

# Time Well Spent: Which Home Learning Activities Add Value to Children's Academic Skills in the Prekindergarten Year?

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March 21<sup>st</sup>, 2019

Society for Research on Child Development Biennial Meeting  
Baltimore, MD



# Parental engagement in early childhood and children's academic outcomes

- Parents' engagement in home learning activities is associated with children's academic outcomes in early childhood (Boonk et al., 2018; Fantuzzo et al., 2004; Padilla & Ryan, 2018)
- Nationally, parents appear to be engaging in at-home learning activities at higher levels than ever before (Bassok et al., 2016; Kalil, 2016)
- Yet, interventions that target parent engagement have modest effect sizes at best and typically have little effect on children's skills in the long-term (Kalil, 2015)

# To this literature we add:

- A focus on *skill type*
  - Activities that build *constrained skills* like alphabet knowledge and counting
  - Activities that build *unconstrained skills* like language and problem solving

# Home learning activities to support constrained vs. unconstrained skills in the prekindergarten year

- Unconstrained skills in early childhood are more predictive of longer-term academic outcomes than constrained skills (Snow & Matthews, 2016).
- Larger impacts of prekindergarten programs on constrained vs. unconstrained skills (e.g., Lipsey et al., 2018; Weiland & Yoshikawa, 2013; Wong et al., 2008).
- Home-based activities that can be conceptualized as unconstrained correlate more strongly with outcomes like:
  - reading comprehension (Niklas, Cohreseen, & Tayler, 2016)
  - vocabulary knowledge (Sénéchal, 2006; Sénéchal & LeFevre, 2002)
  - advanced number skills (Ramani et al., 2015)

# Variation in home-based learning by socioeconomic status (SES)

- Significant gaps in at-home learning between higher- and lower-SES families (Bradley et al., 2001; Hart & Risley, 1995)
- Lower-SES families have less money/time to invest during early childhood (Kalil, 2015 ; Muller, 2018; Reardon, 2011)
- SES-based gaps may be largest for activities conceptualized as supporting unconstrained skills (Bassok et al., 2016; Kalil, 2016)
- Academic risk hypothesis – lower-SES children may benefit more from engagement in at-home learning activities (Hamre & Pianta, 2001)

# Research Questions

- To what extent do parents of children enrolled in a public prekindergarten program engage in at-home learning activities that support children's constrained and unconstrained literacy/language and math skills?
- Does engagement in these four domains of at-home learning activities vary by family SES?
- To what extent does parental engagement in these four domains of at-home learning activities predict gains in receptive vocabulary and math skills across the prekindergarten year?
- Do associations between parental engagement in these four domains of at-home learning activities and gains in children's receptive vocabulary and math skills vary by family SES?

