Freie Universität Berlin

FOR 5187
PREACT

Behind the spotlight: Using EMA and passive sensing to depict situational context in a clinical sample

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Background

What is "**context**"?

- *"sum of environmental conditions or situational circumstances under which behaviour occurs, distinct from person-characteristics or inner states"*1
- Ambulatory assessments = perfect for assessing context in situ!
  - **Active (EMA): i.e.** Social context, Situation Evaluation (DIAMONDS)
  - **Passive:** Location and Movement, Weather, Surrounding
- Incorporating context leads to improved prediction of proximal (i.e. mood) and distal (i.e. long-term mental health) outcomes!

Implementation in **psychotherapy research**

- understand and address conditions and behaviors driving patients' symptoms
- automaticly detect critical contexts and trigger an appropriate intervention on the patients' smartphone (**JITAI**)

➔ Can we predict situational context using passive data?
➔ Can we predict mood using active and passive context data?

Study Setup

Data collection

- Participants are provided with the Withings Scanwatch and the TIKI-app
- Collect data for 14 days pre-therapy; max. 8 EMA beeps per day
- Active data: situational context (new measure), affect (PANAS)

Sample

- 173 participants remain after quality control, 58% female, mean age =33.7
- 11055 EMA-beeps in total, mean= 63 ± 22

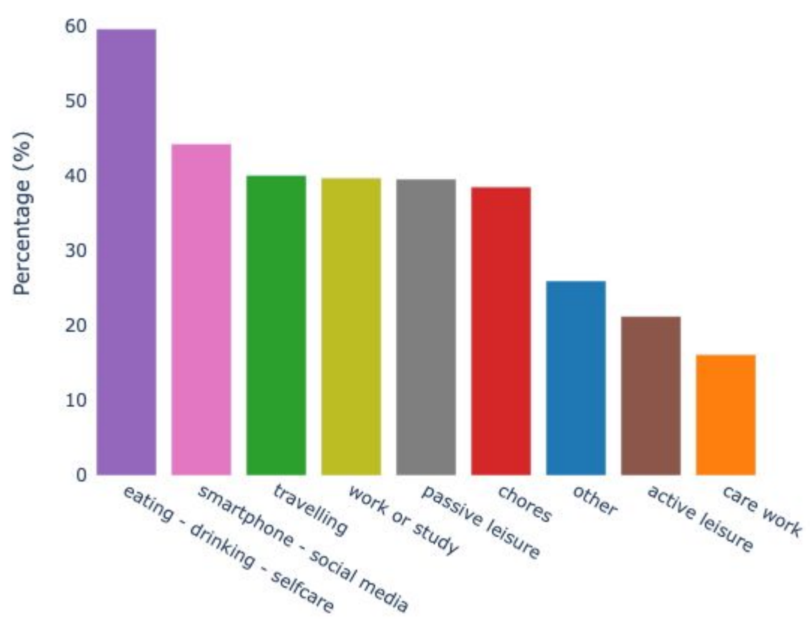
Features

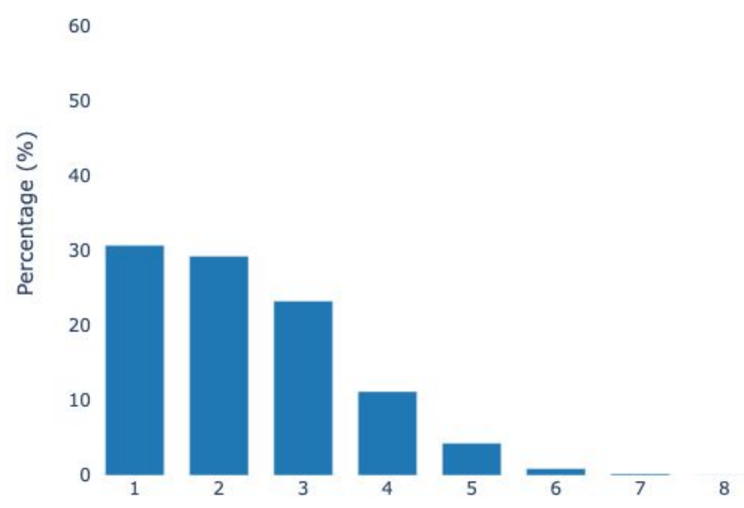
- 2h before each assessment
- GPS: total distance travelled (km), minutes in transition, minutes at home, n GPS
- Time-based: Season, time of day, weekday, weekend, hour
- Activity: step count

