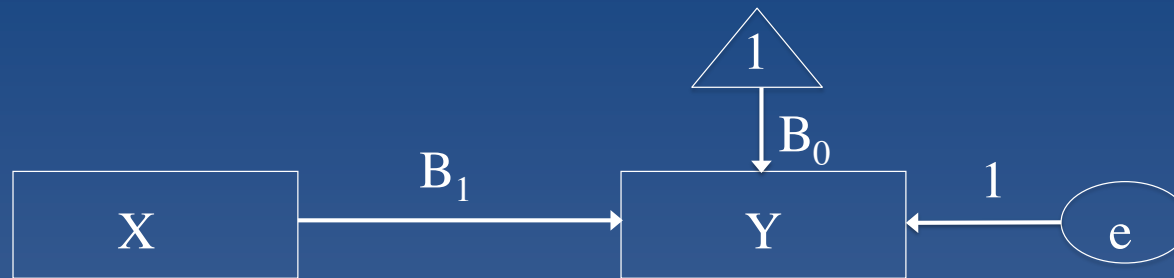# Lecture 10
Segment 2

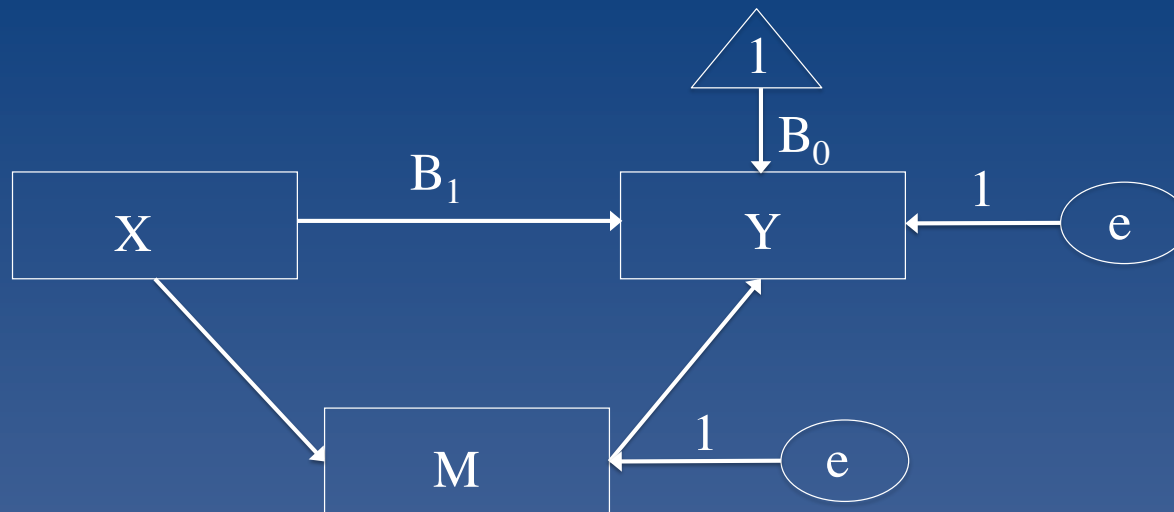Mediation: Path analysis method

Mediation

- Mediation analyses are typically illustrated using "path models"
    - Rectangles: Observed variables (X, Y, M)
    - Circles: Unobserved variables (e)
    - Triangles: Constants
    - Arrows: Associations (more on these later)
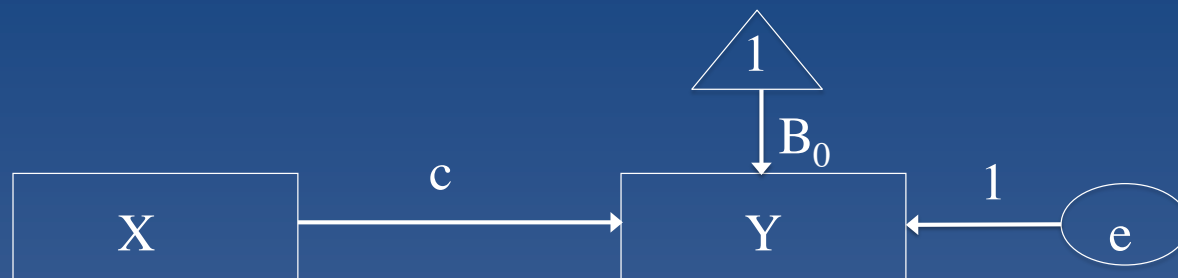
Path model

