AIR®
Advancing Evidence.
Improving Lives.

# What Does National Data Tell Us About Early Reading Development?

## Early Reading Skill Development and Characteristics of Reading Skill Profiles

B. Jasmine Park, Senior Researcher
Xiaying Zheng, Yuan Zhang

FCSM| October 26, 2023

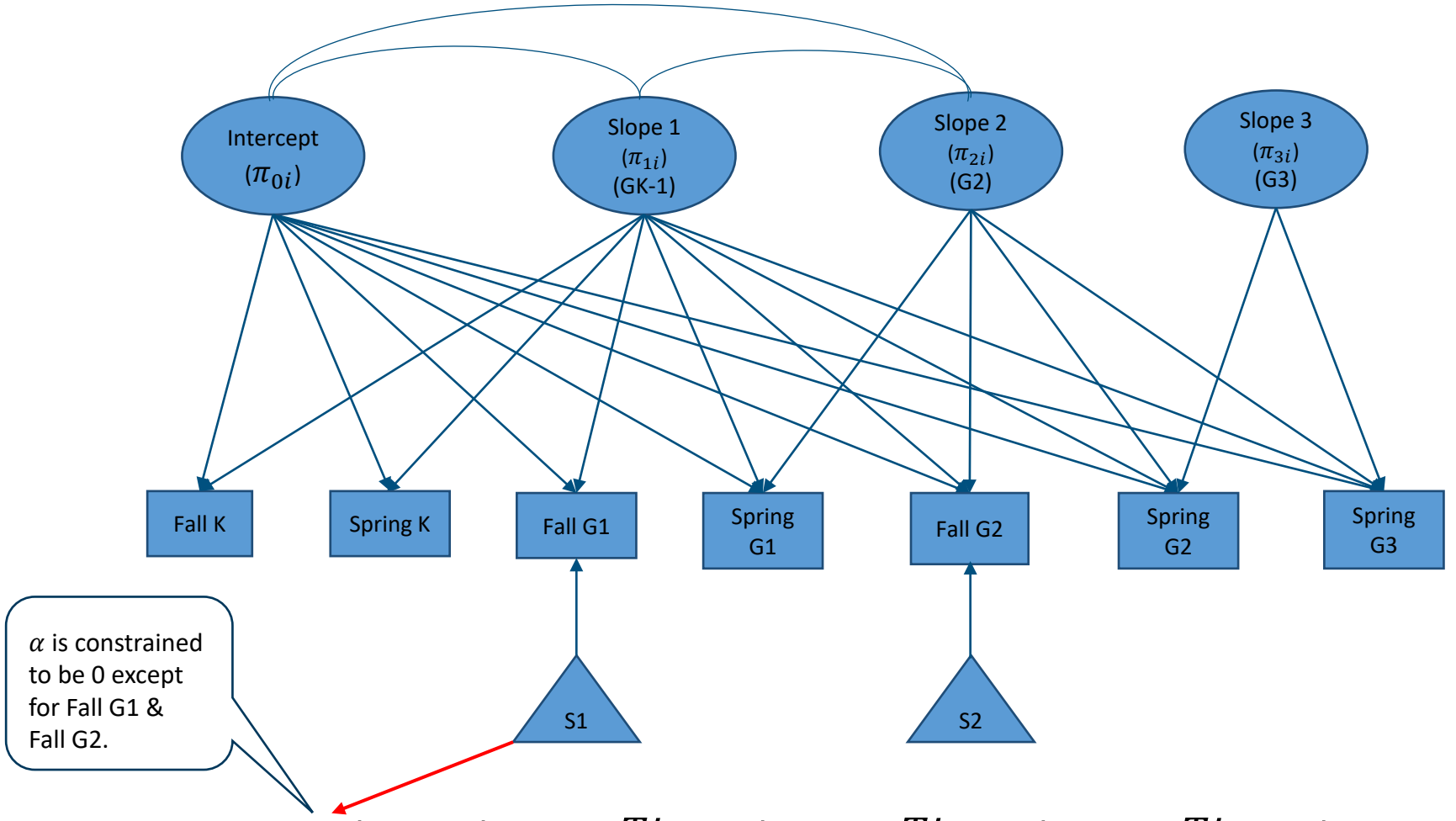
# Purpose of the Study

- Explore the importance of early reading development for future academic success
- Opportunity to link two national large-scale datasets to further examine how early reading skills are related to grade 4 NAEP reading assessment performance
- Research Questions:
  - Do distinct patterns of reading growth exist?
  - If so, how are these related to students' contextual information?
  - How are early reading growth development patterns related to students' performance on the NAEP grade 4 reading assessments?

