structural_model

Basic Introduction to SEM-in-R

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The structural model:

- describes relationship between latent variables
- order and sequence of constructs: based on theory/ experiences and knowledge
- path-models from left to right -- left: independent variables -- right: dependent variables -- left: sequential ahead, influence variables on the right

The structural model 2 - exogeneous vs. endogeneous variables:

- variables can serve as dependent and independent
- latent variables serving only as independent = exogeneous latent variables (Y1 and Y2)
- latent variables serving only as dependent (Y4) or as independent and dependent (Y3) = endogeneous latent variables (Y3)
- each variable, which has only arrows coming from it = exogeneous latent variable
- endogeneous latent variables can have either incoming and outgoing arrows (Y3) or only incoming arrows (Y4)
- exogeneous latent variables have no error terms (because these constructs depict the independent variables explaining the dependent variables in the path-model)

Specification of structural model:

- When developing a structural model, two things must be considered:

1. sequence of the constructs
2. relationships between constructs

- both represent hypotheses and the theory to be tested (must be reflected during development of model)

Sequence of constructs:

- based on theory/ concept, logic/ experiences
- from left to right: left: independent (eplanatory) constructs > dependent constructs (outcomes)
- assumes, that constructs on the left are ahead and that they predict variables on the right
- constructs only serving as independent variables = exogeneous latent variables; at the left side; have only arrows coming from it
- constructs serving as dependent variables = endogeneous latent variables; at the right side; only incoming arrows
- constructs serving as independent and dependent variables = endogeneous variables; in the middle of the path-model

Determining sequence of constructs:

- hard: contradictory theoretic perspectives imply different sequences
- should always be based on theory and logic
- contradictory perpectives: personal judgement
- possible: competing models

Relationships between constructs:

- specified by arrows
- generally the tip points to the right
- directed relations: called causal, when supported by theory
- conflict: completeness (all relations supported by theory) and sparsity (few relations)
- sparsity: not everything should explain everything
- mostly, linear relationships between two or more constructs within one path-model
- more complex modell relationships: mediations; moderations (next slides)

Mediation:

- mediating effect: third construct occurs between two other related constructs
- e.g. model with direct and indirect effects:
- direct effects: two constructs are related by only one arrow
- indirect effects: related by a sequence of relationships with at least one mediating construct
- indirect effects: sequence of two or more direct (indicated by arrows) effects = mediating effect

Mediation:

- most common used for "explanation" why a relation between an exogeneous and an ednogeneous construct exists
- (e.g. one observes a relation between two constructs, but is unsure "why" this relation exist or if the relation is the only possible relation between the constructs)

Moderation:

- mediating effect: third construct occurs between two other related constructs