- $Y = B_0 + B_1 X + e$
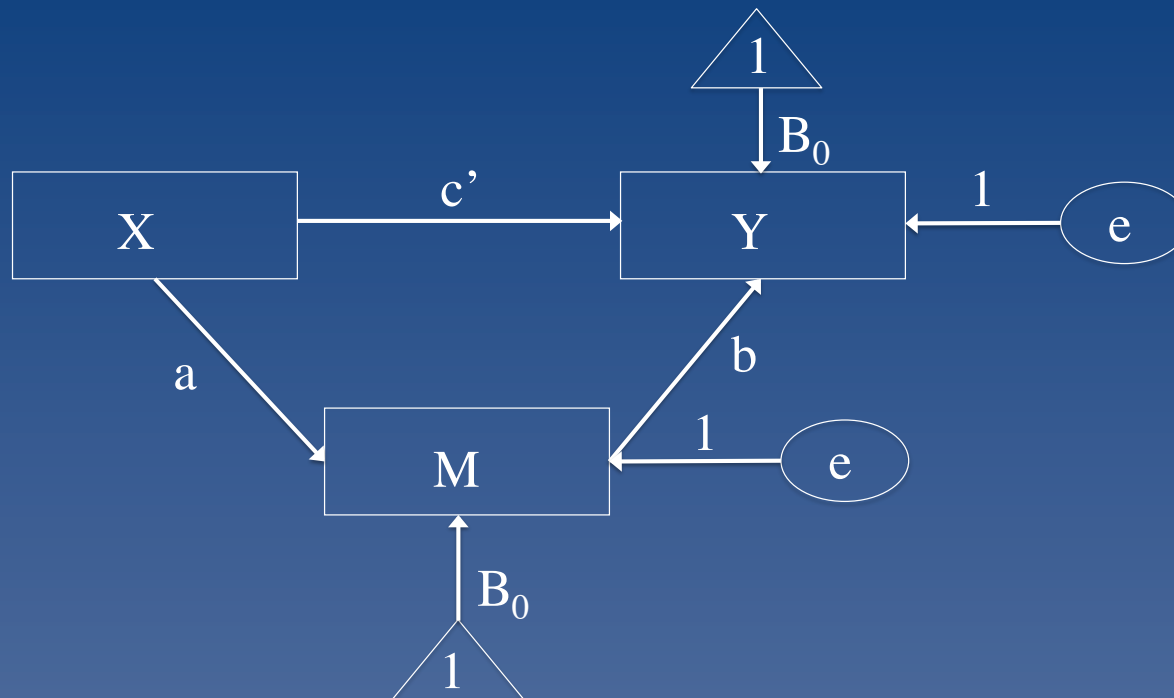
Path model with a mediator

Path model with a mediator

- To avoid confusion, let's label the paths
    - a: Path from X to M
    - b: Path from M to Y
    - c: Direct path from X to Y (before including M)
    - c': Direct path from X to Y (after including M)
    - Note: (a*b) is known as the indirect path

Path model

Path model with a mediator

How to test for mediation

- Three regression equations can now be re-written with new notation:
    - $Y = B_0 + cX + e$
    - $Y = B_0 + c'X + bM + e$
    - $M = B_0 + aX + e$

How to test for mediation
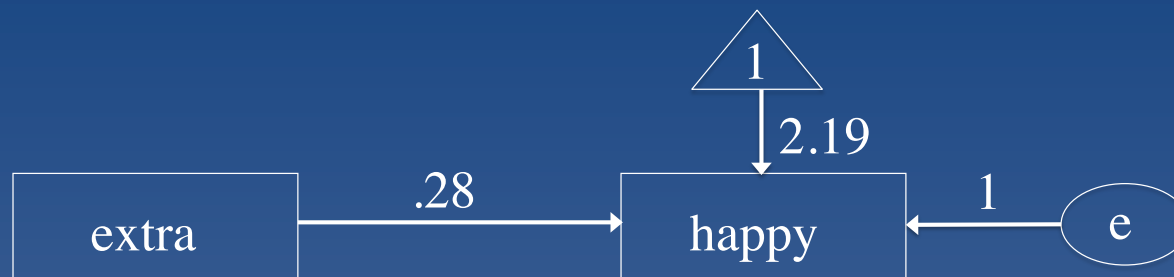
- The Sobel test