# Data Source

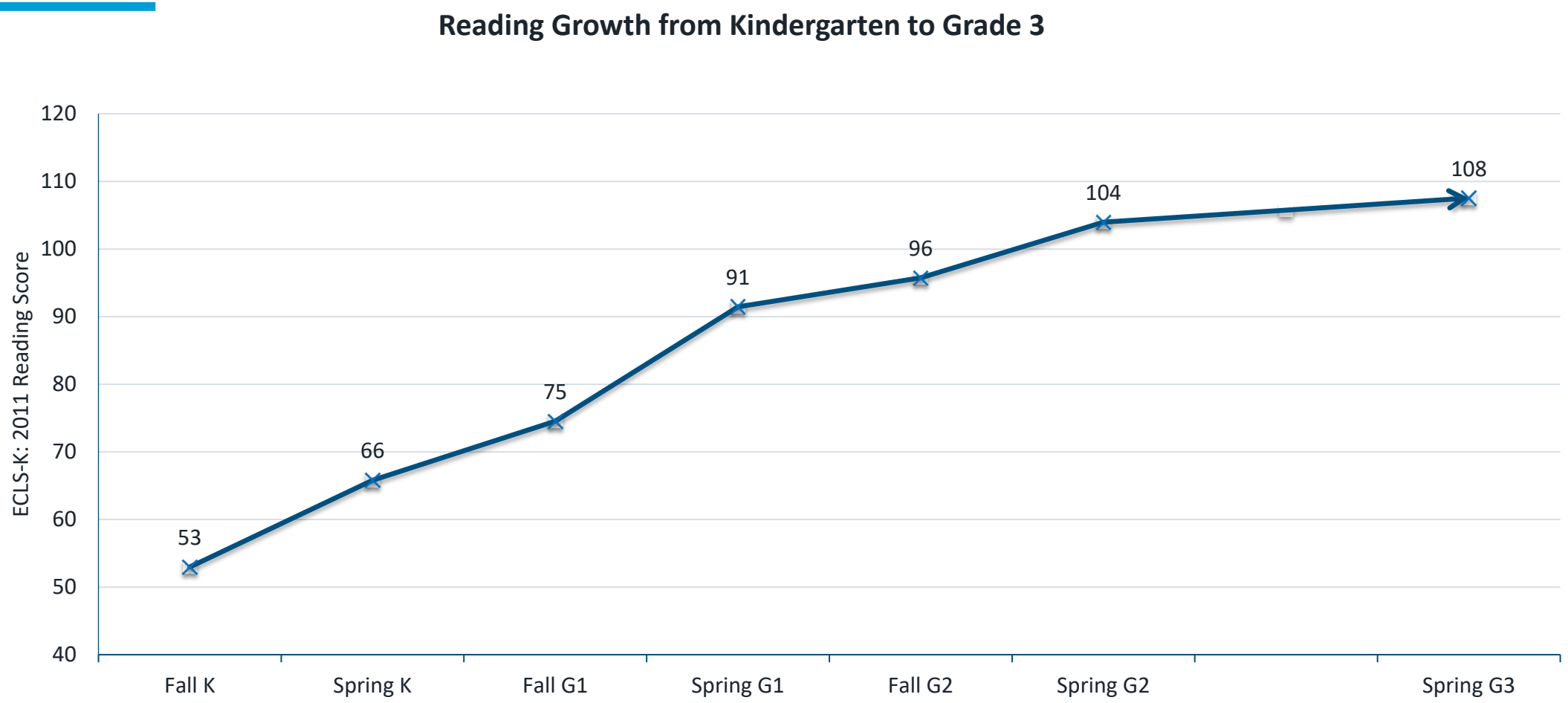
- Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011)
- One-on-one assessments of cognitive skills and knowledge
- Overall reading score is based on measures of a variety of reading skills
  - Phonemic awareness; Beginning & ending sound; Rhyming words
  - Letter recognition; Print familiarity
  - Phonics; Word recognition and sight words
  - Vocabulary
  - Comprehension
- Scores are calculated using IRT and are vertically scaled.
- Contextual questionnaires administered to parents, teachers, and school administrators

