(Mis)Perceptions About Children

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Evaluating children's developmental delays

- Cognitive and non-cognitive skills are important for labour market outcomes (Deming, 2017), schooling and risky behaviours (Heckman, Stixrud, and Urzua, 2006), marriage stability (Lundberg, 2015), and health (Conti, Heckman, Pinto, 2015).
- Family and school investments in children are critical for child development
  - Early childhood (ages 0–6) is the period of the highest returns on investment. (Cunha, Heckman, Lochner, Masterov, 2006, Cunha, Heckman, Schennach, 2010)

Key challenge: **correctly identifying developmental delays in children**

- Misperceptions about developmental delays → suboptimal investment choices (Dizon-Ross, 2019, Kinsler and Pavan, 2021)
  - Exacerbate inequality in child development
  - Persistent delays
  - Misallocation of resources

This paper:

Teachers' perceptions about children's developmental delays

- Teachers' inform parents, researchers, governments, school administrations.
  - Particularly important for non-cognitive skills and early development
    $\sim$ no standardized tests to complement perceptions

Research question: Are teachers' perceptions biased?

Yes! I show that conditional on children's development, they depend on the average non-cognitive and cognitive development of other children in the neighbourhood

3 key findings

1. Quantify the reference group bias in teachers' perceptions of *non-cognitive and cognitive* developmental delays for children ages 4-5

   - Use *objective measures of non-cognitive* and cognitive skills in Longitudinal Study of Australian Children (LSAC)

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- Use *objective measures of non-cognitive* and cognitive skills in Longitudinal Study of Australian Children (LSAC)
- Conditional on children's objective development measures
  - ⇓ neighbourhood non-cognitive development → ⇓ reporting of all delays
  - ⇓ neighbourhood cognitive development → ⇓ reporting of cognitive delays (Kinsler and Pavan, 2021, Elder and Zhou, 2021)

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- Early Childhood Education: Teachers with college degrees are more likely to report delays for children with low objective development measures.

This paper: 3 key findings

2. Document the relationship between teachers' and mothers' perceptions about children's *non-cognitive* skills for children ages 4-5 and 8-9

- Mothers contacted by schools about their children's behaviour update their perceptions about children's non-cognitive delays

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2. Document the relationship between teachers' and mothers' perceptions about children's *non-cognitive* skills for children ages 4-5 and 8-9

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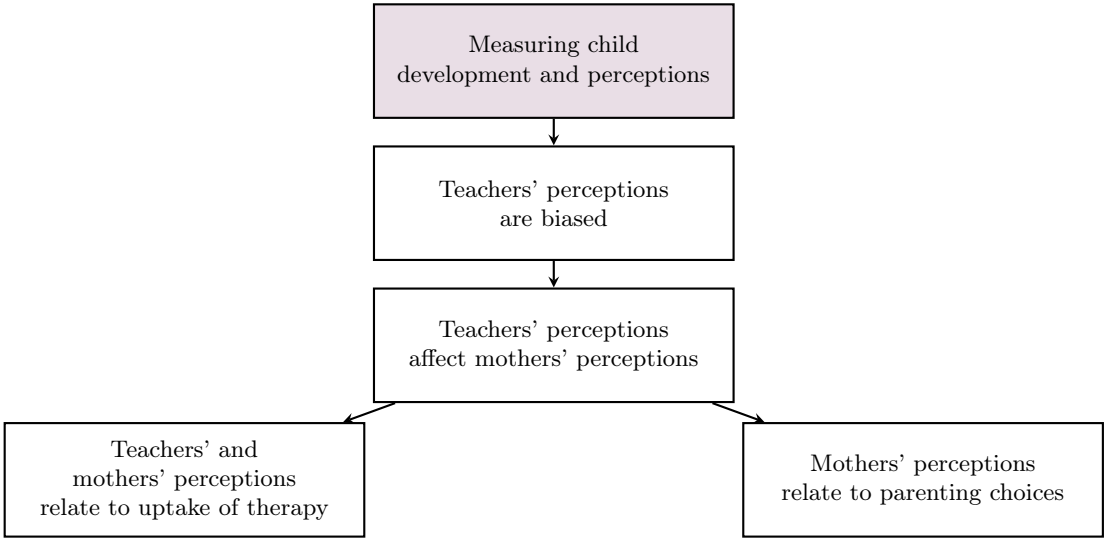
3. Consequences of misperceptions for *child environment*

- Underestimation of delays in child non-cognitive and cognitive development development by teachers and mothers → underinvestment in therapy
- Overestimation of delays in child non-cognitive development by mothers → angrier parenting and lower educational aspirations

Literature and contribution

- Misperceptions about children's human capital
  (Kinsler and Pavan, 2021, Elder and Zhou, 2021, Dizon-Ross, 2019, Boneva and Rauh , 2018, Attanasio, Cunha, and Jervis, 2019, Kiessling, 2021)
  - Quantify teachers' reference bias for both non-cognitive & cognitive delays
- Early childhood program characteristics and children's outcomes
  (Chetty, Friedman, Hilger, Saez, Schanzenbach, and Yagan, 2011, Heckman, Pinto, and Savelyev, 2013, Manning, Wong, Fleming, and Garvis, 2019)
  - Explore the role of teacher and classroom characteristics in delay recognition
- The role of teachers' for parents' perceptions about children's cognitition
  (Dizon-Ross, 2019, Doss, Fahle, Loeb, and York, 2019, Bergman, 2021)
  - Focus on the transmission of information about non-cognitive skills
- Drivers of inequality in parenting across neighbourhoods/socioeconomic status
  (Attanasio, Cattan , Meghir, 2021, Kautz, Heckman, Diris, Weel, Borghans, 2014, Falk, Kosse, Pinger, Schildberg-Hörisch, Deckers, 2023)
  - Focus on the role of neighbourhood-related information frictions

Roadmap


Measuring child development and perceptions
Teachers' perceptions are biased
Teachers' perceptions affect mothers' perceptions
Teachers' and mothers' perceptions relate to uptake of therapy
Mothers' perceptions relate to parenting choices

Data: LSAC - B(aby) and K(indergarten) cohorts

Following 10000 children starting from ages 0-1 and 4-5 in 2004 biennially

- Pool children from both cohorts when they are ages 4-5 and 8-9
- Objective interview measures: children's non-cognitive | cognitive skills
- Teachers' & mothers' perceptions: children's non-cognitive | cognitive delays
- School and home environments of children

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- School and home environments of children
- **Neighbourhood = postcode** (over 3,000 in Australia) map detailed map
  - **Sample** = random draw of 409 postcodes ($\sim$ 37 children per postcode)
  - Example: two postcodes in Sydney

    2006 Merrylands $\sim$ 5,319 families | median weekly household income \$873
    2006 Putney $\sim$ 886 families | median weekly household income \$1,715

Interviewer-evaluated objective measures of child development

- Psychologists trained interviewers to
  - conduct cognitive tests
  - conduct direct observations of non-cognitive skills
- Assessments of cognitive and non-cognitive skills used objective scales.
  - Non-cognitive skills: count of the number of times and intensity of attitudes (Review of Observational Methods in ADHD diagnosis - Platzman, et al., 1992)
- *"All interviewers received two weeks of intensive training across procedures."* (LSAC – Data User Guide)

