Parental Responses to Children's Achievement Test Results

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In a nutshell

- Parents understanding of their children's ability is an important factor in their investment decisions (Cunha 2015; 2021)

- However, parents often have incorrect beliefs about their children's school achievement, and misinformation is heterogeneous (Dizon-Ross 2019)

- We show that standardized test score report cards inform parents and change their investments
  - Relevant for the current debate on value of standardized testing
  - Estimate effects on many parental investments
  - Design of standardized text score cards leads to behavioral responses

This paper

1. We estimate parents' responses to the release of national standardized test report cards
   - Identification: calendar time variation relative to test card release date
   - Multiple margins of parental responses

     Parents' assessment of child' school achievement and school satisfaction

     Time investments: hrs/day with parents, activities together

     Money investments: books at home, tutoring, extracurr. activities

     Parenting style: warmth, monitoring

     Child time use data: leisure, education activities, sleep

- Test scores released → ≈-2% assessment of child school achievement, and school satisfaction ; +44% in private tutoring enrollments ; -22% extracurricular activities

This paper

2. Estimate information content of test score report cards for parents → separate effects of good news, no news and bad news
   - Identification: contrast *actual* scores with *forecasted* scores, and interact this with calendar time variation

- Decrease on parents' assessment of child school performance driven by bad news and no news
- No differential effects of news types on tutoring and extracurricular activities

This paper

3. Estimate whether parents benchmark their child's performance against other children
   - Identification: RD of child score (running variable) vs national/school average (displayed in test score report cards)

- Child score right above national average → + perceptions of achievement ; - activities at home ; + education time, - leisure time,
- Only effect of child score right above school average is on + school satisfaction

In the literature on parental reactions to information

- Missed assignments → - monitoring (Bergman 2021)
- Academic performance → + targeted educational inputs (Dizon-Ross 2019)
- School report cards → + test scores, + enrolment (Andrabi et al. 2017)
- Anticipated school funding → - money (Das et al. 2013)
- Good school quality → - time (Greaves et al. 2019)
- School value-added → + belief accuracy about schools (Ainsworth et al. 2020)

The Longitudinal Study of Australian Children (LSAC)

LSAC wave	1	2	3	4	5	6
time investments						
money investments						
parenting style						
child time use						
subjective assessments						
NAPLAN test			✓	✓	✓	✓
Age	5	7	9	11	13	15
Year of schooling	K	1	3	5	7	9



