

Teachers, Schools, and Pre-K Effect Persistence: An Examination of the Sustaining Environment Hypothesis

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TN-VPK: Typical Statewide Program

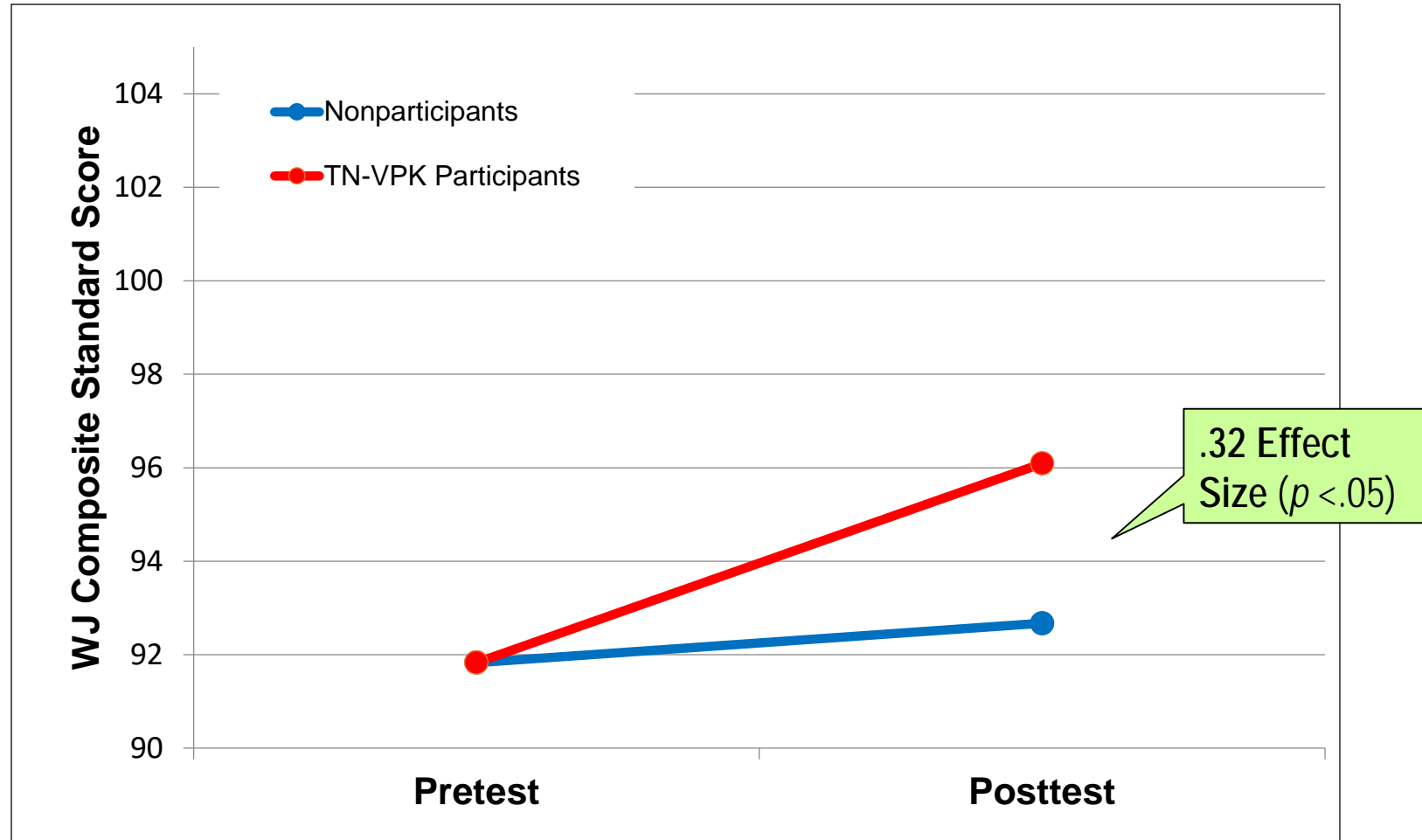
- Starting in 1998 with small pilot program, legislation created the TN Voluntary Pre-K program in 2005.
- Current program:
 - 935 pre-k classrooms in 135 of the 136 Tennessee school systems across all 95 Tennessee counties
 - Serving more than 18,000 children.
 - **Targeted: FRPL eligibility**
 - Met 9 of 10 NIEER Benchmarks for quality programs
 - 93% of classrooms are in public schools
 - Program not expanded since 2009