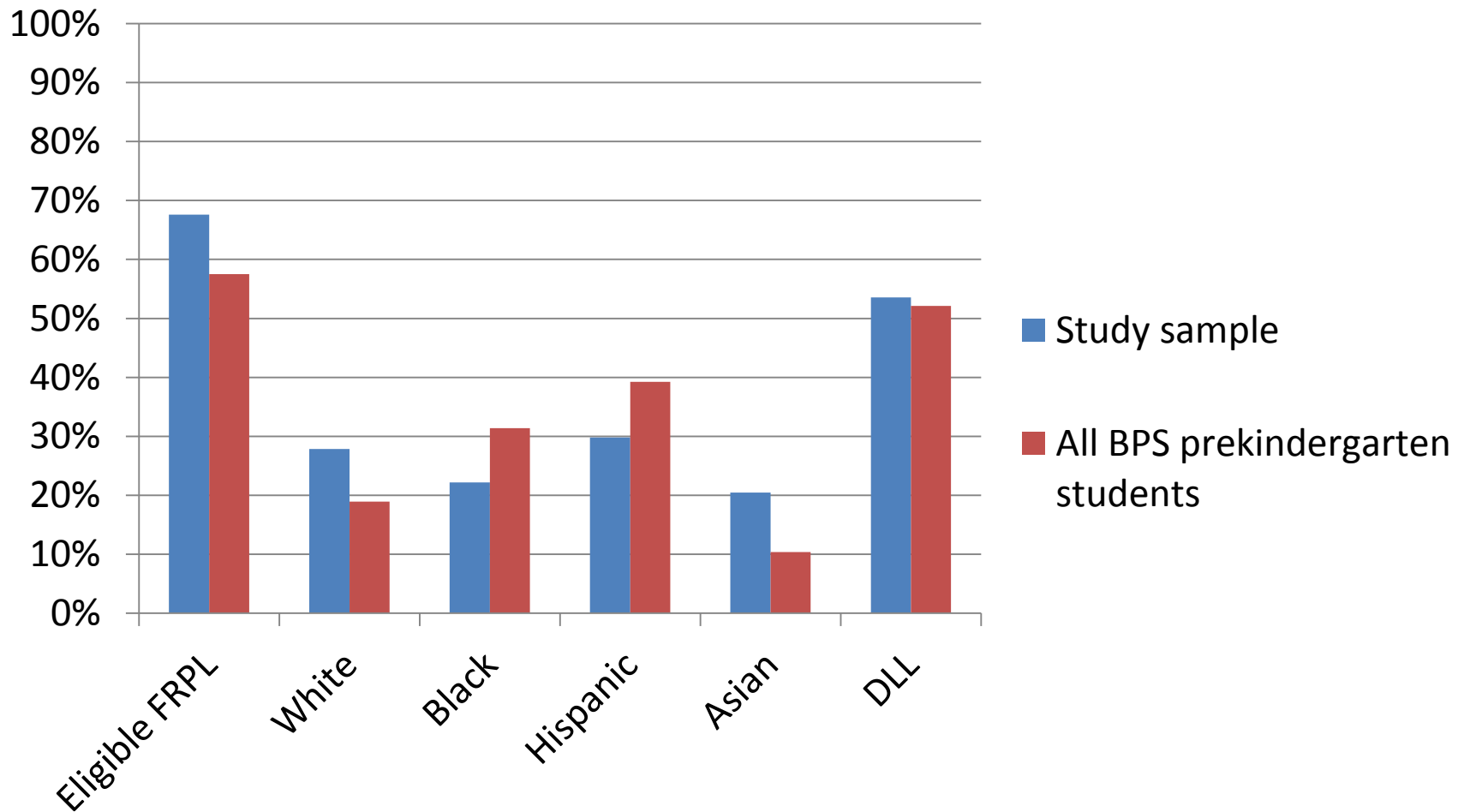
# BPS schools participating in study

## (N = 20 public schools with prekindergarten program)

School-level characteristic	% for study schools	% for school district
School structure: PreK – 5 <sup>th</sup> grade	30%	50%
School structure: PreK – 1 <sup>st</sup> grade	5%	8%
School structure: PreK – 8 <sup>th</sup> grade	55%	32%
% Students economically disadvantaged	48.38%	51.05%
% Students Black	25.59%	31.60%
% Students White	15.70%	16.17%
% Students Hispanic	46.43%	42.37%
% Students Asian	8.50%	5.99%
% Students whose first language is not English	49.15%	41.90%
% Met or exceeded expectations on 2015 – 2016 ELA exam	39.74%	35.95%
% Met or exceeded expectations on 2015 – 2016 math exam	44.47%	41.48%

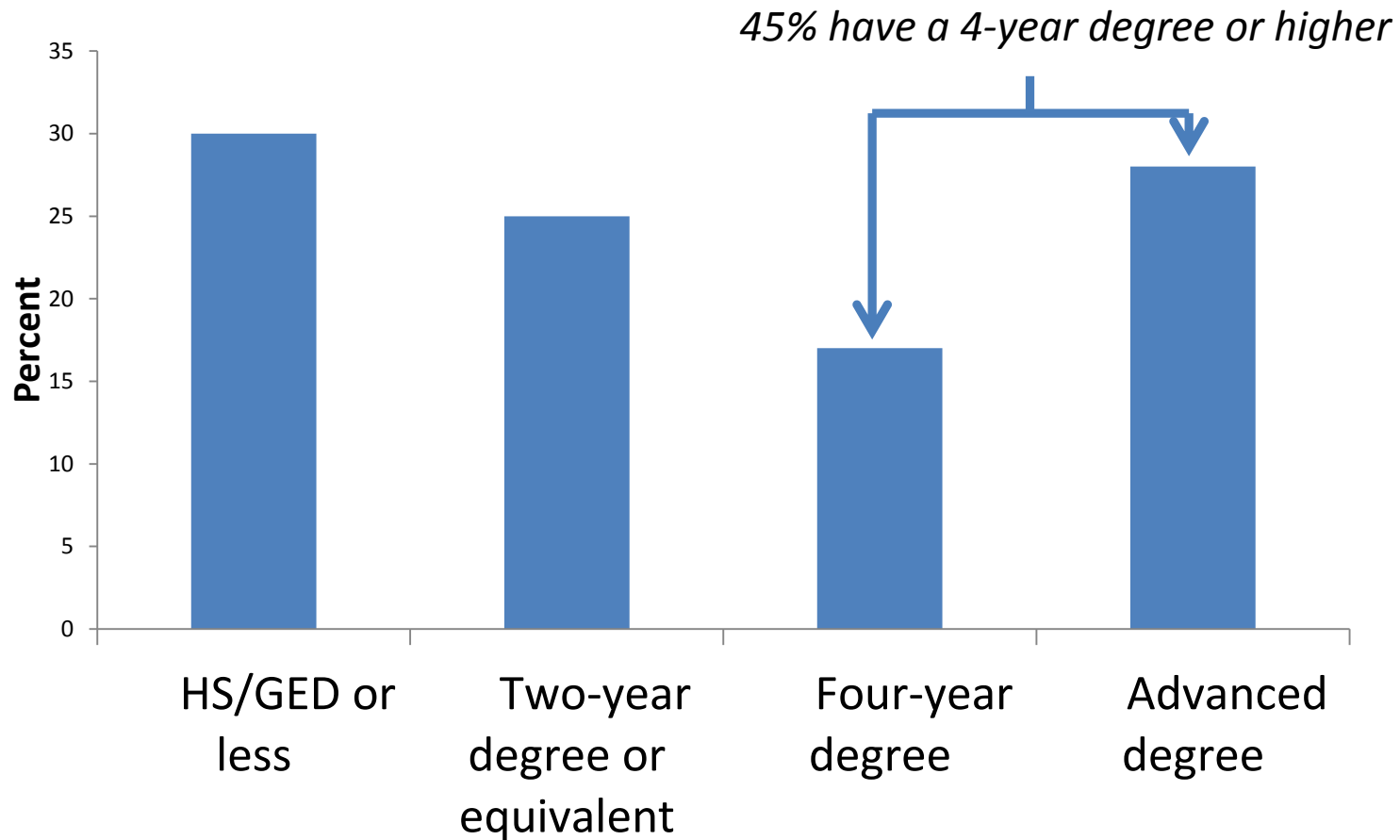
# Student sample

(N = 307 BPS prekindergarten students)





