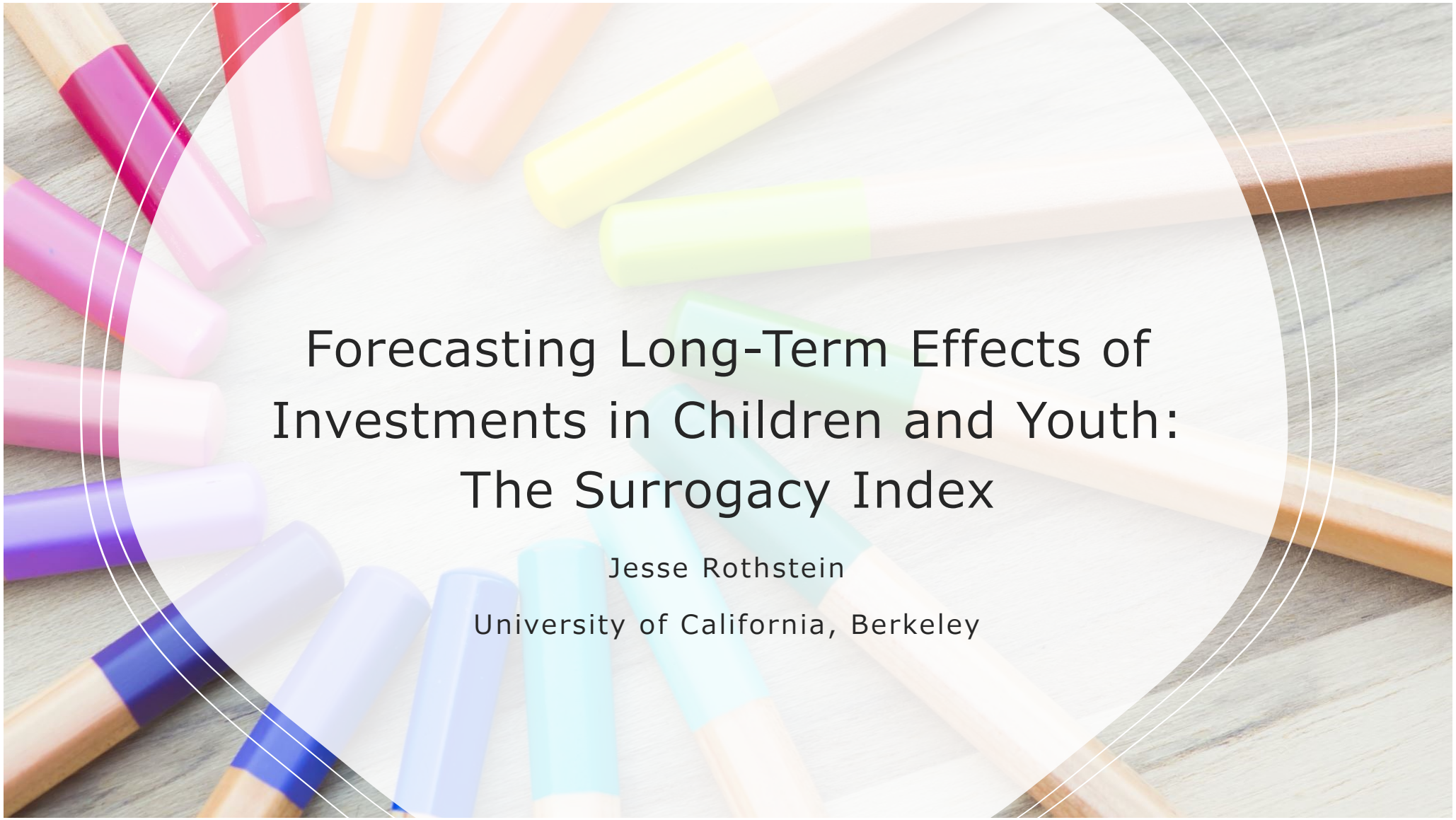


Forecasting Long-Term Effects of Investments in Children and Youth: The Surrogacy Index

Jesse Rothstein

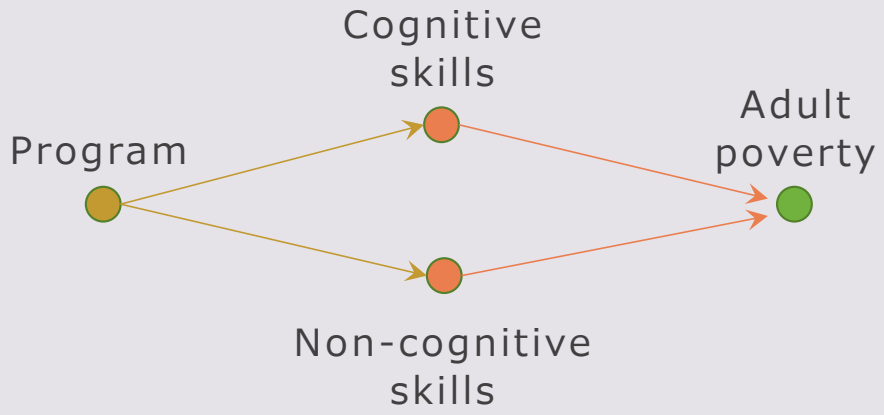
University of California, Berkeley

What are the effects of an early childhood program on poverty as an adult?