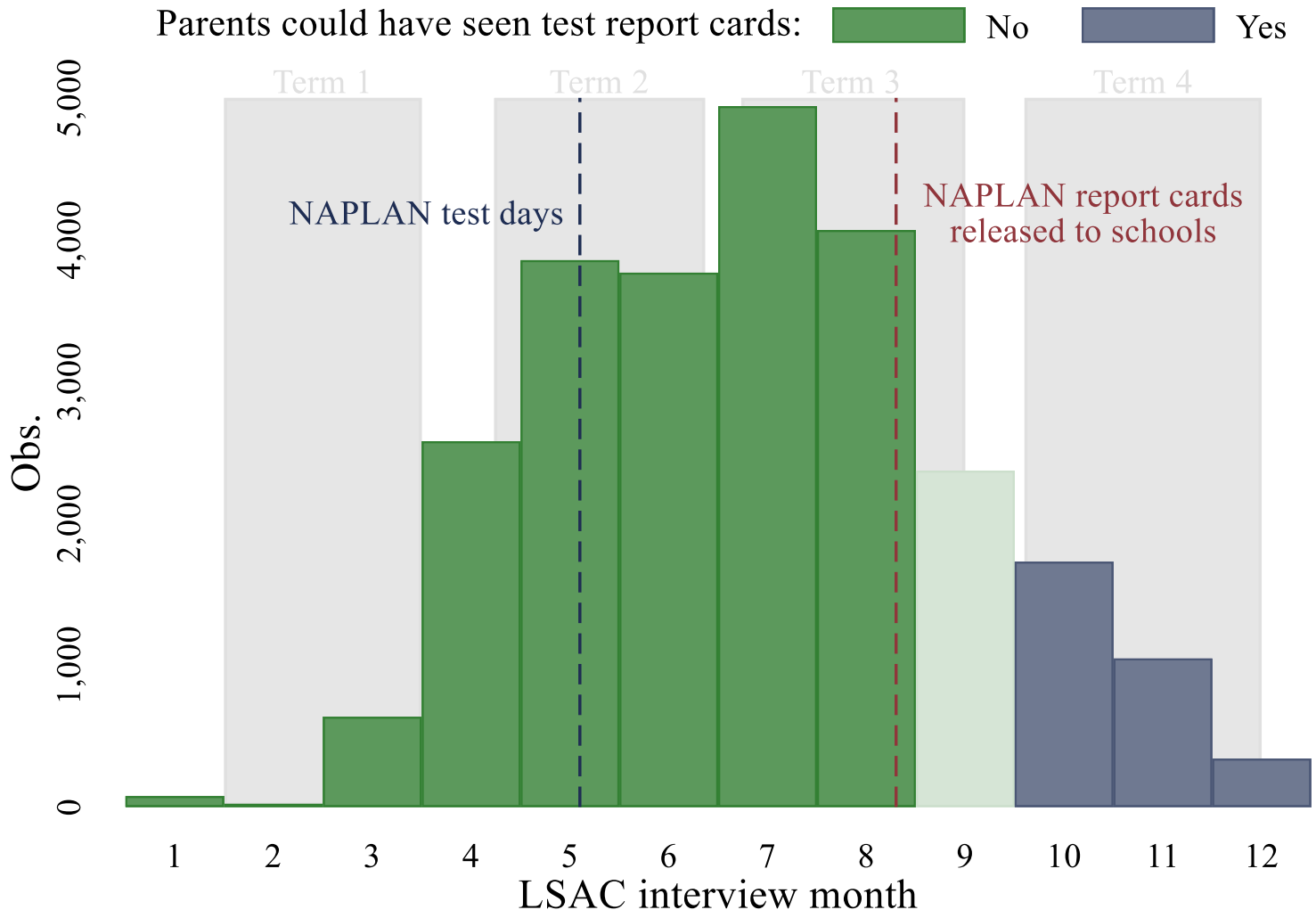
all measures available

some measures available

Cohort design, representative of Australian resident cohort

≈5,000 children and 25,000 child-year observations

Identifying variation # 1

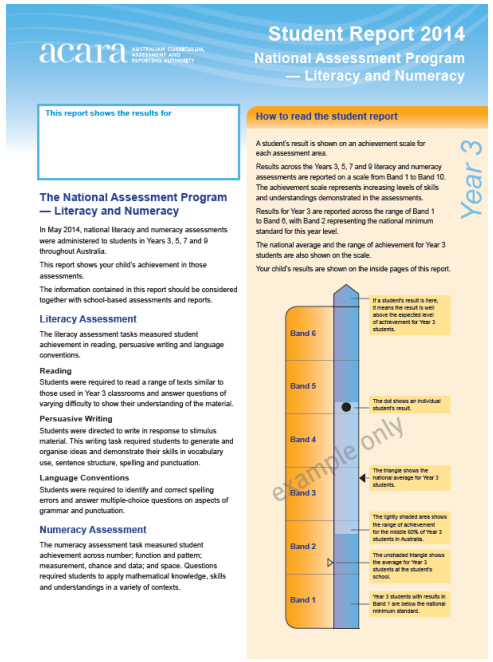


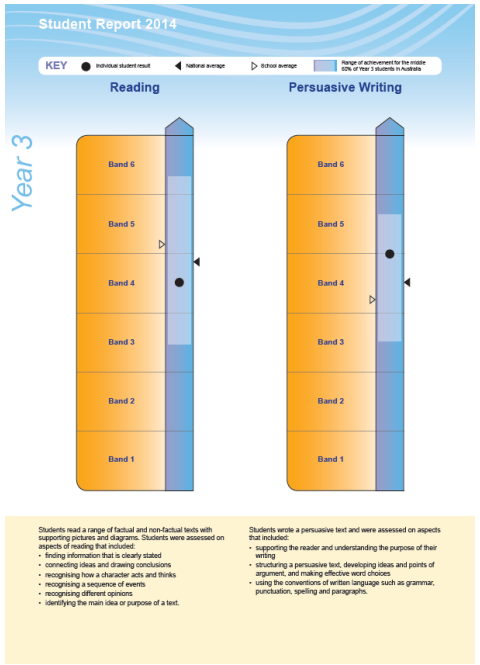
NAPLAN Report Cards

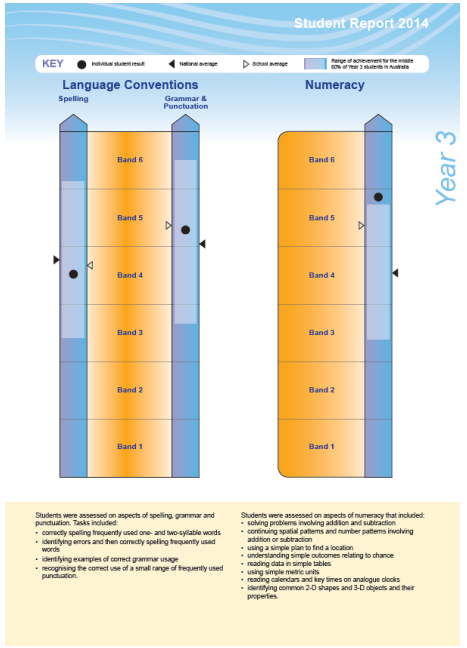
Child name and how-to-read figures

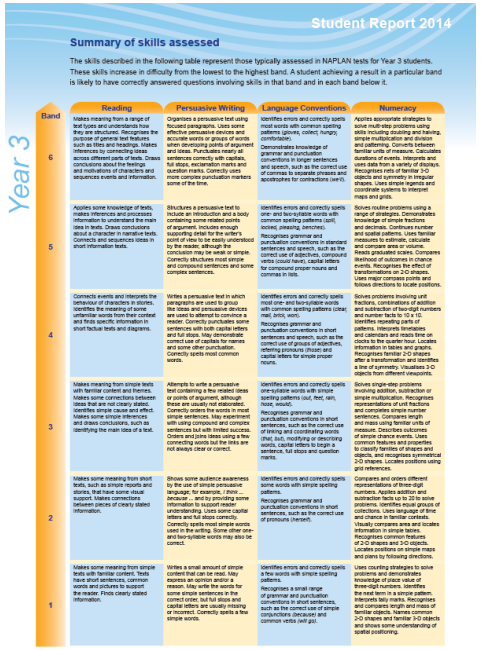
Student test scores, national avg. (+school avg. sometimes) over 4 subject matters [Reading, Writing, Language, Numeracy]

Summary of skills assessed



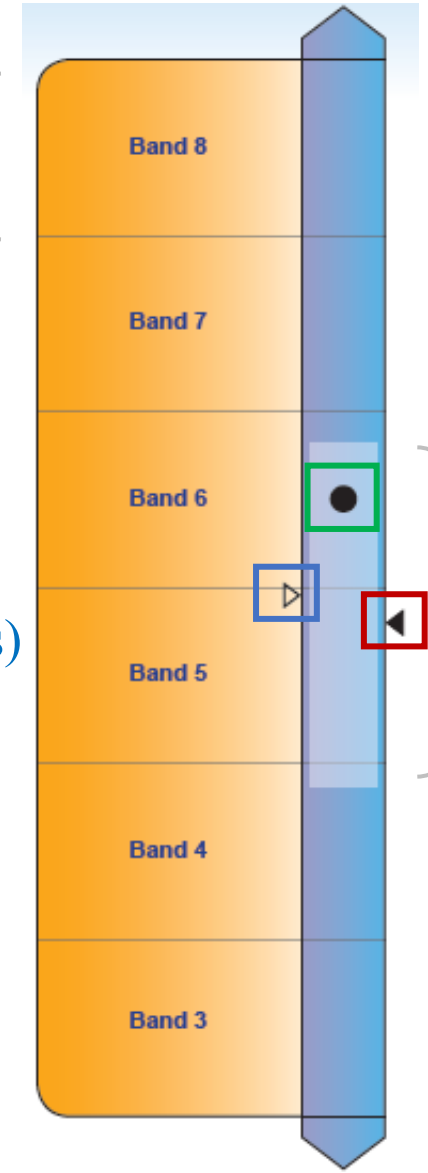






NAPLAN Report Cards – Year 5 Example

Skill assessment bands



School average score
(only shown in some states)

