Personalizing healthcare using digital N-of-1 trials

Stefan Konigorski & Health Intervention Analytics Lab

Motivation

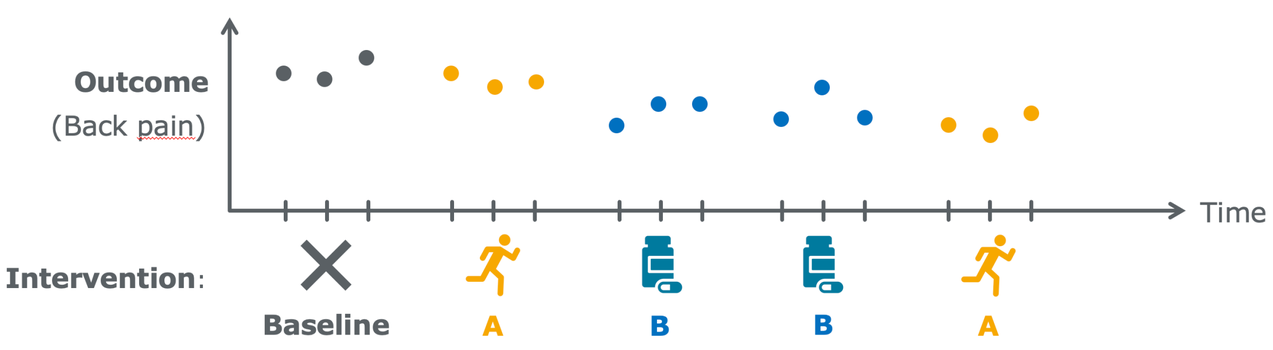
- Most treatment suggestions are based on population-level research and guidelines
- But: there is a large heterogeneity in the effect of many treatments and need for personalization
- If you are unsure whether the treatment works, the only way is to try and test it!

Aim

- Build a platform that enables the evaluation and personalization of treatments in digital trials
- Every person will run their own trial: their N-of-1 trial!

N-of-1 Trials

- N-of-1 Trials are scientific experiments and a special case of randomized controlled trials in one person, comparing two treatments A and B over time:

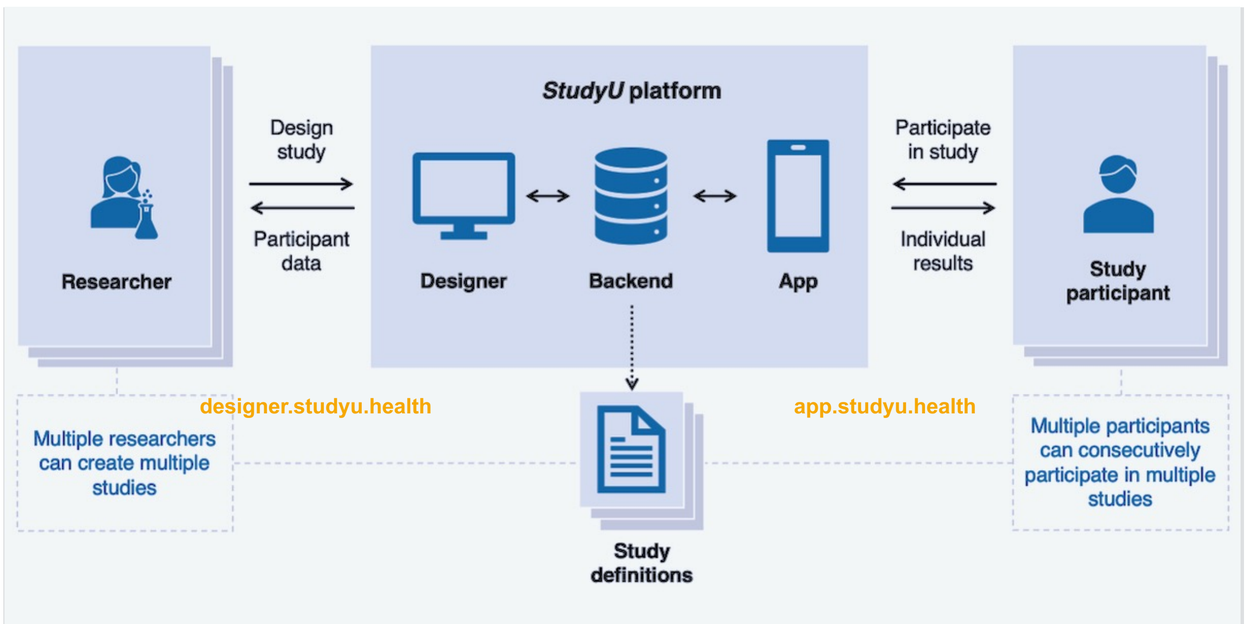


- The trials can be analyzed by state-of-the-art machine learning and Bayesian mixed models
- The results can then be summarized and presented to the participant with a conclusion such as:

For you, exercising helps to decrease your back pain meaningfully with 90% probability!

Try out StudyU at studyu.health.
Design a trial or take part in one!

Overview of the StudyU platform



Features of StudyU

- User-friendly open source platform containing the web study designer and participant app for iOS and Android
- Implement and run N-of-1 trials fully digitally
- All trials and their data are stored securely at HPI

Applications in studies and clinical care

- Non-pharmacological interventions for chronic pain
- Optimal medication dosage in heart failure patients
- Effect of open-label placebo in depression
- Effect of fasting on side effects of endocrine therapy in breast cancer patients

New developments

- Assess your health through images, audio and video
- Novel machine learning models to automate the analyses
- Adaptive N-of-1 trials

References

- Konigorski et al. (2022). J Med Internet Res 24(6): e35884.
- Zenner, Böttinger, Konigorski (2022). Trials 23:1045.
- Gärtner, Schneider, Arnrich, Konigorski (2022). medRxiv. DOI:10.1101/2022.07.21.22277832.
- Fu et al. (2023). arXiv. https://arxiv.org/abs/2302.07547.

Health Intervention Analytics Lab | Machine Learning & Digital Health | Hasso Plattner Institute | Digital Engineering | University of Potsdam | Prof.-Dr.-Helmert-Str. 2–3 | 14482 Potsdam