# Final Model for Piecewise Latent Growth Curve Model



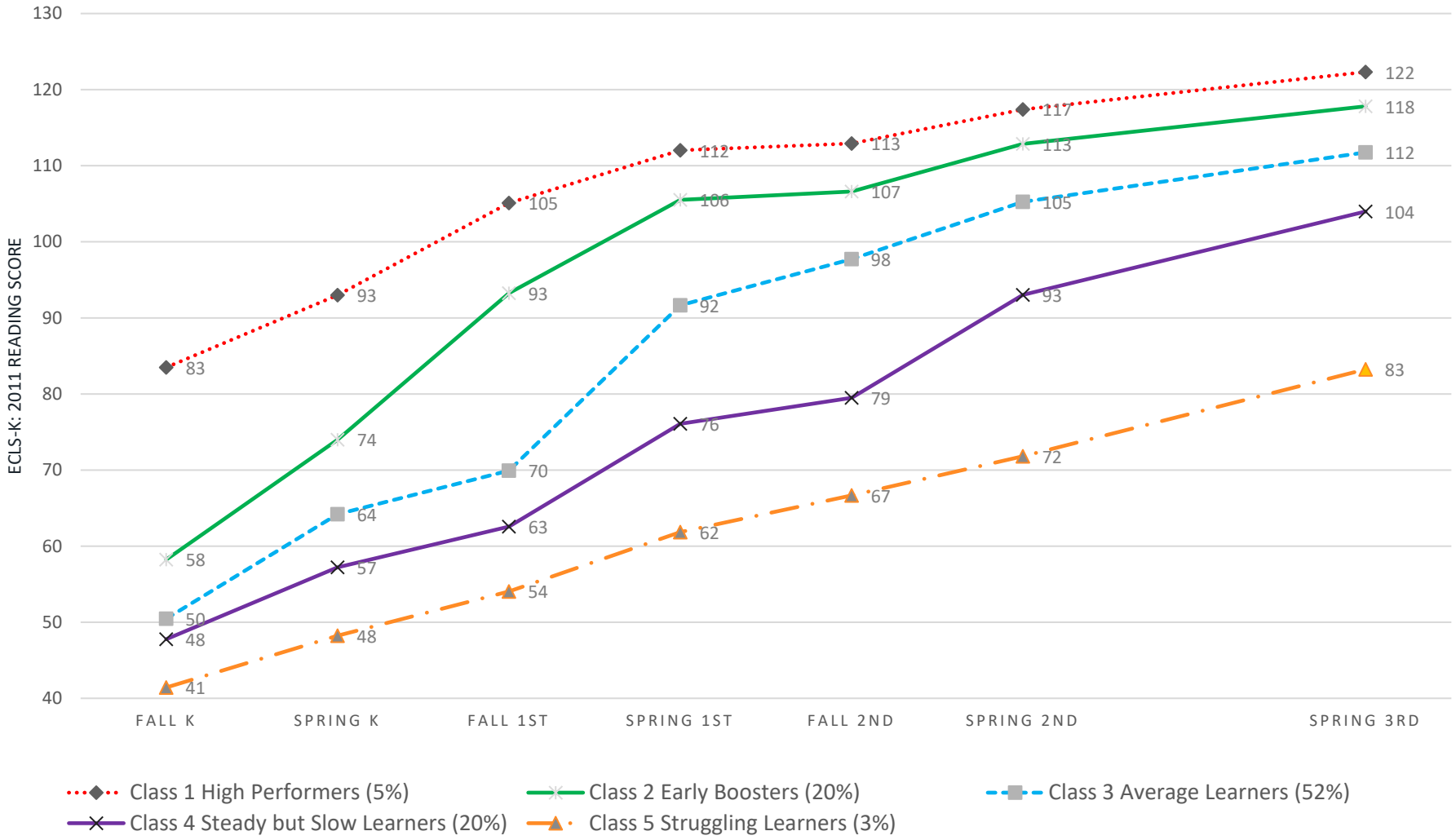

$$y_{it} = \alpha + \pi_{0i} + \pi_{1i} \times Time_{\mathrm{t}} + \pi_{2i} \times Time_{\mathrm{t}} + \pi_{3i} \times Time_{\mathrm{t}} + \varepsilon_{it}$$

# Piecewise Latent Growth Model Results




SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011), Kindergarten–Third Grade Restricted-Use Data File.