# Parent education



# Measures

- Data sources were child assessments, administrative records, parent survey (with 84% response rate)
- Outcomes measured in the Spring of prekindergarten
  - Math skills: Woodcock Johnson Applied Problems III raw and standardized scores (Woodcock et al., 2001)
  - Language skills: PPVT IV raw and standardized scores (Dunn & Dunn, 2007)
- Indicator for family SES
  - Parental education coded as 4 year college degree or more (1) or less than 4 year college degree (0)
- Covariates measured in Fall of prekindergarten
  - SES (eligible for free/reduced price lunch or not), DLL, race/ethnicity, gender, child's age at time of Fall of prekindergarten assessment, parent age, marital status, parent ed., HH size, & employment, level of the outcome measured in the Fall of prekindergarten

# Measures: Home learning activities to support constrained vs. unconstrained skills (from HSIS parent survey & ECLS-K)

	Constrained	Unconstrained
Literacy/ Language	<ul style="list-style-type: none"> <li>• Show how to read book</li> <li>• Practice writing alphabet letters</li> <li>• Practice sounds letters make</li> <li>• Practice rhyming words</li> <li>• Learn names of letters/words</li> <li>• Practice writing or spelling name</li> </ul>	<ul style="list-style-type: none"> <li>• Read books</li> <li>• Retell/make up stories</li> <li>• Teach about world around them</li> <li>• Talk about world around them</li> <li>• Have child explain parts of storybook</li> <li>• Define/discuss new words</li> <li>• Name objects in books/world around you</li> </ul>
Math	<ul style="list-style-type: none"> <li>• Count number of things you can see/touch</li> <li>• Count out loud</li> <li>• Name/teach/learn shapes</li> <li>• Identify written numerals</li> <li>• Sort by size/color/shape</li> <li>• Teach simple sums</li> </ul>	<ul style="list-style-type: none"> <li>• Play with shape blocks</li> <li>• Talk about how big something is/how much something holds</li> <li>• Practice/teach directional words</li> <li>• Read books about numbers/shapes</li> <li>• Talk about money</li> </ul>

Frequency of items measured on 1 – 4 Likert scale (1= never, 2 = once or twice a week, 3 = three to six times a week, 4 = everyday)

# Analytic approach

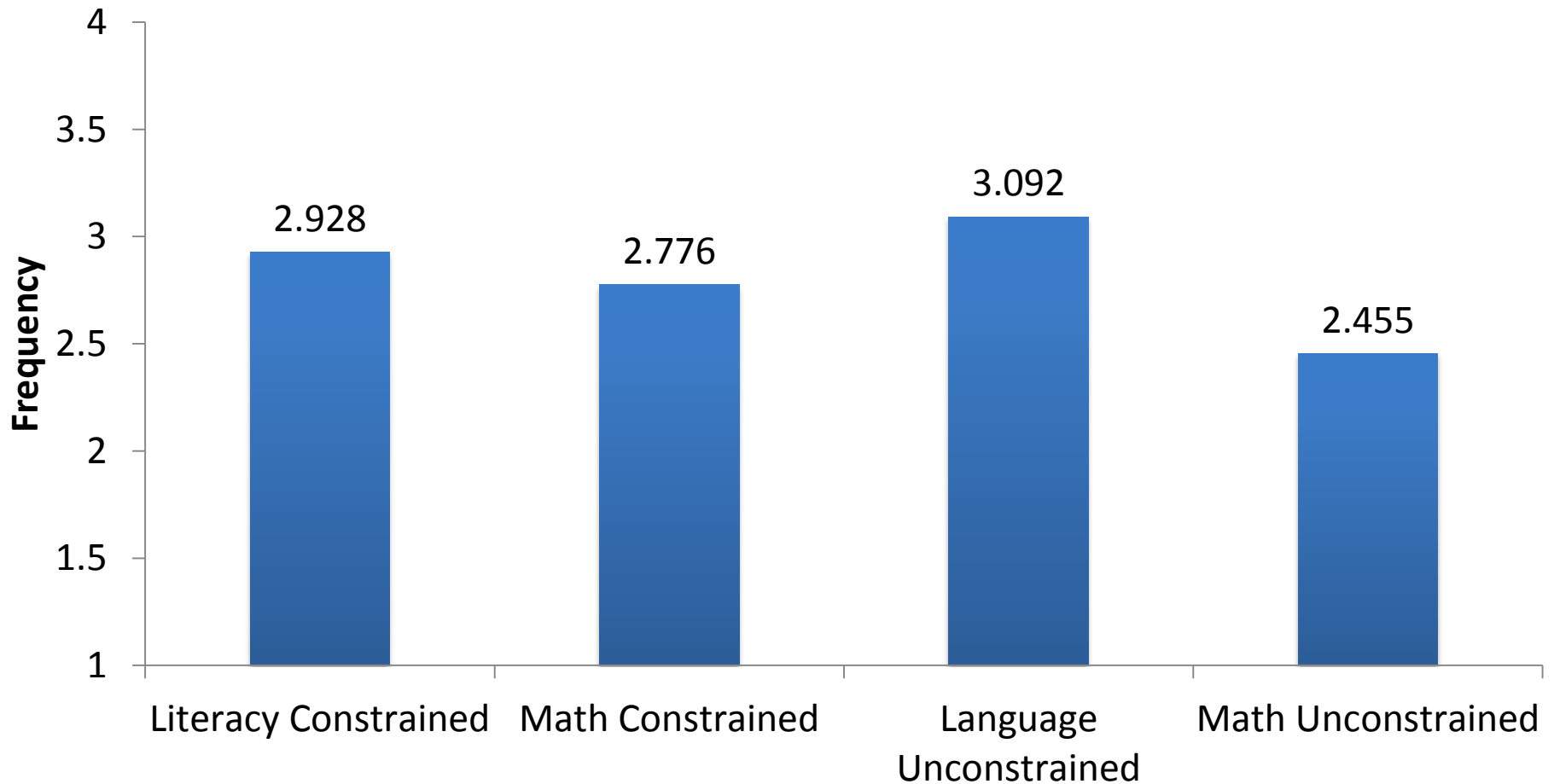
- RQ1 and RQ2:
  - Establish evidence for reliability/validity of learning domains
  - Create domain composites by averaging items and use ANOVA to test for significant differences in overall reports and variation by parental education
- RQ 3 and RQ4:
  - Multi-level models with random intercepts for school.
  - Control for covariates & baseline levels of the outcomes.
  - Interactions between SES dummy and home-based learning domains to test for variation in associations.

