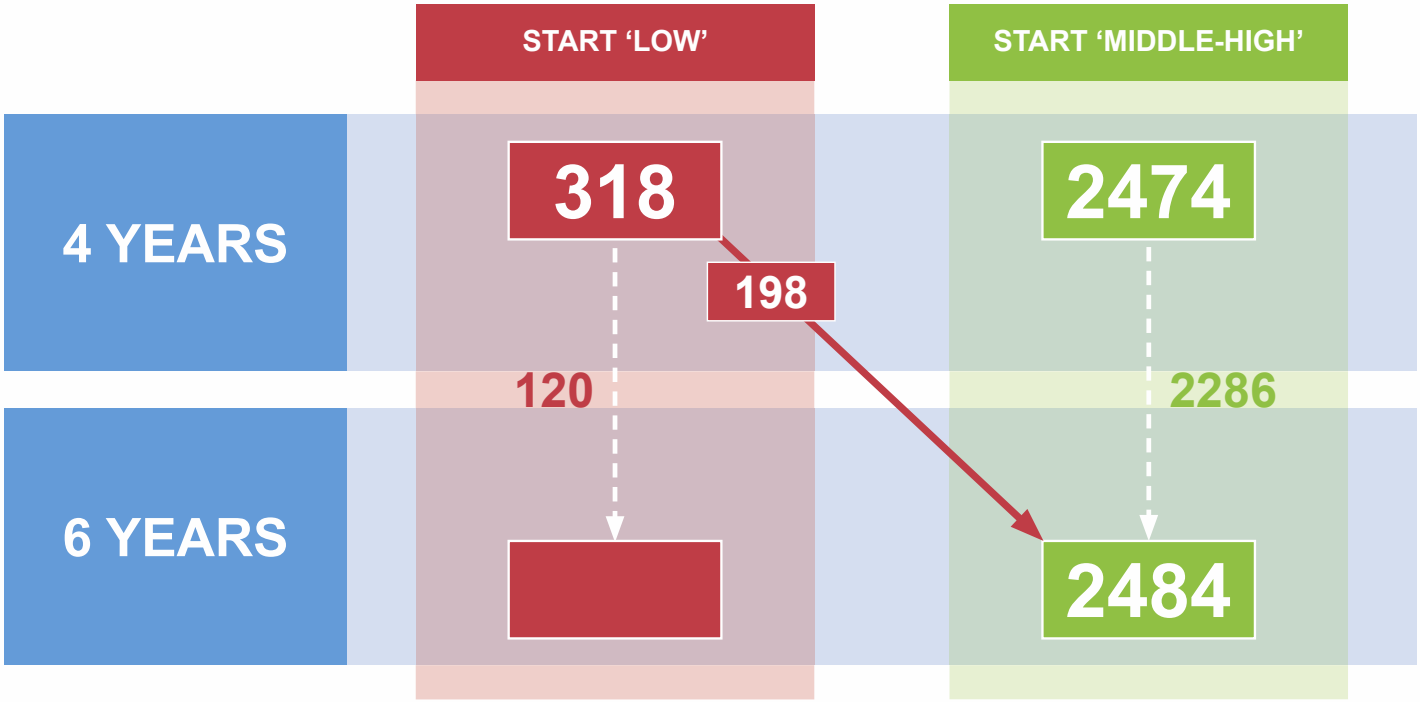


Movement pattern 4-6 years

2792 children



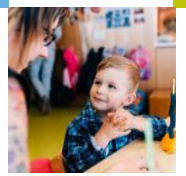


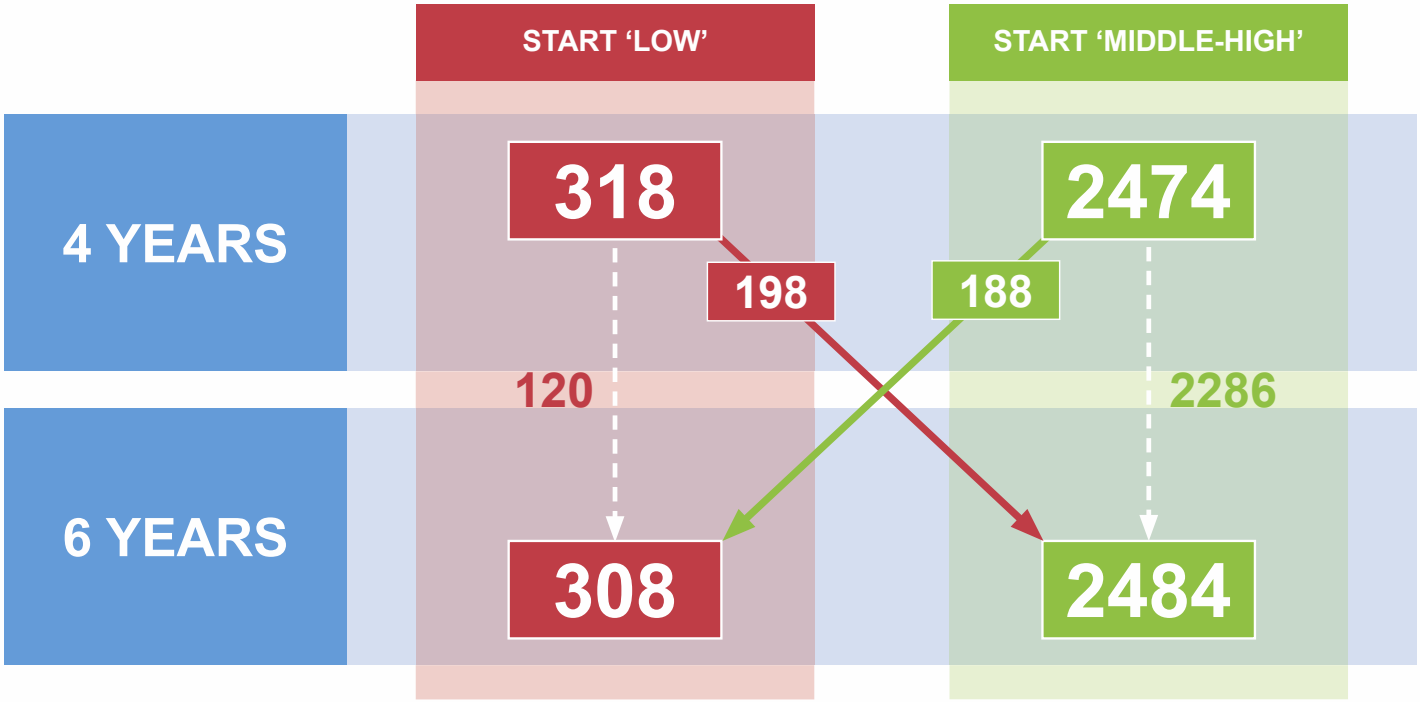



Movement pattern 4-6 years

2792 children



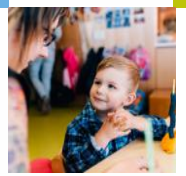





Movement pattern 6-8 years

2792 children

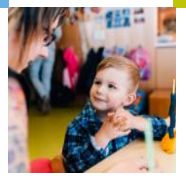


