What Shape is the Relationship Between Child Outcomes and Classroom Assessment Scoring System?

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Project Description.
Good child care quality is associated with good child outcomes, but high-quality care is rare. What level of quality is necessary to achieve good outcomes? Is there a minimum level of quality that must be delivered in order to attain good outcomes? Is there a level of quality beyond which there are diminishing returns? To address such questions, the goal of this project is to understand the shape of the relationship between child outcomes and a measure of teacher-child interactions (the Classroom Assessment Scoring System, or CLASS) that is increasingly used in program improvement and in high-stakes applications such as quality rating and improvement systems and Head Start designated renewal. The distinguishing feature of this project is the use of contemporary quantitative techniques (shape constrained additive models) to rigorously estimate the shape of the relationship.

Research Questions.
- *In overall CLASS score, is there a base value that must be achieved before a strong relationship appears between CLASS score and child outcomes?*
- *In overall CLASS score, is there a ceiling value beyond which there is only a weak relationship between CLASS score and child outcomes?*
- *CLASS scores in the Instructional Support domain are typically lower than they are in the Emotional Support or Classroom Organization domains. Are these low Instructional Support scores*

meaningful, or are they simply an artifact of the CLASS scoring rubric?
- *Within the Instructional Support domain of CLASS, scores on the Language Modeling dimension are typically highest, scores on Quality of Feedback are typically intermediate, and scores on Concept Development are typically lowest. Are these differences meaningful, or are they simply artifacts of the CLASS scoring rubric?*

Sample. *Data in this project brief come from FACES 2009 (Head Start Family and Child Experiences Survey), the National Center for Early Development and Learning's combination of the datasets from the Multi-State Study of Pre-Kindergarten and the State-Wide Early Education Programs Study (NCEDL-SWEEP), and Educare Learning Network. In largest-N analysis in this project brief, we had complete data for 10,849 fall/spring data points from 5,870 children in 947 classrooms.*

Methods. *In a secondary analysis of FACES, NCEDL-SWEEP, and Educare, we used shape constrained additive models (Pya, 2016). This sort of analysis assumes that higher quality may be associated with better outcomes—but does not assume a straight-line (linear) relationship. This allowed us to assess the shape of the relationship between CLASS scores in various domains of child outcomes. We controlled for important covariates (IEP status, child race/ethnicity, home language, maternal education, whether classroom received Head Start funding, etc).*

Progress Update. *We found low and high thresholds (low threshold: minimum quality that must*

be achieved to achieve improved child outcomes, high threshold: quality beyond which diminishing returns were obtained). In an analysis using Peabody Picture Vocabulary Test (PPVT) as outcome, score on the CLASS Instructional Support domain (CLASS-IS) was related to spring PPVT for CLASS-IS between 2.3 and 4.1, with maximal gain at CLASS-IS = 3.2. A CLASS-IS score like this is well above typical scores in FACES 2009 or NCEDL-SWEEP but is only somewhat above typical CLASS-IS scores in more recent Head Start grantee reviews. It is close typical CLASS-IS in the Educare dataset.

Implications for policy/practice

Big picture: CLASS-IS scores have improved to the point where there are now associations with improved PPVT scores, but there remains substantial room for improvement. Details: CLASS-IS scores from FACES 2009 were low enough that mean score was below the low threshold (Mean CLASS-IS score in FACES 2009 was below the point where they were associations with improved PPVT). Current Head Start grantee reviews are in the range where there are associations with improved PPVT scores—but are low enough that further increase in CLASS-IS scores might be associated with additional improvement in child's PPVT. The higher CLASS-IS scores in the higher-resourced Educare programs are associated with even higher child outcomes.

Implications for research

By using shape constrained additive models we take advantage of the flexibility of generalized additive models while imposing the realistic constraint that higher quality is unlikely to ever lead to poorer outcomes.

For more information:

For more information on the datasets at ICPSR see doi: 10.3886/ICPSR34558.v1 (FACES 2009), and doi: 10.3886/ICPSR34877.v1 (NCEDL-SWEEP). For more information on Educare dataset see doi: doi:10.1016/j.ecresq.2015.02.002 (Yazejian et al., 2015). A poster on this study will be presented at 2017 biennial meeting of Symposium for Research in Child Development, Austin TX. For more information on the analysis please contact the principal investigator.

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