

*In the Running for Successful Outcomes:*  
Predicting Elementary School Academic and  
Social Trajectories from School Readiness Skills

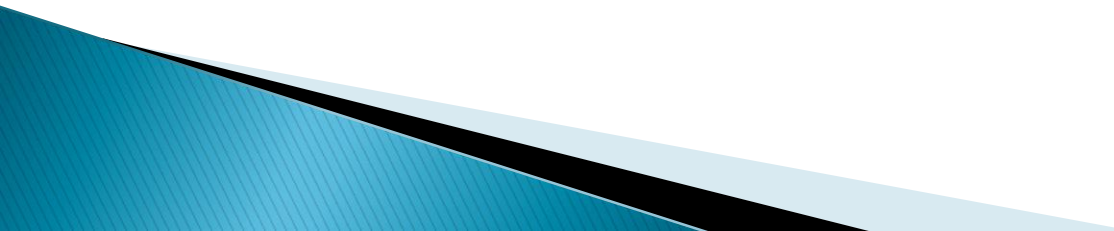
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Head Start Research Conference  
Washington, DC  
June 19, 2012

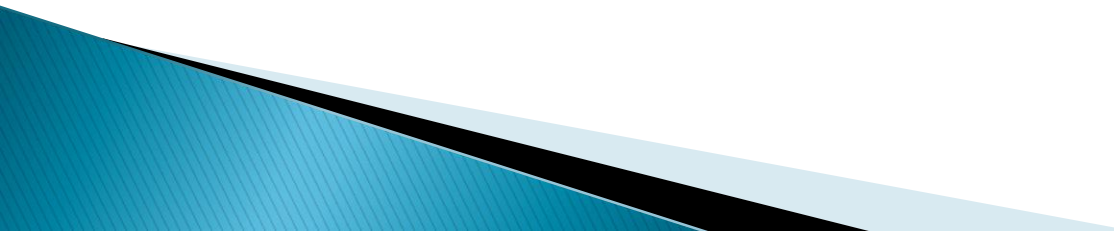
This project is funded by the Office of the Assistant Secretary for Planning and Evaluation, with collaborative partnering with the Office of Planning, Research and Evaluation in the Administration for Children and Families.

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# Overview

- ▶ Research Question
  - ▶ Overview of Methods
  - ▶ Review of Major Findings
  - ▶ Conclusions and Take Away Messages
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# Research Questions

- ▶ Do outcomes in elementary or later schooling depend on the skills and competencies in various domains at school entry?
    - To what extent does each school readiness skill predict school-age trajectories?
    - Which school readiness skills provide the best prediction school-age trajectories?
    - Do we see evidence of thresholds in school readiness skills?
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# Research Questions

- ▶ Do outcomes in elementary or later schooling depend on the school readiness skills and competencies in various domains at school entry?

Analytic Approach: School Readiness Skills	Representation of “thresholds” of School Readiness Skills in Analyses	Analytic Approach: School-age Outcomes
Person-centered	Latent Profiles	Longitudinal: Growth curve analysis of academic and behavioral skills
Variable-centered	Nonlinear prediction from school readiness skills  Piecewise splines using school readiness skills	Retrospective: Fifth grade status in terms of being “in the running”

# Data Sets and Analytic Samples

- Data Sets:
  - NICHD Study of Early Child Care and Youth Development (NICHD SECCYD)
  - Early Childhood Longitudinal Study– Kindergarten Class 1998–1999 (ECLS–K)
    - First–time kindergartners (ECLS–K)
    - Children who could not complete assessments in English were excluded

# Outcome Measures

Outcome Measures	SECCYD	ECLS-K
Reading	WJ-R Passage Comp W Scores (G3, G5, 15y)	ECLS-K Reading IRT scores (K, G1, G3, G5, G8)
Math	WJ-R Applied Problems W Scores (G1, G3, G5, 15y)	ECLS-K Math IRT scores (K, G1, G3, G5, G8)
Externalizing	TRF Externalizing t scores (K, G1-5)	Externalizing (K, G1, G3, G5, G8)
Social Skills	T-rating SSRS St Scores (K, G1-5)	Self control composite (K, G1, G3, G5, G8)

# School Readiness Skills

School Readiness Construct	SECCYD	ECLS-K
1. Language General Knowledge	Composite -PLS /WJ-R	ECLS-K IRT scores
2. Reading	WJ-R Letter Word	ECLS-K IRT scores
3. Math	WJ-R Applied	ECLS-K IRT scores
4. Social Skills	T-Rating SSRS	T-rate Self control composite
5. Attention Approaches to Learning	Cont. Performance Task Approaches to Learning	Approaches to Learning
6. Health	Parent rating	Parent rating

# Covariates used in Analyses

Covariates	SECCYD	ECLS-K
Sampling	Include Site	Use K weights
Race/ethnicity	Race/Ethnicity	Race/Ethnicity
Gender (female=1)	Female (0/1 variable)	Female (0/1 variable)
Maternal Education	M Education	M Education
Low-income status	Mean of Income/needs 6m-54m < 2	Income/needs Fall of kindergarten < 2
Marital Status	Proportion of time mother married 1-54m	Whether mother is married at fall of kindergarten
Child age	Age on Sept 1 of Kindergarten	Age on Sept 1 of Kindergarten
Disability status	Mother report of disability	Mother report of doctor diagnosis of disability
Home Language	NA	Whether home language is English



# Analytic Methods

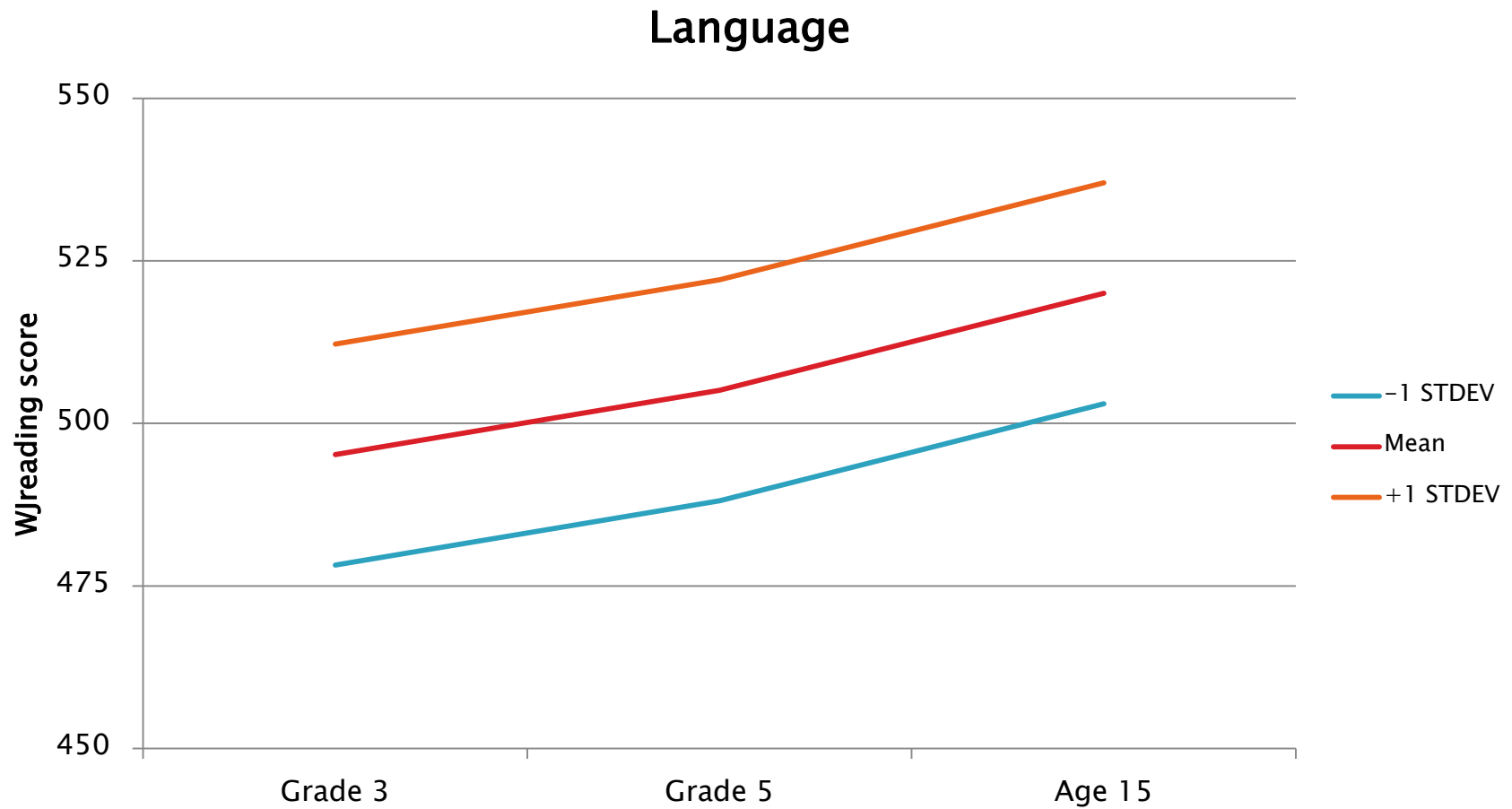
- ▶ HLM analyses of longitudinal school–age data
  - Quadratic population and linear individual growth curves
  - Covariates – demographic and sampling variables
  - **2 sets of analyses** (due to high correlations among school readiness variables)
    - **Each school readiness variable included in separate analyses**
    - **All school readiness variables included together**

