Understanding the *Old* and *New* School Finance Literature

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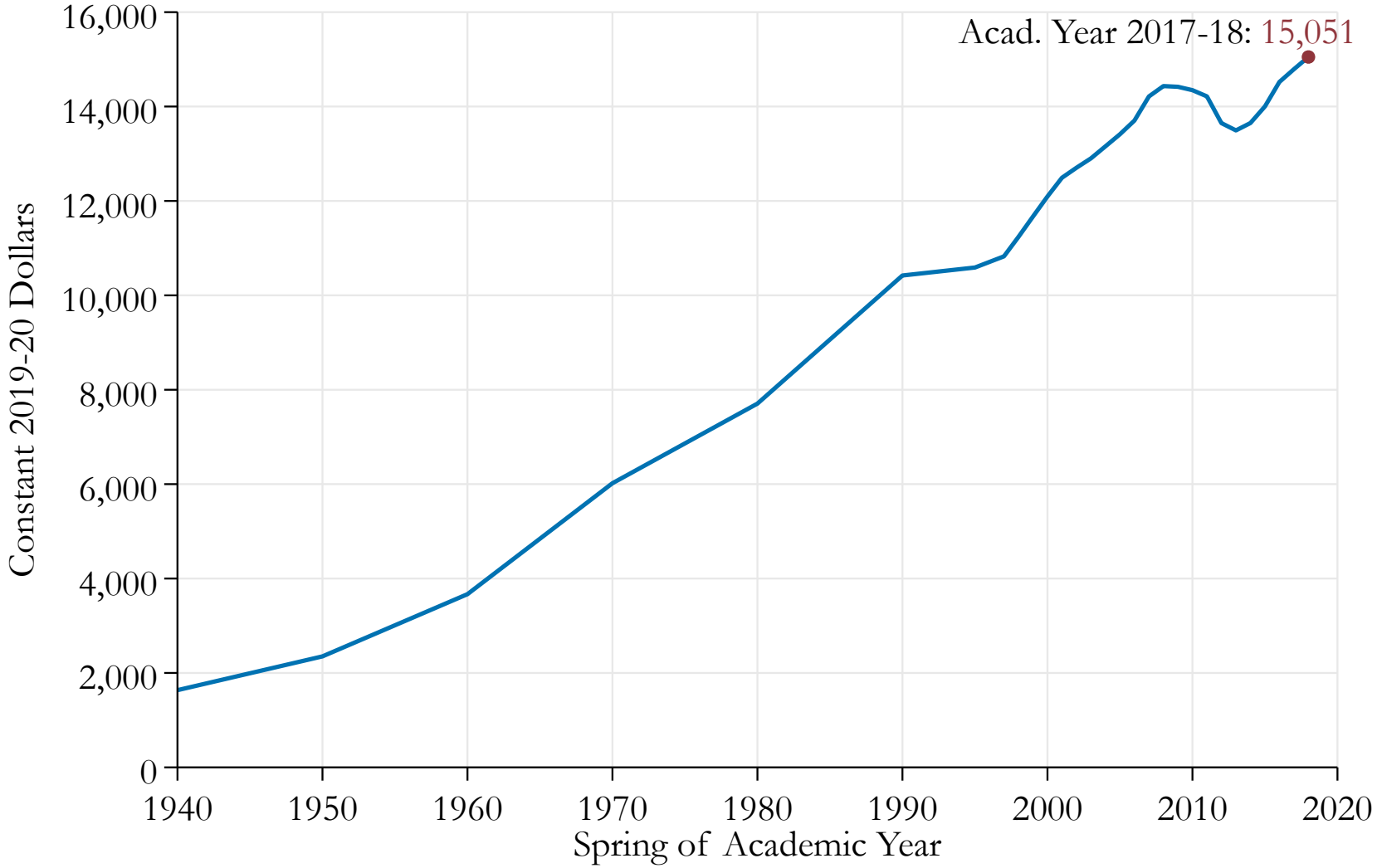
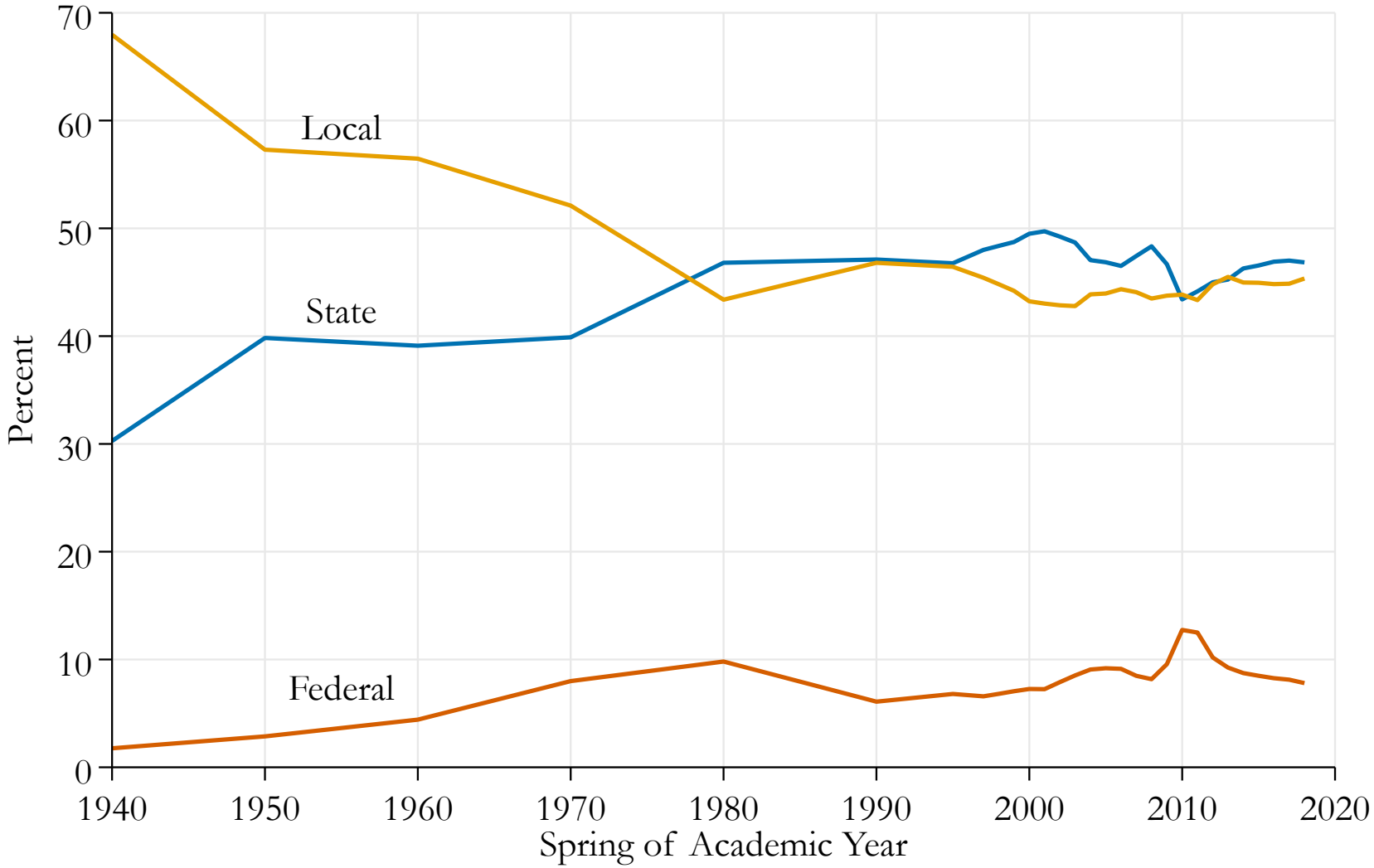
Funding per Pupil has increased substantially: $1,636 in 1940 to $15,051 in 2018