# Results: Reasonable psychometrics for key constructs

	Literacy Constrained	Math Constrained	Language Unconstrained	Math Unconstrained
Cronbach's Alpha	0.873	0.815	0.821	0.808

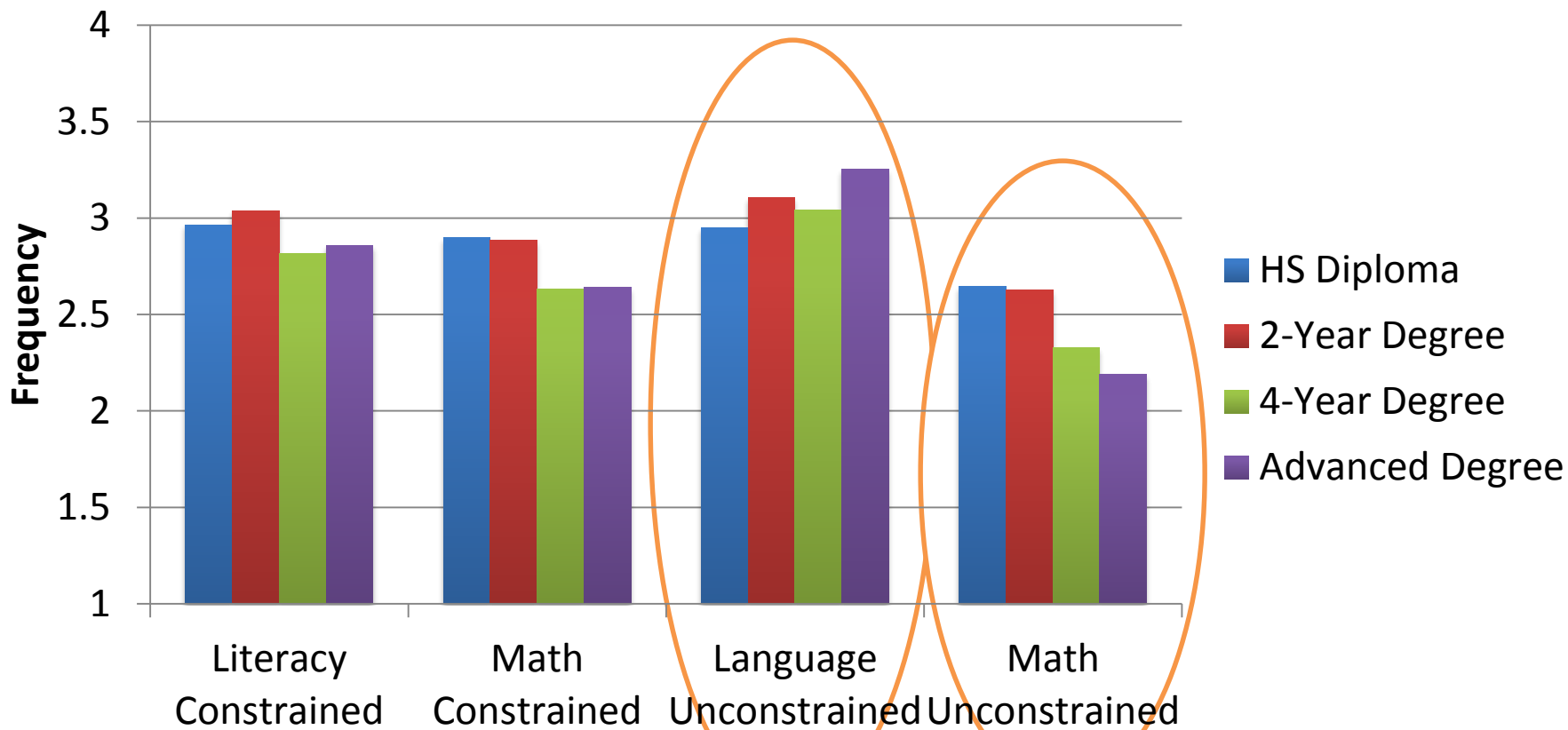
# RQ1: Parental reports of frequency of home learning activities

