# Methodological and Analytical Aspects of Longitudinal Research

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# Methodological and Analytical Aspects of Longitudinal Research

COORDINATE project November 17, 2023





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### LECTURE CONTENT

- 1. Aspects of longitudinal design (a brief overview)
  - Longitudinal hypotheses
  - Sample size
  - Number of waves
  - Measures
- 2. Challenges and recommendations
  - Logistic
  - Methodological
    - Attrition
- 3. Choosing an analysis framework (a brief overview + example)

### WHAT IS LONGITUDINAL DESIGN?

Data collected using multiple measurement occasions across time nested within same entities (e.g., individuals – within-individual changes over time)

# Data collected repeatedly over time

At least three measurement occasions (waves)

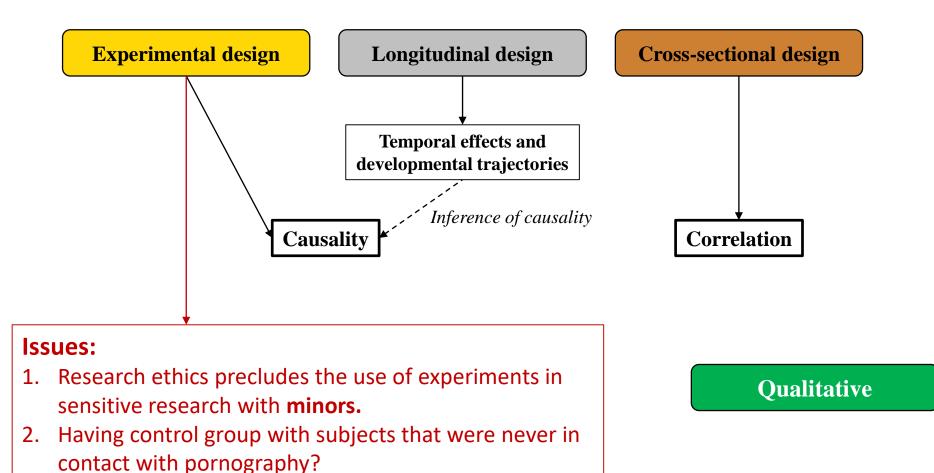
 With only two waves of data: a) difficult to disentangle true change from measurement error;
 b) impossible to model nonlinear forms of change.

Different from (econometric) time-series design.

https://www.scribbr.com/methodology/longitudinal-study/

### In some cases...THE BEST POSSIBLE DESIGN?

How to assess pornography use in adolescent population?

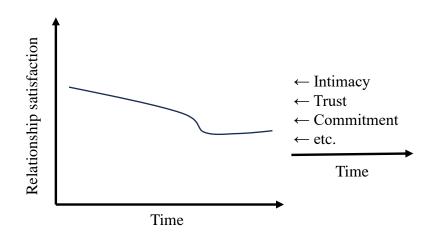


### NEED FOR LONGITUDINAL DESIGN

- 1. Assess temporal effects and developmental trajectories.
- 2. Test existing (cross-sectional) theory from a longitudinal perspective.
- 3. While cross-sectional studies render causal inference unwarranted, well-conducted longitudinal study will provide an inference of causality.
  - For example, should we pursuit experimental design for a target topic or not?
- 4. Do conclusions differ between cross-sectional and longitudinal designs?
  - Compare longitudinal effect sizes to the cross-sectional <u>effect sizes</u>.
  - If a longitudinal study makes the same predictions and leads to the same conclusions as a cross-sectional study, is there a unique theoretical contribution?

### CONSTRUCTING LONGITUDINAL HYPOTHESES

- Not uncommon that theories (or research-related conclusions) overlook when an effect is likely to occur or for what duration.
  - Longitudinal versions of cross-sectional hypotheses
    - "A is associated with B"  $\rightarrow$  "A is associated with B over time"
- Focus on unique change in a construct (vs. its static representation):
  - 1. When does the change occur?
  - 2. For how long it lasts and how it changes?
  - 3. Why it changes?
  - 4. What is <u>associated</u> with the change?
  - 5. What is the nature of the association?
    - Decreasing/increasing trend
      - Less or more substantial change



