Critical Time Points in Reading Education

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Abstract

Reading is a fundamental aspect that supports all future education and understanding how to allocate scarce resources to support reading comprehension is of paramount importance. Previous research has shown the large impact that socio-economic status and race have on process of reading achievement. Our research examines if there are critical timepoints during reading education based on socio-economic status and race. Data for the study was taken from the nationally representative longitudinal study ECLS K-8 which follows 17,911 Kindergarten students through 7 waves of data starting in 1998 and ends after their 8th-grade year. For the current analysis the sample was grouped based upon race and SES. To simplify the analysis we examined two races, Black and White students, and three levels of SES, Poor, Middle class, and Rich samples. In the model Reading IRT (Item Response Theory) reading scores is used as the outcome during kindergarten, first, and third grade. Biological Sex is included within the groups as a control variable and group means differences were tested using an independent sample t-test. Our main findings show that the growth rate for reading is higher for students in 1st-3rd grade than with students in K-1st grade. Our findings also show that in K-1st male, Black students have a growth rate that is significantly less than white male students, but there was no difference amongst the female populations. However, across all genders and classes in 1st-3rd grades, black students, including black female students, grew significantly less in their reading achievements than white students. This research and finding points to important allocations in schools and future research.

Introduction

Reading education is an incredibly important aspect of elementary school and its implications can be found in adults' lives. In one research paper, the researchers argue that race and socioeconomic status play an important role in science achievement in elementary school (Curran & Kellog, 2016). Another set of research showed that in a twenty year study, it was shown the achievement gap was prevalent with the gap continuing to widen over the years, and low SES Black students always performing lower than low SES White students (Paschall, Gershoff, Kuhfeld, 2018). We argue that these important research findings can be transferred to the implications of reading achievement in elementary school. The achievement gap, particularly with reading, begins in kindergarten and is based on race. Our research attempts to prove this idea and discover where reading intervention needs to begin in elementary school.

Methods

- **ECLS K-8**
  - Data for the study was taken from the nationally representative Longitudinal ECLS K-8 data set. ECLS K-8 follows the Kindergarten Class of 1998-1999 through 7 waves to collect data and ends after their 8th-grade year.
    - Data for the ECLS K-8 study was taken in 7 waves taking place in the Fall of Kindergarten (1998-99), Fall and Spring of 1st Grade (1999,2000), Spring of 3rd Grade (2002), Spring of 5th Grade (2004), and Spring of 8th Grade (2007).
    - Children from the ECLS K-8 study are from both private and public schools
    - Data from the ECLS K-8 study is taken from students, parents, teachers, and schools across the United States
      - These participants provided information on the children's cognitive, social, emotional, and physical development.
    - Data for the ECLS K-8 study was taken from over the phone and questionnaires
- **Study Sample**
  - For the study sample, we divided the total population (17,911) into 12 groups based on Race, Social Economic Status (SES), Biological Sex. Within the race group, we are only studying the Black and White samples. Within the SES group, we are only studying the Poor, Middle, and Rich samples. Biological sex is defined as female and male. Table 1 describes the sample by race, SES, and Bio-sex groups.

Methods

- **Variables**
  - Race: Black and White
  - Biological Sex: Male and Female
  - Social Economic Status:
    - SES was defined based on parental education, parental job prestige, and total household income.
    - SES was defined into quintiles. We examined three to ease interpretation- bottom 20% (poor), middle 20% (middle), and top 20% (rich).
  - Parental Involvement: Parental involvement was a sum of both mother and father helping with homework.
  - Outcome Variable: We looked at Item Response Theory, IRT, scores for both reading and math scores of students in grades kindergarten, first, third, fifth, and eighth grade.
    - IRT scores are explain the relationship between latent traits and their manifestations. They are given by the teacher in both the fall and spring for grades K and 1 and only the spring for grades 3, 5, and 8. We only looked at the IRT scores conducted in the spring for our study

Chart 1- Group Frequencies

Sample Size	Frequency
White, Poor, Male	363
White, Middle, Male	956
White, Rich, Male	1540
White, Poor, Female	327
White, Middle, Female	956
White, Rich, Female	1389
Black, Poor, Male	343
Black, Middle, Male	233
Black, Rich, Male	99
Black, Poor, Female	341
Black, Middle, Female	215
Black, Rich, Female	85

Results

We used an independent sample T-test to test important differences in the groups and their reading scores based on class and race while holding biological sex constant.

