PSYC 646 – Longitudinal Data Analysis
Fall 2023
Tuesdays & Thursdays @ 9:00am
Innovation Hall 203

Instructor: Timothy W. Curby, PhD
Email: tcurby@gmu.edu
Office Hours: After class Tuesdays and Thursdays 10:15-11:00
Office: David King 2006

Course Description

The purpose of this course is to train students to think deeply about techniques for measuring developmental change across lifespan. As such, we focus on sophisticated techniques for measuring change that can be used with repeated measures of individuals. Although many of the techniques are special cases of familiar statistical techniques (e.g., regression), many additional opportunities and considerations need to be explored in a focused, supported way. With this in mind, the course will introduce students to using Hierarchical Linear Modeling (HLM) and Structural Equation Modeling (SEM) to analyze longitudinal data.

Student Learning Objectives:

- Analyze and interpret multi-level analyses
- Describe multi-level models from equations and convert research questions into equations
- Account for missing data through multiple imputation and full information maximum likelihood estimation
- Perform nested comparisons of SEM models
- Analyze and interpret transactional and growth SEM models
- Perform multigroup SEM analyses
- Apply learned statistical techniques to novel datasets

Textbook and Readings

Finch, W. H., Bolin, J. E., & Kelly, K. (2019). Multilevel Modeling Using R (Second Ed.). New York: CRC Press. ISBN-10:1138480673
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1prj2t5/alma9947144774904105

Selected articles (download from Blackboard)

Course Requirements and Assignments

1) **Attendance** (10%) You need to attend class if you are going to learn this material. An online link will often be available. However, this is for people who cannot attend class who make arrangements with me to attend online in advance.

2) **Exams** (40%) There will be two take-home exams. One will largely cover HLM and the other will cover SEM. The exams will be distributed in class and will be due (approximately) one week later as defined below. The exams are to be done individually with no outside help from another person.

3) **Weekly Assignments** (25%) There are going to be assignments of varying intensity and difficulty that require you to apply your knowledge of material from class to additional questions, data, et cetera. Some of these assignments will be directly related to the poster assignment.

4) **Poster** (25%) Students will analyze a longitudinal, repeated measures dataset from beginning to end and present it as a virtual poster at the end of the course. Students will need to choose a dataset, decide on research questions, decide on a data analysis plan, implement data analyses, interpret the results, and summarize salient pieces into a poster. We will be using the newer poster format explained here: https://www.youtube.com/watch?v=1RwJbhkCA58

Datasets for Poster. Students should work to find a dataset for use in the course poster. The dataset needs to have at least three repeated-measures time points for individual people and already be in some kind of electronic form (i.e., database, spreadsheet, or statistical package file). Because of the depth of the work and the fact that the end result of this project may be eventually worthy of publication, students are encouraged to obtain a dataset with which they have some reasonable personal interest/commitment. Ultimately, the instructor needs to approve the use of the dataset. It is expected that multiple office meetings between students and the instructor will be needed in order to complete the assignment. Students are encouraged to talk to their advisor about the dataset and project.

Grading Scale
Grades will be calculated as follows: > 93% = A, 90 – 92% = A-, 87 – 89% = B+, 83 – 86% = B, 80 – 82% = B-, 70 – 79% = C, 60 – 69% = D, < 60% = F

Software & Computers. Students will need to install R (https://cloud.r-project.org/), R Studio (https://rstudio.com/), and Onyx (http://onyx.brandmaier.de/). In addition, students should plan to have access to SPSS, if needed, through the Citrix Virtual Lab (https://mymasonapps.gmu.edu/). A VPN connection is needed (https://its.gmu.edu/service/virtual-private-network-vpn/) to access the Citrix Virtual Lab. If for any reason we need to meet synchronously, students will need access to Zoom (gmu.zoom.us/signin).

Official Communications via GMU E-mail: Mason uses electronic mail to provide official information to students. Students are responsible for the content of university communication sent to their mason e-mail account and are required to activate that account and check it regularly.

Recordings of the class should only be done with the expressed consent of the instructor and for personal use by the individual student. Any recordings should not be shared with anyone else. Other recording is not allowed. Class recordings are not a substitute for attending the class.

Honor Code. Students in this course are expected to behave at all times in a manner consistent with the GMU Honor System and Code. (http://mason.gmu.edu/~montecin/plagiarism.htm). Students are encouraged to study together as much as possible throughout the course, however, no assistance, sharing of information, or discussion of test items or answers between students may take place. For all work, the name that appears on the paper must be the author. Violations of the Honor Code will not be tolerated in this course and will be immediately reported according to GMU procedures. The instructor reserves the right to use software to determine the extent to which the work is the student's. The instructor for this course reserves the right to enter a failing grade to any student found guilty of an honor code violation.

