Parental Investments in Early Childhood and the Gender Gap in Math and Literacy

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Why do women choose STEM at lower rates?

- Women are under-represented in STEM (Kahn and Ginther, 2017)
- One possibility -> under-representation in STEM driven by over-representation in non-STEM (nursing, languages) (Charles and Bradley, 2002)
- Why over-representation in non-STEM? Women have a comparative advantage in language arts (Breda and Nap, 2019)

What is the source of the advantage?

- Why do women have an advantage in language arts? I.e., what is the source?

- Emerges early, by age 5 (DiPrete and Jennings, 2011)
  - Before formal schooling

- Hence: Parental investments?

- This paper: Use 2 sources of data and a field experiment to identify if a gap in parental investments can explain part of this advantage.

This paper

- When children are 3-5 years old, survey parents to study whether there are differences in parental investment by child gender.
  - Are there gender gaps?
- When children are 8-13 years old, collect administrative data on test scores in math and English Language Arts/Literacy
  - Are there gender gaps?
  - Is parent investment at age 3-5 associated with later skills?
- Take advantage of an experiment to understand whether a parenting intervention can reduce the gaps.

Chicago Heights Early Childhood Center

- Conducted in 2010-2014 (UChicago/Harvard)
- Chicago Heights, IL (Diverse, low-SES)
- Randomized ~2,000 children to treatments
- Idea:
  - Intervene early
  - Reduce the academic achievement gap
  - Parents matter
  - Focus on academic skills and executive functions

CHECC
Chicago Heights Early Childhood Center

Data

- Parent Surveys

  Children are 3-5 years old

- Test scores

  Children are 8-13 years old

Data

- Parent Surveys

  Children are 3-5 years old

Parent Investment

About how many hours on a typical weekday do you spend teaching to your child overall?

- None
- Less than 1 hour
- 1 to 2 hours
- 2 to 3 hours
- 3 to 5 hours
- More than 5 hours

Parent Beliefs

How would you rank your child relative to other children his or her age in terms of:

1) Eagerness to learn
2) Reading skills, such as being able to recognize letters
3) Math skills, such as being able to recognize shapes/count?

Data

- Administrative data from the state of Illinois
- Partnership for Assessment of Readiness for College and Careers (PARCC) standardized test
- Two areas are assessed:
  - English Language Arts/Literacy (ELA)
  - Math