### SAMPLE SIZE

### As large as possible! (attrition)

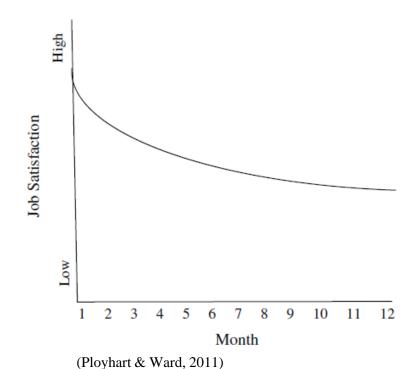
### **Keep in mind that:**

- 1. Total sample size (observations) = subjects x measurement occasions
- 2. Within-subject designs have smaller error terms (compared to cross-sectional designs)
- 3. Power analysis is complex (subjects, measurement occasions, linear or nonlinear change, variability in change over time)
  - Adding more subjects should reflect on between-person effects
  - Adding more measurement occasions should reflect on within-person effects

### NUMBER OF MEASUREMENT OCCASIONS

# **Exactly equal spacing (less important) vs. number of time points (more important)**

 Frequent enough to detect hypothesized kind of change and that the occasions cover a reasonable duration of time



### **Possible assessments:**

T1, T12: detecting linear decline

T1, T6, T12: detecting nonlinearity

T1, T2, T3: overestimating negative slope

T10, T11, T12: underestimating negative slope

### **Guidelines for number measurement occasions (and time lags)**

- 1. Review related literature.
- 2. When there is no ,,natural" measurement dynamic, conduct interviews or behavioral observations with relevant subjects to determine a measurement schedule.

### CHALLENGES

### **LOGISTIC**

- Time consuming (number of waves, time lags)
- Recruitment
  - Often requires larger baseline samples
- "Gatekeepers" (classroom-based)
  - School principals, etc.
- Motivating participants (online)
  - Incentives

### **METHODOLOGICAL**

- Attrition
  - Reasons for lost to follow-up participants
  - Potential bias
  - Online vs. classroom-based (on-site) vs. commercial panel
- Familiarity with research topic and measures
- (Re)contacting participants and linking surveys
- Assuring anonymity (online)
- Assuring privacy (classroom-based)

### **FINANCIAL**

- Requires a research team
- Expensive

### RECENT EXPERIANCE

# The PROBIOPS Study

**ABOUT** 

**RESEARCH TEAM** 

INTERNATIONAL COLLABORATION

**PAPERS PUBLISHED** 

MANUSCRIPTS UNDER REVIEW

**CONFERENCES** 

BRIEF SUMMARY OF FINDINGS

**AWARDS** 

**CONTACT US** 

SAŽETAK

Informacija za roditelje

Preliminarni izvještaj

Prospective Biopsychosocial Study of the Effects of Sexually Explicit Material on Young People's Sexual Socialization and Health (2015-2018)

Project leader: Aleksandar Štulhofer, PhD

Team: sociologists, psychologists and a medical biochemist

14 international collaborators









etc.

→ 40 published papers

**Topics:** question-behavior effect, parental monitoring, body-surveillance, internalization of appearance ideals, sexism, the role of religiosity, compulsive pornography use, communication about sexuality, well-being, sexual risk taking, sexual victimization, sexual permissiveness, perceived pornography realism, academic achievement, content progression thesis, sexual satisfaction, sexting, sexual aggressiveness, sexual agency, selective dropout, the role of testosterone, etc.

http://probiops.ffzg.hr

Funded by Croatian Science Foundation

# PROBIOPS: Participants and procedures

### **ZAGREB**

- Spring 2015.
- 59/90 high-schools
- 6 waves
- 6 month between waves
- Leaflet recruitment
- Online questionnaires
- $N(T1_{baseline}) = 2,235$
- Lottery based incentives

**RIJEKA** (population wise, 3<sup>rd</sup> Croatian city)

- Winter 2015.
- 14/23 high-schools
- 6 waves
- 5-6 month between waves
- Classroom based
- Paper-pen questionnaires
- $N(T1_{baseline}) = 1,287$
- No incentives

ZAGREB							
Wave	N						
1	2015	2235					
2	2013	636					
3	2016	711					
4	2016	683					
5	2017	686					
6	2017	511					