# Analytic Methods

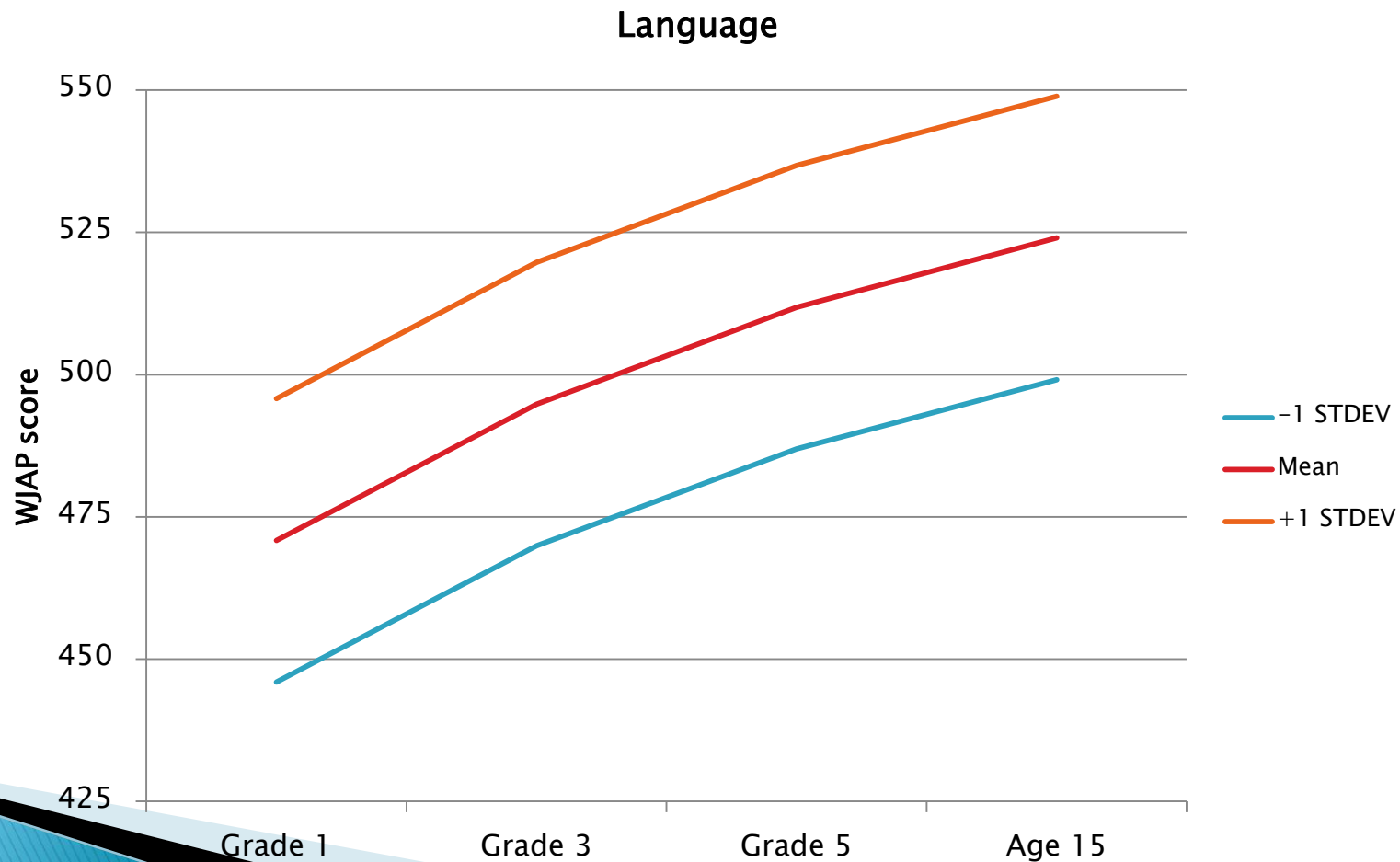
- ▶ HLM analyses of longitudinal school-age data: Associations between School Readiness Skills and School-Age Outcomes
  - Nonlinear Associations : do school readiness skills provide linear or quadratic prediction of the individual intercepts and rates of change of time in school-age outcomes?

$$Y_{ij} = \pi_{0i} + \pi_{1i} \text{Grade}_{ij} + B_2 \text{Grade}_{ij}^2 + B_3 \text{SchoolReadiness}_i + B_4 \text{SchoolReadiness}_i^2 + B_5 \text{Grade}_{ij} \times \text{SchoolReadiness}_{ij} + B_6 \text{Grade}_{ij} \times \text{SchoolReadiness}_{ij}^2 + B \text{ covariates} + e_{ij}$$

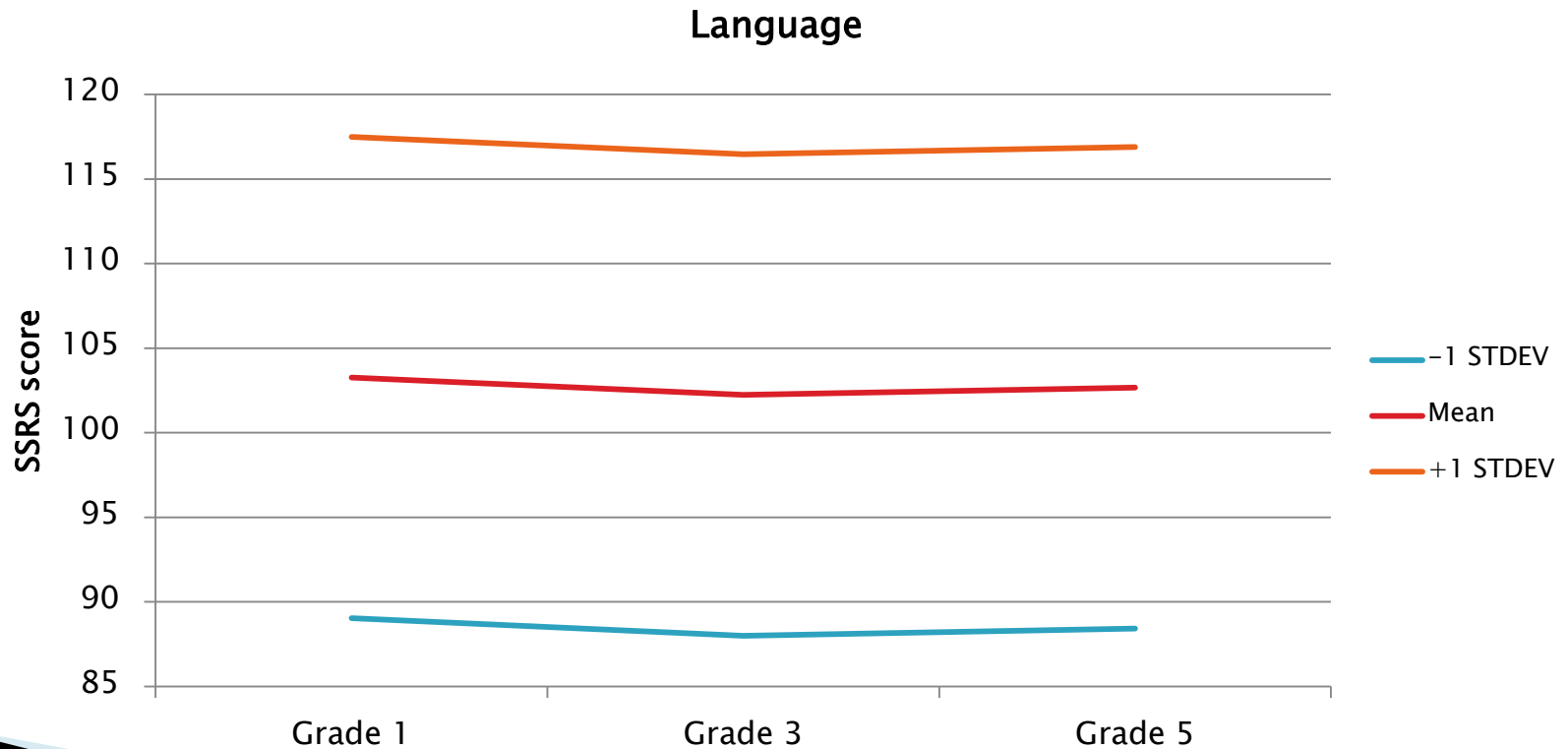
# Language skills' association with reading skill growth over time



