



# Using wearable mHealth devices to maximise outcomes in young people with mental illness: The unWIRED project

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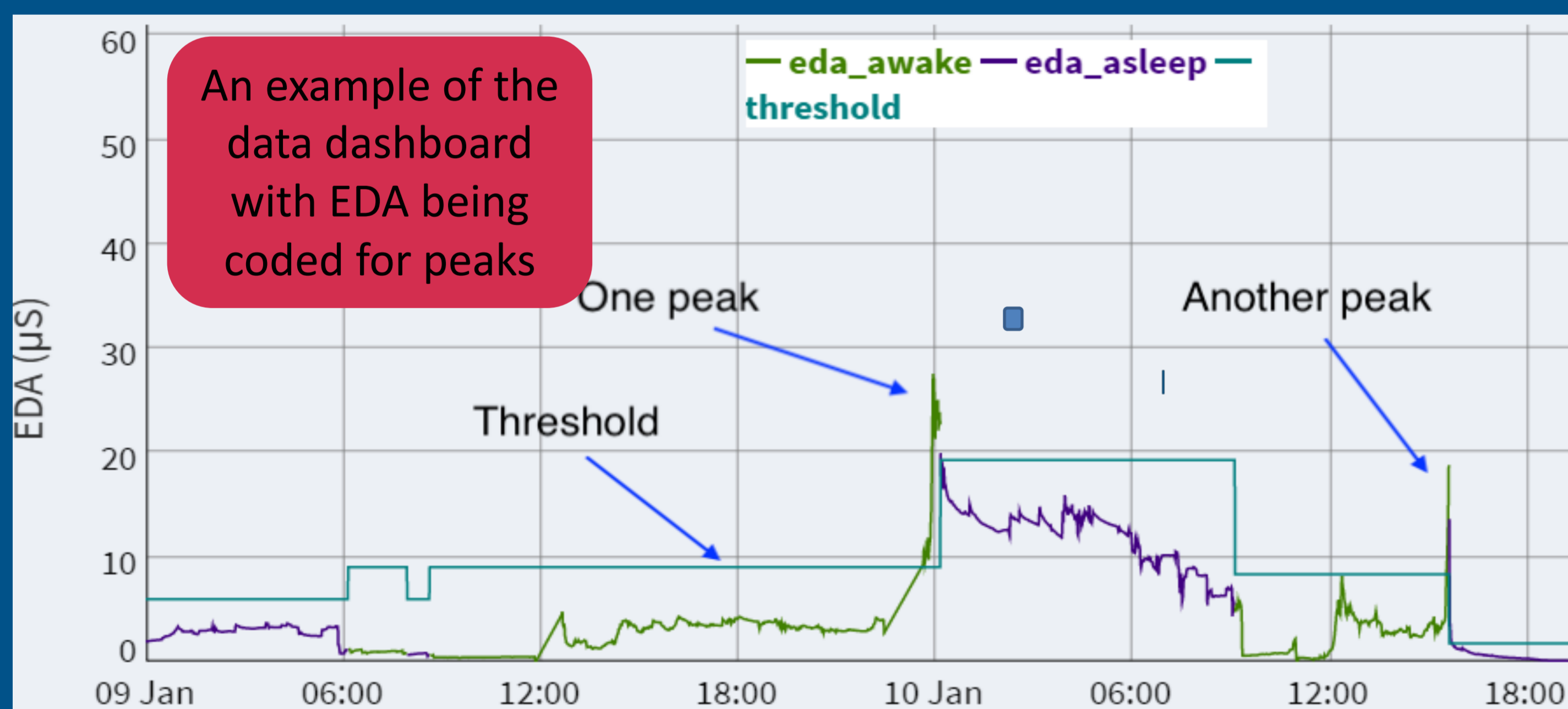


## Background

- Community mental health services with an orientation to early intervention strive to intervene at the earliest opportunity in the onset of mental illness or relapse.
- However, community-based clinicians remain at a disadvantage as they 'catch up' with the mental state of their clients often *after* a deterioration in a person's mental state, leading to periods of untreated illness [1,2]
- mHealth (e.g. digital apps and wearables) provide the possibility of real time tracking of key psychophysiological indices of good mental health such as sleep, arousal and activity [3].
- The unWIRED Project integrates a mHealth device into clinical care to track and record these indices with the aim of recognising signs of early deterioration in young adults' mental health.

## Aims

- To assess the effectiveness of integrating a mHealth device in the clinical care of young people with a mental illness
- Examine the use of a machine learning approach in predicting deterioration in participants using psychophysiological data collected by the mHealth device.



## Method

- An initial pilot study of the use of the E2 (Empatica) device measuring sleep, arousal (electrodermal activity; EDA), and level of activity was conducted in young adults referred to a community mental health service.
- Labels for participants' functioning ('stable', 'ambivalent' or 'distress') were extracted from medical records and matched with electrophysiological data.
- Ecological Momentary Assessment (EMA) in the form of replies to randomly sent text messages to participants asking them to rate their stress levels on a 1-10 scale were also included.
- Data was examined using machine learning to predict significant changes in mental state.
- Qualitative data from participants and clinician interviews assessed acceptability of the device.

## Results

- 11, male = 8). Average age = 21 years (SD = 1.86 years), all recruited from a young adults' early intervention service, within community mental health WSLHD
- Participants were enrolled in the study for an average of 92.8 days (SD = 44.30 days).
- A Random Forest Classifier was superior to a Logistic Classifier; we were able to predict clinical deterioration with a high degree of specificity (0.96) but a lower degree of sensitivity (0.50). Accuracy rate = 0.86 (95% CI 0.75 - 0.94).
- SMS self-reported stress levels (via EMA) did not improve the accuracy of the model



- Qualitative data suggests that the clients and clinicians identify the benefits of the mHealth device in aiding both self-monitoring and clinician-monitoring [4]
- The barrier to utilisation, understandably, is concerns with privacy and data misuse [4]

## Conclusion

- We have been able to establish the acceptability of wearing a mHealth device over an extended period
- While reasonable accuracy was achieved it did not reach an acceptable level for clinical use.
- EMA vis SMS self-reporting of stress does appear necessary in monitoring patient deterioration when other psychophysiological and clinical data is available
- A subsequent Randomised Controlled Trial (N = 80) is ongoing in 2022 with the aim to further strengthen these findings.

## References

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