Are different measures of literacy skills equally prone to summer learning loss?
Evidence from North Carolina's Read to Achieve program

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Background & Objectives

The tendency for students to return to school after the summer break with less knowledge or skills, commonly referred to as "summer learning loss," has been well documented in the empirical literature (for a recent overview, see Atteberry & McEachin, 2019). However, previous studies of summer learning loss focus on global measures of literacy development, often over a short time period. For example, many studies that utilize the Early Childhood Longitudinal Study, Kindergarten 1998-99 or 2010-11 cohort examine an overall measure of summer learning loss in reading over just one or two summers in early elementary grades (Benson & Borman, 2010; Burkam, Ready, Lee, & LoGerfo, 2004; Downey, von Hippel, & Broh, 2004; Downey, von Hippel, & Hughes, 2008; Quinn, 2014). Even work examining summer learning loss using the Northwest Evaluation Association's (NWEA) Measures of Academic Progress tests, spanning grades 1-8, provides a single aggregate measure of literacy development (Atteberry & McEachin, 2019). Yet early literacy acquisition is a complex process, involving the development of phonemic awareness, vocabulary, fluency, and comprehension. Further, struggles in each of these aforementioned areas requires different types of academic support. While prior work used global measures that incorporated various elements of early literacy, such measures do not allow us to examine whether students' skills across various measures of early literacy change equally over summer months when students are not in school.

This study seeks to advance the literature on summer learning loss by examining changes in student's early literacy skills across multiple measures of literacy development. We use statewide achievement data from North Carolina's Read to Achieve literacy program that contains multiple phonics, fluency, and comprehension-based test scores for students in grades kindergarten through third across the 2014-15 through 2017-18 school years. As a result, we are able to examine average gains during the school year and summer between kindergarten and third grade, totaling approximately 629,568 test scores for 78,696 unique students. Further, we have access to two composite measures of early literacy skills, as well as their subcomponent scores, which allow us to examine whether average gains are consistent across various measures of early literacy.

Research Questions

We ask the following research questions:

(1): How do average gains in literacy skills during the school year compare to average gains during the summer?
(2): To what extent do gains in literacy skills during the school year and summer vary across student subgroups?
(3): Are gains during the school year and summer consistent across multiple measures of literacy skills?

Research Design

Setting, Data, and Participants

We combine two data sources for all public school students in North Carolina. First, we use statewide administrative data that contains information linking all students, teachers, principals, and schools in North Carolina. We then merge the administrative data with mCLASS student achievement data. mCLASS is comprised of two assessments: one focuses on literacy development [Dynamic Indicators of Basic Early Literacy Skills (DIBELS)] and the other reading comprehension [Text Reading and Comprehension (TRC)]. The mCLASS assessments are administered three times per year (first at the beginning of the year, then in the middle, and finally at the end of the year) to students in grades

kindergarten through third. We specifically use administrative and student mCLASS data from the 2014-15 through 2017-18 school years for our analysis.

Our sample will include students who have literacy development and reading comprehension composite scores from both the beginning and end of year in every grade between kindergarten and third (i.e. test scores across all 8 time points). Our analytic sample contains approximately 629,568 early literacy and reading comprehension test scores for 78,696 unique students.

Measures

We estimate average gains during the school year and summer using two measures: literacy development and reading comprehension. We operationalize literacy development as the composite score from the DIBELS student assessment, which provides an estimate of a student's alphabetic understanding, phonological awareness, and reading accuracy. We operationalize reading comprehension as the composite score from the TRC assessment, which measures a student's reading accuracy, fluency, and comprehension. Student covariates include a series of dummy-coded indicators of gender, race/ethnicity, economic disadvantage, disability, academically gifted, and limited English proficiency.

Analysis

Similar to other studies of summer learning loss (Dumont & Ready, 2019; von Hippel, Workman, & Downey, 2018), we will use a three-level hierarchical linear model to estimate an individual learning trajectory for each student as they progress through sequential school years and summers. Test scores (Level 1) are nested within students (Level 2), and students are nested within schools (Level 3) (Raudenbush & Bryk, 2002). This approach is possible due to the fact that the dates on which assessments were administered varied across students, and starting and ending dates of academic years varied across schools.

Level 1 of our model will include seven time-varying covariates that indicate student exposure to school prior to each assessment: months of exposure to kindergarten, first grade, second grade, and third grade; and months of exposure to summer between kindergarten and first grade, between first and second grade, and between second and third grade. These seven measures allow us to model eight parameters: initial achievement as the students began kindergarten (the intercept), and the other seven parameters represent linear monthly learning rates during the four school years and three summers. Level 2 of our model will include the student covariates listed above.

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