Power analysis for longitudinal multilevel models with missing data

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Presentation/abstract: Multilevel, or hierarchical/linear mixed-effects, models are common in many different research areas. For instance, in clinical psychology it is common to have subjects with repeated measures nested within therapists, leading to a nested three-level model. Doing a priori power analyses for these models can be complicated, and the problem is often made even harder by potential missing data, random effects (subjects and clusters with varying rates of change over time), and varying cluster sizes. Moreover, some studies include very few clusters; in psychotherapy studies as few as 2 to 4 therapists in total is not uncommon. With such few clusters, the degrees of freedom used in the analysis will have a huge impact on the estimated power. In this seminar, I will cover how these different factors relate to the statistical power of the test of the treatment effect. I will cover both the typical two-level model (subjects with repeated measures), and extend it to the three-level model with subjects nested within a higher level cluster, in one or both study arms. Hands-on examples will be shown using my R package powerlmm.

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