Student test score in subcomponent

National average score

Middle 60% of test scores

Empirical strategy

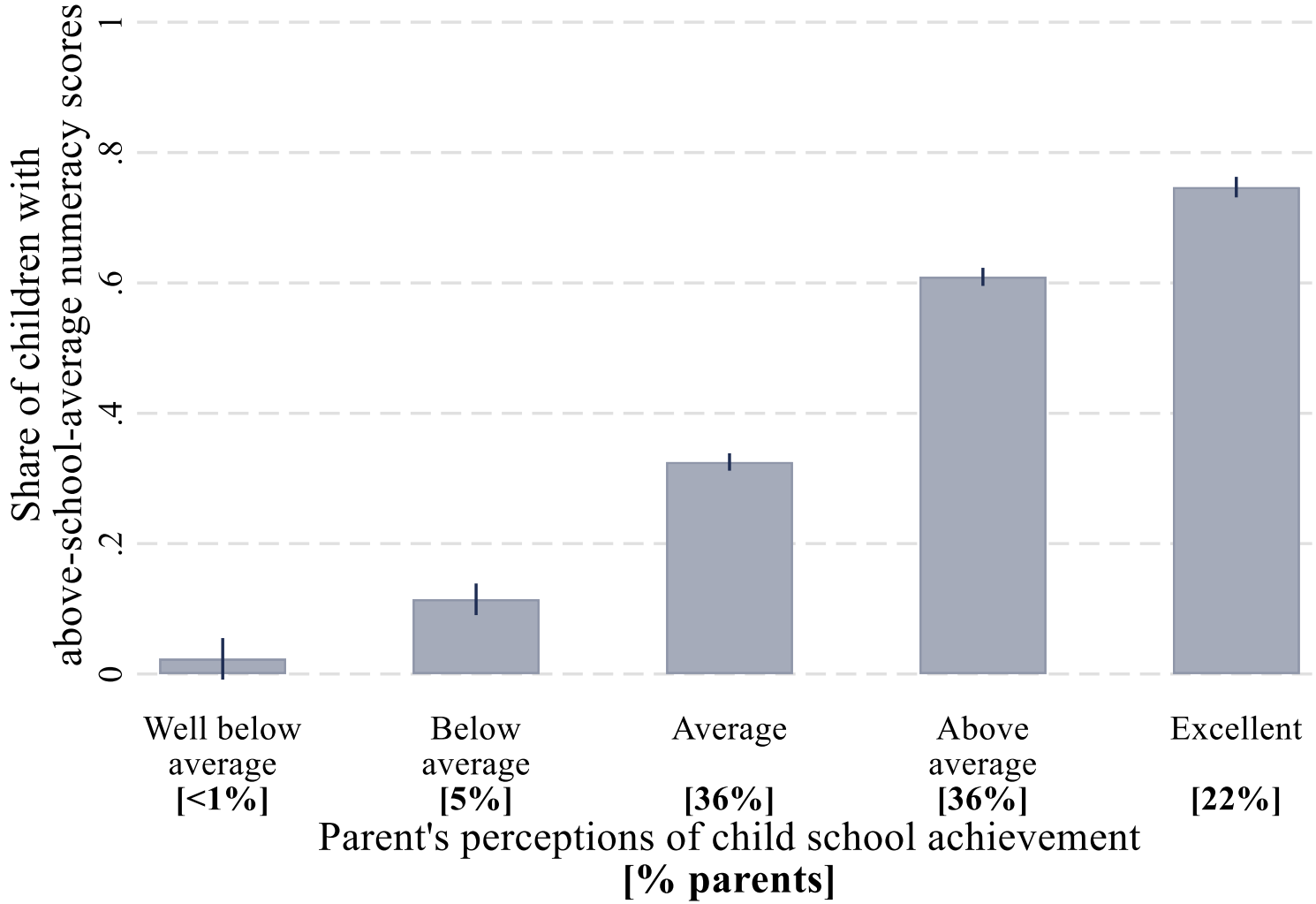
$$Y_{iw} = \theta Post_{iw} + \gamma' X_{iw} + \delta_w + \delta_{Region} + \delta_{Age} + \varepsilon_{iw}$$

Y_{iw} = Perceptions of child school performance, school satisfaction, parental investments (time, money, parenting style), child time use

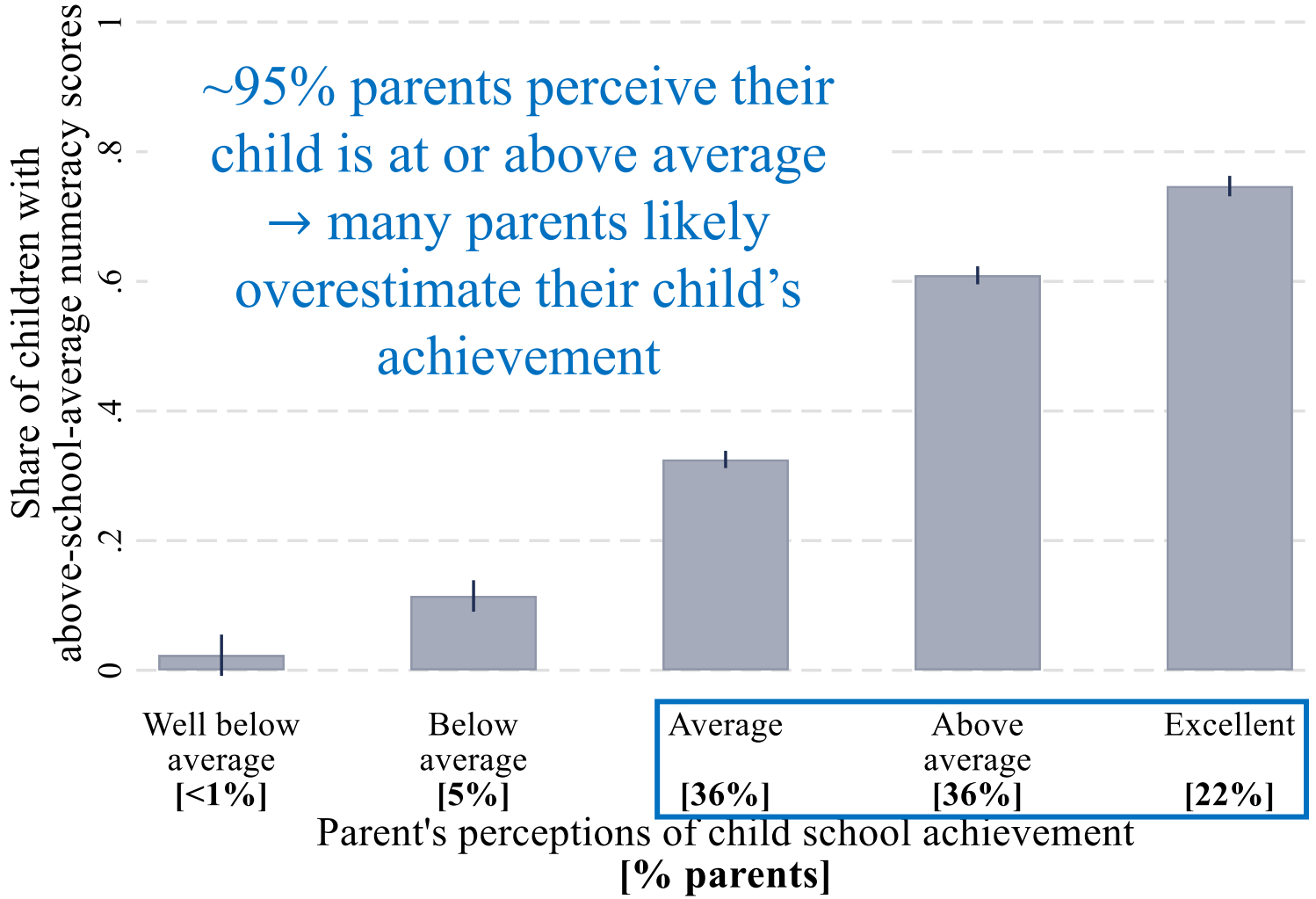
$Post_{iw}$ = LSAC interview date in October—December (18% obs.)