Students may not reproduce (including uploading to the Internet) any portion of any test. Students who attempt to photograph or in any way capture information about tests for others' use will be reported for an honor violation, even if the violation happens after the end of the term.

Deadlines for adding and dropping classes are as follows:
      Last Day to Add Classes- August 28
      Drop Deadline with no tuition penalty- September 5
      https://registrar.gmu.edu/calendars/fall_2023/

Classes may be canceled by either the University or the Instructor (via email). In the event of a canceled class, the instructor will either switch to an online class modality, try to make up the material during other meetings of the class, or provide a supplementary assignment/video.

Notice of mandatory reporting of sexual assault, interpersonal violence, and stalking. As a faculty member, I am a designated a "Responsible Employee," and must report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per University Policy 1412. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (703-993-2380). You may seek assistance from Mason's Title IX Coordinator by calling 703-993-8730.

Life is stressful and we all need a little support sometimes. Students are encouraged to contact Counseling Services (364 Student Union I) at 993-2385 for assistance with any kind of psychological/life problem or crisis situation. I can help with referrals for students with particular counseling needs so please feel free to talk with me for help with anything.

Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu | Phone: (703) 993-2474

Student Privacy and Student Rights under FERPA can be found at: http://registrar.gmu.edu/ferpa/

	Date	Topic	Assignment	Reading
				https://youtu.be/_V8eKsto3Ug (First 20 minutes and then Importing Data (@1:34:18)
1	8/22/2023	Introductions, HLM Intro--equations	*Poster Interests*	Textbook Ch. 1
	8/24/2023	HLM—random v. fixed effects		Textbook Ch. 2
2	8/29/2023	HLM—Equations→R Syntax, importing data, running models	Working with HLM Part I	Textbook Ch. 3
	8/31/2023	HLM—running models practice	Working with HLM Part II	
3	9/52023	HLM—running models practice	Finish HLM Part III	Exemplar: Rimm-Kaufman et al. (2009) Optional: Textbook Ch. 4
	9/7/2023	Moderation in multi-level models	Interactions in HLM	Peugh (2009)
4	9/12/2023	HLM Workshop	Finish HLM In-Class Workshop	Enders & Tofighi (2007)
	9/14/2023	HLM Growth Presentation		Textbook Ch. 5
5	9/19/2023	HLM Growth in R Demonstration		Fairchild & McQuillin (2010)
	9/21/2023	HLM Growth Assignment	HLM Growth	Enders (2013)
6	9/26/2023	Missing Data: Mean, Single, Stochastic, Multiple Imputation	Multiple Imputation	Woods et al (2021) https://doi.org/10.31234/osf.io/mdw5r
	9/28/2023	Missing Data: Analyzing Multiply Imputed Data	**EXAM 1 Out**	
7	10/3/2023	Poster Check in		Loehlin (2004)
	10/5/2023	SEM Intro	**Exam 1 Due**, *Poster RQs*	Ωnyx User Manual
8	10/10/2023	**NO CLASS – Monday Classes Meet this day**		
	10/12/2023	Doing CFA & Begin Ωnyx		Oertzen et al (2015)
9	10/17/2023	CFA Part 2	CFA	
	10/19/2023	CFA Part 3	*Poster Codebook*	
10	10/24/2023	SEM - path analysis	Path Analysis	
	10/26/2023	SEM – transactional & model comparisons		Exemplar: Verboom et al (2013) Extension: https://youtu.be/buXM38NaK9s
11	10/31/2023	SEM – Latent Growth Model	*Poster Analysis Plan*	Hamaker et al (2015)
	11/2/2023	SEM – Growth practice; Latent Basis Growth & Plotting	SEM Growth	Exemplar: Curby et al. (2008)
12	11/7/2023	SEM - bivariate growth	*Poster: Results;* Bivariate Growth	
	11/9/2023	SEM- multi-group analysis	*Poster: Rough Draft*	
13	11/14/2023	SEM- multi-group analysis (re-do path analysis)	**Poster Rough Draft Due; Exam 2 OUT**	Selig & Preacher (2009)
	11/16/2023	SEM- multi-group analysis		
14	11/21/2023	Latent Difference Score Model	**EXAM 2 DUE**	Grimm et al (2016)
	11/23/2023	**NO CLASS THANKSGIVING**		
15	11/28/2023	Student Poster Presentations (or SEM- Factor Scores in Onyx; True Scores)		
	11/30/2023	Student Poster Presentations	*Poster Final*	