Mean age (T1) = 16.241% M / 59% F

All 6 waves = 307

RIJEKA							
Wave	Year	N					
1	2015	1287					
2	2016	1281					
3	2010	1232					
4	2017	1176					
5	2017	931					
6	2018	892					

Mean age (T1) = 15.944% M / 56% F

All 6 waves = 430

# RECOMMENDATIONS (long before data collection)

Obtaining approvals (e.g., relevant ,,gatekeepers")



Developing a catchy public name and an attractive visual identity

+ feedback (e.g., focus groups)



Developing a "recruitment" leaflet and video tutorial



# RECOMMENDATIONS (long before data collection)

### Setting up a registration website and social media sites

MEDIJI + JA O ISTRAŽIVANJU SUDJELUJ U NASTAVKU ISTRAŽIVANJA I 1. Ulaz za registrirane korisnike Prijavi se putem Facebook-a Prijavi se pomoću svoje E-mail adrese Klikni na Korisničko ime Zapamti me Prijava Zaboravliena lozinka? Zaboravljeno korisničko ime? © 2016 PROBIOS tim. f MEDIJI+JA Edit Profile News Feed Anonimno znanstveno online istraživanje o djelovanju medija na ponašanje i stavove Messages miedih. Istražívanje provodi Filozofski fakultet Sveučilišta u Zagrebu, 13 Events a financira ga Hrvatska zaklada za znanost ₹ 2NA MUZIKA € NOVSKA 2 **W** VOLMO PUTOVAT → Share ✓ Notifications **▼** MEDUI+JA KU Krija Ustvari Search thin group Sale groups Write Post 🛅 Add Photo-Video 🗐 Create poil 🧱 More ADD MEMBERS I 2NA MUZIKA

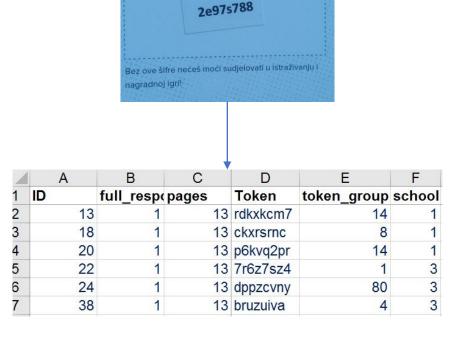
Krija Ustvari

**Deciding on incentives model** (e.g, lottery based) + feedback

ZAGREB						
Wave	Collected					
1	27%					
2	57%					
3	63%					
4	61%					
5	67%					
6	62%					

System for assuring confidentiality (separate database for contact information and questionnaire data + linking database)

i registriraj se što prije pomoću svoje jedinstvene šifre:



### A brief detour...INCENTIVES

### **Types of incentives**

- An incentive which shows respect for participants' time and effort
- Money, gift cards, food vouchers, school supplies, telephone cards, etc.

# **Determining adequate** incentive

- Incentive amounts vary depending on many factors, including:
  - Study budget
  - Standard of living in the study country
  - Population of interest
  - Institutional or governmental policies (monetary incentives not allowed, pre-established cap amount for incentives)

### **Models**

- 1. Each participant
- 2. Each participant + extra for participating in each subsequent wave
- 3. One-price lottery
- 4. Horizontal lottery (a number of awards, same incentive amount)
- 5. Pyramidal lottery (a number of awards, increasing incentive amount)
- 6. Combining previous models

### Acquire feedback!

# RECOMMENDATIONS (before data collection)

### Training a fieldwork force



### **Developing necessary planning/tracking sheets**

(coordinating, contacting, and measures!)