## Average Weekly Use of Home Learning Activities



# RQ2: Variation in reports of home learning activities by parent education

## Average Weekly Use of Home Learning Activities by Parental Education



# RQ3: Associations between home learning activities and gains in vocabulary

At-home learning domain	(1)	(2)	(3)
Literacy Constrained	-2.198 (2.282)	-2.172 (2.253)	-1.782 (2.230)
Math Constrained	1.475 (3.094)	2.814 (3.093)	1.908 (3.066)
Language Unconstrained	6.628*** (2.338)	5.099** (2.434)	5.893** (2.504)
Math Unconstrained	-4.007* (2.307)	-3.164 (2.364)	-3.027 (2.348)
Child-level covariates		X	X
Family-level covariates			X

Notes: Statistical significance levels are indicated as: \*\*\* = 0.1 percent \*\* = 1 percent; \* = 5 percent.



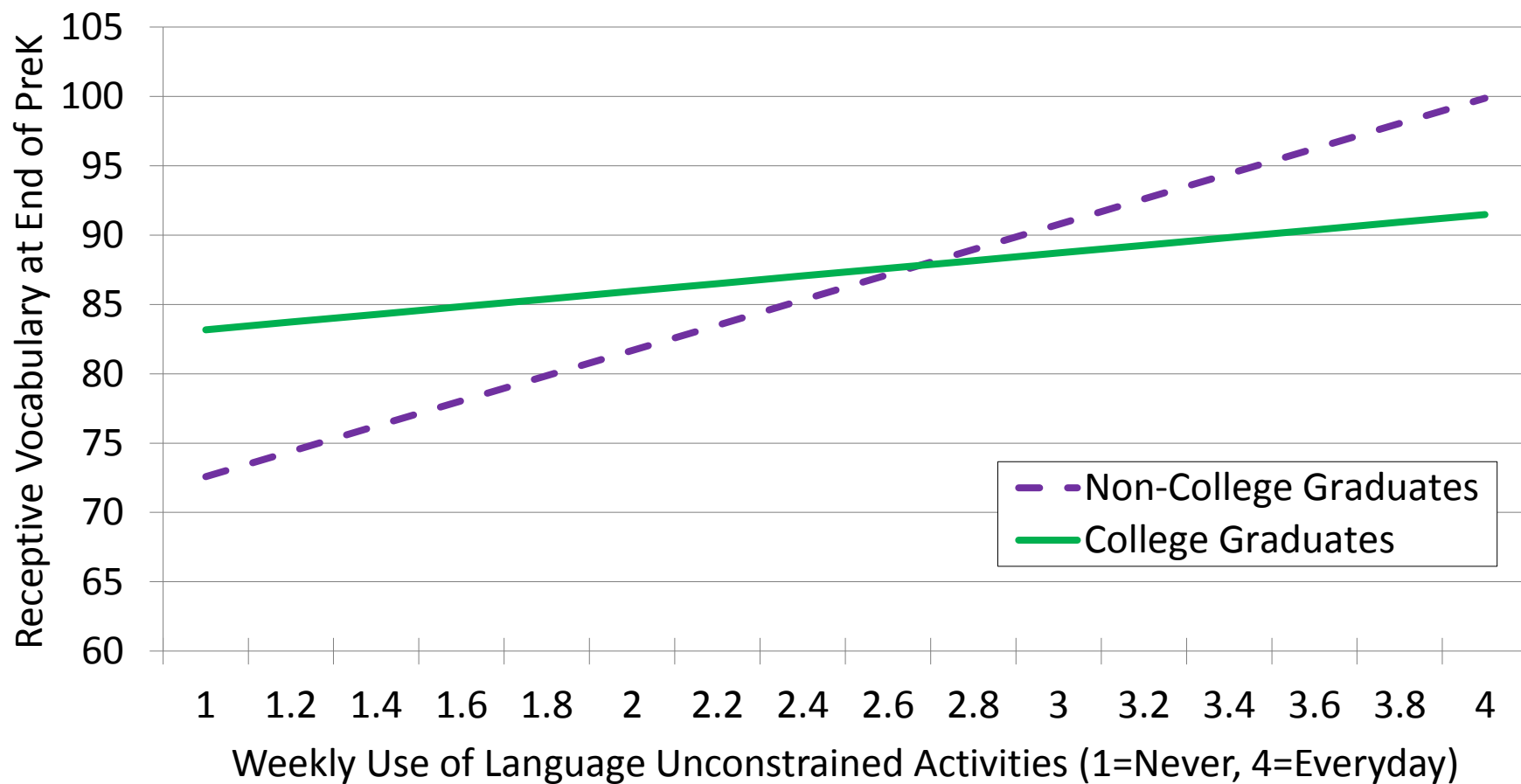
# RQ3: Associations between home learning activities and gains in math skills

At-home learning domain	(1)	(2)	(3)
Literacy Constrained	-0.0400 (0.421)	-0.0669 (0.416)	-0.0216 (0.405)
Math Constrained	-0.665 (0.562)	-0.727 (0.562)	-0.729 (0.544)
Language Unconstrained	-0.0969 (0.412)	-0.118 (0.440)	-0.0813 (0.442)
<b>Math Unconstrained</b>	<b>0.673</b> <b>(0.436)</b>	<b>0.861*</b> <b>(0.442)</b>	<b>0.846**</b> <b>(0.429)</b>
Child-level covariates		X	X
Parent-level covariates			X

Notes: Statistical significance levels are indicated as: \*\*\* = 0.1 percent \*\* = 1 percent; \* = 5 percent.

