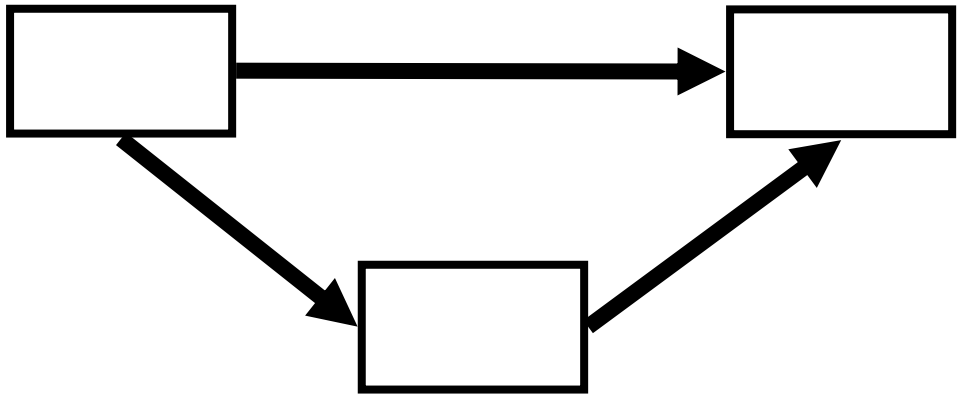
The Basics

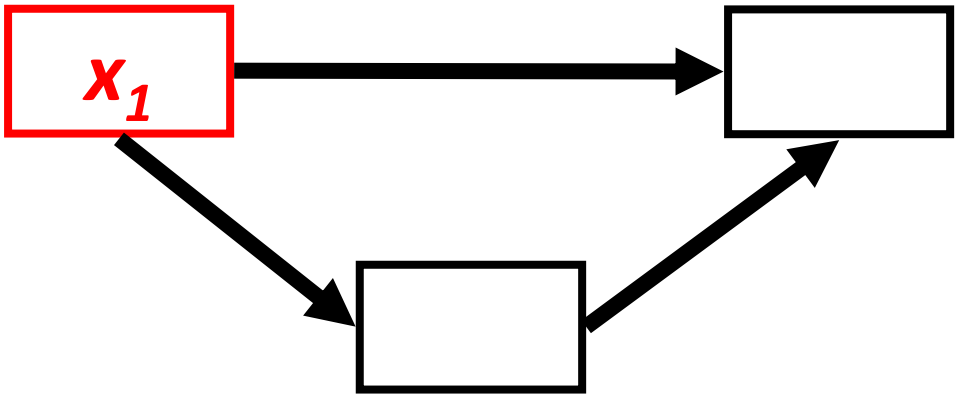
2. Terms & Definitions.

- Structural equation model = observed, latent, composite
- Direct acyclic graph (DAG) = observed
- Path analysis = observed



