

Jumpstart Mplus 9. MIMIC models

Arielle Bonneville-Roussy
Dr Gabriela Roman

Objectives

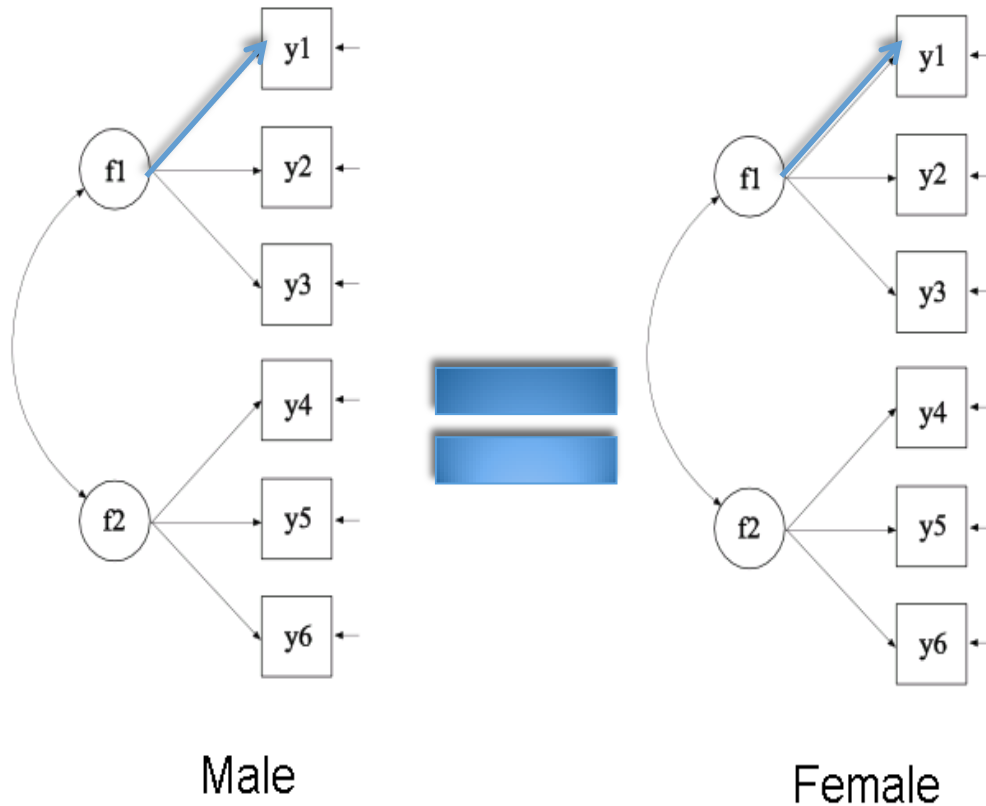
- What is MIMIC?
- How to use MIMIC in Mplus?

Measurement Invariance

Traditional method

- Confirmatory factor analysis (CFA)
- Covariates must be categorical:
 - Gender, nationality etc...
- Continuous groups must be split in often arbitrary categorical groups:
 - Eg age 12-65: Adolescents- Young adults- Middle-aged Adults

