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Outcome prediction in psychological therapy with continuous time dynamic modeling of digitally assessed phenotyping parameters

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Background

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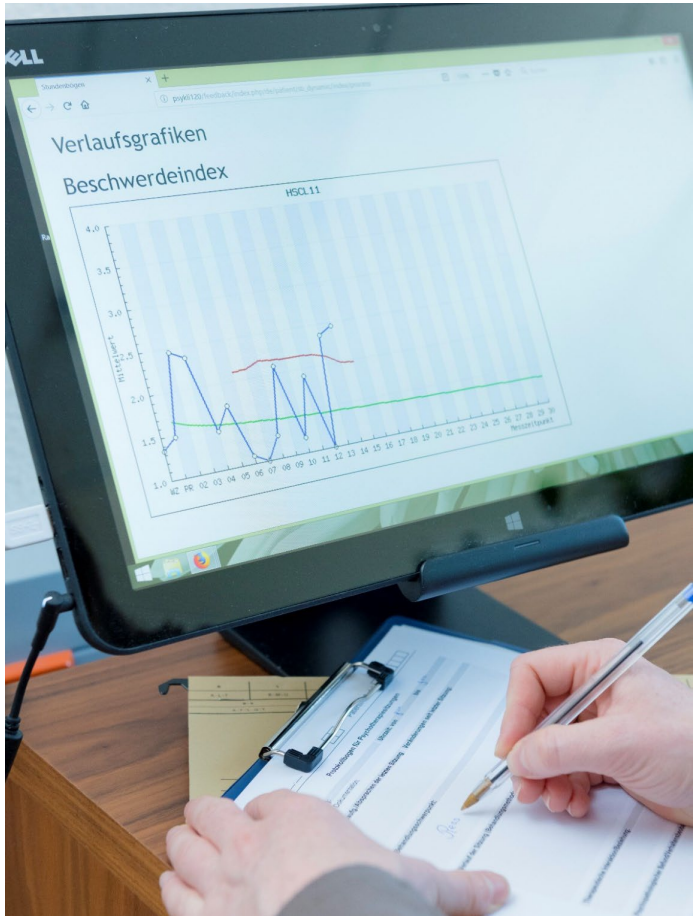
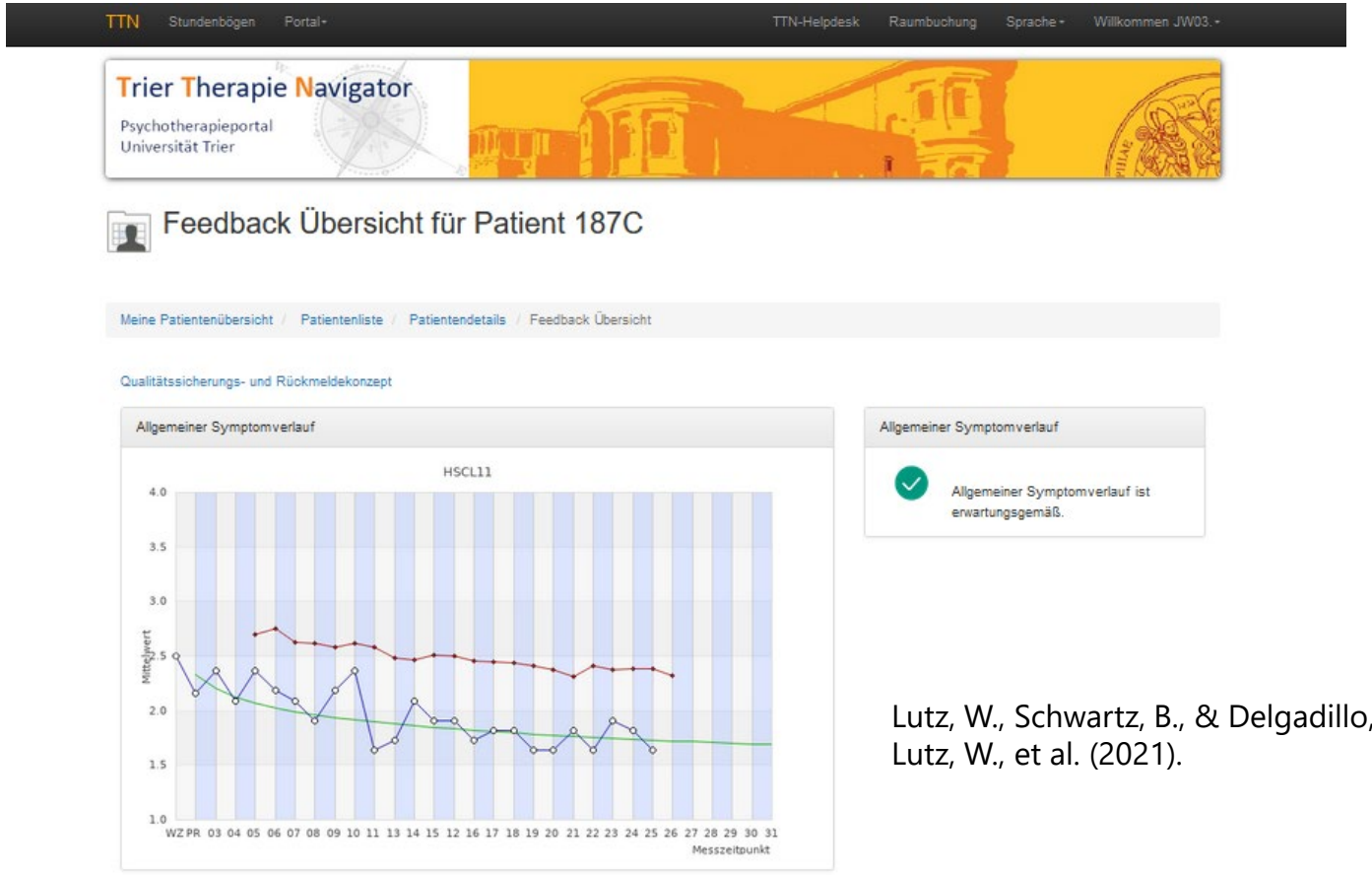
Using EMA for outcome prediction in psychological therapy





