

Program evaluation and causal inference with R

Evidence, evaluation, and causation

What is the relationship between social science research and public policy & administration?

**Can we find and
measure evidence for
policies and programs?**

Evidence-based policy

RAND health insurance study

Oregon Medicaid expansion

HUD's Moving to Opportunity

Tennessee STAR

Policy evidence industry

Jameel Poverty Action Lab (J-PAL)

Campbell Collaboration

**Should we have evidence for
every policy or program?**

No!



Ellie Murray

@EpiEllie

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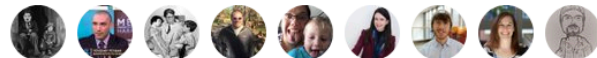
IF U DONT SMOKE,
U ALREADY
BELIEVE IN
CAUSAL INFERENCE
WITHOUT
RANDOMIZED TRIALS



[#HistorianSignBunny](#) [#Epidemiology](#)

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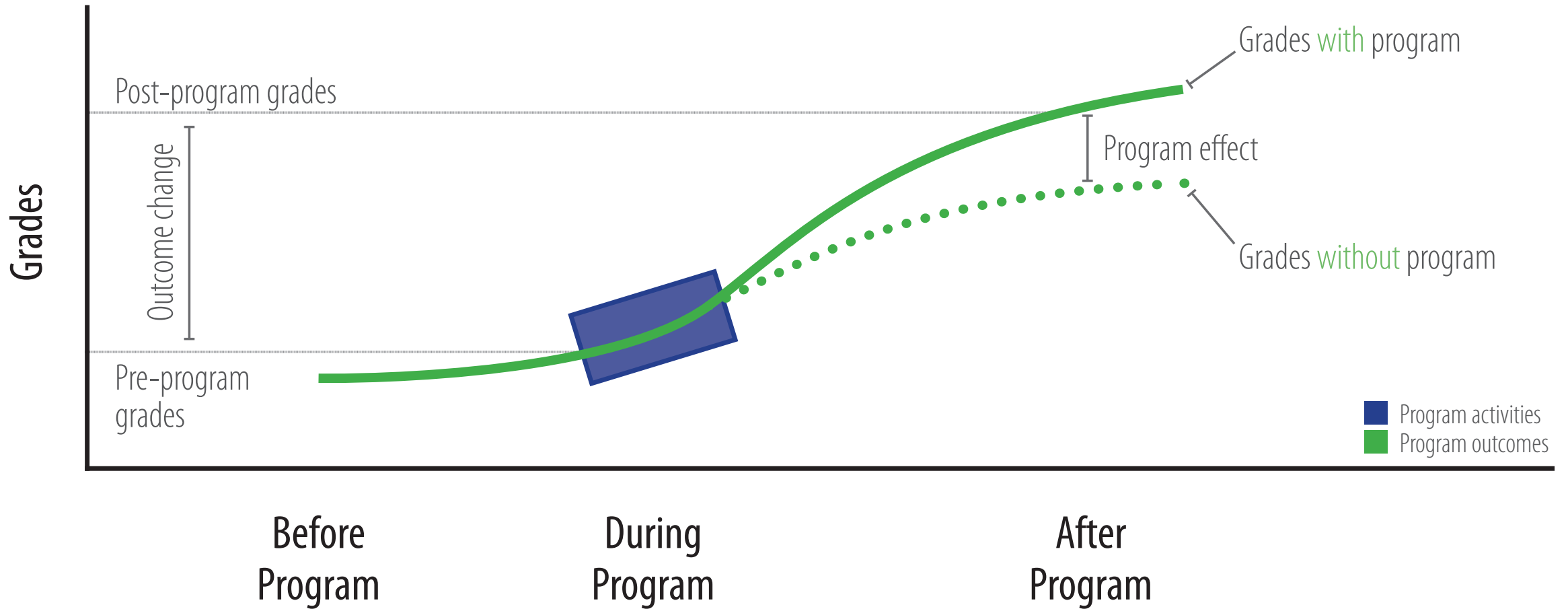
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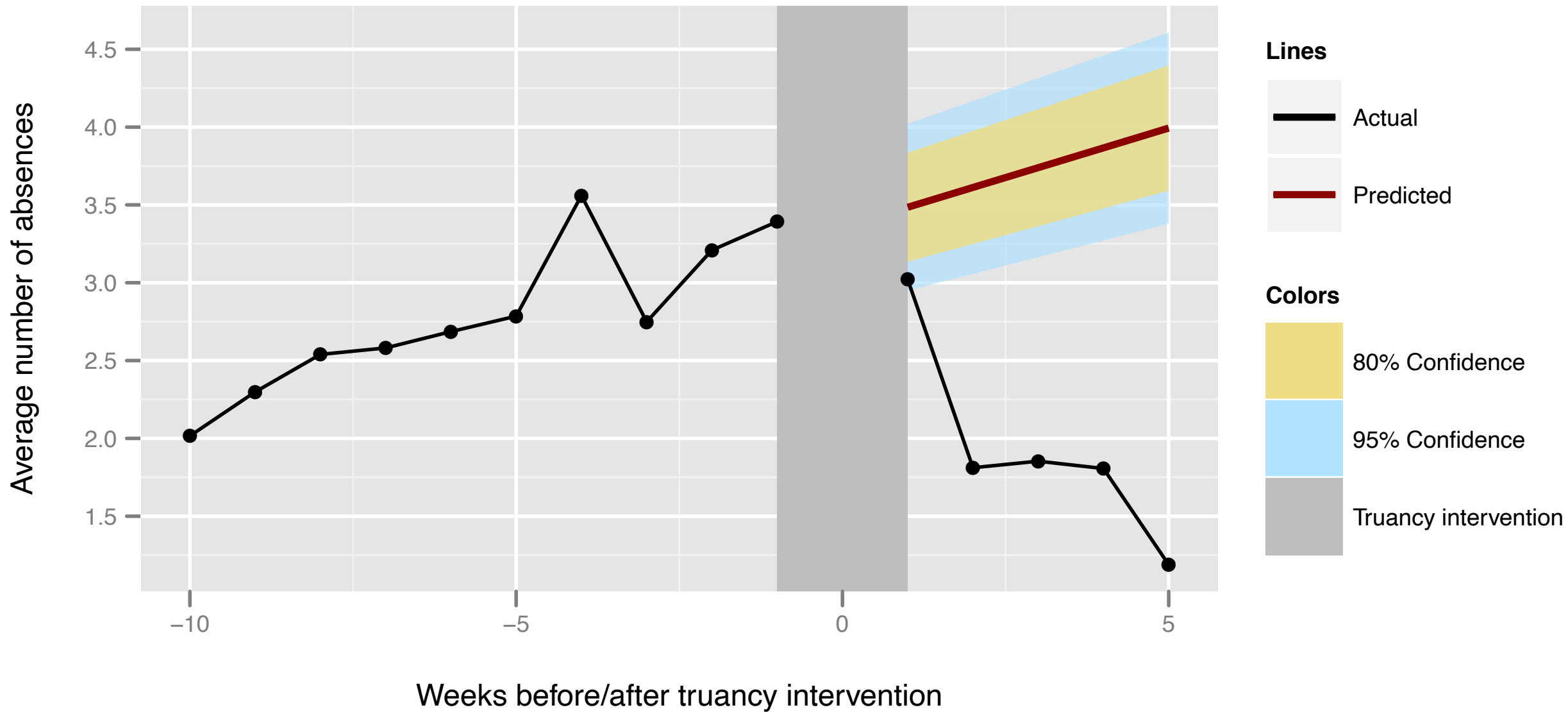