Multigroup CFA



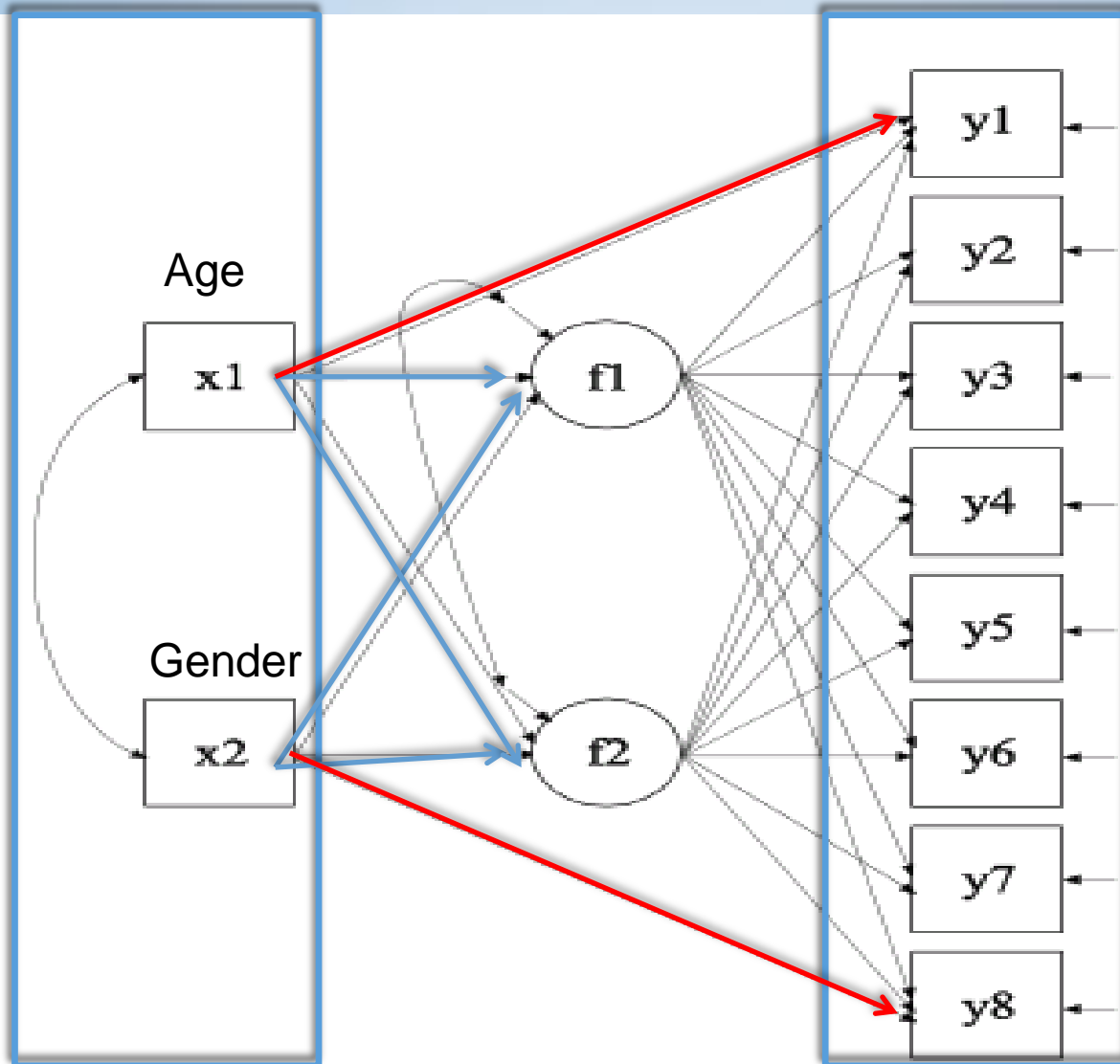
Measurement Invariance

MIMIC

- **M**ultiple **I**ndicators **M**ultIple **C**auses
- Special case of SEM
- Aim: to test the impact of a covariate on a measurement model
 - Regression model: latent variables and observed indicators are regressed on continuous (or categorical) covariates (e.g. age, level of education, gender...).