2. Terms & Definitions.

Exogenous variable = independent variable, predictor

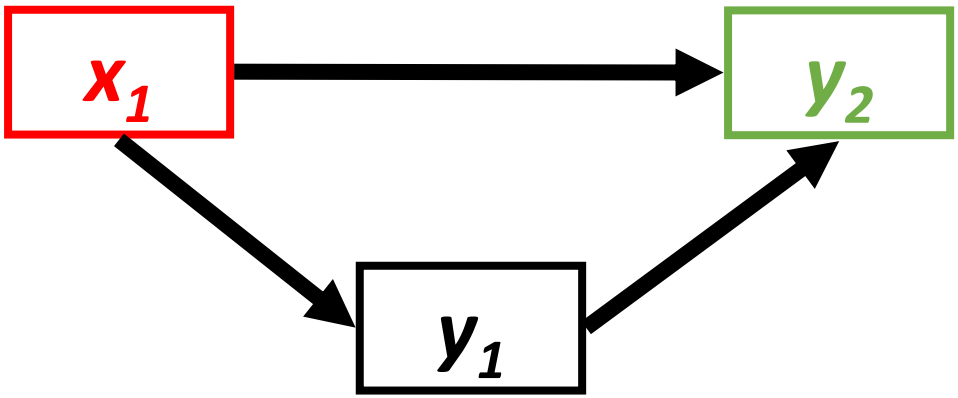


2. Terms & Definitions.

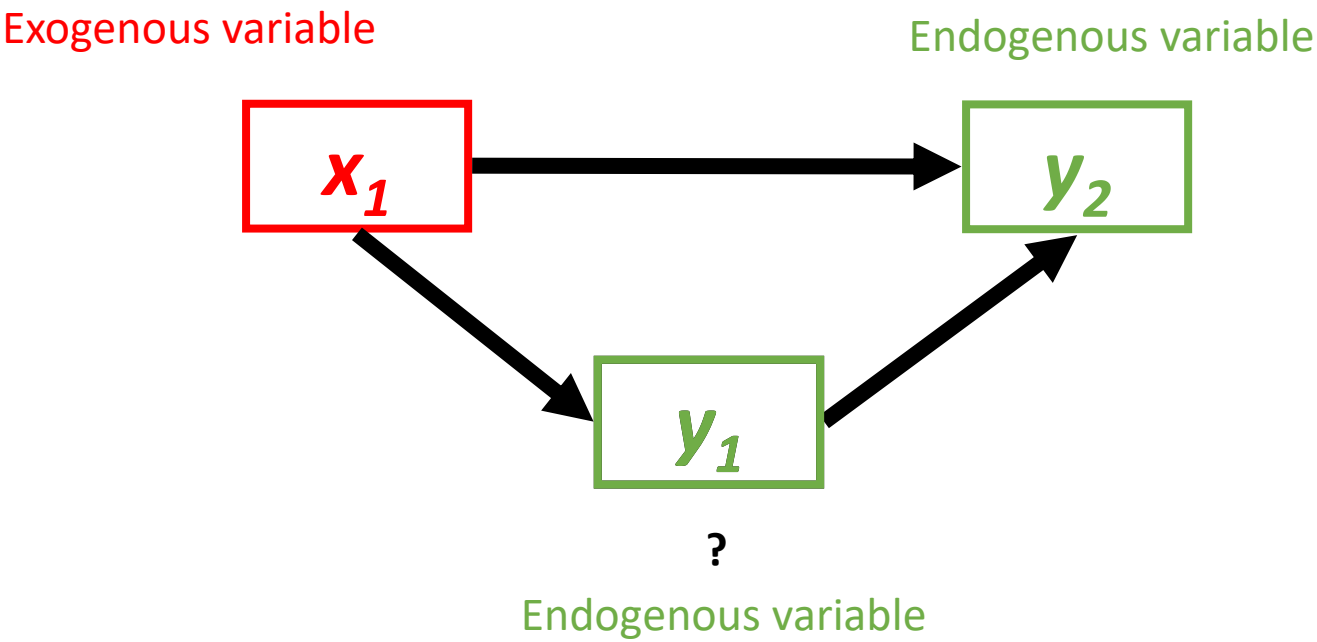
Exogenous variable

Endogenous variable =

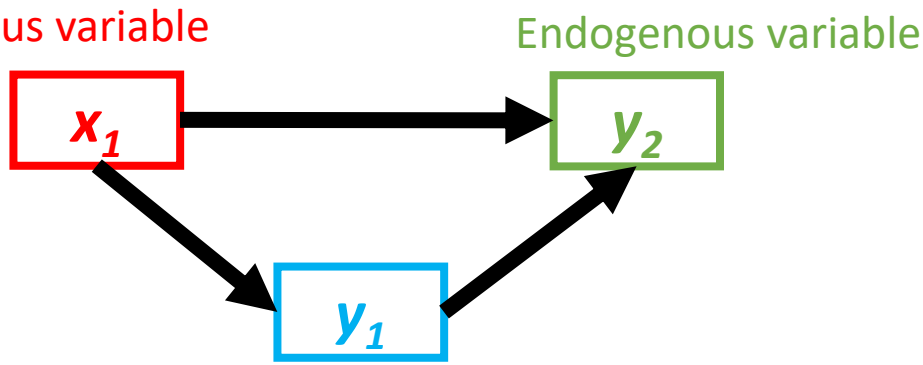
dependent variable,
response



2. Terms & Definitions.



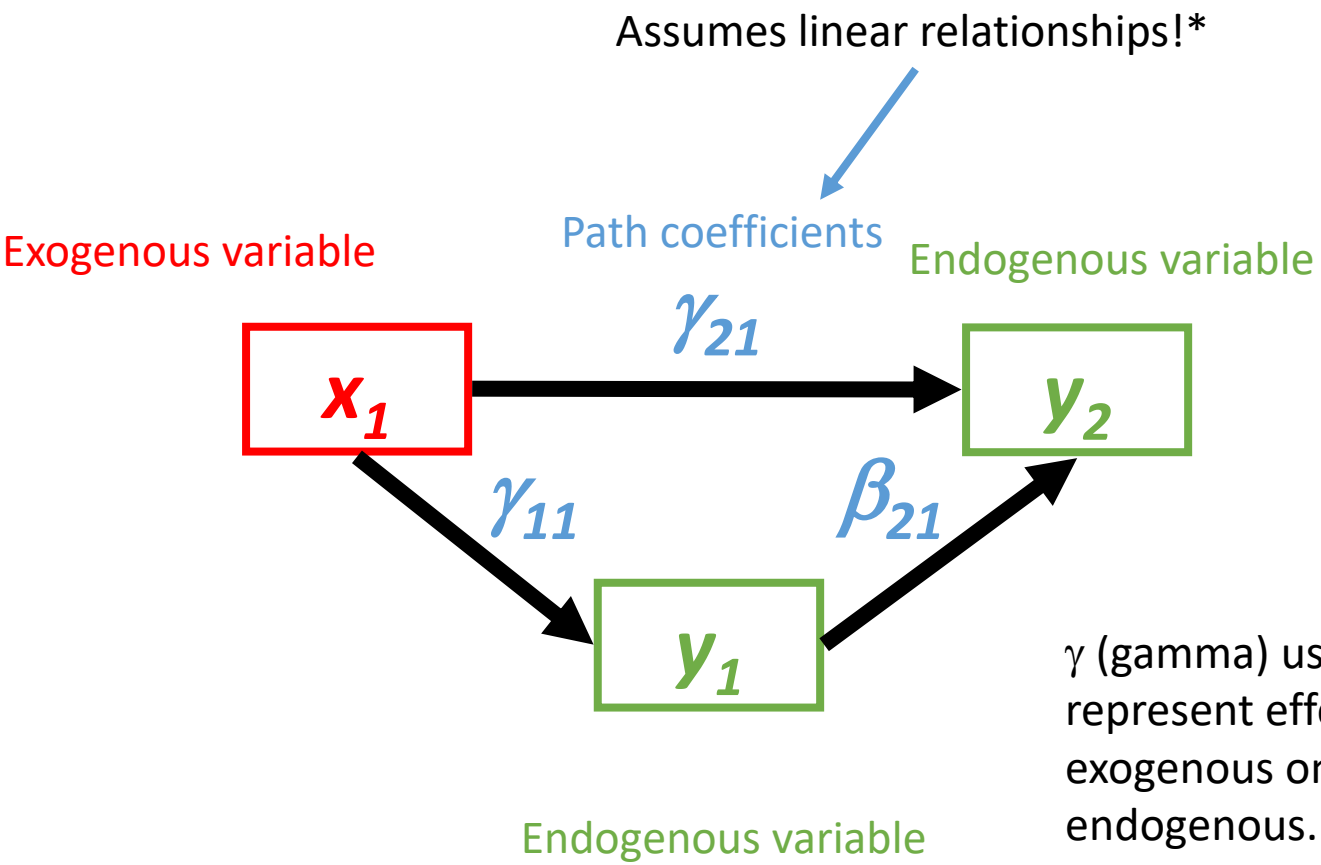