$$z = (B_a * B_b) / \sqrt{(B_a^2 * SE_b^2) + (B_b^2 * SE_a^2)}$$
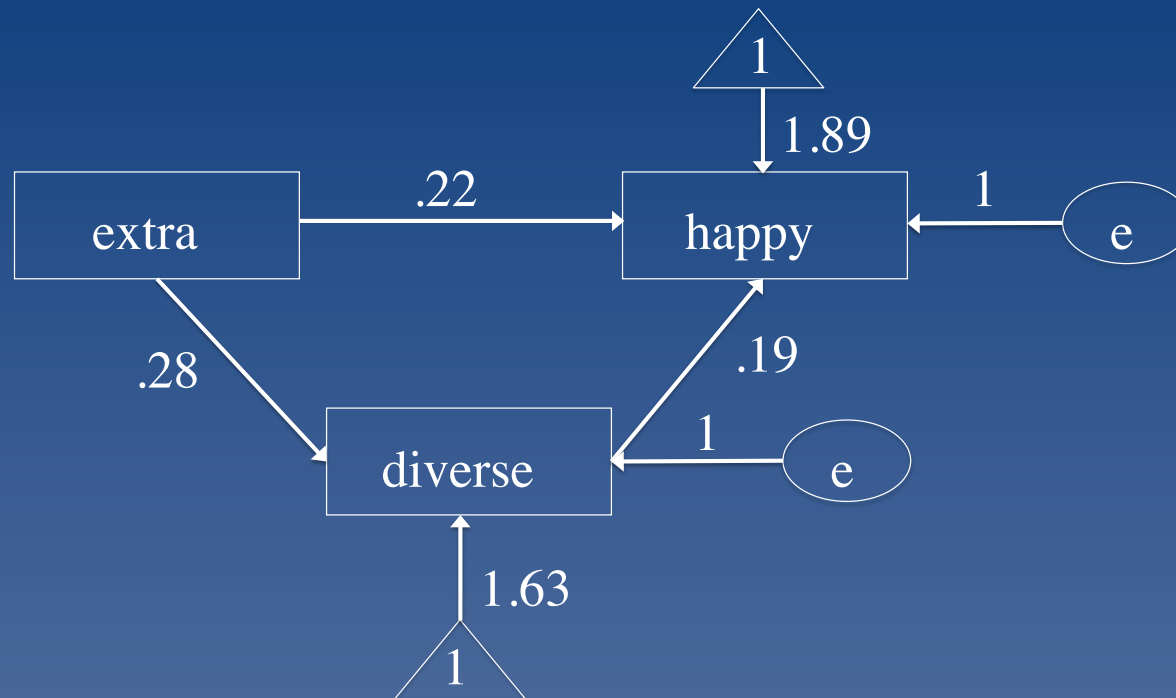
  - The null hypothesis
    - The indirect effect is zero
    - $(B_a * B_b) = 0$

Results in path model

- happy = 2.19 + .28(extra)

Path model with a mediator

Path model with a mediator

- Three regression equations:
  - happy = 2.19 + .28(extra) + e
  - diverse = 1.63 + .28(extra) + e
  - happy = 1.89 + .22(extra) + .19(diverse) + e

  Sobel z = +1.98, p = .04

Interpretation

- Partial, not full, mediation
- Partial mediation because the direct effect (extra) is still significant after adding the mediator (diverse) into the regression equation
- According to the Sobel test, the indirect effect is statistically significant

Mediation: Final comments

- Here we used path analysis to *illustrate* the mediation analysis
- It is also possible to test for mediation using a statistical procedure called:
  - Structural Equation Modeling (SEM)

Mediation: Final comments

- Causality!
- The example here was weak in terms of ability to make causal statements
- Mediation analysis is more powerful with:
  - True independent variables
  - The incorporation of time

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