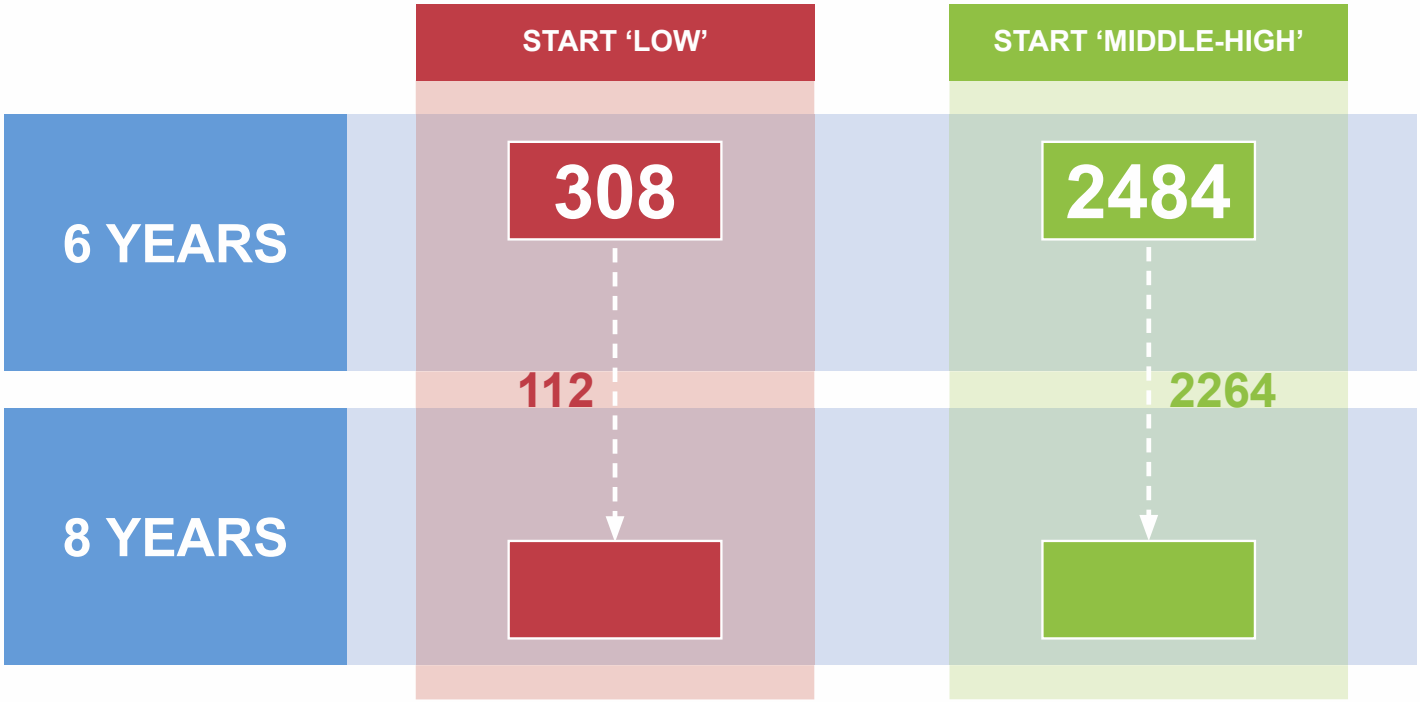


	START 'LOW'	START 'MIDDLE-HIGH'
6 YEARS	308	2484
8 YEARS		


Movement pattern 6-8 years

2792 children

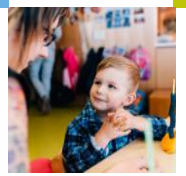


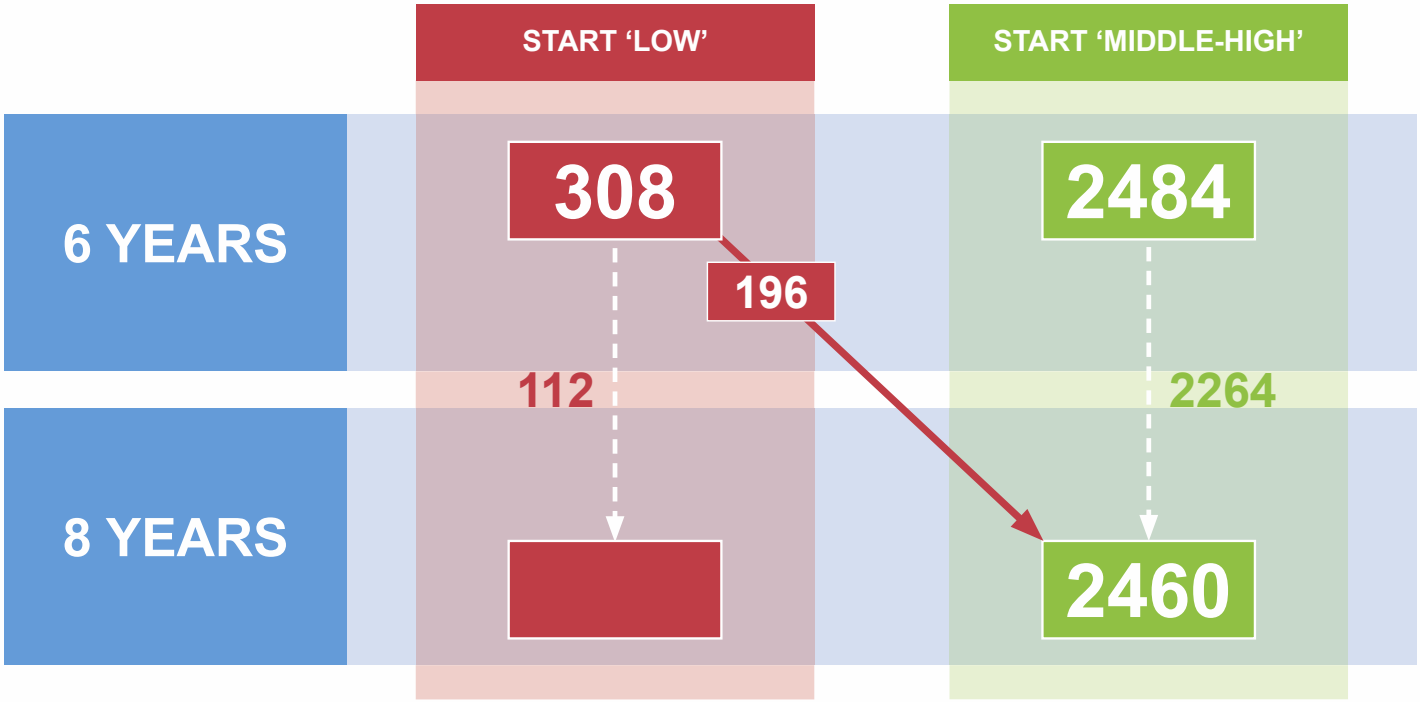


Movement pattern 6-8 years

2792 children



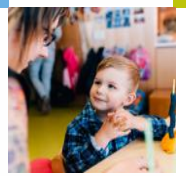