Source: Digest of Education of Statistics (2020 edition): Table 235.10

Federal funds are smallest share of school district revenues

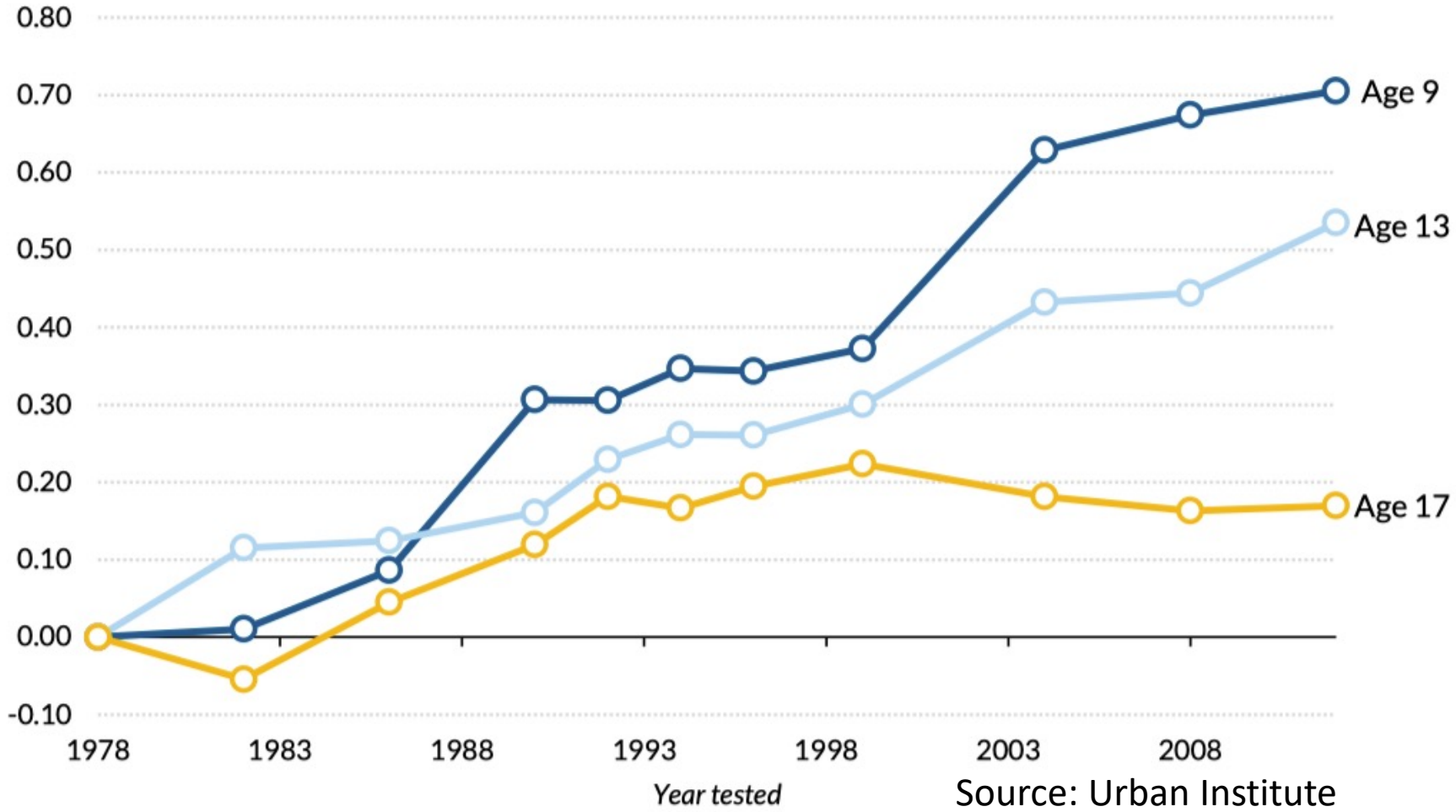


Source: Digest of Education of Statistics (2020 edition): Table 235.10

Trends over time suggest test scores have been increasing for 9- and 13-year-old students, but appear to be stagnant for 17-year-old students

FIGURE 1

LTT NAEP Mathematics Score Changes, in 1978 Standard Deviations



Source: Urban Institute

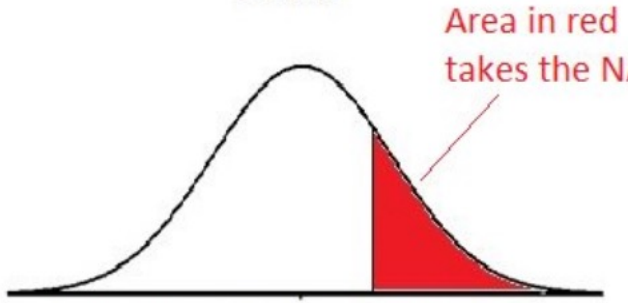
What does this mean for education investment?

- On the one hand, increased funding improves outcomes for 9 and 13-year-old students
- But…there appears to be no substantial growth among 17-year-old students
- Question arises: Does money matter for education outcomes?

