Simulating a Causal Chain

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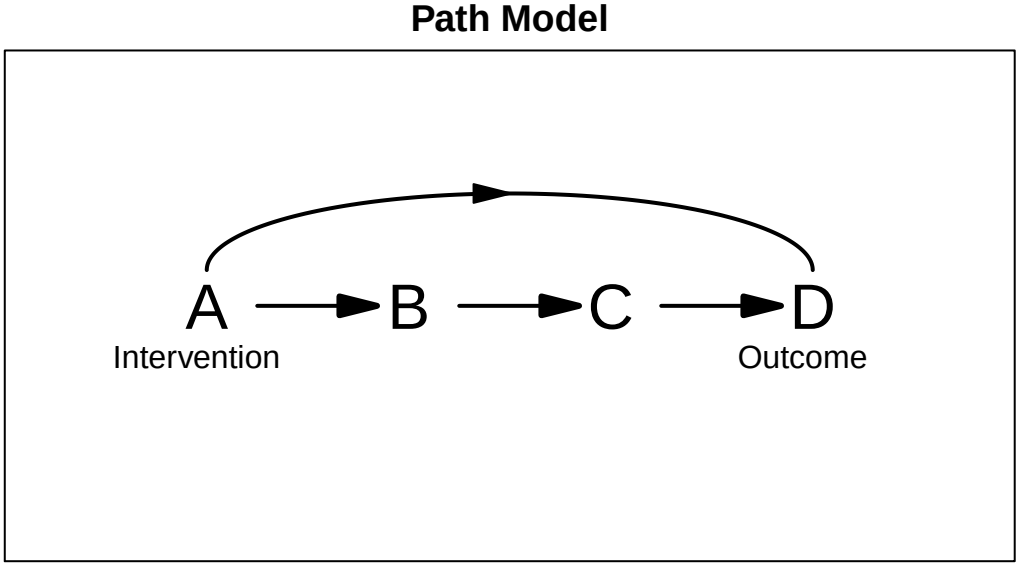
Imagine that 200 people were randomly assigned to a treatment, and 200 were randomly assigned to control group. Assume the intervention is linked to the major outcome of interest via two mediating variables, in a casual chain, with no indirect paths.



For example,

A: Random assignment to a mailing to encourage use of a new service

B: Does the person actually learn about tbe new service?

C: Does the person actually contact the providers of the new service?

D: Some outcome the service is intended to promote (e.g., getting a job, installing an energy saving device).

So the service (A) will only raise the outcome probability (D) if person knows about the service (B) and seeks it out (C).

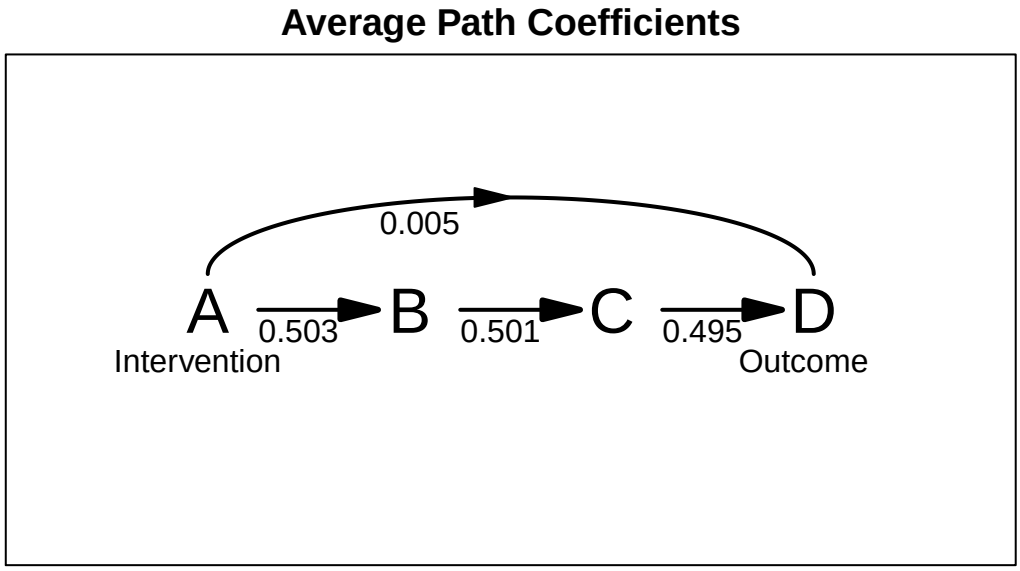
This simulation generates random data with these transition probabilities (for a given cell size), and then fits a path model to the data. The process is repeated 100 times to generate a distribution of estimated path coefficients for each path in the model, and I diagram the model using the average patch coefficient across the 100 runs.