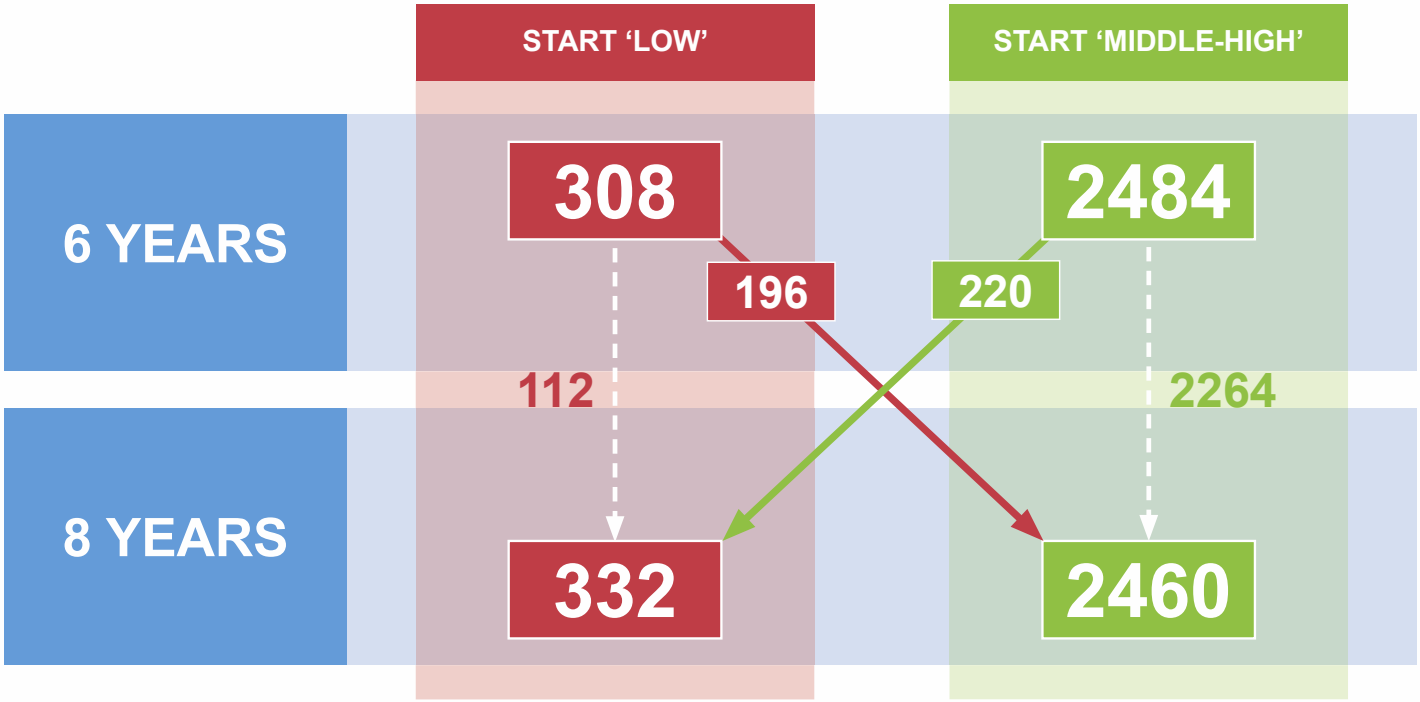



Movement pattern 6-8 years

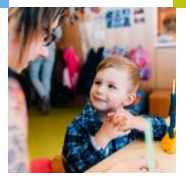
2792 children









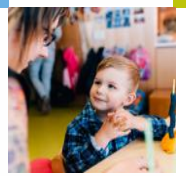



Movement pattern age 8-10

2792 children

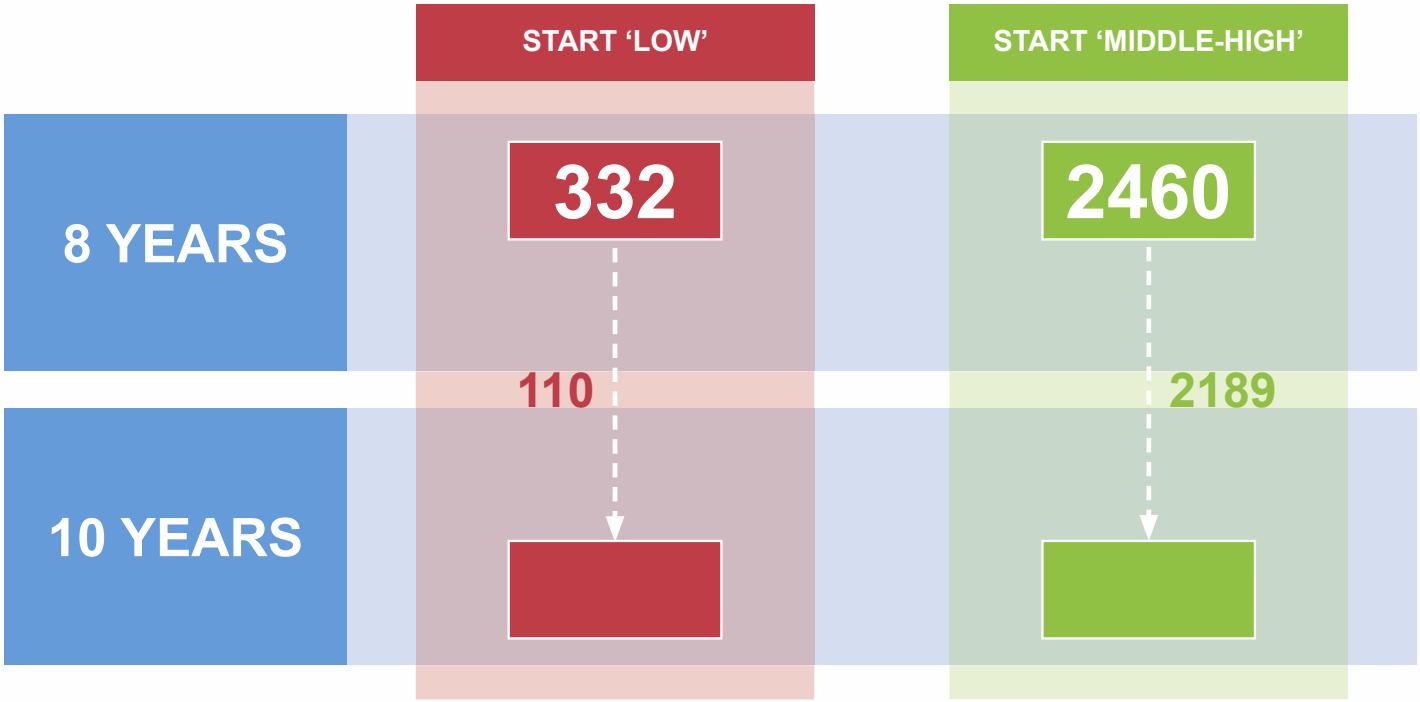
	START 'LOW'	START 'MIDDLE-HIGH'
8 YEARS	332	2460
10 YEARS		



