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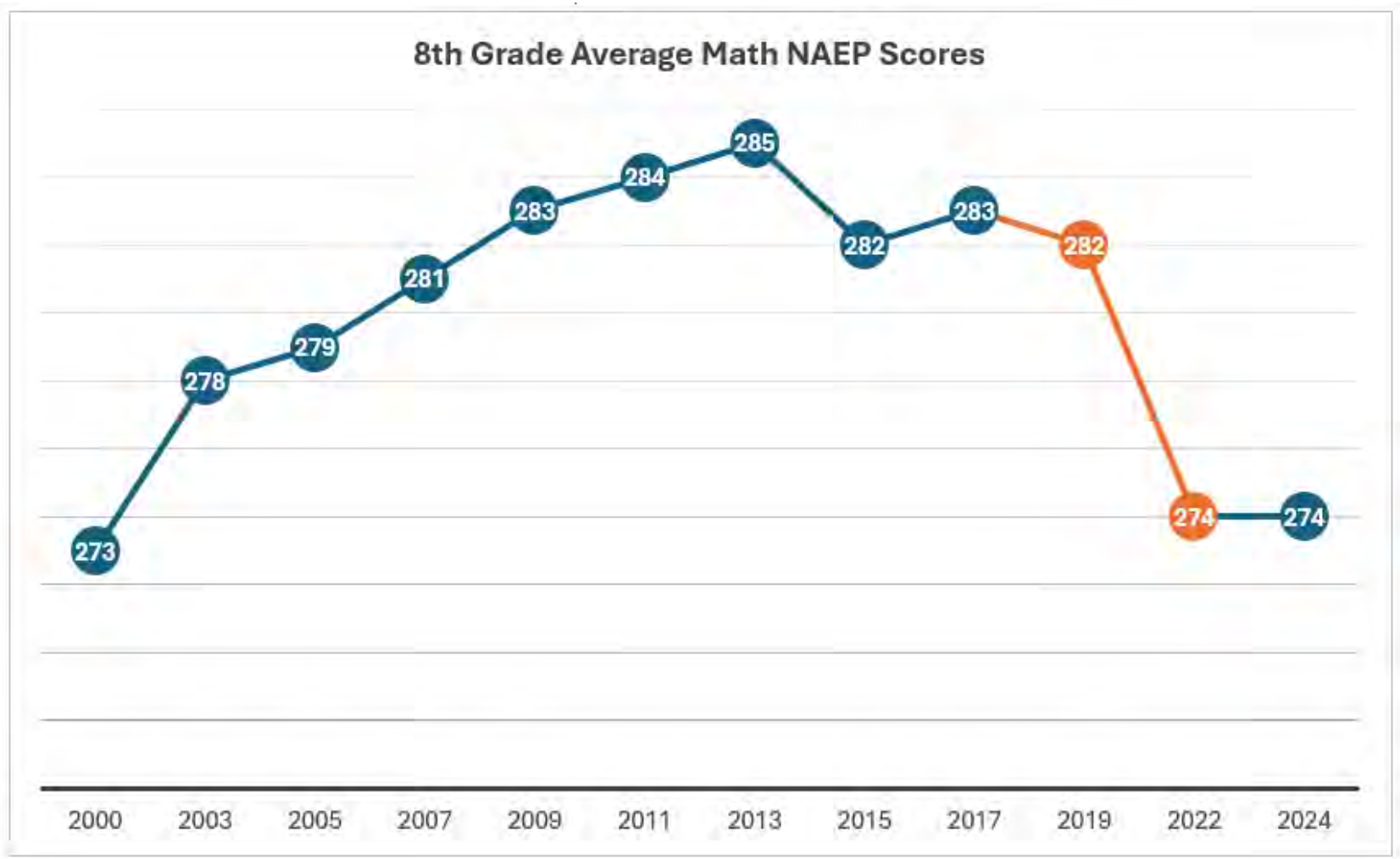
How can schools support early learners struggling with numeracy?