# Growth Mixture Model Results: Growth Trajectories



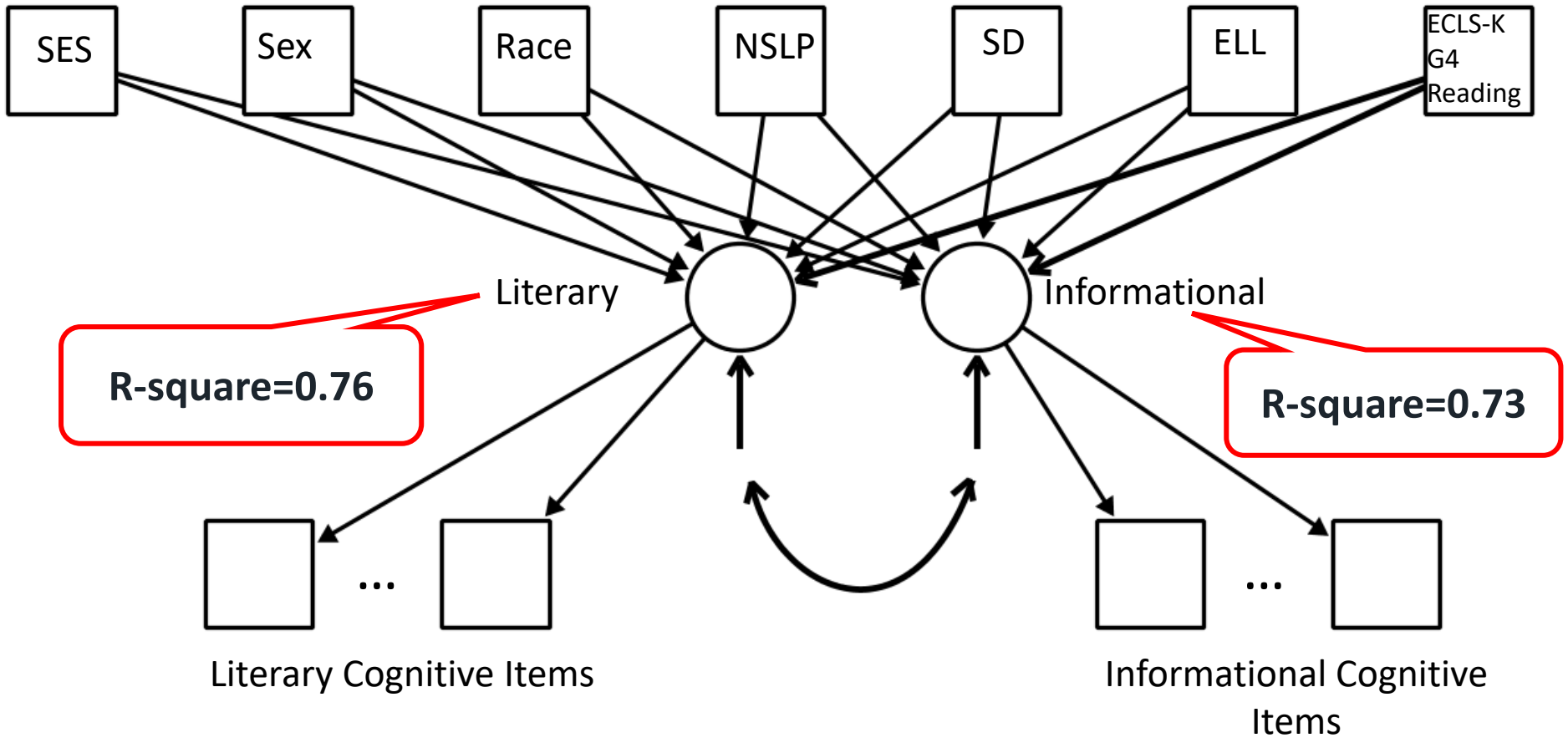

SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011), Kindergarten–Third Grade Restricted-Use Data File.

