Recent Trends in Socioeconomic and Racial School Readiness Gaps at Kindergarten Entry

Sean F. Reardon & Ximena A. Portilla

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Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families

Trend in 90/10 Income Gap in Reading, 1940-2005 Cohorts

Study
- TALENT
- NLS
- HS&B
- NELS
- Add Health
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- ECLS-B

95% CI
Fitted Trend
Trend in 90/10 Income Gap in Math, 1940-2005 Cohorts

Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families

Cohort Birth Year

Study
- TALENT
- NLS
- HS&B
- NELS
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- HLS
- ECLS-B

95% CI

Fitted Trend
Trends in Racial and Income Achievement Gaps, by Birth Cohort

Reading

Math

Achievement Gap (standard deviations)

Birth Year


White-Black Gap
White-Hispanic Gap
90-10 Income Gap
Trends in Academic Achievement Gaps, Age 9

White-Black

White-Hispanic

Achievement Gap (standard deviations)

Approximate Kindergarten Entry Year

Source: Reardon, Robinson, & Weathers (2014)
Trends in Spending on Children, by Family Income, Families with Children 0-5.

Source. Kornrich, *What can Money Buy? Increasing Inequality in Monetary Investments in Young Children*
Top-bottom income quintile preschool enrollment gaps between, 3- and 4-year olds.

Source: Magnuson & Waldfogel. The Role of Early Childhood Education in Changing Income-Related Gaps in Achievement
Black-white preschool enrollment gap: 3- and 4-year olds.

Source: Magnuson & Waldfogel. *The Role of Early Childhood Education in Changing Income-Related Gaps in Achievement*
Hispanic-white preschool enrollment gap: 3- and 4-year olds.

Note: Data from October CPS, data shown are from 3 year moving averages

Source. Magnuson & Waldfogel. The Role of Early Childhood Education in Changing Income-Related Gaps in Achievement
Measuring Trends in School Readiness Gaps, 1998-2010

Data:
- ECLS-K 1998: Kindergarteners in Fall 1998
- ECLS-K 2010: Kindergarteners in Fall 2010

Samples:
- Nationally representative samples
- Restricted to first-time kindergarteners
- Restricted to student not missing race & gender
- All other variables imputed via multiple imputation
- Final N’s = 20,219; 6,606; 16,981
Kindergarten Readiness Measures:

• **Mathematics assessment** (one-one with trained assessor)
  o Administered in English or Spanish
  o We impute otherwise (for non-English/Spanish speaking students)

• **Reading assessment** (one-one with trained assessor)
  o Administered in English to everyone in 2010
  o In 1998 and 2006/07, not available for non-English speaking students

• **Approaches to Learning scale**
  o Parent report
  o Teacher report

• **Self-control scale**
  o Parent report
  o Teacher report

All measures administered in both Fall and Spring of K year
Measures of Readiness Gaps

- Standardize readiness scores
  - Age-adjusted
- Race/ethnic gaps
  - White-Black
  - White-Hispanic
  - Differences in mean scores
  - Disattenuated for measurement error in scores
- Income gaps
  - 90-10 income gap
  - 90-50 income gap
  - 50-10 income gap
  - Disattenuated for measurement error in income and scores
  - See Reardon (2011) for details
Math Achievement Gap Trends

90/10 Gap

Achievement Gap (Standard Deviations)

White-Black Gap

Achievement Gap (Standard Deviations)

White-Hispanic Gap

Achievement Gap (Standard Deviations)
## Income (90/10) School Readiness Gaps at Kindergarten Entry, First-Time Kindergarteners, 1998-2010

