

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

Meghan McCormick

Amanda Ketner

Christina Weiland

JoAnn Hsueh

Jason Sachs

Catherine Snow

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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

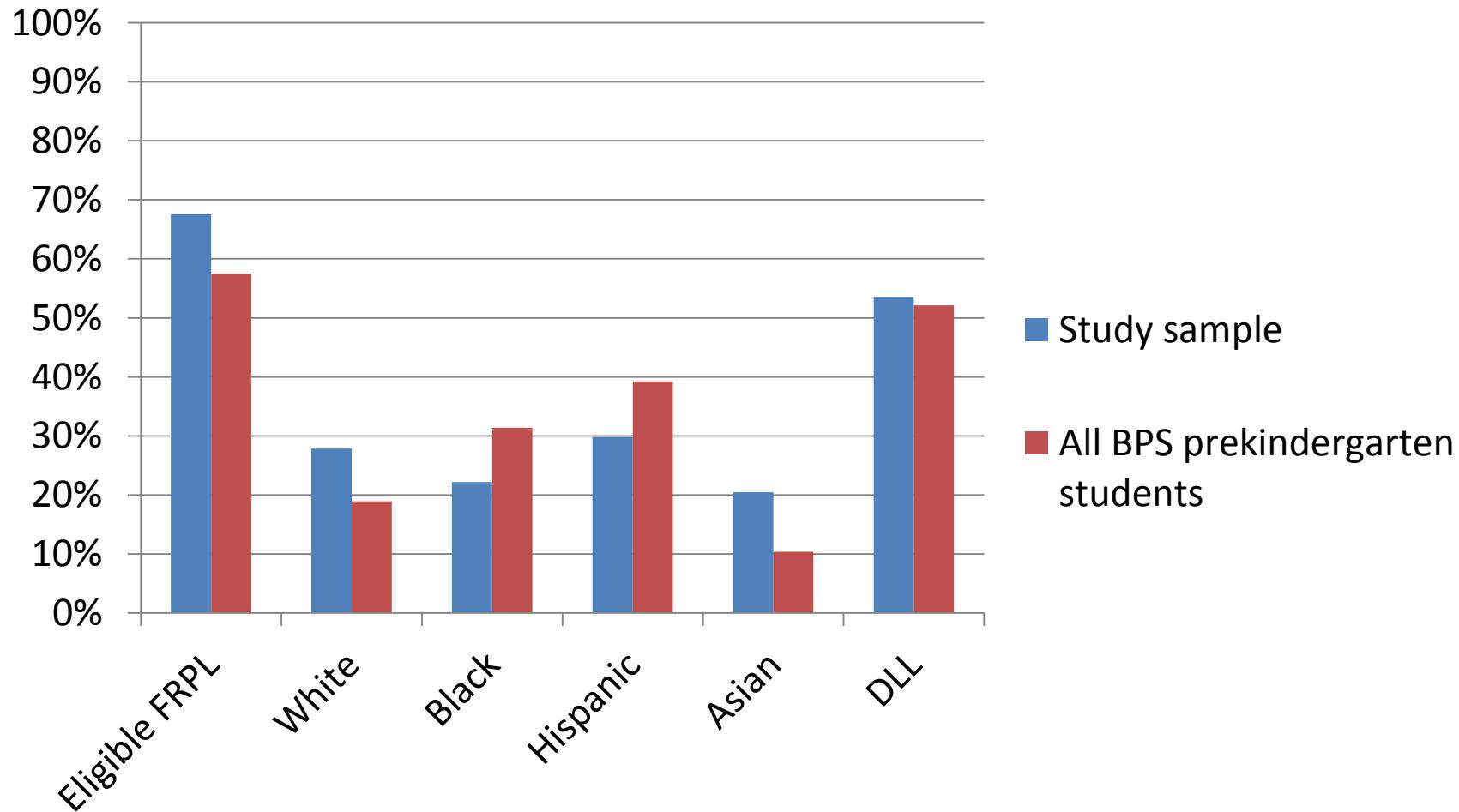
(N = 20 public schools with prekindergarten program)

School-level characteristic	% for study schools	% for school district
School structure: PreK – 5 th grade	30%	50%
School structure: PreK – 1 st grade	5%	8%
School structure: PreK – 8 th 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%

