UNC ELN: Early Education in Rural NC

Ellen Peisner-Feinberg, Margaret Burchinal, Mary Bratsch-Hines, & Kylie Bezdek

Frank Porter Graham Child Development Institute
UNC-Chapel Hill

The Early Learning Network is funded by the Institute of Education Sciences.
Early childhood education (ECE) can reduce achievement gap
  • Led to state and federal preschool programs

Mixed evidence regarding how quality is measured and shorter- and longer-term impacts
  • Very modest associations between “process” quality measures and child outcomes
  • Raises questions about which child outcomes are promoted by which aspects of preschool and early elementary education
Research Question

• What is the quality of ECE classrooms in Pre-K vs Kindergarten?
• Do children show substantial gains in skills when they attend Pre-K?
• Do Pre-K attenders enter K with higher skill levels and do they show different larger gains during K than non-attenders?
• Are there differences in Pre-K effects by home language?
Study Sample: Pre-K Attenders

- 6 rural NC counties
- 45 early childhood education programs
  - 62% public school
  - 22% private for-profit
  - 9% Head Start
  - 7% private nonprofit
- 63 randomly-selected NC Pre-K classrooms
  - 455 randomly-selected children
  - 36% Spanish-English English Learners (ELs)
NC Pre-K Program

• NC Pre-K is an established high quality state-funded pre-k program (Friedman et al., 2018)

• Serves approximately 30,000 children across NC

• Child eligibility criteria:
  • Year before kindergarten (four-year-olds)
  • “Risk” factors such as
    • Gross income <= 75% of the state median income level
    • Limited English Proficiency
    • Disability

• Programs must meet performance standards
  • Observed high classroom quality
  • Lead teacher – has or is working on BA / B-K license
  • Class size=18 & Ratio=9:1
  • Uses approved curriculum
Study Sample: Pre-K Attenders and Non-Attenders

- Followed children into 182 K classrooms
- Recruited 249 children without preschool experience (non-attenders)
- Demographics – a few differences between attenders and non-attenders
  - Maternal education
  - Family income
  - Race
Child and Family Characteristics by Pre-K Status

* p<.05; ** p<.01; *** p<.001
ECE Quality Measures

• Teacher-Child Interactions: CLASS

• Instructional Format:
  • Language Interaction Snapshot (LISn) – time child observed in whole and small group

• Content Instruction:
  • LISn – time child observed in reading and math activities/instruction

• Teacher Complex Language:
  • LISn – time teacher used decontextualized language or multi-turn conversation with target child
ECE Quality in Pre-K vs K: T-C Interactions

* p<.05; ** p<.01; *** p<.001
ECE Quality in Pre-K vs K: T-C Language and Instructional Practices

* p<.05; ** p<.01; *** p<.001
Outcome Measures (Fall/Spring)

- Mathematics
  - Applied Problems (WJ AP)

- Language and Literacy
  - Picture Vocabulary (WJ PV)
  - Expressive Language (EOW PVT – PK only)
  - Letter-Word Identification (WJ LW)
  - First Sound Fluency (DIBELS FSF)
  - Phoneme Segmentation Fluency (DIBELS PSF)

- Executive Functions
  - Flanker Inhibitory Control and Attention Test (NIH Toolbox Inhibitory Control)
  - Dimensional Change Card Sort (NIH Toolbox Cognitive Flexibility)
Gains in Child Outcomes During Pre-K