Mediators are Endogenous Variables that Can Also Be Predictors



Endogenous Mediator Variable = Endogenous variable that drives other endogenous variables

Often we are interested in a mediator variable – but we cannot assess its importance without the exogenous variable

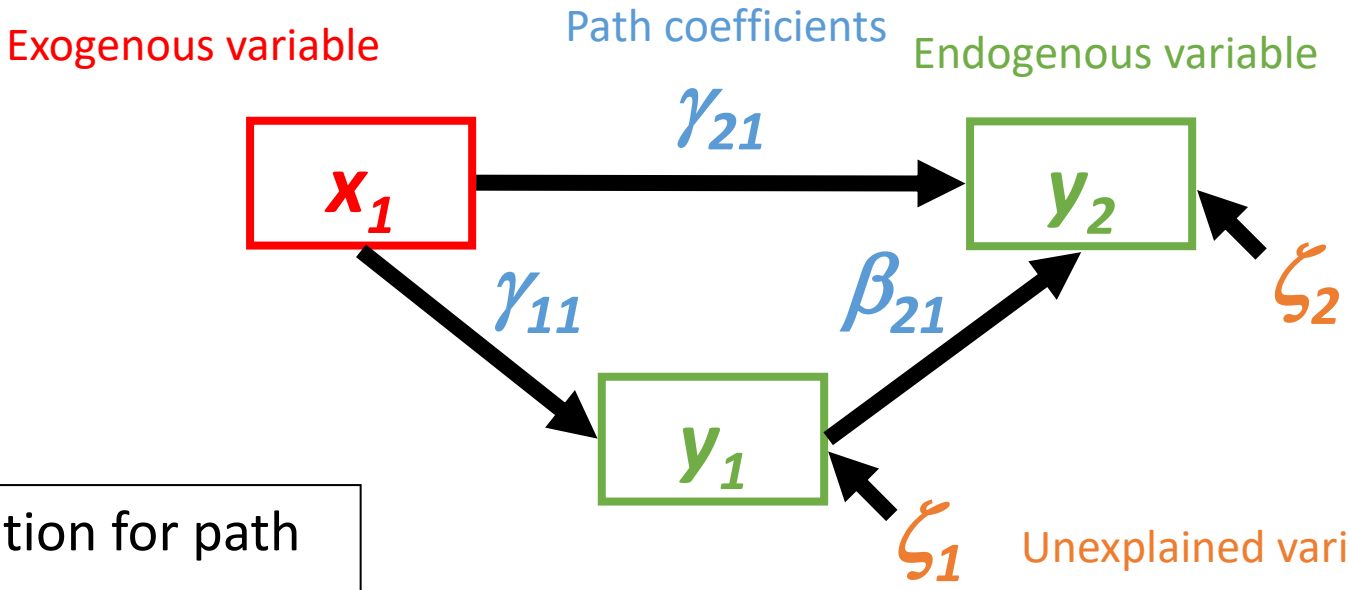
2. Terms & Definitions.