We can wait 30 years to measure poverty.

Or, we can measure short-term effects (e.g., on childrens' cognitive & non-cognitive skills) and use these to forecast.

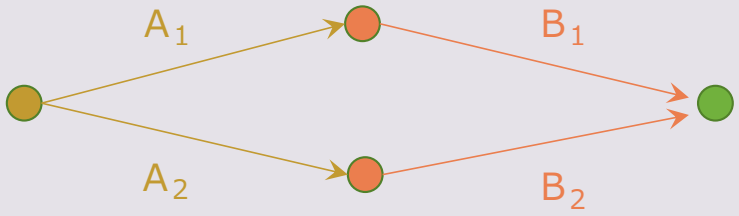
Surrogacy index proposed by Athey et al.



Athey, Susan, Raj Chetty, Guido Imbens, and Hyunseung Kang (2019). "The surrogate index: Combining short-term proxies to estimate long-term treatment effects more rapidly and precisely."

How does the surrogacy index work?

1. Measure short-term effects of program in a well-designed evaluation. (A_1, A_2)
2. Measure relationship between surrogates and long-run outcome in observational sample. (B_1, B_2)
3. Multiply these together to estimate effect of program on long-run outcome $\tau = A_1 * B_1 + A_2 * B_2$



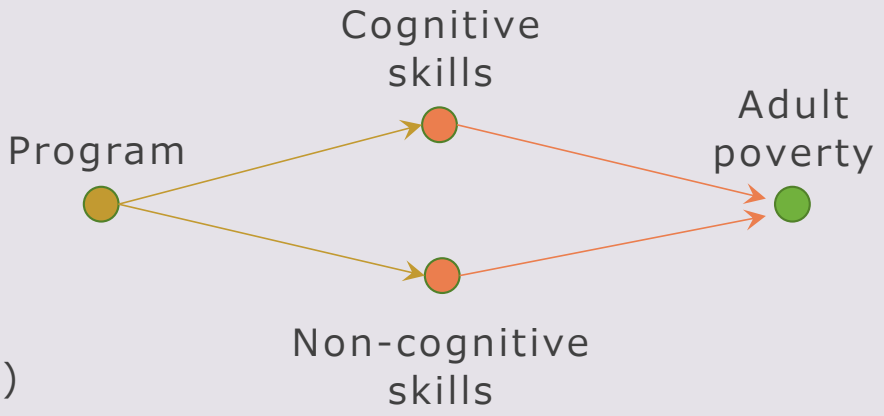
What are the effects of an early childhood program on poverty as an adult?

Predicted effect of the program, using the surrogacy index, on adult poverty is:

(Effect of pgm on cognitive skills) *
(Effect of cog. skills on adult poverty)

+

(Effect of pgm on non-cognitive skills) *
(Effect of non-cog. skills on adult poverty)



It’s not that simple!

Three strong assumptions underlie this:

1. We can measure the *causal effect* of the program on the short-run surrogates.

2. The program’s effect on long-term outcomes operates *only through* the short-run surrogates.

3. We can measure the causal effects of the surrogates on the long-run outcomes.

Getting concrete

Suppose our short-term surrogates are test scores and measures of non-cognitive skills.

We have credible pilot estimates of short-term effects:

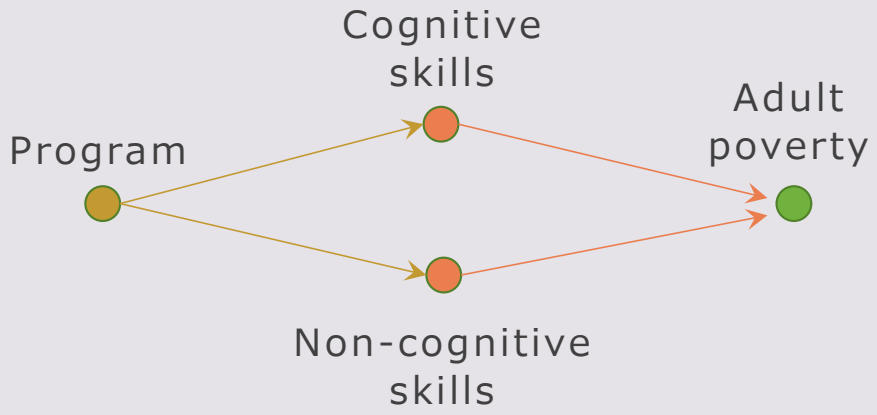
- Program 1 affects test scores but not non-cognitive.
- Program 2 affects non-cognitive scores but not tests.

Which is better for long-run outcomes?