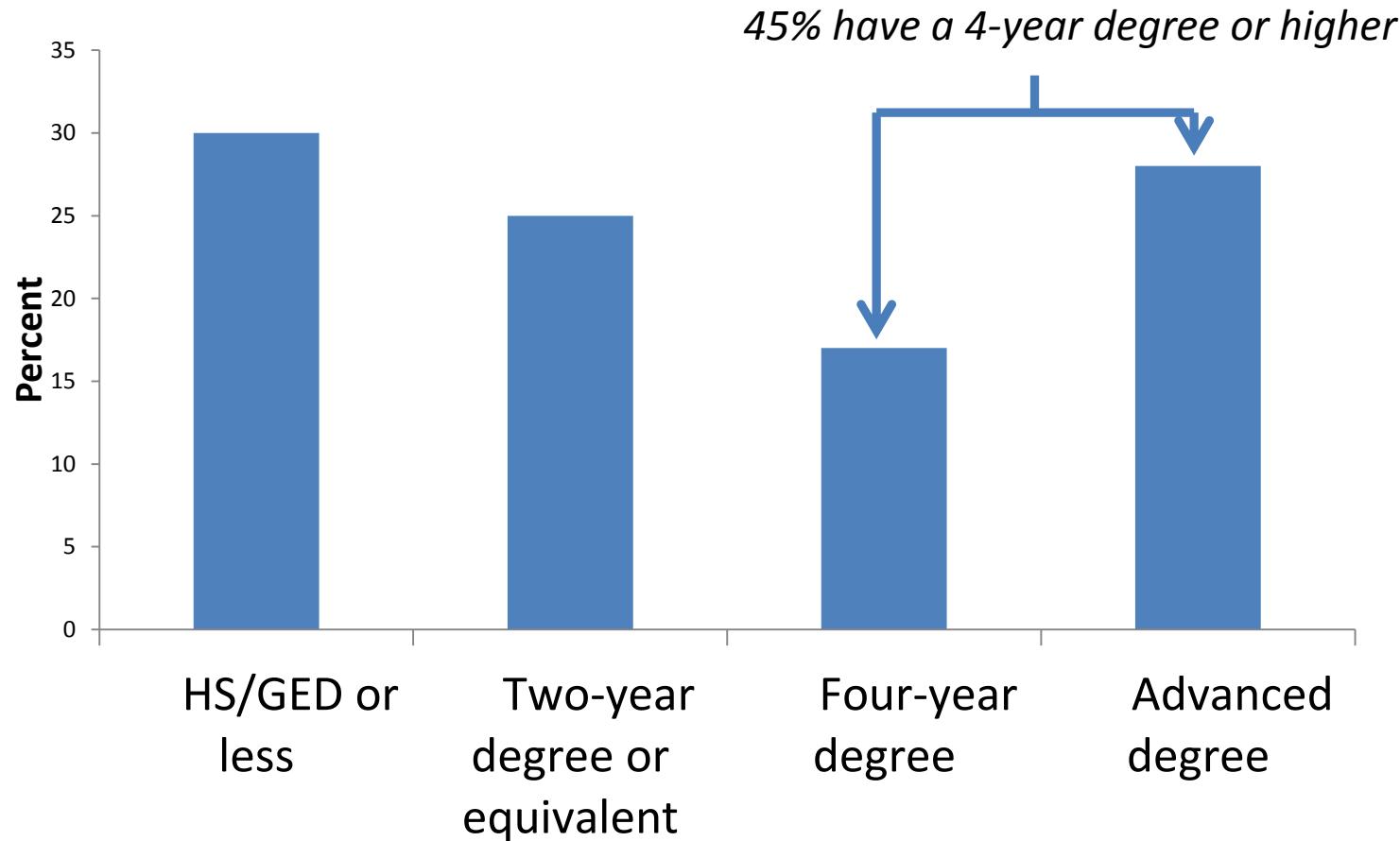


Student sample

($N = 307$ 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">• Show how to read book• Practice writing alphabet letters• Practice sounds letters make• Practice rhyming words• Learn names of letters/words• Practice writing or spelling name	<ul style="list-style-type: none">• Read books• Retell/make up stories• Teach about world around them• Talk about world around them• Have child explain parts of storybook• Define/discuss new words• Name objects in books/world around you
Math	<ul style="list-style-type: none">• Count number of things you can see/touch• Count out loud• Name/teach/learn shapes• Identify written numerals• Sort by size/color/shape• Teach simple sums	<ul style="list-style-type: none">• Play with shape blocks• Talk about how big something is/how much something holds• Practice/teach directional words• Read books about numbers/shapes• Talk about money

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.