γ (gamma) used to represent effect of exogenous on endogenous.

β (beta) used to represent effect of endogenous on endogenous.

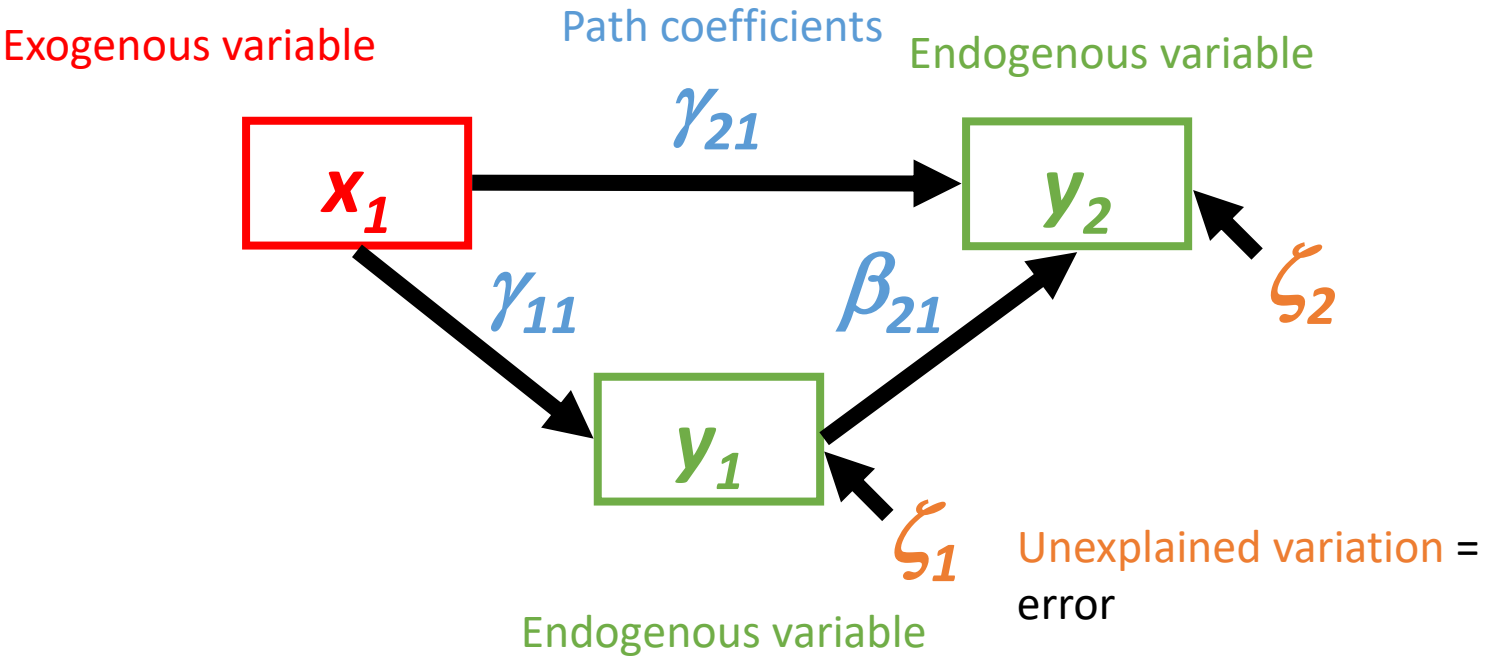
2. Terms & Definitions.