Stagnant growth among 17-year-old students perhaps due to falling dropout rate over time (C. Kirabo Jackson)

Effect of Falling High School Dropout of Average NAEP score among 17 Year Olds

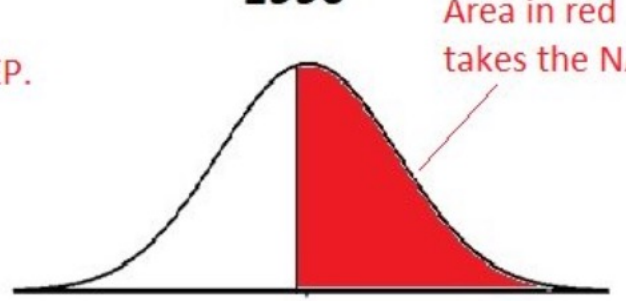
1970



With a high dropout rate (a bad thing), only the most well prepared students remain in school. As a result, the average NAEP scores among those 17 years olds *who did not drop out* is very high.

NOTE: The average NAEP scores of those 17 year olds who do not drop out is not representative of the true distribution of skills in the population of interest.

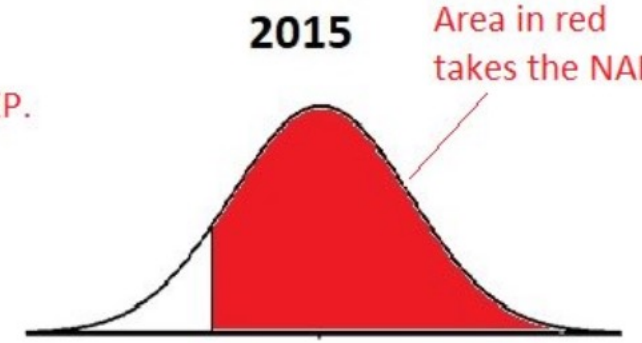
1990



As the dropout rate falls (a good thing), more less-well prepared students remain in school. As a result, the average NAEP scores among those 17 years olds *who did not drop out* is lower than before.

NOTE: The underlying distribution of skills is unchanged.

2015



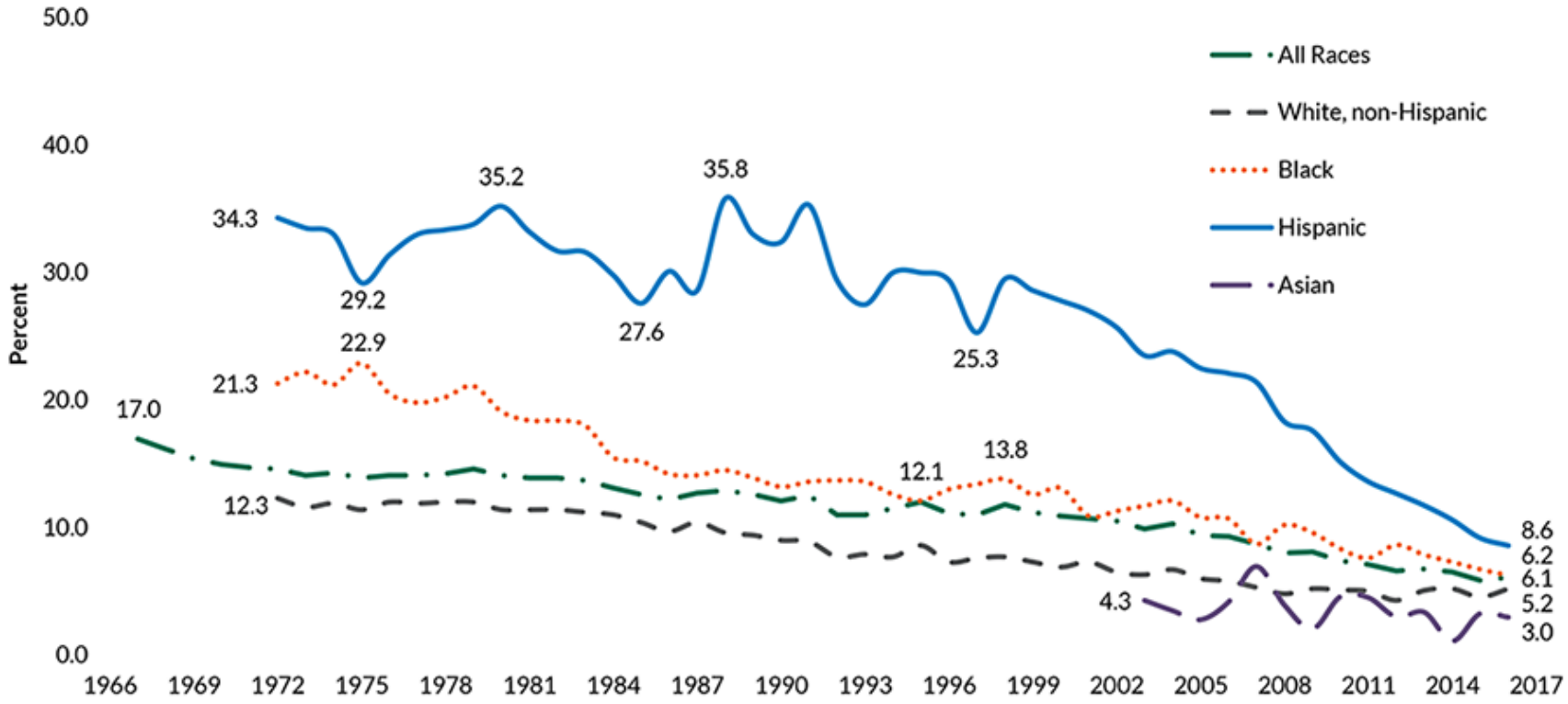
As the dropout rate falls even further (a great thing), even more less-well prepared students remain in school. As a result, the average NAEP scores among those 17 years olds *who did not drop out* falls even lower.

NOTE: The underlying distribution of skills is still unchanged.