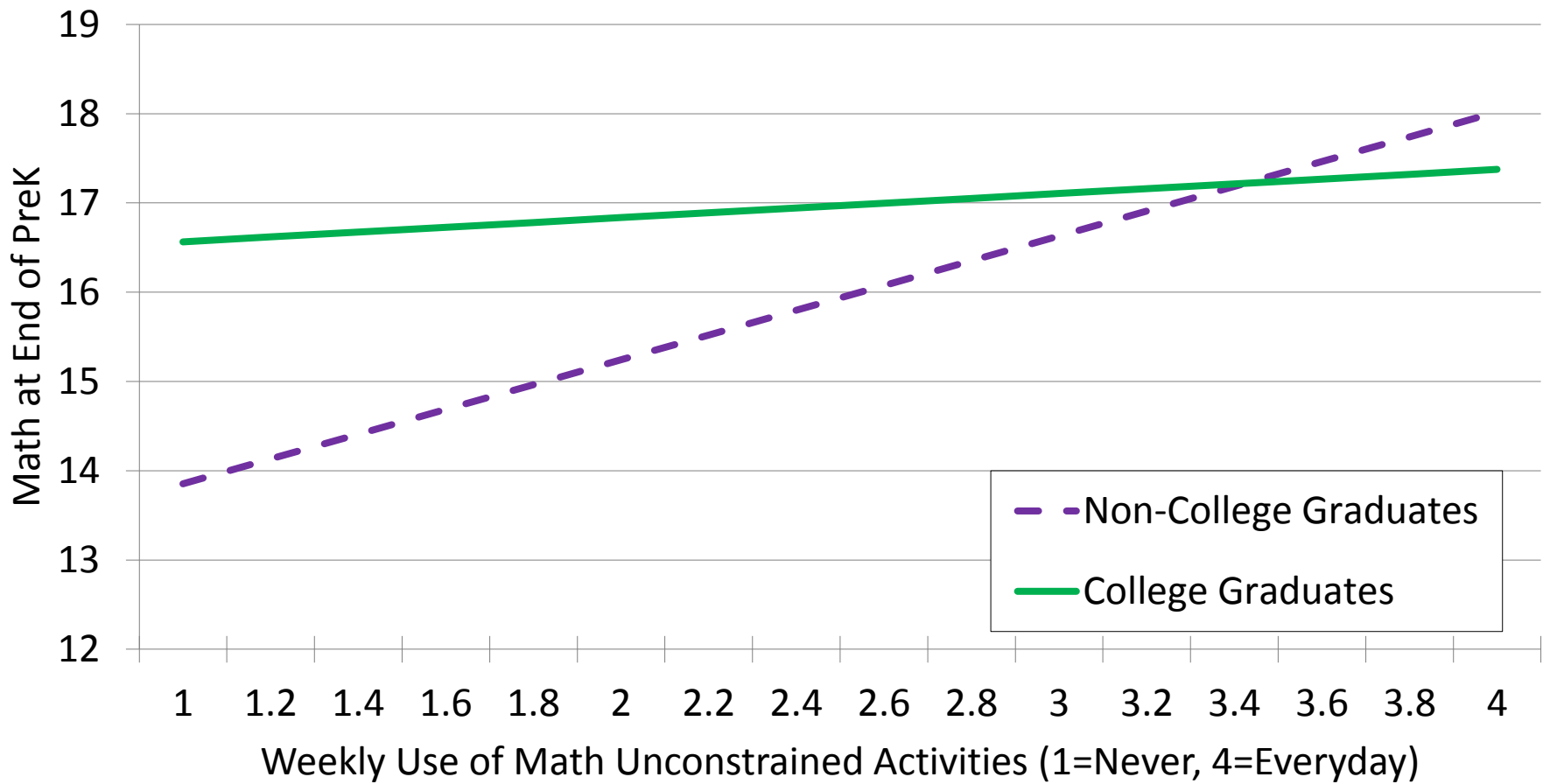
# RQ 4: Variation in vocabulary gains by parental education

## Receptive Vocabulary by Use of Language Unconstrained



# RQ4: Variation in math gains by parental education

## Math by Use of Math Unconstrained



# Limitations

- Non-causal with two time points of data.
- Findings generalize only to children enrolled in prekindergarten during their 4-year-old year.
- Parent reports were collected over a 3 month span with some parents returning surveys earlier in the academic year than others.
- Measure of constrained/unconstrained activities has not been used or validated outside of this study.