Lutz, W., Schwartz, B., & Delgadillo, J. (2022)
Lutz, W., et al. (2021).

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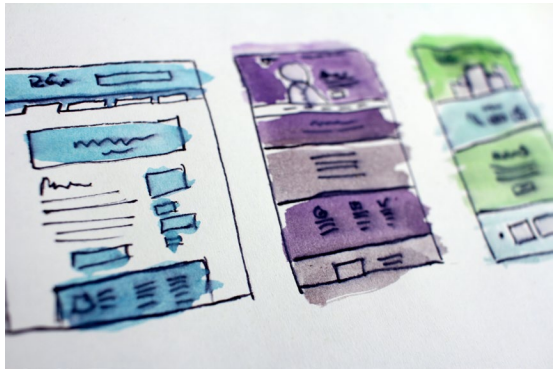
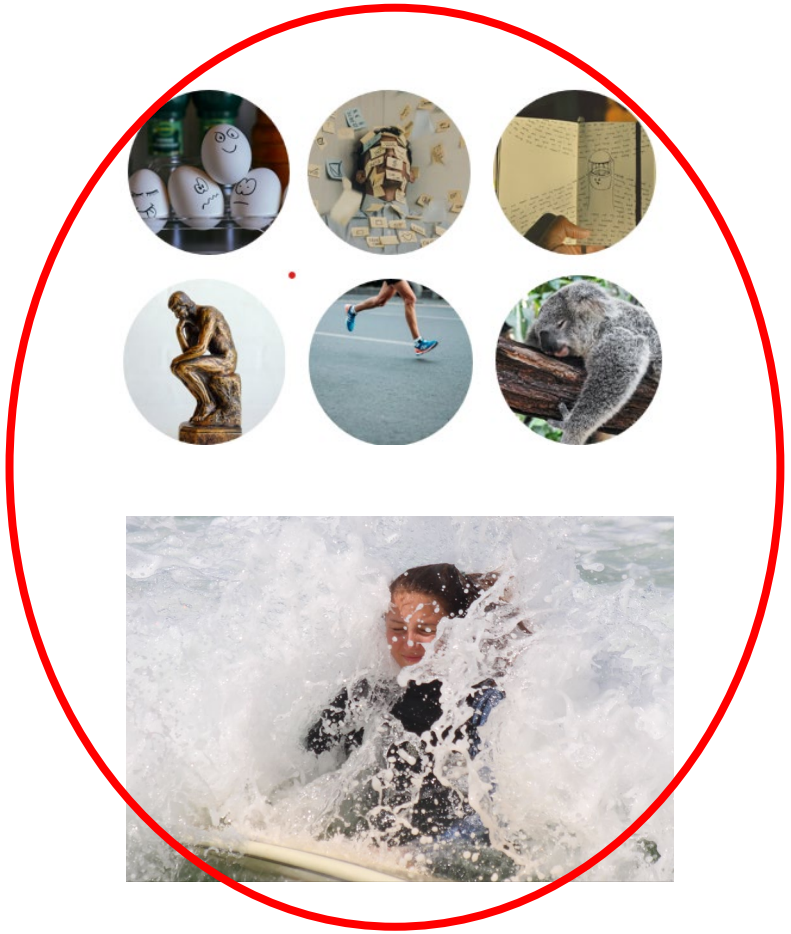
Using EMA for outcome prediction in psychological therapy