  "A large part of the training involved practice interviews, with one day devoted to interviews with parents and children." (LSAC – Data User Guide)

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Advantages of interview measures of development:

- Training + objective scale → designed to limit bias in assessments
- Available for a large, nationally representative sample

Interviewer-evaluated development: non-cognitive | cognitive scores

- **Non-cognitive score** (ages 4-5 and 8-9): first principal component of 3 interview direct observations measures
  (in-person interview lasted 1 - 2.5 hours with and without the parent present)
  1. *Positive:* smiling, laughing, or sounding excited, happy, or pleased
  2. *Negative:* fussing, pouting, whining, crying, vocal/physical expression of anger
  3. *Focus:* To what degree did the child remain focused on the PPVT tasks?
     - Detects children in the left tail of non-cognitive skill distribution density plot

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- **Cognitive score** (ages 4-9): Peabody Picture Vocabulary Test (receptive language)
  - Who Am I test (ages 4-5) used to address measurement error (language and numeracy abilities)

Teachers' and mothers' perceptions: non-cognitive | cognitive delays

- Perceptions match developmental dimensions measured in interview
- **Teachers** evaluate children ages 4-5 *compared to children of similar age*
  - Non-cognitive delays - social/emotional development
  - Cognitive delays - receptive language development
- Teacher reports delay = child is much less | less competent than other children

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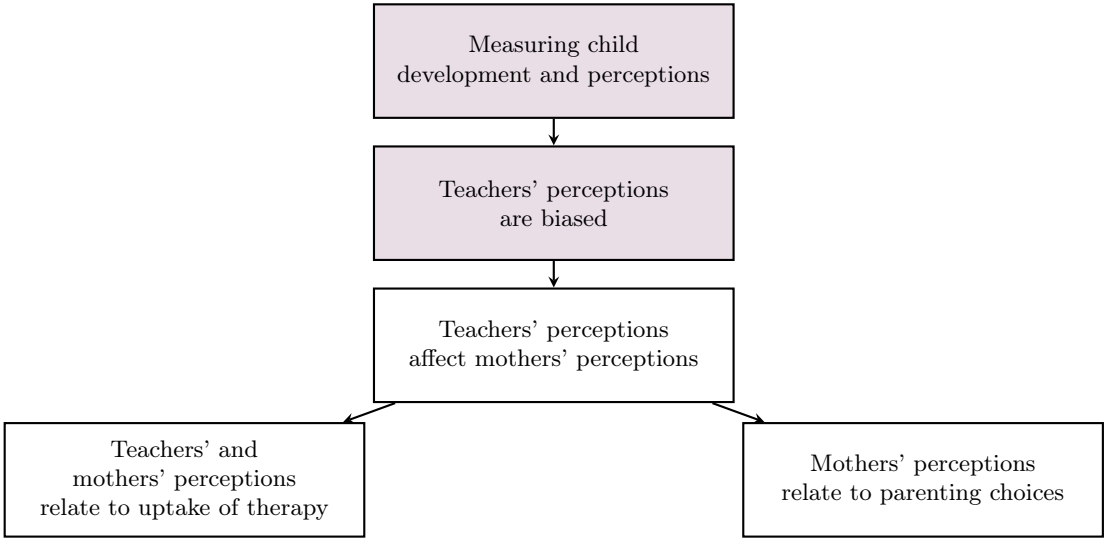
  - Non-cognitive delays - social/emotional development
  - Cognitive delays - receptive language development
- Teacher reports delay = child is much less | less competent than other children
- **Mothers** evaluate children ages 0-15 *compared to children of a similar age*
  - Non-cognitive delays:

    Overall, compared to other children of the same age, do you think your child is?
    1 Easier than average; 2 About average; 3 More difficult than average
- Mothers report non-cognitive delays: child is more difficult than average

Average neighbourhood development: Computation

- Construct leave-one-out measure of neighbourhood child development (same age, both cohorts):
  1. De-mean objective interview measures by year and age group
  2. Average neighbourhood child development = the average de-meaned measure for children from the same postcode as child i excluding child i
  3. Standardize within age groups to match the scale of child development scores

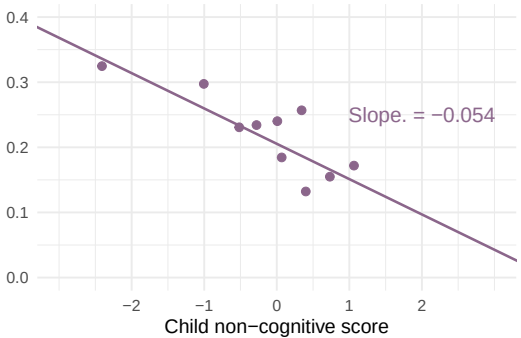
Roadmap: Teachers' perceptions



Teachers' and mothers' perceptions are informed by child development

- ⇑ measured development = ⇓ likelihood teachers or mothers indicate delay

(a) Share teachers: non-cognitive delays



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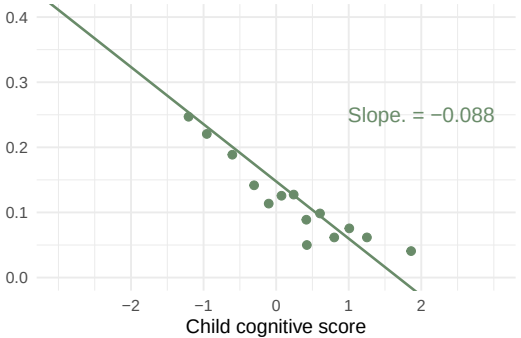

mother

Teachers' and mothers' perceptions are biased by local environment

- $\Uparrow$ neighbourhood development score = $\Uparrow$ child own development score

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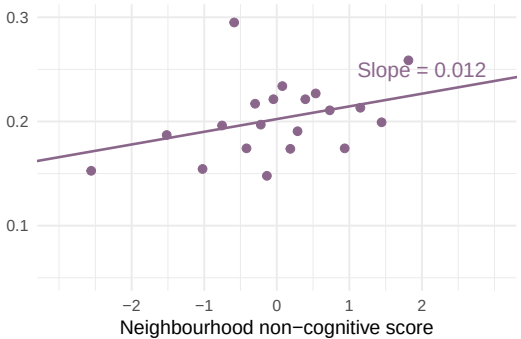

