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Introduction

- Research on minority children's educational outcomes often has focused on risk factors that constrain children's school readiness (Reardon & Galindo, 2009).
- The proposed study focuses on *promotive* factors that can foster math development: children's approaches to learning, home stimulation, parental educational expectations, mathematical instruction that engages children and fosters higher level thinking, amount of math instruction (Crosnoe, Morison et al. 2010).
- This study has three aims:
 - Aim 1:** Document math learning trajectories for African American and Latino children who differ on proficiency in math skills at start of kindergarten.
 - Aim 2:** Analyze how child (approaches to learning), home (stimulating environment, parental expectations), and classroom (math instruction) promotive factors impact the development of mathematical skills for African American and Latino children.
 - Aim 3:** Describe differences in promotive factors between groups of children.

Method

Data: Early Childhood Longitudinal Study - Kindergarten Cohort (ECLS-K).

Participants: African American (N=2,828) and Latino children (N=3,556). Referent group: European American children (N=10,306).

Measures:

Math Proficiency at Kindergarten Entry: Probability scores on the "Relative Size" proficiency level. Includes reading all single-digit numerals, recognizing the next number in a sequence, identifying ordinal position of an object, using nonstandard units of length to compare objects.

Proficient - Receive proficient probability scores of 1.0 or higher.

Not Proficient - Receive proficient probability scores of 0.75 or lower.

Math Proficiency at Kindergarten Entry by Race/ Ethnicity (%)

	Proficient	Not proficient
African American	25%	75%
Latino	22%	78%
European American	52%	48%

- Math Scores:** Conceptual and procedural knowledge, problem solving in number and shape, relative size, ordinality and sequence, addition and subtraction, multiplication and division, place value, rate and measurement, fractions, area and volume. IRT scores from Kindergarten, 1st,3rd, and 5th grades.

- Promotive Factors:** assessed in kindergarten

Child:

- Approaches to Learning:** Composite of teachers' ratings on children's task persistence, attentiveness, eagerness to learn, learning independence, flexibility, and organization (Gresham & Elliott, 1990))

Home:

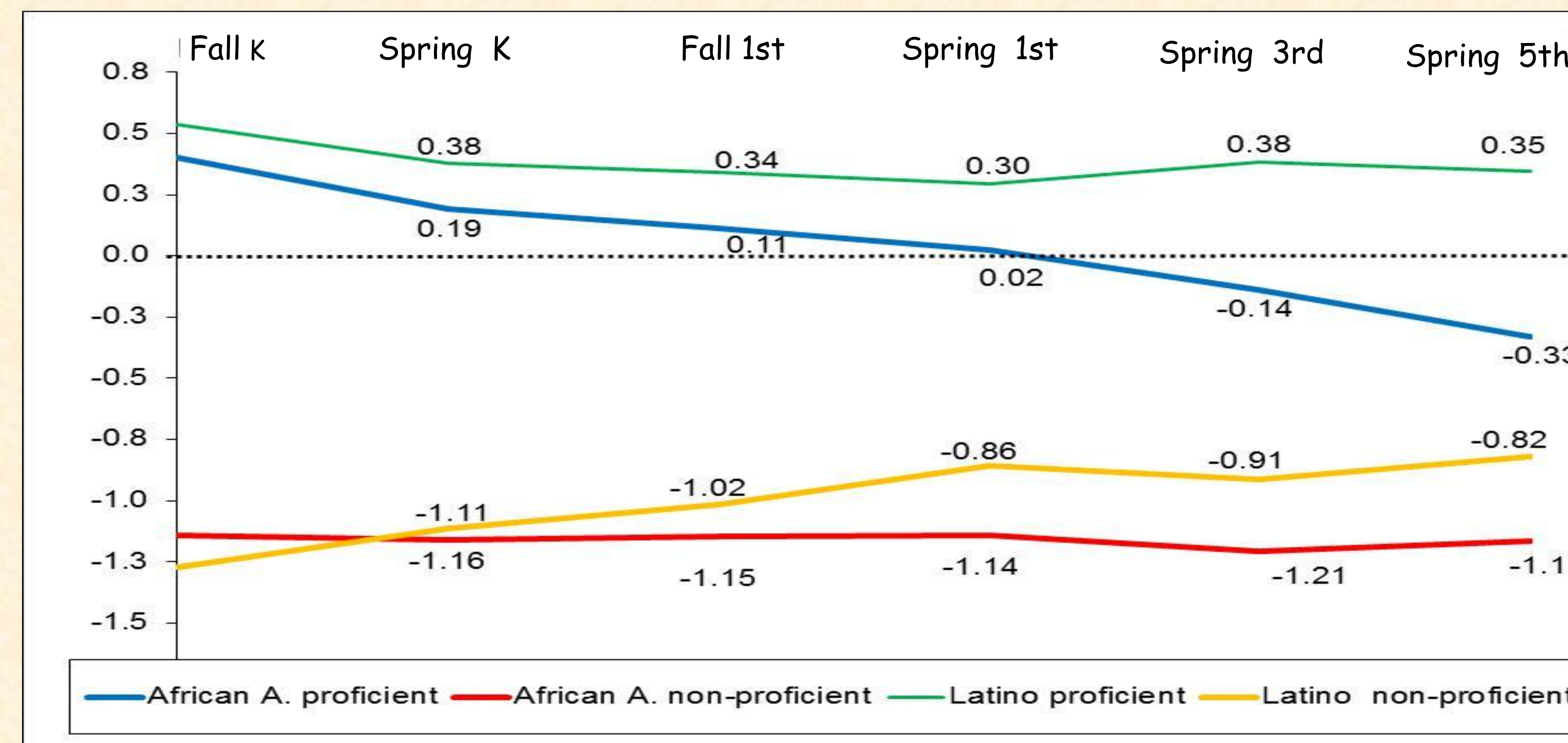
- Home Stimulation:** Composite of home-based activities to promote children's learning: e.g., Parents' ratings of frequency of read books, do arts & crafts, help parents with chores, play games,
- Parents' Expectations:** Expectations that child will complete college or more.