# Summary and conclusion

- Reports of engagement in home learning activities were relatively high
  - Parents with **lower parental ed.** reported higher engagement in unconstrained math activities.
  - Parents with **higher parent ed.** reported higher engagement in unconstrained language activities.
- Home learning activities supporting unconstrained skills predicted gains on the hypothesized child skills.
  - Language unconstrained -> vocabulary gains
  - Math unconstrained -> math gains
- Engagement in constrained activities did not predict outcomes.
- Associations were strongest for families with lower levels of parental education
  - Interventions to enhance parental engagement may consider opportunities to increase activities conceptualized as unconstrained

# Thank you to our team!

## MDRC

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# Funding Acknowledgment

The research reported here was supported by the Institute of Education Sciences, Department of Education, through Grant R305N160018 – 17 to MDRC and predoctoral funding through the Institute of Education Sciences, U.S. Department of Education on PR/Award R305B150012.

The opinions expressed are those of the authors and do not represent views of the Institute or U.S. Department of Education.

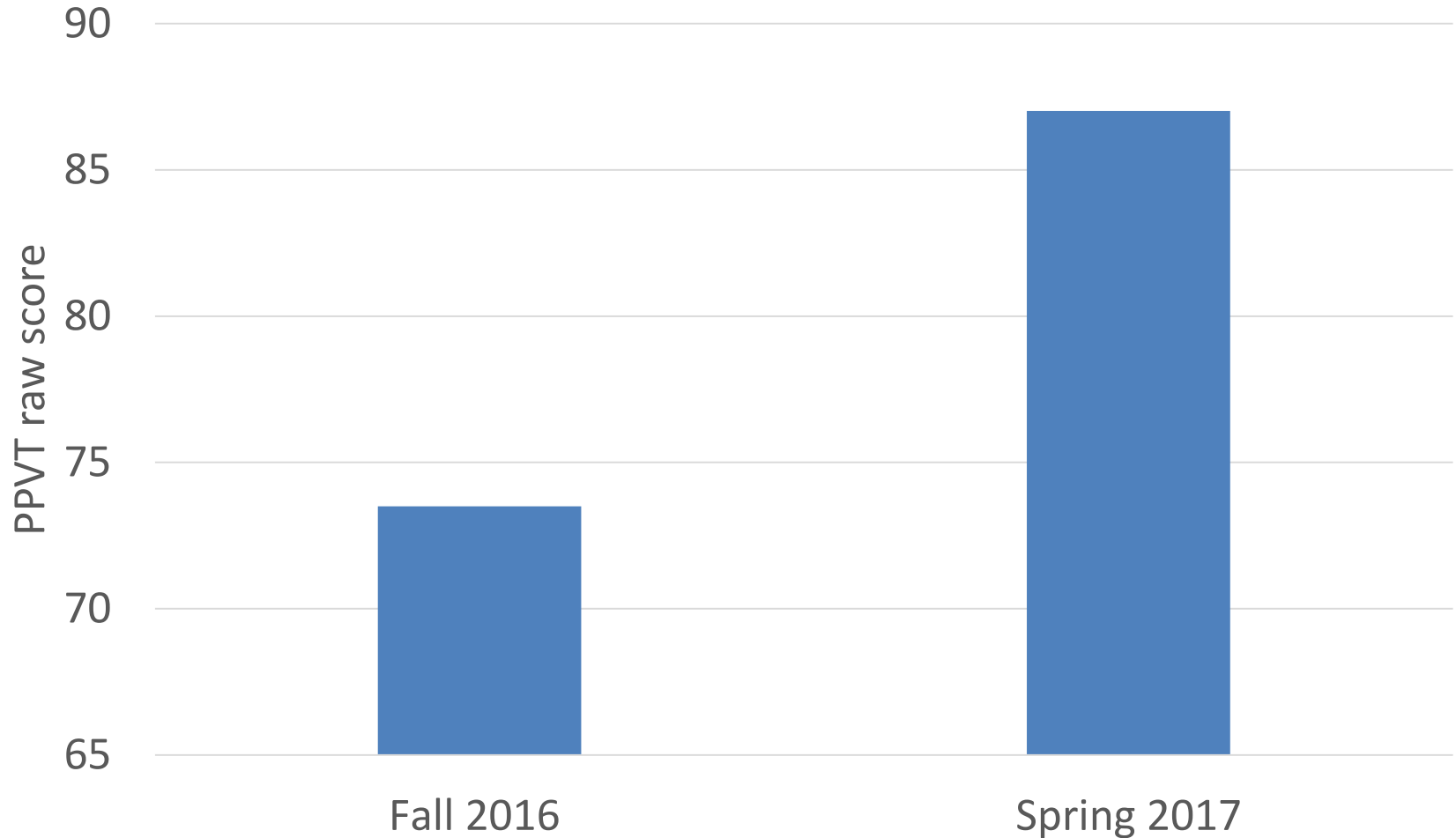


# Supplementary Slides

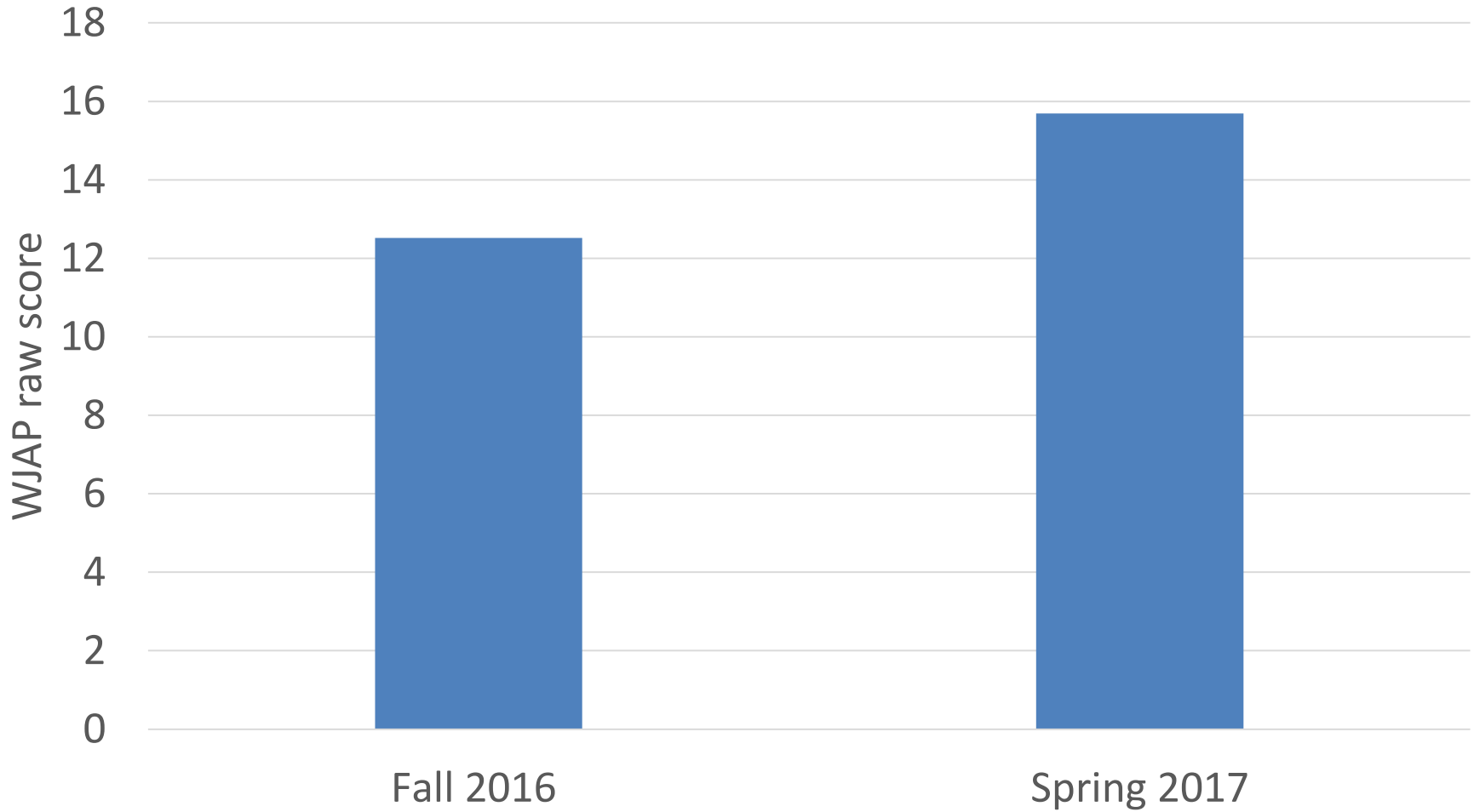




# Receptive Language Skills



# Math Skills



# Fit Statistics for CFA

Fit Statistic	Literacy Constrained	Language Unconstrained	Math Constrained	Math Unconstrained