Source: C. Kirabo Jackson (2017). Twitter: https://twitter.com/KiraboJackson/status/896207189379096577

Indeed, dropout rates have been declining over time

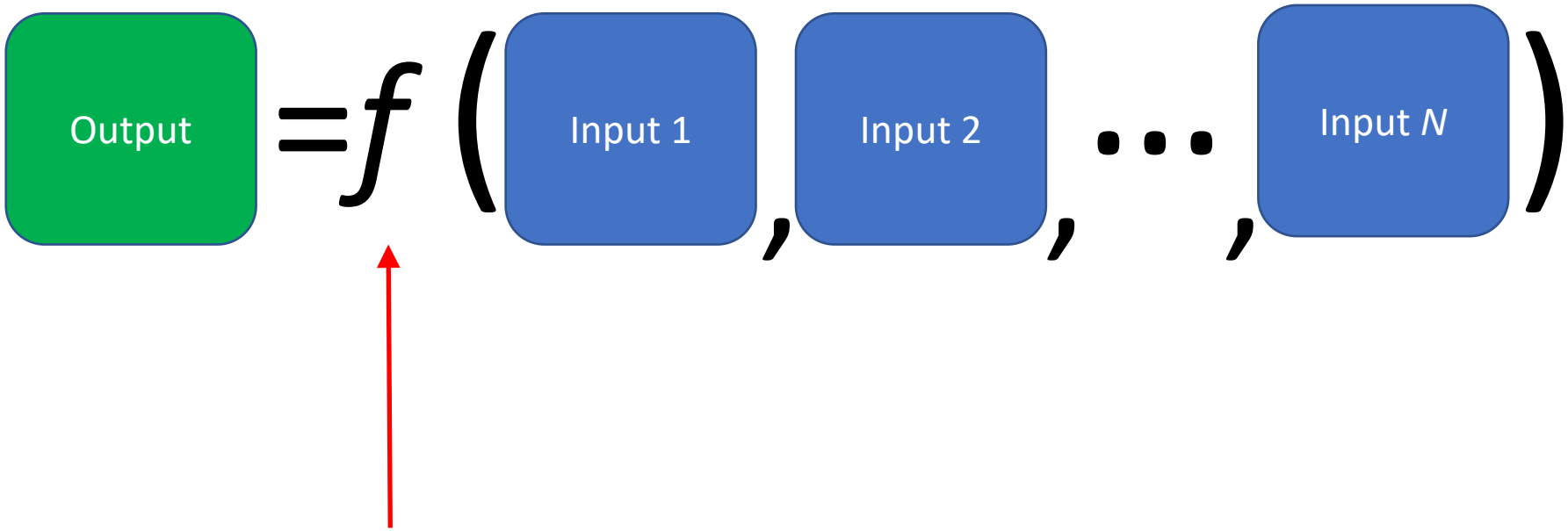
Status High School Dropout* Rates Among Youth Ages 16 to 24, by Race and Hispanic Origin:** Selected Years, 1967–2016



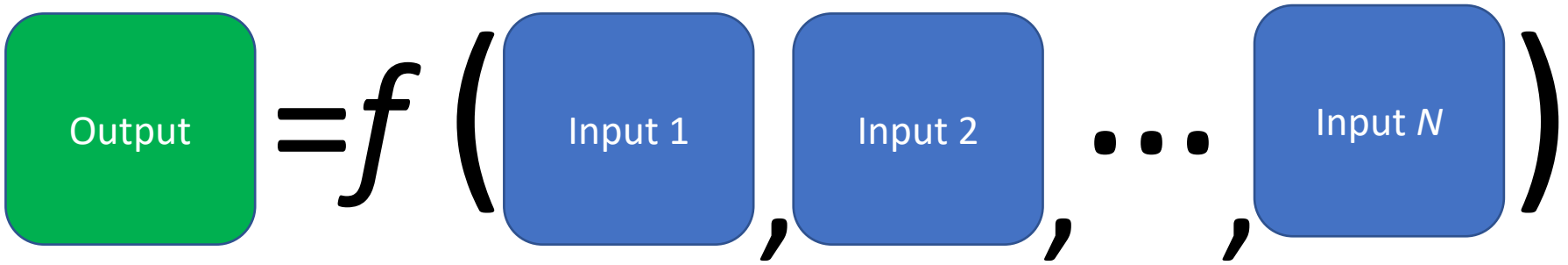
*The status dropout rate measures the percentage of young adults ages 16 to 24 who were not enrolled in school and had not received a high school diploma or obtained a GED. This measure excludes people in the military and those who are incarcerated, but includes immigrants who never attended U.S. schools.
**Due to changes in race categories, estimates from 2003 are not strictly comparable to estimates from 2002 and before. After 2001, the black race category includes Hispanics.
Source: Child Trends' calculations using U.S. Census Bureau. (2017). *School enrollment in the United States: October - detailed tables* [Table 1]. Retrieved from https://www.census.gov/topics/education/school-enrollment/data/tables.html.

childtrends.org

The Production Function



Education Production Function



Q1: What is the output in the education production function?

Q2: What are the inputs?

How do schools choose the input levels?

- Schools are constrained:

$$R = p_T \times T + p_C \times C$$

  - ➢ Schools have a budget constraint
  - ➢ Simplistic example: Revenues are a function of the teacher wages, price of computers, and the quantities of teachers and computers
  - ▪ Which variables do schools typically have control over?

Economic question: How should schools choose the input levels?

→Through cost minimization

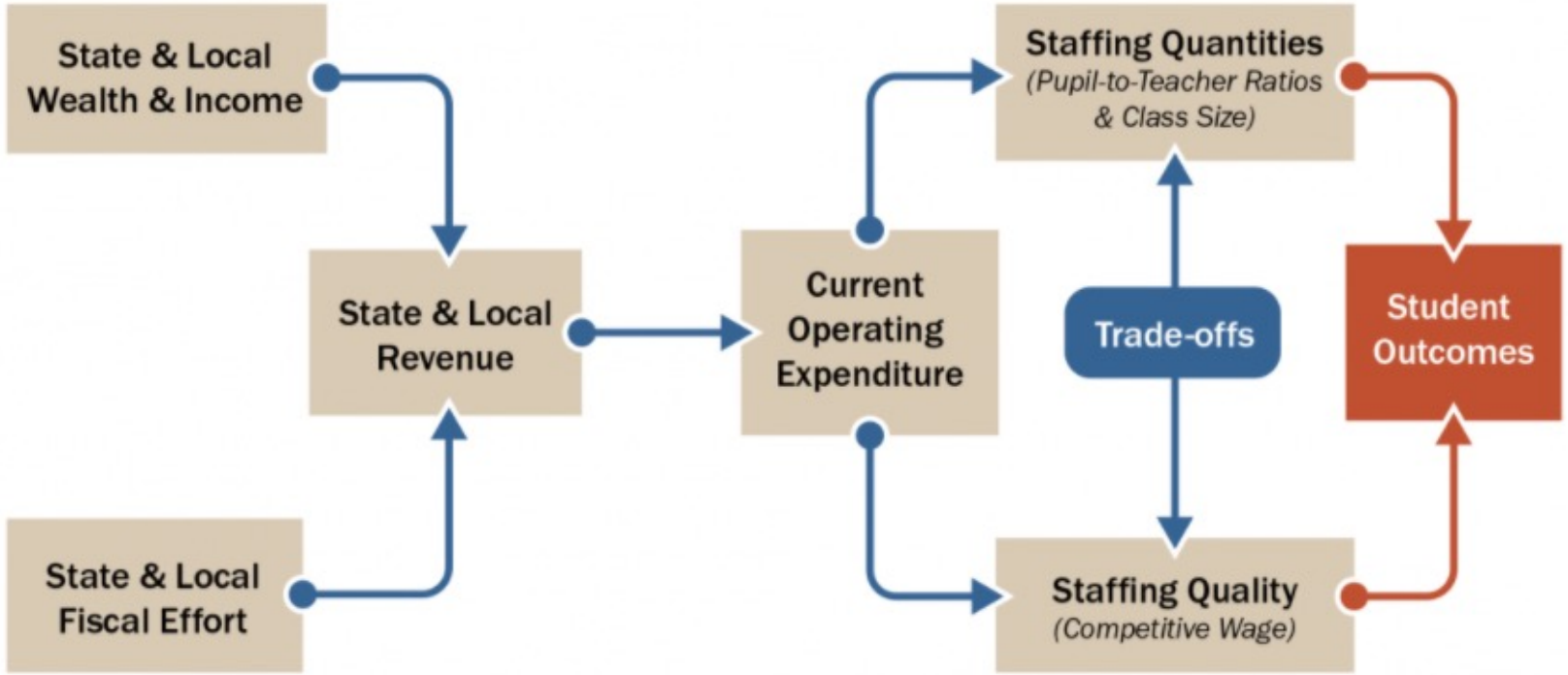
- Objective:
  - School leaders must decide how to combine various inputs to produce educational outcomes at the lowest cost