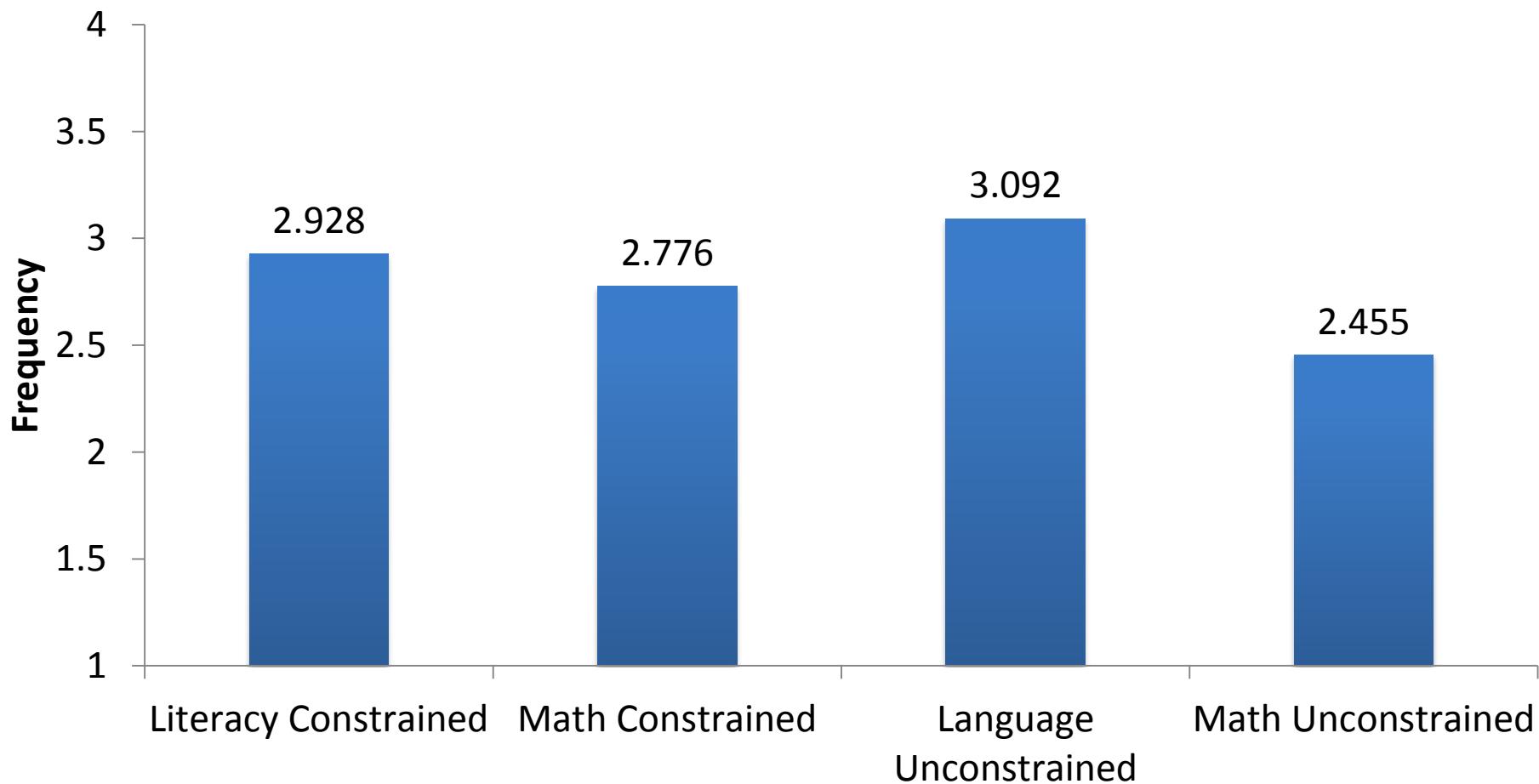


Results: Reasonable psychometrics for key constructs

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