A B C D E F G H I J K L M N O P Q R S T U V W X Y

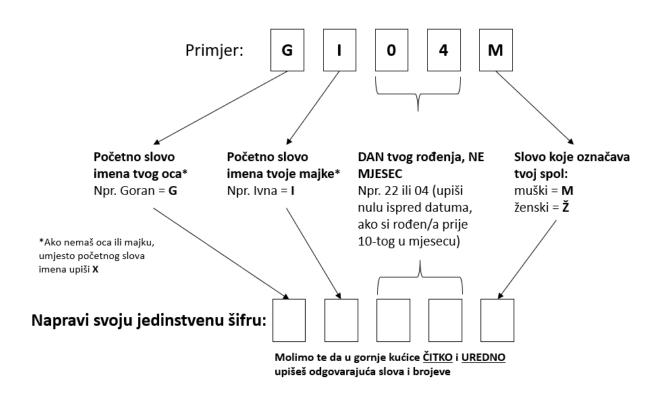
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Participant related (0-10)			8	3	12		Konavoska Kombolovi Kleićeve u Palmotićev Trg hrvatsk	26   Novi Zegreb   9   1   Donji Gred   7   18   54   Donji Gred   7   19 povilno 1   Stonjovec   7	209 25,2 6684-986 200 25,4 129 28,4 3762-969 105 27,0 5752-366
Gender (filter)		1	х	х	х		Frankopan Ax Marina Kubianova Axerrija Da	Držića 14 Trnje 7 52 Peščenica Žitnjak 6 brovnik 85 Novi Zagrob 6	195 27,9 193 26,1 6965 563 192 27,4 6156-611 181 30,2 170 20,8 6601-158
Age (month)		1					Prilaz bera Trg J. F. Ker Križaničevi Prilaz bara Križaničevi	s 4 Donii Grad 6 na Filipovića 80 Donji Grad 6	175 25,0 5775-133 172 26,7 2300-766 169 26,2 169 18,8 4880-779 168 26.0
Age (year)		1	х				Gjure Prejo Gjure Prejo Ax Marina Trg Keterin Dobojske	a 2 Dubrave 6 a 2 Dubrave 6 Ddica 14 Tinje 7 e Zrinske 5 Medvešček 6	168 28.0 2988-970 160 26.7 2993-358 152 21.7 618-713 149 24.8 4851-935 168 25.0 5097-150
Academic achievement		1	х		х		Trg maršai Ax Vecesii Kričanićeve Getaldićev	e Tita 11 Donji Grad 6 ma Holjovca 13 Novi Zagrab 7 e 4e Donji Grad 5 e 2 Peščence-Žitnjak 5	148 24.7 4828-095 148 20,7 6670-565 141 28,2 4611-516 141 28,2 2371-070
Average grade (HR, ENG, PSJ)		3			х	strukcija	Dabojska ces Savska ces Ul. Vladire Zarka Dali Sveti Duh 2	to 86 Trodirjouks 6 ine Stehurjake 1 Seswete 5 nere 9, Kajperice Novi Zegreb 5	140 28,0 140 28,3 6177-662 140 28,0 179 27,8 6677-188 139 17,4 3700-736
Educational aspiration		1					Bissribta 7 Kričarničeva Trg J. P. Ker Ax. Večesti	sul. 4e Donji Grad 5	137 27,4 2002.466 134 26,8 134 26,8 2335-116 131 26,2 6670-106
Religious practice		1	х		х	9	ok	pedagog - Anja Trišić 091 2593 58	9:00
Faith in god		4	х		х	7	ok	psiholog Zlaticu Kozjak Mikić 5552	8:30
Relationship status		1		х	х	t,f,c	ok	pedagog - Tatjana Mergi (091 7244 450)	12:20
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### **Classroom-based data collection**

**Use privacy panels** 



Develop coding system for linking participants across multiple study waves



### **Response tracking**

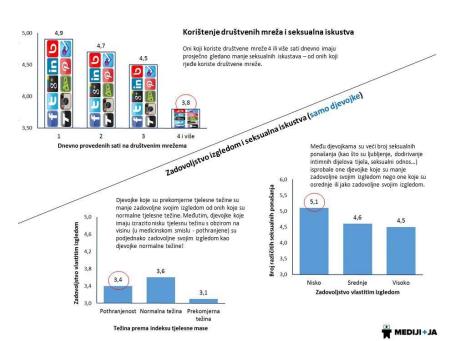
**Issues:** rarely checking email, changing email address, using "secondary" email for the initial registration

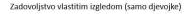
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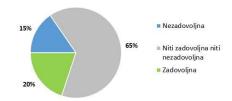
Fieldwork: 14.04. - 06.05. (13 work days)

# Maintaining communication before/during/after data collection periods Repeated in-person visits Social media posts with interesting results Social media and e-mail announcements

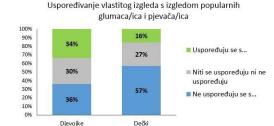
Social media and e-mail reminders







Rezultati analize pokazuju da je 15% djevojaka nezadovoljno svojim fizičkih izgledom.