Measurement Invariance

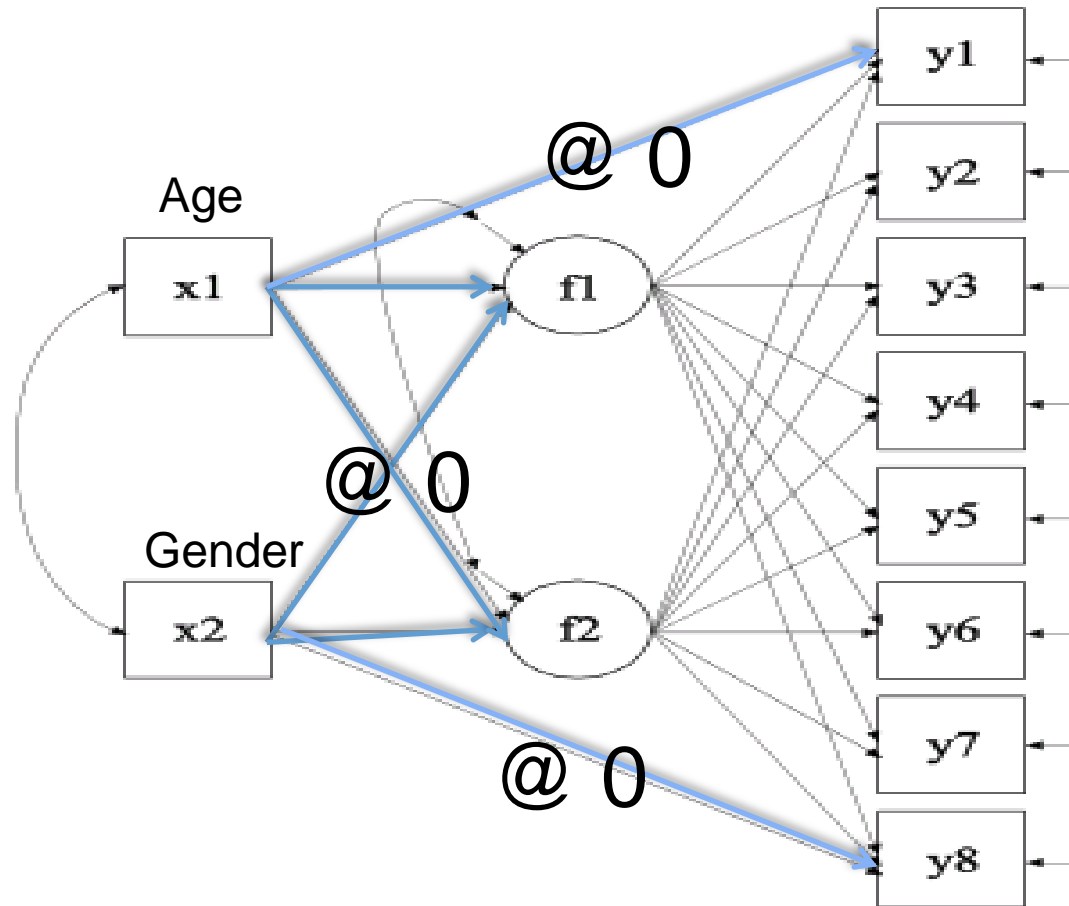
MIMIC



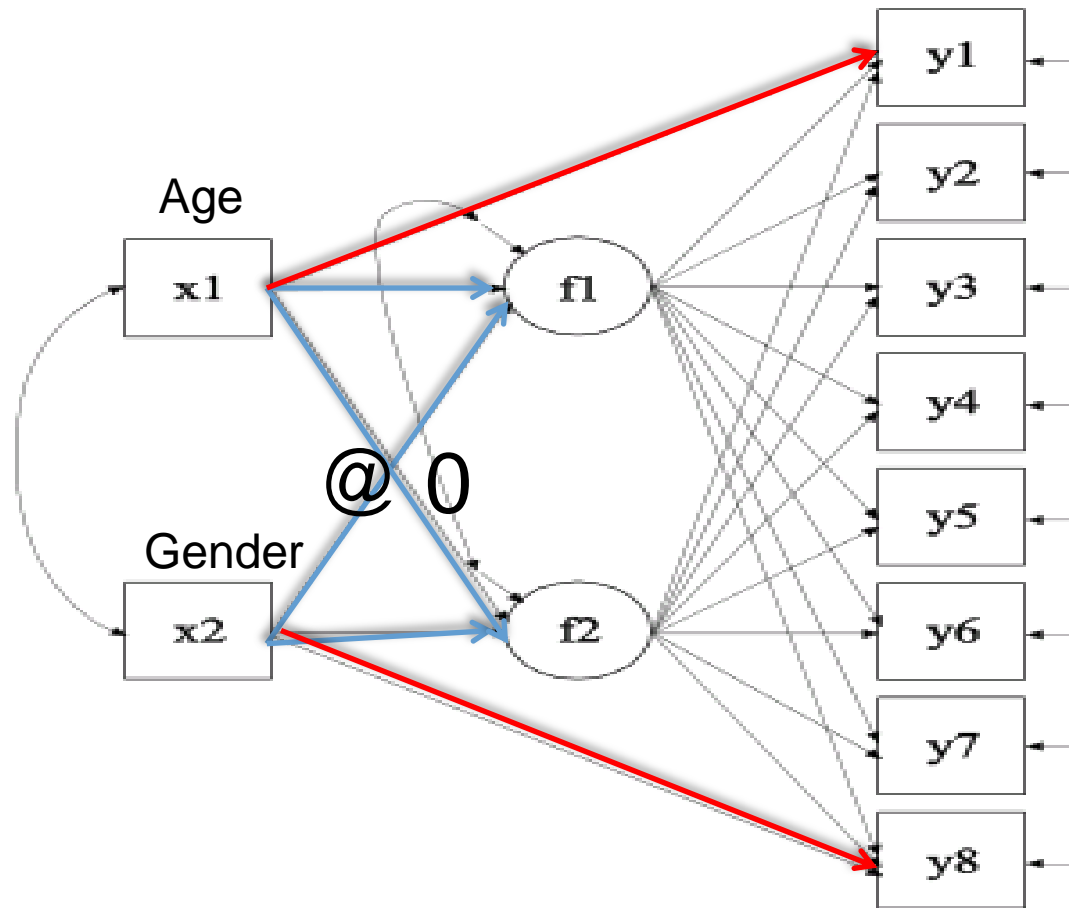
Measurement Invariance MIMIC

- Advantages:
 - Allow continuous and categorical predictors
 - Explore linear relationships between confounding variables and a measurement model
 - Avoid subjective categorisation of a continuous variable (e.g. age, weight, height).
 - Can be combined with multigroup (hybrid model).