**Note:** * p<.05; ** p<.01; *** p<.001
### Pre-k Attender/Non-Attender x EL Differences at Kindergarten Entry

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Picture Vocabulary</th>
<th>Applied Problems</th>
<th>Letter-Word Identification</th>
<th>First Sound Fluency</th>
<th>Phoneme Segmentation Fluency</th>
<th>Inhibitory Control</th>
<th>Cognitive Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>91.36***</td>
<td>95.96***</td>
<td>97.27***</td>
<td>21.37***</td>
<td>13.68***</td>
<td>31.53***</td>
<td>23.53***</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.49)</td>
<td>(0.50)</td>
<td>(0.60)</td>
<td>(0.54)</td>
<td>(0.45)</td>
<td>(0.60)</td>
</tr>
<tr>
<td>NCPK</td>
<td>3.65***</td>
<td>3.57***</td>
<td>2.18*</td>
<td>0.98</td>
<td>1.13</td>
<td>0.62</td>
<td>2.34</td>
</tr>
<tr>
<td></td>
<td>(0.96)</td>
<td>(1.01)</td>
<td>(1.04)</td>
<td>(1.25)</td>
<td>(1.12)</td>
<td>(0.93)</td>
<td>(1.24)</td>
</tr>
<tr>
<td>EL</td>
<td>-12.67***</td>
<td>-4.20***</td>
<td>-0.96</td>
<td>-0.35</td>
<td>0.35</td>
<td>0.73</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>(1.09)</td>
<td>(1.15)</td>
<td>(1.18)</td>
<td>(1.42)</td>
<td>(1.27)</td>
<td>(1.06)</td>
<td>(1.41)</td>
</tr>
<tr>
<td>NCPK*EL</td>
<td>4.54*</td>
<td>9.29***</td>
<td>3.11</td>
<td>4.47</td>
<td>4.81*</td>
<td>1.98</td>
<td>3.30</td>
</tr>
<tr>
<td></td>
<td>(1.93)</td>
<td>(2.04)</td>
<td>(2.10)</td>
<td>(2.52)</td>
<td>(2.26)</td>
<td>(1.88)</td>
<td>(2.49)</td>
</tr>
<tr>
<td>Mat Ed</td>
<td>1.60***</td>
<td>1.28***</td>
<td>1.36***</td>
<td>0.70*</td>
<td>1.02***</td>
<td>0.11</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>(0.22)</td>
<td>(0.23)</td>
<td>(0.24)</td>
<td>(0.28)</td>
<td>(0.25)</td>
<td>(0.21)</td>
<td>(0.28)</td>
</tr>
<tr>
<td>Male</td>
<td>1.20</td>
<td>0.05</td>
<td>-0.05</td>
<td>-0.67</td>
<td>-1.50</td>
<td>-0.77</td>
<td>-1.75</td>
</tr>
<tr>
<td></td>
<td>(0.93)</td>
<td>(0.98)</td>
<td>(1.01)</td>
<td>(1.21)</td>
<td>(1.08)</td>
<td>(0.90)</td>
<td>(1.20)</td>
</tr>
<tr>
<td>Age</td>
<td>-3.37*</td>
<td>-8.17***</td>
<td>-11.3***</td>
<td>9.78***</td>
<td>5.21**</td>
<td>5.80***</td>
<td>6.48***</td>
</tr>
<tr>
<td></td>
<td>(1.41)</td>
<td>(1.50)</td>
<td>(1.54)</td>
<td>(1.84)</td>
<td>(1.65)</td>
<td>(1.37)</td>
<td>(1.86)</td>
</tr>
</tbody>
</table>
Fall Scores by Attender and EL Status

- WJ Picture Vocabulary PK*** & PKxEL***
- WJ Letter Word PK*
- WJ Applied Problems PK*** & PKxEL***
- DIBELS Phoneme Segmentation Fluency PKxEL*

- Non-Attender (non-EL)
- Pre-K Attender (non-EL)
- Non-Attender (EL)
- Pre-K Attender (EL)
Pre-k Attender/Non-Attender x EL Differences at Kindergarten End