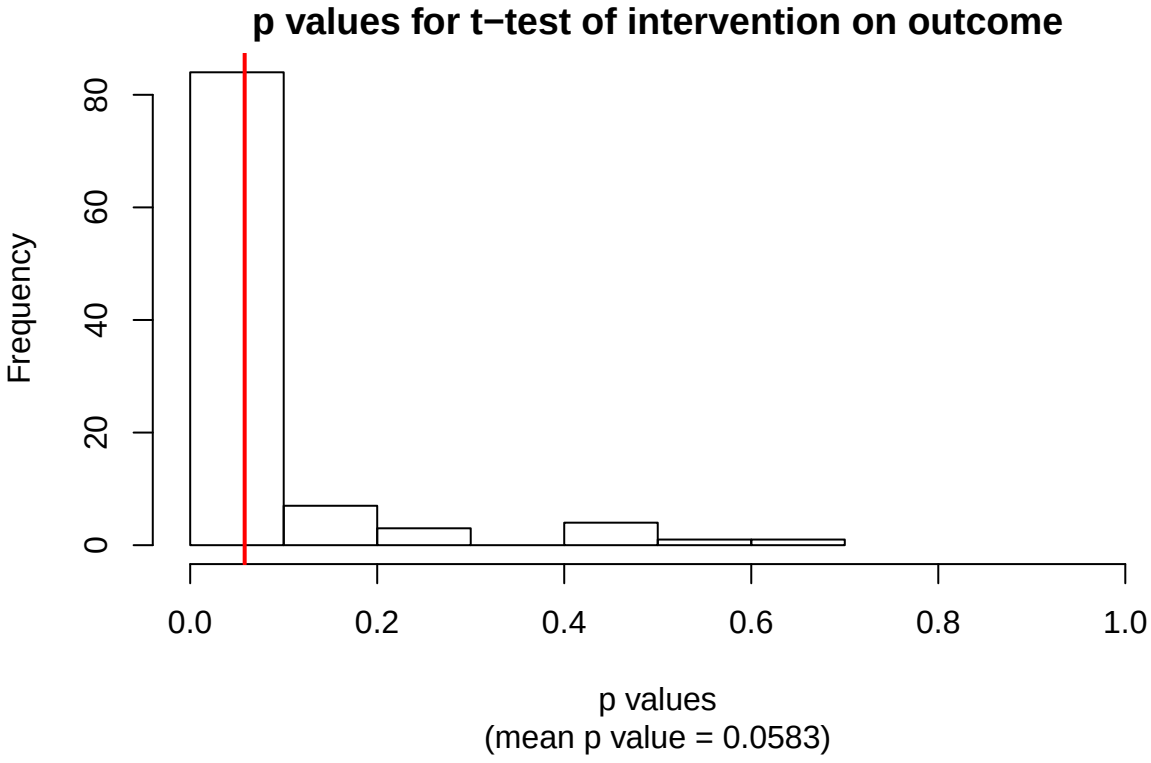
Note. The path coefficients are regression coefficients, NOT probabilities.