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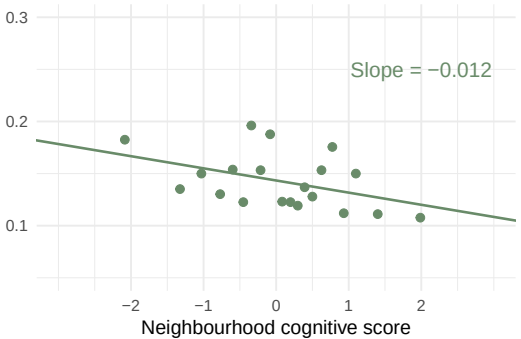


child mother

Estimation: Teacher perceptions and local environment

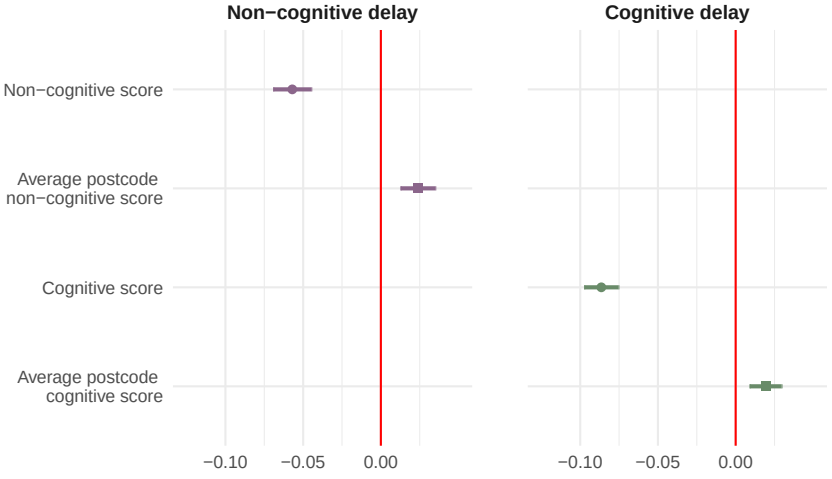
$$T_{it} = \boldsymbol{\beta^{T,N}} \bar{D}^N_{it} + \beta^{T,D} D^I_{it} + \gamma^{T,X}_t X^T_{it}$$

- T_{it} - teacher reports delay for child i at age 4-5
- D^I_{it} - child interview development score
- $\bar{D}^N_{it}$ -neighbourhood average development
- X^T_{it} - **Control variables:**

child's gender child's cohort child's age in months
family socioeconomic status (SES) index

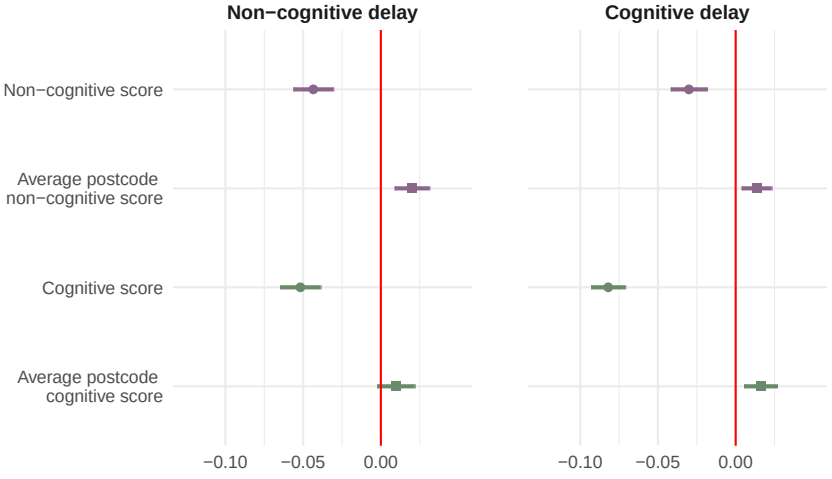
Reference bias: assessment of non-cognitive and cognitive delays

Estimated regression coefficients table



Reference bias: Cross-influence of developmental dimensions

Estimated regression coefficients table



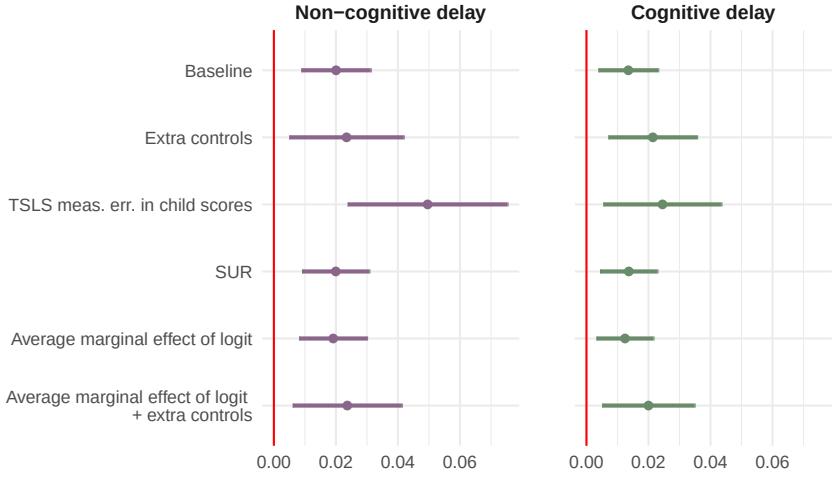
Robustness checks

1. Unobserved heterogeneity in interview measures or teachers' perceptions
   - Additional control for
     - behaviour of parents and siblings during the interview
     - sleeping problems
     - interview months
     - teacher and classroom characteristics
2. Measurement error in interview scores → distorts coefficients towards zero
   - TSLS adjustment for measurement error (Agostinelli and Wiswall, 2016)
3. Seemingly unrelated regression specification
4. Sensitivity to functional form
   - Linear probability model vs average marginal effects of the logistic model

Robust table ME in average

Robustness checks: Average neighbourhood non-cognitive score

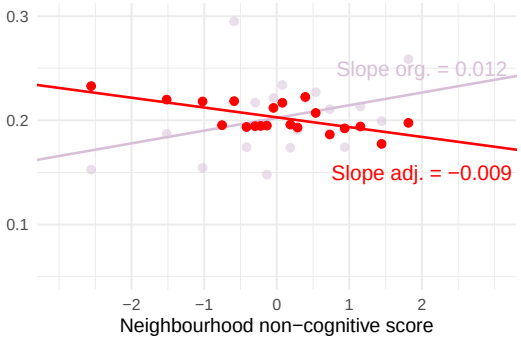
95% CI estimated $\beta^{T,N}$ for average neighbourhood non-cognitive development cognitive



Teachers' perceptions adjusted for bias

- I adjust for reference bias component in perceptions: ME adjusted
  - Predict probability of reporting delay at mean neighbourhood development

