Personal Sensing for Temporally Precise Lapse Prediction for Alcohol Use Disorder

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BACKGROUND & RATIONALE

- Alcohol Use Disorder (AUD) is a highly prominent, complex disorder with low rates of treatment seeking and low levels of insight
- Treatments for AUD require individuals to monitor their risk for relapse and seek/deploy interventions at appropriate times
- Ecological Momentary Assessment (EMA) can be used to frequently sample contextual and person-specific variables associated with alcohol use lapses

METHODS

151 participants with AUD

- Early in recovery (1 – 8 wks), abstinence goal

On study for 3 months

Provided 4x daily EMAs reporting:

- Date and hour of any alcohol use not previously reported
- Maximum intensity since last survey of:
  - ✓ Craving, risky situations, stressful events, pleasant events
- Predicted likelihood of future:
  - ✓ Risky situations, stressful events, maintaining abstinence

ANALYSES

3 prediction models

- Next week, next day, next hour

4 candidate machine learning algorithms

- ElasticNET GLM, Random Forest, XGBoost, KNN

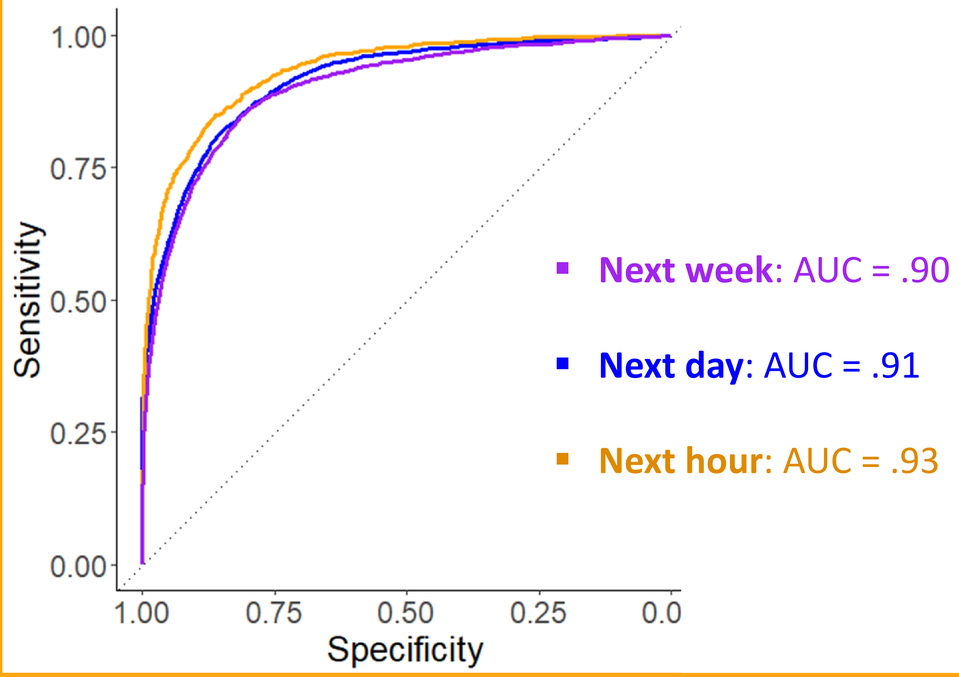
300 potential features

- Based on recent past experiences (e.g. ratings in past 12, 24, 48 hours)
- Mins, maxes, medians of all EMA responses
- Past lapses, compliance, day of week, change scores

Tuned and assessed using participant grouped 10-fold cross-validation

Ecological momentary assessment accurately predicts lapse onset in the next week, next day, and next hour for individuals with AUD

Receiver Operating Characteristic (ROC) Curves across lapse prediction models



STUDY GOAL

Generate EMA based models to predict hour-by-hour probability that any lapse will occur between current hour and the...

- Next week (current hour +168 hours)
- Next day (current hour +24 hours)
- Next hour (current + 1 hour)

RESULTS

	Next week	Next day	Next hour
AUC	.90	.91	.93
Sensitivity	.79	.81	.84
Specificity	.86	.86	.87
Balanced Accuracy	.82	.83	.86
PPV	.65	.32	.02
Window lapse frequency	25.4%	7.7%	0.4%