SCENARIO 1: STRONGER EFFECT

Control: p(B|A) = .25, p(C|B) = .25, p(D|C) = .25

Treated: p(B|A) = .75, p(C|B) = .75, p(D|C) = .75

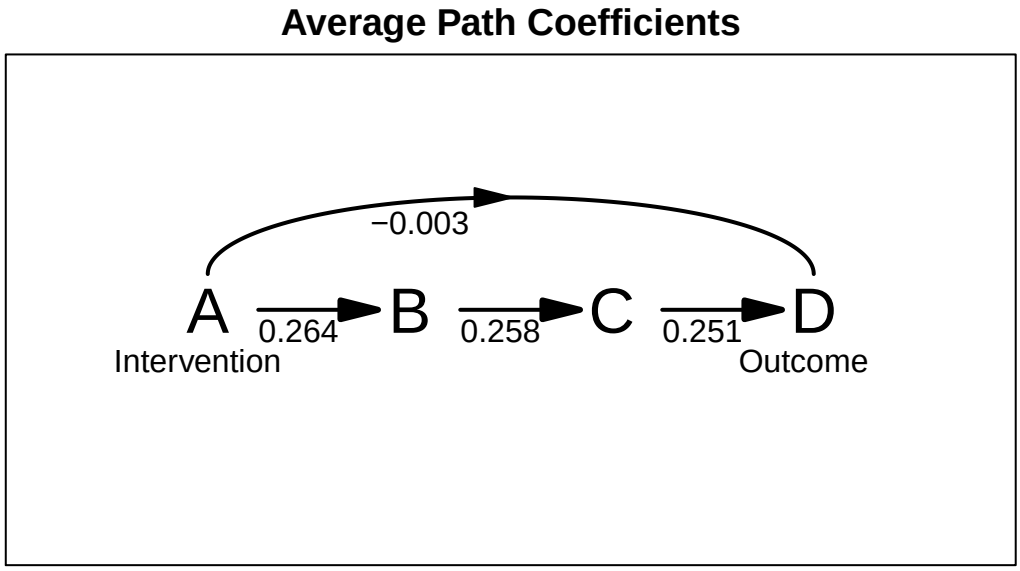


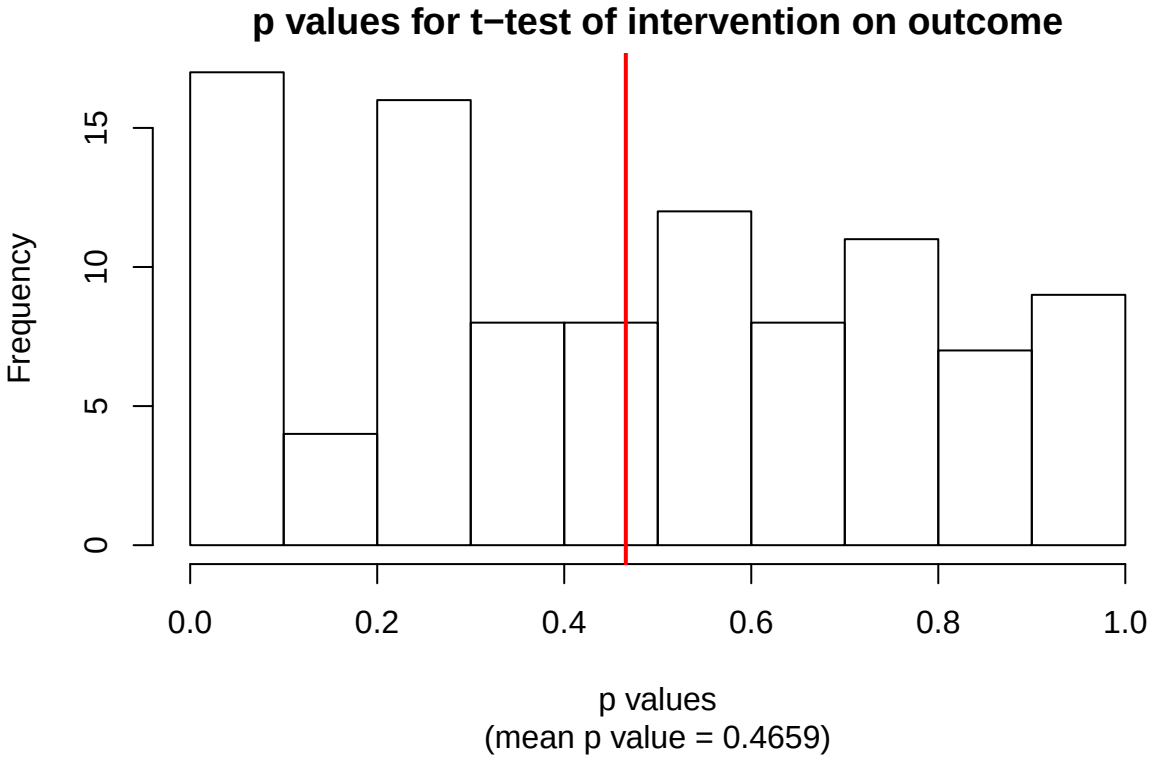


SCENARIO 2: WEAKER EFFECT

Control: p(B|A) = .25, p(C|B) = .25, p(D|C) = .25

Treated: p(B|A) = .50, p(C|B) = .50, p(D|C) = .50

