Early Learning Network
Year 1 Results:
*Preschool Educational Practices and Child Outcomes*

The Early Learning Network is funded by the Institute of Education Sciences.

National Research Conference on Early Childhood
June 27, 2018
The Early Learning Network aims to advance the understanding of *policies and practices* that narrow the achievement gap and *maintain early learning success* as children transition from preschool to elementary school and beyond.
♦ Five Research Teams
♦ One Assessment Team
♦ Network Lead
Complementary Research Studies

• **Descriptive study:**
  Identify systems-level policies and practices that support early learning

• **Classroom observation study:**
  Identify teaching practices and other classroom-level malleable factors associated with children’s school readiness and achievement in preschool and early elementary school

• **Longitudinal study:**
  Identify malleable factors associated with early learning and school achievement over time from preschool through the early elementary school grades
Symposium Agenda

• **Chair:** Susan Sheridan, ELN Lead (University of Nebraska-Lincoln)

• **Paper 1:** How Does Quality of Curricular Implementation Support Diverse Children’s Skills in Prekindergarten?: Evidence from Boston
  • JoAnn Hsueh, Meghan McCormick, Michelle Maier, Christina Weiland, Jason Sachs, Catherine Snow (MDRC & Partners)

• **Paper 2:** Pre-K classroom Characteristics and Pre-K Gains of Children Living in Rural Areas
  • Peg Burchinal, Irina Mokrova, Mary Bratsch-Hines, Ellen Peisner-Feinberg (UNC)

• **Paper 3:** Classroom quality and classroom network structure: Interplay and prediction of student outcomes
  • Jessica Logan, Jing Chen, Laura Justice, Tzu-Jung Lin, Kelly Purtell (OSU)

• **Paper 4:** Understanding the Effects of Classroom Processes on Child Outcomes in Pre-kindergarten
  • Bob Pianta, Ginny Vitiello, Jessica Whittaker, Erik Ruzek, Tara Hofkens & Arya Ansari (UVA)

• **Discussant:** Sara Vecchiotti, Foundation for Child Development
How Does Quality of Curricular Implementation Support Diverse Children’s Skills in Prekindergarten?: Evidence from Boston

JoAnn Hsueh
Meghan McCormick
Michelle Maier
Christina Weiland
Jason Sachs
Catherine Snow

June 27, 2018
National Research Conference on Early Childhood
<table>
<thead>
<tr>
<th>Curriculum in place</th>
<th>Example components adapted from OWL</th>
<th>Example Building Blocks components</th>
<th>Example district-developed components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on K1 (district-adapted version of Opening the World of Learning &amp; Building Blocks). Thematic curriculum that cuts across ELA, math, science, social study, and arts.</td>
<td>Centers &amp; Introduction to Centers</td>
<td>Building Blocks centers</td>
<td>Thinking &amp; feedback; SWPL; Let’s Find Out About It</td>
</tr>
<tr>
<td></td>
<td>Read Aloud</td>
<td>Building Blocks whole group activities</td>
<td>Storytelling</td>
</tr>
<tr>
<td></td>
<td>Small Groups to support language/literacy</td>
<td>Building Blocks small group activities</td>
<td>Storyacting</td>
</tr>
</tbody>
</table>
Research questions

1. What does fidelity look like across prekindergarten public school classrooms in BPS?

2. What measures of fidelity are most closely associated with CLASS?

3. Is fidelity to the BPS PreK model associated with children’s language and math scores in the Spring of PreK?
   - For which groups of students does fidelity appear most predictive of Spring outcomes (e.g., dual language learners, racial/ethnic minority students)?
Research & BPS teams Co-construct Tool to Measure Fidelity of Implementation

- Research team conducts in-depth curriculum review and meets with BPS staff
- Research team develops fidelity tool and iteratively edits it following meetings with BPS staff
- Further edits and adaptation following field-based piloting with BPS staff
- Training and reliability procedures take into account BPS staff feedback
- BPS instructional coaches collect data in classrooms
Fidelity Data in Public School Classrooms

N = 41 classrooms in 20 schools

41 total public prekindergarten classrooms participated (97% of teachers in participating schools)

Each classroom observed on two separate days for 2 – 3 hours/obs. Observation data averaged across days.

