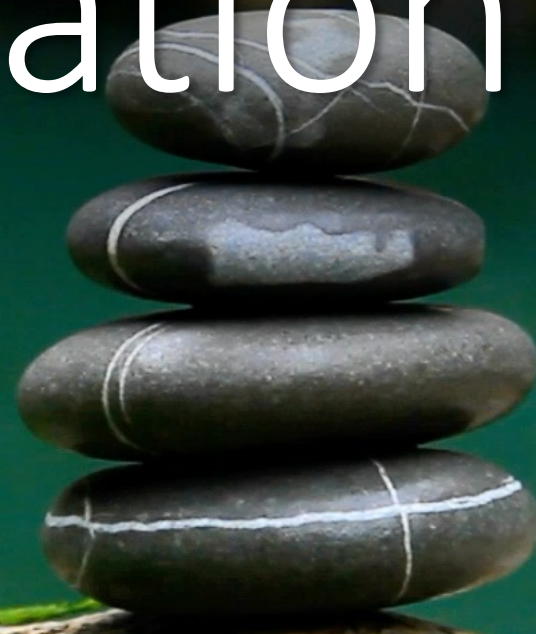


Mediation

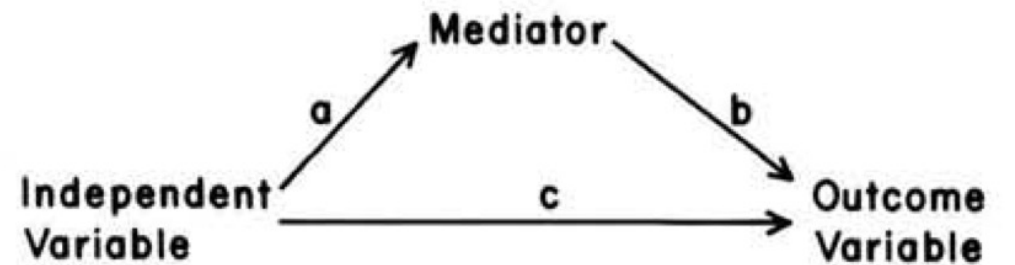


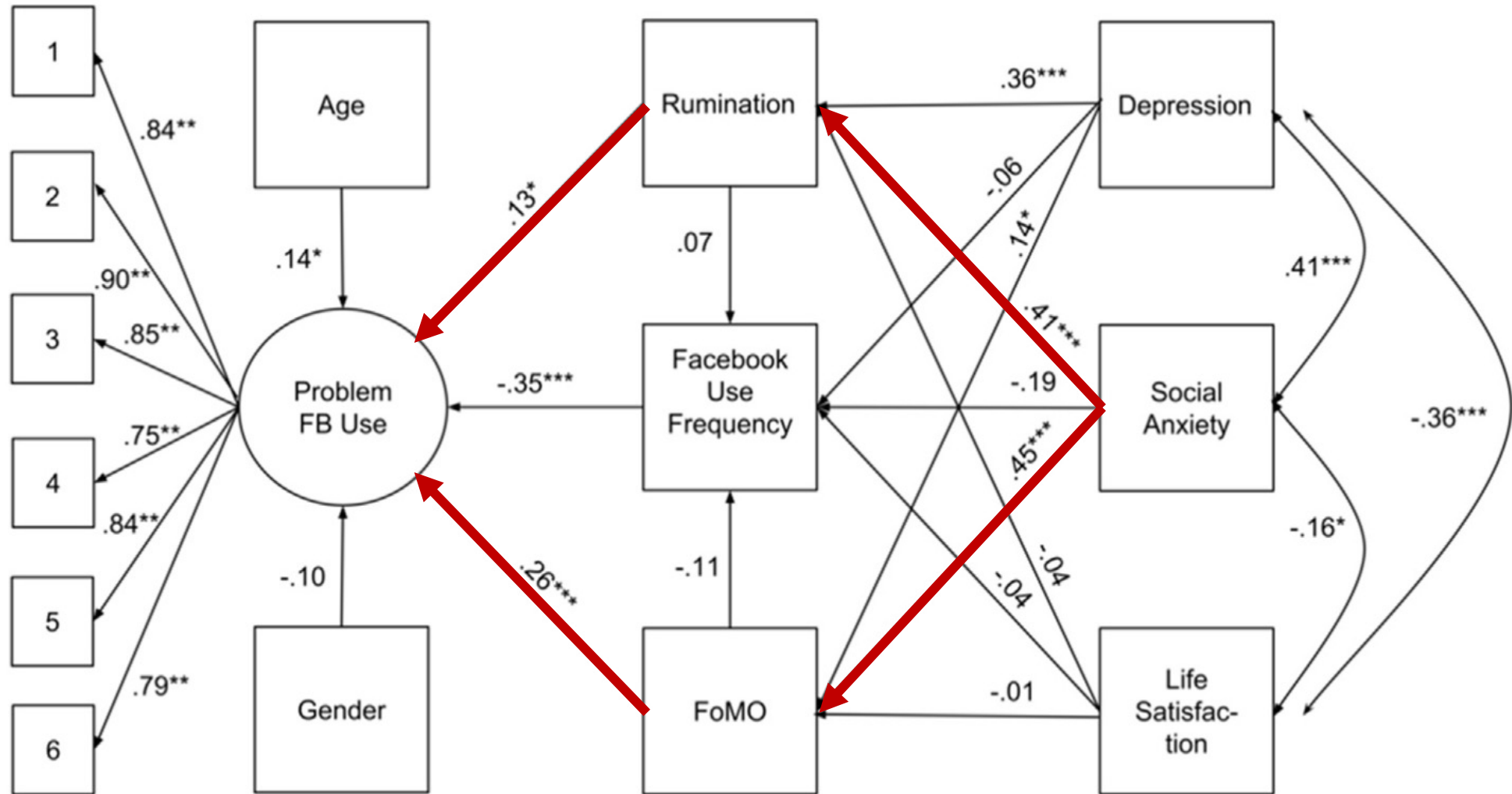
Baron & Kenny (1986)