Hall et al. (2021)



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1) Which variables should be assessed and used for outcome prediction?

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Potential predictor variables

Husen et al., 2016 & **Lutz et al., 2018**

- Positive & Negative affect (PANAS)

Hehlmann et al., 2021

- Stress level

Hehlmann et al., in press

- PA, NA & Emotion regulation
- PA, NA & Rumination

Future Progress

- Activity
- Sleep






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2) How can the dynamics be accurately mapped methodically to be used for outcome prediction?

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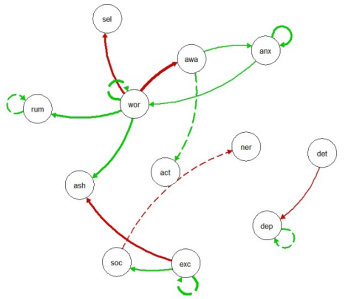
Capturing Dynamics

Husen et al., 2016 – Prediction of early treatment response

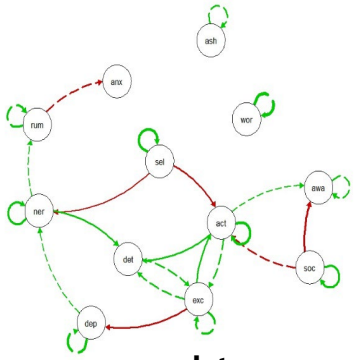
- Mean
- PA/NA Ratio
- MSSD Score

Lutz et al., 2018 – Prediction of Dropout

- Network parameters (centrality measures)