- Intuition: If spending another dollar on teachers leads to larger gains in student achievement, while spending another dollar on computers leads to only modest gains, what should the school leader do?

  Answer: Invest more in teachers!

Conceptualizing How Money Matters

Figure 1
Conceptual Map of the Relationship of Schooling Resources to Children's Measurable School Achievement Outcomes



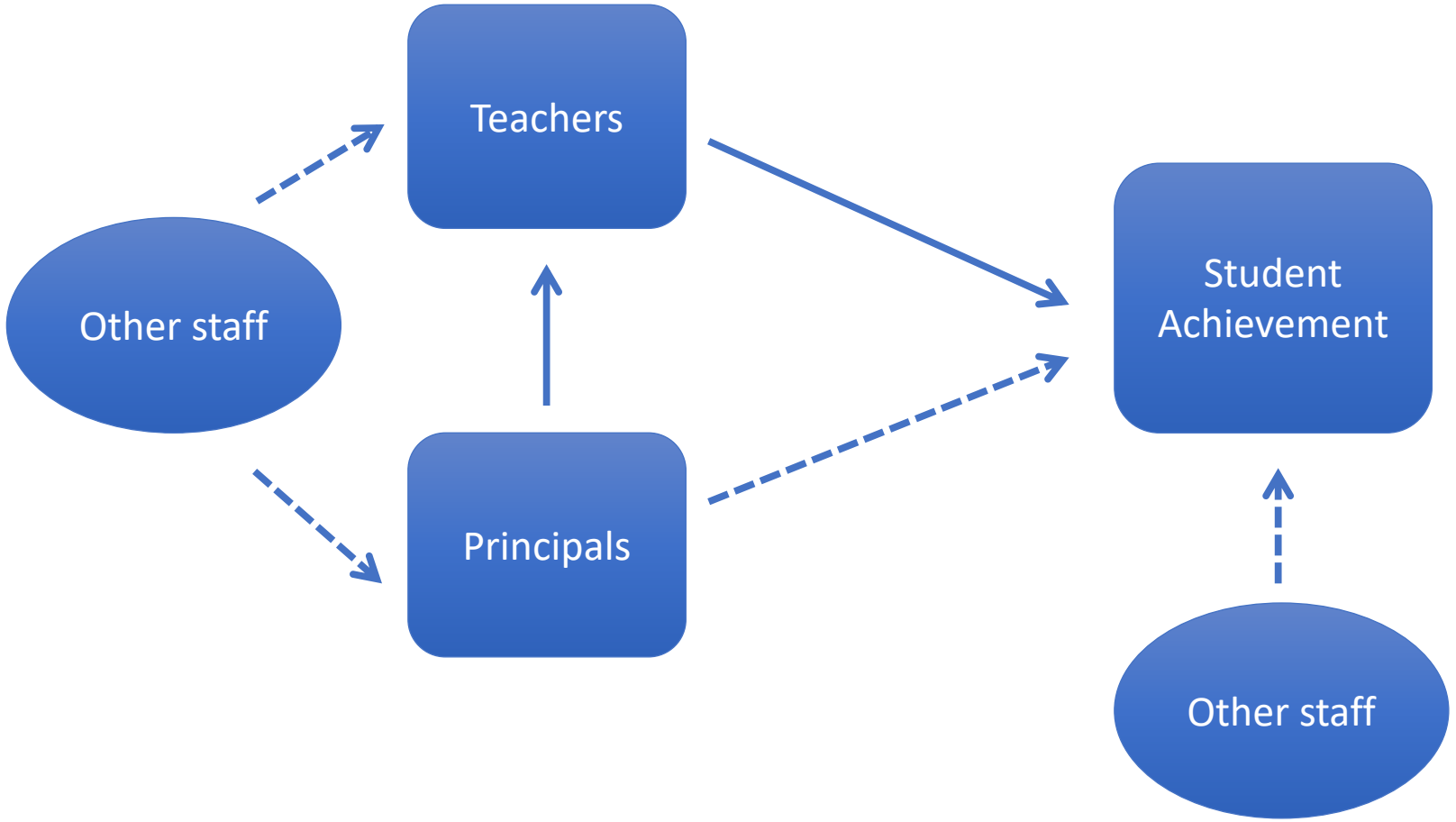
Source: **How Money Matters for Schools:** *School Finance Series* by Bruce Baker (https://learningpolicyinstitute.org/product/how-money-matters-brief)

In addition to teachers, what about other school staff?