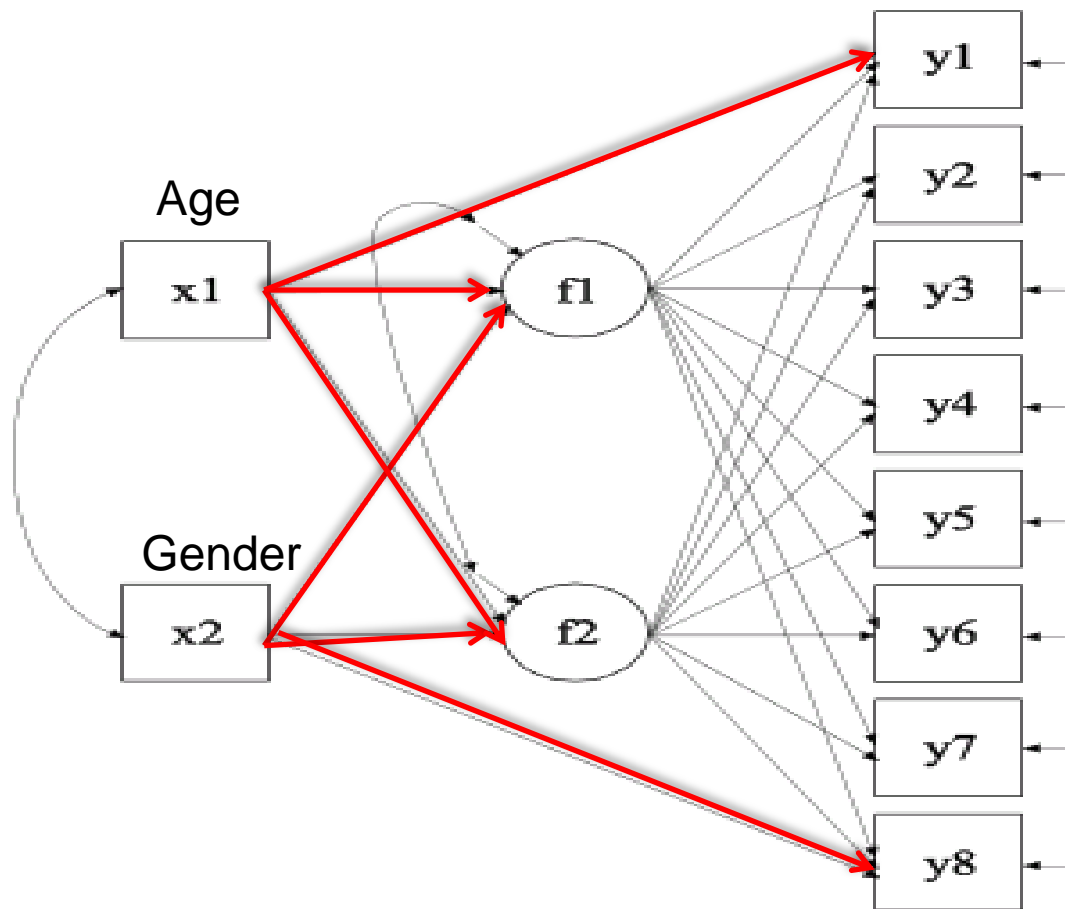
MIMIC



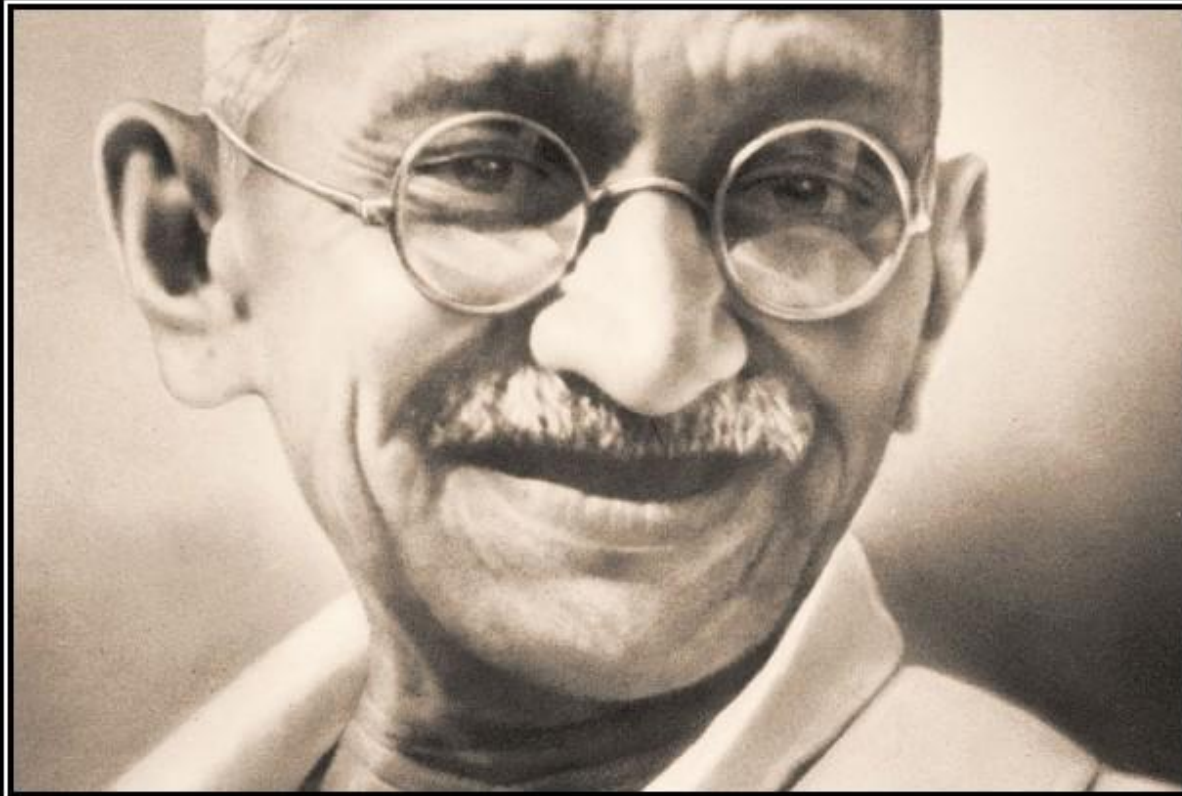
MIMIC



MIMIC



Mplus Example



MOTIVATION

"Whatever you do will be insignificant, but it is very important that you do it."