# Figure 5. Language skills' association with math skill growth over time



# Figure 6. Language skills' association with social skills growth over time

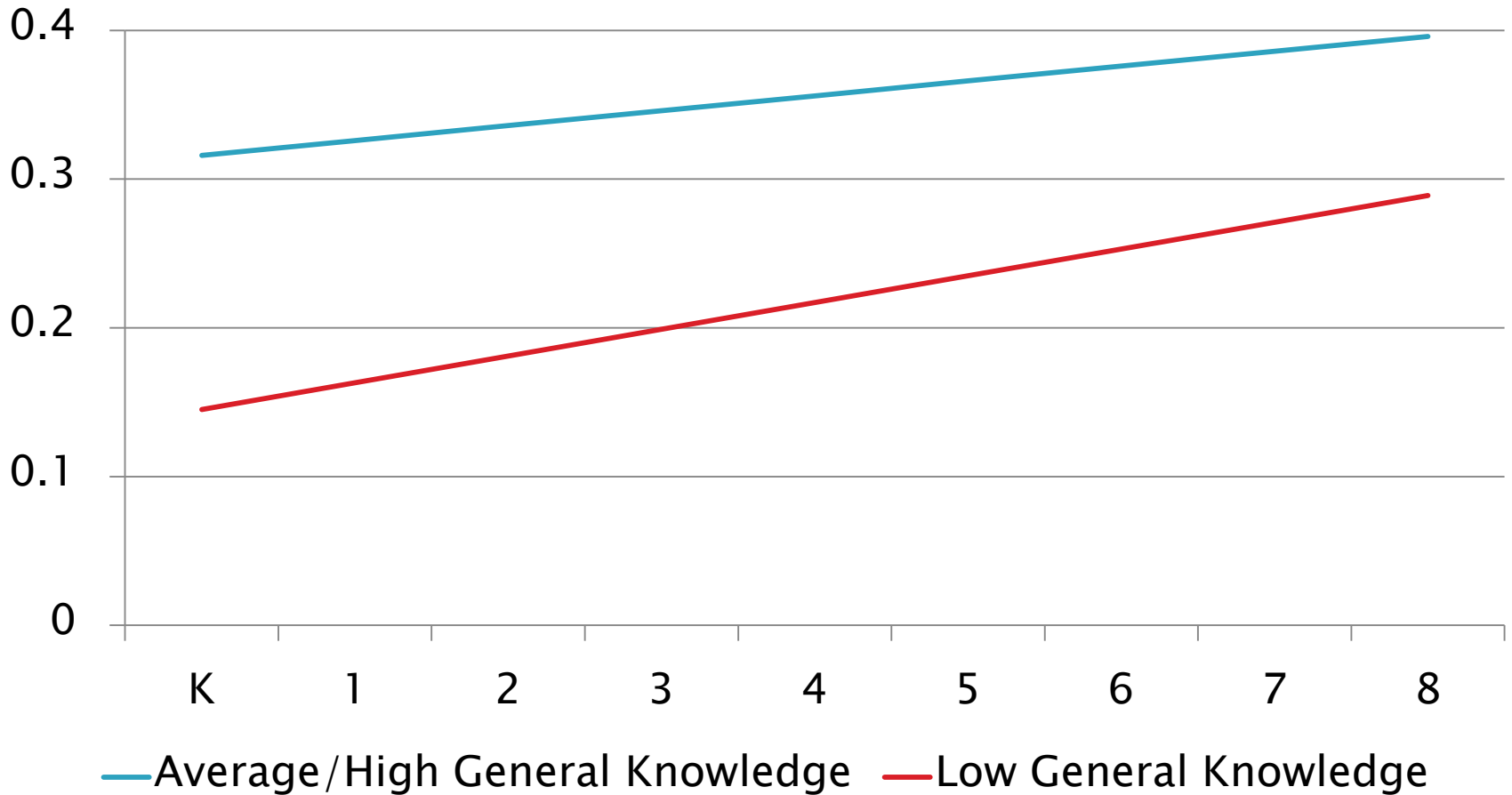


# Analytic Methods

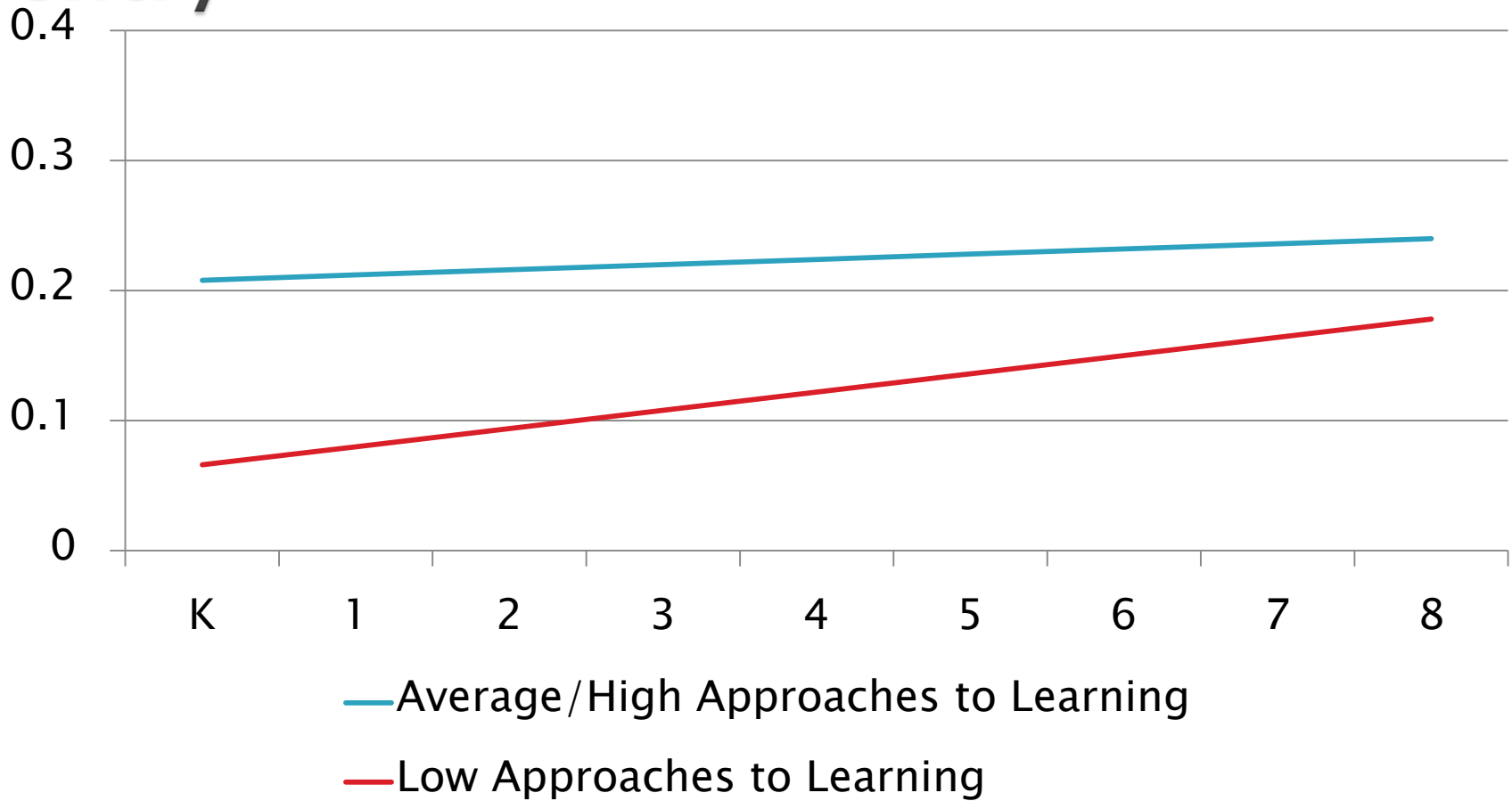
- ▶ HLM analyses of longitudinal school–age data: Associations between School Readiness Skills and School–Age Outcomes
  - Piecewise Associations: is the association between school readiness skills different when children enter school with low levels of skills and average -to-high levels of skills
  - Low level of skills: 1 SD from mean

$$Y_{ij} = \pi_{0i} + \pi_{1i} \text{Grade}_{ij} + B_2 \text{Grade}_{ij}^2 + B_3 \text{SchoolReadiness}_{ij} + B_4 \text{SchoolReadiness}_{ij} \times \text{low range}_{ij} + B_5 \text{Grade}_{ij} \times \text{SchoolReadiness}_{ij} + B_6 \text{Grade}_{ij} \times \text{SchoolReadiness}_{ij} \times \text{low range}_{ij} + B \text{covariates} + e_{ij}$$

# ECLS-K: Math trajectories based on K entry general knowledge



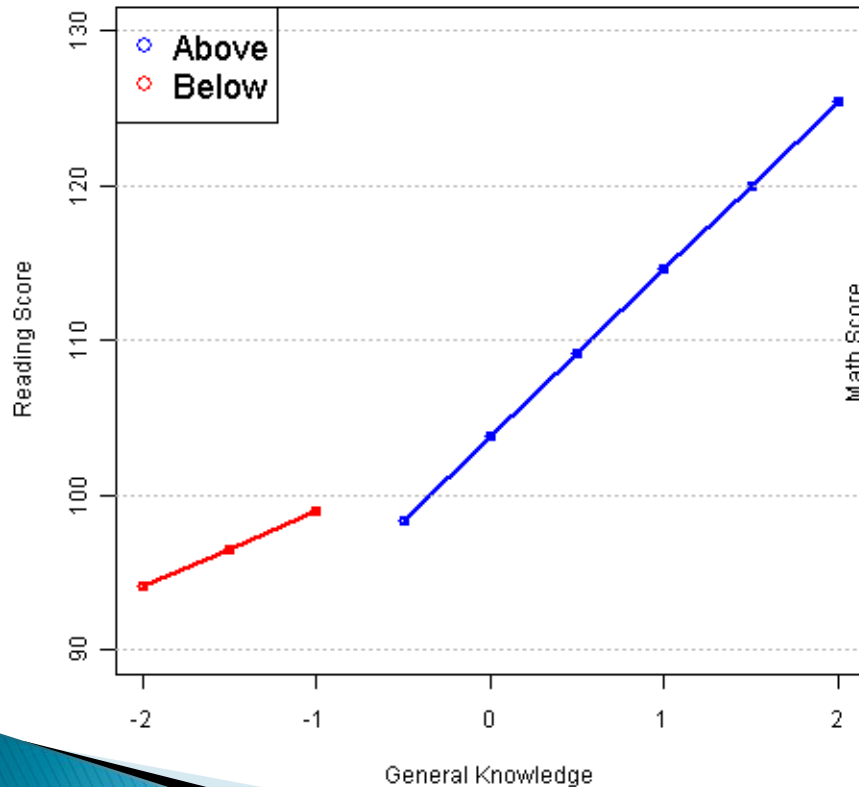
# ECLS-K: Reading trajectories based on approaches to learning at K entry



