

# Planned Missing Data in Longitudinal Dyadic Modeling

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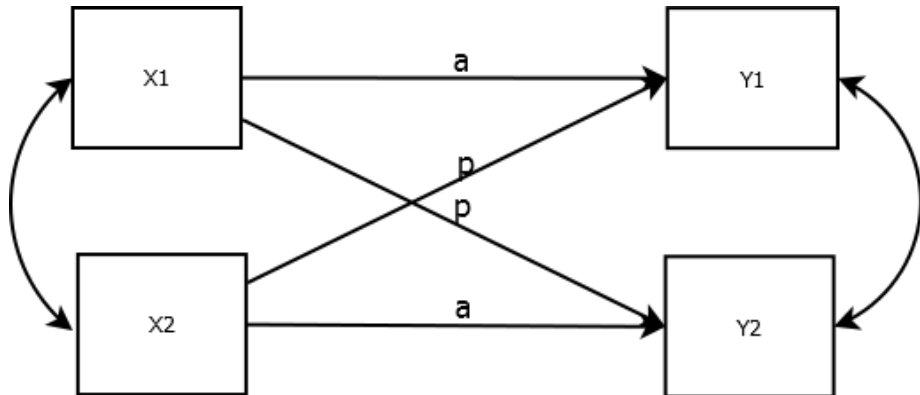
Developmental Methods 2016

- Dyadic data analyses
- Missing data handling
- Planned missing data designs with dyadic data

- 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

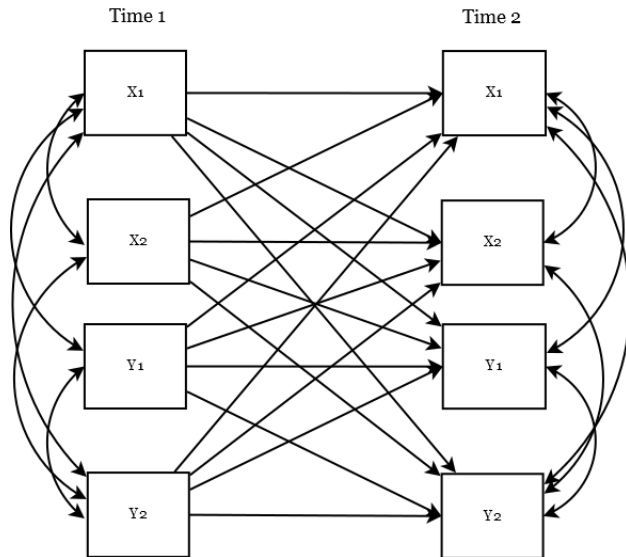
- Distinguishability – whether dyad members can be “told apart”
  - AKA: Exchangeability
  - Distinguishable dyads (non-exchangeable): dyad where each member has a unique role
    - Heterosexual couples, parent and child, older and younger siblings
  - Indistinguishable dyads (exchangeable): dyad where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



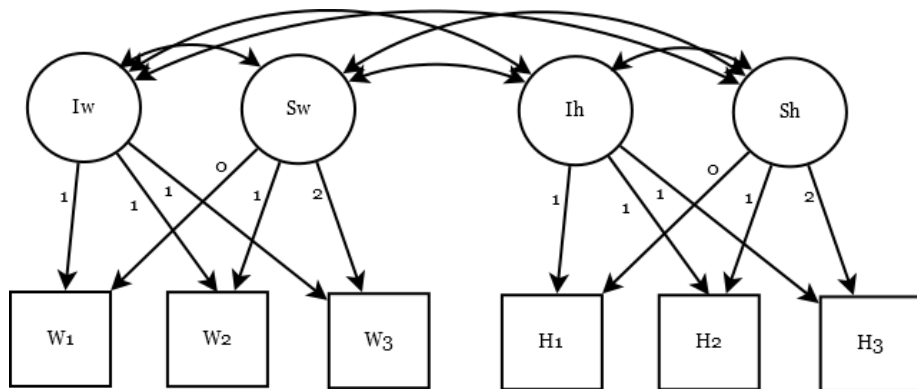
# Longitudinal Dyadic Models

- 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



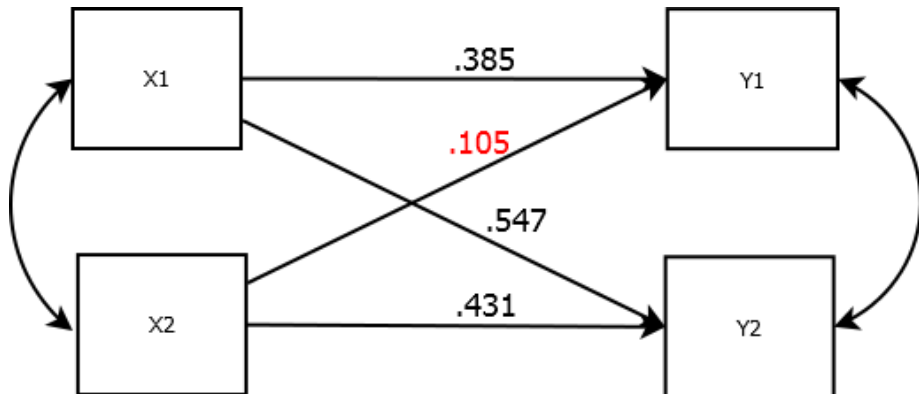
- Missing data should (if possible) be balanced across individuals
  - Equal missing for both members in distinguishable dyads
  - Missingness equally distributed across members for indistinguishable dyads
    - Data management

# 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 all dyads 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/](http://MARlab.org/Supplemental_Materials/)

- email: [schoemanna@ecu.edu](mailto:schoemanna@ecu.edu)

# Simulation population values I

```
## This is lavaan 0.5-20
```

```
## lavaan is BETA software! Please report any bugs.
```

##		lhs	op	rhs	label	est
## 1	SATISFACTION	~		ACT_HOUSE	a	-0.591
## 2	SATISFACTION	~		PART_HOUSE	p	0.888
## 3	PSATIS	~		ACT_HOUSE	p	0.888
## 4	PSATIS	~		PART_HOUSE	a	-0.591
## 5	SATISFACTION	~~		SATISFACTION	v2	2.382
## 6	PSATIS	~~		PSATIS	v2	2.382
## 7	ACT_HOUSE	~~		ACT_HOUSE	v1	1.060
## 8	PART_HOUSE	~~		PART_HOUSE	v1	1.060
## 9	ACT_HOUSE	~~		PART_HOUSE		0.417
## 10	SATISFACTION	~1			int1	4.791

# Simulation population values II

##	11	PSATIS	~1	int1	4.791
##	12	ACT_HOUSE	~1	int2	1.630
##	13	PART_HOUSE	~1	int2	1.630
##	14	SATISFACTION	~~	PSATIS	0.812