Jumpstart Mplus

4. Confirmatory Factor Analysis

Dr Gabriela Roman
Arielle Bonneville-Roussy

Questions of the day:

1. How do we get the Mplus data file if our data are in SPSS?
2. How do we get information from Mplus into SPSS?
3. How do we change the “reference group” in measurement invariance models?

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1. How do we get the data file if our data are in SPSS?

- Let's open the following file:
 - User_File_JumpstartMplus
 - Mplus_files
 - CFA
 - data2.sav

Questions of the day:

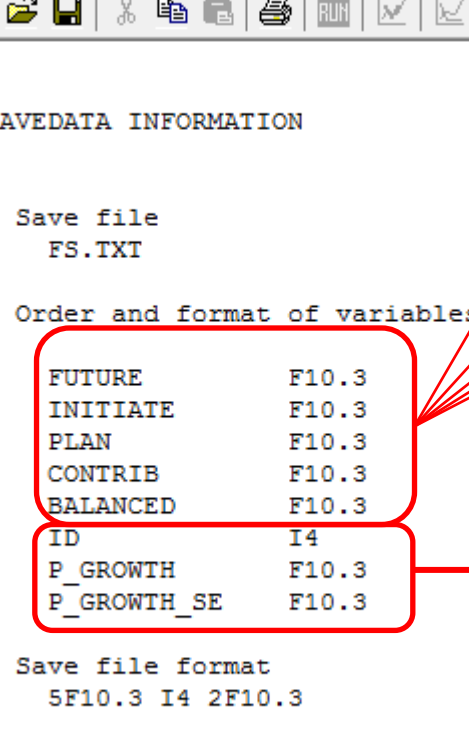
2. How do we get information from Mplus into SPSS?

Questions of the day:

2. How do we get information from Mplus into SPSS?

- Let's use Mplus to open the following file:
 - User_File_JumpstartMplus
 - Mplus_files
 - CFA
 - 2-personal-growth.inp

