Modelling two time-varying indicators measured in real-life – teachers' physiological stress and affect

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Associations between physiological and affective stress responses have been studied quite widely, although less is known about the intraindividual relations. In the literature, mostly hierarchical linear modelling with one (time)dependent variable has been applied. Studies of situational affect predicting physiological stress levels have mostly measured affect and cortisol at exactly the same time, without considering the time lag between affect observations and cortisol sampling. In real-life data collection (e.g on workdays and in ambulatory settings) it is difficult to ensure the exact same time stamps for two or more time-varying indicators of interest.

We aimed to study the within-person relations between teachers' situational physiological stress and affect during the school day. In two working days, 61 teachers from Finnish primary schools gave six saliva samples and answered to affect questionnaire four times a day. We faced two analytical problems with our data. First, in many cases, there was a time lag between the cortisol sampling and affect observations. Second, the hen and egg problem arose while designing a regression model for cortisol and affect.

Here we would like to present a multilevel structural equation model that includes cortisol, with time since awakening as a flexibly coded time-varying covariate predicting affect with time since cortisol measurement as a time-varying covariate. We excluded affect observations collected before the cortisol sampling from the data set.

We are showing one option for modeling two or more time-varying indicators concurrently in a multilevel SEM framework, and discuss the data linking and exclusion criteria. We hope to continue academic discussions about combining different indicators in intraindividual research. Substantively, our study showed that despite teachers' average levels of physiological stress and affect, their higher cortisol levels are related to experiencing less positive (e.g., enthusiasm) and more negative (e.g., nervousness) affect at a situational level