

Planned Missing Data in Longitudinal Dyadic Modeling

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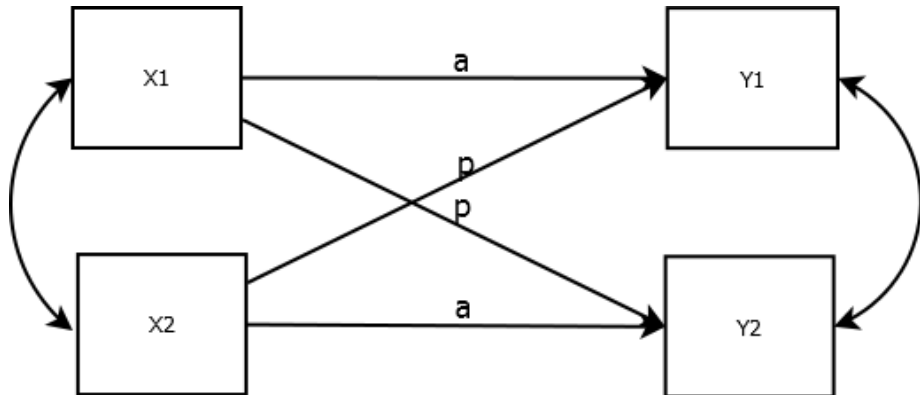
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Developmental Methods 2016

- Data collected from two individuals
 - Usually individuals have a social relationship
 - Usually measure the same variables on each member of the dyad
 - Responses within dyad are not independent

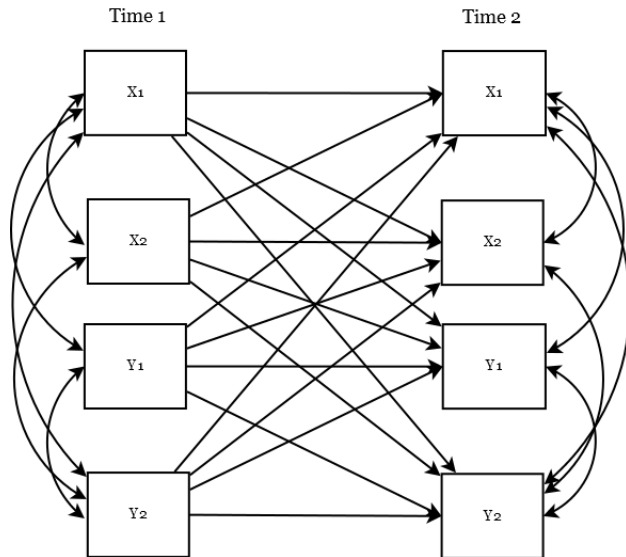
- Distinguishability – whether dyad members can be “told apart”
 - AKA: Exchangeability
 - Distinguishable dyads (non-exchangeable): dyad where each member has a unique role
 - Heterosexual couples, parent and child, older and younger siblings
 - Indistinguishable dyads (exchangeable): dyad where both members have the same role
 - Homosexual couples, twins, friends, coworkers

- Common models with dyads include:
 - Actor-Partner Interdependence Model (APIM)
 - Common Fate Model (CFM)
 - Social Relations Model (SRM)

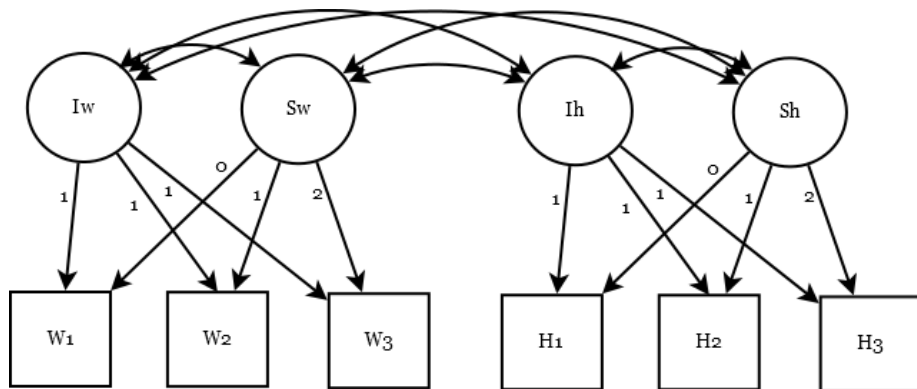


Longitudinal Dyadic Models

- Common models with dyads include:
 - Cross-lagged panel model Actor-Partner Interdependence Model (CP-APIM)
 - Growth curve models



Growth Curve Model



Missing data in dyadic data

- Rarely discussed by dyadic researchers
 - Missing data strategies only mentioned in about 30% of dyadic papers
 - Deletion strategies tend to dominate (followed by FIML)
- Dependence in dyadic data provides special challenges with missing data.
 - Techniques need to incorporate distinguishability when recovering missing data

Patterns of missingness in longitudinal dyadic data

- Three patterns of missingness
 - ① Missing data by item
 - ② Missing data by time
 - ③ Missing data by person
 - More on this later!