Djevojke više uspoređuju svoj izgled s izgledom popularnih glumica, pjevačica i plesačica od svojih muških vršnjaka. Zanimljivo je da od 34% posto djevojaka koje su sklone uspoređivanju, najveći broj njih (41%) provodi 6 ili više sati dnevno na društvenim mrežama i gledajući razne serije i filmove. Istovremeno, među djevojkama koje ne uspoređuje svoj izgled s izgledom raznih popularnih osoba najveći broj ih je zadovoljino svojim fizičkim izgledom.

# Maintaining communication before/during/after data collection periods

Repeated in-person visits

1. w	/ave	2. w	vave	3. Wave			
Schools	Respondents	Visited	Respondents	Visited	Respondents		
59	2210	35	542 (M* = 32%)	31	601 (M* = 39%)		
		Not visited	Respondents	Not visited	Respondents		
		24	68 (M* = 15%)	28	124 (M* = 21%)		
		Schools	Respondents	Schools	Respondents		
		59	610	59	725		
			"in-person effect"		"in-person effect"		
			+17%		+18%		

<sup>\*</sup>M = average response rate in (not)visited schools based on the number of baseline respondents

### **Qualitative feedback** (intention to dropout, satisfaction with incentives, etc.)

BARRIERS	IVANIĆ GRAD	SESVETE	ZAGREB
Long time Intervals and forgetfulness	✓		
Rare communication with participants, lack of reminders	✓	✓	
Image research too laid back. Unrecognized seriousness and importance of research	✓		
Prizes are not particularly motivating			✓
Use of e-mail compared to Facebook, WhatsApp or similar		✓	✓
Immaturity (boys)			✓

RECOMMENDATIONS AND SUGGESTIONS:	IVANIĆ GRAD	SESVETE	ZAGREB
Joining the Facebook group	✓		
Frequent e-mails (though rarely checked)	✓	✓	
More content on the Facebook group	✓		
Be sure to visit schools	<b>✓</b>		✓
Completing the questionnaire during class	✓	✓	✓
emphasize prices		✓	
Create an impression of obligation to an adult at school (teacher, psychologist)			✓
Some will be more interested if you have "dirty" questions		✓	