Classrooms observed 2x

20% of observational visits were coded by two BPS coaches; Reliability analysis suggests high agreement.

Reliability
## Classroom & teacher participants

\(N = 41\) public school classrooms across 20 schools

<table>
<thead>
<tr>
<th>Teacher characteristic</th>
<th>%age/Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher age</td>
<td>43.95 (SD = 9.37)</td>
</tr>
<tr>
<td>Years teaching</td>
<td>14.79 (SD = 9.25)</td>
</tr>
<tr>
<td>Years teaching prekindergarten</td>
<td>8.6 (SD = 7.37)</td>
</tr>
<tr>
<td>Years teaching at current school</td>
<td>7.79 (SD = 8.01)</td>
</tr>
<tr>
<td>Teacher has master’s degree</td>
<td>90%</td>
</tr>
<tr>
<td>Teacher female</td>
<td>100%</td>
</tr>
<tr>
<td>Teacher Black</td>
<td>22%</td>
</tr>
<tr>
<td>Teacher White</td>
<td>49%</td>
</tr>
<tr>
<td>Teacher Hispanic</td>
<td>13%</td>
</tr>
<tr>
<td>Teacher Asian or other race</td>
<td>16%</td>
</tr>
<tr>
<td>Classrooms per school</td>
<td>1.35 (SD = .42)</td>
</tr>
</tbody>
</table>
### Summary of Fidelity Data for BPS K1 Classrooms

<table>
<thead>
<tr>
<th>Component</th>
<th>% classrooms component observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centers</td>
<td>100%</td>
</tr>
<tr>
<td>Intro to Centers</td>
<td>95%</td>
</tr>
<tr>
<td>Read Aloud</td>
<td>93%</td>
</tr>
<tr>
<td>SWPL</td>
<td>80%</td>
</tr>
<tr>
<td>Building Blocks Whole Group</td>
<td>66%</td>
</tr>
<tr>
<td>Small Group, Language/Literacy</td>
<td>63%</td>
</tr>
<tr>
<td>Building Blocks Centers</td>
<td>49%</td>
</tr>
<tr>
<td>Building Blocks Small Group</td>
<td>41%</td>
</tr>
<tr>
<td>Thinking &amp; Feedback</td>
<td>32%</td>
</tr>
<tr>
<td>Storytelling</td>
<td>15%</td>
</tr>
<tr>
<td>Story-acting</td>
<td>12%</td>
</tr>
<tr>
<td>Let’s Find Out About it</td>
<td>7%</td>
</tr>
</tbody>
</table>
Cross-component fidelity measures

- Vocabulary $(\alpha = .91)$
- Extending/Building $(\alpha = .91)$
- Summary/Reflection/Making Connections $(\alpha = .79)$
- Scaffolding/Differentiation $(\alpha = .82)$
What does fidelity look like overall in BPS public school prekindergarten classrooms?

![Bar chart showing fidelity scores for Extending/Building, Scaffolding/Differentiation, Summary/Reflection, and Vocabulary. The scores range from 1 to 5 with 3.25 being the highest for Vocabulary and 2.5 being the lowest for Scaffolding/Differentiation.]
How does this compare to CLASS scores?

CLASS Domain Scores

<table>
<thead>
<tr>
<th>Domain</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional support</td>
<td>6</td>
</tr>
<tr>
<td>Classroom organization</td>
<td>5</td>
</tr>
<tr>
<td>Instructional support</td>
<td>3</td>
</tr>
</tbody>
</table>
How do fidelity measures relate with CLASS?

<table>
<thead>
<tr>
<th></th>
<th>Instructional support</th>
<th>Emotional support</th>
<th>Classroom org.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional support</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional support</td>
<td>.67</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Classroom org.</td>
<td>.69</td>
<td>.85</td>
<td>1.0</td>
</tr>
<tr>
<td>Extending/Building</td>
<td>.18</td>
<td>.16</td>
<td>.10</td>
</tr>
<tr>
<td>Summary/Reflection</td>
<td>.22</td>
<td>.10</td>
<td>.14</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>.01</td>
<td>.01</td>
<td>-.07</td>
</tr>
<tr>
<td>Scaffolding/Differentiation</td>
<td>.35</td>
<td>.21</td>
<td>.22</td>
</tr>
</tbody>
</table>
How does implementation vary depending on classroom composition?