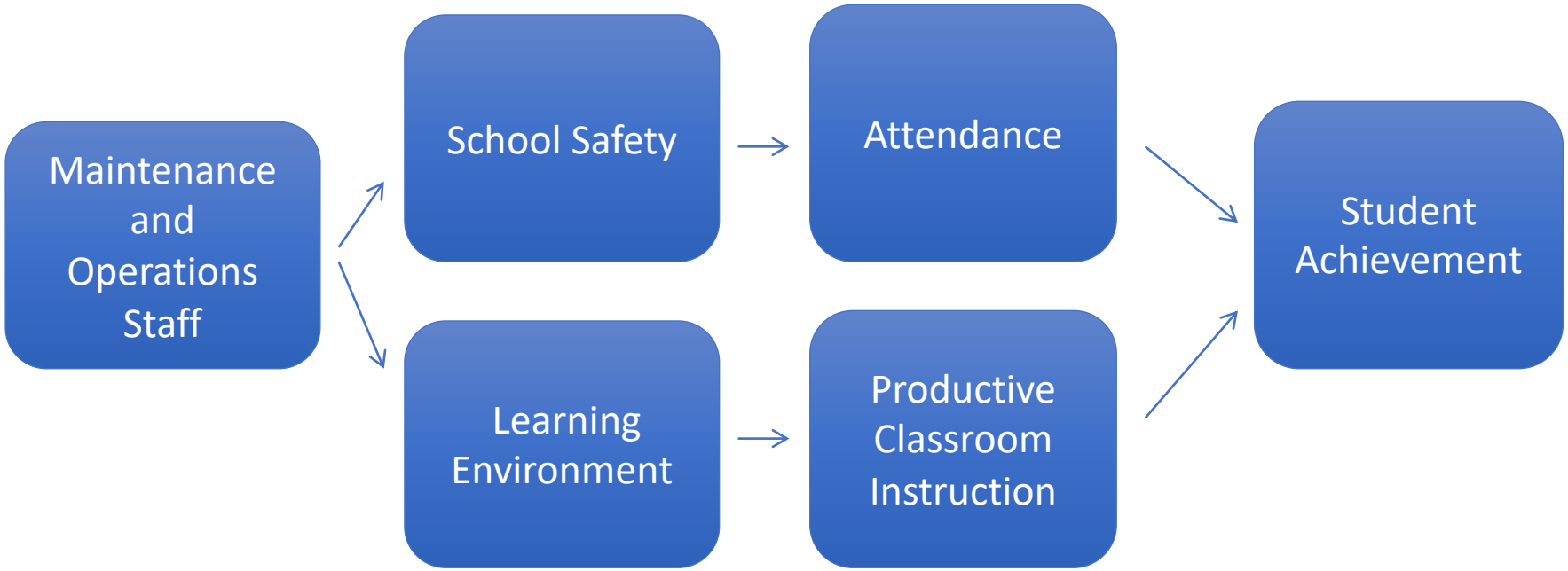
- Academic Staff
  - Teachers
  - Library specialists
  - Instructional coordinators
- Administrative Staff
  - Principals
  - VPs and Aps
  - Secretaries
  - Other clerical support staff
- Basic Services
  - Food Service
  - Custodial / maintenance
  - Security
- Health Services Staff
  - School counselors
  - Nurses
  - Psychologists
  - Speech therapists
- School Aides
  - ESL/bilingual
  - Special education
  - Library
  - Title I
  - Other classroom aide

Based on NCES Schools and Staffing Survey

Do other staff matter?



Example Conceptual Framework: Maintenance Staff & Achievement



Old Literature: No consistent evidence between resources and student outcomes

Table 3

Percentage Distribution of Estimated Effect of Key Resources on Student Performance, Based on 376 Production Function Estimates

Resources	Number of estimates	Statistically significant (%)		Statistically insignificant (%)
		Positive	Negative	
Real classroom resources				
Teacher-pupil ratio	276	14	14	72
Teacher education	170	9	5	86
Teacher experience	206	29	5	66
Financial aggregates				
Teacher salary	118	20	7	73
Expenditure per pupil	163	27	7	66
Other				
Facilities	91	9	5	86
Administration	75	12	5	83
Teacher test scores	41	37	10	53

Source: Hanushek (1997*a*) (revised, see text and footnote 14).

Source: Hanushek (2003)

Old Literature: No consistent evidence between teacher characteristics and student test score gains

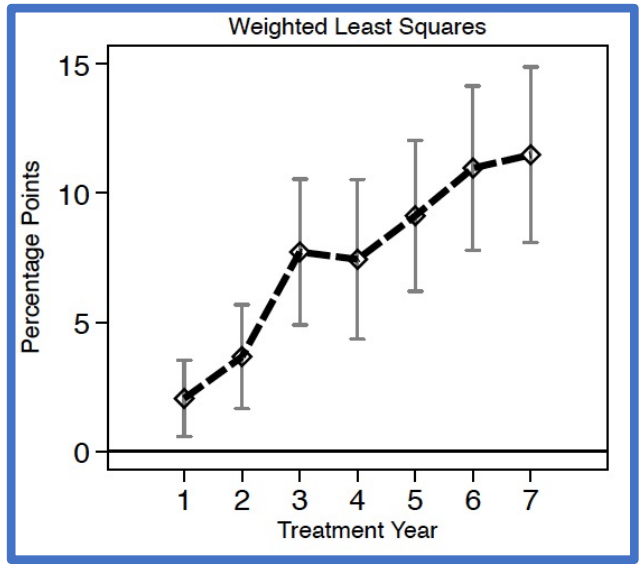
Table 5

Percentage Distribution of Other Estimated Influences on Student Performance, Based on Value-added Models of Individual Student Performance

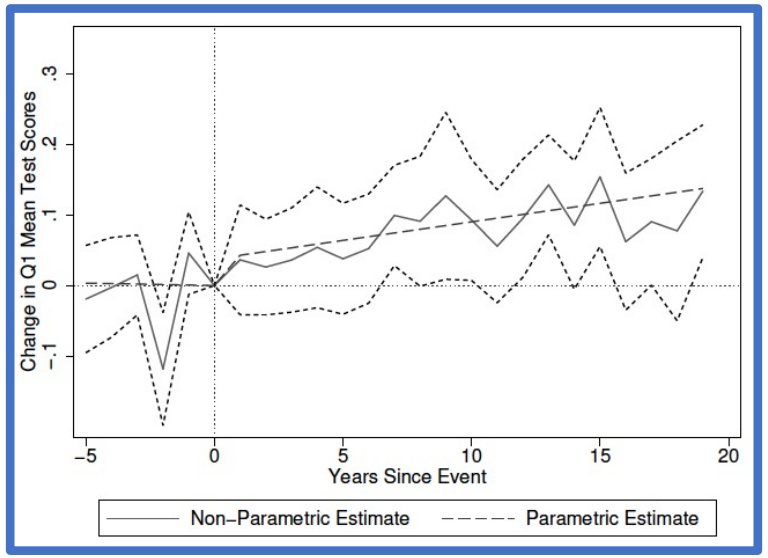
Resources	Number of estimates	Statistically significant (%)		Statistically insignificant (%)
		Positive	Negative	
a. All estimates				
Teacher-pupil ratio	79	11	9	80
Teacher education	41	0	10	90
Teacher experience	62	37	2	61
b. Estimates within a single state				
Teacher-pupil ratio	24	4	17	79
Teacher education	34	0	9	91
Teacher experience	37	41	3	56