Factor scores



Mplus 7.0

File Edit View Mplus Plot Diagram Window

Save file
FS.TXT

Order and format of variables

FUTURE	F10.3
INITIATE	F10.3
PLAN	F10.3
CONTRIB	F10.3
BALANCED	F10.3
ID	I4
P_GROWTH	F10.3
P_GROWTH_SE	F10.3

Save file format
5F10.3 I4 2F10.3

Save file record length 10000

Diagram Information

File	Edit	Format	View	Help			
6.000	5.000	5.000	6.000	6.000	1	1.888	0.219
4.000	5.000	4.000	5.000	5.000	2	0.963	0.219
4.000	5.000	6.000	5.000	6.000	3	1.454	0.219
1.000	2.000	2.000	2.000	2.000	4	-1.475	0.219
4.000	4.000	5.000	4.000	4.000	5	0.340	0.219
2.000	2.000	2.000	2.000	2.000	6	-1.326	0.219
4.000	4.000	4.000	4.000	5.000	7	0.757	0.219
4.000	5.000	5.000	4.000	5.000	8	0.825	0.219
5.000	6.000	1.000	6.000	6.000	9	1.685	0.219
2.000	2.000	2.000	3.000	3.000	10	-0.723	0.219
4.000	6.000	4.000	5.000	6.000	11	1.448	0.219
1.000	1.000	1.000	1.000	1.000	12	-2.147	0.219
3.000	3.000	3.000	2.000	2.000	13	-1.109	0.219
3.000	6.000	5.000	4.000	5.000	14	0.721	0.219
1.000	1.000	1.000	1.000	1.000	15	-2.147	0.219
5.000	5.000	2.000	5.000	5.000	16	1.062	0.219
1.000	4.000	1.000	1.000	1.000	17	-2.015	0.219
6.000	6.000	6.000	5.000	6.000	18	1.795	0.219
2.000	5.000	2.000	2.000	2.000	19	-1.194	0.219
1.000	2.000	5.000	2.000	2.000	20	-1.401	0.219
4.000	4.000	6.000	4.000	4.000	21	0.365	0.219
6.000	6.000	6.000	6.000	6.000	22	1.957	0.219
5.000	6.000	5.000	5.000	1.000	23	-0.585	0.219
1.000	1.000	1.000	1.000	1.000	24	-2.147	0.219
3.000	5.000	6.000	5.000	5.000	25	0.864	0.219
1.000	2.000	1.000	3.000	3.000	26	-0.896	0.219
4.000	5.000	1.000	4.000	5.000	27	0.726	0.219
5.000	6.000	6.000	5.000	6.000	28	1.646	0.219
5.000	5.000	3.000	3.000	5.000	29	0.762	0.219
4.000	6.000	4.000	4.000	4.000	30	0.403	0.219
3.000	*	4.000	4.000	4.000	31	0.184	0.224
4.000	4.000	4.000	2.000	2.000	32	0.892	0.219

Factor scores

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0	2.000	0	2.000	0	19	-1.194	0.219
0	2.000	0	2.000	0	20	-1.401	0.219
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0	4.000	0	4.000	0	30	0.403	0.219
0	4.000	0	4.000	0	31	0.184	0.224
0	2.000	0	2.000	0	32	-0.892	0.219

A1	:	X	✓	fx	6			
A	B	C	D	E	F	G	H	
1	6	5	5	6	6	1	1.888	0.219
2	4	5	4	5	5	2	0.963	0.219
3	4	5	6	5	6	3	1.454	0.219
4	1	2	2	2	2	4	-1.475	0.219
5	4	4	5	4	4	5	0.34	0.219
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12	1	1	1	1	1	12	-2.147	0.219	

	id	p_growth
1	1.00	1.89
2	2.00	.96
3	3.00	1.45
4	4.00	-1.48
5	5.00	.34
6	6.00	-1.33
7	7.00	.76
8	8.00	.83
9	9.00	1.69
10	10.00	-.72
11	11.00	1.45
12	12.00	-2.15
13	13.00	-1.11

Questions of the day:

3. How do we change the “reference group” in measurement invariance models?

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3. How do we change the “reference group” in measurement invariance models?

- Let's use Mplus to open the following file:

- User_File_JumpstartMplus

- Mplus_files

- invariance

- m-inv-template.inp

Other interesting things you
may like to know...