RMSEA estimate (90% CI)	0.136 (0.103, 0.170)	0.142 (0.116, 0.170)	0.097 (0.063, 0.133)	0.052 (0.000, 0.107)
CFI	0.983	0.927	0.978	0.996
TLI	0.971	0.891	0.963	0.991
WRMR	0.875	1.143	0.736	0.410
N	290	290	286	287

# Correlations Between Constructs

	Literacy Constrained	Math Constrained	Language Unconstrained	Math Unconstrained
Literacy Constrained	1.000			
Math Constrained	0.792***	1.000		
Language Unconstrained	0.646***	0.641***	1.000	
Math Unconstrained	0.695***	0.816***	0.556***	1.000

# Results: Vocabulary Gains by Parental Education

	(1)	(2)	(3)
Language Unconstrained	8.493*** (2.820)	8.199*** (2.890)	9.097*** (2.955)
Language Unconstrained * CollegePlus	-5.033 (3.223)	-6.226* (3.211)	-6.329* (3.231)
CollegePlus	19.00* (10.21)	18.26* (10.07)	16.92* (10.25)
Literacy Constrained	-2.329 (2.260)	-2.102 (2.236)	-2.056 (2.213)
Math Constrained	2.423 (3.095)	3.038 (3.087)	2.503 (3.055)
Math Unconstrained	-3.894* (2.317)	-3.491 (2.351)	-3.411 (2.336)
Child-level covariates		X	X
Parent-level covariates			X

# Results: Math Gains by Parental Education

	(1)	(2)	(3)
Math Unconstrained	1.174** (0.475)	1.326*** (0.480)	1.381*** (0.470)
Math Unconstrained * CollegePlus	-0.848* (0.472)	-1.064** (0.465)	-1.140** (0.456)
CollegePlus	3.244*** (1.219)	3.456*** (1.216)	3.877*** (1.216)
Literacy Constrained	-0.146 (0.412)	-0.179 (0.409)	-0.116 (0.401)
Math Constrained	-0.316 (0.557)	-0.478 (0.555)	-0.515 (0.540)
Language Unconstrained	-0.384 (0.410)	-0.188 (0.431)	-0.257 (0.429)
Child-level covariates		X	X
Parent-level covariates			X