- Test scores

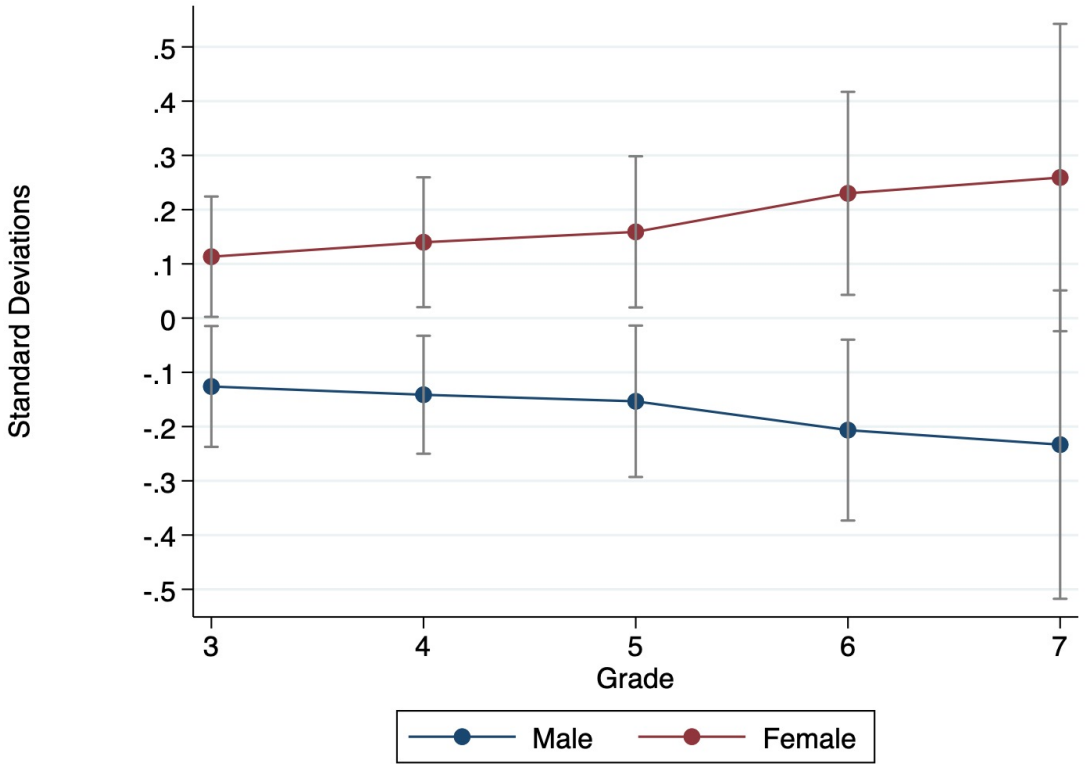
  Children are 8-13 years old

Data

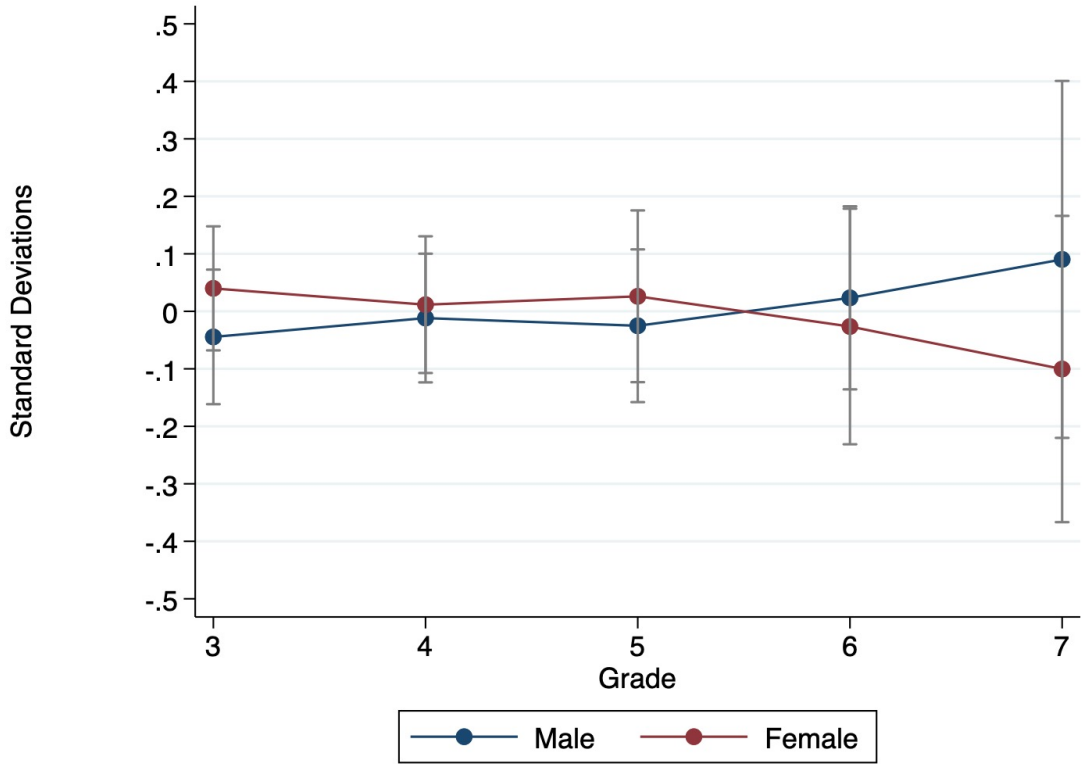
- Of the 2,185 CHECC children, parents of 953 children completed the year-end parent survey. We have data on PARCC scores for 702 of these children. These 702 children are in our analysis sample (32% of 2,185)