(a) Adj. share teachers: non-cognitive delays



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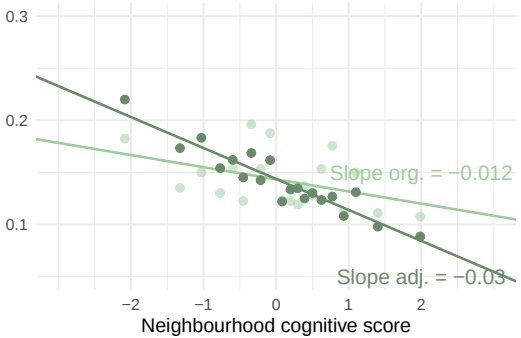
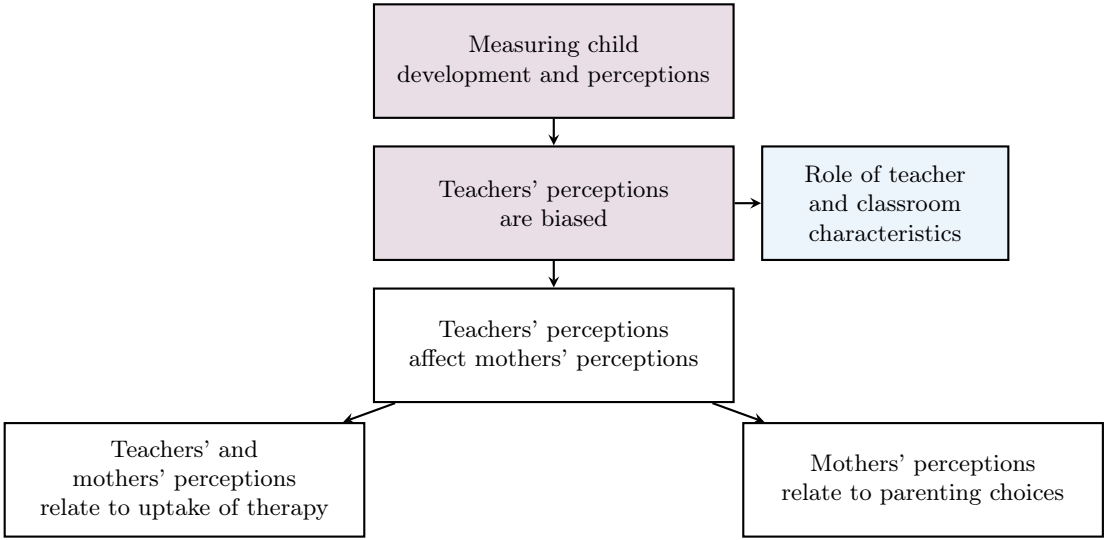


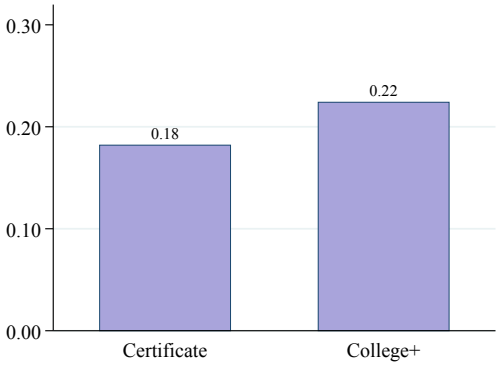
Roadmap: Teacher and classroom characteristics and perceptions



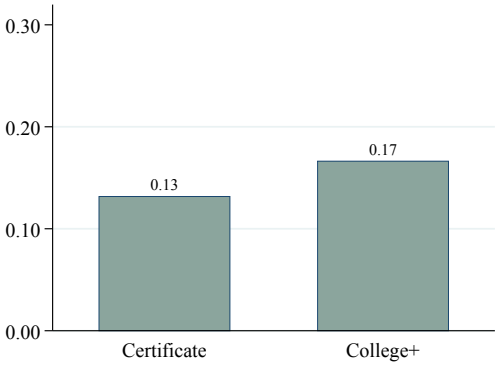
College-educated teachers more likely to report delays

Probability to report delays by teacher's education

(a) Share teachers: non-cognitive delays



(b) Share teachers: cognitive delays



- College-educated teachers report more delays

College-educated teachers more likely to report delays

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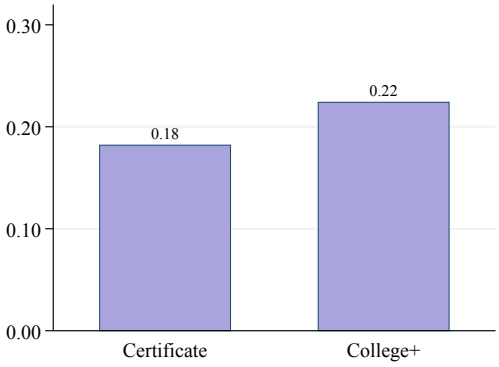

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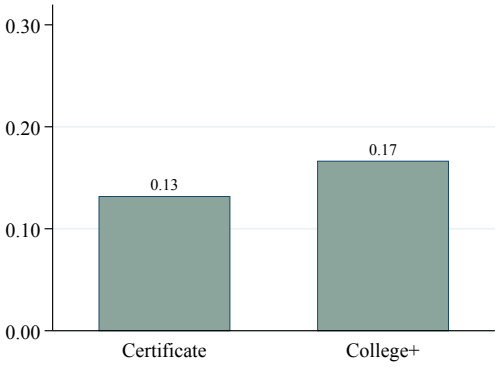


- College-educated teachers report more delays **for the right children?**

Estimation: Teachers' quality and deficit recognition

1. Split children into **high/low measured development** subsamples:
   - Low measured development = interview development measure below median
2. Estimate linear probability regression separately for subsamples $j = \{H, L\}$

$$T_{i,t} = \beta^{j,V} V_{i,t}^{T} + \gamma_t^{j,X} X_{i,t}^{T}$$

   - $V_{i,t}^{T}$ are observed teachers' quality characteristics:
     - level of education (bachelors or postgraduate vs certificate or diploma)
     - experience in the childcare setting (0-5 and 6-10 years vs 11+ years)
     - childcare arrangement (daycare vs pre-school or kindergarten)
     - class size children to qualified staff ratio)
     - age range (age of oldest and youngest in class)

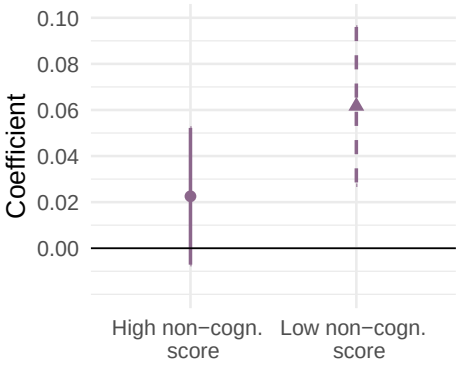
Educated teachers are more likely to report delays in low-skill children

- ⇑ education → ⇑ reports of delays for children with low measured development
  - both for cognitive and non-cognitive skill
  - Reason: Stronger relationship between measured cognitive skills and perceptions

