Math curricula boosts academic outcomes in Pre-K and Head Start classrooms, literacy curricula have no detectable impacts

<table>
<thead>
<tr>
<th>SITE</th>
<th>TREATMENT</th>
<th>N Pre-K</th>
<th>HS</th>
<th>CONTROL</th>
<th>N Pre-K</th>
<th>HS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA/NY</td>
<td>Pre-K Mathematics with DLM Early Childhood Express Math Software (math)</td>
<td>80</td>
<td>70</td>
<td>HighScope-Creative Curriculum (whole-child) or teacher developed</td>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>TX</td>
<td>Doors to Discovery &amp; Let’s Begin with the Letter People (literacy)</td>
<td>130</td>
<td>60</td>
<td>Teacher developed</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>VA</td>
<td>Language Focused Curriculum (literacy)</td>
<td>60</td>
<td>30</td>
<td>HighScope (whole-child)</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

- The majority of the children in our sample were from low-income families and had mothers with less than a high school degree
- 40% of the children were Black and 15% were Hispanic

Findings support policies that prescribe proven, targeted curricula.

Data: Preschool Curriculum Evaluation Research (PCER) initiative study
- Random assignment evaluations of 14 early childhood education curricula in 18 sites across the country
- We pool data from sites that have both public pre-K and Head Start classrooms and randomly assigned targeted curricula, limiting our sample to 3 sites:

<table>
<thead>
<tr>
<th>MEASURES</th>
<th>Outcome variables – Child school readiness skills:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Literacy composite: PPVT; WI Letter-Word; WI Spelling</td>
<td></td>
</tr>
<tr>
<td>- Math composite: WI Applied Problems; Childhood Mathematics Assessment-Arbitrator</td>
<td></td>
</tr>
<tr>
<td>- Academic composite: Literacy and math skills measures described above</td>
<td></td>
</tr>
<tr>
<td>- Social skills composite: Teacher reports from Social Skills Rating System; Problem Behaviors and Social Skills subscales</td>
<td></td>
</tr>
</tbody>
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Key independent variables:
- Whether the child attended a program that delivered targeted treatment curricula
- Whether the child attended Head Start or pre-K program

Additional covariates: Baseline achievement scores, site/grantee fixed effects, child characteristics (gender, race, age), and family characteristics (mother’s level of education, log of income, receiving welfare, employment, marital status), teacher characteristics (gender, race, age, annual salary, teaching experience, highest degree earned)

Analysis plan:
- Child and family characteristics differed by preschool program type, so we used inverse propensity score weighting to adjust for these observable differences
- OLS regression with standard errors clustered at the classroom level and fixed effects for unit of random assignment (either classroom or school)

Model

$$Y_{ij} = \alpha + \beta_1(\text{Pre-K})_{ij} + \beta_2(\text{Math})_{ij} + \beta_3(\text{Literacy})_{ij} + \beta_4(\text{Math} \times \text{Pre-K})_{ij} + \beta_5(\text{Literacy} \times \text{Pre-K})_{ij} + \beta_6(\text{Covariates}) + \mu_i + e_{ij}$$