X_{iw} = weather, child and family characteristics (↑precision)

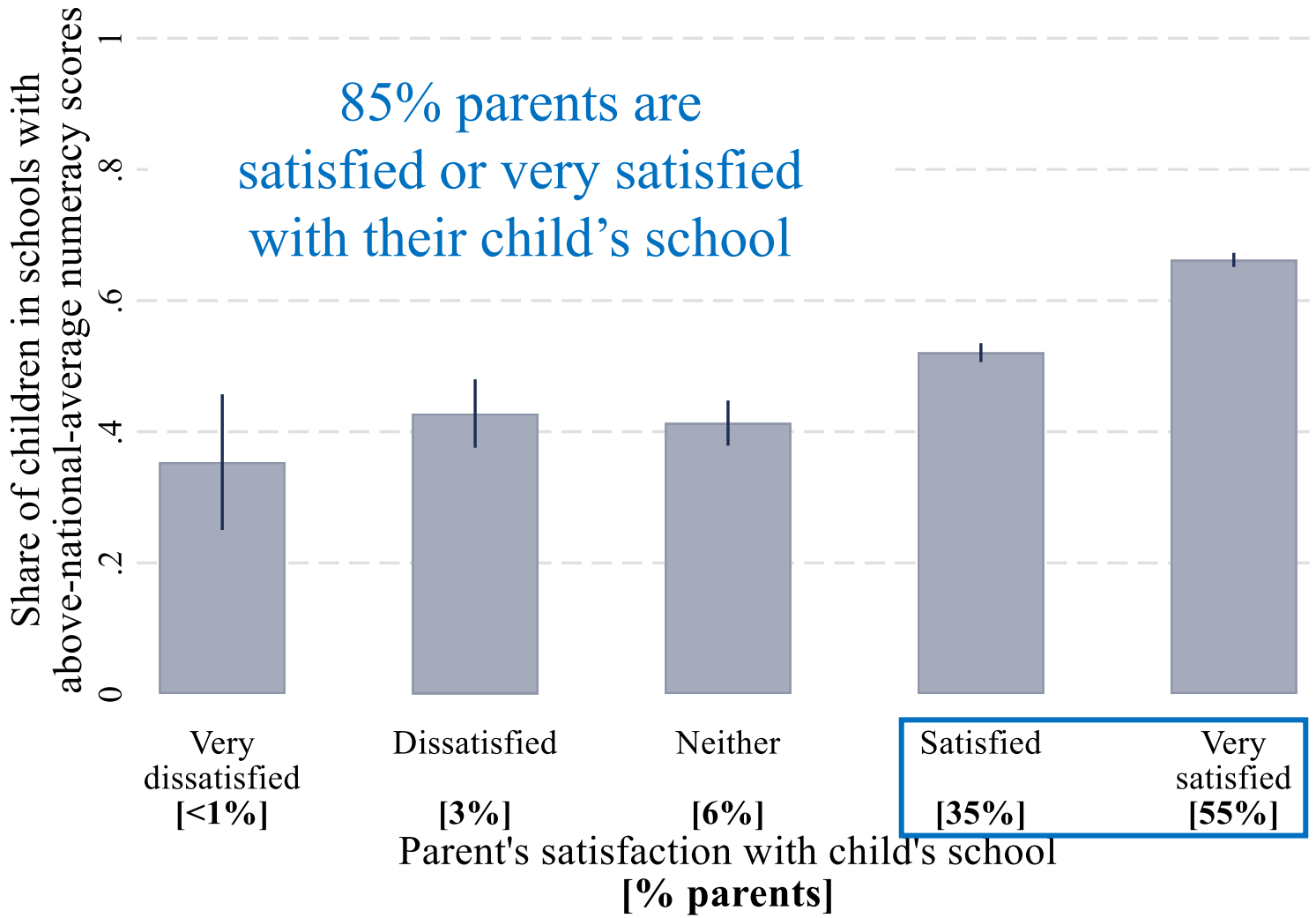
Parent’s perceptions of child school achievement



Parent's perceptions of child school achievement



Parent’s satisfaction with child’s school



Perceptions of achievement and school satisfaction

	Effect of Post-September LSAC interview	Mean	Children	Obs.
Parent's perceptions of child achievement	-0.086*	3.76	2,852	8,444
	(0.051)			
Parental satisfaction with child school:	-0.109**	4.44	2,853	8,456
	(0.046)			

Decrease of about ≈2%
of unconditional mean in
both measures

Time and money investments

	Effect of Post-September LSAC interview	Mean	Children	Obs.
Time investments:				
Hours per day with parents	-0.198	3.25	2,596	5,459
	(0.180)			
At-home activities per week	-0.445	9.20	2,592	4,240
	(0.354)			
Out-of-home activities per month	0.040	1.64	2,853	8,449
	(0.062)			
Monetary investments:				
30+ books at home	-0.016	0.74	2,592	4,243
	(0.032)			
Has private tutor	0.064***	0.15	2,667	5,901
	(0.023)			
Has allowance	-0.037	0.37	2,679	5,980
	(0.032)			
Extracurr. activities per week	-0.321***	1.43	2,352	3,740
	(0.099)			