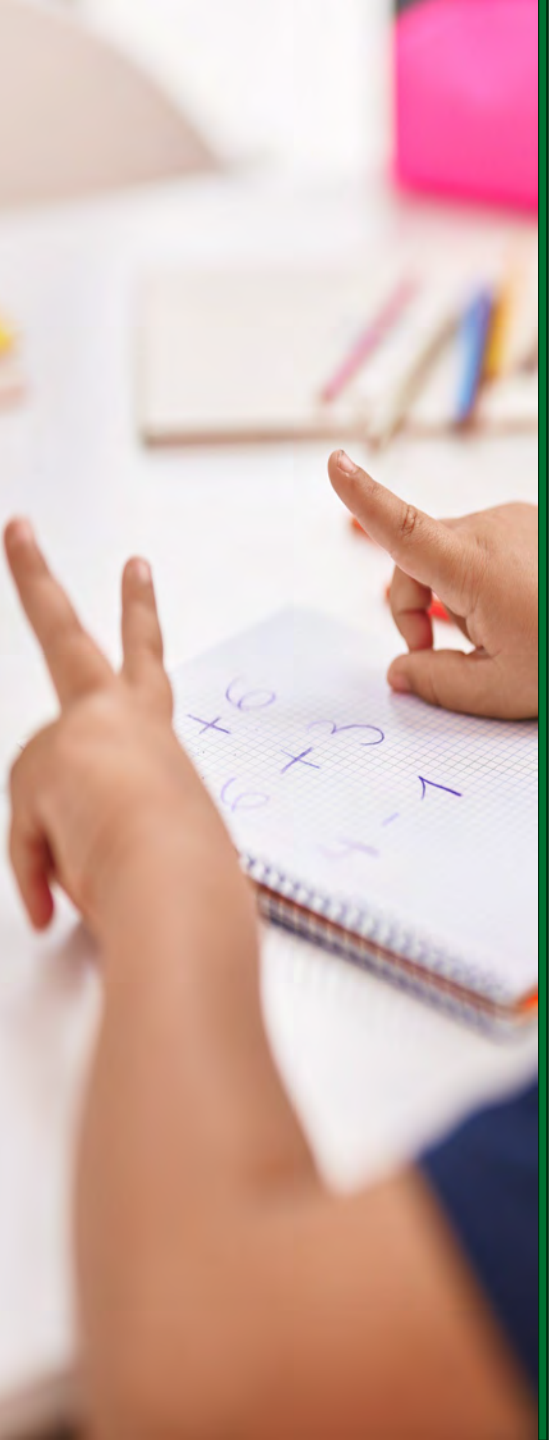
Findings from a meta-analysis of 112 studies show large benefits of high-quality Tier 2 & 3 numeracy interventions in grades PreK-1.

Math and reading achievement across the U.S. sharply declined from 2019-2022.

While some states are making progress, scores remain well below pre-pandemic levels on average.



https://www.nationsreportcard.gov/reports/mathematics/2024/g4_8/national-trends/?grade=8