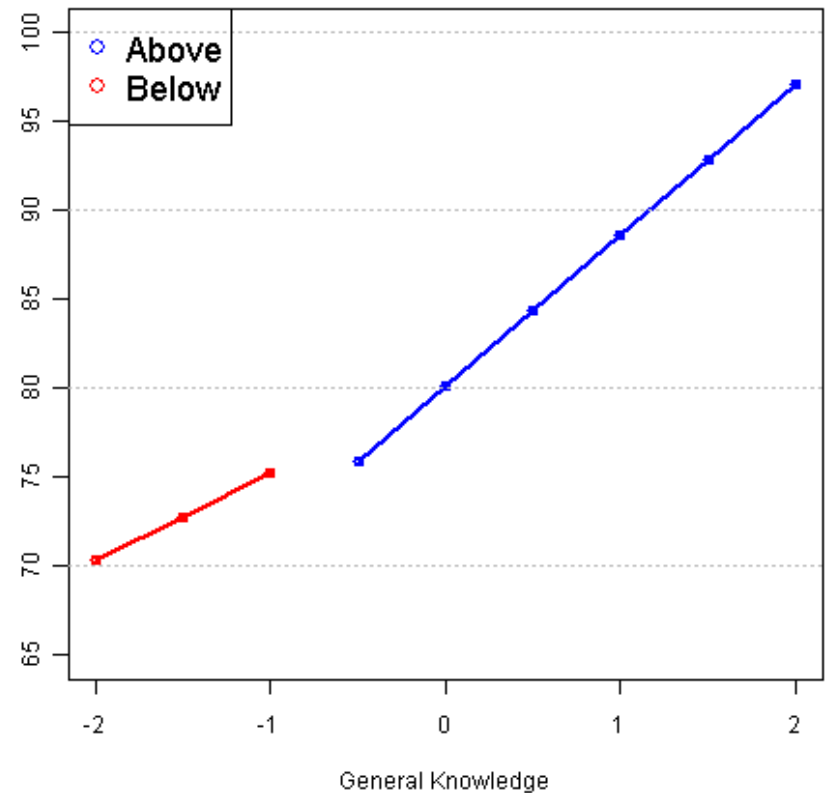


# Spline Analysis: General Knowledge's Effect on Reading and Math Scores

General Knowledge's Effect on Reading Score

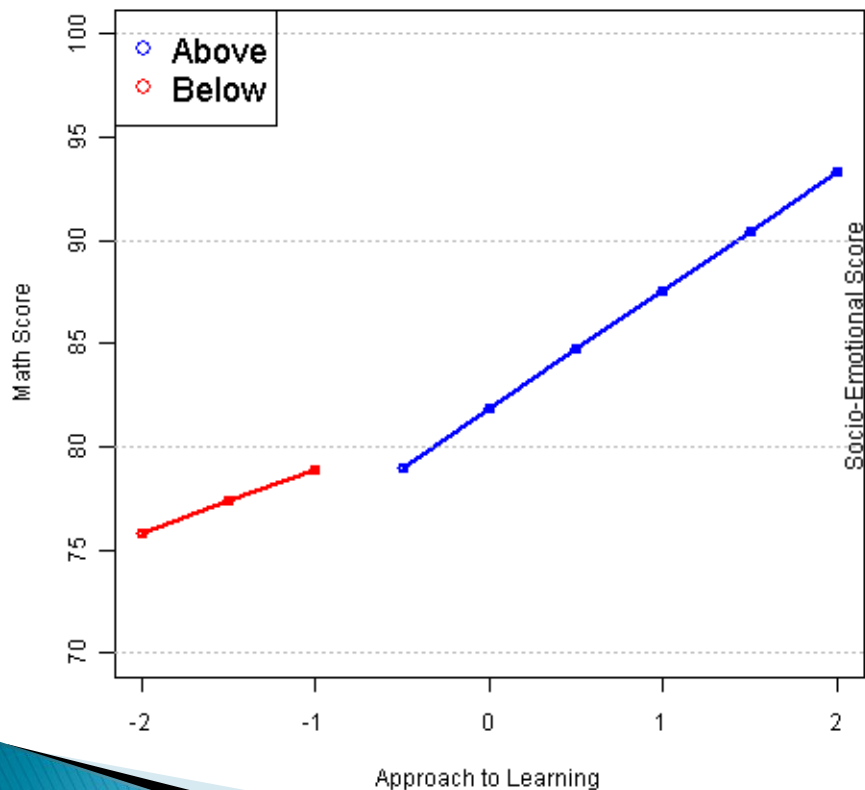


General Knowledge's Effect on Math Score

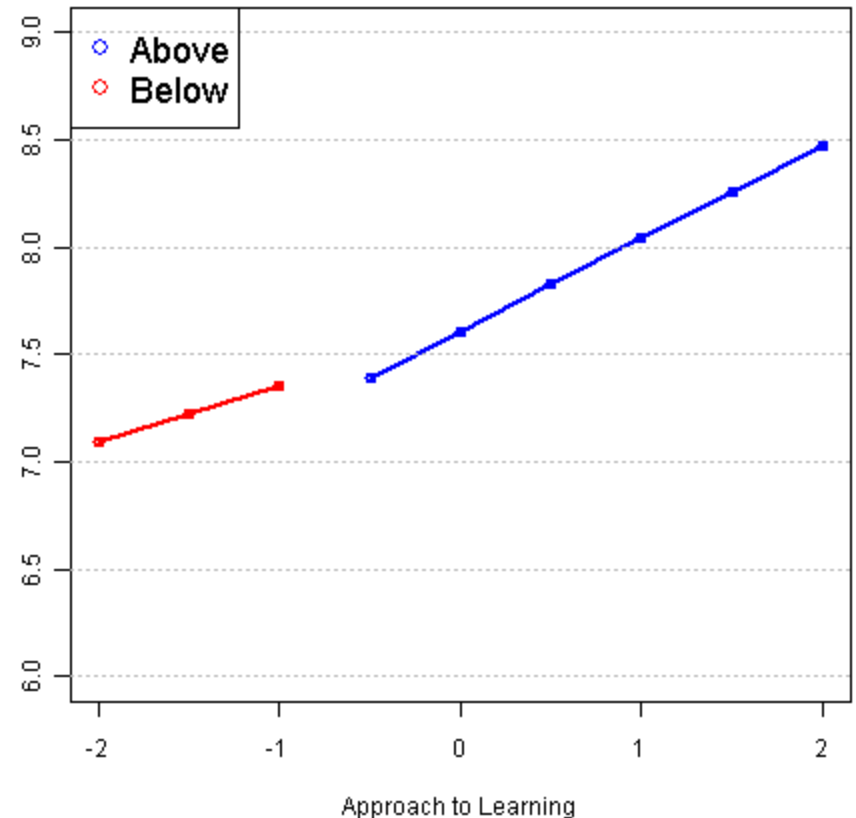


# Spline Analysis: Approaches to Learning's Effect on Math and Socio-Emotional Scores

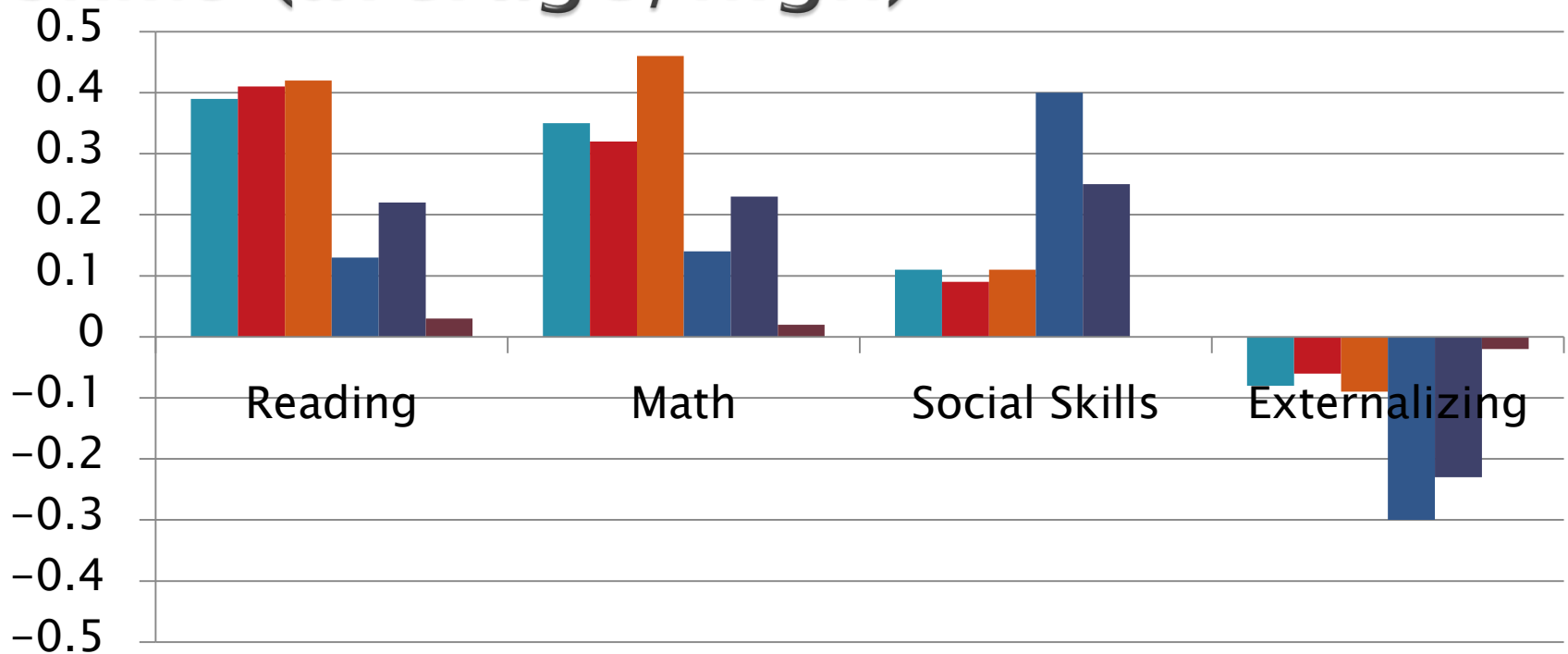