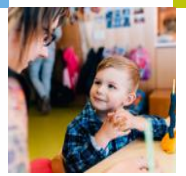


Movement pattern age 8-10

2792 children

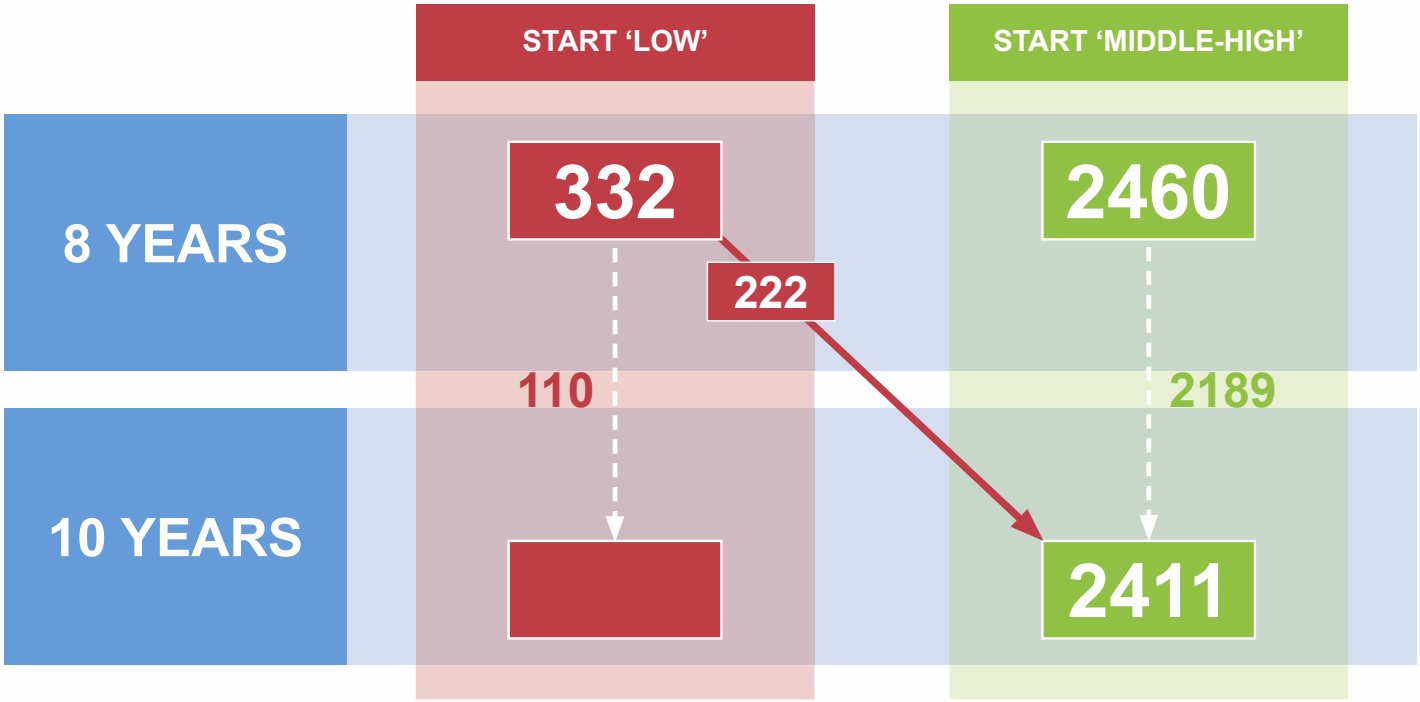




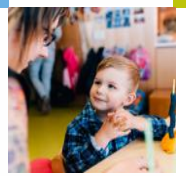


Movement pattern age 8-10

2792 children

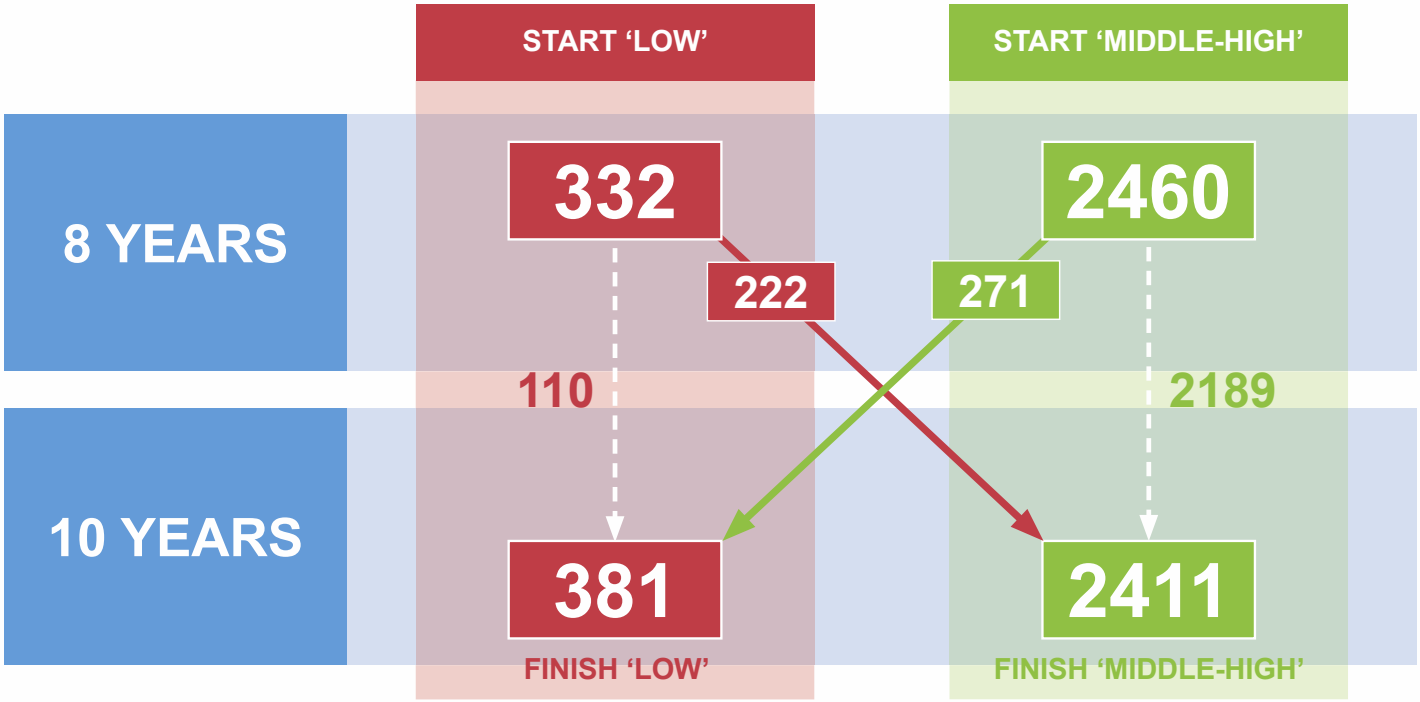


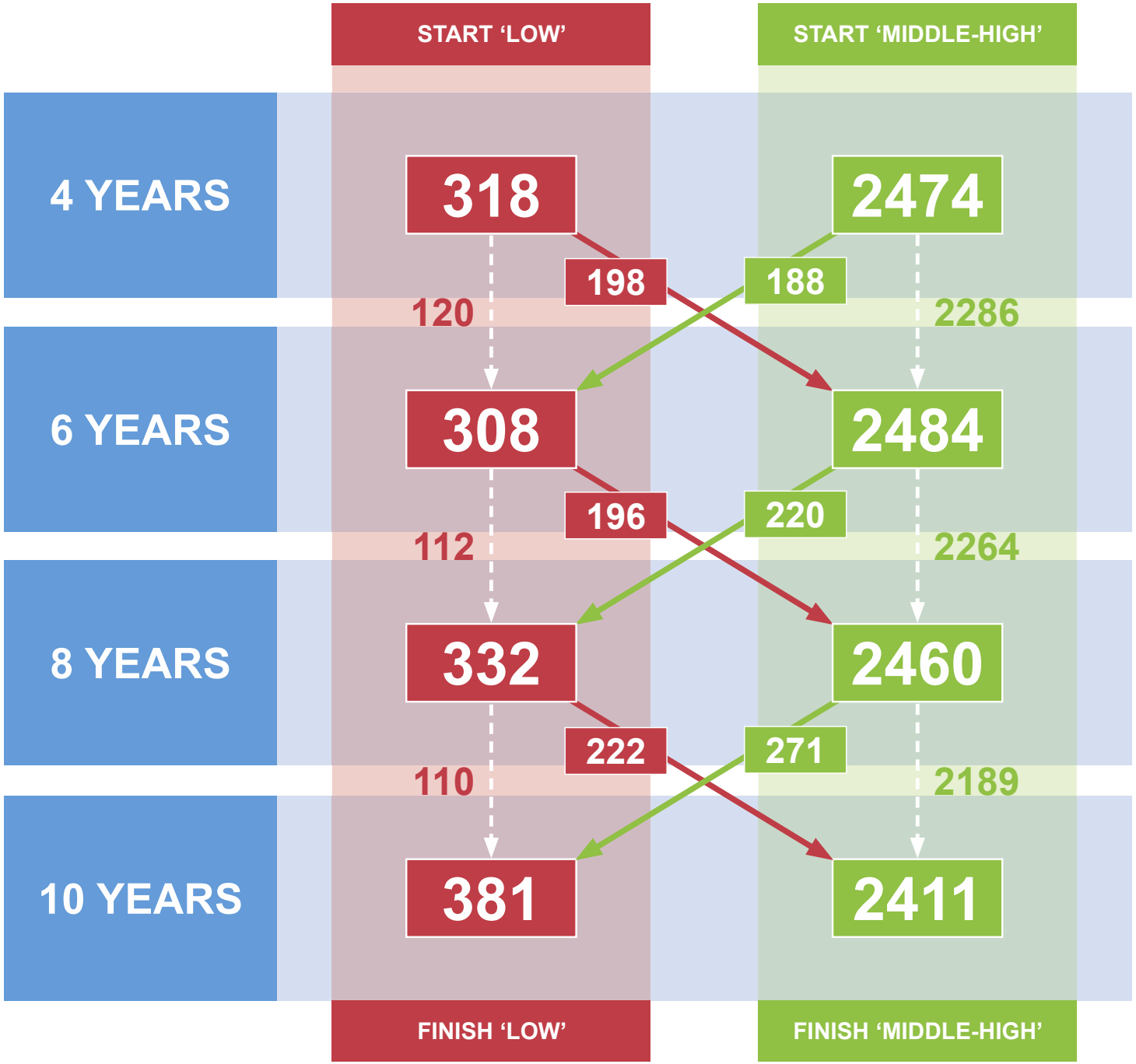




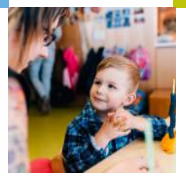
Movement pattern age 8-10

2792 children




START 'LOW'
START 'MIDDLE-HIGH'
4 YEARS
6 YEARS
8 YEARS
10 YEARS
318
2474
198
188
120
2286
308
2484
196
220
112
2264
332
2460
222
271
110
2189
381
2411
FINISH 'LOW'
FINISH 'MIDDLE-HIGH'



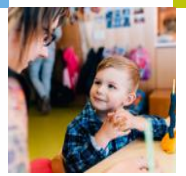


On-track pattern fit 69% children

2792 children (K cohort)

Age 4 Language	Age 6 Language	Age 8 Language	Age 10 Literacy	n	%
On-track	On-track	On-track	On-track	1915	68.6



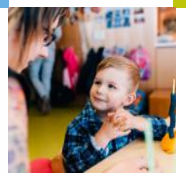



Improving pattern fit 18% children

2792 children (K cohort)

Age 4 Language	Age 6 Language	Age 8 Language	Age 10 Literacy	n	%
