

MOSAIC: Multimodal OCD Sensing And Information Context

Kristina Kirsten, Prof. Dr. Bert Arnrich

Facts about Obsessive-Compulsive Disorder (OCD)

- >2% of world's population suffer from OCD
- Symptoms
 - Recurrent or persistent thoughts, images, impulses or actions
 - Desire to resist
 - Obsessions and compulsion take >1 hour a day
- Risk Factors
 - Genetics
 - Brain Structure and Functioning
 - Environment (e.g. physical or sexual abuse)
- Treatments and therapy
 - Medication (SRIs/ SSRIs)
 - Psychotherapy, esp. Cognitive Behavior Therapy (CBT)

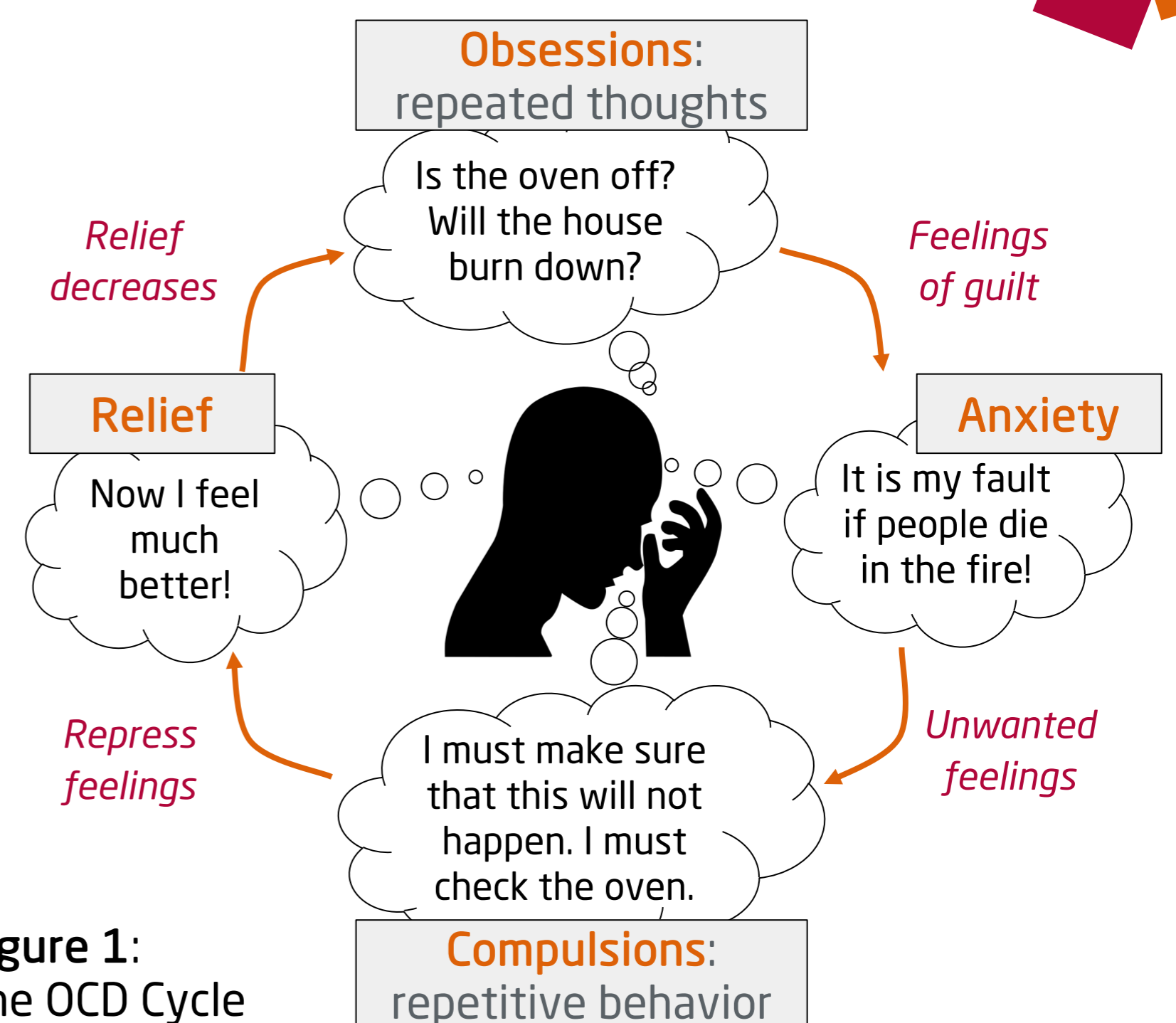


Figure 1: The OCD Cycle

Research Questions

1. Is it possible to identify compulsive activities with the help of wearables?
2. What role does the context play in this?
3. Is the indoor location a meaningful feature?
4. Is there a correlation between physiological parameters and compulsions and/or obsessions?