The Vanderbilt Pre-K Study

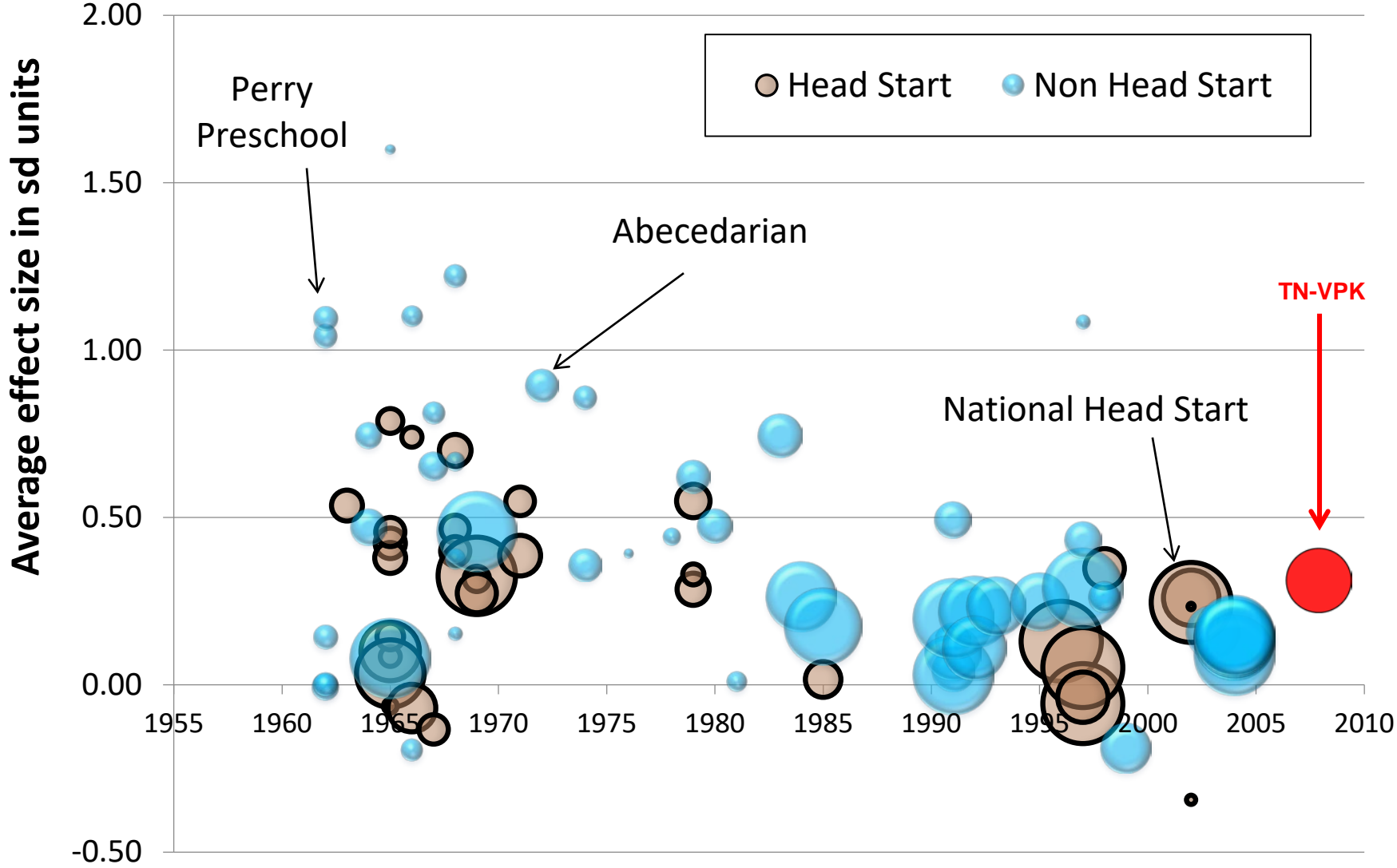
Three main components:

- Randomized control trial in oversubscribed schools-- 2 cohorts, 2990 students, 80 schools, 29 districts; tracking through the state data system to 3rd grade and beyond (now 6th grade).
- Intensive substudy of consented children in the full sample-- assessed each year by the research team through 3rd grade; 1076 students, 58 schools, 21 districts.
- Follow up Intensive substudy of Cohort II students through middle school; one-third new consents, 725 students with their families and teachers.

TN-VPK Effects at End of Pre-K on the Overall WJ Achievement Composite Score

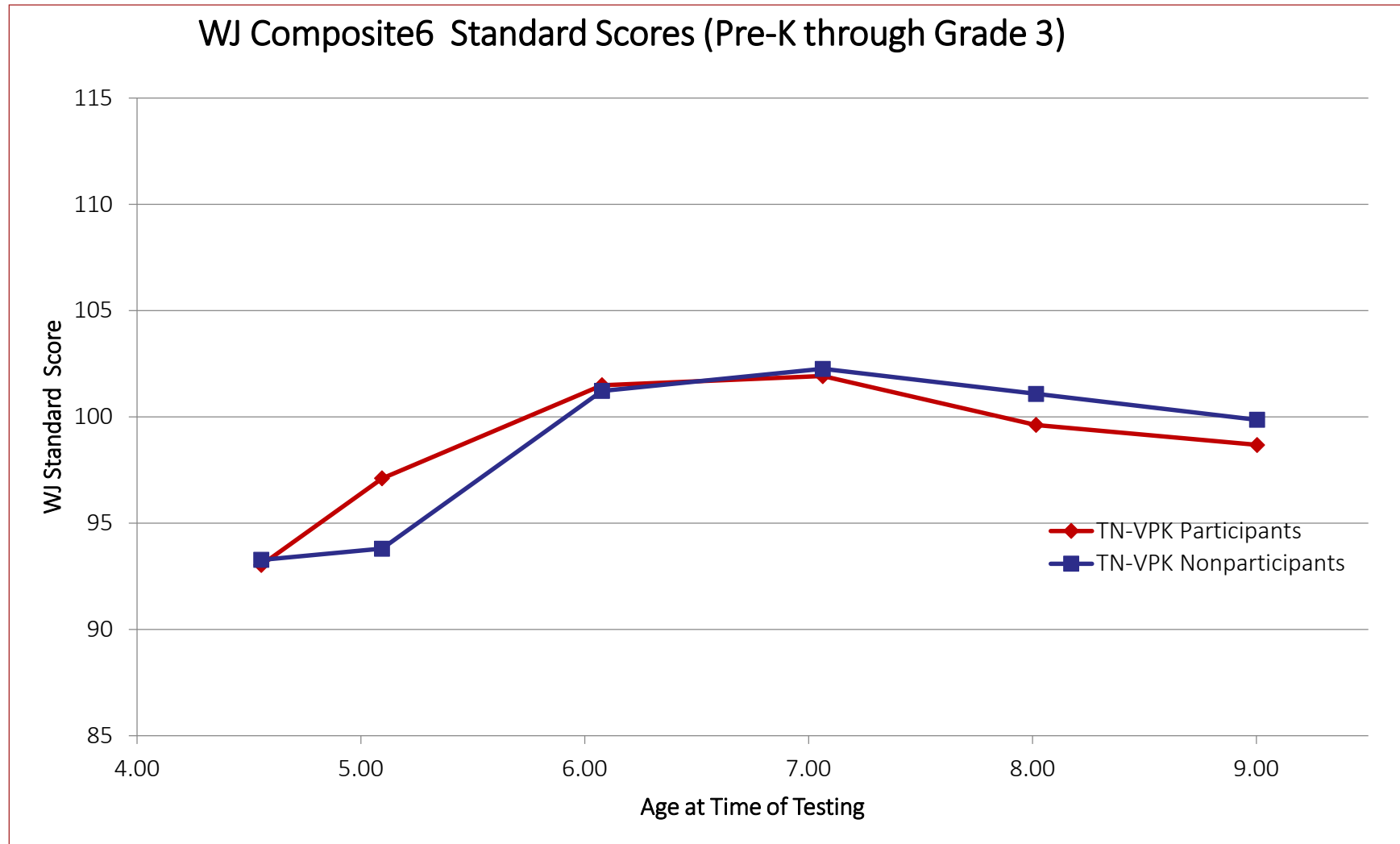


Review of End of Pre-K Average Cognitive Effects



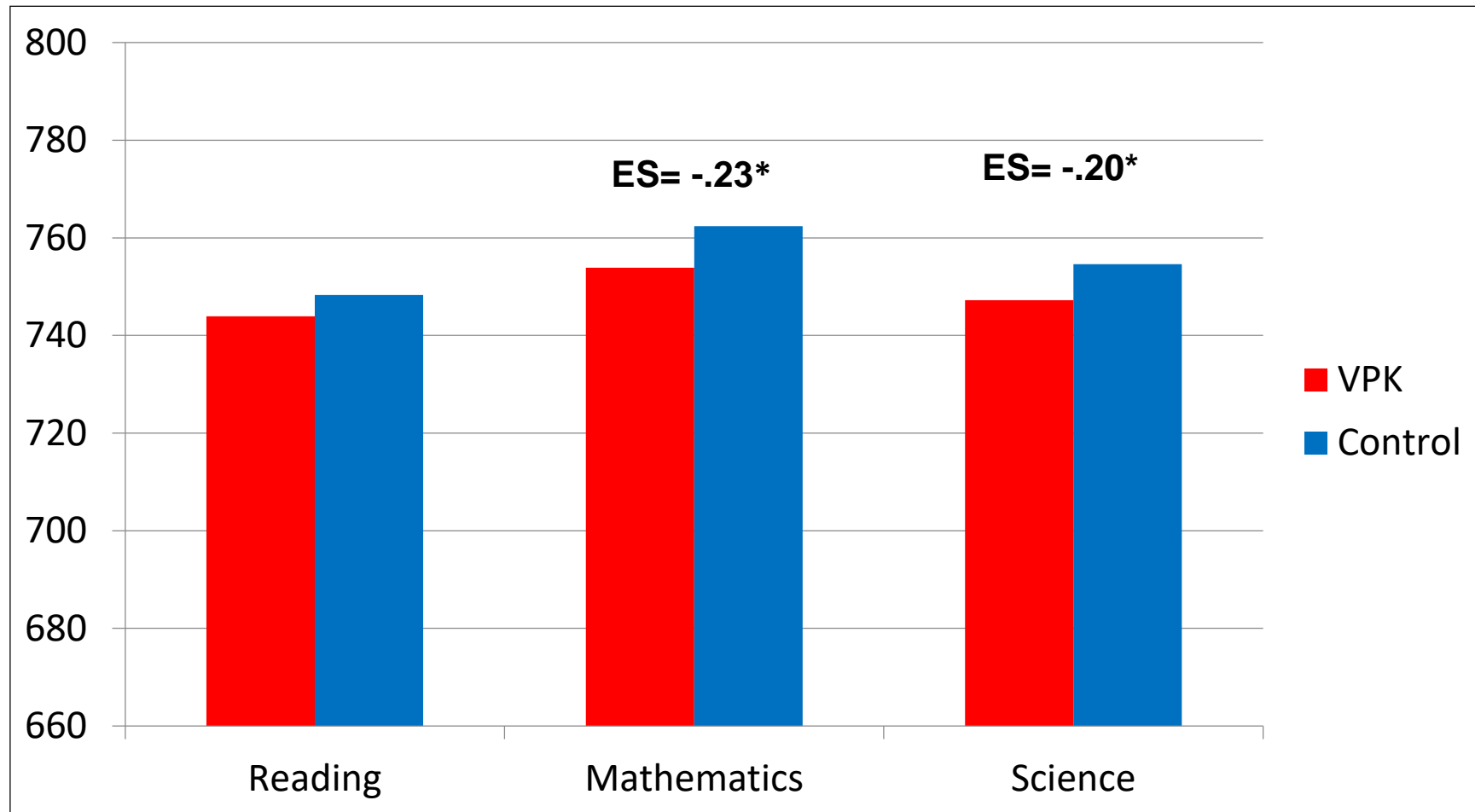
Source: Duncan & Magnuson, 2013

Overall VPK Achievement Advantage Fades



3rd Grade State TCAP Scores: Full Sample

(Treatment on Treated; N=2990)



Possible Explanations

Subsequent teacher and school quality

Research Questions

1. Is the association between PreK participation and 3rd grade achievement conditional on the number of teachers rated as highly effective that children have between PreK and 3rd grade or the timing of their exposure to such teachers?
2. Is the association between PreK participation and 3rd grade achievement conditional on the quality of schools that children attend between PreK and 3rd grade?