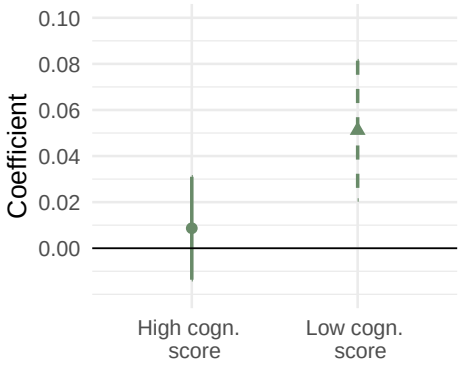
full table | bias by educ

Estimated coefficient for teacher's level of education: College+

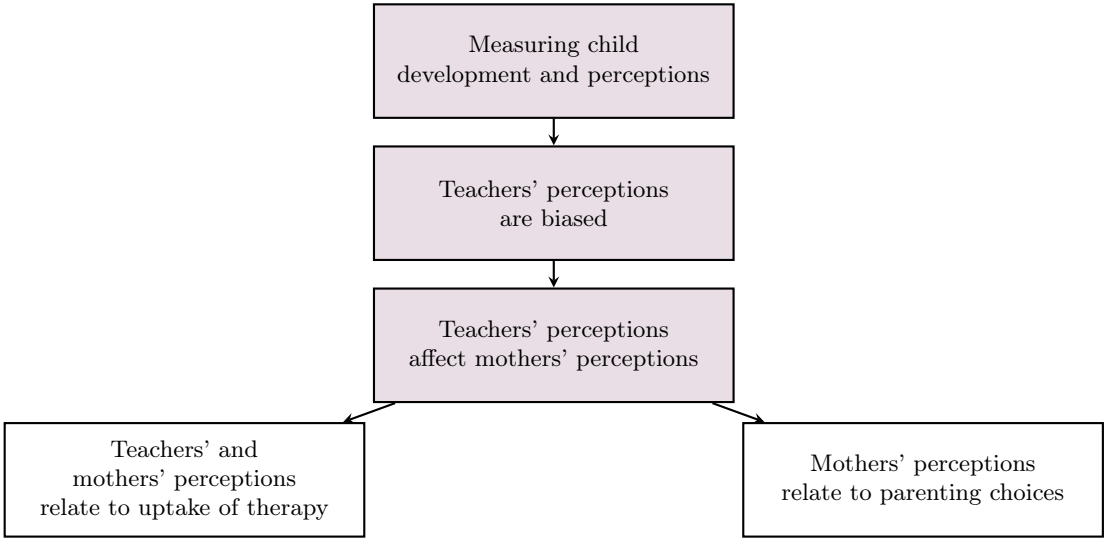
(a) Report of non-cognitive delays



(b) Report of cognitive delays



Roadmap: Mothers' perceptions



Estimation: Mothers' and teachers' perceptions (ages 4-5 and 8-9)

$$\underbrace{M_{it}}_{\substack{\text{mother reports}\\ \text{non-cognitive delay}}} = \alpha^{M,D} D_{it}^{I} + \underbrace{\alpha^{M,T} T_{i,t}}_{\substack{\text{teacher reports}\\ \text{delay}}} + \alpha^{M,X} X_{it}^{M} + \alpha^{M,M'} M_{it-1}$$

$T_{i,t}$ - measures of teachers' perceptions about delays

- Ages 0-4: teacher's reports of non-cognitive and cognitive delays
- **Ages 8-9: Measure of teacher-to-parent communication**
  School has contacted parents about child's behavior within the last 12 months

- $X_{i,t}^{M}$ - **Control variables:**

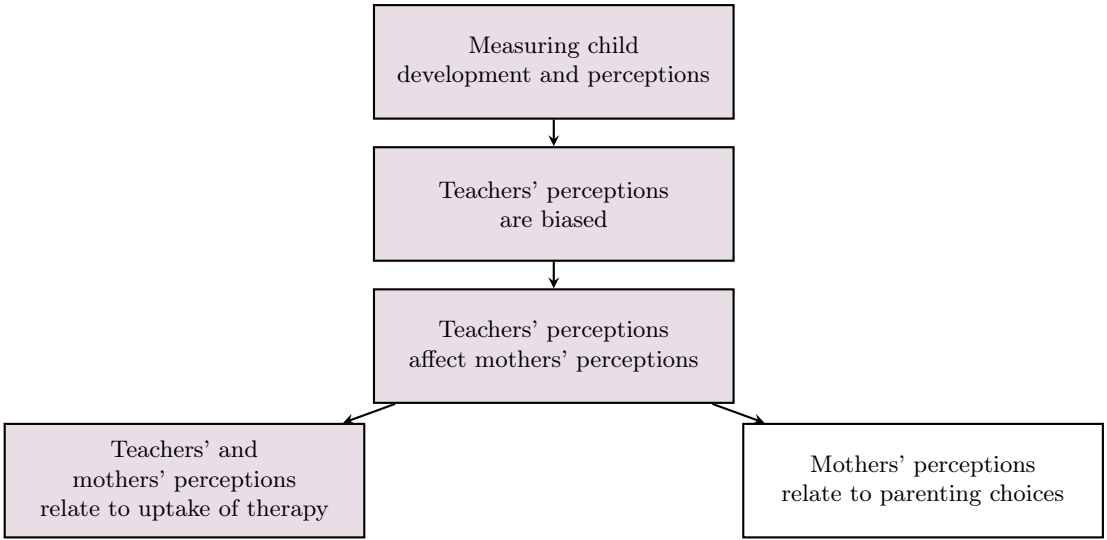
child's gender	child cohort	age in months
SES index	*mother's depression*	*mother's involvement at school (ages 8-9)*

Teacher's perceptions affect mother's perceptions

	Non-cognitive delay perceived by mother	
	Ages 4-5	Ages 8-9
Teacher: Non-cognitive delay	**0.08***	
	(0.02)	
Teacher: Cognitive delay	0.02	
	(0.02)	
School contacted about behavior		**0.11***
		(0.01)
Non-cognitive score	-0.02*	-0.01*
	(0.01)	(0.00)
Cognitive score	0.00	-0.01
	(0.01)	(0.00)
N	2228	5561

ME adj

Roadmap: School environment



Estimation: Perceptions and school environment

- School-based investments - child received therapy $I^S_{i,t}$:
  - directed at *non-cognitive skills:*
    - behavioural therapy
    - psychological evaluation
    - guidance counsellor
    - other psychiatric and behavioural services
  - directed at *cognitive skills:*
    - learning support
    - speech therapy

$$I^S_{i,t} = \boldsymbol{\beta^{S,M}} M_{it} + \boldsymbol{\beta^{S,T}} T_{it} + \beta^{S,X}_t X^S_{it}$$

- X^S_{it} - **Control variables:**

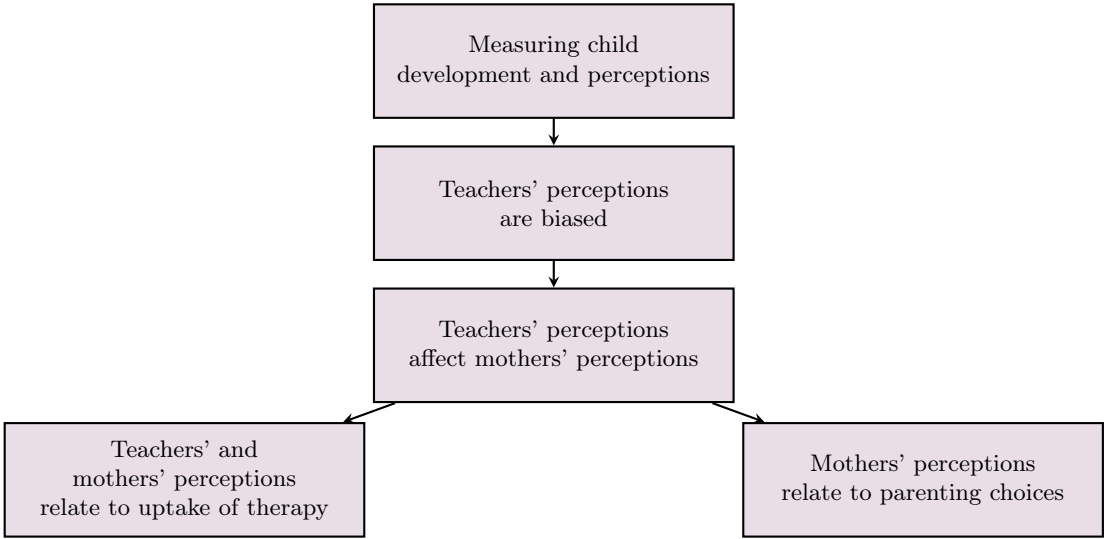
  child's gender | child's cohort | child's age in months
  SES index | *neighbourhood characteristics*