43% of mean

22% of mean

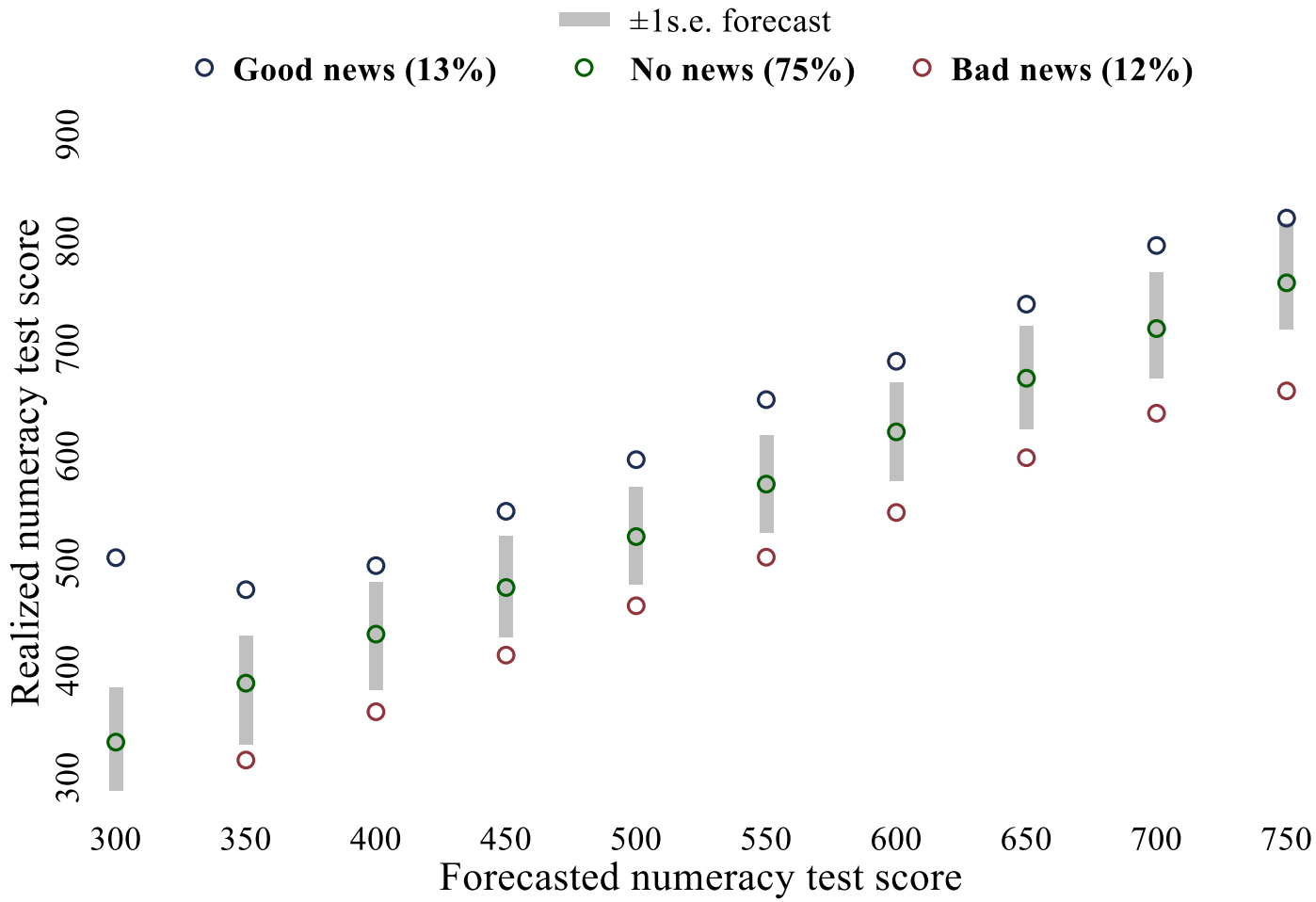
Parenting style and child's time use

	Effect of Post-September LSAC interview	Mean	Children	Obs.
Parenting style:				
High warmth	0.012	0.72	2,800	8,028
	(0.028)			
Strict monitoring	-0.012	0.75	2,836	8,303
	(0.025)			
Minutes per day of child time in:			2,596	5,459
Educational activities	13.328	283		
	(12.669)			
Leisure	-21.114*	304		
	(12.558)			
Sleeping & personal care	6.415	638		
	(5.885)			
Other activities	2.797	216		
	(7.479)			

Some evidence of -7% of leisure time, mostly reallocated to education

Information content: Good News, No News, Bad News

$$NAPLAN_{i,w} = f(NAPLAN_{i,w-1}, Perceived\ Assessment_{i,w-1}, \theta_{Region}, \theta_w) + \varepsilon_{iw}$$



By news type: Perceptions and school satisfaction

no news and bad news drive change in perceptions of child achievement …

	Effect of post-September LSAC interview if based on numeracy scores parents receive:					
	good news	**no news**	**bad news**	Mean	Children	Obs.
Parental perceptions of child achievement	-0.039	-0.122**	-0.168*	3.77	2,679	5,976
	(0.083)	(0.057)	(0.089)			
Parental satisfaction with child school:	-0.119	-0.054	-0.117	4.45	2,679	5,970
	(0.074)	(0.051)	(0.086)			

By news type: Time and money investments

	Effect of post-September LSAC interview if based on numeracy scores parents receive:					
	good news	**no news**	**bad news**	Mean	Children	Obs.
Time investments:						
Hours per day with parents	-0.098	-0.174	-0.365	3.25	2,592	5,435
	(0.279)	(0.192)	(0.261)			
At-home activities per week	-0.470	-0.426	-0.518	9.21	2,586	4,215
	(0.512)	(0.380)	(0.579)			
Out-of-home activities per month	-0.128	0.031	0.044	1.55	2,676	5,953
	(0.100)	(0.071)	(0.111)			
Monetary investments:						
30+ books at home	-0.022	-0.006	-0.051			
	(0.049)	(0.035)	(0.052)			
Has private tutor	0.080**	0.055**	0.093**			
	(0.037)	(0.025)	(0.038)			
Has allowance	-0.068	-0.023	-0.058			
	(0.047)	(0.034)	(0.048)			
Extracurr. Activities per week	-0.259*	-0.357***	-0.297**			
	(0.145)	(0.101)	(0.144)			