• There are some differences in implementation between classrooms. **On average:**
  – Classrooms with higher percentages of white students have higher quality of implementation
  – Classrooms with higher percentages of black and Hispanic students have lower quality of implementation
  – Classrooms with higher percentages of DLLs have similar quality of implementation as classrooms with fewer DLLs, but more variation across classrooms.
Links between fidelity of implementation and improvements in language and math across prekindergarten year

• Full sample of students - no significant associations between cross-component fidelity measures and gains in language or math across prekindergarten year

• No significant associations detected in this preliminary work using cross-component fidelity constructs to predict PPVT outcomes

• Statistically significant interactions between fidelity of implementation, Hispanic and DLL status, and math outcome
Example of Predicted Math Skills for Hispanic Students at End of Prekindergarten Year

WJ Applied Problems Standard Score

- High fidelity
- Low fidelity

Chart showing comparison of WJ Applied Problems Standard Score for 'Extending/building' and 'Summary/reflection' tasks. The 'Extending/building' task has a higher standard score for high fidelity compared to low fidelity.
Example of Predicted Math Skills for White Students at End of Prekindergarten Year

WJ Applied Problems Standard Score

- Extending/building
- Summary/reflection

High fidelity
Low fidelity
Example of Predicted Math Skills for Dual Language Learner Students at End of Prekindergarten Year

- Vocabulary
- Summary/reflection
- Extending/building

WJ Applied Problems Standard Score

High fidelity
Low fidelity
Some preliminary conclusions

Reliable fidelity data can be collected by district staff.

Systematic variation in fidelity across classrooms.

Fidelity may predict math outcomes (on a small magnitude) but story is likely in the subgroups for a diverse sample with varying skill levels at baseline and follow-up.
Limitations & Next Steps

• Work is **very preliminary** and in early stages
  – Future models will include more rigorous work to determine covariates and alternative model fits.

• More measurement work needed to operationalize fidelity constructs and consider any within-component measures of adherence, dosage, quality

• Data are correlational across one school year

• Sample is fairly small in Year 1 study (particularly for subgroups); future years will include larger samples for subgroup examination
Acknowledgments

MDRC
Marissa Strassberger
Rama Hagos
Sharon Huang
Jared Smith
Desiree Alderson
Ilana Blum
Kelly Terlizzi
Mirjana Pralica

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 Rosado
Amanda Ketner

Harvard
Nonie Lesaux
Sibyl Holland
Maia Gokhale

Data collection team

[Logos for MDRC, University of Michigan, Harvard, and Boston Public Schools]
The research reported here was supported by the Institute of Education Sciences, Department of Education, through Grant R305N160018 – 17 to MDRC.

The opinions expressed are those of the authors and do not represent views of the Institute or U.S. Department of Education.
Questions?

JoAnn Hsueh
MDRC
joann.hsueh@mdrc.org

Meghan McCormick
MDRC
meghan.mccormick@mdrc.org

Michelle Maier
MDRC
meghan.mccormick@mdrc.org

Christina Weiland
University of Michigan
weilandc@umich.edu

Jason Sachs
Boston Public Schools
jsachs@bostonpublicschools.org

Catherine Snow
Harvard Graduate School of Education
Catherine_snow@gse.harvard.edu
Pre–K classroom characteristics and Pre–K gains of children living in rural areas

Peg Burchinal
Irina Mokrova
Mary Bratsch–Hines
Ellen Peisner–Feinberg

University of North Carolina at Chapel Hill
Educational practices and child outcomes in Pre-K

- ECE can reduce achievement gap
- State and federal preschool programs
- But – questions remain:
  - Which child outcomes are promoted by which aspects of preschool ECE?
ECE quality dimensions

- Process quality
  - Teacher sensitivity and classroom management relate to socio-emotional outcomes,
  - Widely examined; modest associations