### **Document sampling flow**

															1	
ZAGREB	Data collection dates	Total sample size	Sample size after dataset cleaning	Sample size in MASTER data	ZA	GREB - Number of	participants in al	previous waves (I	linked)			ZAGREE	- Partic	ipared i	n: (number of wa	ves)
ZG W1	10 April - 11 May 2015	2655	2241	2235	w1 = 2235	w12 = 636	w123 = 486	w1234 = 417	w12345 = 372			only 1 wave	1178	53%	at least 1 wave	2235
ZG W2	10 Nov - 27 Nov 2015	680	644	636	w2 = 636	w13 = 711	w124 = 462	w1235 = 400	w123456 = 307			only 2 waves	273	12%	any 2 waves	1057
ZG W3	14 April - 6 May 2016	766	727	711	w3 = 711	w14 = 683	w125 = 448	w1245 = 397				only 3 waves	172	8%	any 3 waves	784
ZG W4	7 Oct - 28 Oct 2016	739	692	683	w4 = 683	w15 = 686	w134 = 534	w1345 = 455				only 4 waves	145	6%	any 4 waves	612
ZG W5	15 Mar - 27 Mar 2017	761	693	686	w5 = 686	w23 = 486	w135 = 522	w2345 = 372				only 5 waves	160	7%	any 5 waves	467
ZG W6	17 Sep - 2 Oct 2017	542	517	511	w6 = 511	w24 = 462	w145 = 520					only 6 waves	307	14%	all 6 waves	307
						w25 = 448	w234 = 417					TOTAL	2235	100%		
						w34 = 534	w235 = 400									
						w35 = 522	w245 = 397									
						w45 = 520	w345 = 455									
RIJEKA	Data collection dates		Sample size after	Sample size in		RIJEKA - Num	ber of participan	ts in all previous v	vaves (linked)		Unique	RIJEKA	- Partici	pared in	n: (number of wav	ves)
		size	dataset cleaning	MASTER data				· · · · · · · · · · · · · · · · · · ·			•				· · · · · · · · · · · · · · · · · · ·	,
RI W1	7 Dec 2015 - 1 Feb 2016		1291	1287	w1 = 1287	w12 = 1059	w123 = 883	w1234 = 758	w12345 = 534	w123456 = 430 w1		only 1 wave	291	17%		1744
RI W2	18 April - 13 May 2016	1309	1283	1281	w2 = 1281	w13 = 1007	w124 = 862	w1235 = 588	w12346 = 516		u = 68	only 2 waves	164	9%	any 2 waves	1453
RI W3	7 Oct - 27 Oct 2016	1252	1233	1232	w3 = 1232	w14 = 977	w125 = 665	w1236 = 582	w12356 = 473		u = 49	only 3 waves	205	12%	any 3 waves	1289
RI W4	13 Mar - 12 Apr 2017	1202	1177	1176	w4 = 1176	w15 = 757	w126 = 661	w1245 = 592	w12456 = 481		u = 46	only 4 waves	285	16%	any 4 waves	1084
RI W5	2 Oct - 3 Nov 2017	944	931	931	w5 = 931	w16 = 746	w134 = 850	w1246 = 578	w13456 = 476		u = 38	only 5 waves	369	21%	any 5 waves	799
RI W6	5 Mar - 30 Mar 2018	924	892	892	w6 = 892	w23 = 1012	w135 = 665	w1256 = 534	w23456 = 469		u = 21	all 6 waves	430	25%	all 6 waves	430
						w24 = 968	w136 = 651	w1345 = 596		TO	TAL = 291	TOTAL	1744	100%	<u> </u>	
						w25 = 744	w145 = 662	w1346 = 571								
						w26 = 735	w146 = 641	w1356 = 531								
						w34 = 968	w156 = 599	w1456 = 531								
	ZAGREB		RIJE	KA		w35 = 756	w234 = 846	w2345 = 585								
w1	spring, 2015, 2. class		autumn, 2015, 2. cl	ass		w36 = 737	w235 = 654	w2346 = 562								
w2	autumn, 2015, 3. class spring, 2016 2. class		SS		w45 = 751	w236 = 643	w2356 = 521									
w3	spring, 2016, 3. class	ng, 2016, 3. class autumn, 2016, 3. class		ass		w46 = 716	w245 = 653	w2456 = 525								
w4	autumn, 2016, 4. class spring, 2017 3. class		SS		w56 = 696	w246 = 631	w3456 = 526									
w5	spring, 2017, 4. class		autumn, 2017, 4. cl				w256 = 589									
w6	autumn, 2017, out of sch	nool	spring, 2018, 4. cla	SS			w345 = 660									
							1		1							

### Are we losing the most relevant cases first? (attrition)

- In longitudinal research, losing particular types of participants over the course of the study may become a serious analytical issue (e.g., identifying moderating effects, diminishing or inflating links between predictors and outcomes of interest).
  - *Štulhofer et al.* (2021). *Selective Dropout in Longitudinal Studies of Adolescent Pornography. Archives of sexual behavior, 50, 2215–2226.*

### • Using two independent panel samples, we examined:

- 1. Was attrition substantially different among adolescents who may be particularly vulnerable to pornography use compared to other participants?
  - Vulnerability indicators (measured at the baseline): adverse family situation, lower academic achievement, early biological maturation, lower self-esteem, sexual aggressiveness, earlier sexual debut.
- 2. Did panel type (online vs. classroom-based) moderate associations between attrition and the vulnerable group membership?

### Are we losing the most relevant cases first? (attrition)

• Based on attrition patterns in two panels, we distinguished: early attrition, later attrition, and participation gaps.

### **RESULTS**

- 1. Only <u>early attrition</u> was substantially higher among more vulnerable adolescents, compared with other participants.
- 2. Panel type moderated the associations between adolescent vulnerability and participation gaps, which was significant for the classroom-based but not the online panel.