<table>
<thead>
<tr>
<th>School Readiness Measure</th>
<th>1998</th>
<th>2006/07</th>
<th>2010</th>
<th>Change</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math score</td>
<td>1.298</td>
<td>1.157</td>
<td>1.192</td>
<td>-0.106 *</td>
<td>-8.2%</td>
</tr>
<tr>
<td></td>
<td>(0.031)</td>
<td>(0.040)</td>
<td>(0.033)</td>
<td></td>
<td>(0.045)</td>
</tr>
<tr>
<td>Reading score</td>
<td>1.262</td>
<td>1.001</td>
<td>1.072</td>
<td>-0.190 ***</td>
<td>-15.1%</td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
<td>(0.062)</td>
<td>(0.030)</td>
<td></td>
<td>(0.049)</td>
</tr>
<tr>
<td>Self-control (teacher-reported)</td>
<td>0.504</td>
<td>0.554</td>
<td>0.050</td>
<td></td>
<td>10.0%</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td>(0.034)</td>
<td>(0.047)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-control (parent-reported)</td>
<td>0.474</td>
<td>0.473</td>
<td>-0.001</td>
<td></td>
<td>-0.1%</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.031)</td>
<td>(0.040)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approaches to learning (teacher-reported)</td>
<td>0.642</td>
<td>0.592</td>
<td>-0.050</td>
<td>-7.8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.038)</td>
<td>(0.046)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approaches to learning (parent-reported)</td>
<td>0.477</td>
<td>0.507</td>
<td>0.030</td>
<td></td>
<td>6.2%</td>
</tr>
<tr>
<td></td>
<td>(0.042)</td>
<td>(0.030)</td>
<td>(0.051)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ tabulations from Early Childhood Longitudinal Studies (ECLS-K 1998; ECLS-B; and ECLS-K 2010). All gaps are measured in population standard deviation units. Standard errors in parentheses. † p <.10; * p <.05; ** p <.01; *** p <.001.
### Income (50/10, 90/50) school readiness gaps at kindergarten entry, first-time kindergarteners, 1998-2010

<table>
<thead>
<tr>
<th>School Readiness Measure</th>
<th>Income Gap</th>
<th>Change in Gap (1998-2010)</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1998</td>
<td>2006/07</td>
<td>2010</td>
</tr>
<tr>
<td>50/10 income gap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math score</td>
<td>0.619</td>
<td>0.407</td>
<td>0.582</td>
</tr>
<tr>
<td></td>
<td>(0.031)</td>
<td>(0.037)</td>
<td>(0.031)</td>
</tr>
<tr>
<td>Reading score</td>
<td>0.611</td>
<td>0.357</td>
<td>0.506</td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
<td>(0.053)</td>
<td>(0.029)</td>
</tr>
<tr>
<td>90/50 income gap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math score</td>
<td>0.680</td>
<td>0.750</td>
<td>0.610</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.042)</td>
<td>(0.028)</td>
</tr>
<tr>
<td>Reading score</td>
<td>0.652</td>
<td>0.644</td>
<td>0.567</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td>(0.057)</td>
<td>(0.031)</td>
</tr>
</tbody>
</table>

Source: Authors' tabulations from Early Childhood Longitudinal Studies (ECLS-K 1998; ECLS-B; and ECLS-K 2010).

All gaps are measured in population standard deviation units. Standard errors in parentheses. † p <.10; *p <.05; **p <.01; ***p <.001.
White-Black school readiness gaps at kindergarten entry, first-time kindergarteners, 1998-2010

<table>
<thead>
<tr>
<th>School Readiness Measure</th>
<th>White-Black Gap</th>
<th>Change in Gap</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1998</td>
<td>2006/07</td>
<td>2010</td>
</tr>
<tr>
<td>Math score</td>
<td>0.626</td>
<td>0.559</td>
<td>0.546</td>
</tr>
<tr>
<td></td>
<td>(0.034)</td>
<td>(0.056)</td>
<td>(0.028)</td>
</tr>
<tr>
<td>Reading score</td>
<td>0.396</td>
<td>0.325</td>
<td>0.319</td>
</tr>
<tr>
<td></td>
<td>(0.040)</td>
<td>(0.053)</td>
<td>(0.039)</td>
</tr>
<tr>
<td>Self-control (teacher-reported)</td>
<td>0.442</td>
<td>0.315</td>
<td>0.315</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td>(0.032)</td>
<td>(0.048)</td>
</tr>
<tr>
<td>Self-control (parent-reported)</td>
<td>0.026</td>
<td>-0.017</td>
<td>-0.043</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td>(0.040)</td>
<td>(0.053)</td>
</tr>
<tr>
<td>Approaches to learning (teacher-reported)</td>
<td>0.382</td>
<td>0.264</td>
<td>0.264</td>
</tr>
<tr>
<td></td>
<td>(0.031)</td>
<td>(0.028)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>Approaches to learning (parent-reported)</td>
<td>0.200</td>
<td>0.154</td>
<td>0.154</td>
</tr>
<tr>
<td></td>
<td>(0.031)</td>
<td>(0.034)</td>
<td>(0.046)</td>
</tr>
</tbody>
</table>