Children with perceived delays more likely to use therapy

- Perceived non-cognitive delays $\rightarrow \Uparrow$ use of both therapy types
- Perceptions of cognitive delays by teachers $\rightarrow \Uparrow$ use of cognition therapy

	Behavioral or psych therapy	Learning or speech therapy
Teach.: Non-cognitive delay	0.07*	0.07*
	(0.01)	(0.02)
Teach.: Cognitive delay	0.01	0.15*
	(0.01)	(0.02)
Moth.: Non-cognitive delay	0.15*	0.10*
	(0.02)	(0.03)
Moth.: Concern cognitive	0.06*	0.21*
	(0.02)	(0.03)
N	4104	4104

Roadmap: Home environment



Estimation: Perceptions and home environment

- Family-based investments ($I^F_{i,t}$):

$$I^F_{i,t} = \boldsymbol{\beta^{F,M}} M_{it} + \beta^{F,X}_t X^F_{it} + \beta^{F,M'} M_{it-1} + \beta^{F,I} I^F_{i,t-1}$$

  - X^F_{it} - **Control variables:**

child's gender	child's cohort	child's age in months
SES index	neighbourhood characteristics	mothers' depression

  - Control for unobserved heterogeneity
    - Lag of perceptions M_{it-1} $\sim$ idiosyncratic perceptions
    - Lag of investment I_{it-1} $\sim$ idiosyncratic preferences

Mothers reporting delays engage in lower quality of parenting

- Perceived non-cognitive delays by mothers:
  - ⇓ quality of parental attitudes
  - ⇑ tutoring

	Mother warmth ⇓	Mother anger ⇑	Expected college+ ⇓	Weekly tutoring ⇑
Mother: Non-cognitive delay	-0.23*	0.62*	-0.09*	0.10*
	(0.05)	(0.05)	(0.02)	(0.03)
N	6584	6582	6186	3570

TSLS full table

Discussion

- Teachers' perceptions about children's non-cognitive & cognitive delays biased relative to average level of neighbourhood non-cognitive development.
  - Early Childhood Education:
    More educated teachers are more likely to recognize deficits in children with low objective measures of development.
- Teachers' perceptions affect mothers' perceptions.
- Children with perceived delays are more likely to use therapy.
- Mothers who perceive child deficits have a lower quality of parenting but are more likely to reach out for professional help.
- **Policy implication:**
  - Training improves the recognition of children's developmental trajectories.

Mothers recognising delays engage in lower quality of parenting

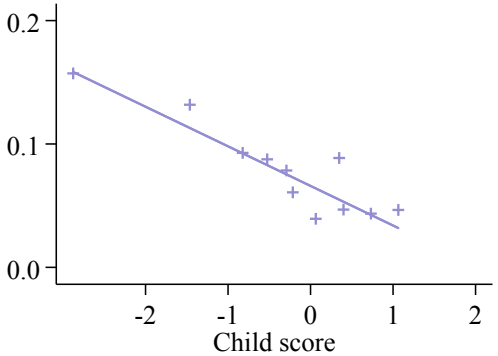
Dependent variable:	Mother: non-cognitive delay Coef.	SE	N	R2
A: Parental attitudes				
Mother Warmth Score	-0.228*	(0.033)	6584	0.41
Mother Anger Score	0.616*	(0.049)	6582	0.42
Expected educ: college and higher	-0.094*	(0.023)	6186	0.36
B: Weekly investment (times per week)				
Meet with tutor	0.105*	(0.033)	3570	0.09
Talk about school	-0.043	(0.059)	6586	0.09
Read to child	0.092	(0.118)	6621	0.15
Play outside	0.060	(0.103)	6621	0.09
Tell story	0.026	(0.113)	3690	0.13
Music	-0.233	(0.143)	3690	0.13
Play with toys	-0.134	(0.111)	3690	0.08
Draw a picture	0.090	(0.090)	3690	0.11
C: Weekly investment (hours)				
Mom childcare	1.634	(1.725)	2460	0.07
Dad childcare	-1.463	(0.929)	2082	0.10

Mothers perceptions are informed by child development

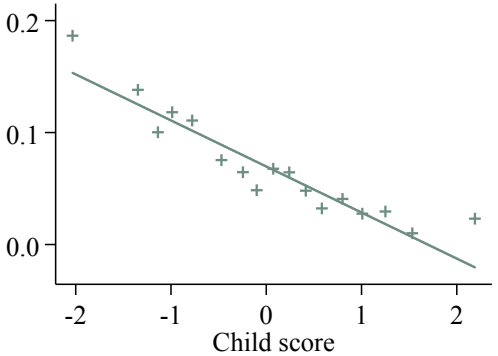
- ↑ measured development = ↓ lower likelihood that mothers indicates delay

main

(a) Share mothers: socio-emotional delays



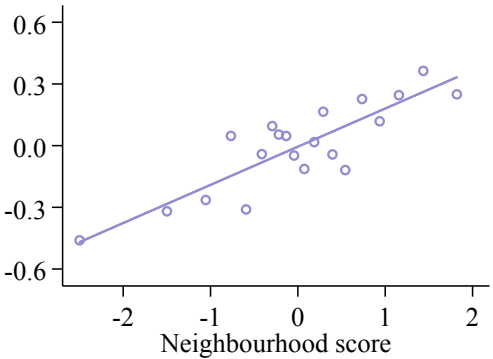
(b) Share mothers: receptive language concerns



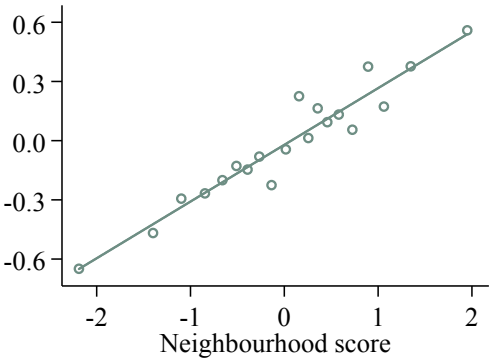
Children in less developed neighbourhoods have lower own development

- ↑ average development of other children in the neighbourhood = ↑ higher average development score main

