

Pre-Analysis Plan

Evaluating Learning Interactions (ELI) compares the efficacy of two different text-based interventions encouraging low-income parents for increasing children's literacy skills. The ELI experiment has two treatment groups and one control group. The first treatment encourages parents to engage in curiosity-based literacy learning interactions with their child i.e. engage in open-ended question asking, conversation and play. The second treatment encourages parents to engage in direct academic-based instruction with their child i.e. ask closed-ended questions that have a correct answer. The control group receives messages unrelated to literacy learning. The primary goal of this study is to compare how motivating two different kinds of parent-child learning interactions affect children's literacy skills and curiosity at the end of the intervention.

The analytical sample for estimation includes children who:

- (1) Complete the baseline assessment, remain in the study until the end of the intervention, and complete the follow-up assessment;
- (2) Are not reported/observed to have a learning disability.

The intent-to-treat (ITT) model is

$$Y_{i,t} = \beta_0 + \beta_1 T_{1i} + \beta_2 T_{2i} + \alpha Y_{i,t-1} + \epsilon_i \quad (1)$$

where $Y_{i,t}$ is the literacy skills of child i as measured at the end of the intervention by two different literacy assessments adapted from the Peabody Picture Vocabulary Test (PPVT-5), one being a measure of the vocabulary words included in the treatment and the other a measure of vocabulary words not included in the treatment, and curiosity scores measured by a curiosity assessment adapted from children's novelty preference tests; T_{1i} is an indicator of child i assigned to treatment arm 1; T_{2i} is an indicator of child i assigned to treatment arm 2; $Y_{i,t-1}$ is baseline literacy skills/curiosity scores measured by the same tests as $Y_{i,t}$; and ϵ_i is an error term. Because the omitted group is the control group, the coefficients of T_{1i} and T_{2i} estimate the average treatment effects of treatment arms 1 and 2 for child i . In the main regression specification, we also plan to control any unbalanced variables where an f-test of differences in means across three conditions is significantly different at the .1 level at baseline.

The robustness checks of the ITT estimates include:

- (1) Apply quantile regressions at every decile to investigate the change in literacy skills/curiosity score distribution between baseline and follow-up;
- (2) Apply randomization inference to compute the empirical p-values.

We plan to estimate heterogeneous treatment effects (HTE) in five baseline characteristics: the child's gender, baseline literacy skills, baseline curiosity scores, preschool enrollment status, and parental education. Specifically, we plan to separate children's baseline literacy skill and curiosity scores at the median of the score distribution and by thirds of the distribution. We plan to estimate treatment effects by whether children are enrolled in a formal preschool. We will also divide the sample by whether parents have a BA degree. The HTE model is

$$Y_{i,t} = \beta_0 + \beta_1 T_{1i} + \beta_2 T_{2i} + \theta_1 T_{1i} * Z_i + \theta_2 T_{2i} * Z_i + \alpha X_i + \epsilon_i \quad (2)$$

where Z_i is the baseline characteristic; the coefficients θ_1 and θ_2 show the difference in treatment effects by the baseline characteristic; X_i is a vector of controls including the indicated baseline characteristic, the unbalanced variables, and the interaction between the treatment arms and these control variables.

We are also interested in measuring the treatment effects on secondary outcomes collected from the parent survey, which collects measures of parent psychological characteristics, parenting beliefs and attitudes, time investment in their children, and perceptions about their children's cognitive skill and curiosity. We will use the model specification (1) and (2) for the ITT and HTE analysis. This exploratory analysis will provide suggestive evidence of potential mechanisms behind any detected treatment effects on children's literacy skills and curiosity at the end of the intervention.