Model

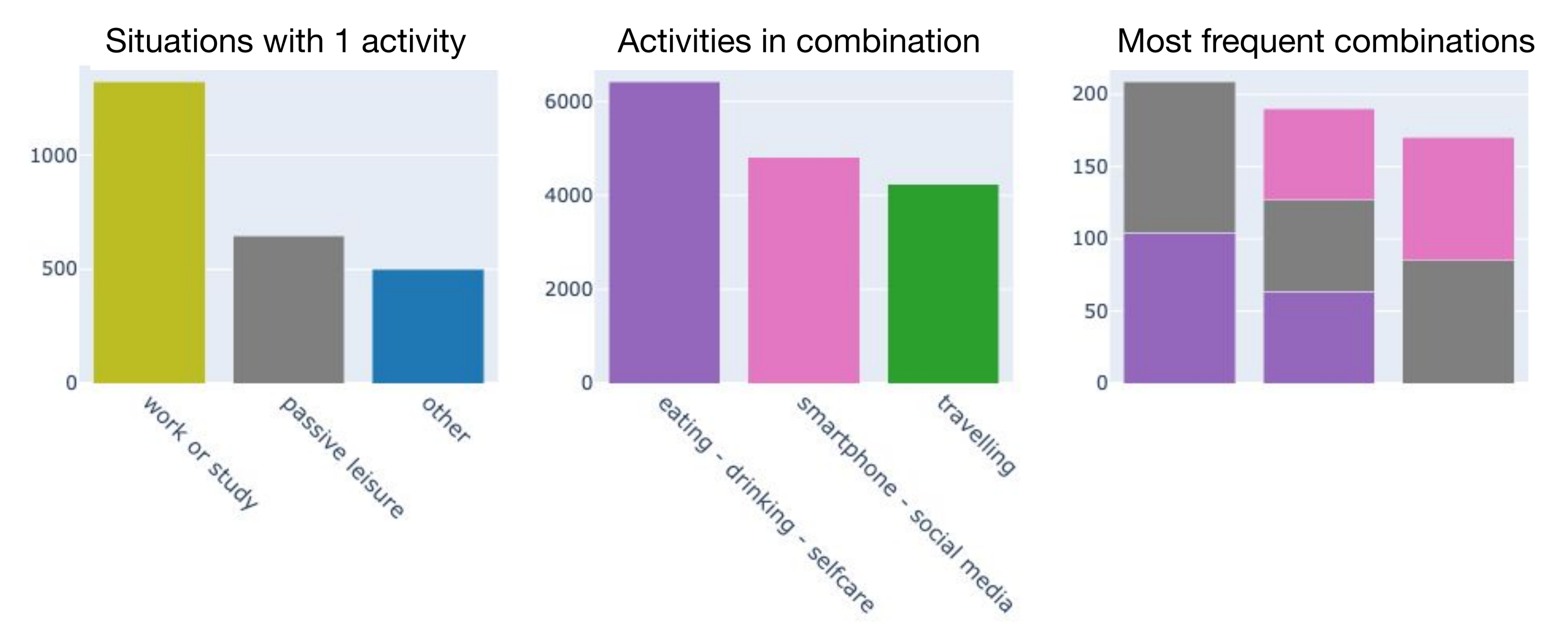
- Multilabel prediction of situation composition
- Ensemble of 10 Classifier Chains using Random Forests