(a) Socio-emotional score



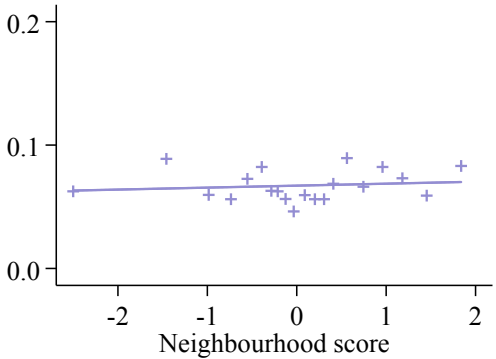
(b) Receptive language score



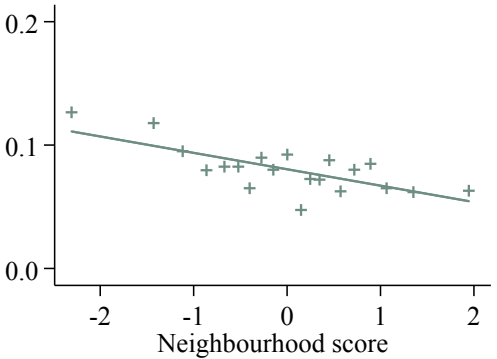
Mothers' perceptions and local environment

main

(a) Share mothers: socio-emotional delays



(b) Share mothers: receptive language concern



Robustness checks

	Non-cognitive delay			Cognitive delay		
	(1)	(2)	(3)	(4)	(5)	(6)
	Logit Avg. Marg. Effect	Extra control	Meas. error adj.	Logit Avg. Marg. Effect	Extra control	Meas. error adj.
Neighbourhood non-cognitive score	0.019*	0.023*	0.050*	0.012*	0.021*	0.025*
	(0.006)	(0.009)	(0.013)	(0.005)	(0.007)	(0.010)
Non-cognitive score	-0.037*	-0.033*	-0.386*	-0.023*	-0.030*	-0.161
	(0.006)	(0.011)	(0.112)	(0.005)	(0.010)	(0.087)
Neighbourhood cognitive score	0.010	0.007	0.003	0.017*	0.011	0.030*
	(0.006)	(0.010)	(0.018)	(0.005)	(0.009)	(0.013)
Cognitive score	-0.050*	-0.074*	-0.045	-0.077*	-0.089*	-0.155*
	(0.006)	(0.011)	(0.067)	(0.005)	(0.011)	(0.052)
N	5258	1939	5215	5254	1939	5211

main

Teacher-reported skill deficits at age 4-5

	Non-cognitive delay		Cognitive delay	
	(1)	(2)	(3)	(4)
Neighbourhood	0.024*	0.020*		0.014*
non-cognitive score	(0.006)	(0.006)		(0.005)
Non-cognitive score	-0.057*	-0.043*		-0.030*
	(0.006)	(0.007)		(0.006)
Neighbourhood cognitive		0.010	0.019*	0.016*
score		(0.006)	(0.005)	(0.005)
Cognitive score		-0.052*	-0.086*	-0.082*
		(0.007)	(0.006)	(0.006)
N	5520	5258	5270	5254

main

Behavior during the interview at age 4-5 is predictive of later outcomes

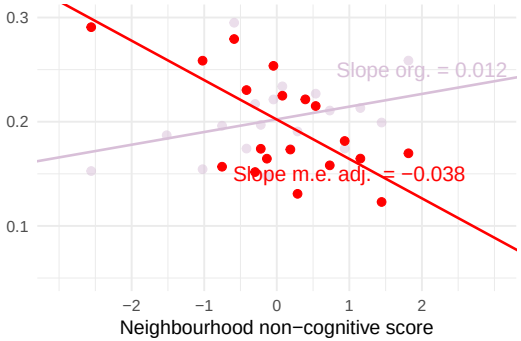
	Repeated grade by ages 12-13	Grade 9 Reading	Grade 9 Math
Socio-emotional score	-0.010***	4.199***	4.440***
	(0.003)	(0.873)	(0.929)
PPVT score	-0.011***	17.490***	12.168***
	(0.003)	(0.869)	(0.920)
N	6699	5739	5678

ME adjusted

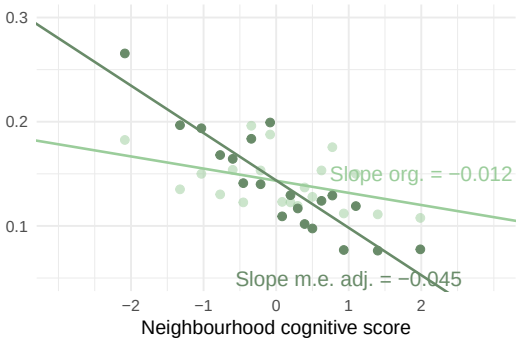
Teachers' and perceptions adjusted for bias

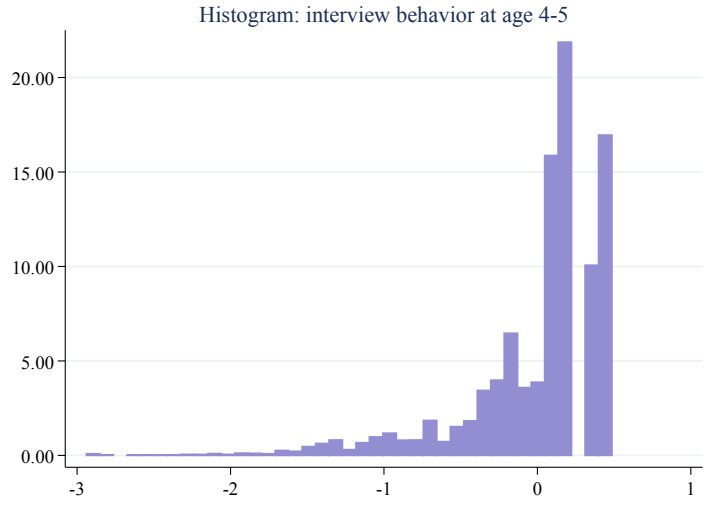
- Predict probability of delay reporting at mean neighbourhood development (TSLS adjustment for measurement error in children's individual scores) back

(a) Adj. share teachers: non-cognitive delays



(b) Adj. share teachers: cognitive delays




Histogram: interview behavior at age 4-5
20.00
15.00
10.00
5.00
0.00
-3
-2
-1
0
1

back

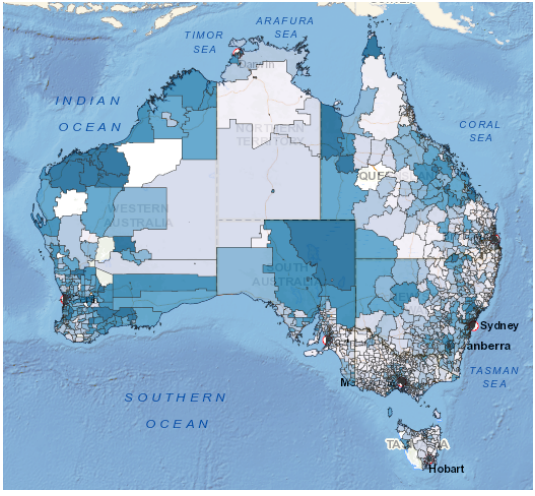
Educated teachers are more likely to report delays in low-skill children