Approach to Learning's Effect on Math Score



Approach to Learning's Effect on Socio-Emotional Score

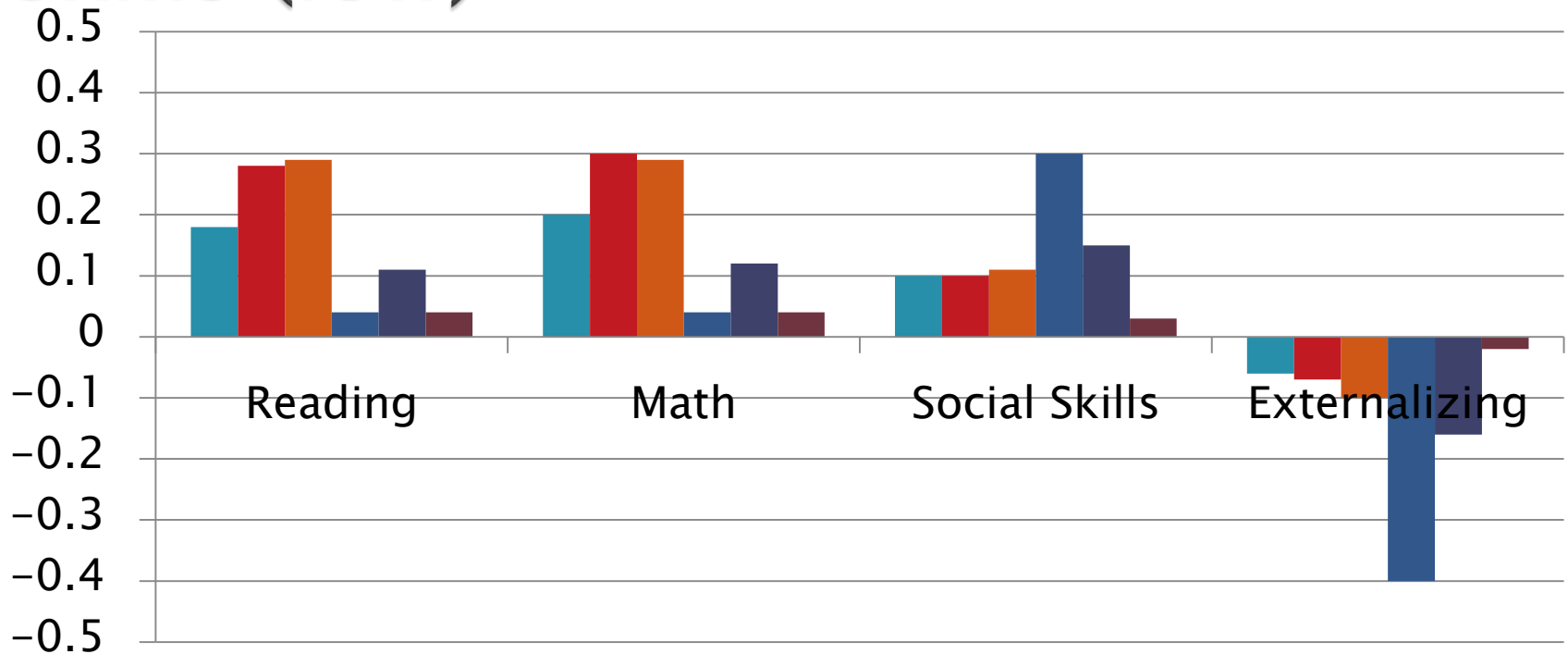


# ECLS-K: Predicting trajectory level from individual school readiness skills (average/high)



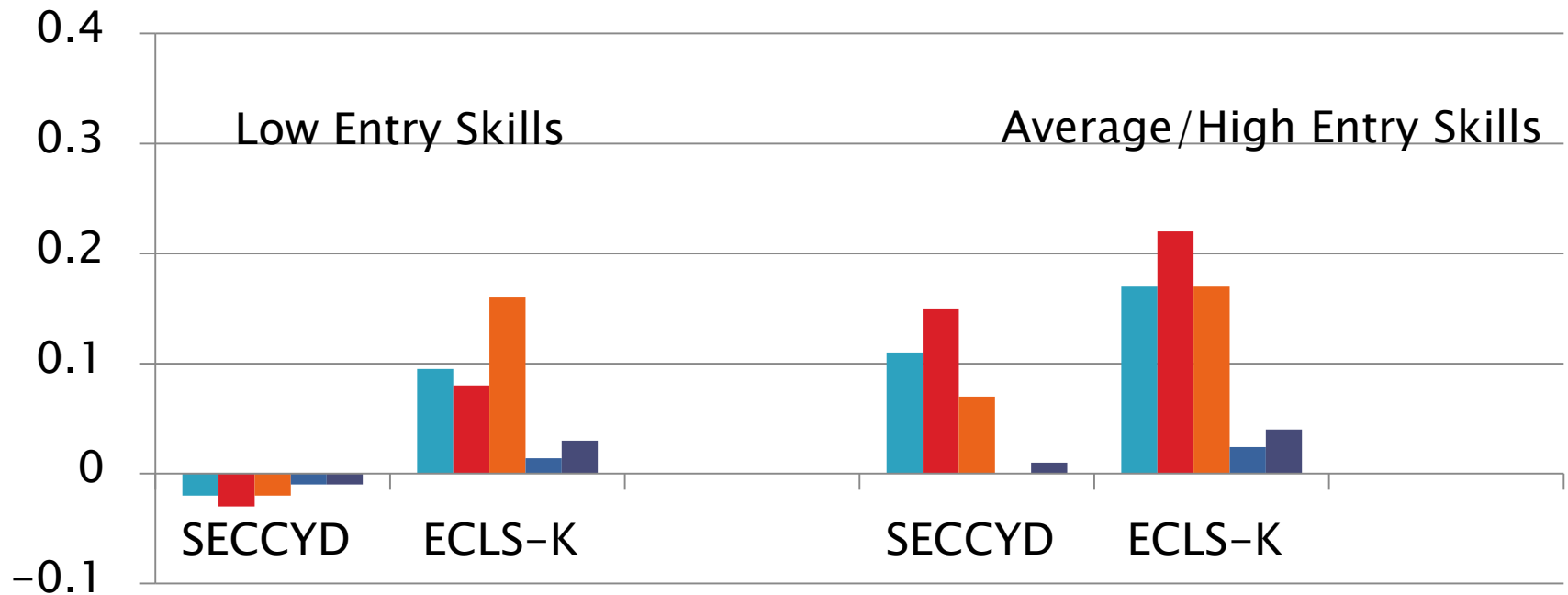
General Knowledge Reading Math  
Social AppLearn Health

