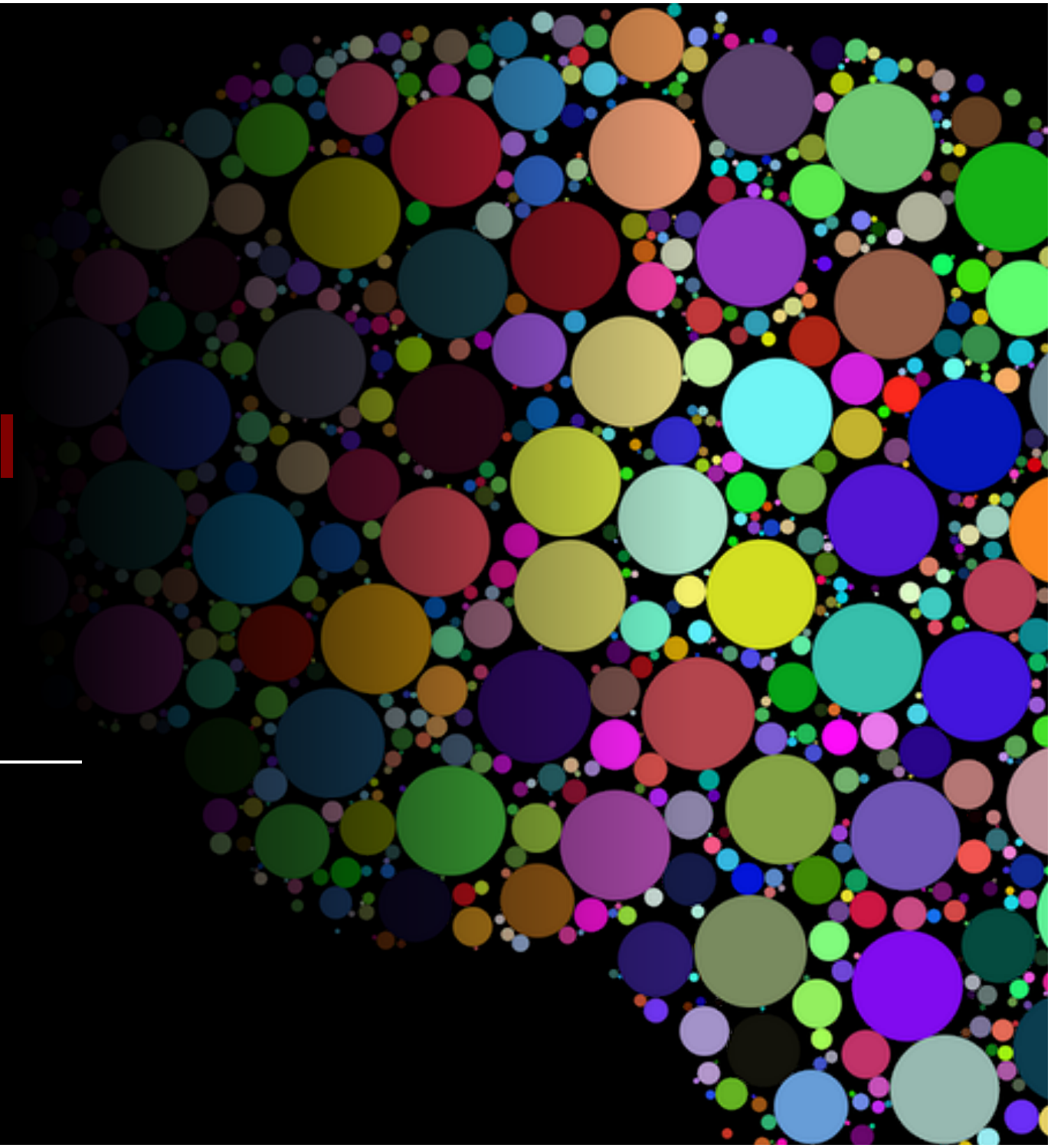
# Structural Equation Modeling

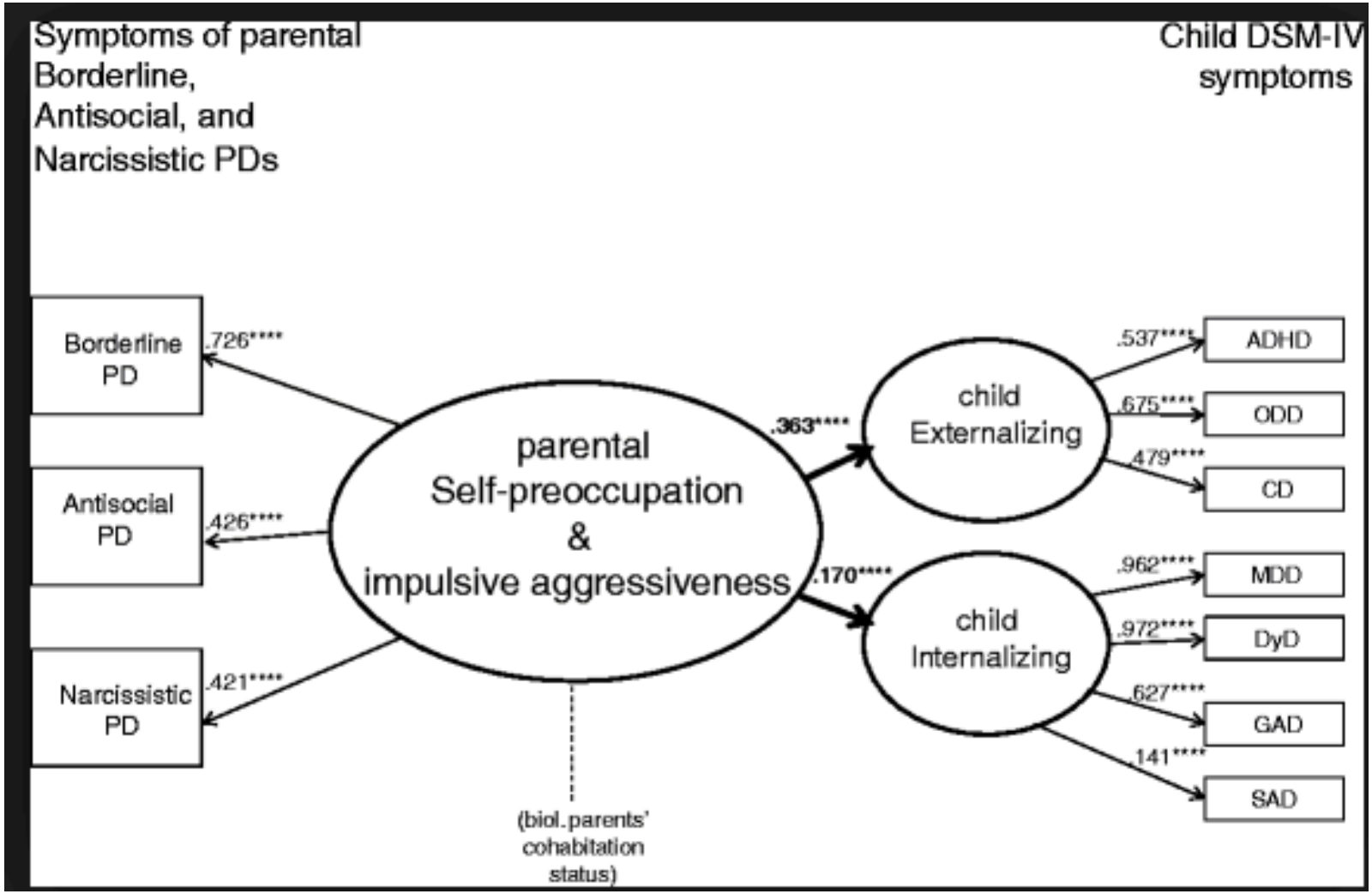
Chapter 16

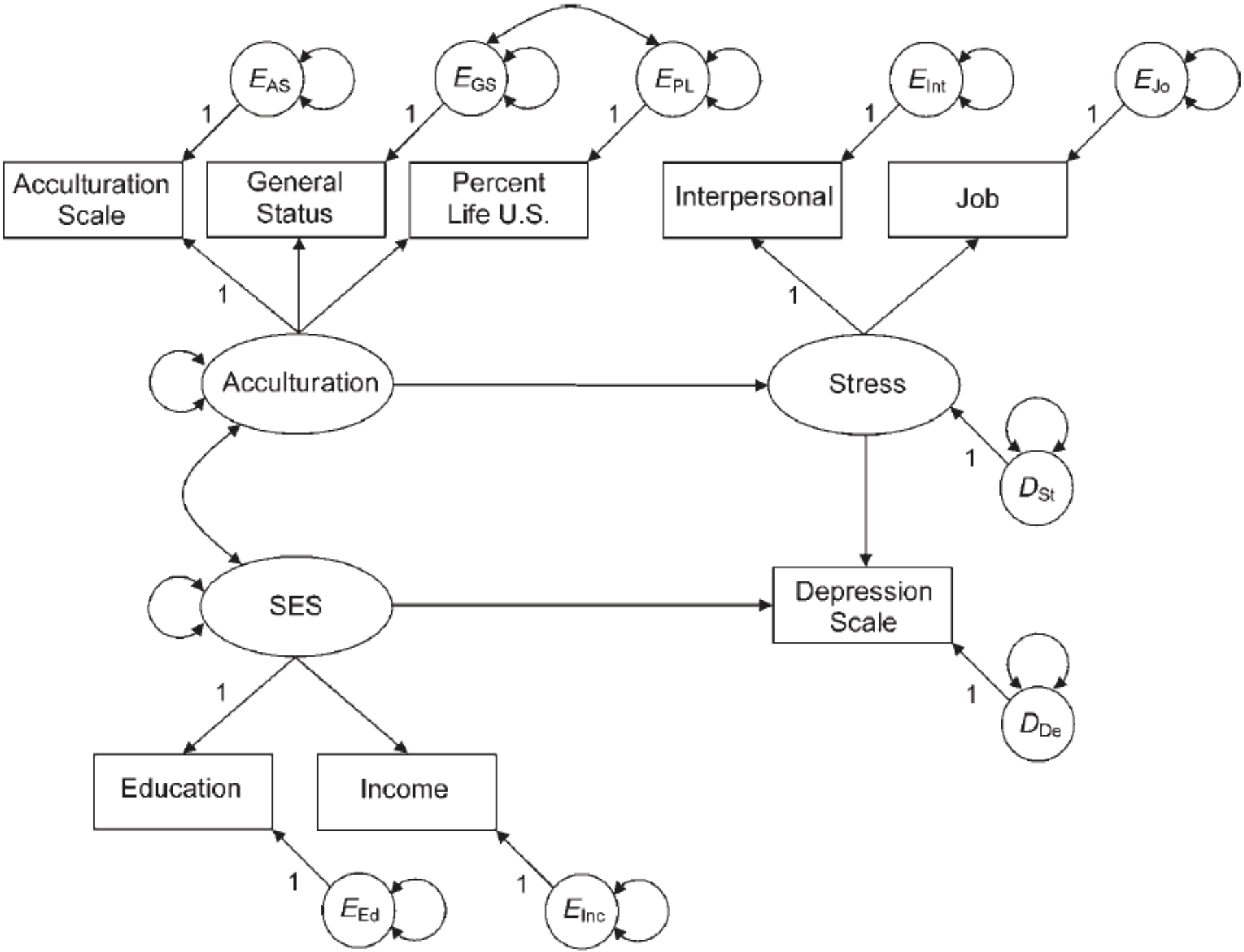


# Full SEM

> You have to have:

- Measurement model: the CFA part
- Structural part: the relationship between the latents


Symptoms of parental Borderline, Antisocial, and Narcissistic PDs
Child DSM-IV symptoms
Borderline PD
Antisocial PD
Narcissistic PD
.726****
.426****
.421****
parental Self-preoccupation & impulsive aggressiveness
.363****
.170****
child Externalizing
child Internalizing
.537****
.675****
.479****
.962****
.972****
.627****
.141****
ADHD
ODD
CD
MDD
DyD
GAD
SAD
(biol. parents' cohabitation status)


$E_{AS}$
$E_{GS}$
$E_{PL}$
$E_{Int}$
$E_{Jo}$
1
Acculturation Scale
General Status
Percent Life U.S.
Interpersonal
Job
Acculturation
Stress
$D_{St}$
SES
Depression Scale
$D_{De}$
Education
Income
$E_{Ed}$
$E_{Inc}$

# Full SEM

> Reminder:

- Reflective indicators / effects indicators
  - > We assume factors cause the indicators, so the arrows go out.
- Formative indicators / cause indicators
  - > When we use items to predict a latent (arrows go into the latent).