dropouts



completers

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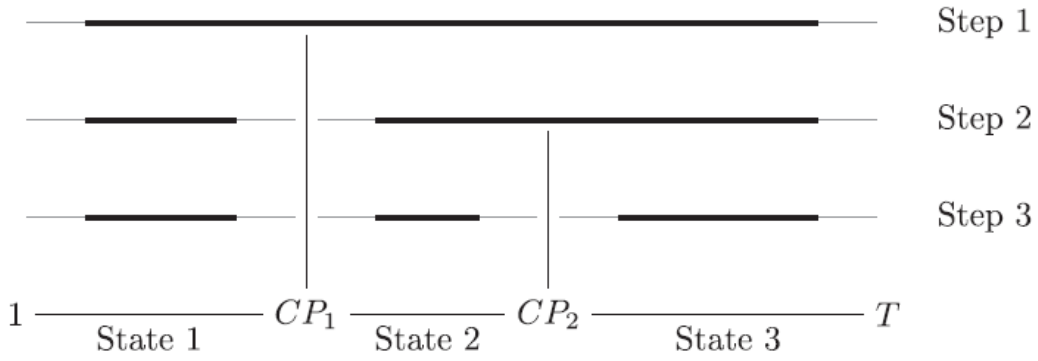
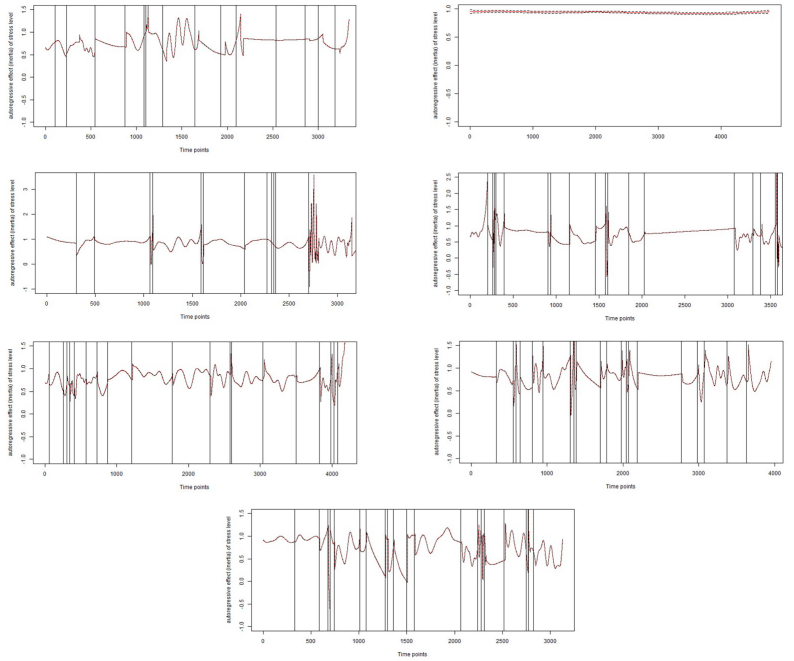
Capturing Dynamics

Hehlmann et al., 2021 – Prediction of outcome

- Time-varying change point autoregressive