# ECLS-K - Predicting trajectory level from individual school readiness skills (low)



General Knowledge Reading Math  
Social AppLearnr Health

# Reading: Predicting average level of school-age trajectories from all school readiness variables



SR Gen Know/Lang

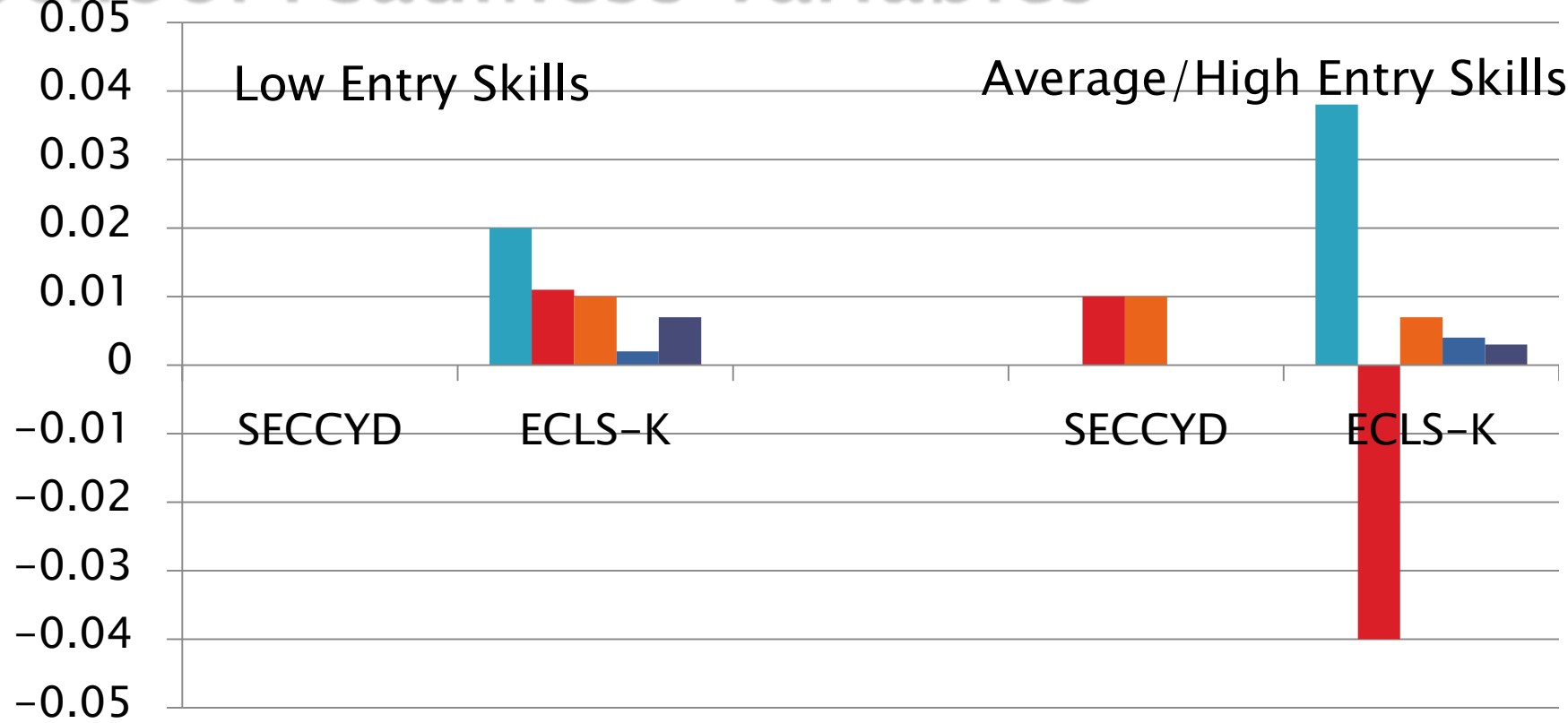
SR Reading

SR Math

SR Social Skills

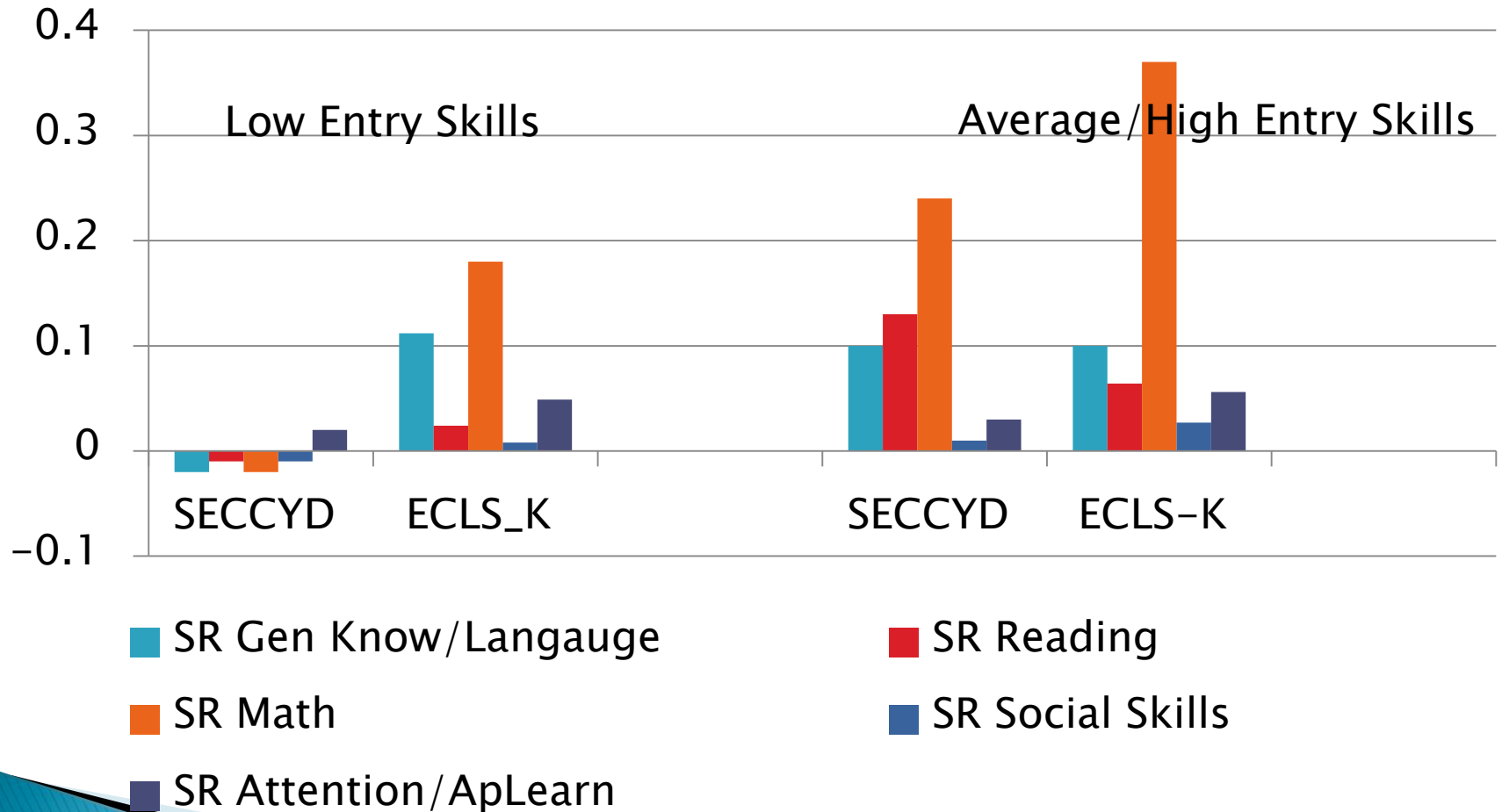
SR Att/ ApLearn

# Reading: Predicting change over time in school-age trajectories from all school readiness variables

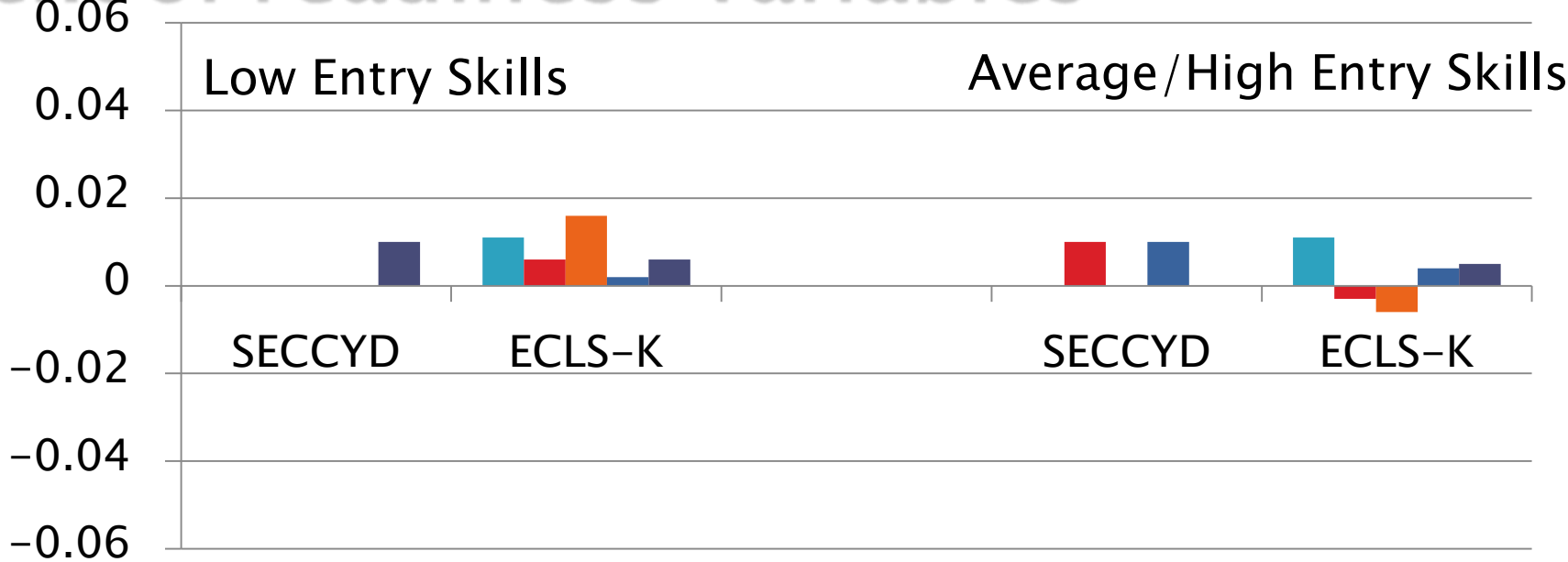