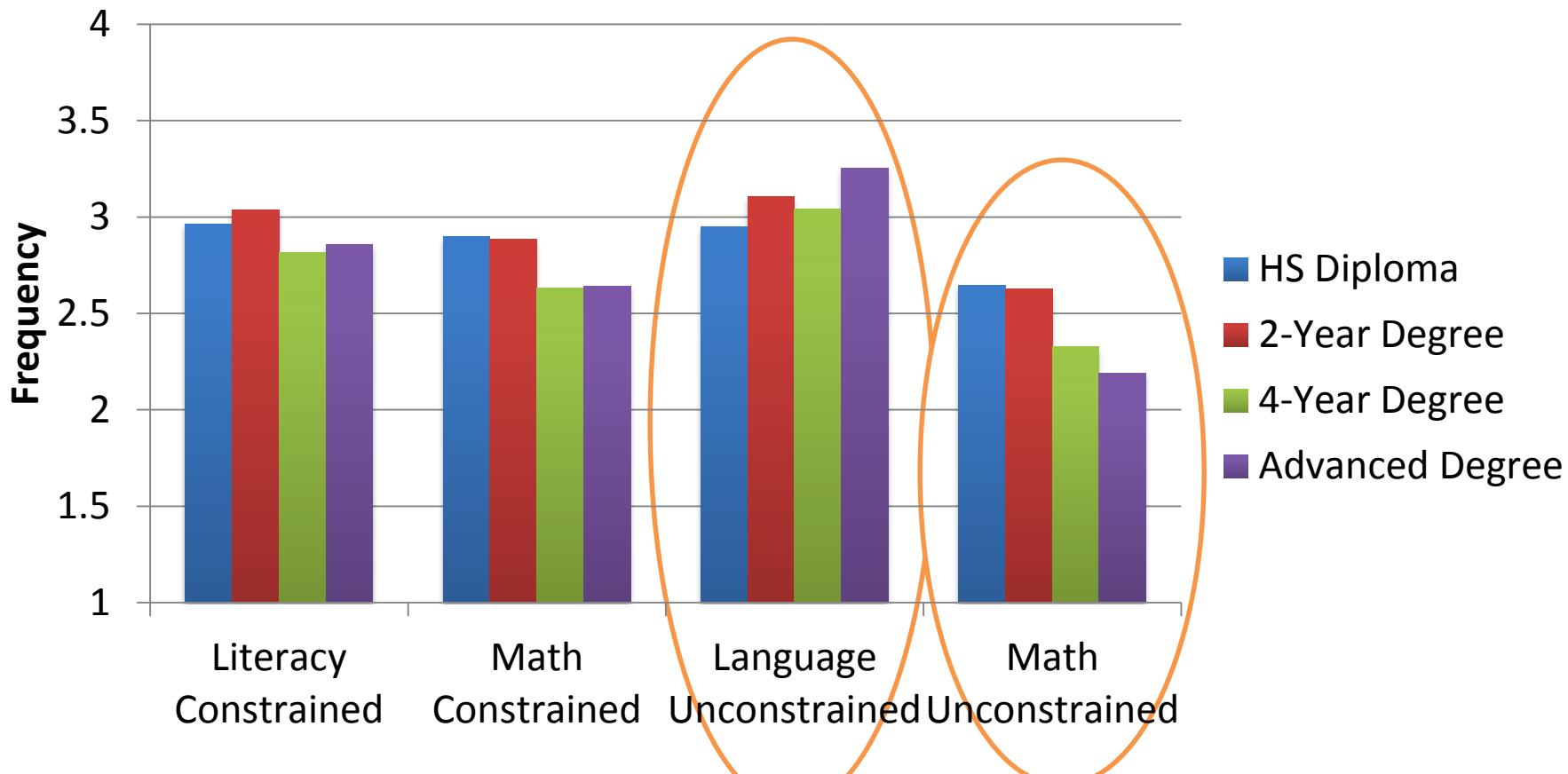
RQ1: Parental reports of frequency of home learning activities

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.