models (TVCP-AR, Albers & Bringmann, 2020)





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Capturing Dynamics

Hehlmann et al., 2023 – Prediction of outcome

- Continous-time dynamic modeling

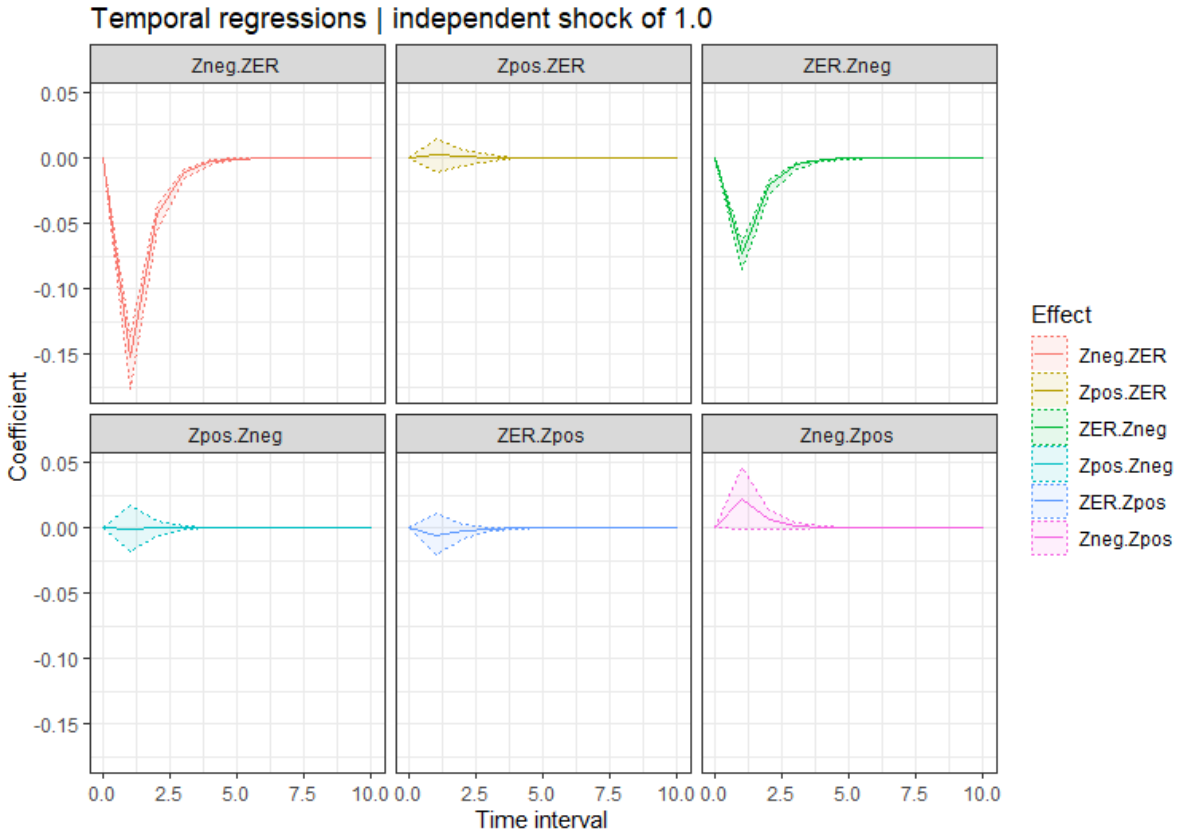
  (Driver & Voelkle, 2018)