**Where does program
evaluation fit with all this?**

**It's a method for collecting evidence for
policies and programs**

Causation!





Godwin's law

From Wikipedia, the free encyclopedia

Godwin's law (or **Godwin's rule of Hitler analogies**)^{[1][2]} is an [Internet adage](#) asserting that "As an online discussion grows longer, the probability of a comparison involving [Nazis](#) or [Hitler](#) approaches 1";^{[2][3]} that is, if an online discussion (regardless of topic or scope) goes on long enough, sooner or later someone will compare someone or something to Adolf Hitler or his deeds, the point at which effectively the discussion or thread often ends. Promulgated by the American attorney and author [Mike Godwin](#) in 1990,^[2] Godwin's law

Godwin's Law for statistics

**Correlation does not
imply causation**

Except when it does

**Even if it doesn't,
this phrase is useless
and kills discussion**

Not everyone found the news believable. “Facepalm. Correlation doesn’t imply causation,” wrote one unhappy Internet user. “That’s pretty much how I read this too... correlation is NOT causation,” agreed a Huffington Post superuser, seemingly distraught. “I was surprised not to find a discussion of correlation vs. causation,” cried someone at Hacker News. “Correlation does not mean causation,” a reader moaned at Slashdot. “There are so many variables here that it isn’t funny.”

Correlation vs. causation

How do we figure out correlation?

Math and statistics

How do we figure out causation?

Philosophy. No math.



John B. Holbein @JohnHolbein1 · Apr 7

Causality isn't achieved; it's approached.



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John B. Holbein @JohnHolbein1 · Apr 7

Causality isn't binary; it's a continuum.



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How do we know if X causes Y?

X causes Y if...

...we intervene and change X
without changing anything else...

...and Y changes

Y “listens to” X

X isn't the only thing that causes Y

A light switch causes a light to go on, but not if bulb is burned out (no Y despite X) or if the light was already on (Y without X)

Causal relationships?

Lighting fireworks causes noise

Rooster crows are followed by sunrise

Getting an MPA increases your earnings

**Colds go away a few days
after you take vitamin C**

Causation

**Causation =
Correlation + time order +
all other factors ruled out**

How do you know if you have it right?

You need a philosophical model

That's what this workshop is for!

Plan for today

DAGs and the causal revolution

(1 hour)

Causation and RCTs

(30 minutes)

Causation, regression, and matching

(30 minutes)

Causation and difference-in-differences

(30 minutes)

Causation and regression discontinuities

(30 minutes)

andhs.co/gpl-causation