Early math concepts are one of the most powerful predictors of later learning

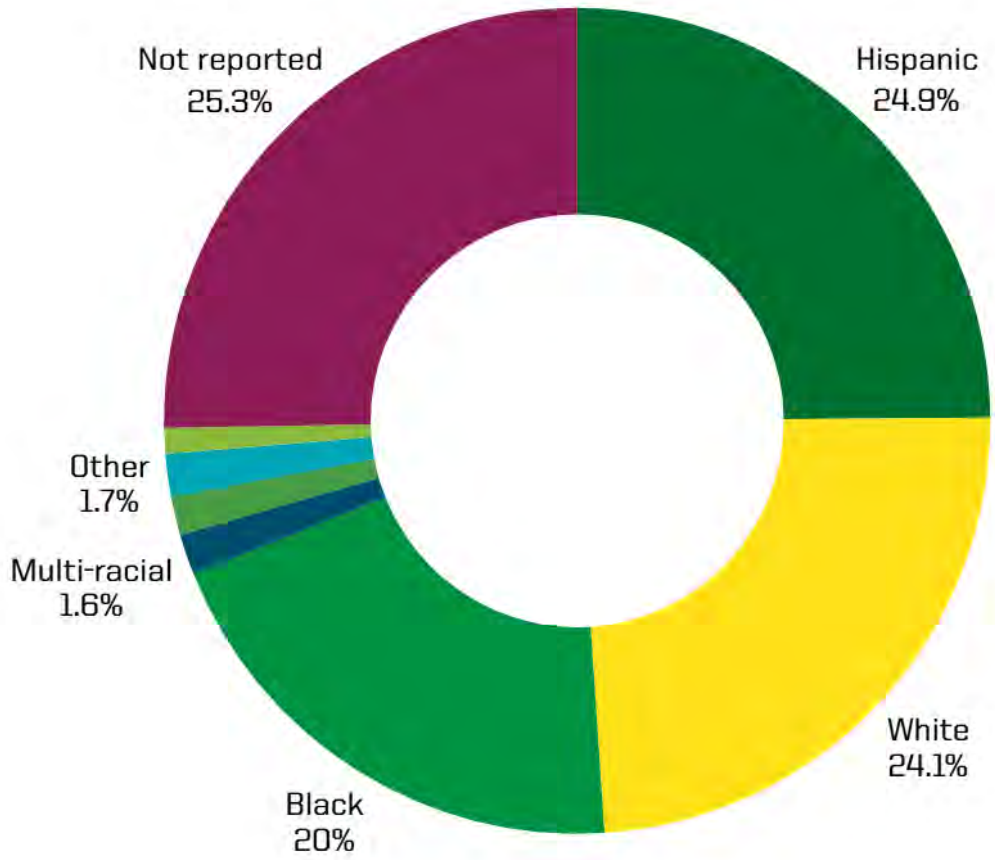
- Evidence has shown that early math knowledge is a stronger predictor of later achievement outcomes than early language, literacy, and attention skills.

- Because gaps in math knowledge are evident prior to school entry and tend to remain stable or widen over time, the preschool – Grade 1 period represents a critical window for schools to intervene.

Methods

- Studies published between 2006 and 2025
- 51% of studies (*n* = 57) conducted in the United States
- Interventions (or "tutoring programs") targeted whole number concepts and were conducted in school settings.

Participants identified as:



What did we find?

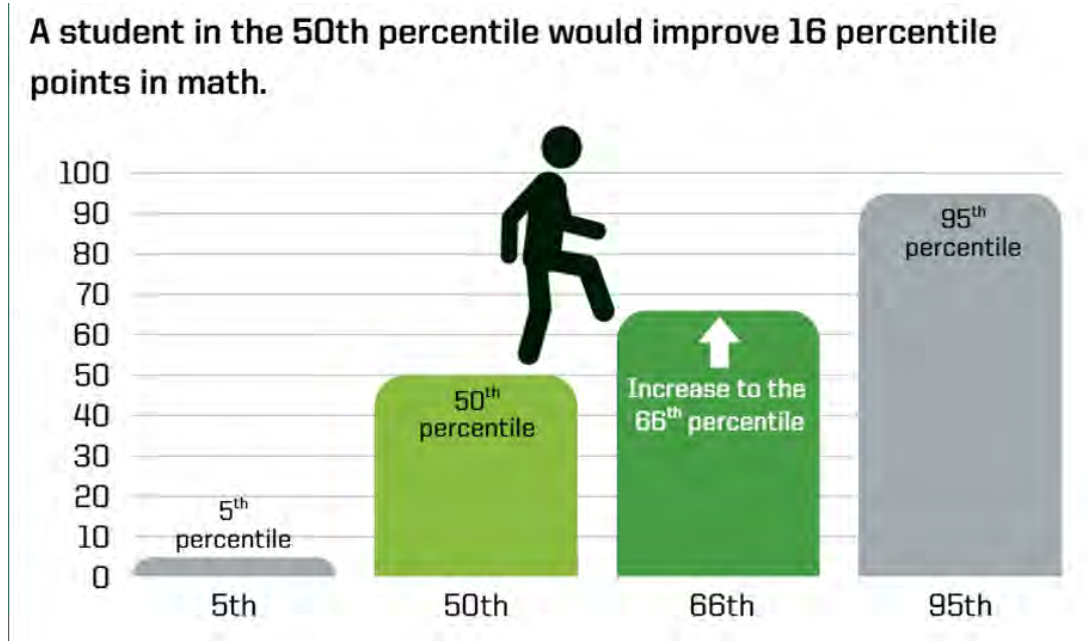
High-quality numeracy interventions showed large benefits for math achievement with early learners.