# Linking the ECLS-K:2011 & 2015 NAEP Reading Data

1. Linking the ECLS-K:2011 and 2015 NAEP reading assessment data using the overlap sample (approximately 600 students)
   - Unconditional two-dimensional IRT model (corresponds to two NAEP reading subscales) was fitted to 2015 NAEP grade 4 reading item response data using the NAEP operational item parameter estimates
   - Seven covariates (student characteristics from ECLS-K:2011) were added to the IRT model to predict two latent subscales
   - Using the parameters from the previous step, the two latent subscale scores were estimated for the ECLS-K:2011 non-overlap sample
2. Projected NAEP reading scores were compared across latent classes to examine the relationship between reading development patterns and NAEP reading performance

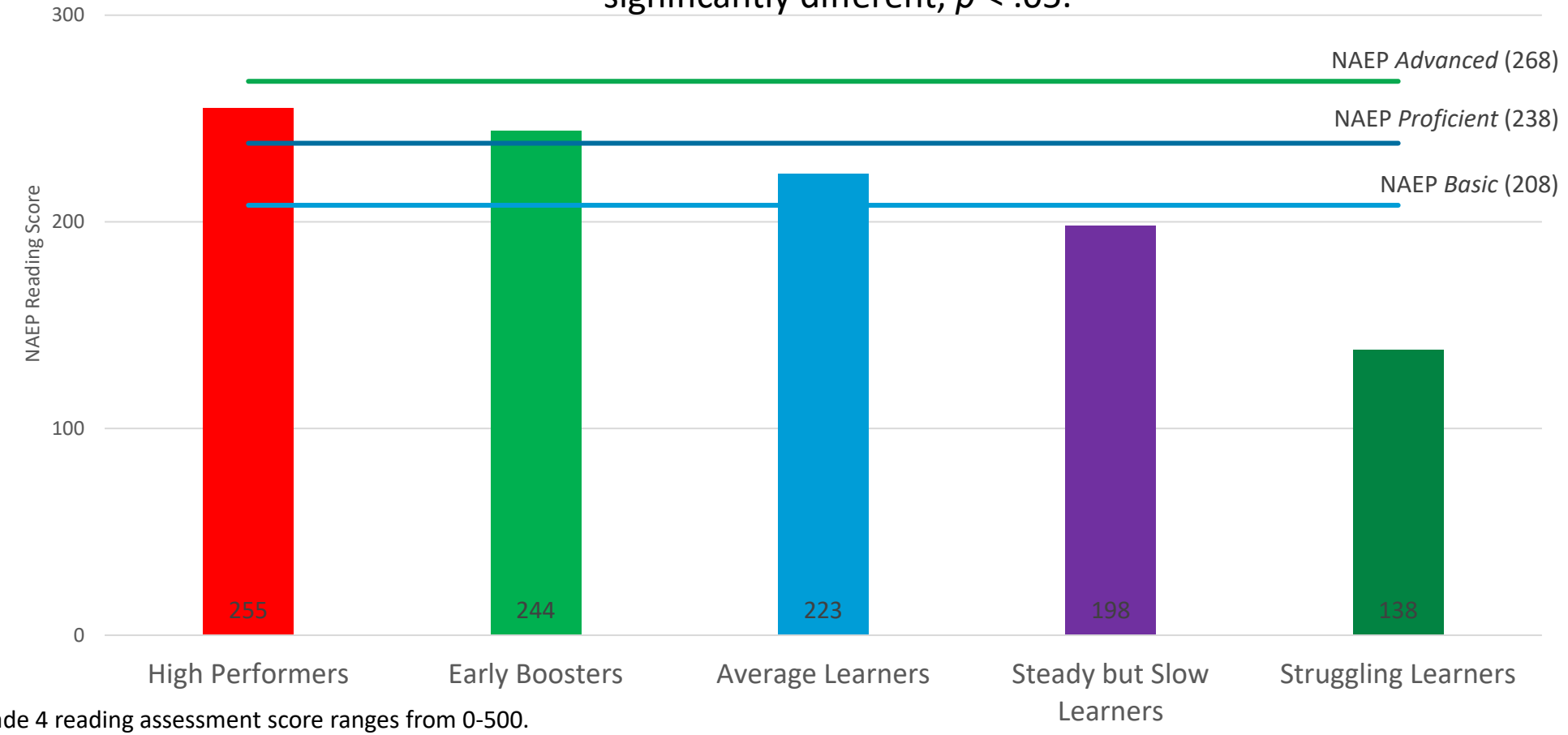