- SR Gen Know/Lang
- SR Reading
- SR Math
- SR Social Skills
- SR Att/ApLearn

# Math: Predicting average level of school-age trajectories from all school readiness variables



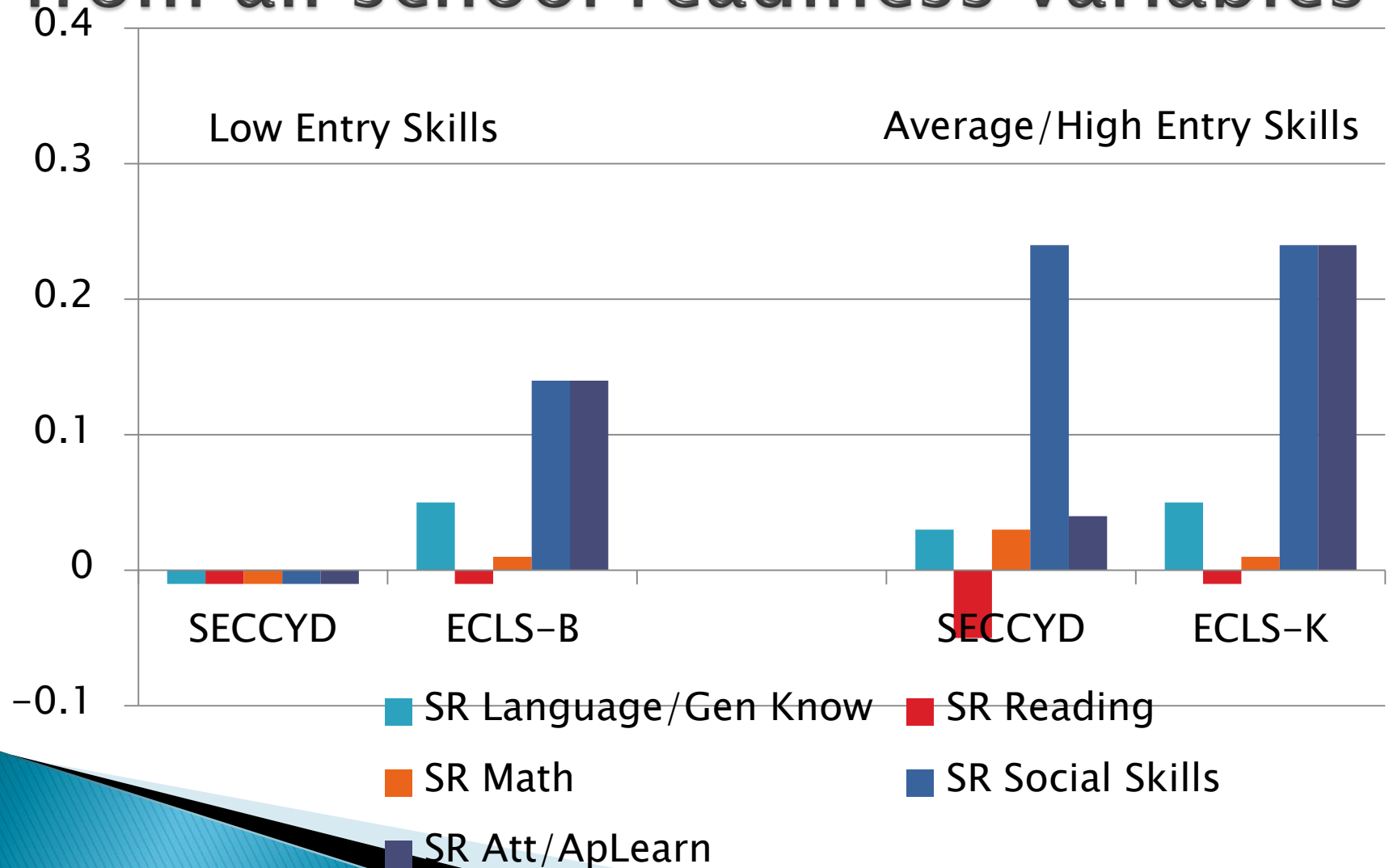
# Math: Predicting change over time in school-age trajectories from all school readiness variables



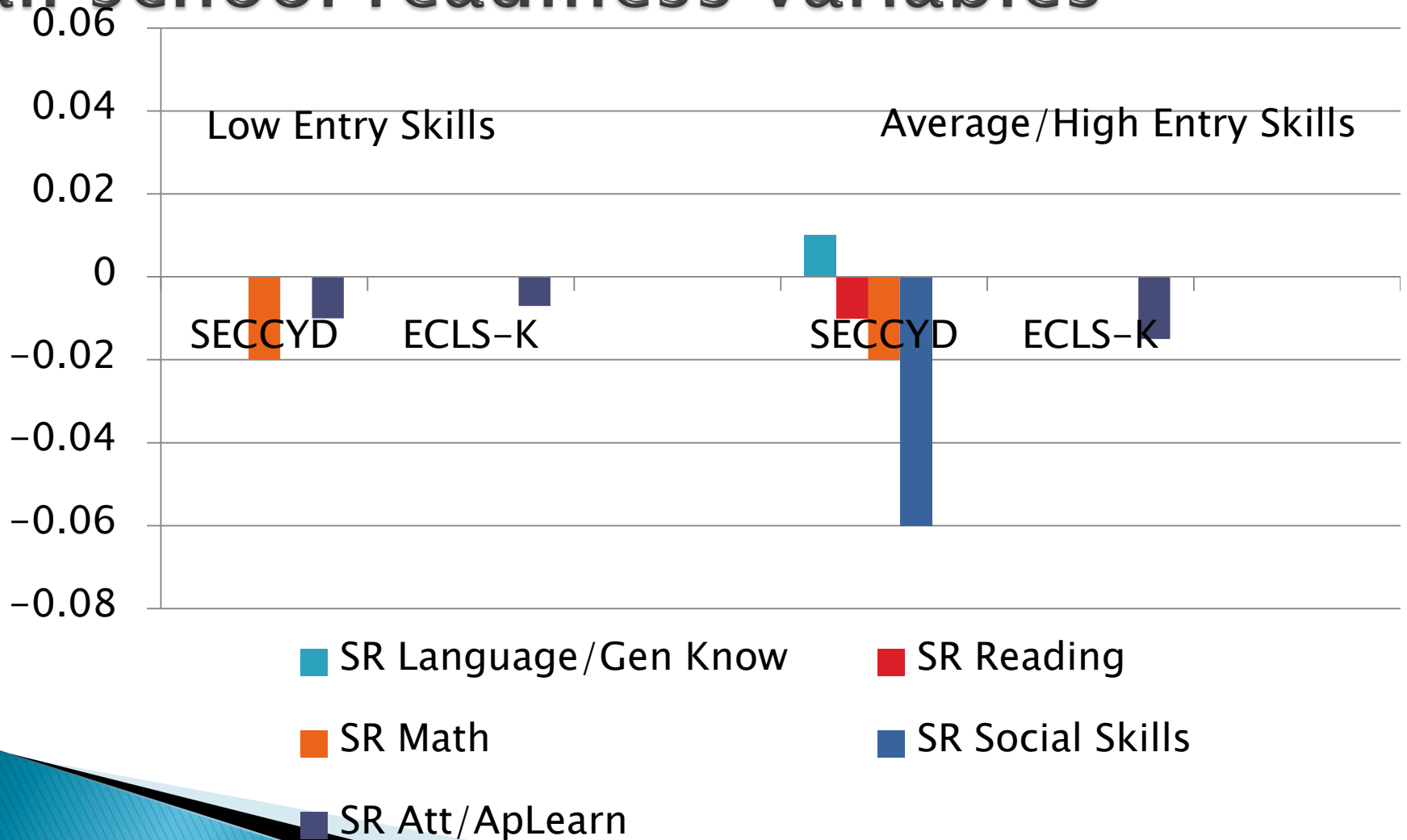
- SR Gen Know/Lang
- SR Math
- SR Att/ApLearn
- SR Reading
- SR Social Skills