- Verbal interactions with adults
  - T–C conversations relate to language
  - Verbal literacy instruction relate to literacy skills
  - Less widely examined; modest associations
ECE quality dimensions

- **Instruction time**
  - More time in content area relates to gains in that skill
  - Less widely studied: modest associations

- **Setting**
  - Small groups help young children learn
  - Centers provide children with hands-on learning opportunities: Cornerstone of ECE instruction

- **Curriculum**
  - Wide-scale belief in whole child curricula
  - Moderate to strong evidence for some domain-specific curricula
Design and participants

- Cohort study of rural NC
  - 6 NC rural counties
  - 63 randomly selected NC Pre–K classrooms

- Pre–K children
  - 351 randomly selected children
    - 34% Spanish–English dual language learners

- ECE dimensions
  - Classroom observations
  - Teacher report of curriculum
Quality measures

- Classroom observed

  Day 1
  - CLASS
  - High quality instructional practices – adapted Boston pre–K “fidelity” checklist
  - Combined – alpha = .90

  Day 2
  - Language Interaction Snapshot (LISn) – summarized for classroom
    - Time sampling observations of individual children
      - 30 second recording of language exchanges
      - 5 minute recording of setting and activity
      - 4–6 cycles for 6 or more children
ECE Dimensions

Process quality

- Total
- CLASS Emotional Support
- CLASS Classroom Organization
- CLASS Instructional Support
- BPS Global Rating
ECE Dimensions: Teacher Talk and Instructional Time

Language Interaction Snapshot

- Complex Language Exchanges
- Literacy Activities
- Phonics Activities
- Math Activities
ECE Dimensions: Curriculum

Teacher Report

<table>
<thead>
<tr>
<th>Curriculum</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Curriculum</td>
<td>0.8</td>
</tr>
<tr>
<td>Tools of Mind</td>
<td>0.2</td>
</tr>
<tr>
<td>Opening Word of Learning</td>
<td>0.1</td>
</tr>
<tr>
<td>High Scope</td>
<td>0.01</td>
</tr>
</tbody>
</table>
## ECE Dimensions

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>% Mean</th>
<th>Sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Quality Practices</td>
<td>62</td>
<td>4.17</td>
<td>0.66</td>
</tr>
<tr>
<td>Teachers: complex language</td>
<td>61</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Instructional Time Literacy Activities</td>
<td>61</td>
<td>0.23</td>
<td>0.12</td>
</tr>
<tr>
<td>Phonics Activities</td>
<td>61</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Math Activities</td>
<td>61</td>
<td>0.16</td>
<td>0.13</td>
</tr>
<tr>
<td>Grouping – Small Group</td>
<td>61</td>
<td>0.08</td>
<td>0.11</td>
</tr>
<tr>
<td>Whole Group</td>
<td>61</td>
<td>0.36</td>
<td>0.18</td>
</tr>
<tr>
<td>Free Choice/Center</td>
<td>61</td>
<td>0.48</td>
<td>0.19</td>
</tr>
<tr>
<td>Creative Curriculum</td>
<td>59</td>
<td>78%</td>
<td></td>
</tr>
</tbody>
</table>
## Correlations among Quality Dimensions

<table>
<thead>
<tr>
<th></th>
<th>Process Quality</th>
<th>Complex conversation</th>
<th>Literacy Activities</th>
<th>Sounds Activities</th>
<th>Math Activities</th>
<th>Small Group</th>
<th>Whole Group</th>
<th>Creative Curric.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process quality</td>
<td>.27*</td>
<td>.16</td>
<td>-.04</td>
<td>.13</td>
<td>-.10</td>
<td>.25*</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>Complex conver-</td>
<td>.34**</td>
<td>.24+</td>
<td>.47***</td>
<td>.35**</td>
<td>.07</td>
<td>-.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literacy Activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.63***</td>
<td>.05</td>
<td>.01</td>
<td>.21+</td>
<td>-.24+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sounds Activities</td>
<td></td>
<td>.12</td>
<td>.00</td>
<td>.05</td>
<td>-.37**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math Activities</td>
<td></td>
<td></td>
<td></td>
<td>.50***</td>
<td>.06</td>
<td>-.34**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.27*</td>
<td>-.24+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Child outcomes