Estimates showed there is a 96% chance that using these interventions will improve math achievement for students at your school, assuming students and schools are like those included in this analysis

Key finding #1

Across 112 studies of more than 21,000 students, the average effect was large and positive: 0.40 standard deviation units [95% CI (0.33, 0.47)].

A student in the 50th percentile would move to the 66th percentile with this size of effect.



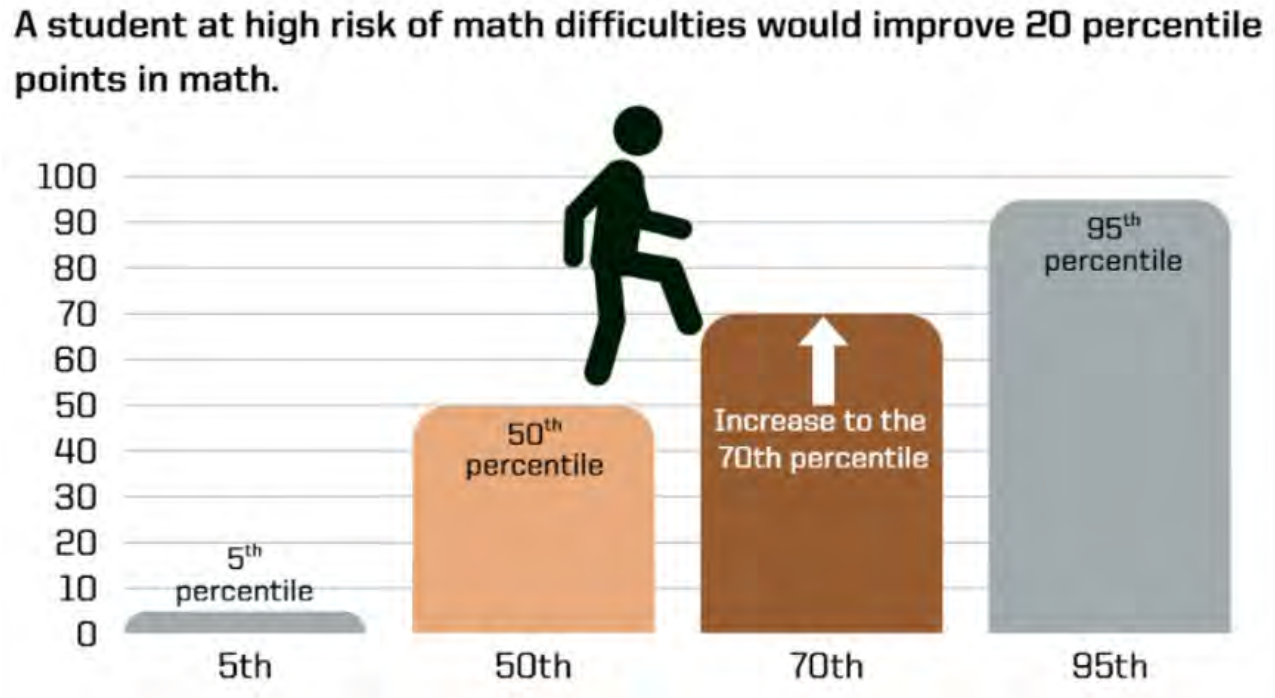
Recommendation #1:

Pass legislation requiring schools to offer high-quality Tier 2 and 3 math intervention in grades PreK-1. The National Conference of State Legislatures offers summaries of exemplar legislation from a variety of states.

Note that these states also provide resources for teacher professional development in early math instruction and student screening, along with coordinated efforts across early childhood and K-12 education, all which are necessary for overall intervention

Key finding #2

Effects of interventions were strongest for students at high risk of math difficulties, with an effect size of 0.53 standard deviation units [95% CI (0.31, 0.76)], or the equivalent of 20 percentile points.



Recommendation #2:

Require schools to implement math screening in the earliest grades to identify students at risk. Provide guidance and tools to schools to support these efforts.