- **Advantages:** deals well with observations taken at unequal intervals; facilitates cross-study comparisons; explors the unfolding of effects across time

- **Predictors**: initial impairment &

  cross-effect of PA on ER

  - 40% explanation of variance in OQ-30
  - 4% explained by cross-effect of PA on ER



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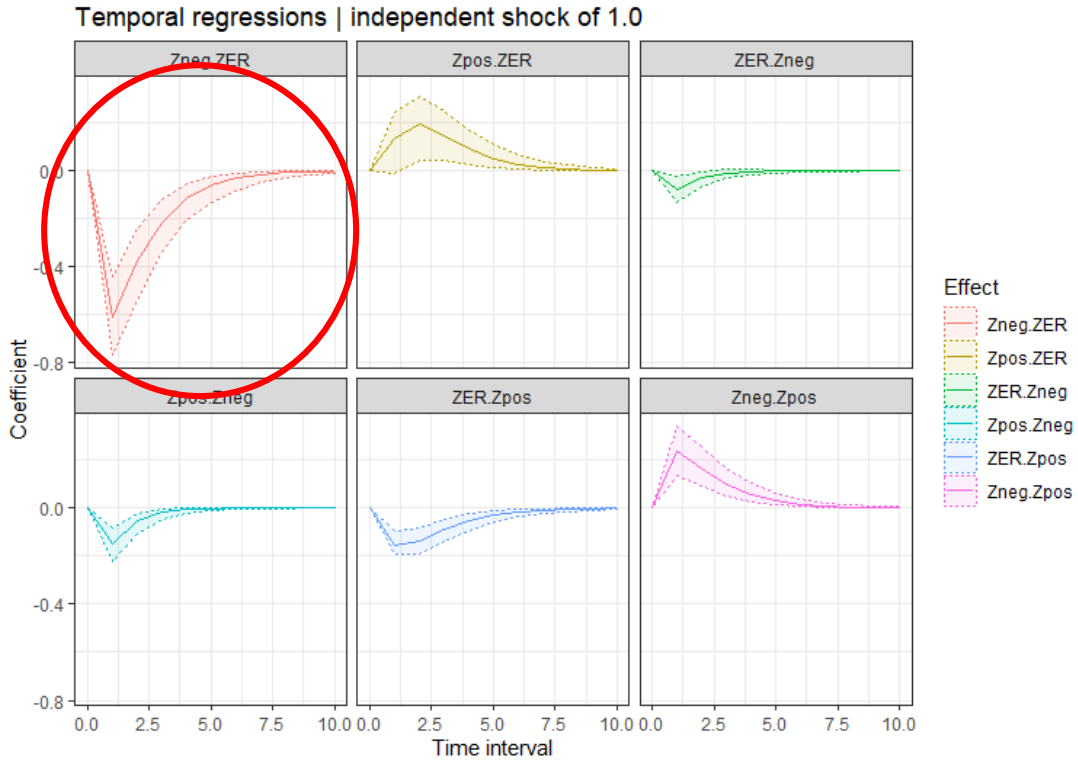
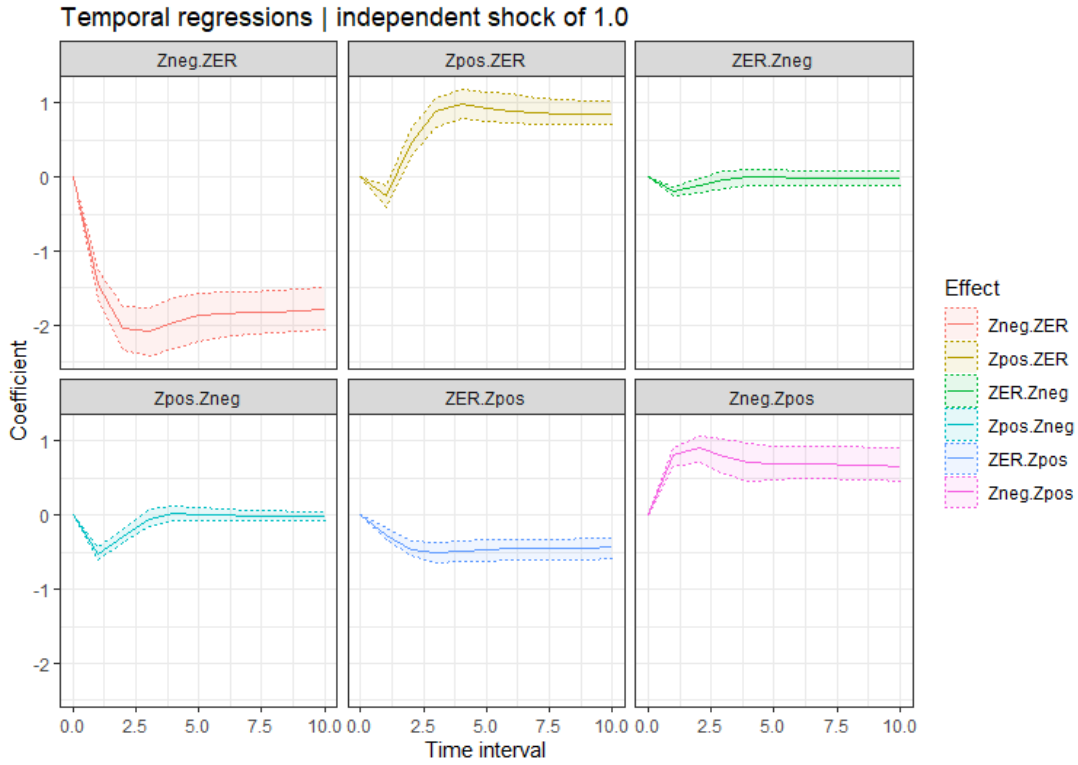
Capturing Dynamics