Low	On-track	On-track	On-track	118	4.2
Low	Low	Low	On-track	27	1.0



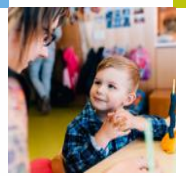


Declining pattern fit 12% children

2792 children (K cohort)

Age 4 Language	Age 6 Language	Age 8 Language	Age 10 Literacy	n	%
On-track	On-track	On-track	Low	202	7.2
On-track	On-track	Low	Low	43	1.5



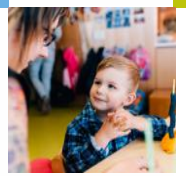


Low pattern fit 1% children

2792 children (K cohort)

Age 4 Language	Age 6 Language	Age 8 Language	Age 10 Literacy	n	%
Low	Low	Low	Low	26	0.9



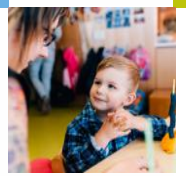
Summary of patterns

2792 children (K cohort)

- On-track (69%)
- Improving (18%)
- Declining (12%)
- Low (1%)

Prediction of low literacy at age 10 from language at age 4

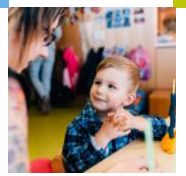




- Prediction of children with low literacy at age 10 on the basis of low language at a younger age was poor

- Can we improve our prediction if we include other risk factors for low literacy in the model?