Estimate observational relationship between adult poverty and childhood test scores & non-cognitive scores → choose the one with the bigger coefficient.

What could go wrong?

1. We might get the short-run effects wrong.
2. The program could operate through unmeasured channels.
3. The effects of the surrogates on long-run outcomes might be confounded by other factors.



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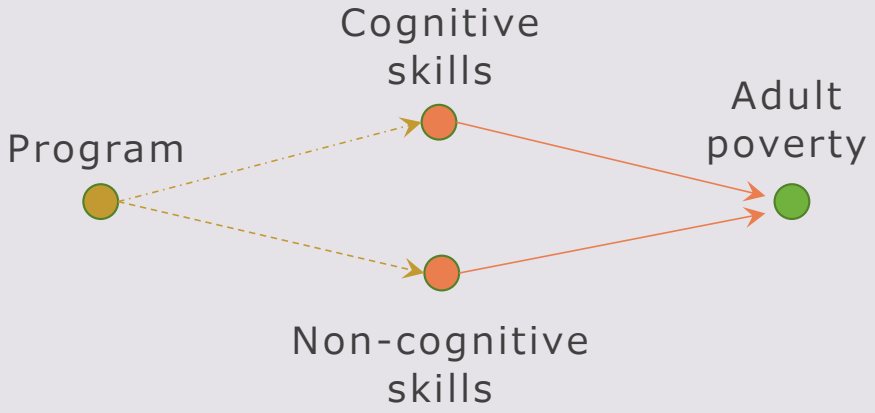

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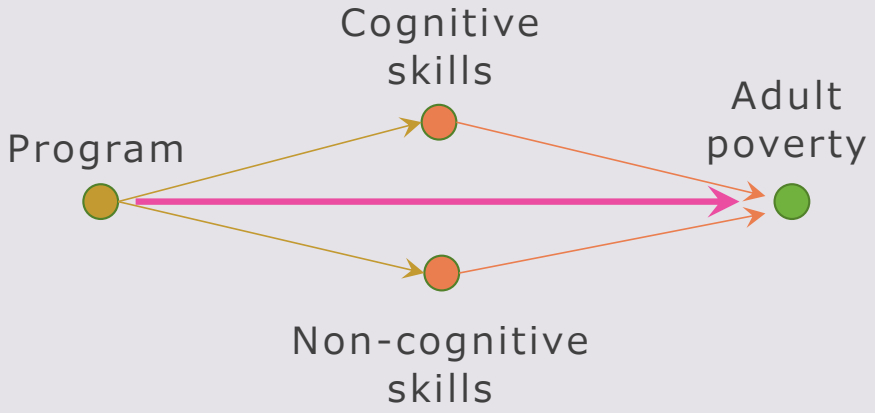

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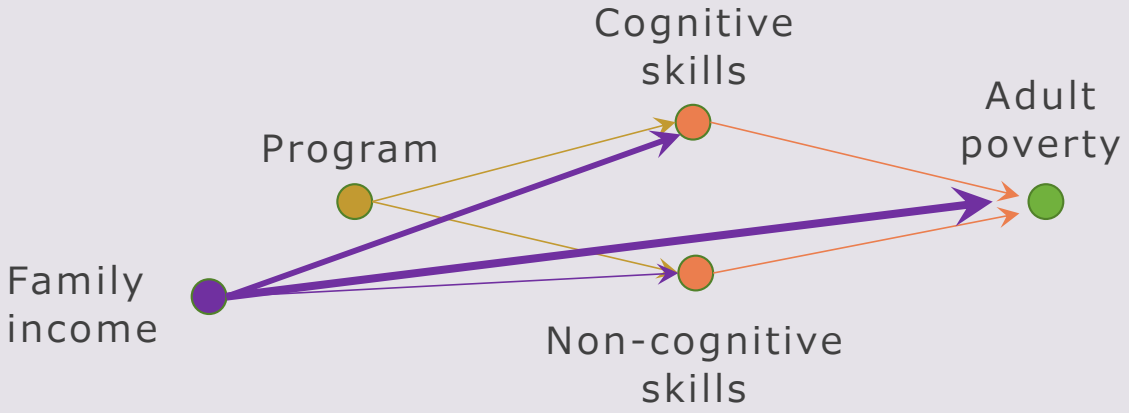

Surrogacy strategy is strictly harder than mediation analysis

Mediation analysis is hard to do credibly – we don't have strategies for identifying causal effects of mediators.

Surrogacy assumption 3 is that mediation analysis is straightforward.

Surrogacy assumption 2 is that the mediators capture the entire effect.

What else should we do?

We definitely want well-designed pilot studies to get the short-run effects.

I don’t think observational studies are the best way to estimate the surrogates’ effects on long-run outcomes. *Likely to bias us toward programs that try to imitate wealthy families.*

Alternative 1: Use professional judgement to guess at these.

Alternative 2: Use other pilot studies to obtain credible causal effects

- Academic tutoring programs for cognitive skills
- Behavioral modification programs for non-cognitive