- ⇑ education → ⇑ reports of delays for children with low measured development
  - both for cognitive and non-cognitive skill
  - Reason: Stronger relationship between measured cognitive skills and perceptions

bias degree main

	Non-cognitive delay		Cognitive delay	
	Non-cogn. score low	Non-cogn. score high	Cogn. score low	Cogn. score high
Teacher college+	0.06*	0.02	0.05*	0.01
	(0.02)	(0.02)	(0.02)	(0.01)
Child attends daycare	-0.04	-0.02	-0.02	0.00
	(0.02)	(0.02)	(0.02)	(0.01)
Teaching experience 0-5	-0.04	0.01	0.01	0.03
years	(0.02)	(0.02)	(0.02)	(0.02)
Teaching experience 6-10	0.01	-0.02	-0.02	0.01
years	(0.02)	(0.02)	(0.02)	(0.01)
Age of youngest in class	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Age of oldest in class	-0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Children to qualified	-0.00	0.00	0.00	0.00
staff ratio	(0.00)	(0.00)	(0.00)	(0.00)
N	2899	2847	2771	2749

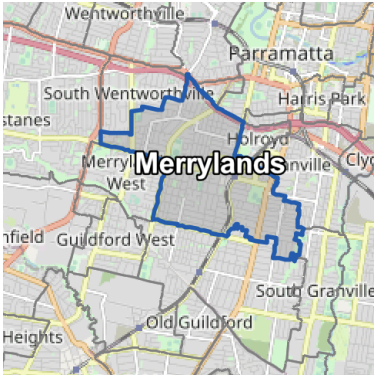
Postal areas map of Australia



main

Merrylands and Putney postcodes in Sydney

(a) Merrylands: Median weekly income $1,470



(b) Putney: Median weekly income $3,053

main

Teacher's perceptions affect mother's perceptions: ME in development

	Non-cognitive delay perceived by mother			
	(1)	(2)	(3)	(4)
	Ages 4-5	Ages 4-5	Ages 8-9	Ages 8-9
	b/se	b/se	b/se	b/se
Non-cognitive score	-0.282*	-0.253	-0.611*	-0.358*
	(0.121)	(0.172)	(0.192)	(0.146)
Cognitive score	0.039	-0.018	0.009	0.011
	(0.055)	(0.063)	(0.034)	(0.028)
Teach.: Non-cognitive delay	0.081*	0.050		
	(0.017)	(0.026)		
Teach.: Cognitive delay	0.013	-0.018		
	(0.023)	(0.031)		
Mother depression	0.028*	0.019*	0.018*	0.015*
	(0.006)	(0.008)	(0.008)	(0.006)
Lag mother: Non-cognitive delay		0.303*		0.496*
		(0.051)		(0.033)
School contacted about behavior			0.133*	0.090*
			(0.032)	(0.025)
Index: mothers' interactions with school				0.006
				(0.006)
N	4698	2202	7241	5547

main

Perceptions and school-based investment: ME in development

	Behavioral or psych therapy			Learning or speech therapy		
	(1)	(2)	(3)	(4)	(5)	(6)
	b/se	b/se	b/se	b/se	b/se	b/se
Teach.: Non-cognitive	0.069*	0.062*		0.070*	0.061*	
delay	(0.012)	(0.013)		(0.018)	(0.020)	
Teach.: Cognitive delay	0.013	-0.009		0.145*	0.078*	
	(0.014)	(0.017)		(0.022)	(0.028)	
Moth.: Non-cognitive	0.154*	0.133*		0.104*	0.103*	
delay	(0.025)	(0.028)		(0.028)	(0.032)	
Moth.: concern Cognitive	0.058*	0.038		0.206*	0.160*	
	(0.019)	(0.021)		(0.031)	(0.033)	
Non-cognitive score		-0.112	-0.194*		0.096	-0.014
		(0.087)	(0.094)		(0.109)	(0.108)
Cognitive score		0.001	0.007		-0.184*	-0.197*
		(0.043)	(0.048)		(0.060)	(0.059)
Neighbourhood		0.014	0.023*		-0.022	-0.010
non-cognitive score		(0.009)	(0.010)		(0.012)	(0.012)
Neighbourhood cognitive		-0.005	-0.009		0.045*	0.043*
score		(0.011)	(0.013)		(0.017)	(0.017)
N	4104	4074	4074	4104	4074	4074

main

Family investment: endogenous perceptions

- Maternal perceptions and investment can suffer from reverse causality → instrument for mother deficit recognition with indicator for being contacted by school about child's behavior

	Warmth	Anger	Tutor	Exp coll+
Mother: Non-cognitive delay	0.113	2.152*	0.065	-0.850*
	(0.279)	(0.354)	(0.171)	(0.185)
N	6556	6554	3570	6186
F stat.	77.24	66.49	50.14	65.21

main

Measurement error adjustment

	Socio-emotional delay			Receptive language delay		
	(1)	(2)	(3)	(4)	(5)	(6)
	Logit Avg. Marg. Effect	Extra control	Meas. error adj.	Logit Avg. Marg. Effect	Extra control	Meas. error adj.
Average postcode PPVT	0.010	0.003	-0.064	0.016***	0.030**	-0.003
	(0.006)	(0.018)	(0.045)	(0.005)	(0.013)	(0.036)
PPVT score	-0.052***	-0.045	-0.103*	-0.082***	-0.155***	-0.197***
	(0.007)	(0.067)	(0.054)	(0.006)	(0.052)	(0.045)
Average postcode	0.020***	0.050***	0.162***	0.014***	0.025**	0.097**
socio-emotional score	(0.006)	(0.013)	(0.059)	(0.005)	(0.010)	(0.046)
Socio-emotional score	-0.043***	-0.386***	-0.283***	-0.030***	-0.161*	-0.090
	(0.007)	(0.112)	(0.086)	(0.006)	(0.087)	(0.077)
N	5258	5215	5215	5254	5211	5211

main

Stronger link between measured development and perceptions

- $\Uparrow$ education $\rightarrow \Uparrow$ stronger relationship between measures of cognitive development and perceptions

	Non-cognitive delay		Cognitive delay	
	(1)	(2)	(3)	(4)
	Certificate	College+	Certificate	College+
Non-cognitive score	-0.031*	-0.055*	-0.030*	-0.036*
	(0.011)	(0.009)	(0.011)	(0.008)
Neighbourhood	0.016	0.025*	0.021*	0.016*
non-cognitive score	(0.010)	(0.008)	(0.008)	(0.007)
Cognitive score	-0.030*	-0.067*	-0.060*	-0.098*
	(0.012)	(0.009)	(0.009)	(0.008)
Neighbourhood cognitive	0.004	0.008	0.012	0.018*
score	(0.010)	(0.009)	(0.008)	(0.008)
N	1725	2912	1722	2912

main

Other measure of non-cognitive deficits

- Use a continuous non-cognitive problems score based on subquestions from Strength and Difficulty Questionnaire related to behaviours measured during the interview.

	Ages 4-5	Ages 8-9
	(1)	(2)
Average postcode PPVT	-0.005	0.002
	(0.017)	(0.020)
PPVT score	-0.076***	-0.051***
	(0.015)	(0.014)
Average postcode	0.036**	0.037**
socio-emotional score	(0.017)	(0.017)
Socio-emotional score	-0.070***	-0.054***
	(0.016)	(0.016)
N	5055	4679

main

Robustness checks: Average neighbourhood cognitive score

95% CI estimated $\beta^{T,N}$ for average neighbourhood cognitive development main