- Collected fall and spring
- Measures
  - Expressive One Word Picture Vocabulary
  - Woodcock Johnson III
    - Letter Word
    - Applied Problems
  - DIBELS
    - First Sound Fluency
    - Phonemic Segmentation Fluency
  - NIH Tool Box
    - Flankers (inhibitory control)
    - Dimensional Card Sort (cognitive flexibility)
Pre-K Child Outcomes

Standardized Child Outcomes

- Language - EOW
- Decoding - WJ3 LW
- Numeracy - WJ AP
- EF - Flankers
- EF - DCC

Fall vs Spring
<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expressive One Word</td>
<td>345</td>
<td>7.14*</td>
<td>11.93</td>
</tr>
<tr>
<td>WJ3 Letter Word Identification</td>
<td>352</td>
<td>21.05***</td>
<td>19.73</td>
</tr>
<tr>
<td>DIBELS First Sound Fluency</td>
<td>351</td>
<td>3.86*</td>
<td>8.96</td>
</tr>
<tr>
<td>DIBELS–Phonemic Segmentation</td>
<td>350</td>
<td>2.89*</td>
<td>8.39</td>
</tr>
<tr>
<td>WJ3 Applied Problems</td>
<td>352</td>
<td>18.66***</td>
<td>18.71</td>
</tr>
<tr>
<td>NIH Tool Box–EF: Flanker</td>
<td>341</td>
<td>8.74*</td>
<td>13.18</td>
</tr>
<tr>
<td>NIH Tool Box–EF: Dimensional Card Sort</td>
<td>332</td>
<td>7.00*</td>
<td>15.89</td>
</tr>
</tbody>
</table>
Gain scores analyzed

Model
- Level 1: \( Y_{ijk} = d_{ojk} + d_{1jk} \text{<child covariates>} + e_{ijk} \)
- Level 2: \( d_{ojk} = B_o + B_1 \text{High Quality Practices}_{jk} + B_2 \text{T Complex Language}_{jk} + B_3 \text{Content Activities}_{jk} + B_4 \text{Small Group}_{jk} + B_5 \text{Whole Group}_{jk} + B_6 \text{Creative Curriculum}_{jk} + e_{jk} \)

Backwards elimination to check findings
# HLM Results

<table>
<thead>
<tr>
<th></th>
<th>Language EOW</th>
<th>Literacy WJ LW</th>
<th>Letters DIBELS FSF</th>
<th>Phonemic DIBELS PSF</th>
<th>Math WJ AP</th>
<th>EF Flankers</th>
<th>EF Card Sort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Quality</td>
<td></td>
<td>.19**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.14**</td>
</tr>
<tr>
<td>Complex Conversation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction: Literacy Sounds Math</td>
<td>.21*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole Group</td>
<td>-.17*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.12*</td>
</tr>
<tr>
<td>Creative curriculum</td>
<td></td>
<td>-.17**</td>
<td></td>
<td></td>
<td></td>
<td>-.17**</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

- Surprisingly sparse findings
  - No one ECE dimension predicted all outcomes
  - Best predictors
    - Instructional time: positively related to gains in language and specific literacy skills
    - Whole group: negatively related to gains in language and math
    - Curriculum: negatively related to gains in literacy
    - Process quality: mixed, positive gains—decoding, negative gains – inhibitory control
Conclusions

- May need attend to
  - Other ECE dimension in addition to process quality
  - Measures of individual child experiences as well as measures of teachers

- Different predictors for different outcomes –
  - need to be strategic in what ECE dimensions should be promoted for specific child outcomes
Our appreciation

- To all participating families, teachers, and school administrators
- To all research assistants and project staff
- To the Institute of Education Sciences
Thank You

burchinal@unc.edu
Classroom quality and classroom network structure: Interplay and prediction of student outcomes

Jessica Logan, Jing Chen, Laura Justice, Tzu-Jung Lin, Kelly Purtell
The Ohio State University
NRCEC
6/27/2018
Early Learning Ohio Team