Definition of a mediator:

Variable that accounts for some causal relation between the independent and dependent variable.

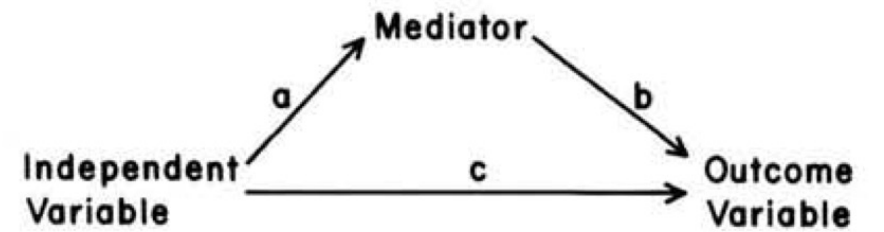
“How”/ “why” of an effect





Dempsey et al., (2019)

Baron & Kenny (1986)



Variations in levels of the independent variable significantly account for variations in the presumed mediator (i.e., Path a)

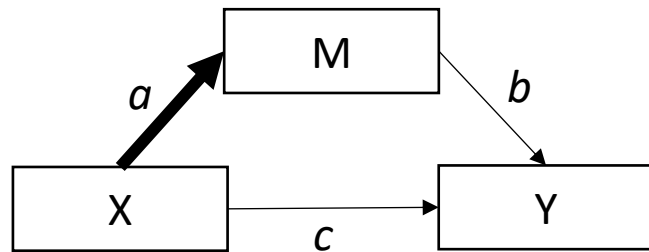
Variations in the mediator significantly account for variations in the dependent variable (i.e., Path b)

When Paths a and b are controlled, a previously significant relation between the independent and dependent variables is no longer significant.