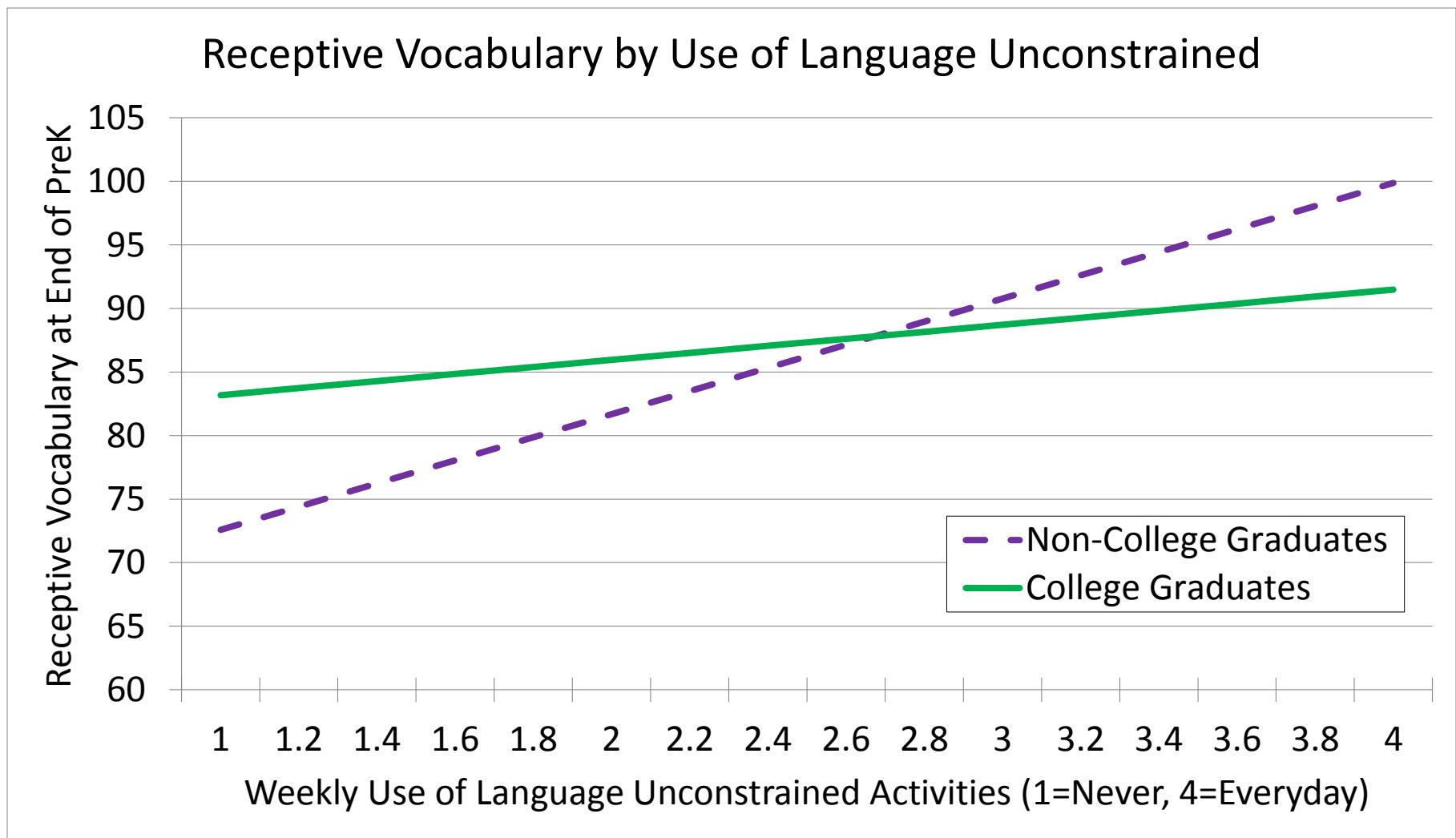


RQ3: Associations between home learning activities and gains in math skills

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)
Math Unconstrained	0.673 (0.436)	0.861* (0.442)	0.846** (0.429)
Child-level covariates		X	X
Parent-level covariates			X