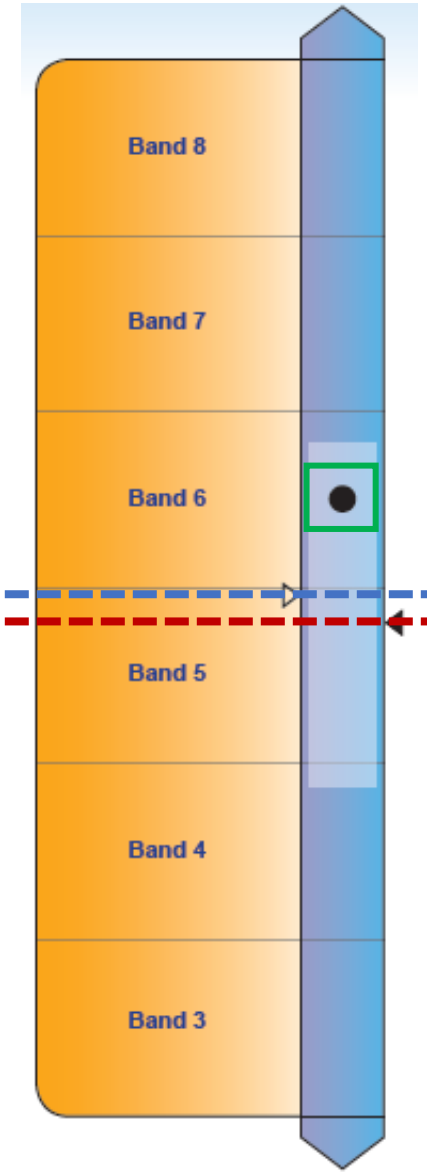
… yet there is no heterogeneity across news types on monetary investments …

By news type: Parenting style and child's time use

	Effect of post-September LSAC interview if based on numeracy scores parents receive:					
	good news	**no news**	**bad news**	Mean	Children	Obs.
Parenting style:						
High warmth	0.016	0.016	0.033	0.70	2,647	5,829
	(0.048)	(0.033)	(0.046)			
Strict monitoring	-0.002	-0.022	-0.013	0.71	2,659	5,862
	(0.043)	(0.030)	(0.043)			
Minutes per day of child time in:						
Educational activities	34.554*	-2.173	53.440***	283		
	(19.514)	(13.509)	(19.317)			
Leisure	-45.803**	-10.689	-37.952*	304		
	(20.325)	(13.227)	(19.613)			
Sleeping & personal care	0.483	9.690	-3.371	638		
	(9.333)	(6.272)	(9.330)			
Other activities	11.711	4.136	-8.652	216		
	(11.211)	(8.064)	(11.345)			

… and some (puzzling) heterogeneity for child time use responses

Comparisons with other children: Variation # 2



Student test score in subcomponent
(running variable)

School average score
(only shown in some states)

National average score

Child vs Nat. avg: Perceptions and school satisfaction

Children scoring right above nat. avg. are perceived to be higher-achieving by their parents

	RD estimates using numeracy scores **Child vs Nat. avg**	Obs.	Bandwidth below	Bandwidth above
Parental perceptions of child achievement	0.568*** (0.169)	1,474	23	26
Parental satisfaction with child school	-0.028 (0.169)	1,475	26	36

Child vs Nat. avg: Time and money investments

	RD estimates using numeracy scores Child vs Nat. avg	Obs.	Bandwidth below	Bandwidth above
Time investments:				
Hours per day with parents	-0.016	1,160	33	52
	(0.447)			
At-home activities per week	-2.838**	855	23	38
	(1.404)			
Out-of-home activities per month	0.174	1,477	33	34
	(0.198)			
Monetary investments:				
30+ books at home	0.115	856	37	40
	(0.107)			
Has private tutor	0.094	1,365	26	41
	(0.067)			
Has allowance	0.172*	1,374	33	28
	(0.098)			
Extracurr. activities per week	0.113	1,116	33	28
	(0.275)			

They also do fewer at-home activities with their parents…

Child vs Nat. avg: Parenting style and time use

	RD estimates using numeracy scores Child vs Nat. avg	Obs.	Bandwidth below	Bandwidth above
Parenting style:				
High warmth	-0.098	1,396	21	35
	(0.087)			
Strict monitoring	0.149*	1,437	26	21
	(0.090)			
Minutes per day of child time in:		1,160	34	30
Educational activities	86.357**			
	(39.395)			
Leisure	-84.704**			
	(36.402)			
Sleeping & personal care	-6.242			
	(19.460)			
Other activities	-3.088			
	(24.368)			

… likely because they refocus their time on educational activities and away from leisure

Heterogeneity in effects of test reports (summary)

- In Qld, WA, and SA, NAPLAN reports also display school-level average test scores side by side with child assessment; other states only display national average
  - Stronger effects on school satisfaction → school info does matter to parents
  - Stronger decrease of leisure *when school average is not shown* → same-school children are more relevant benchmarks (and likely more similar to child than national average on test scores); a "local distortion"? (e.g., Kinsler & Pavan 2020)

- Stronger effects on leisure and perceptions of achievement in public schools
  - Consistent with less parent-school contact in public system (Goldring & Phillips 2008)

Additional results from RD models (summary)

- Only effect for RD of child vs. school avg. is + school satisfaction
  - Parents benchmark against school avg., but this doesn't affect investments
- No systematic evidence that parents react to School avg. vs National avg. comparisons
- No RD effects in the pre-September LSAC interview sample
  - This validates empirical design

Putting everything together

- We show that when standardized test report cards are released to parents, they correct downwards their (likely optimistic) perception of their child school performance and their (very high) satisfaction with the child's school

- Parents also respond by making investments targeted at improving academic achievement, but responses in investments are proportionally larger than on perceptions
  - Also heterogeneous effects by "news type" on perceptions but not investments
  - See also Ainsworth et al. (2020) for school choices
  - Consistent with empirically important priming effect of test report cards

- Parents care about their child's standing in the national distribution, highlighted in the design of the test report cards
  - Makes sense in Australian context given centralized university admissions

Conclusions

- Standardized test scores can increase parental engagement, even if they carry little information parents do not already have
  - Can act as a "third set of eyes" on children, especially useful for children attending less engaged schools
- The design of test reports can trigger important behavioral responses to parents
  - Could introduce inequality-enhancing local distortions
  - But could also be used to increase parental engagement overall

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Support Slides

Parental investments – Time

Variable	Definition
Time spent with child (days/week of activity)	
Read with child	The number of days in the past week where the parent or an adult in the family has read to the study child from a book.
Told child a **story**	The number of days in the past week where the parent or an adult in the family has told the study child a story, not from a book.
Drawn picture with child	The number of days in the past week where the parent or an adult in the family has drawn pictures or done other art or craft activities with the study child.
Music with child	The number of days in the past week where the parent or an adult in the family has played music, sung songs, danced or done other musical activities with the study child.
Toys or games with child	The number of days in the past week where the parent or an adult in the family has played with toys or games indoors, like board or card games and excluding electronic games, with the study child.
Everyday activities with child	The number of days in the past week where the parent or an adult in the family has involved the study child in everyday activities at home, such as cooking or caring for pets.
Played outdoors with child	The number of days in the past week where the parent or an adult in the family has played a game outdoors or exercised together (e.g., walking, swimming, cycling) with the study child.
Sum of activity days/week	Sum of days per week spent with the study child being engaged in activities inside the home.