equation for path from error variable

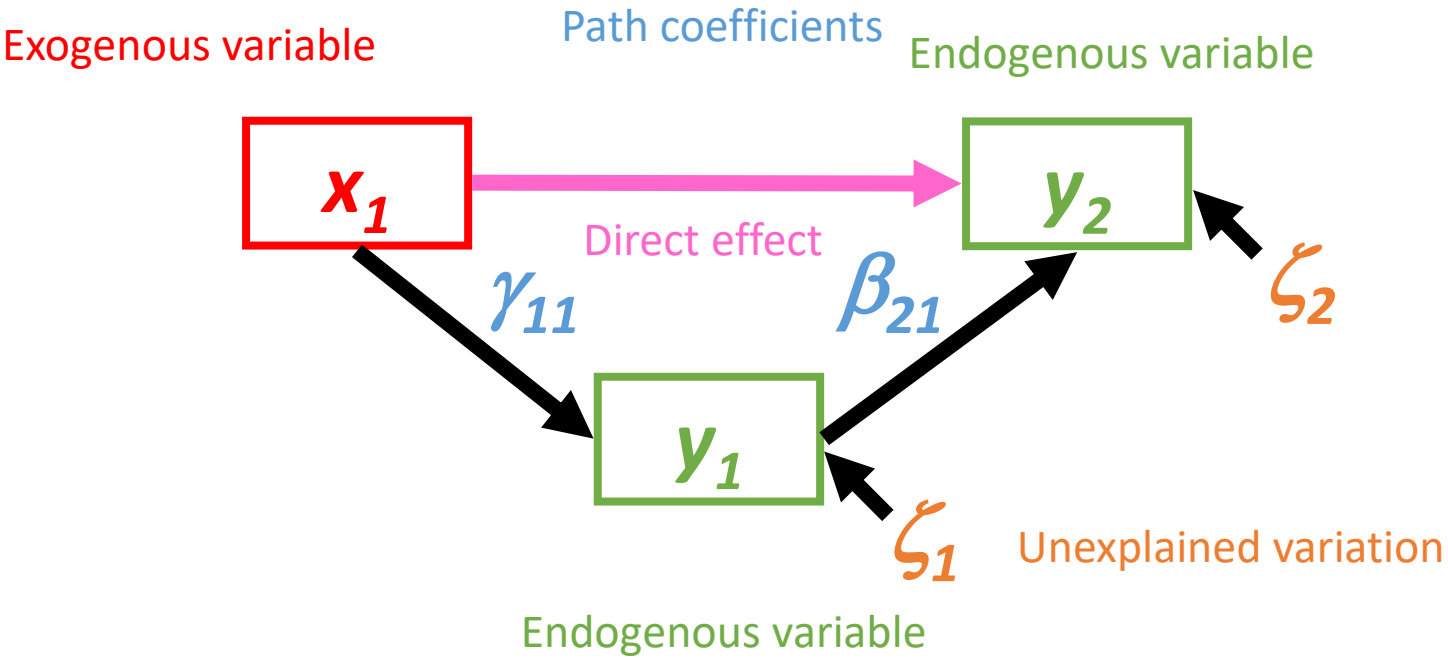
$$\zeta = \sqrt{1 - R^2_{y_i}}$$

2. Terms & Definitions.



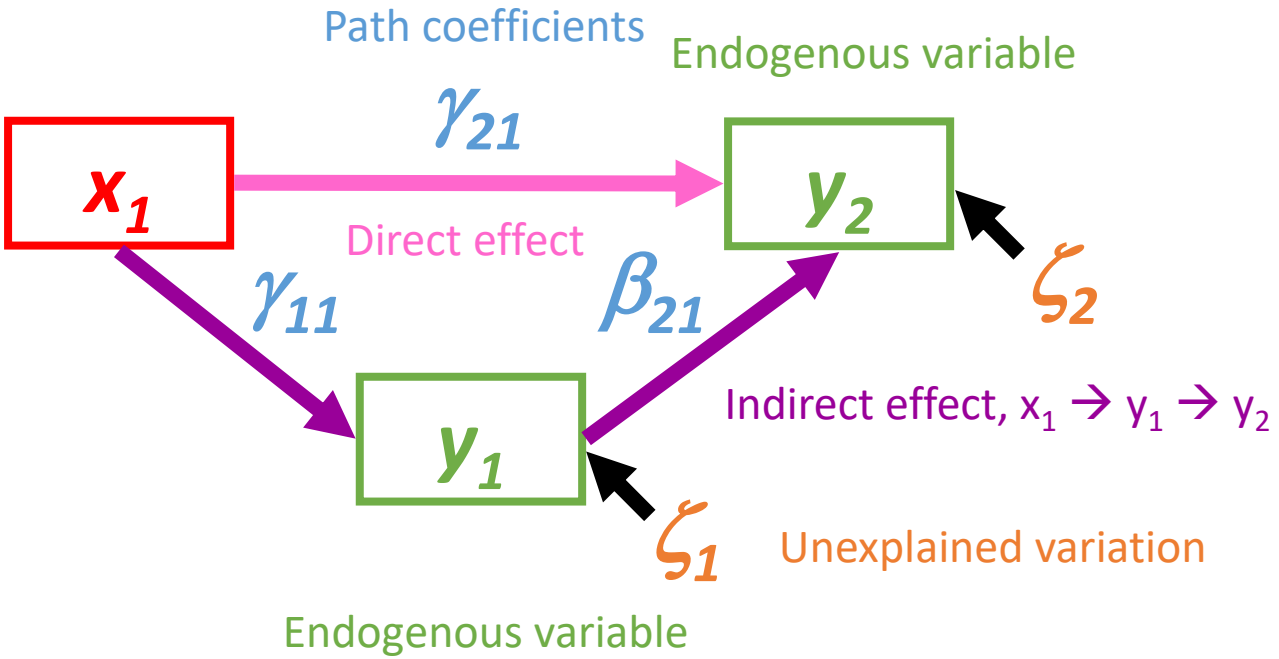
$$y_1 = \alpha_1 + \gamma_{11}x_1 + \zeta_1$$
$$y_2 = \alpha_1 + \gamma_{21}x_1 + \beta_{21}y_1 + \zeta_2$$