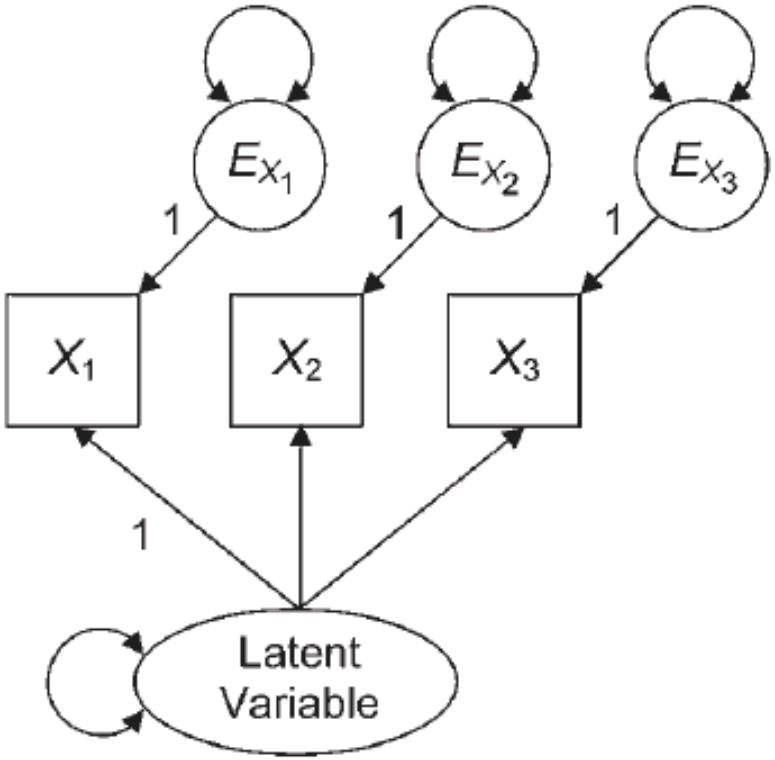
# Full SEM

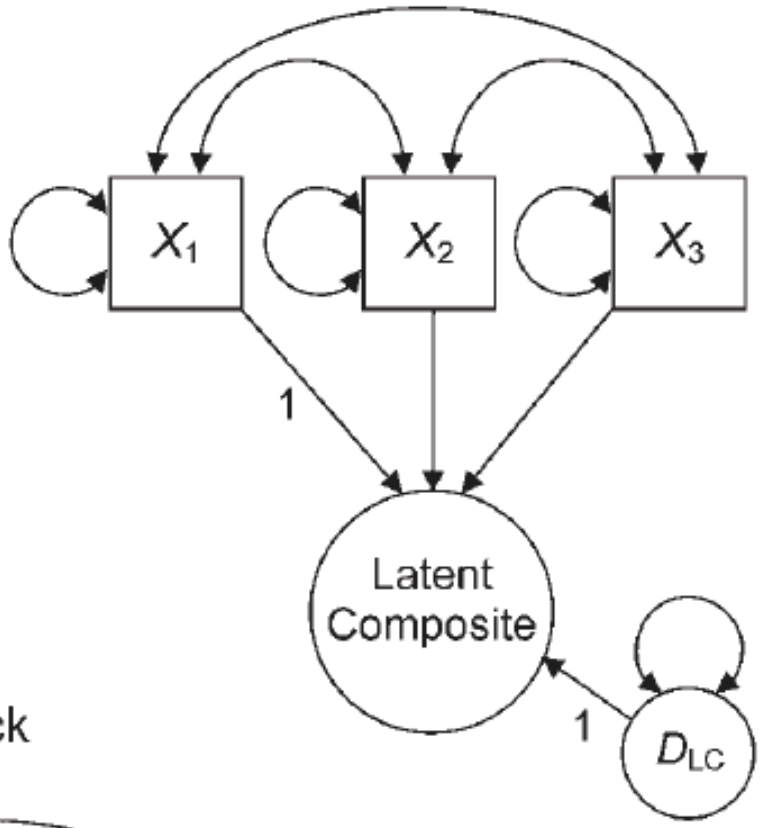
> Example of formative indicator

- Income, education level, and occupation all predict your SES
- Stress caused by outside factors

> Other names:

- Composite causes
- MIMIC – multiple indicators, multiple causes models


$E_{X_1}$
$E_{X_2}$
$E_{X_3}$
1
1
1
$X_1$
$X_2$
$X_3$
1
Latent
Variable


$X_1$
$X_2$
$X_3$
1
Latent
Composite
1
$D_{LC}$

(c) M → C block

# Measurement Model Identification Reminder

> Identification rules of thumb:

- Latent variables should have four indicators
- Latent variables have three indicators AND
  - > Error variances do not covary
- Latent variables have two indicators AND
  - > Error variances do not covary
  - > Loadings are set to equal each other.

# Structural Model Identification

> Scaling is also required to identify the structural part

> 2+ emitted paths rule

- Composite variable must have have direct effects on two other endogenous variables

# Things to Consider

## > Parceling

- When you have large structural models, they can be very complex to fit to a Full SEM if each latent variable has lots of indicators (items).
- Parceling occurs when you creating subsets of items to be able to get the model to run and to balance out the number of indicators on each latent.

# Things to Consider

> Parceling

- At the moment, this topic is still pretty controversial.  Many fall into the: this is bad don’t do it camp.

# Things to Consider

> How to model?

- Test each CFA piece separately to make sure they run.***
- Slowly add structural paths to see if you can get the full model to work.
  - > If not, try parceling.
- Drop non-significant paths.

> ***if your CFA is bad, the full model will be bad too.

# Things to Consider

> As you add the structural components, you should not see a big change in the loadings to the indicators

- If you do, it means the model is not invariant (a fancy word for doesn't change)
- Called interpretational confounding

# When to Stop?

> We've discussed lots of tricks to explore models and improve them.

> When do you quit?

- Based on theory
- Fit indices do not greatly improve
- Parsimony