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Future Progress

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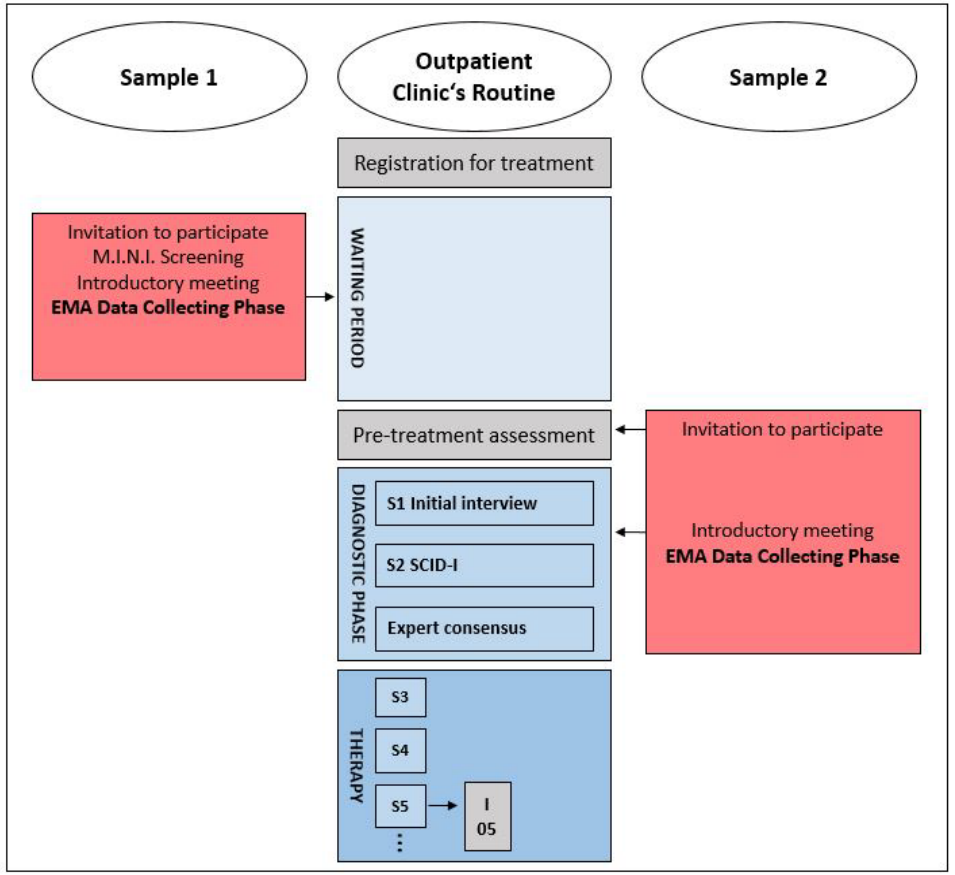
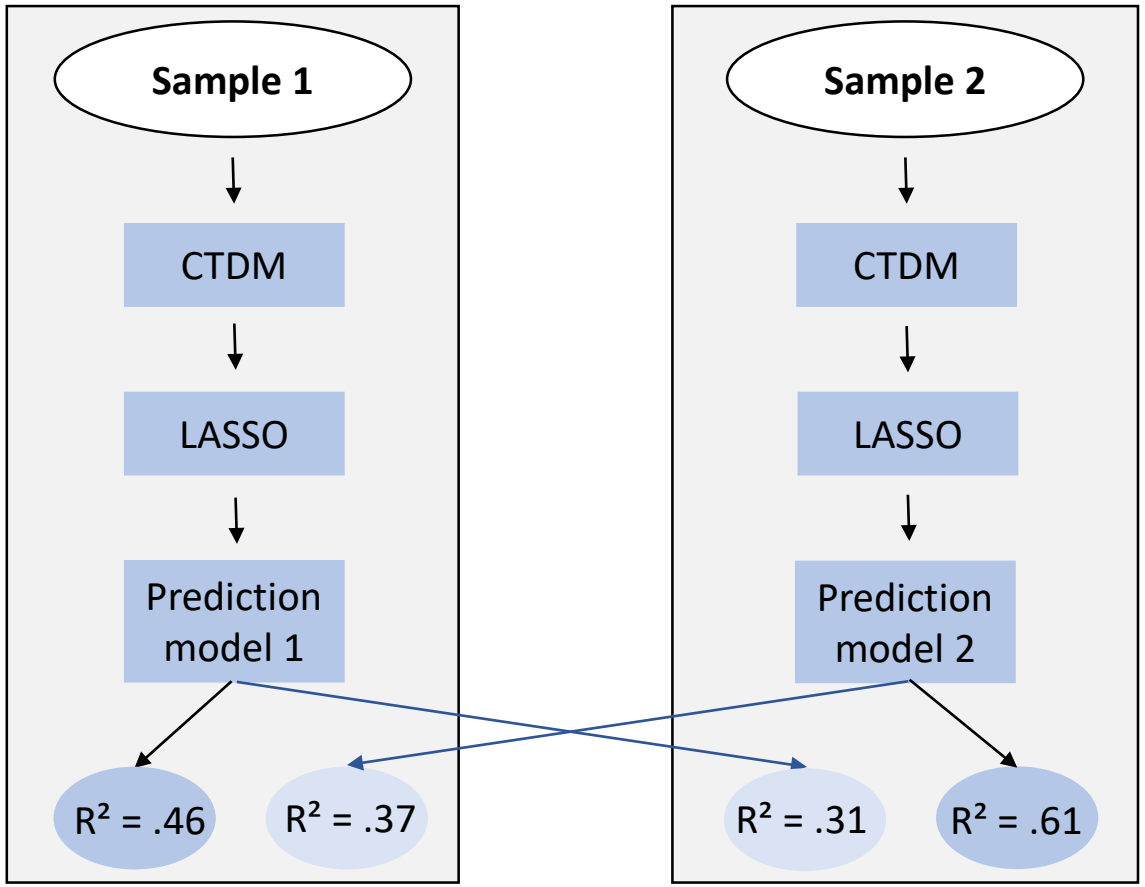
Cross-Validation





