

Exploring heterogeneity in temporal dynamics with different extensions of time-varying coefficient models

Thursday 24 July 2025 08:45 (15 minutes)

Oral presentation

Investigating heterogeneity in temporal dynamics with a latent variable extension of time-varying coefficient models

Author

Esther Ulitzsch

Affiliation

University of Oslo

Abstract

Many psychological interventions aim to uncouple aversive stimuli and negative emotions or cognitions, e.g., the connection between negative triggers and rumination in treatments for anxiety disorders. Understanding whether people differ in when, how effectively, and how enduringly an intervention breaks such links is crucial for its evaluation. Time-varying coefficient models (TVCMs) provide flexible tools for exploring dynamic associations between constructs, approximated by continuous, non-parametric coefficient functions. TVCMs are limited, however, in that they assume coefficient functions to be the same for all persons. We propose and evaluate a flexible, yet parsimonious TVCM extension that allows gauging and quantifying between-person heterogeneity in coefficient functions. To this end, we introduce function-specific latent variables that modulate the coefficient functions, buffering or amplifying them depending on the person's location on the latent variable and the time segment. We illustrate this model extension using intensive longitudinal data collected from 19 patients with anxiety disorders over six weeks—two weeks each before, during, and after an attention training intervention—and explore heterogeneity in the evolving relationship between rumination and nervousness across this period. Our analysis reveals stable rumination-nervousness relationships pre-intervention, varying in strength across individuals. During therapy, the relationship weakens for patients with initially weaker associations but strengthens unexpectedly for those with stronger initial links. Post-intervention, relationships stabilize with minimal rebound effects. To explore how well individual coefficient functions can be approximated by a single latent variable in real data, we contrast model-implied conclusions on individual trajectories against results from case-wise applications of TVCMs.

Keywords

time-varying coefficients; intensive longitudinal data;

Primary author: ULITZSCH, Esther (University of Oslo)

Co-authors: Dr LÜDTKE, Oliver (IPN - Leibniz Institute for Science and Mathematics Education); Dr NESTLER, Steffen (University of Münster); Dr JOHNSON, Sverre (University of Oslo); Ms SNUGGERUD, Therese (University of Oslo)

Presenter: ULITZSCH, Esther (University of Oslo)

Session Classification: Session 14 : "Dynamic and temporal models in psychology"

Track Classification: Statistical analyses: Statistical analyses