Classroom:

- Math Instruction:** Composite of classroom activities to engage children's interest and foster higher-order thinking. Teachers' ratings of frequency of working with geometric manipulatives, playing math-related games, using music, creative movement/drama to understand concepts, explain how math problem is solved, do math problems from textbook, solve math problems with partners, work on math problems in real-life situations, peer tutoring.
- Amount of Math Instruction:** 0-more than 90 minutes per day

Results

Aim 1. Estimated math achievement gaps for African American and Latino children, by math proficiency (reference group= European American children)



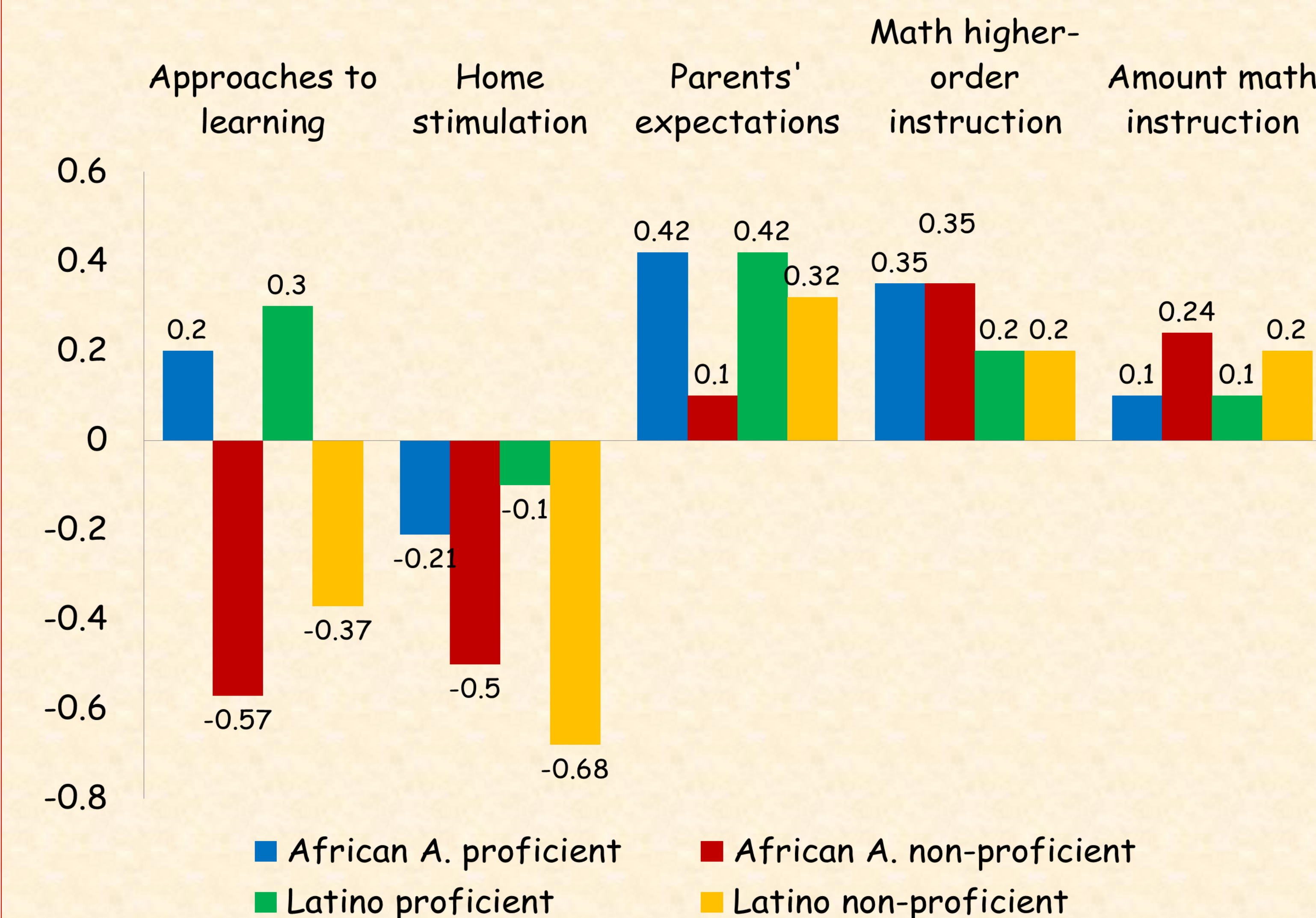
Note. In standard deviation units. Reference group=all European Americans, regardless of proficiency level. All gaps are statistically significant ($p < 0.05$) except for the following: European American-African American proficient in Fall and Spring of First Grade