Observation 1: Skills Gap in Elementary School

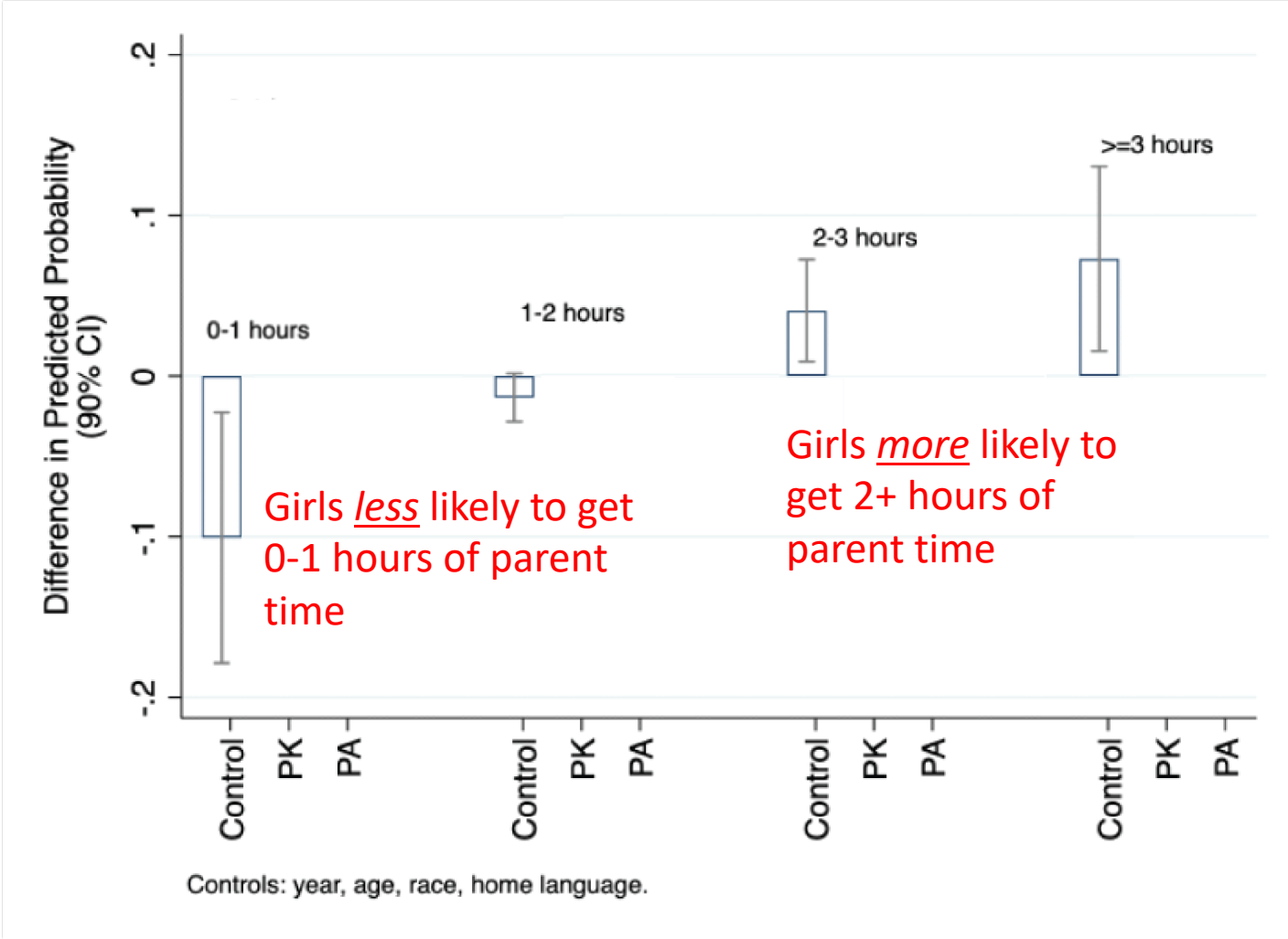
- Gender gap in ELA



- But not math



Observation 2: Gap in Parent Time at Age 3-5



Observation 3: Parent Time & Skills

- Parent investment at age 3-5 matters for ELA in later years

Teaching more associated with increases in ELA

English

	Grade 3	Grade 4	Grade 5
Teach 1-2 hrs	0.185*	0.222**	0.193
	(0.112)	(0.111)	(0.133)
Teach 2-3 hrs	0.193*	0.213*	0.0747
	(0.112)	(0.118)	(0.147)
Teach 3 or more hrs	0.297**	0.367***	0.336**
	(0.116)	(0.124)	(0.159)
Female	0.220***	0.282***	0.300***
	(0.081)	(0.082)	(0.098)
Obs	592	551	369
R-sq	0.093	0.085	0.076

Math

	Grade 3	Grade 4	Grade 5
Teach 1-2 hrs	0.0689	0.0532	0.138
	(0.106)	(0.11)	(0.139)
Teach 2-3 hrs	0.18	0.0644	0.129
	(0.114)	(0.12)	(0.149)
Teach 3 or more hrs	0.235**	0.288**	0.255
	(0.111)	(0.121)	(0.177)
Female	0.0769	0.0313	0.0797
	(0.079)	(0.0835)	(0.109)
Obs	590	552	370
R-sq	0.069	0.046	0.043

Effects less strong for math

Why do Parents Teach More to Girls?

- One possibility: belief that girls are more skilled and/or have greater potential than boys, hence investment is more productive (Freese & Powell, 1999; Carter & Wojtkiewicz, 2000)

- Indeed, parents think girls are more skilled:
  - Parents are significantly more likely to report they think their girls are better at math/reading than their boys
  - Parents are significantly more likely to be optimistic about girls' likelihood of attending college than boys.

- (We didn't gather beliefs about productivity of investment)

Why do Parents Teach More to Girls?

- Another possibility: girls are easier to teach?

- Indeed,
  - girls have significantly higher executive functioning skills than boys at baseline
  - Parents of girls indicate that their child likes it more when they teach to them than parents of boys

Do early childhood interventions affect the gap?