Situation distribution





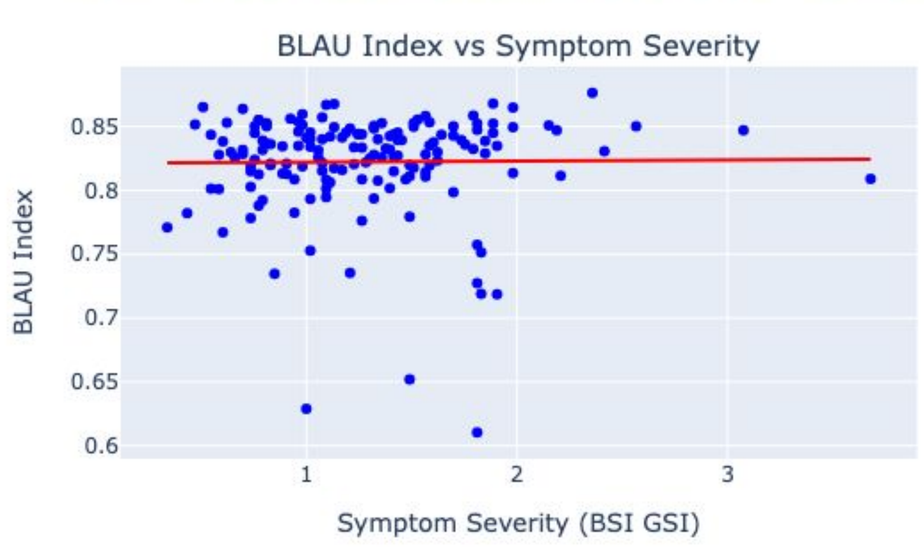
Situation composition

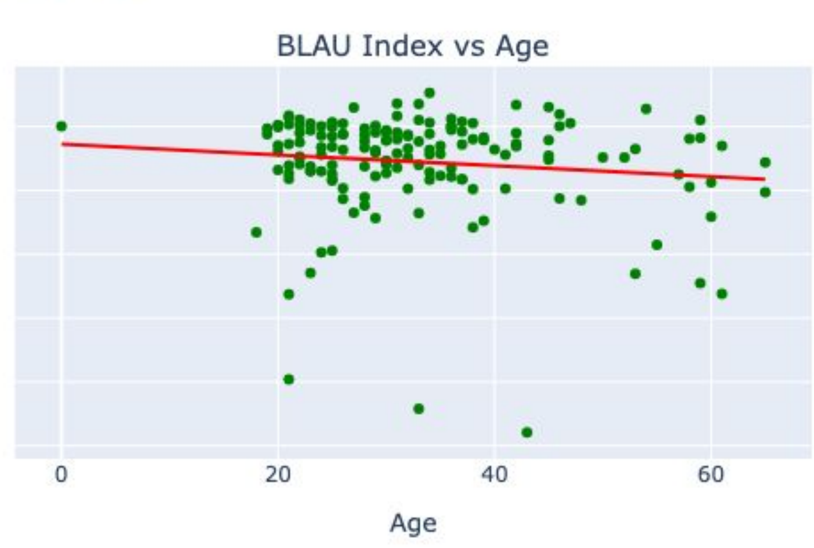


Situation distribution

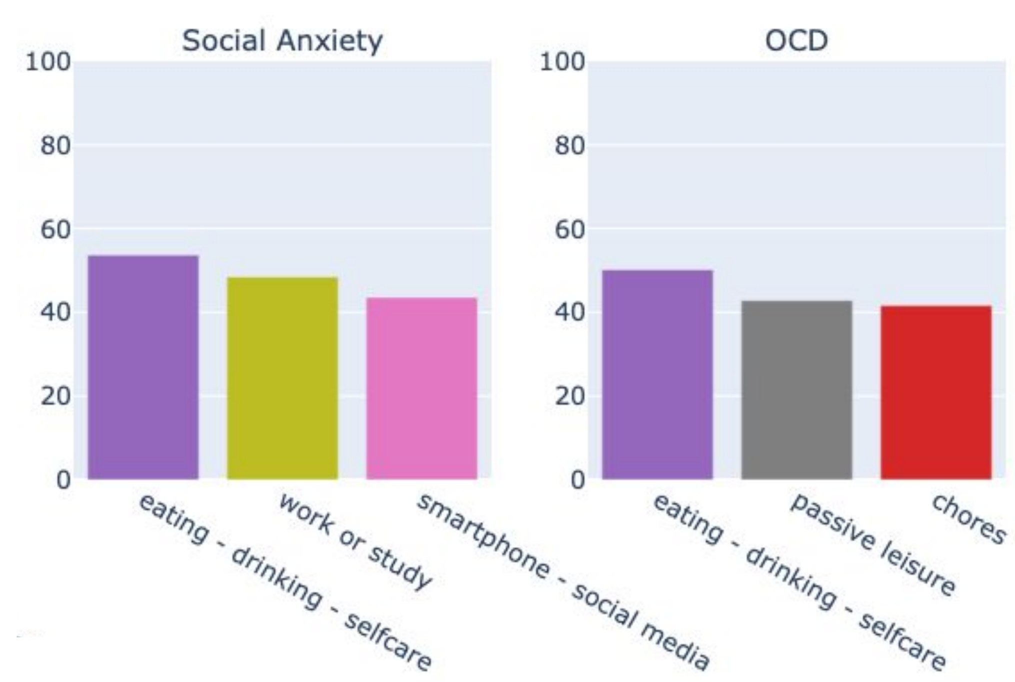
BLAU-Index = meausure of within person situation diversity (0-1)

→ mean BLAU-Index: **0.83 ± .22**





Situation Frequencies across diagnoses

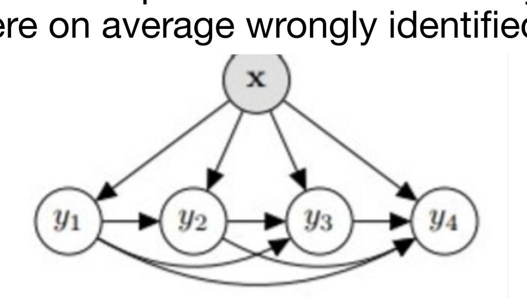


Passive context prediction

How good can we depict situational context using passive data?

- Accuracy: **14%**
- Hamming-Loss: **25%**

→ only 14% of situation compositions were correctly predicted
→ ¼ of the labels were on average wrongly identified



Discussion

- High within-person diversity in situational context; however, patients are **homogeneous** in situational diversity → no adequate measure to distinguish individuals
- Differences in situational contexts between diagnoses, i.e. OCD
- Passive data descriptively match with situational contexts; data used in these analyses **do not suffice** to cover relevant aspects of situational contexts
  → add further available variables like heart rate, weather, physical activity
  → train **idiographic, i.e. individual** models (complexity)
  → outlook: predict above-average negative affect based on active and passive context features (JITAI)

Literature

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