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## INTRODUCTION

- A key consideration when adopting a progress monitoring measure is the degree to which growth on the measure explains performance on an key outcome of interest, after controlling for a student's initial level of performance.
- If growth guides treatment decisions, it should possess evidence of validity.
- There is robust evidence to support the use of computer adaptive tests (CATs) within multi-tiered systems of support (MTSS) to differentiate students in need of supplemental support from students who are not at risk for later difficulties (Klingbeil et al., 2015).
- There is less research to support the use of CATs to assess student response to intervention.
- Star Reading (SR) and Star Math, (SM) both developed by Renaissance Learning (2019; 2020), are among the few CATs that have been investigated to inform progress monitoring decisions.
- The purpose of the current study was to determine the relative value of growth on SR and SM, in predicting performance on end-of-year achievement tests for a sample of students in grades three through six.
- Another purpose of this study was to better understand the degree to which the relationship between growth on SR and SM and end-of-year achievement tests differed amongst students that scored higher or lower on the end-of-year test.

## PARTICIPANTS & PROCEDURE

### Participants

- SR: 805 grade three, 757 grade four, 784 grade five, and 534 grade six
- SM: 478 grade three, 447 grade four, 367 grade five, and 284 grade six
- All scored below 40th percentile during Fall screening

### Measures

- SR: CAT designed to assess reading achievement
- SM: CAT designed to assess math achievement
- Smarter Balanced Assessment Consortium (SBAC): end-of-year statewide summative test (reading and math versions)

### Procedure/ Data Analysis

- Students monitored roughly once a month across the academic year
- Individual rates of improvement, or growth, were estimated for each student
  - Linear mixed effects regression (LMER) models were first estimated for each grade and content area using the lme4 package (Bates et al., 2015) in R (Core Team, 2021)
- Separate quantile regression models for each grade and content estimated in which baseline scores and slope values from SR or SM predicted performance at the .10, .25, .50, .75, and .90 quantiles of the SBAC
  - Follow-up statistical significance tests conducted to compare differences in outcomes across quantiles within each grade and content area.
  - Quantile regression analyses conducted using the quantreg package (Koenker, 2019) in R

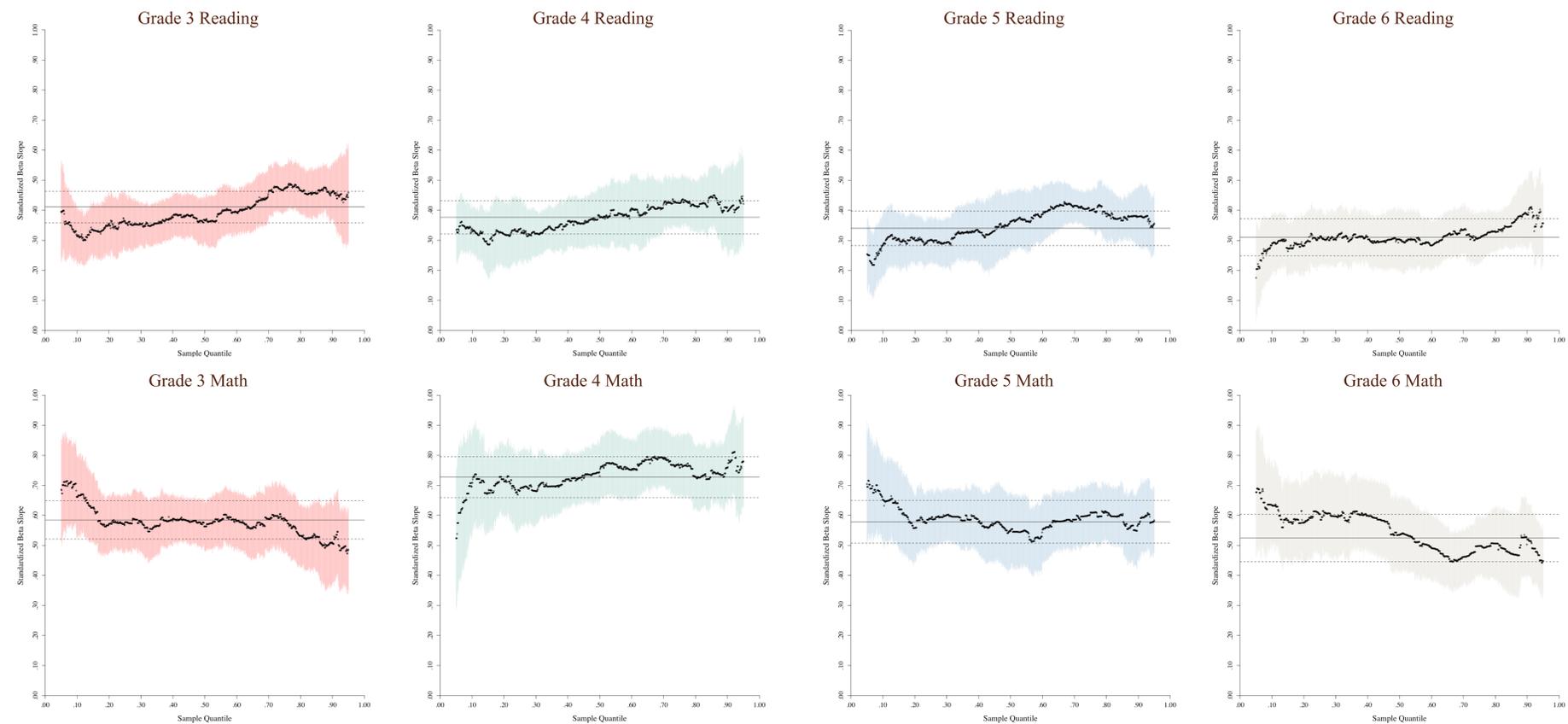
## RESULTS

### Reading

- Correlations between slopes and SBAC scores were consistently lower (range = .37 to .50) relative to correlations between baseline scores and SBAC scores (range = .51 to .62).
- Quantile regression analyses indicate that growth on SR explained a statistically significant amount of variance in performance on SBAC after controlling for baseline performance in all grades.
- In grades three through five, the relationship between growth on SR and the end-of-year test was stronger amongst students that scored better, or at higher quantiles, on the SBAC.

### Math

- Correlations between slopes and SBAC scores were higher than correlations between baseline SM scores and SBAC scores in all grades (range = .44 to .69 versus range = .66 to .77).
- SM explained a statistically significant amount of variance in end-of-year scores after statistically controlling for baseline performance in all grades.
- Growth on SM tended to predict performance on the end-of-year state test similarly across quantiles within each grade.



## DISCUSSION

### Reading

- In grade six, growth on SR tended to be equally predictive of SBAC across quantiles.
- Stronger relationships between growth and performance on the SBAC at higher quantiles test may be related to the alignment of the content and modality of SR and the SBAC.
- SR may be an appropriate method to monitor student progress for students that are receiving interventions targeting more complex skills (e.g., comprehension) relative to students with more severe academic difficulties in grades three through five.

### Math

- SM may be a sufficient measure of progress across a wider range of ability levels and likely for students receiving intervention related to concepts and applications.
- In contrast to reading, the strength of the relationship did not differ amongst students that scored lower or higher on the end-of-year test across grades.
- The lack of significant differences between quantiles could be due to the similarity in math assessment modalities across the range of skills sampled on both assessments.
- The value of growth above baseline performance in predicting end-of-year scores may suggest the need to wait for instruction to occur before conducting screening.