**Principal Investigator:**
Dr. Laura Justice

**Co-Investigators:**
Dr. Tzu-Jung Lin
Dr. Jessica Logan
Dr. Kelly Purtell

**Key Project Staff:**
Jennifer Bostic
Allie Hamilton
Janelle Williamson
Katie Filibeck
Lauren Barnes
Anna Rhoad-Drogalis
Hui Jiang
Jing Chen
Early Learning Ohio

**Broad goal:** Expand our understanding of classroom ecology

A comprehensive examination of the classroom ecology and its relations with children’s learning PreK – grade three.
Classroom Network

• Children’s language and social skills are shaped by who is around them
  • Complexity of teacher talk (e.g., Justice et al., 2013)
  • The skills of their peers (e.g., Justice, Logan, Lin, & Kaderavek, 2016)

• Classroom social networks *directly* measure who children spend time with, and can be characterized

• Children’s academic growth is likely affected by both classroom quality *and* the nature of the social network created by their peers (Gest et al., 2014)

• Children’s language is significantly predictive of classroom density in preschool (Chen et al., 2017).
  • Higher language scores → more dense classrooms
Classroom Density
(observed ties / possible ties)
Research Questions

1. Is classroom density predictive of children’s gains in academic and social skills?

2. Is density more important for children of different skill levels?

3. Interactions with classroom quality
ELO: Cross-Sectional Study Numbers

Study Year 1 (2016-2017 school year)

• One school district
  • Some Head Start, some private PreK programs

• 79 classrooms in five grades: (Prek – 3rd Grade)
  • Attempted to enroll all children in each classroom

• 1,142 students with active and passive consent
  • 80% consent rate
  • Used for social network measures

• 915 with active consent
  • Used for child outcomes
  • 58% white, 78% speak fluent English, 60% moms have HS degree or less
Density

• Network density generated using SNA package in R (Butts 2016)

• Rated per classroom in two ways:
  • Students: Viewed a class roster and asked them who they like to play with.
  • Teachers: Asked to rate how frequently each pair of students in their class play or work together

• Before I get to research questions – want to show you the data in depth
Teacher Ratings of Classroom Density

- A randomly selected preschool Classroom
- Teacher reported who plays and works together
- A pair of children is rated as either playing and working together (1) or not (0).
Results: Teacher Ratings of Density

Pre-K

K

G1

G3

- Red: girl
- Blue: boy
- White: No information
Results: Student Ratings of density

• The same preschool classroom
• Children were asked: “who do you like to play with the most”
• Children with no paths didn’t select anyone and no one selected them.
• Bi-directional arrows are reciprocal friendships.
• Directional arrows show child A likes to play with child B.
Results: Child Report vs Teacher Report

- **Pre-K**
  - Child Report
  - Teacher Report

- **K**
  - Child Report
  - Teacher Report

- **G1**
  - Child Report
  - Teacher Report

Legend:
- ○: No information
- ●: Girl
- □: Boy
Variability : Child Report vs Teacher Report
Predicting Student Outcomes: Model building

• HLM models nesting students within classrooms.

• Outcomes:
  • Social Skills, Problem Behaviors: TCRS (Hightower, 1986): Raw Scores

• Covariates: Pretest, Gender, Age, Grade, Class size

• Predictors of interest:
  1) CLASS composite, Child-rated density, Teacher rated density
  2) Interaction between pretest and density
  3) Interaction between CLASS and density
Results: Main Effects

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>BC</th>
<th>PV</th>
<th>LW</th>
<th>AP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.06</td>
<td>-0.01</td>
<td>0.32</td>
<td>0.19</td>
<td>0.37</td>
</tr>
<tr>
<td>Pretest</td>
<td>0.78*</td>
<td>0.79*</td>
<td>0.67*</td>
<td>0.77*</td>
<td>0.67*</td>
</tr>
<tr>
<td>CLASS</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Child Density</td>
<td>0.06</td>
<td>0.03</td>
<td>-0.01</td>
<td>0.00</td>
<td>5.43</td>
</tr>
<tr>
<td>Teacher Density</td>
<td>0.16*</td>
<td>0.05</td>
<td>0.00</td>
<td>0.01</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

*p < .05, HLMs also included several covariates not pictured here.