Parental investments – Time

Parent-child activities (times last month)	
Gone to **playground or pool**	Equals 1 if study child has gone to a playground or a swimming pool with their parent or another adult in the family in the past month.
Gone to **concert, museum, etc.**	Equals 1 if study child has gone to a concert, play museum, art gallery or community or school event with their parent or another adult in the family in the past month.
Attended a **religious service**	Equals 1 if study child has attended a religious service, church temple, synagogue or mosque with their parent or another adult in the family in the past month.
Visited **library**	Equals 1 if study child has visited a library with their parent or another adult in the family in the past month.
Sum of activities last month	Sum of parent-child activities outside the home in the last month.

Parental investments – Warmth

Warm parenting	
Display **physical affection**	How often the parent has expressed affection by hugging, kissing, and holding the study child in the past six months. Answered on a scale of 1 to 5 where 1 is 'Never/Almost Never' and 5 is 'Always/Almost Always'.
Express happiness to child	How often the parent has told the study child how happy he/she makes them in the past six months. Answered on a scale of 1 to 5 where 1 is 'Never/Almost Never' and 5 is 'Always/Almost Always'.
Warm encounters with child	How often the parent has had warm, close times together with the study child in the past six months. Answered on a scale of 1 to 5 where 1 is 'Never/Almost Never' and 5 is 'Always/Almost Always'.
Enjoy doing things with child	How often the parent enjoyed listening to the study child and doing things with him/her in the past six months. Answered on a scale of 1 to 5 where 1 is 'Never/Almost Never' and 5 is 'Always/Almost Always'.
Close when happy or upset	How often the parent has felt close to the study child when he/she was happy and when he/she was upset in the past six months. Answered on a scale of 1 to 5 where 1 is 'Never/Almost Never' and 5 is 'Always/Almost Always'.
High warmth	We define a parent to have high warmth parenting style if they have rated themselves with a total of 20 or more points from the above 5 warmth parenting items.

