

## Chair Digital Health & Personalized Medicine

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### **TOPIC 1: Precision Psychology via Machine Learning on EHR-data from the Mount Sinai Health System**

In current clinical handbooks, mental disorders are described mainly based on symptoms. However, many patients with different disorders share the same biological underpinnings and patients of the same diagnostic category react very differently to the same treatment. Using computational psychology on Electronic health records (EHR) data holds considerable promises for new research insights and more personalised patient treatment. The Mount Sinai Health System (MSHS) is a modern academic health system serving eight million patients with longitudinal EHR data and the Mount Sinai data warehouse captures real-world healthcare data spanning more than 10 years. The goal of this master thesis is to use unsupervised machine learning methods to identify (sub)phenotypes that are closer to underlying biological or neurological mechanisms and could inform treatment decisions.

*What you need to bring:* very good machine learning and python skills, interest in mental health conditions

*What we will offer:* close supervision and an exiting real-world dataset including cooperation with MSHS in NewYork, aiming for a joint publication

### **TOPIC 2: Validation of a Digital Stress Test with Psychological and Physiological measures**

Acute stress affects cognitive, cardiovascular, immunological and metabolic function via the release of cortisol. Long-term exposure of cortisol increases the risk for metabolic syndrome, obesity, cancer, mental health disorders, cardiovascular disease as well as the susceptibility to infections. Most health studies so far focus on acute stress induced in the laboratory, or on questionnaire measures of long-term stress - despite known problems with recall and biases in self-report. Thus, we have developed a scalable digital stress test. The goal of the thesis is to validate the stress test with physiological and behavioral measures (e.g. Cortisol) and compare it with standard classical test (e.g. Cold Pressure Test and TSST). The validation study will take place with healthy participants at the DHC and be conducted independently with close supervision.

*What you need to bring:* good communication skills (german-fluency required), good statistical knowledge, interest in stress research

*What we will offer:* close supervision, conduction and analysis of a real psycho-physiological study, aiming for a joint publication