Adolescents who are believed to be under increased risk of adverse outcomes associated with pornography use are less likely to complete longitudinal studies.

### Are we losing the most relevant cases first? (attrition)

**Pre-designed attrition reducing strategies (examples)** 

### **Modality of data collection**

- Resources and required baseline sample
- Online data collections platforms vs. cell phone app

### **Preparations for attrition**

- Short questionaries (and planned missing)
- Study's visual identity and presence
- Desirable incentives
- Focus groups (before and during data collection)

### **Delaying selective dropout**

- Notifying participants about an upcoming study wave
- Communicating simple but interesting findings
- Adding or modifying incentives (e.g., adding bonus incentives tied to the number of waves completed)
- Seeding the panel with specially incentivized and committed peer leaders

### Are we losing the most relevant cases first? (attrition)

A simple analytic approach to assess attrition

# For example, assessing attrition from T1 to T2

- N (T1, baseline) = 100
- N(T2) = 75

# Binary logistic regression analysis

- Which participants have higher odds for dropping out?
- Use T1 data
- **DV** 
  - 0 = Participants in T2 (75)
  - 1 = Lost to follow-up (25)
- IV
  - Relevant predictors of attrition (age, gender, etc.)

### CHOOSING AN ANALYSIS FRAMEWORK

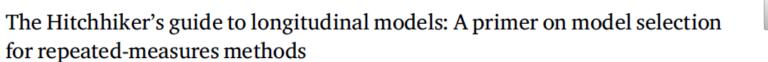


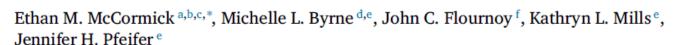
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### CHOOSING AN ANALYSIS FRAMEWORK

### Two general modeling frameworks

### Multilevel (mixed-effect / hierarchical) modeling

- Estimating higher levels of nesting (e.g., beyond individual)
- Limited with respect to measurement error in predictors or outcomes
- Simple inclusion of multiple time-variant covariates (e.g., relation satisfaction) and time-invariant covariates (e.g., gender)
- Relative model fit indices (AIC/BIC and likelihood ratio test) [model comparison]

### **Structural equation modeling (SEM)**

- Repeated measures as multiple indicators on one or more <u>latent</u> factors
- Estimating and removing the effect measurement error in predictors or outcomes
- Absolute model fit indices (CFI, TLI, RMSEA)
- Mediated relationships between constructs

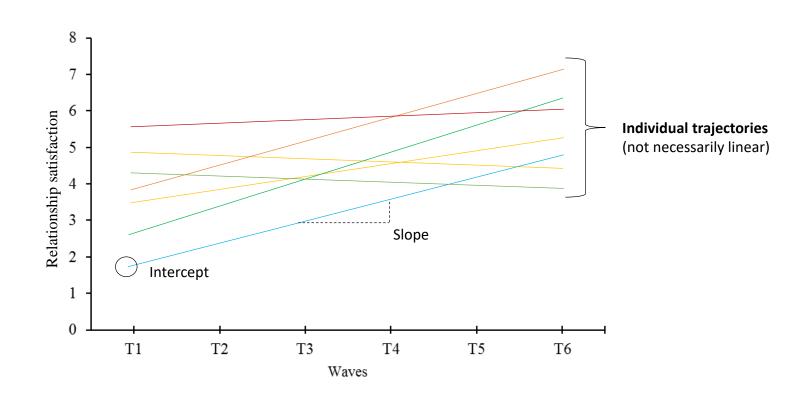
Similarities between the multilevel and SEM frameworks often outweigh the differences.