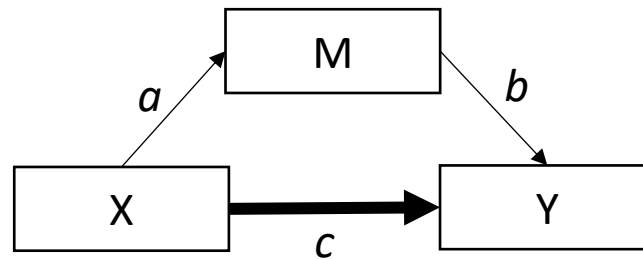
Strongest demonstration of mediation occurring when Path $c = 0$

Baron & Kenny (1986): Causal Steps

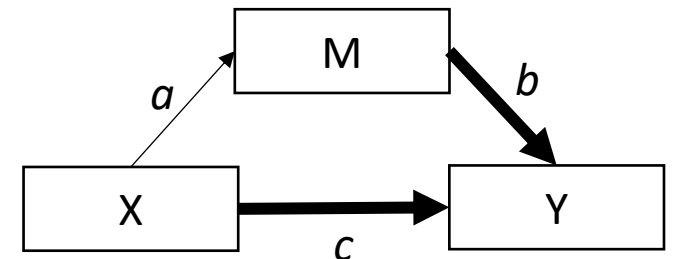
$$1. M = i_1 + aX + e$$



$$2. Y = i_2 + cX + e$$

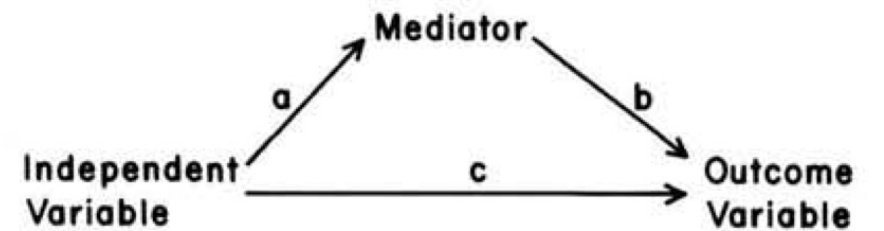


$$3. Y = i_3 + cX + bM + e$$



Effect of X on Y must be less in the third equation than in the second.

Baron & Kenny (1986)



Testing for significance: the Sobel test (Sobel, 1982)

$$z = \frac{ab}{\sqrt{b^2s_a^2 + a^2s_b^2}}$$

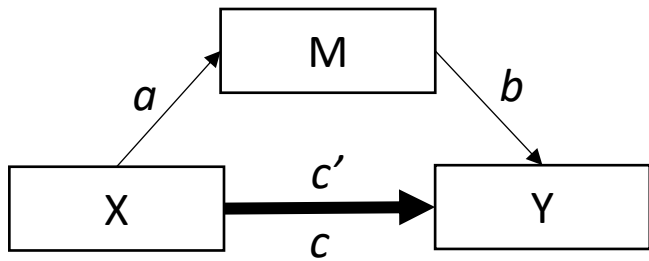
Reconsidering Baron and Kenny

Zhao, Lynch, Chen (2010)

- B & K: Mediation is strongest when there is an indirect effect but no direct effect.
- Strength should be measured by the size of the indirect effect.
- Presence of direct effect can inform theorizing about other mediators.
- Value for theory building.

Reconsidering Baron and Kenny Zhao, Lynch, Chen (2010)

- B & K: Starting point is establishing $X \rightarrow Y$ association.



- Zero-order effect of X on Y = the 'total effect':

$$c' = ab + c$$

(indirect + direct path)

- ab and c could be opposite signs, c' close to zero
- No correlation does not disprove causation
- Directions for future research

Reconsidering Baron and Kenny Zhao, Lynch, Chen (2010)

- B & K: Sobel test to test for significant
- Bootstrapping

$$z = \frac{ab}{\sqrt{b^2s_a^2 + a^2s_b^2}}$$

Reconsidering Baron and Kenny Zhao, Lynch, Chen (2010)

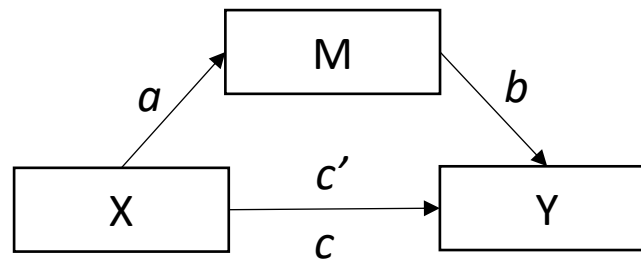
- B & K:

1. $M = i_1 + aX + e$

2. $Y = i_2 + c'X + e$

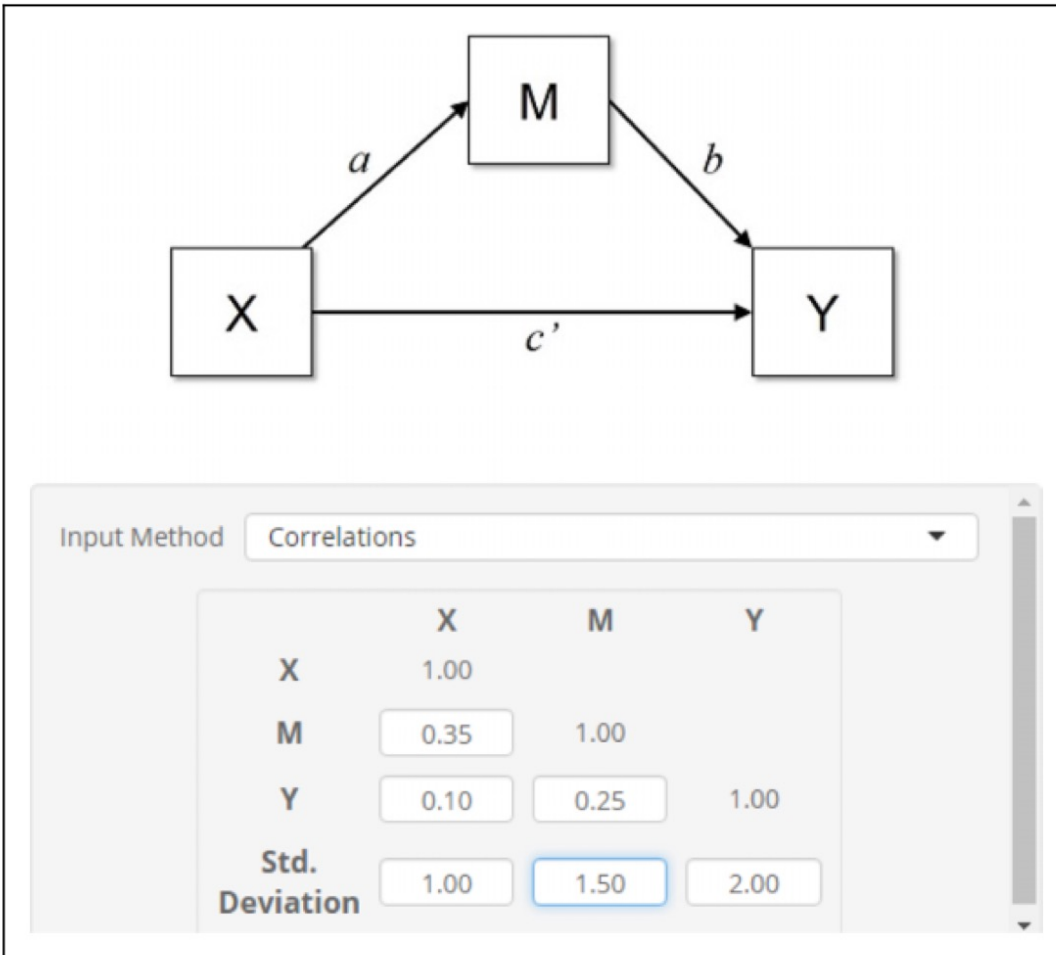
3. $Y = i_3 + cX + bM + e$

Bootstrap test of the
