Course Syllabus
Psychology 9556B. Longitudinal Methods (Winter 2014)

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Course Description

This course focuses on various techniques within the domain of structural equation modeling and multilevel modeling to analyze longitudinal (repeated-measures) data beyond the repeated-measures ANOVA framework. Topics within the SEM domain will include longitudinal measurement models, basic panel models with autoregressive and cross-lagged processes, latent growth curve models, growth mixture models (to investigate prototypical trajectories), longitudinal mediation models and multiple group models. Within the MLM domain, topics will include models for multiple repeated observations (e.g., diary data) and time-variant and time-invariant covariates. Other topics will include missing data techniques, metrics of time, power, and modeling approaches for non-continuously distributed outcome variables.

The objective of this course is to provide students with the necessary knowledge to apply the longitudinal methods to research; the course will therefore involve hands-on projects in which students have the opportunity to analyze their own data or data provided in class. Most of the analysis examples in the lecture material are based on the software program Mplus; however, students have the flexibility to work with other packages (e.g., AMOS, HLM, SPSS Mixed Models or R). Given the heavy emphasis on the SEM modeling approach in this course, students are required to have completed a structural equation modeling course (e.g., PSY9555). Although not mandatory, they would also benefit from having completed a multilevel modeling course.

Prerequisite: must have taken Research Design PSY9540 (or Introduction to Statistics using R PSY9041) and must have taken Psychology 9555 (SEM) or obtained the permission of the instructor. Wednesdays, 9:00 am to 12:00 noon, Room SSC 8438-8440. Start date: Wednesday, January 8, 2014.

Course material: The course textbook is Little Todd D. (2013). *Longitudinal Structural Equation Modeling*. New York: Guilford Press. A free pdf copy of the Mplus Version 7 manual is available at the Mplus website www.statmodel.com.

Lecture Schedule

A note on Readings. Suggested readings include the course textbook by T. D. Little (2013). Additional sources I use in my lectures include the Mplus manual, Version 7 (available as a PDF online) and journal articles outlined below (with full references on the next page).

Date	Topic	Readings
Jan 8	Design issues and overview of analytic methods to investigate intra-individual variation	Ch 2. Design issues in longitudinal studies Ployhart, R. E., & Vandenberg, R. J. (2010)
Jan 15	Longitudinal designs and modeling missing data	Ch 2. Baraldi, A. N., & Enders, C. K. (2010) Graham, J. W. (2009)
Jan 22	A review of SEM for longitudinal models	Ch 1. Overview and foundations of SEM Ch 3. Measurement model Ch 4. Model fit, sample size, and power
Jan 29	Measurement invariance across time	Ch 5. The longitudinal CFA model
Feb 5	Latent growth curve models and equivalent MLM models	Ch 8. Multilevel growth curves and multilevel SEM Curran, P. J., & Hussong, A. M. (2003) Curran, P. J., Obeidat, K., & Losardo, D. (2010)
Feb 12	Growth mixture models (finding prototypical trajectories)	Wang, M., & Bodner, T. E. (2007)
Feb 19	Reading week	
Feb 26	Panel models (auto-regressive and cross-lagged processes)	Ch 6. Specifying and interpreting a longitudinal panel model
Mar 5	Auto-regressive latent trajectory models	Ch 6. Bollen K., & Curran, P. (2004) Hussong, A. M., Hicks, R. E., Levy, S. A., & Curran, P. J. (2001)
Mar 12	Mediation and multiple-groups models in longitudinal research	Ch 7. Multiple-groups models Ch 9. Mediation and moderation
Mar 19	Mediation and moderation cont'd	Ch 9. Mediation and moderation Cole, D. A., & Maxwell, S. E. (2003)
Mar 26	MLM for diary data	Hoffman, L., & Stawski, R. S. (2009) Schwartz, J. E., & Stone, A. A. (1998)
Apr 2	Models for categorical (discrete ordered categories) outcomes	Atkins et al. (2013) Feldman, B. J. et al. (2009)