3. Is the association between PreK participation and 3rd grade achievement stronger with exposure to both higher quality schools and highly effective teachers?

Why focus on Teachers **and** Schools?

- Although poor children often attend lower quality schools, some children may nevertheless have exposure to highly effective teachers in such schools (Sass, Hannaway, Xu, Figlio, & Feng, 2012).
- Likewise, even if children are able to attend higher quality schools after PreK, children may not necessarily have good teachers in these schools.
- Therefore, it is relevant to consider the independent effects of high quality schools and teachers separately as well as the combined effects of exposure to both.

Sample

- Cohort 2 from broader TNVPK study.
- Second cohort permits access to measures of teacher effectiveness for students in each school year.
 - Tennessee's teacher evaluation system was introduced during Cohort 2's kindergarten year (SY 2010-2011).
- Complete case analysis: $n = 806$; imputed outcomes and covariates: $n = 1,240$.

Teacher Quality

- Classroom observation component of the TN teacher evaluation system.
- Adapted from the Charlotte-Danielson rubric.
- Observations focus on areas of instruction, planning, and environment.
- Teachers assessed multiple times per year
- Scores ranged between 0 and 5
- We define teachers with observation scores of 4 or above as *highly effective*.

Teacher Quality

- We use a teacher's average observation score to create variables that capture *overall exposure* and *timing of exposure* to highly effective teachers.
 - Overall exposure is calculated as the number of times that a student was assigned to a highly effective teacher from kindergarten to 3rd grade
 - Timing of exposure is calculated as whether a child had a highly effective teacher in at least the last two school years (late exposure) OR at least the first two years after PreK (early exposure)

School Quality

- Our primary measure is a school-level value added score as calculated by the Tennessee Value-Added Assessment System
- School quality is indexed by the extent to which student performance in a given school is better than expected given their demographics and prior achievement history.
- This measure is different from common metrics of school quality, such as % proficient, that closely approximate the socioeconomic composition of a school.

Identification Strategy

- In an ideal scenario we would derive our effect estimate with sequential randomization.
- In lieu of sequential randomization, we assume equal exposure of PreK participants and non-participants to subsequent quality schools and effective teachers (we test this assumption empirically)
- The treatment-control contrasts of interest are being treated as a quasi-experiment with associated procedures to adjust for baseline differences that may result in bias.