(Previous) Projects & Approaches

- Federated learning for personalized models [1] → tested with augmented OPPORTUNITY dataset
- Active/online learning with smartwatch app to build personal model based on own repetitive activities → use case: relapse prevention
- Simulated lab OCD study with IMU sensors and BLE proximity beacons
- Lab study on compulsive hand washing activities [2]

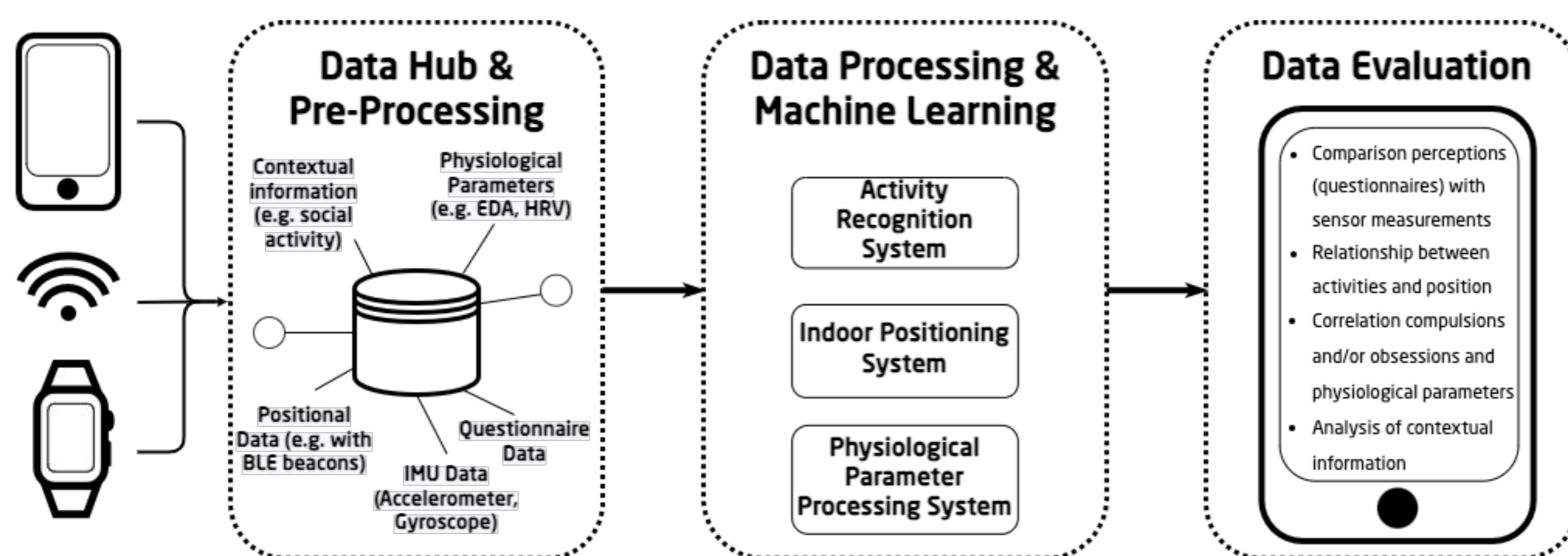


Figure 2: MOSAIC Pipeline

Lessons Learned

- ✓ No publicly available (real) dataset
- ✓ Smartwatch on non-dominant hand
- ✓ Compulsions are highly manifold
- ✓ Obsessions cannot be measured directly with wearable sensors
- ✓ Vital parameters cannot be simulated
- ✓ Patient feedback is desired

References

- [1] Sensor-Based Obsessive-Compulsive Disorder Detection With Personalised Federated Learning. Kirsten, Kristina; Pfützner, Bjarne; Löper, Lando; Arnrich, Bert (2021). 333-339.
 [2] Wahl, K., Scholl, P. M., Wirth, S., Miché, M., Häni, J., Schöllin, P., & Lieb, R. (2022). On the automatic detection of enacted compulsive hand washing using commercially available wearable devices. Computers in Biology and Medicine, 143, 105280.