# Projection Model

## Using the ECLS-K:2011 and 2015 NAEP overlap sample



# Average Projected NAEP Reading Score by Latent Class

Average projected NAEP reading scores for each class are significantly different, $p < .05$.




NOTE: NAEP grade 4 reading assessment score ranges from 0-500.

# Understanding NAEP Achievement Levels

- *NAEP Proficient*: **Represents solid academic performance** for each NAEP assessment. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real world situations, and analytical skills appropriate to the subject matter
- *NAEP Basic*: Denotes **partial mastery of prerequisite knowledge and skills** that are fundamental for performance at the *NAEP Proficient* level
- More information about NAEP Achievement Levels: NAEP Item Maps

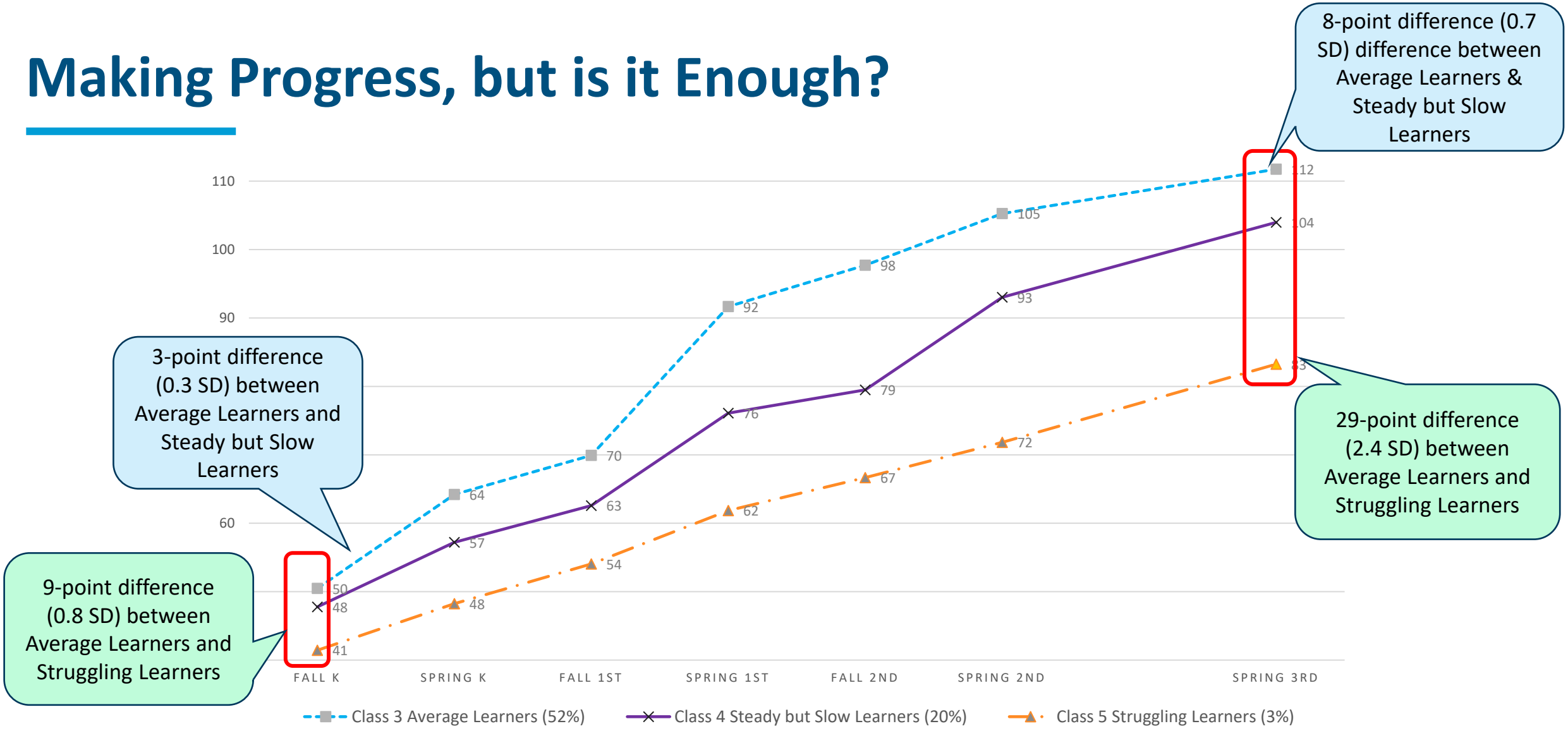
# Reading Growth Trajectory Patterns & NAEP Reading Achievement Levels