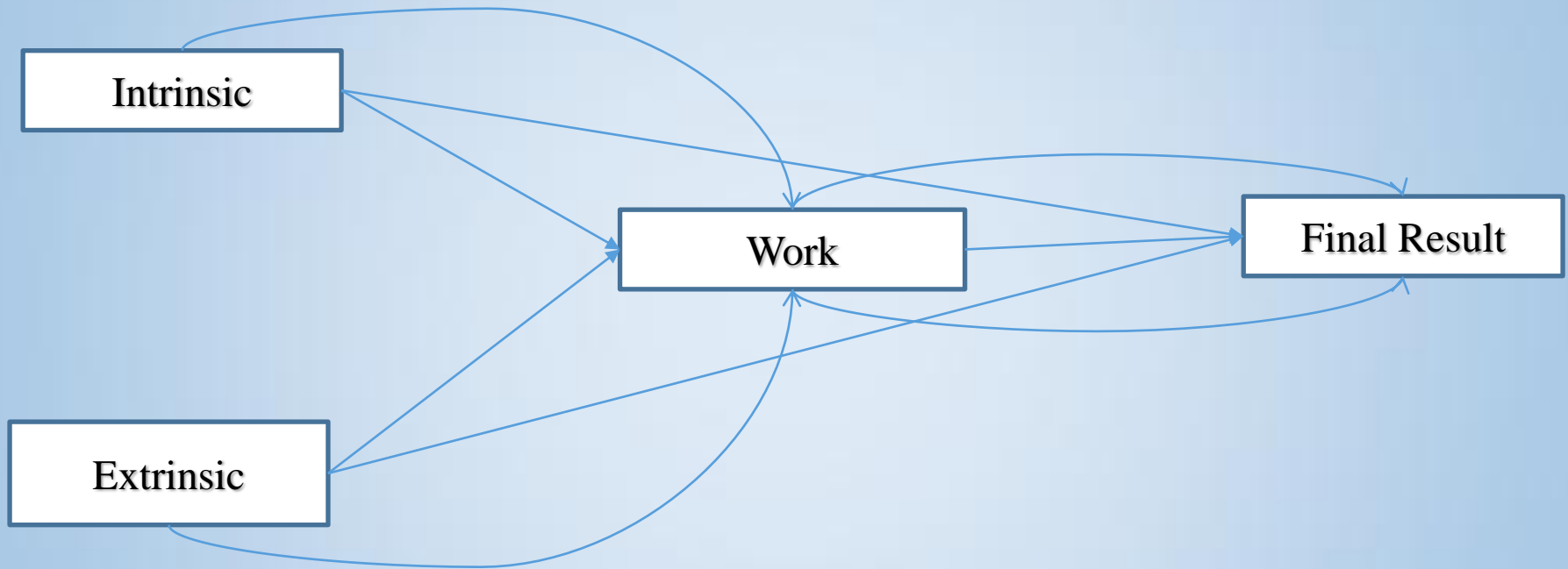
1. Mediation effects

3. How do we test mediation effects in Mplus?

- Let's use Mplus to open the following file:

- User_File_JumpstartMplus
- Mplus_files
- ...
- PATHgroup

Mediation effects



2. Regression in multiple groups

3. How do we test regression paths in multiple groups?

- Let's use Mplus to open the following file:
 - User_File_JumpstartMplus
 - Mplus_files
 - regression-groups
 - PATHgroup

Jumpstart Mplus 12. Summary Quiz

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Dr Gabriela Roman

Objectives

To integrate the concepts
acquired in this course

Psychobiological Effects of Laughter



www.hiren.info

<https://www.youtube.com/watch?v=RP4abiHdQpc>



The Psychometrics Centre

Laughter

Amusement

To show emotion (as mirth or joy) with a chuckle or explosive vocal sound (Merriam-Webster Dictionary)

- Has positive effects on individuals:
 - Hormonal (Berk, 2001):
 - Endorphins
 - Oxygen level in respiration
 - Cortisol
 - Psychological (Tse & al., 2010):
 - Life Satisfaction
 - Resilience
 - Positive emotions

The challenge

- The team of researchers would like your help to uncover the effects of laughter on these variables.
- A study was conducted to evaluate the psychobiological impact of laughter
- 308 individuals aged between 18 and 65 years of age were assessed on psychological variables and several biological markers

The Challenge

1. Variables are:

- Gender. Gender, Males = 0
- Age. Age
- Laughter. Laughter, Likert 1-7
- Life Satisfaction. LifeS, Likert 1-7
- Resilience. Resil, Likert 1-7
- Positive Emotion. PoEmo, Likert 1-7
- Oxytocin. Oxy, Standardised variable
- Dopamine. Dopa, Standardised variable
- Cortisol. Corti, Standardised variable

2. Some data are missing

The Challenge

Questions:

1. What is the optimal number of factors that can explain the relationships between the psychobiological variables?
2. Is it possible to confirm the validity of a 1-factor structure, or a 2-factor structure?
3. Is the latent factor of the psychobiological variables gender-invariant (choose a 1-factor structure)?
4. Is the latent factor of the psychobiological variables age-invariant (choose a 1-factor structure)?
5. Which of the biological or psychological set of variables seems to be affected the most by Age and Laughter simultaneously?

Thank
You