indirect effect ab



Sample Size

- Power analysis: Monte Carlo simulation



$N \sim 150$

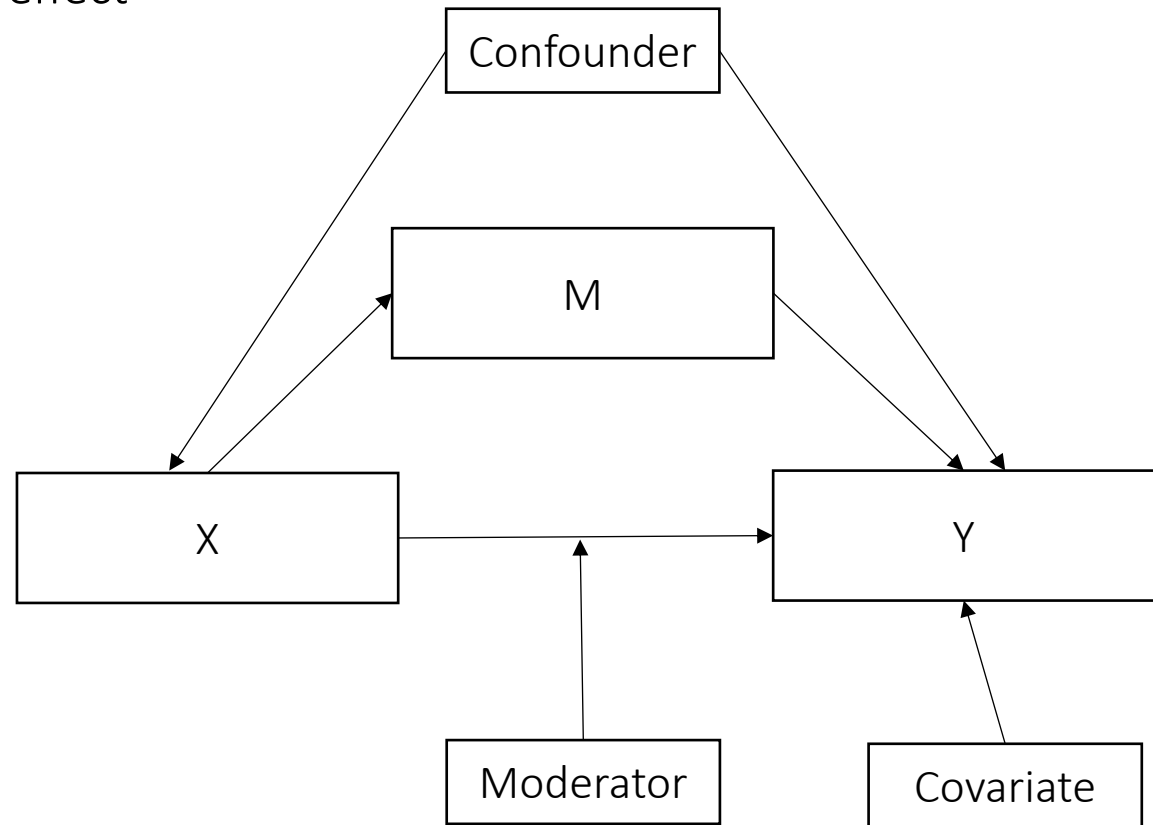
Schoemann et al., (2017)