Model

$$Y_i = \beta_0 + \beta_1 VPK_i + \beta_2 SQ_i + \beta_3 TE_i + \beta_4 VPK_i \times SQ_i + \beta_5 VPK_i \times TE_i + \beta_6 TE_i \times SQ_i + \beta_7 TE_i \times VPK_i \times SQ_i +$$

- $z'_i + \varepsilon_i$
- Y_i is a standardized measure of TCAP math or ELA scores in third grade VPK_i is dummy variable for VPK participation
 - SQ_i is average school quality between kindergarten and 3rd grade
 - TE_i is an indicator of the number of highly effective teachers between kindergarten and 3rd grade
 - z'_i is a vector of student baseline characteristics (age, sex, race/ethnicity, and primary language)
 - ε_i is individual residual clustered at the school level

Notes about Model

- No randomization pool fixed effects
- Contrast of interest in between VPK participants and non-participants
 - Given the relatively small sample size and three-way interactions, IV estimation produces unstable and implausible estimates in this context.

Descriptives of the K-3rd School Environments

- 14% of the students attended K-3rd in high quality schools as measured by average value-added scores across those years.
- 46% of the students had a teacher rated highly effective on the TN evaluation system during 2 or more of the K-3rd grade years (cf. 81% of TN elementary students).
- Only 9% of the students attended high quality schools AND had at least 2 highly effective teachers during the K-3rd grade years.

Influence of the K-3rd School Environments

For the 9% of VPK participants and nonparticipants who attended high quality schools AND had at least 2 highly effective teachers:

- VPK participants scored significantly higher on the 3rd grade reading and math achievement tests (no “fadeout”)
- Highly effective teachers in the early grades were more influential for reading; in the later grades for math.

Influence of the K-3rd School Environments

- No evidence that having a highly effective teacher or attending a high quality school was sufficient by itself to explain differences in 3rd grade achievement between VPK participants and non-participants.
 - Possible Explanations
 - Within-school tracking
 - Academic needs of low-income children may not be captured by teacher observation scores

Influence of the K-3rd School Environments

- Timing of moderation differed by subject.
 - Attending a high-quality school and having a highly effective teacher immediately after VPK, in kindergarten and 1st grade, was most beneficial for ELA achievement
 - Attending a high-quality school and having a highly effective teacher in 2nd and 3rd grade was most beneficial for math achievement

Conclusions

- Supporting early gains from PreK may require exposure to high quality teacher **and** high quality schools as opposed to either.
- This promising finding is tempered by the fact that very few low-income children (~9%) actually experienced learning conditions in subsequent years that would reasonably approximate a sustaining environment.

Thank you!

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State Pre-K: Context and Cautions

1. Implemented at scale as routine organizational practice

- Multiple, varying subunits (districts, schools) with some degree of autonomy; challenges for implementing a shared vision and consistent standards of practice.

(Contrasts with widely-cited small, intensive demonstration projects implemented by researchers.)

2. Pre-k as an education program

- Most often administered by state departments of education.
- Classrooms generally located in public schools.
- Instructors typically licensed teachers.
- Programs primarily academic, but highly variable across states.

(Contrasts with Head Start and private center-based daycare.)

State Pre-K: Context and Cautions

3. High expectations

- School readiness, i.e., children enter K with some early literacy and math skills and appropriate school behavior.
- Boosted long-term achievement, e.g., state achievement tests, graduation rates.
- Reducing racial/ethnic and poverty-related achievement gaps.
- Cost savings via fewer special education placements and retentions in grade.
- Social/behavioral effects, e.g., better behavior in school; longer term effects on employment, criminal behavior, etc.
- Child care that frees parents for employment, income enhancement.

(Much is expected from a school year of pre-k.)

State Pre-K: Context and Cautions

4. Mixed and largely inconclusive supporting evidence

- Most promising indications from small boutique studies conducted 50 or more years ago.
- Clear evidence of immediate school readiness effects.
- Inconclusive evidence about longer-term academic effects, behavioral effects, and cost savings.
- Very limited evidence on life outcomes past graduation.
- Limited evidence of effects on parents' employment, income (may not be well-tailored for working families).
- Some evidence that effects are somewhat more positive for economically disadvantaged children.

(Widespread advocacy claims that solid research evidence supports the expectation of multiple positive long-term effects from participation in a state pre-k program are exaggerated.)