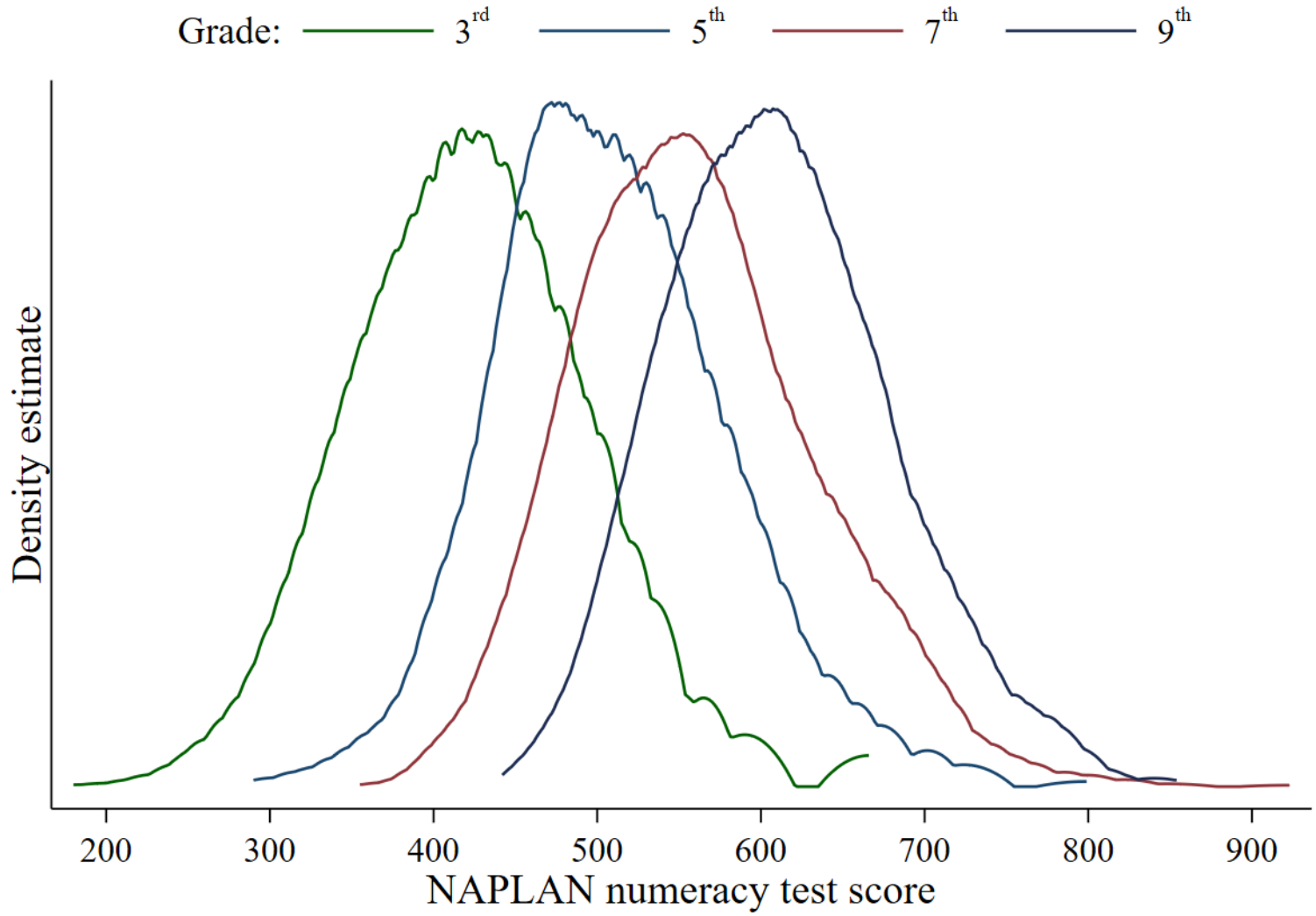
Parental investments – Monitoring

Parental Monitoring	
Know child's **friends' names and faces**	How many of study child's close friends the parent knows by sight and by their first and last names. Answered on a scale of 1 to 5 where 1 is 'None of them' and 5 is 'All of them'.
Know child's **friends' parents' names and faces**	How many of study child's close friends' parents the parent knows by sight and by their first and last names. Answered on a scale of 1 to 5 where 1 is 'None of them' and 5 is 'All of them'.
Know **where child is**	How often the parent knows where study child is in the course of a day. Answered on a scale of 1 to 5 where 1 is 'Always' and 5 is 'Never'. We reverse code the scale such that 1 is 'Never' and 5 is 'Always', so that the scale is increasing in monitoring.
Know **who child is with**	How often the parent knows who the study child is with in the course of a day, when the study child is away from home. Answered on a scale of 1 to 5 where 1 is 'Always' and 5 is 'Never'. We reverse code the scale such that 1 is 'Never' and 5 is 'Always', so that the scale is increasing in monitoring.
Talk with **child about** their **life**	How often the parent talks to the study child about what is going on in his/her life. Answered on a scale of 1 to 5 where 1 is 'Always' and 5 is 'Never'. We reverse code the scale such that 1 is 'Never' and 5 is 'Always', so that the scale is increasing in monitoring.
Child **goes out without telling**	How often the study child goes out without telling the parent where he/she will be. Answered on a scale of 1 to 5 where 1 is 'Always' and 5 is 'Never'.
High monitoring	We define a parent to have high monitoring parenting style if they have rated themselves with a total of 24 or more points from the above 6 monitoring parenting items.

Parent's assessments

Parent's assessments	
Child's performance in school	How the parent would describe the study child's **overall achievement at school**. Answered on a scale of 1 to 5 where 1 is 'Excellent' and 5 is 'Well below average'.
Satisfaction with school	How **satisfied the parent is with the school that the study child currently attends**. Answered on a scale of 1 to 5 where 1 is 'Very satisfied' and 5 is 'Very dissatisfied'.

NAPLAN Numeracy Distribution over Grades



Balancing Regressions on Characteristics

	Mean	Effect of post-September LSAC interview:			
Pre-determined characteristics:					
Waves 3-6					
Child's age (months)	138	12.275***	4.520***	0.002	3.041***
		(1.079)	(0.163)	(1.338)	(0.161)
Female child	0.49	0.021	0.021	-0.016	-0.011
		(0.028)	(0.028)	(0.026)	(0.027)
Child birth weight (kilograms)	3.42	-0.047	-0.049	0.011	0.011
		(0.031)	(0.031)	(0.029)	(0.030)
2 biological parents in household	0.84	0.067	0.051	-0.104	-0.109
		(0.112)	(0.110)	(0.163)	(0.177)
Household gross income (AUD/week)	2,168	-241.184***	-314.610***	-81.100	-79.123
		(85.451)	(86.208)	(87.634)	(88.443)
University-educated parent(s)	0.46	-0.034	-0.043	-0.030	-0.030
		(0.027)	(0.028)	(0.024)	(0.025)
Migrant parent(s)	0.32	0.228	0.225	-0.016	-0.024
		(0.146)	(0.149)	(0.169)	(0.180)
Weather controls		✓	✓	✓	✓
Wave fixed effects			✓		✓
Region fixed effects				✓	✓

Balancing Regressions on Placebo Outcomes

	Mean	Effect of post-September LSAC interview:			
Placebo outcomes:					
Waves 1-2					
At-home activity days per week	15.97	-1.817***	-0.477	-2.139***	-0.154
		(0.319)	(0.315)	(0.363)	(0.361)
Out-of-home activity days per month	2.29	-0.068	0.046	-0.131**	0.032
		(0.059)	(0.061)	(0.066)	(0.068)
30+ books at home	0.85	-0.036	-0.038*	-0.020	-0.019
		(0.022)	(0.022)	(0.023)	(0.024)
High warmth parent(s)	0.87	-0.037*	-0.024	-0.044*	-0.026
		(0.021)	(0.022)	(0.023)	(0.024)
Parents' perceptions of achievement	3.86	0.084	0.084	-0.058	-0.058
		(0.062)	(0.062)	(0.099)	(0.099)
Parent's satisfaction with school	4.54	-0.026	0.010	-0.046	0.005
		(0.043)	(0.044)	(0.051)	(0.052)
Weather controls		✓	✓	✓	✓
Wave fixed effects			✓		✓
Region fixed effects				✓	✓

Heterogeneity by school NAPLAN average shown

State NAPLAN report cards:	**Effect of Post-September LSAC interview if:**	
	do not show school avg. [70%]	*show school avg. [30%]*
Outcomes:		
Has private tutor	0.062**	0.067**
	(0.024)	(0.029)
	0.17	*0.12*
Extracurr. activities per week	-0.306***	-0.350***
	(0.103)	(0.118)
	1.44	*1.41*
Minutes per day on leisure	-35.533***	1.014
	(12.860)	(15.854)
	316	*316*
Parental perceptions of school achievement	-0.091*	-0.076
	(0.054)	(0.062)
	3.77	*3.75*
Parental satisfaction with child school	-0.093*	-0.142**
	(0.048)	(0.061)
	4.46	*4.40*

Heterogeneity by public vs private school

	Effect of Post-September LSAC interview if:	
Child's attends a:	*public school [81%]*	*private school [19%]*
Outcomes:		
Hours per day with parents	-0.228	-0.016
	(0.185)	(0.247)
	3.42	*3.57*
Has private tutor	0.065***	0.064*
	(0.024)	(0.034)
	0.14	*0.20*
Extracurr. activities per week	-0.320***	-0.321***
	(0.100)	(0.123)
	1.33	*1.73*
Minutes per day on leisure	-27.482**	-12.318
	(12.552)	(17.150)
	321	*297*
Parental perceptions of school achievement	-0.104**	-0.000
	(0.052)	(0.069)
	3.74	*3.87*
Parental satisfaction with child school	-0.106**	-0.096
	(0.047)	(0.062)
	4.39	*4.64*

Heterogeneity by household income

	Effect of Post-September LSAC interview if:	
Household income is in the:	*bottom tertile [31%]*	*top tertile [36%]*
Outcomes:		
Hours per day with parents	-0.378	-0.510**
	(0.244)	(0.247)
	3.45	*3.44*
Has private tutor	0.074**	0.064**
	(0.032)	(0.033)
	0.15	*0.18*
Extracurr. activities per week	-0.293**	-0.303**
	(0.136)	(0.134)
	1.23	*1.62*
Minutes per day on leisure	-27.176	-10.055
	(16.826)	(17.077)
	332	*299*
Parental perceptions of school achievement	-0.096	-0.049
	(0.070)	(0.068)
	3.66	*3.84*
Parental satisfaction with child school	-0.127*	-0.064
	(0.066)	(0.061)
	4.35	*4.51*

Alternative model of NAPAN news