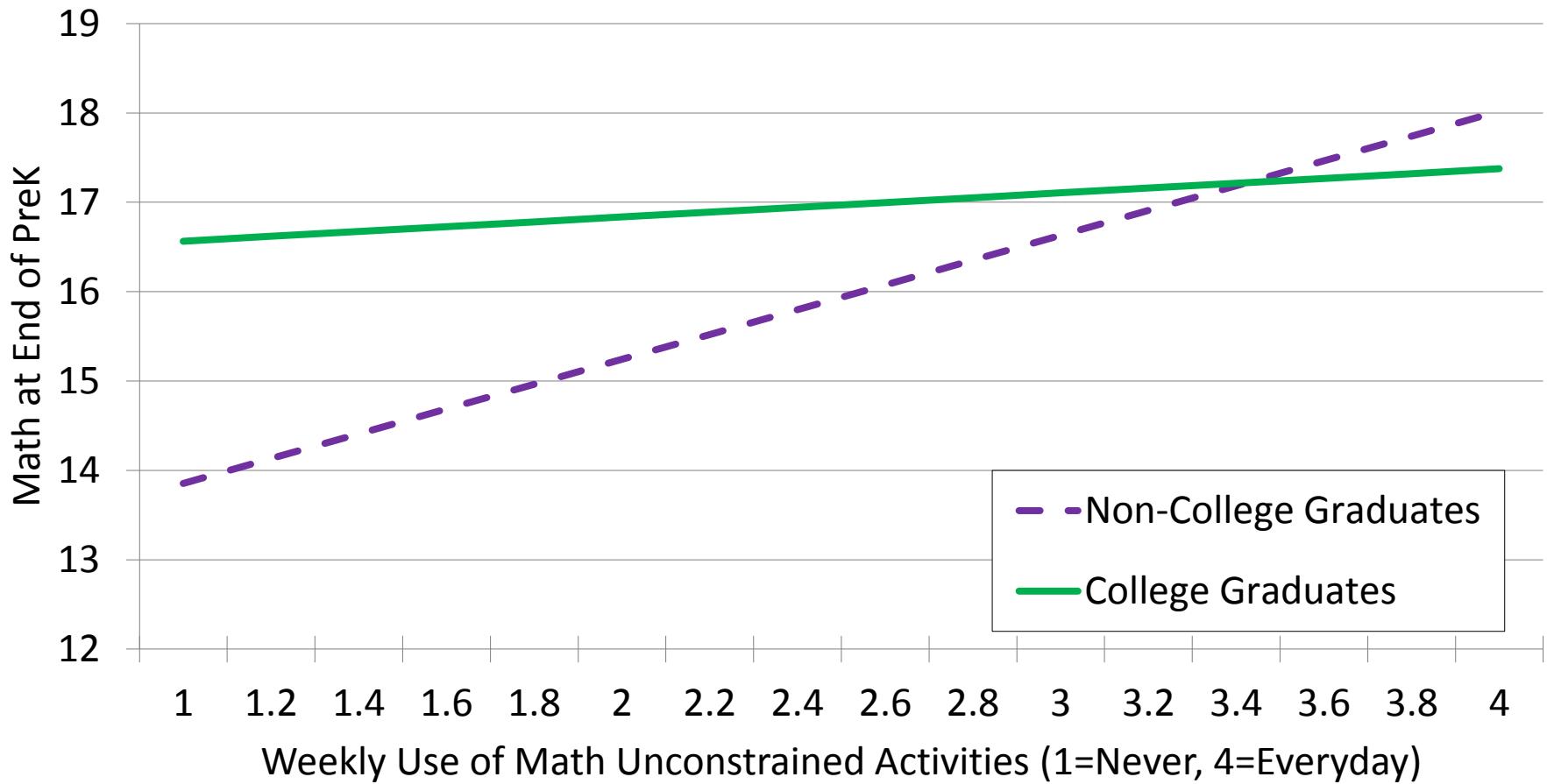
Notes: Statistical significance levels are indicated as: *** = 0.1 percent ** = 1 percent; * = 5 percent.