2. Terms & Definitions.



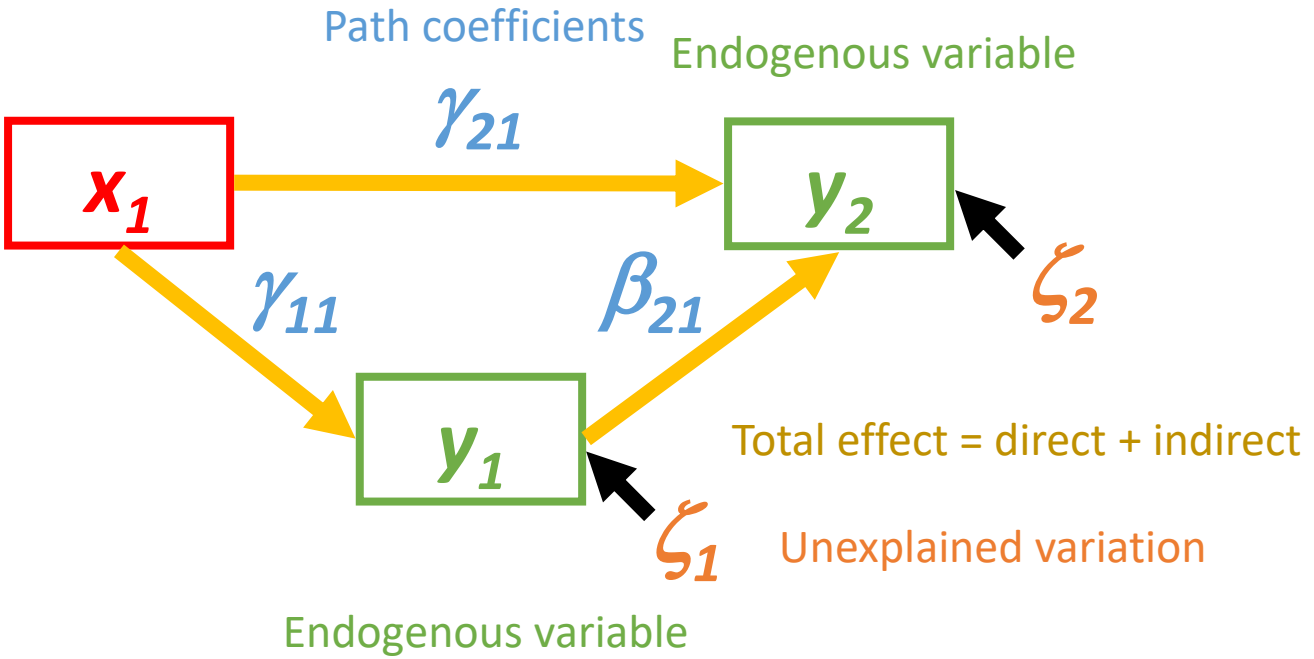
Direct Effects Have No Mediators

2. Terms & Definitions.



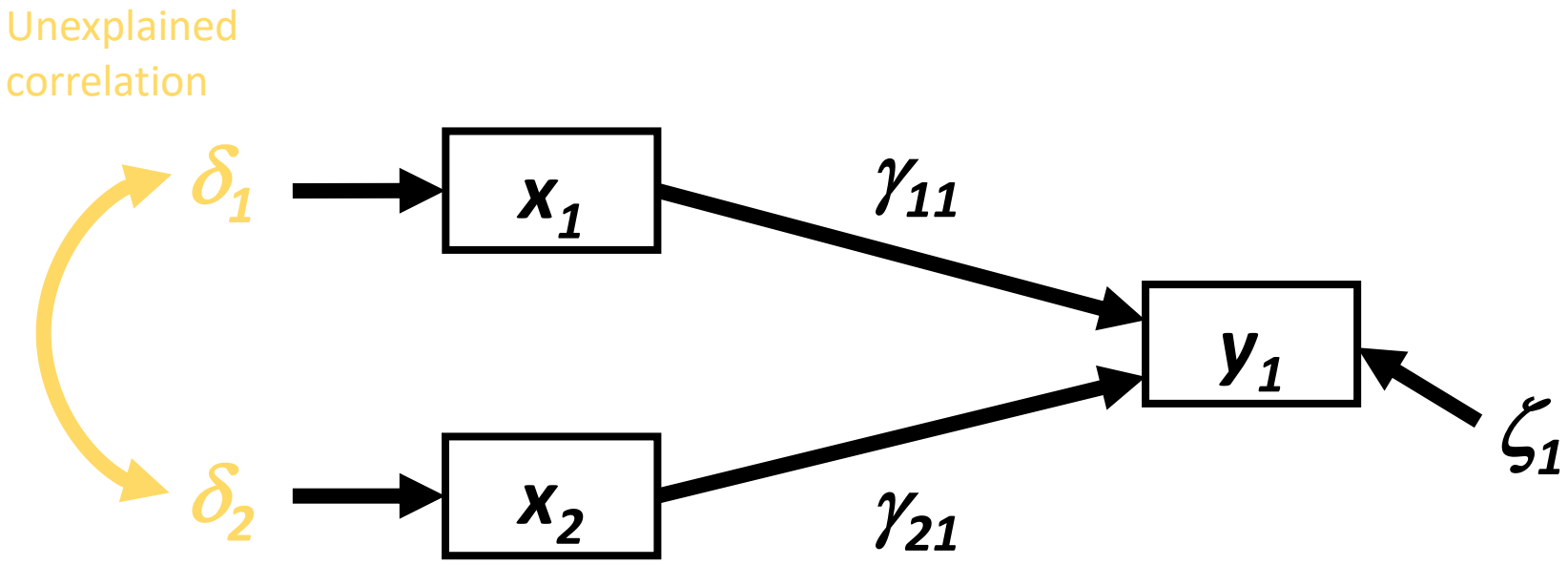