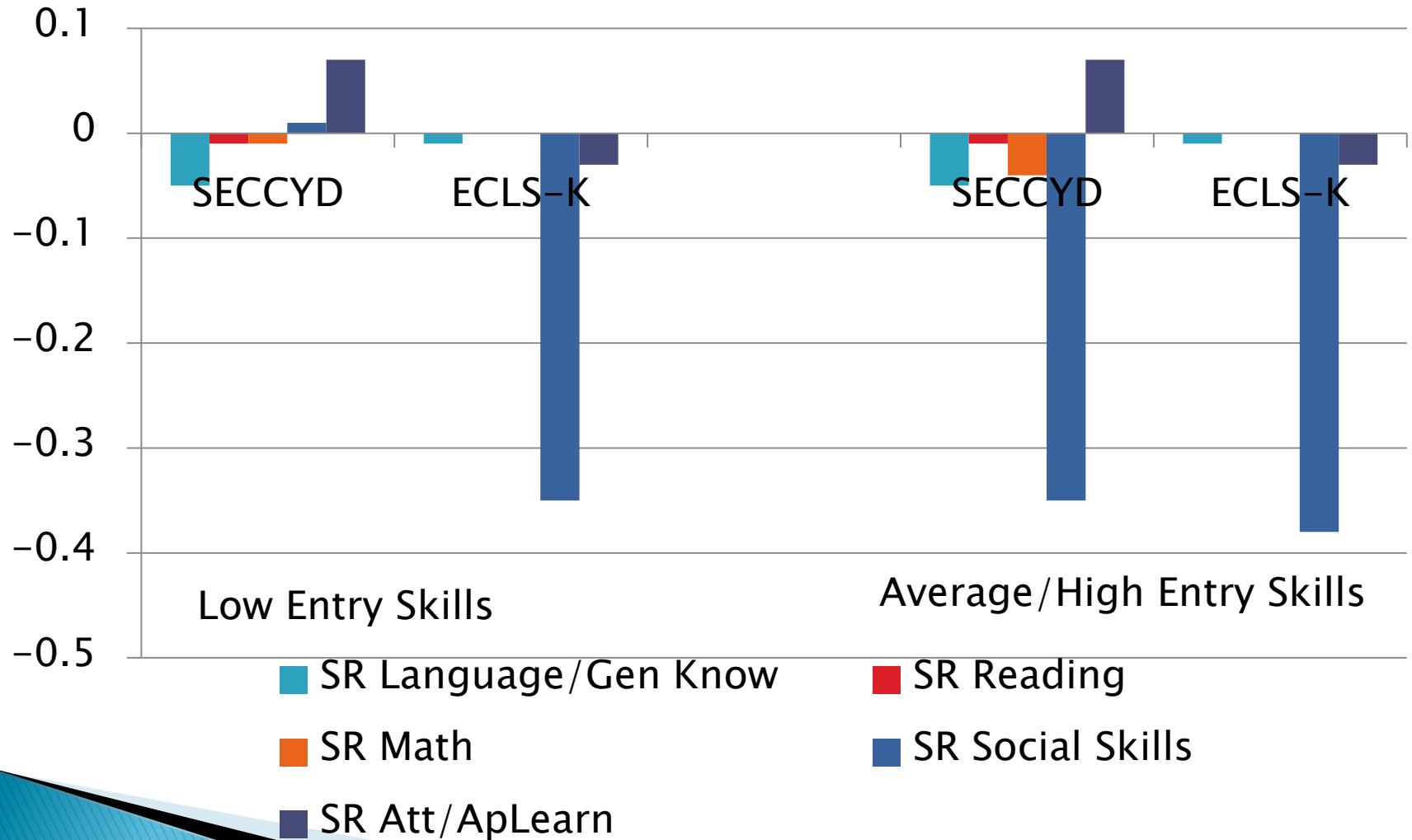
# Social Skills: Predicting average level of school-age trajectories from all school readiness variables



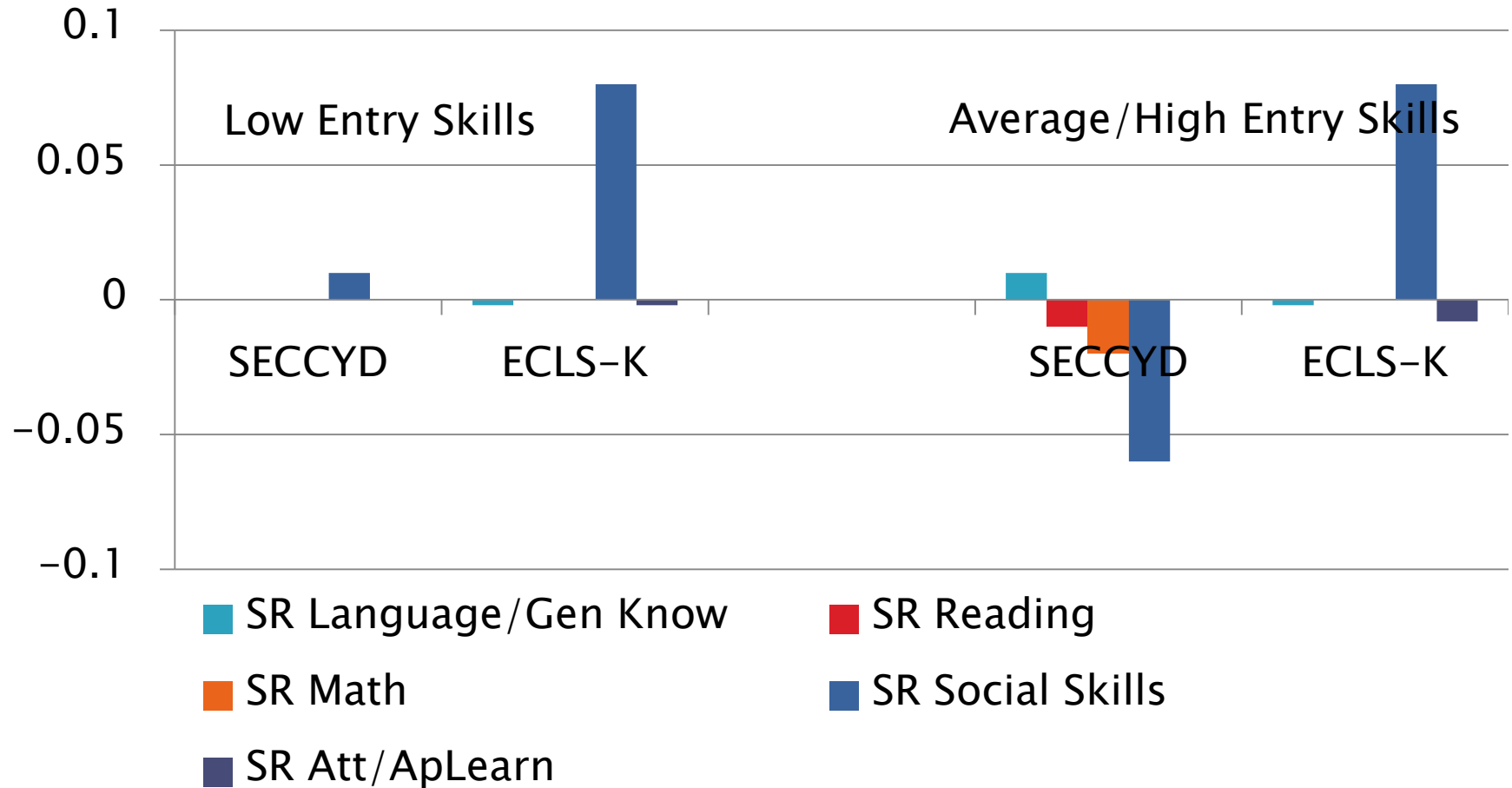
# Social Skills: Predicting change over time in school-age trajectories from all school readiness variables



# Behavior Problems: Predicting average level of school-age trajectories from all school readiness variables



# Behavior Problems: Predicting change over time in school-age trajectories from all school readiness variables



# Key Findings: Importance of School Entry Skills

Entry skill levels predicted the level of skills during the school years


- ▶ Children who entered school with stronger school readiness skills tended to maintain their advantage over time, while children who entered with lower school readiness skills tended to maintain their relative disadvantage over time.
- ▶ School entry skills were stronger predictors of levels of school-age academic skills and behavior among children who entered school with skills in the “normal” range of performance than among children who entered school with skills in the “low” range of performance.

# Key Findings: Differential Prediction

**There is Differential Prediction to Outcomes over Time Based on Skill Level at School Entry**

- No single school readiness variable provided the best prediction of all school-age outcomes in any of the analyses
- Stronger prediction within than across skill domains.

# Key Findings: Differential Prediction

- Content knowledge (language, general knowledge, academic skills) at school entry seemed to provide the best prediction of academic achievement.
  - Process skills (approaches to learning and attention) at school entry seemed to provide the best prediction to social and behavioral outcomes over time.
  - No evidence of “compensatory” relationship between school readiness skills and cross-domain outcomes in later schooling.
- 

# Caveats and Limitations

## ▶ Caveats

- All analyses were conducted to describe association, not to estimate causal linkages
- We don't have the perfect measures or the perfect dataset
- Difficulty in identifying *a priori* cutpoints
- Omission of non-native English speakers from analyses

## • Data Limitations

- Lack of criterion-based measures in these longitudinal datasets
- Reliance on parent and teacher reports of child behavior or skills as opposed to direct assessments for health and social-emotional domains.



# Take-Away Messages

- ▶ It appears that children's later outcomes can be improved by increasing their school readiness skills, regardless of where they are in relation to the national average.
  - ▶ Differential prediction of early skills to later outcomes suggests that there is no single "magic bullet."
  - ▶ Children need a constellation of content and process skills for school success.
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