Chart 2- Results

Comparison (K-1st)		N	Mean	S.D.	F	Sig.	95% C.I	
							Lower	Upper
Black & White Male	White, Poor, Male	361	20.55	9.62	1.35	0	0.8	3.58
	Black, Poor, Male	340	18.36	9.09				
	White, Middle, Male	955	23.22	8.99	2.68	0	1.19	3.75
	Black, Middle, Male	232	20.75	8.66				
	White, Rich, Male	1539	23.86	8.93	1.31	0.02	0.31	3.97
	Black, Rich, Male	98	21.71	9.54				
Black & White Female	White, Poor, Female	327	21.095	9.39	1.84	0.34	-0.71	2.06
	Black, Poor, Female	341	20.42	8.86				
	White, Middle, Female	953	23.59	8.31	0.19	0.18	-0.39	2.08
	Black, Middle, Female	215	22.74	8.5				
	White, Rich, Female	1386	24.7	8.98	8.61	0.44	-1.18	2.7
	Black, Rich, Female	85	23.94	6.587				

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Chart 3- Results

Comparison (1st-3rd)		N	Mean	S.D.	F	Sig.	95% C.I	
							Lower	Upper
Black & White Male	White, Poor, Male	361	47.01	14.31	0.007	0.002	1.19	5.38
	Black, Poor, Male	340	43.72	13.95				
	White, Middle, Male	955	52.52	12.84	1.55	0	2.92	6.67
	Black, Middle, Male	232	47.72	13.97				
	White, Rich, Male	1539	56.69	12.35	0.158	0	5.52	10.56
	Black, Rich, Male	98	48.65	11.81				
Black & White Female	White, Poor, Female	327	49.67	13.28	0.34	0	3.02	7.04
	Black, Poor, Female	341	44.64	13.19				
	White, Middle, Female	953	53.71	12.17	0.01	0	4.39	8.01
	Black, Middle, Female	215	47.51	12.41				
	White, Rich, Female	1386	57.26	11.96	3.28	0	5.57	10.85
	Black, Rich, Female	85	49.05	13.49				

Chart 3- Results

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	Black, Middle, Male	232	47.72	13.97				
	White, Rich, Male	1539	56.69	12.35	0.158	0	5.52	10.56
	Black, Rich, Male	98	48.65	11.81				
Black & White Female	White, Poor, Female	327	49.67	13.28	0.34	0	3.02	7.04
	Black, Poor, Female	341	44.64	13.19				
	White, Middle, Female	953	53.71	12.17	0.01	0	4.39	8.01
	Black, Middle, Female	215	47.51	12.41				
	White, Rich, Female	1386	57.26	11.96	3.28	0	5.57	10.85
	Black, Rich, Female	85	49.05	13.49				

Discussion/Implications

We saw no significance in Kindergarten to First grade females with their reading scores based on race and socio-economic class. Perhaps, this may be due to the fact that the preparation gap and systematic racism may not be as prevalent in kindergarten rather than in later grades in school. We were surprised that there was not a preparation gap in kindergarten female students, knowing that white students in higher socio-economic situations usually come into kindergarten with more of a base knowledge. This research shows that there is an obvious issue with reading differences amongst race with students. It's important to look at students' daily lives rather than just their reading scores when attempting to shorten this gap in reading achievement. In addition, we propose that more research and intervention in schools should be conducted to also help lessen these gaps in reading amongst races.