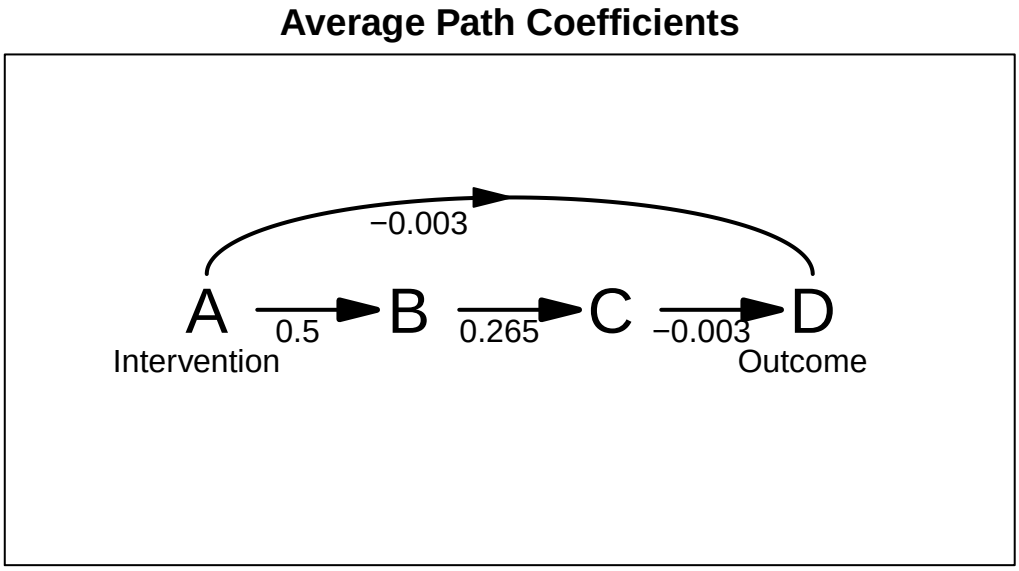


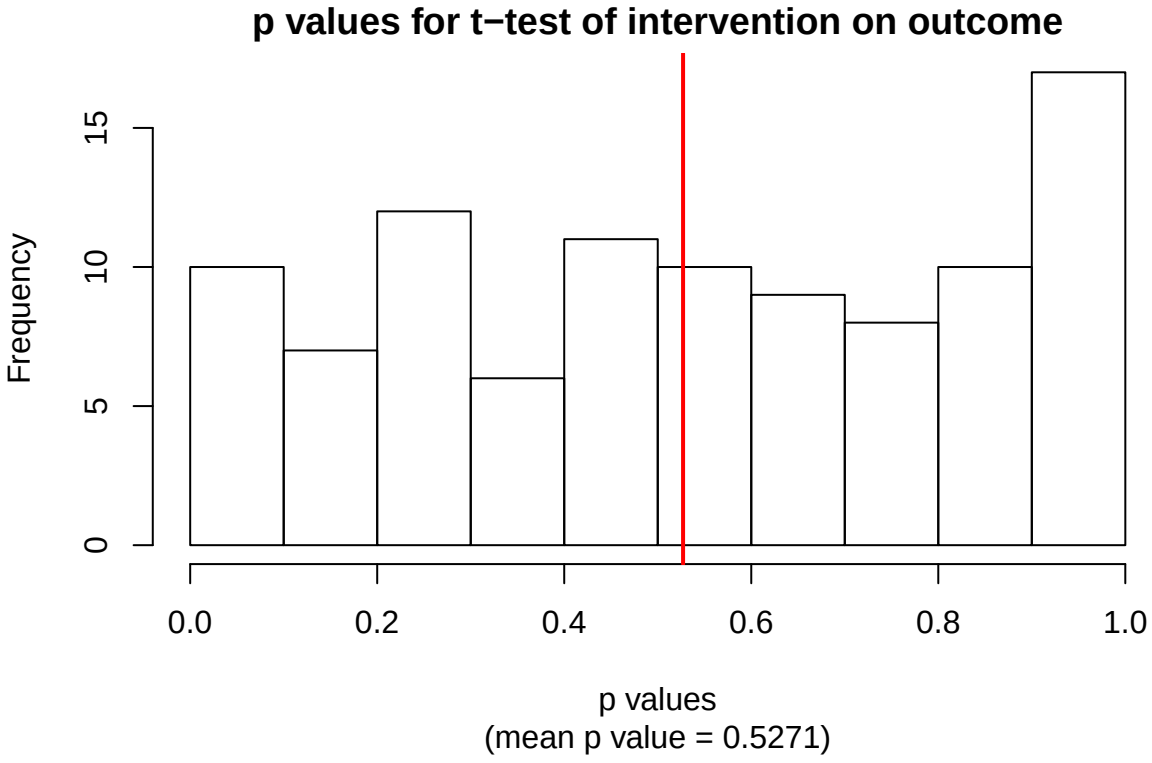


SCENARIO 3: DIMINISHING EFFECT

Control: p(B|A) = .25, p(C|B) = .25, p(D|C) = .25

Treated: p(B|A) = .75, p(C|B) = .50, p(D|C) = .25





SCENARIO 4: STRONG EFFECT, BUT CELL N = 50 INSTEAD OF 200

Control: p(B|A) = .25, p(C|B) = .25, p(D|C) = .25

Treated: p(B|A) = .75, p(C|B) = .75, p(D|C) = .75