A cross-cultural EMA study including digital, affective, and interpersonal markers to enhance the prediction of treatment response and dropout for patients with depression

Wolfgang Lutz, Universität Trier
Juan Martín Gómez Penedo, University of Buenos Aires
Julian Amadeus Rubel, Universität Osnabrück

EMA design

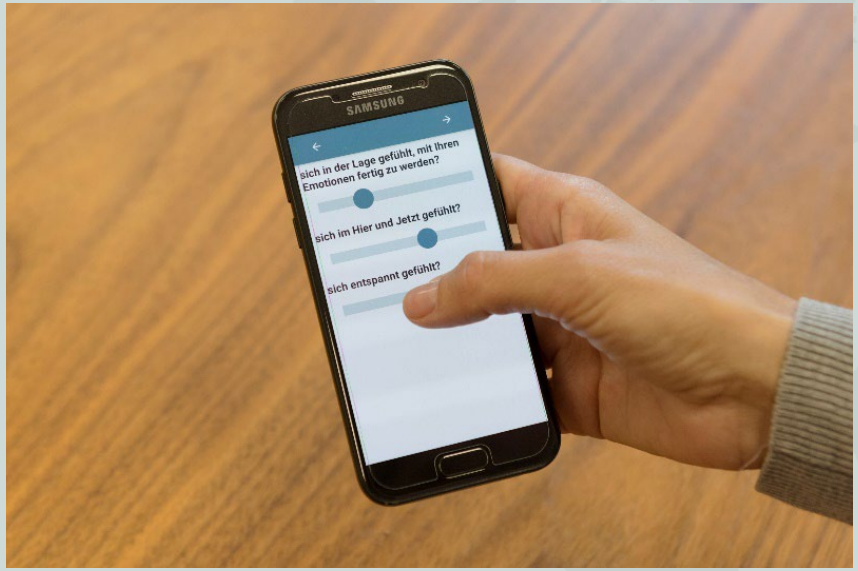
Prediction models will be developed in the training dataset (*n* = 150) and tested in the test dataset (*n* = 150)

150 patients from Trier

75 patients from Buenos Aires

75 patients from Gießen

EMA design



M-path

- 6 times per day
- 2 weeks
- 9 items (affective states & interpersonal distress)

Garmin vivosmart 4

- Stress level
- Activity
- Sleep

Objective

Two different models will be developed:

1) **Cross-sectional models (CSM)**
    - Benchmark: patient characteristics measured at intake
    - five cross-sectional predictors: depression severity, treatment expectations, chronicity, amount of previous treatment, & socioeconomic status.

2) ***EMA-enriched predictive models*** **(EPM)**
    - predictors of the CSM
    - 12 candidate predictors derived from EMA: PA and NA levels and inertia, interpersonal distress levels and inertia, and digital phenotyping levels and inertia (for stress, activity, and sleep)

Objective

First objective

- develop EPM and test their predictive accuracy in a prospective sample compared to CSM
- primary outcome: change in depression symptomatology over the course of the first 20 sessions of treatment
- secondary outcome: unilateral treatment termination (i.e., drop-out)

Second objective

- test if the predictions derived from the model with the highest predictive accuracy (EPM or CSM) are generalizable between centers within Germany (Trier vs. Gießen) and between the centers of Germany and Argentina (Trier & Gießen vs. Buenos Aires)

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Work in Progress

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Big thank you!!

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Literatur

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