### CHOOSING AN ANALYSIS FRAMEWORK: KEY CONSIDERATIONS

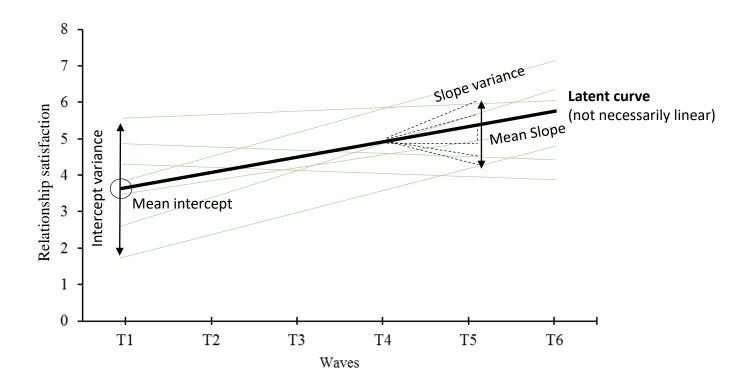
- Research question / hypothesis
- Variable type (categorical / quantitative) // (manifest / latent)
- Number of covariates
- Type of covariates (time-invariant / time-variant)
- (Un)balanced data (unequally spaced measurement occasions and/or missing data)
- Type of change (growth curve)
- Higher-order nesting
- Software

- Enables an assessment of <u>between-person differences</u> over time by estimating <u>within-person latent trajectories of change</u>
  - Observed repeated measures of a construct are represented by two latent factors (latent intercept and latent slope), and their means and variances
  - Latent intercept = initial level of a measured construct
  - Latent slope = measured construct's change over time

### Assessing group means and between-person differences over time

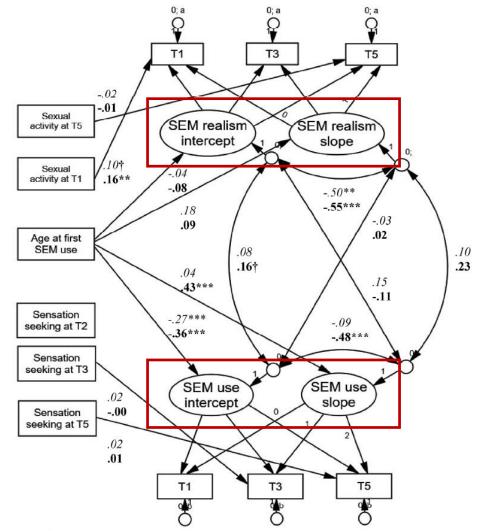


Estimating between-person differences in <u>within-person change</u> over time using **latent curve** and its **intercept** and **slope** 



### **Advantages**

- Assessing multiple constructs simultaneously (parallel LGCM)
- Ability to handle unequally spaced measurement occasions, nonlinear trajectories, and partially missing data
- Flexibility of including both timeinvariant and time-varying covariates



Wright, P. J., & Štulhofer, A. (2019). Adolescent pornography use and the dynamics of perceived pornography realism: Does seeing more make it more realistic? *Computers in Human Behavior*, 95, 37–47. <a href="https://doi.org/10.1016/j.chb.2019.01.024">https://doi.org/10.1016/j.chb.2019.01.024</a>

Interpretations of positive correlations between two latent constructs:

	Construc				
Construct B - SLOPE	Increasing trend Decreasing trend		Construct A - INTERCEPT		
Increasing trend	The higher the increase in construct A, the more substantial the increase in construct B	The higher the increase in construct B, the less substaintal the decrease in construct A	•		
Decreasing trend	The higher the increase in construct A, the less substaintal the decrease in construct B	The steeper the decrease in construct A, the more substantial the decrease in construct B (alternatively – both are decreasing less steeply)	The higher the baseline assessment of construct A, the less substantial the decrease in construct B over time		

Interpretations of negative correlations between two latent constructs:

	Construc	t A - SLOPE	
Construct B - SLOPE		Construct A - INTERCEPT	
	Increasing trend Decreasing trend		
Increasing trend	The higher the increase in construct A, the less substantial the increase in construct B	The higher the increase in construct B, the more substaintal the decrease in construct A	The higher the baseline assessment of construct A, the less substantial the increase in construct B
Decreasing trend	The higher the increase in construct A, the more substantial the decrease in construct B	The steeper the decrease in construct A, the less substantial the decrease in construct B	The higher the baseline assessment of construct A, the <b>more</b> substantial the decrease in construct B

### Final remark...

Common statement ("mantra") in research papers: *More longitudinal research is needed.* 

Time/effort/costs vs. sound empirical/theorical contribution

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