Aim 2: Estimates of Promotive Factors on Spring of Kindergarten Math Scores, by Race/Ethnicity and Math Proficiency

African American Proficient:		β	SE	p
Child:	Approaches to Learning	1.62	.49	.001
Home:	Home Stimulation	1.96	.90	.03
	Parental Expectations	0.49	.27	.07
Classroom:	Higher Order Math Instruction	0.01	.38	.97
	Amount of Math Instruction	0.30	.42	.47
African American Non-Proficient:		β	SE	p
Child:	Approaches to Learning	2.62	.25	.000
Home:	Home Stimulation	0.38	.44	.38
	Parental Expectations	0.48	.13	.000
Classroom:	Higher Order Math Instruction	-0.02	.29	.93
	Amount of Math Instruction	0.13	.23	.58
Latino Proficient:		β	SE	p
Child:	Approaches to Learning	2.09	.47	.000
Home:	Home Stimulation	1.83	.77	.017
	Parental Expectations	0.27	.25	.286
Classroom:	Higher Order Math Instruction	-0.22	.35	.526
	Amount of Math Instruction	1.05	.43	.015
Latino Non-Proficient:		β	SE	p
Child:	Approaches to Learning	2.57	.24	.000
Home:	Home Stimulation	1.16	.44	.009
	Parental Expectations	0.24	.12	.048
Classroom:	Higher Order Math Instruction	0.38	.18	.038
	Amount of Math Instruction	0.60	.22	.006

Results cont.

Aim 3. Estimated differences in protective factors in kindergarten for African American and Latino children (reference group= European American children)



Note. In standard deviation units. Reference group=all European Americans, regardless of proficiency level. All differences are statistically significant ($p < 0.05$) except amount of math instruction for European American - African American proficient, and for European American-Latino proficient.

Conclusions

- There were significant differences in math development trajectories by math proficiency in kindergarten and by race/ethnicity.
 - Proficient children, regardless of race/ethnicity, showed smaller gaps over time than non-proficient children.
 - African American and Latino non-proficient children's began kindergarten with a substantial math disadvantage compared to European American children. However, African American non-proficient children's achievement gap remain substantial and stable by 5th grade but the Latino non-proficient children's achievement gap was reduced by half.
 - African American and Latino proficient children started kindergarten with a half standard deviation advantage over European children. However, African American children's initial advantage was reduced steadily but Latino children's initial advantage remained stable.
- There were similarities and differences in the association between protective factors and math achievement across the four groups. Children's approaches to learning had a significant influence on math scores for the four groups of children. There were significant differences across the four groups of children in what home and classroom factors promoted end-of-kindergarten math scores. Parents' expectations had a significant influence on African American children and amount of math instruction was important for Latino children.
- There were significant differences relative to European American children in the incidence of promotive factors across all four groups.
- These results support contextual theories of development for understanding children's math development (Bronfenbrenner, 1979, Garcia Coll et al., 1996).