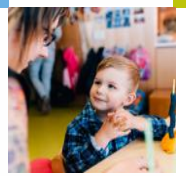


Predictors

- Child (ATSI, low school readiness, self-regulation)
- Parent (single parent, low parenting consistency, low maternal education)
- Family (low family income, health care card)
- Home learning environment (child not read to)
- Neighbourhood (high socioeconomic area disadvantage)

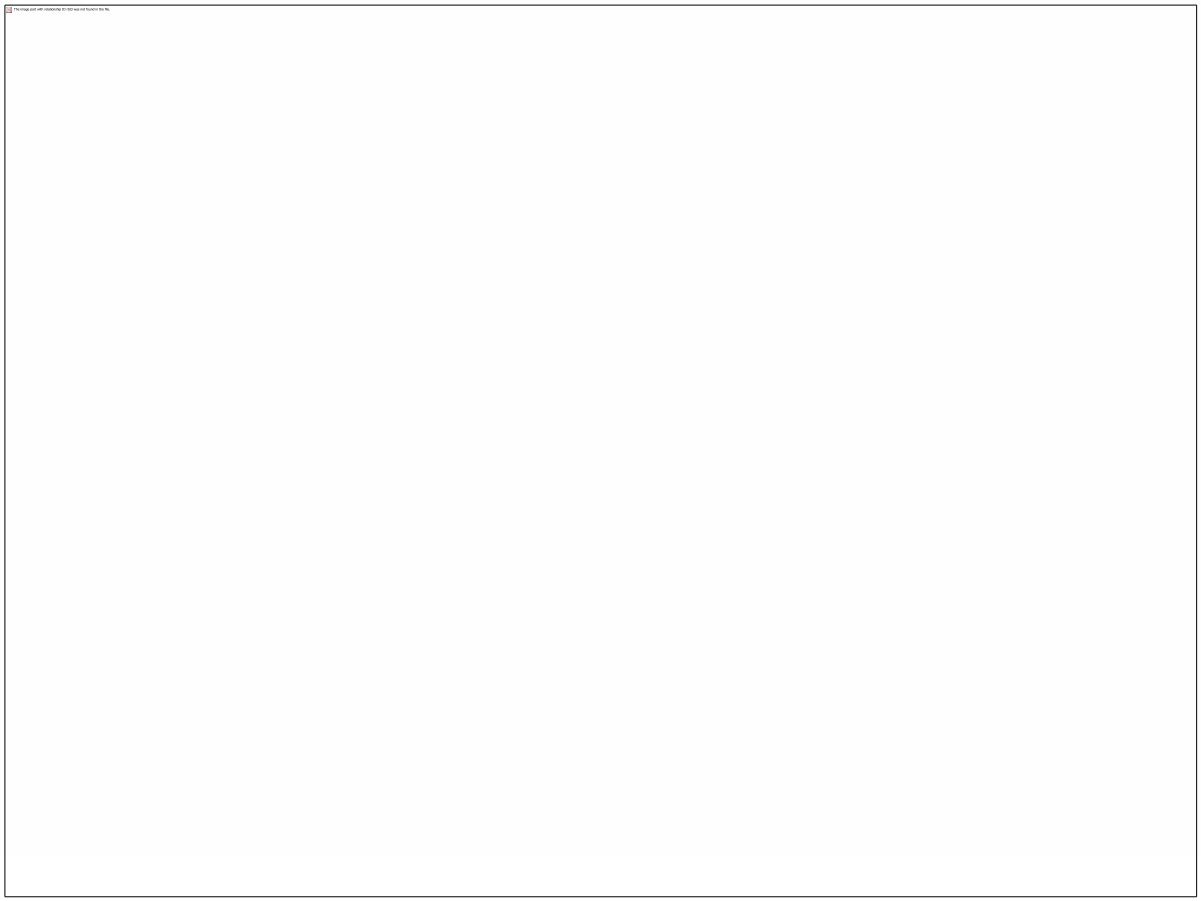
Prediction of low literacy at age 10 from language & other risk factors at age 4



- Prediction of children with low literacy at age 10 on the basis of low language at younger ages and other risk factors was poor

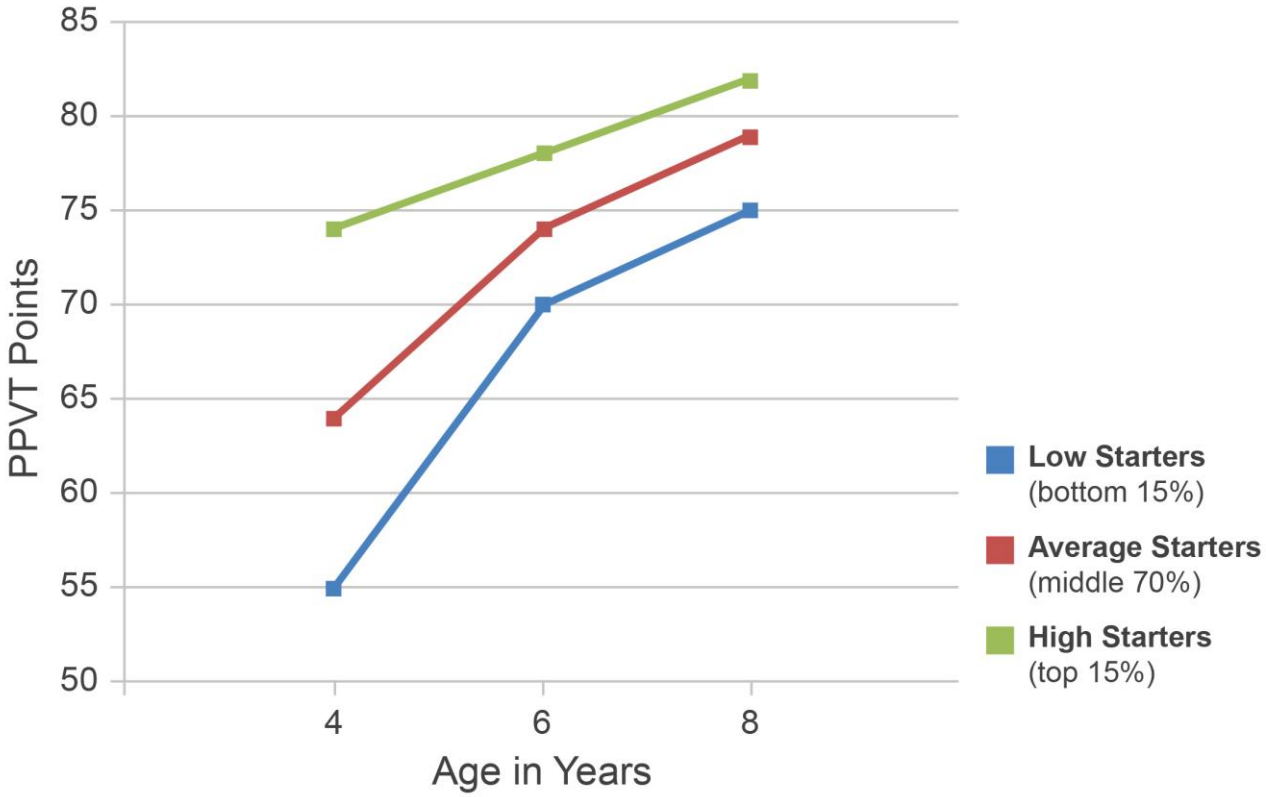
What lies beneath group patterns

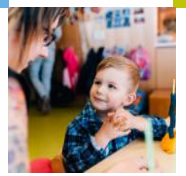
4332 children (K cohort)