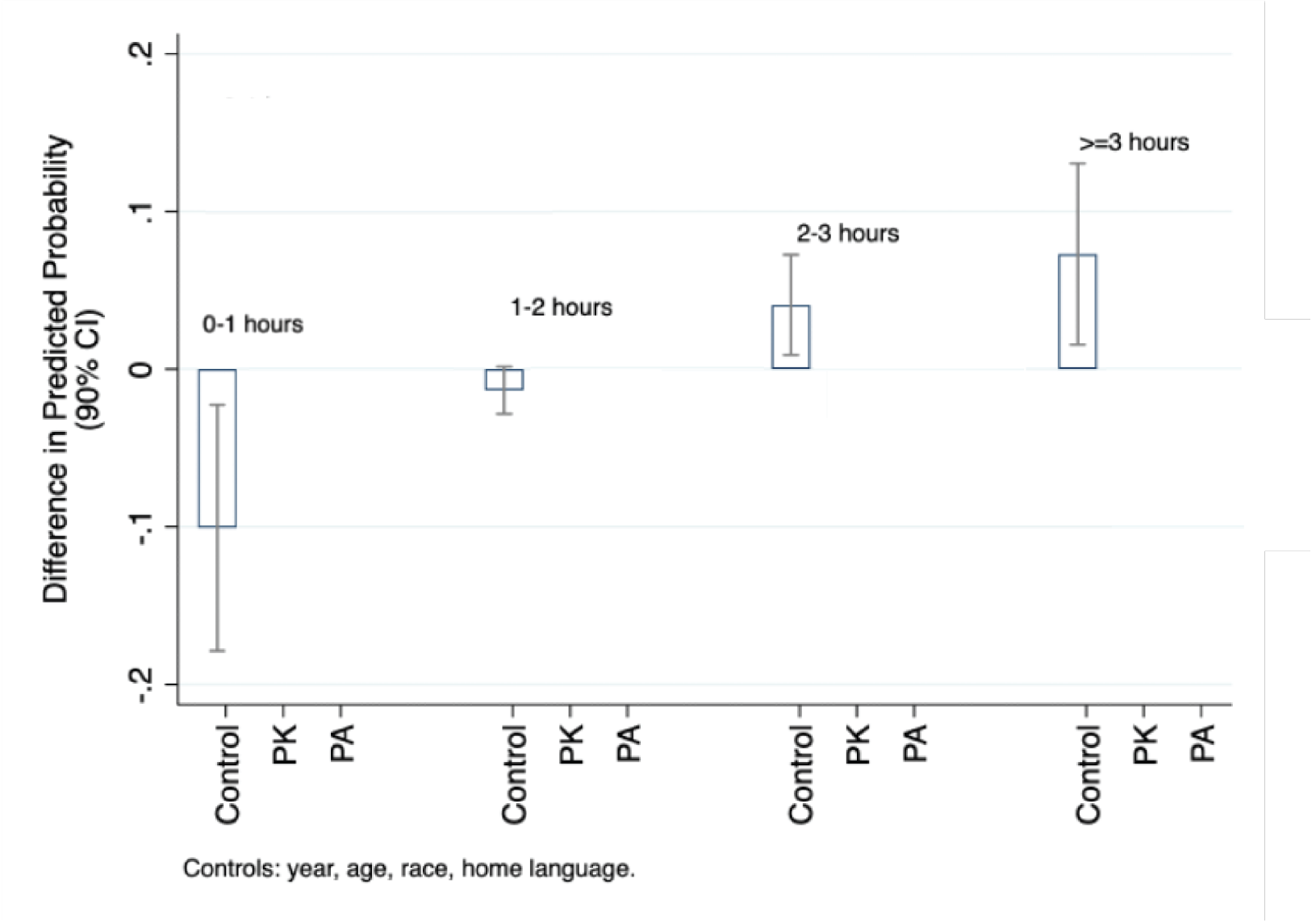
- CHECC randomized children to 3 groups:

Preschool
Free, 9-month full-day or part-time preschool for the child

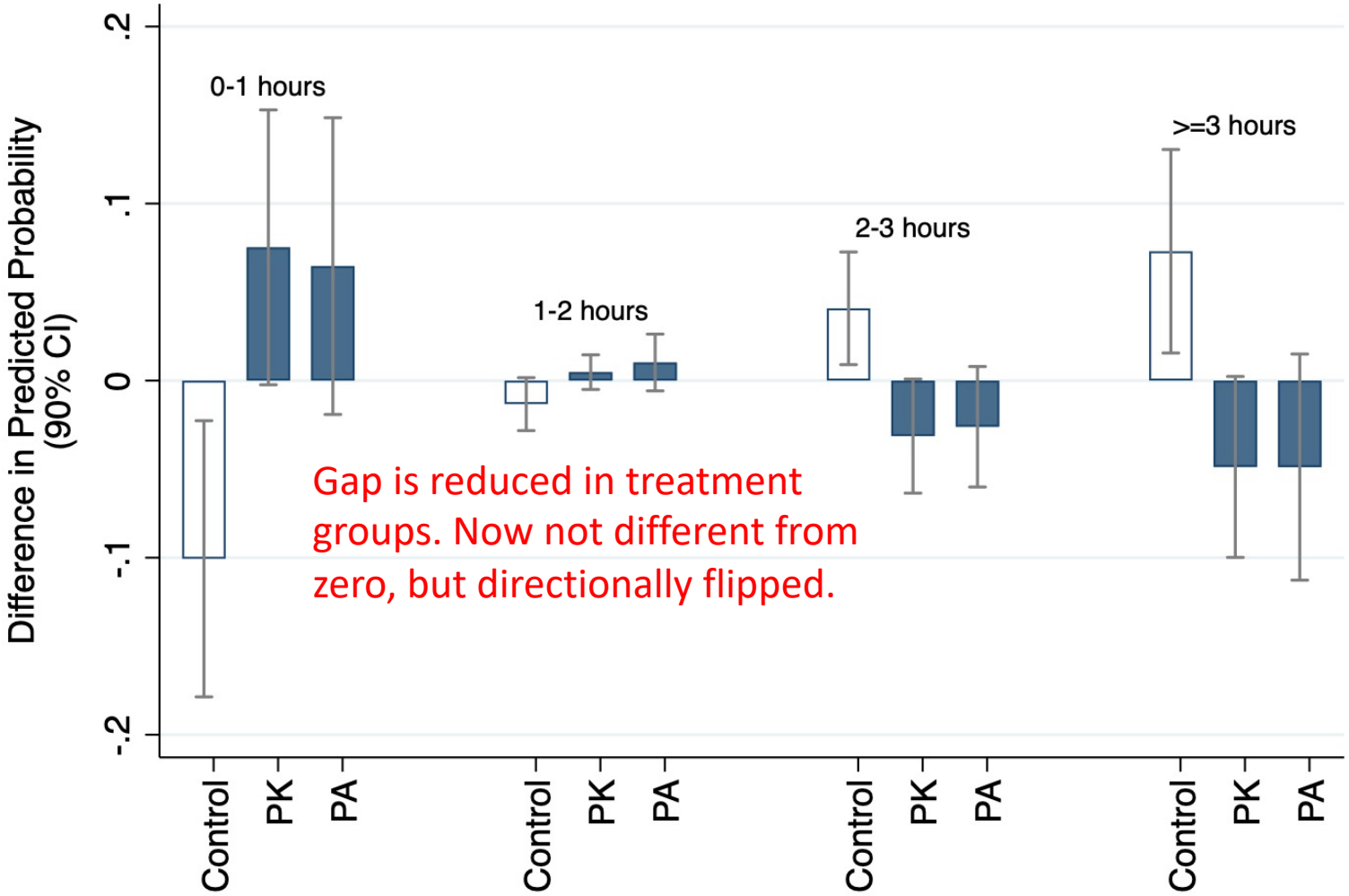
Parent Academy
Free, 9-month incentivized parenting program for parents to learn how to teach to child at home. Parents incentivized

Control ("Family Program")
Neither child or parent received interventions. Families invited to activities to reduce attrition.

Treatment Effects



Treatment Effects



Controls: year, age, race, home language.

Gap is reduced: how?

- Parent Academy raised investment for boys.
  - Provides incentives to invest in children
  - But parents already invested heavily in girls
  - So perhaps reached a ceiling for girls that allowed boys to catch up?

- Preschool lowered investment for girls.
  - Preschool takes children away from home for a large part of the day
  - We may expect declines in teaching for those parents who were already teaching to their children for large amounts of time; specifically, the parents of girls.

Discussion

- Suggestive evidence that parent investments play a role in later gaps – but this evidence is not causal!
  - Gap in parent investment at early ages of 3-5: parents invest more in girls than in boys
  - Gap in child ELA test scores in elementary school: girls perform better than boys
  - Investment at early ages correlated with test scores at later ages.

- Some evidence that interventions move investment differentially for girls and boys, suggesting room for policy intervention
  - But high attrition in our parent investment data!

Thank you!

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John’s kids, circa 2010 (now they are in college!)

One of the authors of this paper dressed as the Easter Bunny

Why does investment affect ELA but not math?

- One possibility is that investments at early ages tend to focus more on reading than on math (Cannon and Ginsburg, 2008)

- Another is that parents are less likely to teach math to girls than to boys (Jacobs et al., 2005)