| | 2015 G4 National Public (%) | High Performers (%) | Early Boosters (%) | Average Learners (%) | Steady but Slow Learners (%) | Struggling Learners (%) |
|---|---|---|---|---|---|---|
| Below NAEP *Basic* | 32 | 3! | 10! | 30 | 64 | 95 |
| At NAEP *Basic* | 33 | 18! | 28 | 40 | 29 | 5! |
| At NAEP *Proficient* | 27 | 51 | 43 | 25 | 7! | 0 |
| At NAEP *Advanced* | 8 | 28 | 18 | 6 | 0 | 0 |

- One out of three "Average Learners" are projected to perform at *NAEP Proficient* or above.
- Almost all "High Performers" (8 out of 10) and "Early Boosters" (6 out of 10) are projected to perform at NAEP *Proficient* or above.
- Almost all "Steady but Slow Learners" (6 out of 10) and "Struggling Learners" (9 out of 10) are expected to perform below *NAEP Basic*.

! Interpret data with caution.
NOTE: Columns add up to totals. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011), Kindergarten–Third Grade Restricted-Use Data File & National Assessment of Educational Progress (NAEP), 2015 Grade 4 Reading Assessment.

# Making Progress, but is it Enough?




SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011), Kindergarten–Third Grade Restricted-Use Data File.

# What Students Can Do

- "Steady but Slow Learners (SSL)" and "Struggling Learners (SL)" are more likely to begin kindergarten with much fewer foundational reading skills.
  - About half of SSL and 80% SL did not have a mastery of alphabetic principles, while other students did at the beginning of kindergarten
- By the end of first grade, most students acquired foundational reading skills, but "Struggling Learners" demonstrated challenges with phonological awareness.
- By the end of second grade, almost all students seemed to show mastery of foundational skills necessary for decoding.

# Teachers' Reporting of Instructional Practices

- No differences in most instruction-related variables regardless of students' reading development patterns or EL status
- Some differences observed in the spring of kindergarten & first grade
  - Kindergarten:
    - » Reading aloud and reading books of their own choice as a class activity: Higher for "Average Learners"
    - » Discussing new or difficult vocabulary and retelling stories: Higher for "Steady but Slow Learners" and "Struggling Learners"
  - First Grade
    - » Teaching comprehension strategies: Higher for "Average Learners"
    - » Teaching phonics and word recognition: Higher for "Steady but Slow Learners" and "Struggling Learners"

# What Did We Learn about Early Reading Development?

- Nationally, data show that all children gain reading skills over time; however, not everyone makes adequate growth in reading, which widens the reading skill gap.
- Mastering foundational reading skills in early grades is important, and most students, including English learners, seem to acquire sufficient foundational reading skills by the end of second grade.
- Building strong foundational reading skills is important but not sufficient for students' overall reading and literacy development.
- For full paper: https://www.air.org/resource/report/early-reading-skill-development-and-characteristics-reading-skill-profiles-analysis

AIR®
Advancing Evidence.
Improving Lives.


# B. Jasmine Park

Senior Researcher
202.403.5704
bpark@air.org