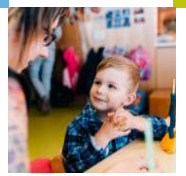
We need to close the gap earlier than age 4

3332 children (K cohort)





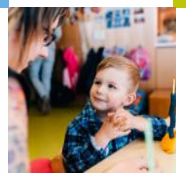




Implications of poor prediction

- Early identification and targeting of children on the basis of risk indicators will **miss** children who are on-track early in development and fall behind later

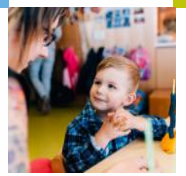




Implications of poor prediction

- Early identification and targeting of children on the basis of risk indicators will **include** children who are behind in their development early and catch-up later



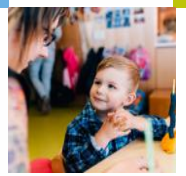



Key messages

- Policies and services have to fit language and literacy patterns that are both stable/unstable and predictable/unpredictable
- Children's capacity for catch-up is good news
- Helping vulnerable children develop faster than their typically developing peers is a huge task
- We need to celebrate gains -– however small

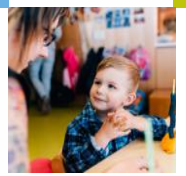
Screening, monitoring & assessment





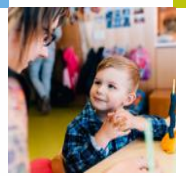
- Time-efficient and cost-effective developmental surveillance across the preschool and school years
- Late rather than early identification is inevitable for children with a declining pattern
- This is not a failure of early intervention or early monitoring (e.g., AEDC)

For the early childhood service system



- Patterns of stability/instability and predictability/unpredictability suggest that services will need to provide multiple touches across childhood with lots of entry points



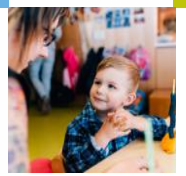


We need a coordinated early years service system

- Services provided by the early childhood sector need to be organised in ‘easy to navigate’ pathways from birth to 5 years so that the benefits add up over the course of childhood

- We need data systems that allow us to follow individual children over time to evaluate the benefits of early childhood policies and services – taking risk factors into account





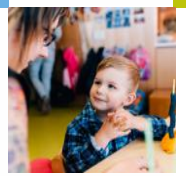
Bang for buck

- Make the most of children's capacity for change (i.e., catch-up) before age 4
- Universal services that reach everyone in the population
- Place-based services for children and families in communities with high socioeconomic disadvantage and high concentrations of risk factors
- Services that meet the needs of Aboriginal &/or Torres Strait Islander children and families

2012 AEDI Language and Cognitive Skills

289,973 children



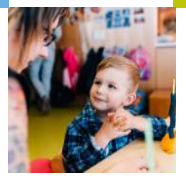


Relative socio-economic area disadvantage	Percentage Children <10th percentile
Quintile 1 (Most)	12%
Quintile 2	8%
Quintile 3	7%
Quintile 4	5%
Quintile 5 (Least)	3%


Clear social gradient

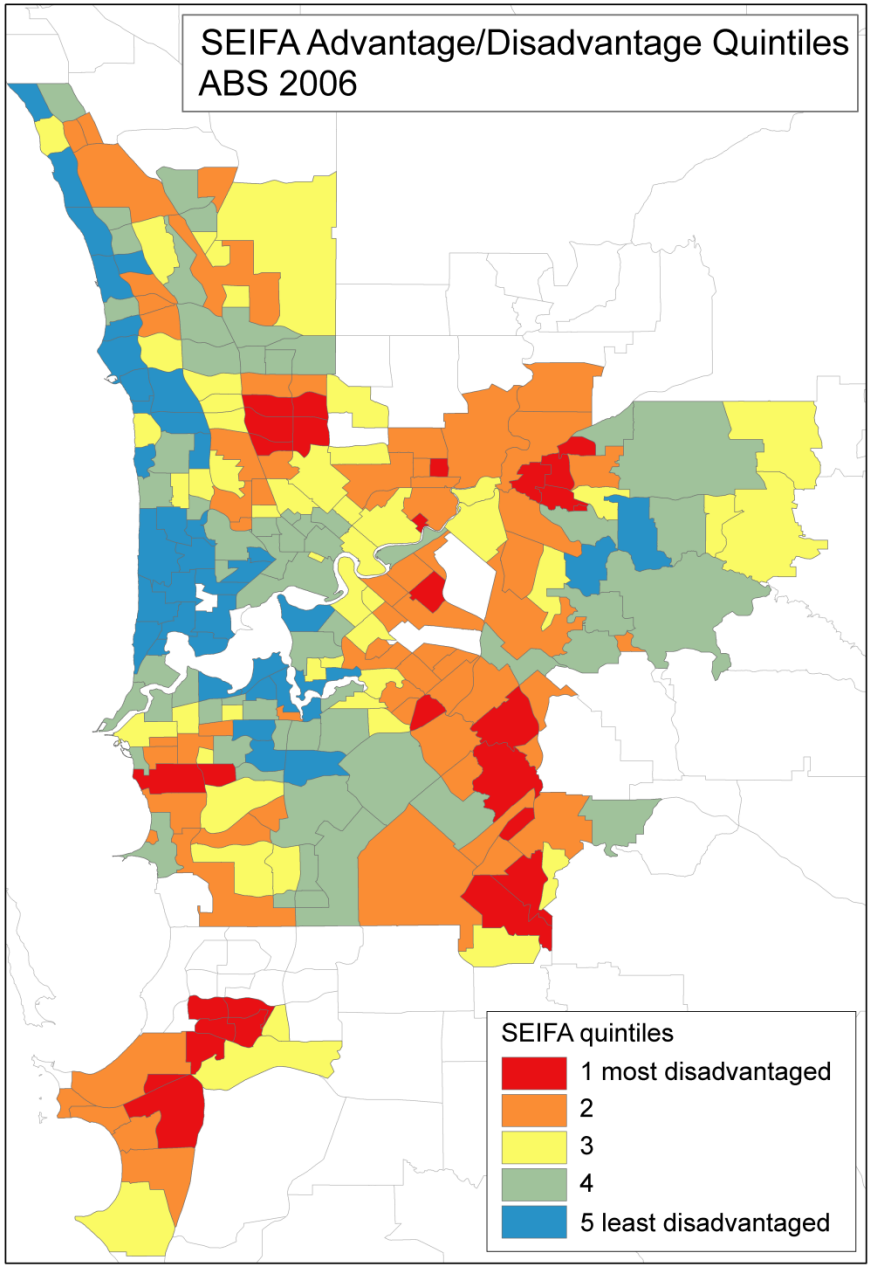
2012 AEDI Language and Cognitive Skills
289,973 children