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Picture Vocabulary</th>
<th>Applied Problems</th>
<th>Letter-Word Identification</th>
<th>First Sound Fluency</th>
<th>Phoneme Segmentation Fluency</th>
<th>Inhibitory Control</th>
<th>Cognitive Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>93.46***</td>
<td>99.65***</td>
<td>115.78***</td>
<td>8.49</td>
<td>25.75**</td>
<td>35.83***</td>
<td>43.83***</td>
</tr>
<tr>
<td></td>
<td>(4.66)</td>
<td>(6.34)</td>
<td>(5.60)</td>
<td>(7.10)</td>
<td>(9.44)</td>
<td>(7.96)</td>
<td>(11.6)</td>
</tr>
<tr>
<td>NCPK</td>
<td>-0.04</td>
<td>-1.38</td>
<td>-1.34</td>
<td>-0.19</td>
<td>0.33</td>
<td>1.55</td>
<td>2.78</td>
</tr>
<tr>
<td></td>
<td>(0.70)</td>
<td>(0.94)</td>
<td>(0.82)</td>
<td>(1.02)</td>
<td>(1.35)</td>
<td>(0.94)</td>
<td>(1.43)</td>
</tr>
<tr>
<td>EL</td>
<td>-4.54***</td>
<td>0.69</td>
<td>0.55</td>
<td>0.93</td>
<td>-3.27</td>
<td>0.69</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>(0.92)</td>
<td>(1.17)</td>
<td>(1.03)</td>
<td>(1.30)</td>
<td>(1.72)</td>
<td>(1.18)</td>
<td>(1.76)</td>
</tr>
<tr>
<td>NCPK*EL</td>
<td>0.94</td>
<td>-2.48</td>
<td>1.35</td>
<td>3.69</td>
<td>-0.02</td>
<td><strong>5.66</strong></td>
<td>-3.69</td>
</tr>
<tr>
<td></td>
<td>(1.39)</td>
<td>(1.91)</td>
<td>(1.67)</td>
<td>(2.09)</td>
<td>(2.78)</td>
<td>(1.93)</td>
<td>(2.88)</td>
</tr>
<tr>
<td>Fall Score</td>
<td>0.57***</td>
<td>0.62***</td>
<td>0.74***</td>
<td>0.35***</td>
<td>0.50***</td>
<td>0.25***</td>
<td>0.31***</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.04)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.05)</td>
<td>(0.04)</td>
<td>(0.05)</td>
</tr>
<tr>
<td>Mat Ed</td>
<td>0.00</td>
<td>-0.59*</td>
<td>0.17</td>
<td>0.11</td>
<td>0.01</td>
<td>-0.09</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>(0.17)</td>
<td>(0.23)</td>
<td>(0.20)</td>
<td>(0.24)</td>
<td>(0.33)</td>
<td>(0.21)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Male</td>
<td>0.51</td>
<td>1.03</td>
<td>0.26</td>
<td>-2.65**</td>
<td>-0.75</td>
<td>-1.18</td>
<td>-5.04***</td>
</tr>
<tr>
<td></td>
<td>(0.65)</td>
<td>(0.89)</td>
<td>(0.78)</td>
<td>(0.98)</td>
<td>(1.31)</td>
<td>(0.90)</td>
<td>(1.38)</td>
</tr>
<tr>
<td>Age</td>
<td>-1.58</td>
<td>-5.15***</td>
<td>-4.26***</td>
<td>3.53*</td>
<td>4.21*</td>
<td>0.94</td>
<td>1.53</td>
</tr>
<tr>
<td></td>
<td>(1.01)</td>
<td>(1.41)</td>
<td>(1.27)</td>
<td>(1.55)</td>
<td>(2.03)</td>
<td>(1.36)</td>
<td>(2.02)</td>
</tr>
</tbody>
</table>
Spring Scores by Attender and EL Status

Inhibitory Control

- Non-Attender (non-EL)
- Pre-K Attender (non-EL)
- Non-attender (EL)
- Pre-K Attender (EL)
Summary

• NC Pre-K & K classrooms differ slightly in quality and practices
  • Quality of T-C Interactions: K > Pre-K
  • Teacher complex talk: K > Pre-K
  • Time in literacy instruction: K > Pre-K
  • Time in free play or centers: Pre-K > K

• Children showed gains in academic and EF skills in PK

• Children entered K with higher skills levels, especially ELs

• PK advantage disappeared in K
  • Exploring possible explanations such as lack of alignment across PK and K