Atkins, D. C., Baldwin, S. A., Zheng, C., Gallop, R. J., & Neighbors, C. (2013). A tutorial on count regression and zero-altered count models for longitudinal substance use data. *Psychology of Addictive Behaviors, 27 (1)*, 166-177. doi: 10.1037/a0029508

Baraldi, A. N., & Enders, C. K. (2010). An introduction to modern missing data analyses. *Journal of School Psychology*, *48*, 5–37. doi:10.1016/j.jsp.2009.10.001

Bollen K., & Curran, P. (2004). Autoregressive latent trajectory (ALT) models. A synthesis of two traditions. Sociological Methods & Research, 32 (3), 336-383. doi: 10.1177/0049124103260222

Cole, D. A., & Maxwell, S. E. (2003). Testing Mediational Models With Longitudinal Data: Questions and Tips in the Use of Structural Equation Modeling. *Journal of Abnormal Psychology*, 112 (4), 558-577. doi: 10.1037/0021-843X.112.4.558.

Collins, L. M., & Graham, J. W. (2002). The effect of the timing and spacing of observations in longitudinal studies of tobacco and other drug use: temporal design considerations. *Drug and Alcohol Dependence*, *68*, S85-S96.

Curran, P. J., & Hussong, A. M. (2003). The Use of Latent Trajectory Models in Psychopathology Research. *Journal of Abnormal Psychology*, *112(4)*, 526–544. doi: 10.1037/0021-843X.112.4.526

Curran, P. J., Obeidat, K., & Losardo, D. (2010). Twelve frequently asked questions about growth curve modeling. Journal of Cognition and Development, 11 (2), 121-136. doi: 10.1080/15248371003699969

Feldman, B. J., Masyn, K. E., & Conger, R. D. (2009). New approaches to studying problem behaviors: A comparison of methods for modeling longitudinal, categorical adolescent drinking data. *Developmental Psychology*, 45 (3), 652-676. doi: 10.1037/a0014851

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, *60*, 549–576. doi: 10.1146/annurev.psych.58.110405.085530

Hoffman, L., & Stawski, R. S. (2009). Persons as contexts: Evaluating between-person and within-person effects in longitudinal analysis. Research in Human Development, 6, 97–120. doi: 10.1080/15427600902911189

Hussong, A. M., Hicks, R. E., Levy, S. A., & Curran, P. J. (2001). Specifying the relations between affect and heavy alcohol use among young adults. Journal of Abnormal Psychology, 110, 449-461. doi: 10.1G37//0021-843X.H0.3.449

Ployhart, R. E., & Vandenberg, R. J. (2010). Longitudinal research: the theory, design, and analysis of change. Journal of Management, 36, 94-120. doi: 10.1177/0149206309352110.

Schwartz, J. E., & Stone, A. A. (1998). Strategies for analyzing ecological momentary assessment data. Health Psychology, 17(1), 6-16.

Wang, M., & Bodner, T. E. (2007). Growth mixture modeling: Identifying and predicting unobserved subpopulations with longitudinal data. Organizational Research Methods, 10 (4), 635-656. doi: 10.1177/1094428106289397

Evaluation

50%: Labs and Short Tests. Each week, beginning during the third class (Jan 22), there will be either a short test (15 min max) test just before the mid-break or a mini-lab assignment (approximately 5 tests and 5 labs). The tests will consist of a question from core material mainly from the previous week lecture and readings and will focus on understanding and application of the procedures. The mini-lab assignments will consist of running analyses and interpreting output. **Your total grade for the short-test/lab component will be calculated as the average of the best 9 of 10 tests/labs**. There will be no make-up tests; thus if you miss a class, your grade for this component will be based on the 9 tests/labs that you will have taken. Students who miss more than one class will need to write an additional test at the end of the course to compensate for their incomplete evaluation.

50%: Individual project. You will have the choice between:

(1) a report on a longitudinal analysis conducted for this course using real or simulated data

(2) a research proposal written like a CIHR operating grant proposal (i.e., 11-13 pages single-space). See examples in class.