

# A Brief Introduction to Latent Variable Analysis

Structural Equation Modeling

# About Me

---

Data Scientist at Auerbach Lab, CU

MS Biostatistics, Columbia University

Biotechnology Engineering, Manipal

**Twitter:** @apoorvasriniva1

**Email:** as5697@columbia.edu



# Structural Equation Modeling

---

SEM is not one statistical 'technique'

It integrates a number of different multivariate techniques into one model fitting framework

It is an integration of

- Measurement theory
- Factor(latent variable) analysis
- Path analysis
- Regression

# When Might You Use SEM?

— — —

- When you want to specify a *system* of relationships rather than a dependent variable and a set of predictors
- When you want to focus on indirect (mediated) as well as direct effects of variables on other variables
- When your question involves complex multi-faceted constructs that are measured with error
- NIH wants you to be sophisticated

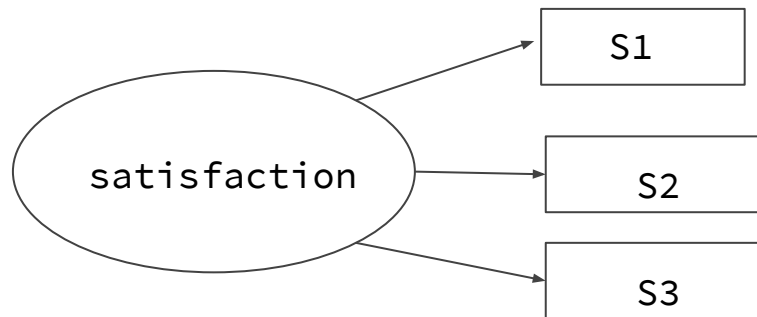
# An Example



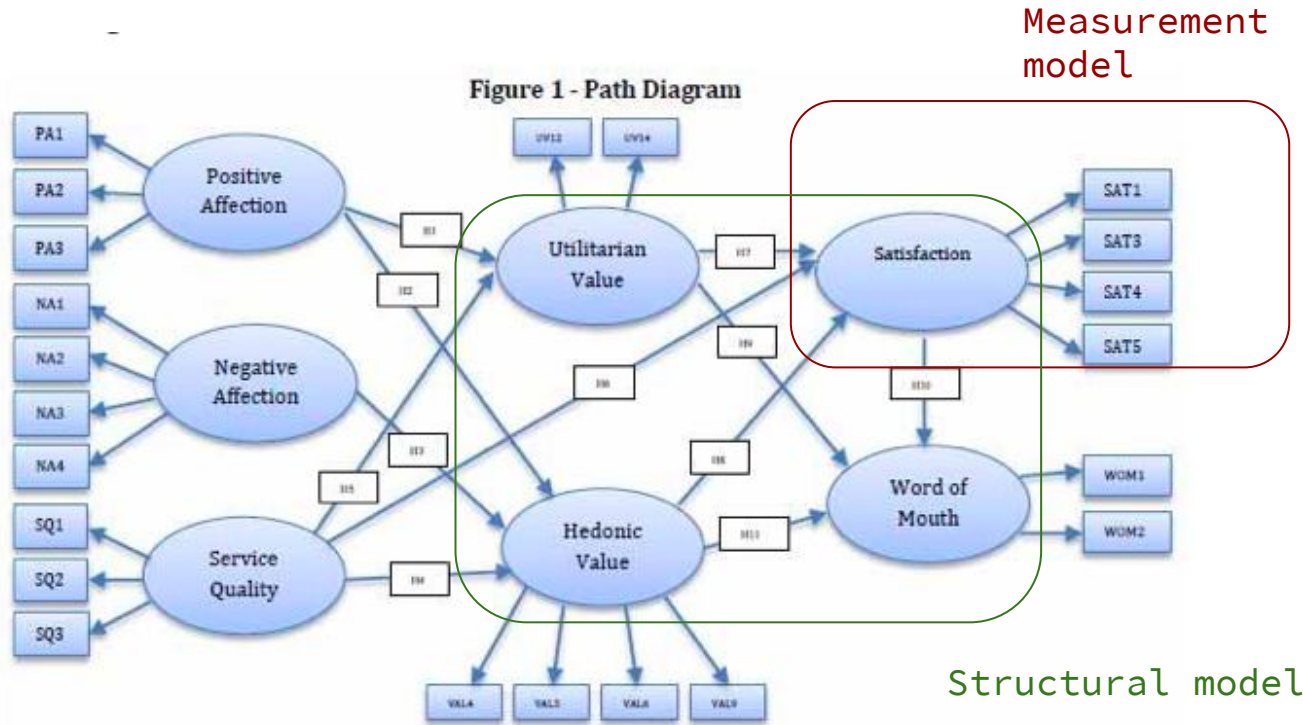
# What are Latent Variables?

---

- Most concepts in social science are not directly observable.
- This makes them hypothetical or 'latent' constructs
- We can measure latent constructs using observable indicators



# A Structural Equation Model



Source: Babin et al. (2005: 133-139).

# To Sum Up..

---

**In favor:** they

- Summarize multiple measures parsimoniously
- Operationalize theory
- Describe population heterogeneity
- Can accommodate large number of models within its framework

**Against:** their

- Modeling assumptions may determine scientific conclusion
- Interpretation may be ambiguous



# Software for SEM

— — —

- Packages in R for SEM: lavaan, OpenMX, and sem.
- If you're bayesian: blavaan
- Mplus

**Thank You!**