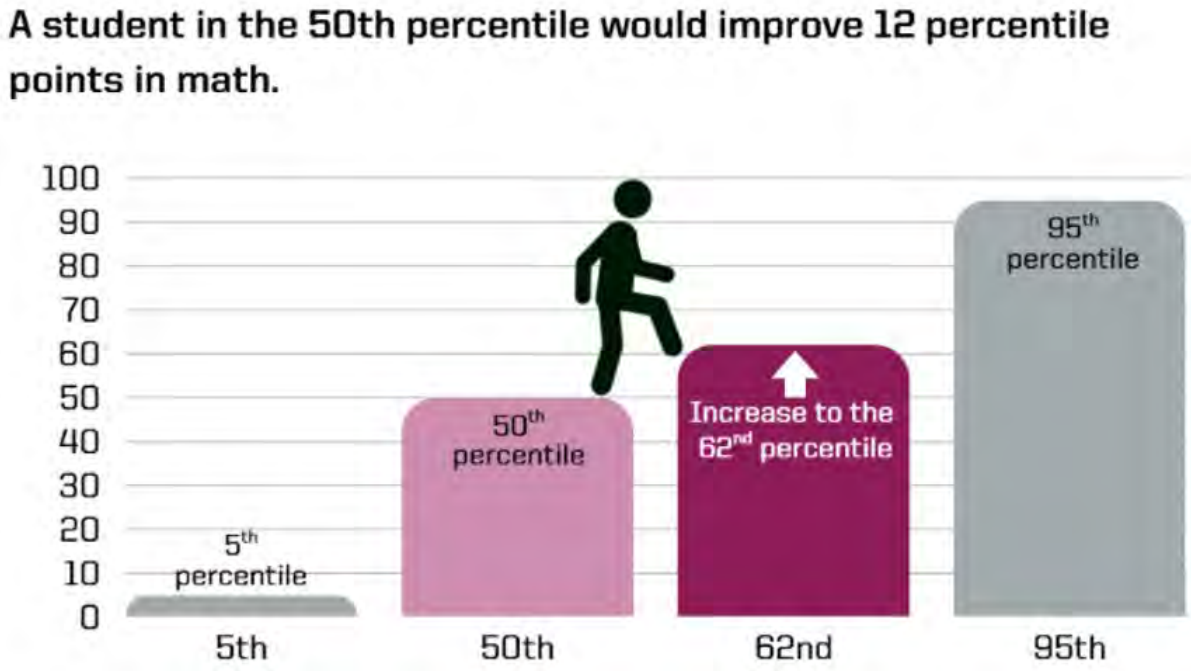
Resources on screening include:

- The National Center on Intensive Intervention's Academic Screening Tools Chart
- Vanderbilt's Iris Center resource on math screening.

Key finding #3

Findings from delayed outcomes had an average effect of 0.31 standard deviation units [95% CI (0.201, 0.421)], equivalent to a student in the 50th percentile moving to the 62nd percentile.

This estimate was significantly lower than the effect of interventions immediately after students completed them, suggesting a one-time intervention is insufficient for long-term success.



Recommendation #3:

Require schools to develop coordinated, long-term math multi-tiered systems of support and provide guidance on how to do this in way that is sustainable.

Sustainability requires high-quality teacher training, along with continuous progress monitoring to identify students no longer needing services (and therefore preserving funding and resources for students who do).

In summary:

High-quality numeracy interventions showed large benefits for math achievement with early learners.

We recommend state leaders:

- ✓ Pass legislation requiring schools to offer high-quality Tier 2 and 3 math intervention in grades PreK-1.
- ✓ Require schools to implement math screening in the earliest grades to identify students at risk.
- ✓ Require schools to develop coordinated, long-term math multi-tiered systems of support.
- ✓ Provide guidance and tools to schools to support these efforts.

Get in touch

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Funding Statement

This work was supported in part by the U.S. Department of Education, Institute of Education Sciences grant R324A240004 to the University of Oregon. The opinions, findings, and conclusions are those of the author(s) and do not necessarily reflect the views of the Institute of Education Sciences.

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