Indirect Effect = $\gamma_{11} * \beta_{21}$

2. Terms & Definitions.



$$\text{Total Effect} = \gamma_{21} + \gamma_{11} * \beta_{21}$$

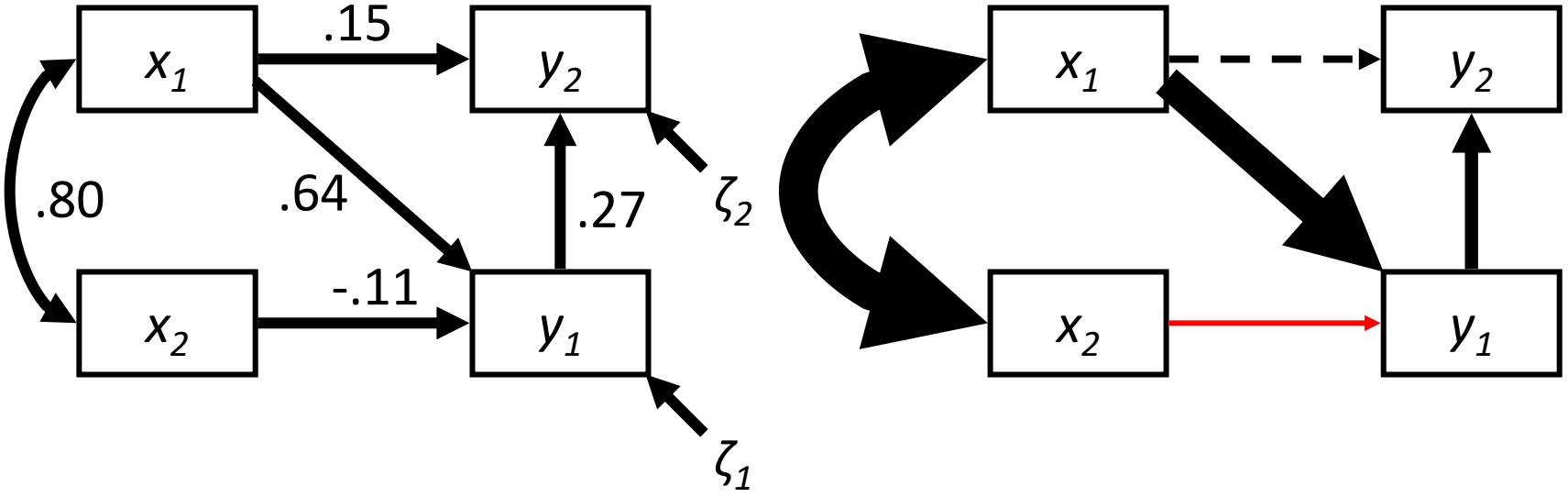
2. Terms & Definitions.