Moderators, Covariates, & Confounders

Moderator: Affects the size/direction of an effect

Covariate: Related to X or Y or both
Does not change relation between X and Y

Confounder: Related to two or more variables and are **not adjusted for**

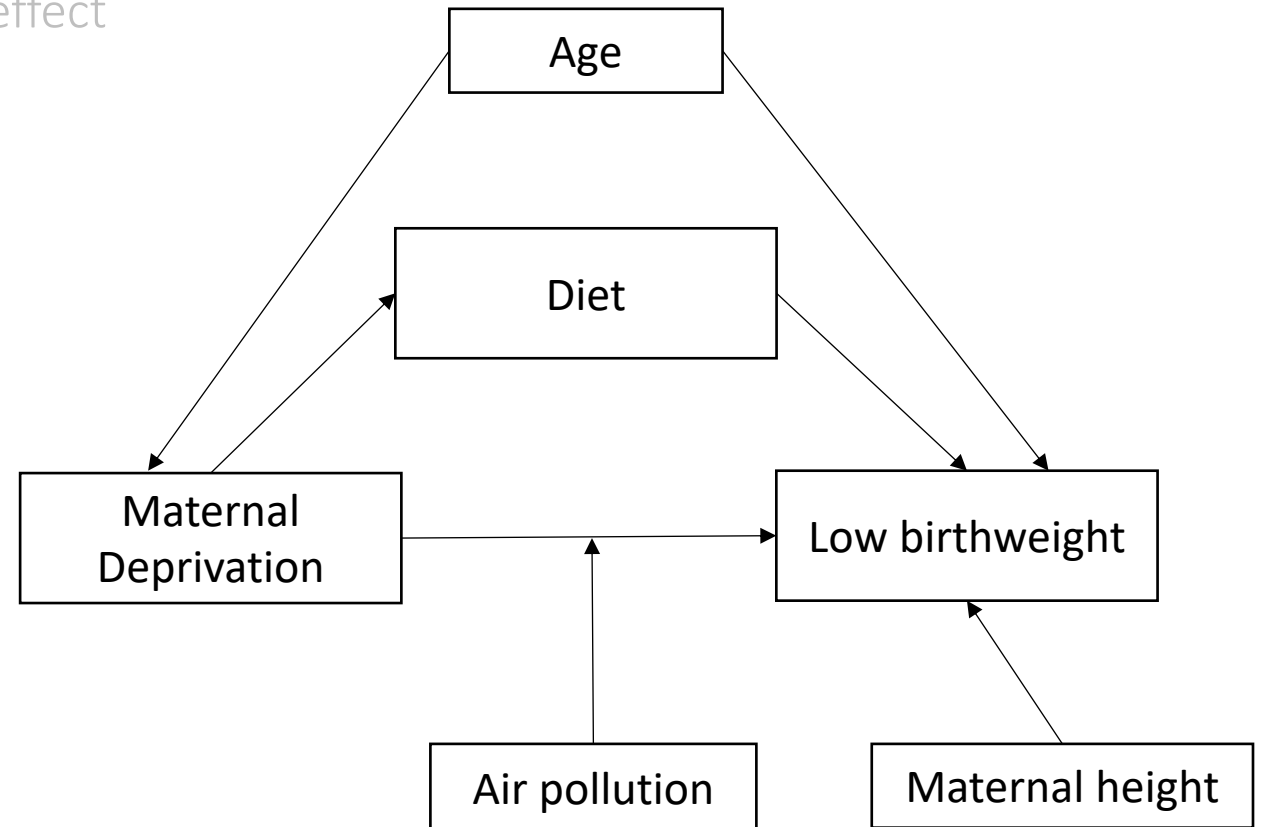


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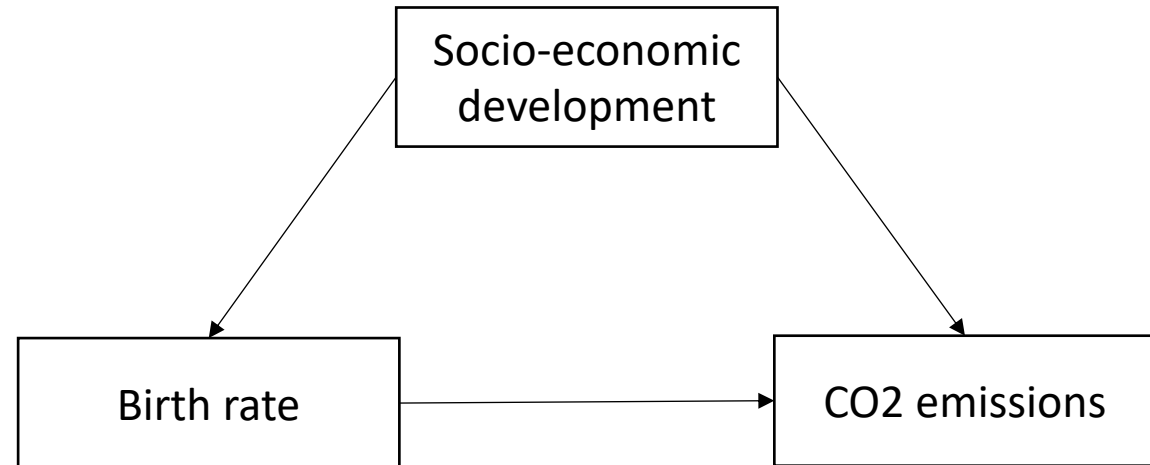


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Mediation and Causality

- Mediation is a causal analysis
- We should use randomized experimental designs
Results from nonexperimental research can only argue that “patterns of covariances are consistent with an assumed causal model”
(Stone-Romero & Rosopa, 2008)
- Kenny (2008):
We are limiting ourselves if we only study variables that we can manipulate.
Valid causal inferences can be made by laypersons, structural equation modelers, and experimentalists.
RCTs aren't perfect either.