Planned missing data

- Missing data do not have to be a problem!
- Two types of planned missing data designs:
 - Time based planned missing data designs
 - Control participant entry into the study (e.g., accelerated longitudinal design)
 - Participant based planned missing data designs
 - Randomly assign participants to receive only a subset of items

Planned missing data

- For dyadic data both planned missing data designs can be used
 - Participant based designs to reduce questionnaire length (e.g. 3-Forms planned missing data designs)
 - Time based planned missing data designs (e.g. control when dyads are measured in a longitudinal study)

- A third type of planned missing data design is possible with dyadic data: dyad based planned missing
 - Some dyads have data from both members
 - Some dyads have data only collected from one dyad member
- This design can lead to cost savings/power increases compared to assessing all dyad members

Dyadic planned missing data

| Dyad | Person 1 | Person 2 |
|------|----------|----------|
| 1 | X | X |
| 2 | X | X |
| 3 | X | O |
| 4 | O | X |

Dyadic planned missing data

- Missing data in this designs can be assigned or naturally occurring
 - When missingness is assigned (dyads are randomly assigned to have 1 or 2 members measured) missingness is MCAR
 - When missingness is natural (only 1 member of a dyad responds) missingness is (probably) MAR or MNAR
 - Researchers should measure dyad/partner variables related to non-response

Dyadic planned missing data

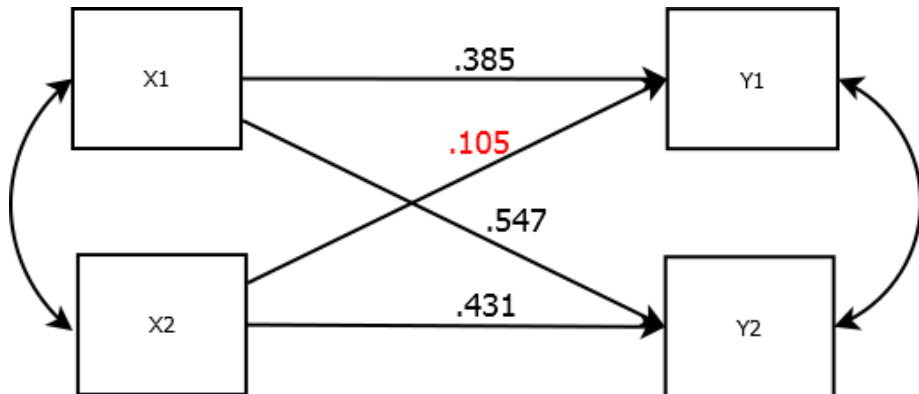
- Missing data should (if possible) be balanced across individuals
 - Equal missing for both members in distinguishable dyads
 - Missingness equally distributed across members for indistinguishable dyads
 - Data management

Dyadic planned missing data

- Example power analysis with MCAR planned missing data
 - Total budget \$10000
 - Dyads: \$50 per dyad
 - Singles: \$10 per person
 - With no planned missing $n = 200$ dyads

Dyadic planned missing data

- Population model



Dyadic planned missing data

| N dyad | N individuals | Power |
|--------|---------------|-------|
| 200 | 0 | .637 |
| 190 | 50 | .643 |
| 176 | 120 | .667 |
| 111 | 445 | .552 |

Longitudinal dyadic planned missing data

- Longitudinal designs provide additional complexity with planned missing data designs
 - Different members of a dyad can be missing at different times of measurement
 - Time and dyad planned missing data can be integrated into the same study
 - Accelerated longitudinal designs with dyad planned missing

Dyadic planned missing data

| Dyad | P1 T1 | P2 T1 | P1 T2 | P2 T2 |
|------|-------|-------|-------|-------|
| 1 | X | X | O | X |
| 2 | X | O | X | X |
| 3 | X | O | O | X |
| 4 | O | X | X | O |

Longitudinal dyadic planned missing data

- Recommendations
 - Alternate which dyad member is missing across time points
 - e.g. if husband is missing at time 1, wife would be missing at time 2
 - Try to assess each dyad together for at least one time point

- Provide guidance on dyadic planned missing data designs
 - Ratio of dyads to singles
 - Distribution of singles across dyad members
 - Distribution of singles across time

Thank you!

- Slides from today at:

http://MARlab.org/Supplemental_Materials/

- email: schoemanna@ecu.edu