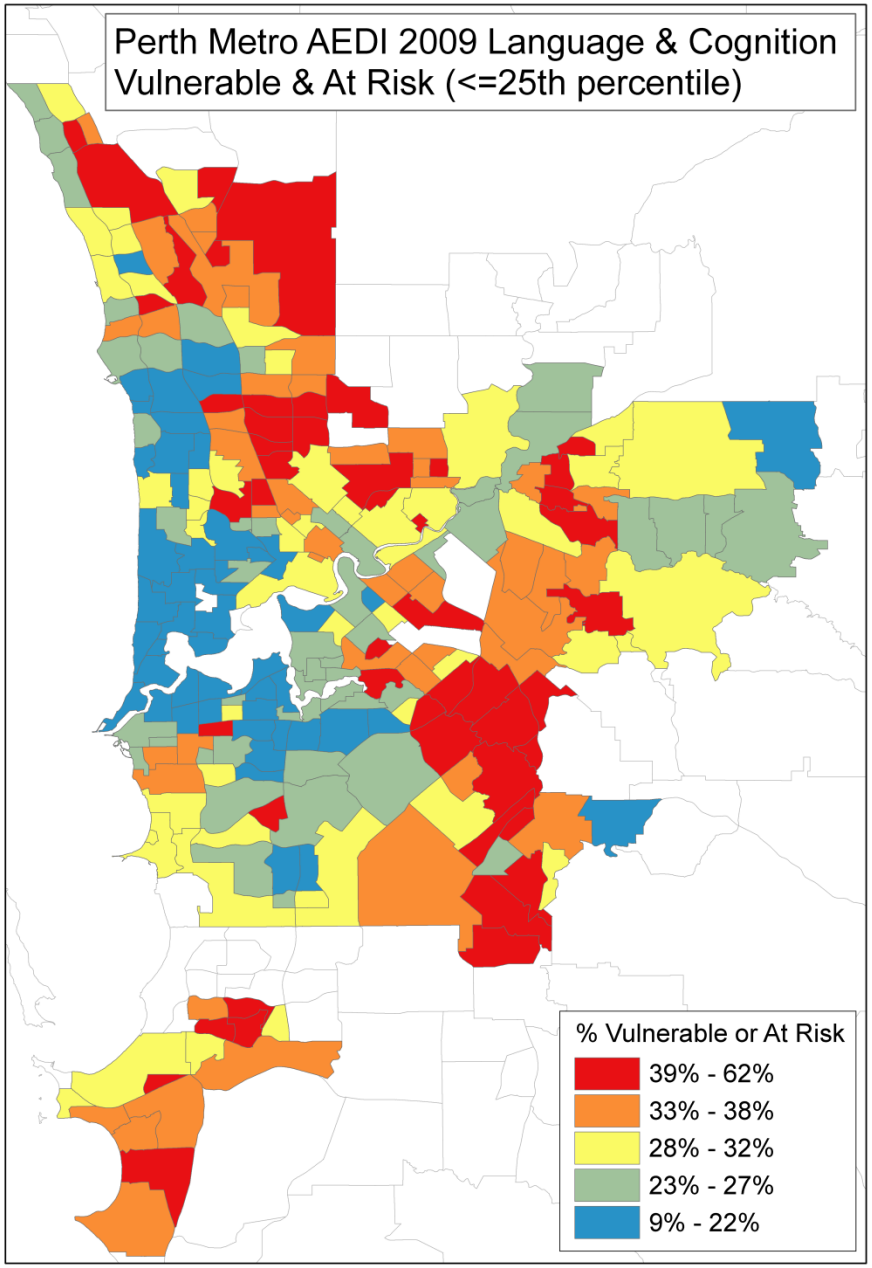




Relative socio-economic disadvantage	Percentage children <10th percentile	Number children in each quintile
Quintile 1 Most	12%	50,992
Quintile 2	8%	51,331
Quintile 3	7%	53,536
Quintile 4	5%	56,002
Quintile 5 Least	3%	61,567

Most children are in Quintiles 2-5

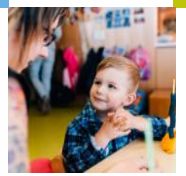


SEIFA Advantage/Disadvantage Quintiles
ABS 2006
SEIFA quintiles
1 most disadvantaged
2
3
4
5 least disadvantaged


Perth Metro AEDI 2009 Language & Cognition
Vulnerable & At Risk (<=25th percentile)
% Vulnerable or At Risk
39% - 62%
33% - 38%
28% - 32%
23% - 27%
9% - 22%

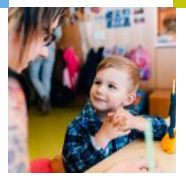
Bang for buck

- Language development
- School readiness
- Self-regulation





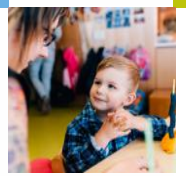




Thank you

All the children and families who are part of the Longitudinal Study of Australian Children



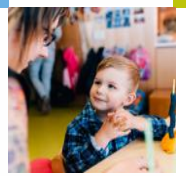


Risks for language growth 4-8 years

Taylor, CL. Christensen, D. Lawrence, D. Mitrou, F. Zubrick, S.R. *Risk factors for children's receptive vocabulary development from four to eight years in the Longitudinal Study of Australian Children*. PLOS ONE 10.1371/journal.pone.0073046

- Multivariate growth curve modelling



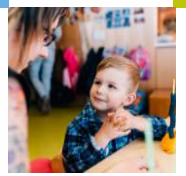



Risks for low language 4-8 years

Christensen, D., Zubrick, S.R., Lawrence, D., Mitrou, F., & Taylor, CL. (2014). *Risk factors for low receptive vocabulary abilities in the preschool and early school years in the Longitudinal Study of Australian Children*. PLOS ONE 10.1371/journal.pone.0101476

- Multivariate logistic regression (Odds Ratios)
- Sensitivity-specificity analysis



Patterns & predictors of language and literacy 4-10 years

Zubrick, S.R., Taylor, CL, & Christensen, D. *Patterns and predictors of language and literacy abilities 4-10 years in the Longitudinal Study of Australian Children*. PLOS ONE 10.1371/journal.pone. 0135612

- Multivariate logistic regression
- Sensitivity-specificity analysis