Source: Authors’ tabulations from Early Childhood Longitudinal Studies (ECLS-K 1998; ECLS-B; and ECLS-K 2010). All gaps are measured in population standard deviation units. Standard errors in parentheses. † p <.10; * p <.05; ** p <.01; *** p <.001.
## White-Hispanic school readiness gaps at kindergarten entry, first-time kindergarteners, 1998-2010

<table>
<thead>
<tr>
<th>School Readiness Measure</th>
<th>White-Hispanic Gap</th>
<th>Change in Gap (1998-2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1998</td>
<td>2006/07</td>
</tr>
<tr>
<td>Math score</td>
<td>0.784</td>
<td>0.578</td>
</tr>
<tr>
<td></td>
<td>(0.034)</td>
<td>(0.048)</td>
</tr>
<tr>
<td>Reading score</td>
<td>0.559</td>
<td></td>
</tr>
<tr>
<td>Self-control (teacher-reported)</td>
<td>0.150</td>
<td>0.090</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.035)</td>
</tr>
<tr>
<td>Self-control (parent-reported)</td>
<td>0.021</td>
<td>0.118</td>
</tr>
<tr>
<td></td>
<td>(0.024)</td>
<td>(0.029)</td>
</tr>
<tr>
<td>Approaches to learning (teacher-reported)</td>
<td>0.223</td>
<td>0.107</td>
</tr>
<tr>
<td></td>
<td>(0.028)</td>
<td>(0.030)</td>
</tr>
<tr>
<td>Approaches to learning (parent-reported)</td>
<td>0.341</td>
<td>0.370</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.027)</td>
</tr>
</tbody>
</table>

Source: Authors’ tabulations from Early Childhood Longitudinal Studies (ECLS-K 1998; ECLS-B; and ECLS-K 2010).

All gaps are measured in population standard deviation units. Standard errors in parentheses. † p < .10; *p < .05; **p < .01; ***p < .001.
Math Achievement Gap Fall-Spring Change, 1998-2010

90/10 Gap

White-Black Gap

Hispanic-White Gap

Achievement Gap (Standard Deviations)

Fall K | Spring K

Fall K | Spring K

Fall K | Spring K

Achievement Gap (Standard Deviations)

1998

2010
Reading Achievement Gap Fall-Spring Change, 1998-2010

90/10 Gap

White-Black Gap

Hispanic-White Gap

Achievement Gap (Standard Deviations)

Fall K  Spring K

Fall K  Spring K

Fall K  Spring K
Trends in White-Black Academic Achievement Gaps, Grades K-4

**Reading**

- Main NAEP, Age 9 Gap
- LTT NAEP, Grade 4 Gap
- ECLS Studies, Kindergarten Gap

**Math**

- Main NAEP, Age 9 Gap
- LTT NAEP, Grade 4 Gap
- ECLS Studies, Kindergarten Gap
Trends in White-Hispanic Academic Achievement Gaps, Grades K-4

**Reading**

- Main NAEP, Age 9 Gap
- LTT NAEP, Grade 4 Gap
- ECLS Studies, Kindergarten Gap

**Math**

- Main NAEP, Age 9 Gap
- LTT NAEP, Grade 4 Gap
- ECLS Studies, Kindergarten Gap
Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families