- Uncertain causal relationship ($x_1 \rightarrow x_2$ or $x_2 \rightarrow x_1$?)
- Common driver (correlated error)
- *Convention:* show correlation between endogenous errors but not exogenous – still there, though!

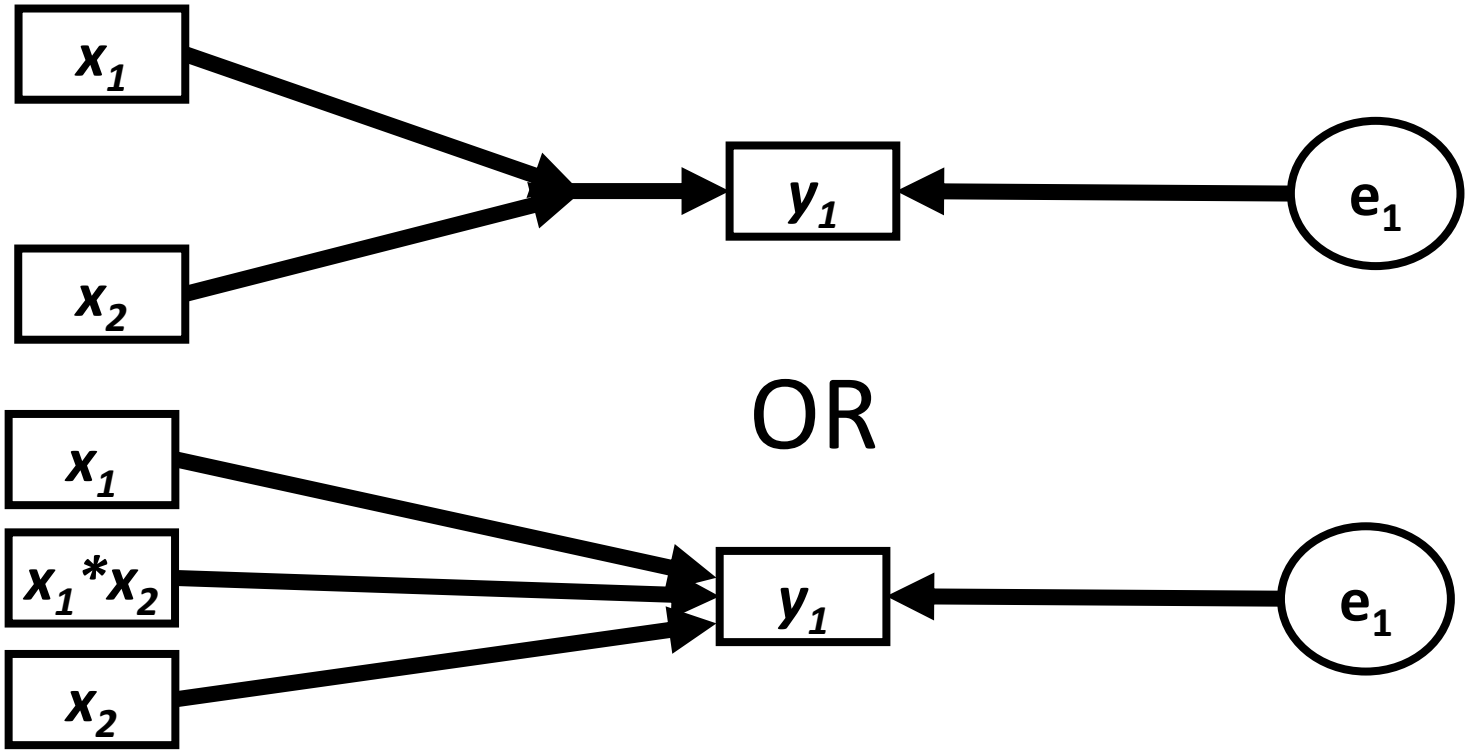
2. Terms & Definitions. Presentation conventions

- Arrow **width** is scaled by the size of the effect
- Arrow color = direction of effect (positive/negative)
- Dashed lines = non-significant paths
- Coefficients reported on diagram or in table



2. Terms & Definitions. Presentation conventions

- Interaction Effects as joint arrows or….
- Show the Interaction as a unique variable



2. Terms & Definitions. How to draw SEMs

- `plot.psem` or `lavaanPlot` FTW!
- Powerpoint (what I use)
- Photoshop, Illustrator, or other software
- Google Jamboard (for virtual collaboration)