Standardized estimates
Results: Pretest Interaction

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>BC</th>
<th>PV</th>
<th>LW</th>
<th>Ap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.05</td>
<td>0.01</td>
<td>0.33</td>
<td>0.23</td>
<td>0.38</td>
</tr>
<tr>
<td>Pretest</td>
<td>0.77*</td>
<td>0.79*</td>
<td>0.68*</td>
<td>0.67*</td>
<td>0.66*</td>
</tr>
<tr>
<td>CLASS</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
<td>0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td>Child Density</td>
<td>0.05</td>
<td>-0.01</td>
<td>-0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Teacher Density</td>
<td>0.17*</td>
<td>0.05</td>
<td>-0.00</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Pretest*Teacher Interaction</td>
<td>-0.07*</td>
<td>0.00</td>
<td>-0.02</td>
<td>-0.01</td>
<td>-0.03*</td>
</tr>
</tbody>
</table>

*p < .05, HLMs also included several covariates not pictured here.

Denser classrooms matter more for children with a low pretest on Social Skills and Applied Problems

Q3: Interactions of CLASS with density: None were significantly different from zero.
Social Skills interaction

![Graph showing Social Skills interaction with T1 levels: Low, Average, High, and Low Density.](image)
Conclusions

• This is a preliminary look at these data.
  • Data being cleaned on another ~100 classrooms

• Will also examine student-level network information
  • Number of ties a child has
  • Position within the network
  • Experiences with victimization
Thank you!
Logan.251@osu.edu
Understanding the effects of classroom processes on child outcomes in pre-kindergarten

Ginny Vitiello

June 27, 2018
Research Team

Robert Pianta
Jessica Whittaker
Ginny Vitiello
Erik Ruzek
Marcia Kraft-Sayer
Brittany Kerr
Laura Helferstay
Marianna Lyulchenko
Arya Ansari
Tara Hofkens
Partners: School district, IES, ELN
Preschool and Fade-Out

• Record enrollment in public preschool

• Produce measurable advantages

• Quality is variable
• What are the active ingredients?

• Why does fade-out (or catch up) occur?
**Longitudinal Cohort Study**

<table>
<thead>
<tr>
<th>Pre-K Attenders</th>
<th>Non-Attenders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-K</td>
<td>K</td>
</tr>
</tbody>
</table>

- Pre-K Attenders
- Non-Attenders
Research Question

How are classroom process variables associated with children’s gains within preschool?
Study Context & Participants
Auspice

Center, For-Profit

2%

Center, Non-Profit

15%

Public School

83%
Children’s Race/Ethnicity

- Black/African American: 21.5%
- Native American/American Indian: 14%
- White/Caucasian: 14%
- Latino/Hispanic/Spanish: 5.1%
- Asian: 3.1%
- Multiracial: 4%
- Other: 4%
- Missing: 42.8%
Primary Language Spoken at Home
Multi-Lingual Classrooms

72% have children who speak 3+ languages
Measures & Procedures
Classroom Processes

Teacher-Child Interactions

Content of Instruction

Time Use

Survey - Rigor

Time on Academics, SEL

Teacher Structured, Routines
Classroom Process Data

2-3 days of classroom observation
  • CLASS (teacher-child interactions)
  • Behavioral Coding System (use of class time)

Teacher questionnaire adapted from ECLS-K
  • Literacy content coverage
  • Math content coverage
Child Assessments

- Executive Functions
- Teacher-Child Relationships
- Social-Emotional
- Math
- Literacy
Child Assessments

Literacy and Math: Woodcock-Johnson III
  • Letter-Word ID
  • Picture Vocabulary
  • Applied Problems
  • Quantitative Concepts

Executive Functions
  • Head-Shoulders-Knees-Toes Task
  • Pencil Tap
  • Backwards Digit Span

Social-Emotional Skills: STRS & TCRS teacher ratings
  • Teacher-child conflict
  • Teacher-child closeness
  • Social Skills
  • Conduct Problems
Analyses

Hierarchical linear models (nesting students in classrooms)

Models control for:

- Baseline measure of each outcome in the fall
- Student characteristics (gender, age, race/ethnicity, SES, language)
- Classroom characteristics (aggregated student gender, age, race/ethnicity, income, special needs)
- Teacher characteristics (race, education, experience, beliefs about children)
- Program type
Results
# Academic Skills

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>p</td>
<td>S.E.</td>
<td>Estimate</td>
</tr>
<tr>
<td>Fall Pretest</td>
<td>.714</td>
<td>***</td>
<td>.028</td>
<td>.759</td>
</tr>
<tr>
<td>Teacher-Child Interactions</td>
<td>Overall Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content Dosage</td>
<td>Proportion Academics</td>
<td>.254</td>
<td>*</td>
<td>.135</td>
</tr>
<tr>
<td></td>
<td>Proportion SEL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity Setting</td>
<td>Proportion Teacher-Structured</td>
<td>.376</td>
<td>**</td>
<td>.134</td>
</tr>
<tr>
<td></td>
<td>Proportion Routines</td>
<td>.354</td>
<td>**</td>
<td>.138</td>
</tr>
<tr>
<td>Rigor</td>
<td>Literacy Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Math Level</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.10, **p<.05, ***p<.01
## Executive Function Skills

<table>
<thead>
<tr>
<th></th>
<th>Backward Digit Span</th>
<th>HTKS</th>
<th>Pencil Tap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>p</td>
<td>S.E.</td>
</tr>
</tbody>
</table>
| Fall Pretest              | .200     | .152 | .579 *** | .092 | .644 *** | .094 |****
| Teacher-Child Interactions| Overall Quality     | .334 | *    | .154     |     |      |          |      |      |
| Content Dosage            | Proportion Academics|      |      |          |      |      |          |      |      |
|                           | Proportion SEL      |      |      |          |      |      |          |      |      |
| Activity Setting          | Proportion Teacher-Structured |      |      |          |      |      |          |      |      |
|                           | Proportion Routines |      |      |          |      |      |          |      |      |
| Rigor                     | Literacy Level      |      |      |          |      |      |          |      |      |
|                           | Math Level          |      |      |          |      |      |          |      |      |

*p<.10, **p<.05, ***p<.01
# Teacher-Child Relationships

<table>
<thead>
<tr>
<th></th>
<th>Closeness</th>
<th>Conflict</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>p</td>
</tr>
<tr>
<td><strong>Fall Pretest</strong></td>
<td>.675</td>
<td>***</td>
</tr>
<tr>
<td><strong>Teacher-Child Interactions</strong></td>
<td>Overall Quality</td>
<td></td>
</tr>
<tr>
<td><strong>Content Dosage</strong></td>
<td>Proportion Academics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proportion SEL</td>
<td></td>
</tr>
<tr>
<td><strong>Activity Setting</strong></td>
<td>Proportion Teacher-Structured</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proportion Routines</td>
<td></td>
</tr>
<tr>
<td><strong>Rigor</strong></td>
<td>Literacy Level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Math Level</td>
<td></td>
</tr>
</tbody>
</table>

*p<.10, **p<.05, ***p<.01
## Social and Emotional Skills

<table>
<thead>
<tr>
<th></th>
<th>Task Orientation</th>
<th>Social Skills</th>
<th>Conduct Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>p</td>
<td>S.E.</td>
</tr>
<tr>
<td><strong>Fall Pretest</strong></td>
<td>.726</td>
<td>***</td>
<td>.018</td>
</tr>
<tr>
<td><strong>Teacher-Child Interactions</strong></td>
<td>Overall Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Content Dosage</strong></td>
<td>Proportion Academics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proportion SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activity Setting</strong></td>
<td>Proportion Teacher-Structured</td>
<td>-.241</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Proportion Routines</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rigor</strong></td>
<td>Literacy Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Math Level</td>
<td>.281</td>
<td>*</td>
</tr>
</tbody>
</table>

*p<.10, **p<.05, ***p<.01
Note:

- Very little variance in academic gains
  - 0 – 3.4%

- Classrooms made gains, but at similar rates
Conclusions

• Some early evidence that exposures to effective teacher-child interaction and educational content and structured setting promote greater performance in EF and academic skills

• Focus on examining moderated effects

• In Kindergarten, increase observation of child experience
Thank You