Source: Hanushek (2003)

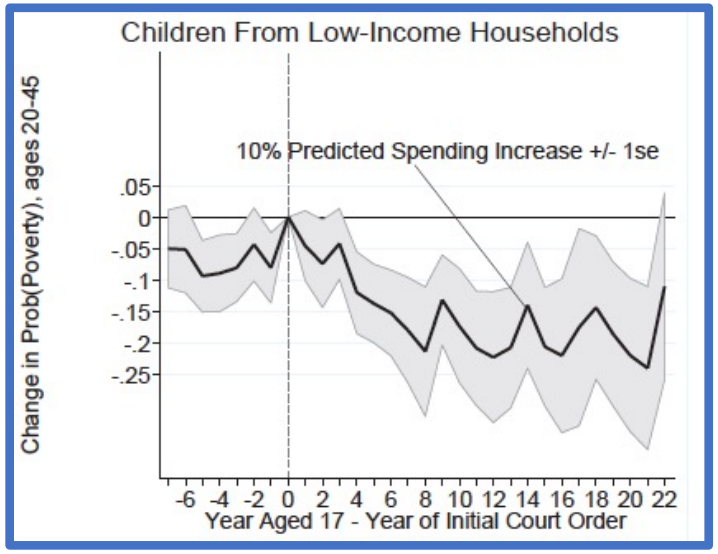
New Literature: Key results from studies that leverage shocks from school finance reforms



Graduation Rates in High-Poverty Districts ↑
(Candelaria & Shores, 2019)



Test scores for low-SES children ↑
(Lafortune et al., 2018)



Incidence of Poverty ↓
(Jackson et al., 2016)

- **Economic mobility**: A $4,500 reduction in gap in per pupil revenues between high- and low-income districts leads to a 5 percentile increase in intergenerational mobility of children whose parents are the bottom on the income distribution (Biasi, 2021)

- **Across studies**: "On average, a $1000 increase in per-pupil public school spending (for four years) increases test scores by 0.044 standard deviations, high-school graduation by 2.1 percentage points, and college-going by 3.9 percentage points." (Jackson & Mackevicius, 2021)

New Literature Summary: money matters, but still much to learn

National Studies Summary:

- Spending increased and was redistributive (Candelaria & Shores, 2019; Sims, 2011)
- Money matters, especially among students in lower-income districts (Candelaria & Shores, 2019; Lafortune, Rothstein, & Schanzenbach, 2018; Jackson, Johnson, & Persico, 2016)

State-Specific Studies Summary: Mixed results

- Moderate spending increase, no evidence of academic improvement
  A. Kansas 1992 School District Finance and Quality Performance Act (Duncombe & Johnston, 2004; Johnston & Duncombe, 1998)
  B. Kentucky 1990 Education Reform Act (Clark, 2003)
  C. Maryland 2002 Bridge to Excellence in Public Schools Act (Chung, 2015)

- Spending increases plus academic improvements
  A. Massachusetts 1993 Education Reform Act (Dee & Levine, 2004; Guryan, 2001)
  B. Vermont 1997 Equal Educational Opportunity Act (Downes, 2004)

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What are the mechanisms?

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What explains the heterogeneity?

- Spending increases plus academic improvements
  A. Massachusetts 1993 Education Reform Act (Dee & Levine, 2004; Guryan, 2001)
  B. Vermont 1997 Equal Educational Opportunity Act (Downes, 2004)

And now the big question…

- How should school leaders “productively” spend funds?

Need to ask the right questions…

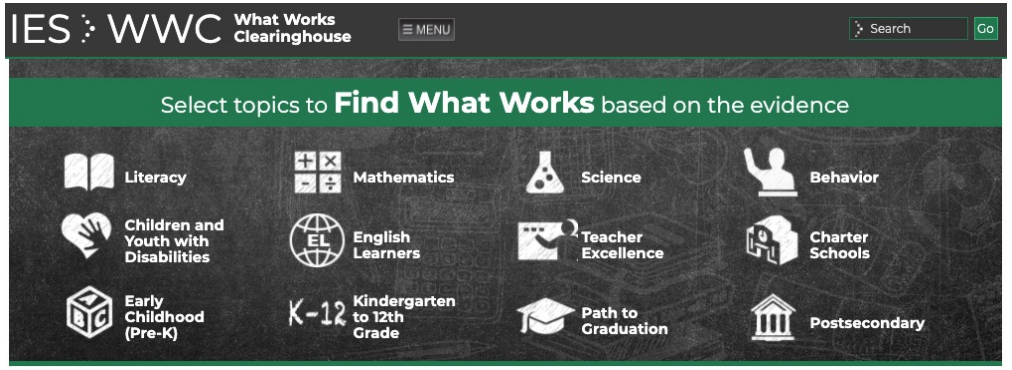
BROAD Question	NARROW QUESTIONS
1. Diagnosing the problem Is the problem worse when _____ (or for _____)?	What is the best way to measure current outcomes? What are those outcomes now? What alternative explanations for this problem can we check? How convincing and relevant is this research finding?
2. Assessing the implementation of the strategy	What is the strategy supposed to look like in best practice (the faithful-implementation scenario), and what would (or does) it look like in our setting? What are all the resources this strategy requires (e.g., space, scheduling, training, materials, budget, communications)? What can we monitor to see if we are on track?
3. Evaluating the impact of the strategy How might (or did) the strategy change outcomes for us?	How do the outcomes for the group that participated in the strategy compare with those for the group that didn't? And what alternative strategy (potentially just business as usual) did the nonparticipating group use? How convincing and relevant is this research finding

Source: Gordon, N. & Conaway, C. (2020). Common-Sense Evidence: The Education Leader's Guide to Using Data and Research

How can school leaders learn more about what works?