Trend in 90/10 Income Gap in Reading, 1940-2005 Cohorts

Study
- TALENT
- NLS
- HS&B
- NELS
- Add Health
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- ECLS-B

95% CI
Fitted Trend
Trend in 90/10 Income Gap in Reading, 1940-2005 Cohorts

Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families

Cohort Birth Year

Study
- TALENT
- NLS
- HS&B
- NELS
- Add Health
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- ECLS-B
- ECLS-K 2010

95% CI

Fitted Trend
Trend in 90/10 Income Gap in Reading, 1940-2005 Cohorts

Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families

Cohort Birth Year

Study

- TALENT
- NLS
- HS&B
- NELS
- Add Health
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- ECLS-B
- ECLS-K 2010

95% CI

Fitted Trend

Kindergarten Trend
Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families

Trend in 90/10 Income Gap in Math, 1940-2005 Cohorts

- TALENT
- NLS
- HS&B
- NELS
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- HLS
- ECLS-B

95% CI
Fitted Trend
Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families

Study
- TALENT
- NLS
- HS&B
- NELS
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- HLS
- ECLS-B
- ECLS-K 2010

95% CI

Fitted Trend

Trend in 90/10 Income Gap in Math, 1940-2005 Cohorts

Cohort Birth Year:
- 1940
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000
- 2010

Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families:
- 0.00
- 0.25
- 0.50
- 0.75
- 1.00
- 1.25
- 1.50

Study:
- TALENT
- NLS
- HS&B
- NELS
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- HLS
- ECLS-B
- ECLS-K 2010

95% CI

Fitted Trend
Average Difference in Standardized Test Scores Between 90th & 10th Income Percentile Families

Study
- TALENT
- NLS
- HS&B
- NELS
- Prospects
- ELS
- SECCYD
- ECLS-K 1998
- HLS
- ECLS-B
- ECLS-K 2010

95% CI
Fitted Trend
Kindergarten Trend
Thanks!
Development of Income Achievement Gap (90/10 Gap)
Reading, Ages 4-15

Average Difference in Standardized Test Scores (90/10 Income Gap)

Age

4  6  8  10  12  14

Fall K  Fall G1  Fall G3  Fall G5  Fall G8

Study
- ECLS-K (1992-93 birth cohort)
- ECLS-B (2001 birth cohort)

Source: Reardon (2011)
Trends in White-Black Achievement Gaps in Kindergarten and Grades 3-8

The graph shows the achievement gap (standard deviations) for White and Black students in reading and math across different birth years from 1950 to 2010. The gaps are measured for Kindergarten Entry, State Tests (G3-G8), State NAEP (G4-G8), Main NAEP (G4-G8), and NAEP LTT (G4-G8).

In reading, the gap decreases over time, with the most significant reduction occurring in the early 2000s. In math, the gap also decreases but shows more variability, particularly in the later decades.

The data indicates a persistent trend of narrowing achievement gaps between White and Black students, reflecting progress in educational equity over the past several decades.
Trends in White-Hispanic Achievement Gaps in Kindergarten and Grades 3-8

**Reading**
- State Tests (G3-G8)
- State NAEP (G4-G8)
- Main NAEP (G4-G8)
- NAEP LTT (G4-G8)

**Math**
- Kindergarten Entry
- State Tests (G3-G8)
- State NAEP (G4-G8)
- Main NAEP (G4-G8)
- NAEP LTT (G4-G8)
Per-child spending on education, child care, and children’s toys, games, and clothes by year and age of youngest child in the household.

Note: Spending for all years is inflated to year 2008 dollars.

Preschool enrollment gaps between first and fifth income quintile, 3-year olds.

Source: Magnuson & Waldfogel. The Role of Early Childhood Education in Changing Income-Related Gaps in Achievement
Preschool enrollment gaps between first and fifth income quintile, 4-year olds.

Source. Magnuson & Waldfogel. *The Role of Early Childhood Education in Changing Income-Related Gaps in Achievement*