RQ 4: Variation in vocabulary gains by parental education



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



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Strassberger
Rama Hagos
Sharon Huang
Jared Smith
Desiree Alderson
Ilana Blum
Kelly Terlizzi
Samantha Xia

BPS

Brian Gold
Abby Morales
Marina Boni
Melissa Luc
David Ramsey
BPS Dept. of
Early Childhood
Staff

University of Michigan

Deborah Ball
Lillie Moffett
Paola Rosada
Harvard

Nonie Lesaux
Sibyl Holland
Maia Gokhale
Data collection team



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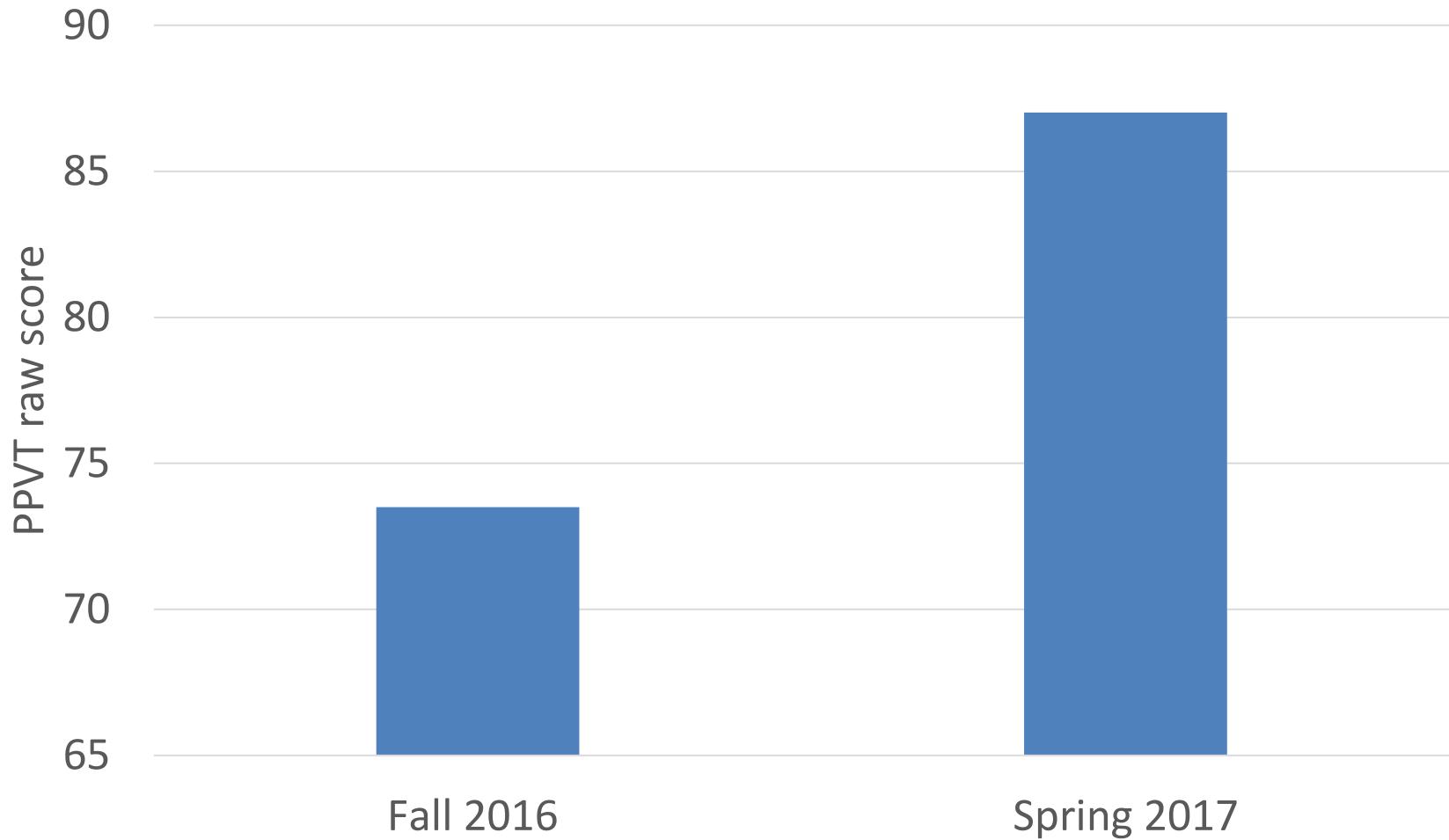
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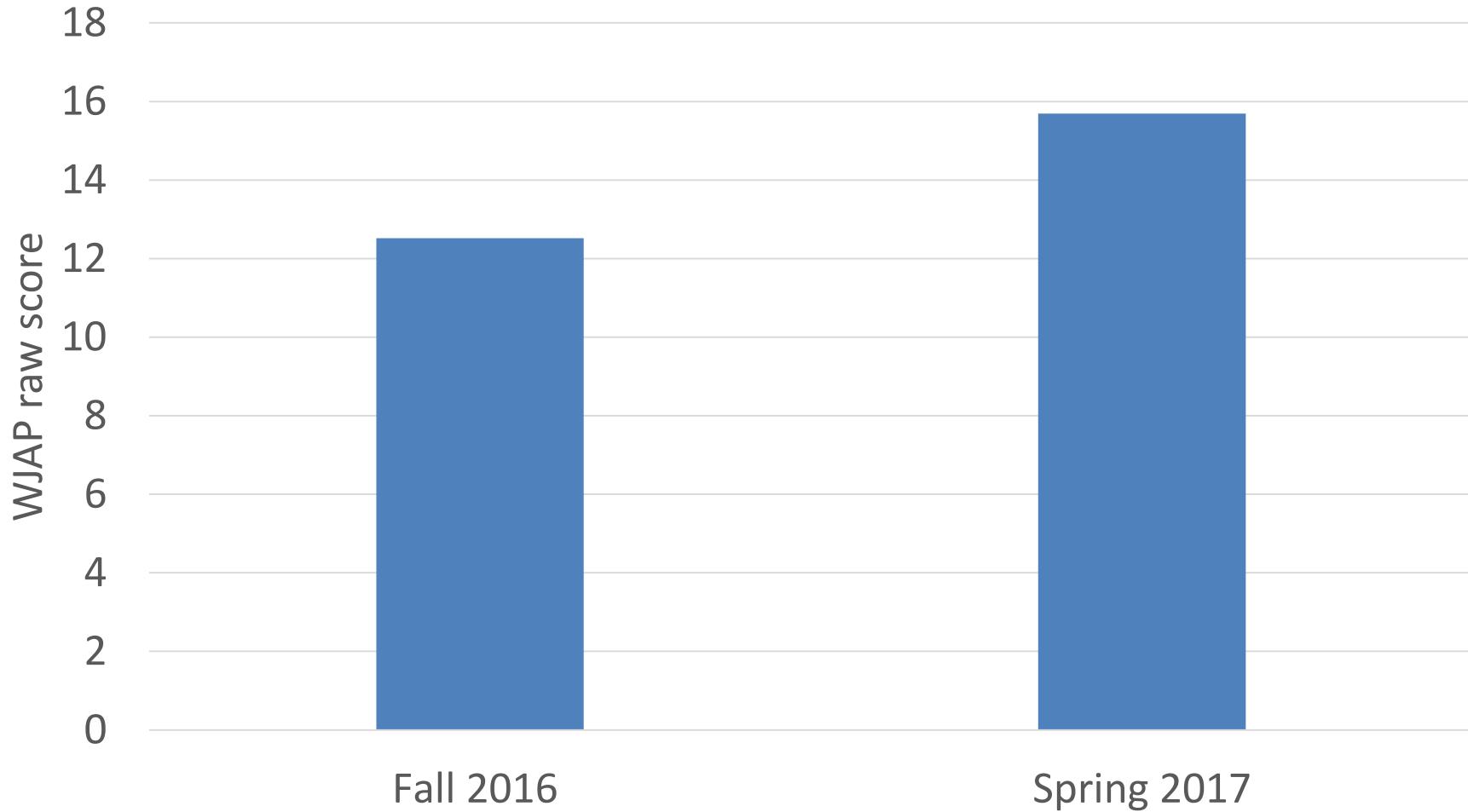
Supplementary Slides



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 *	-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