Campbell Collaboration

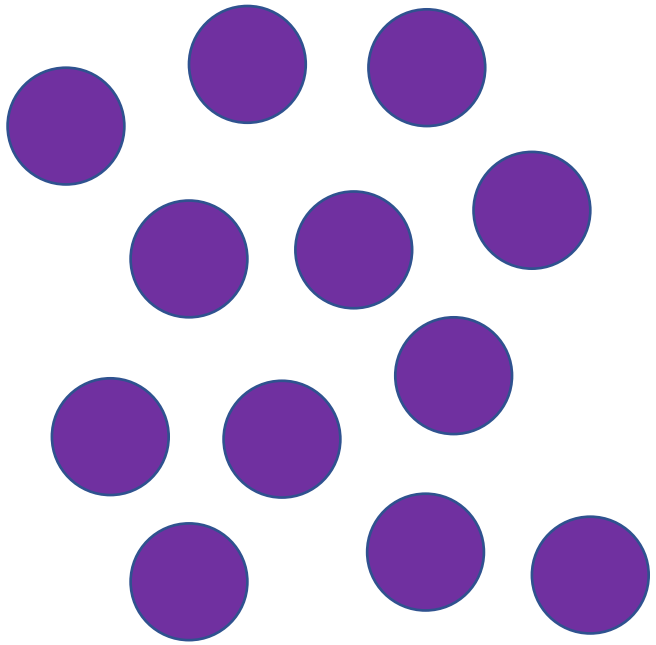
https://www.campbellcollaboration.org/



https://ies.ed.gov/ncee/wwc/

Additional Slides

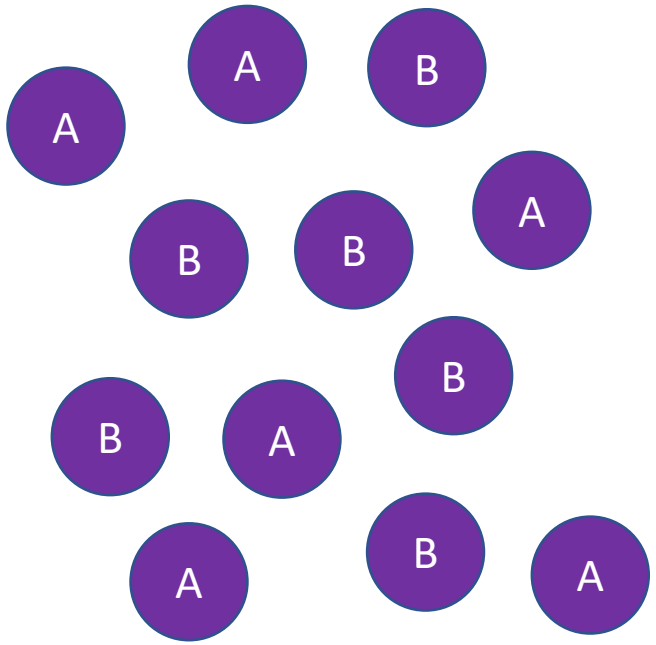
Randomized Controlled Trials (RCTs): Overview



Intervention (Treatment) Group

Non-Intervention (Control) Group

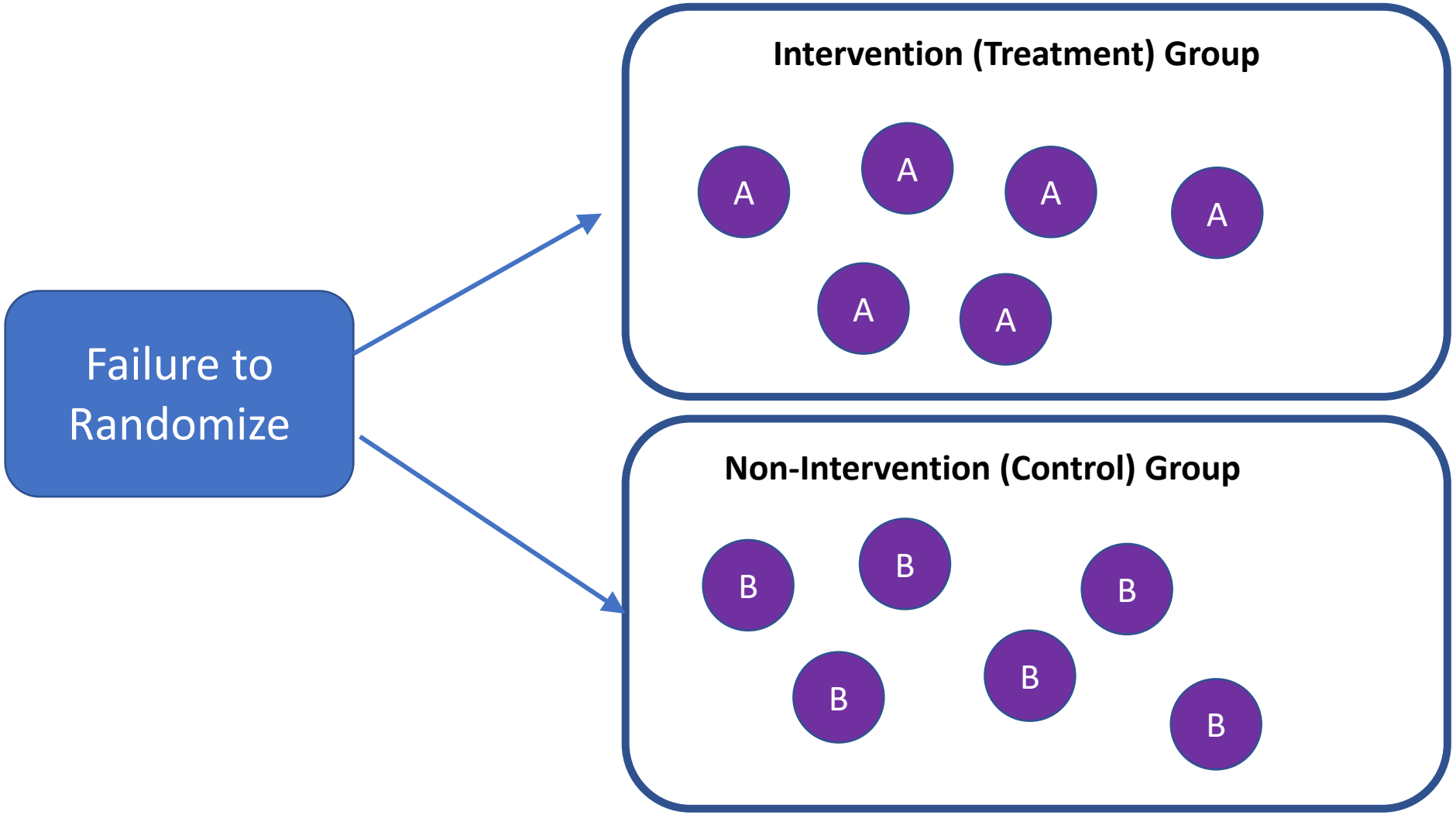
People have unobservable characteristics



Intervention (Treatment) Group

Non-Intervention (Control) Group

If people self-select into ”treatment,” we get biased results



Randomization balances individuals on observable and unobservable characteristics