



Personal Sensing of Smartphone Communications to Support Recovery from Alcohol Use Disorder

Kendra Wyant

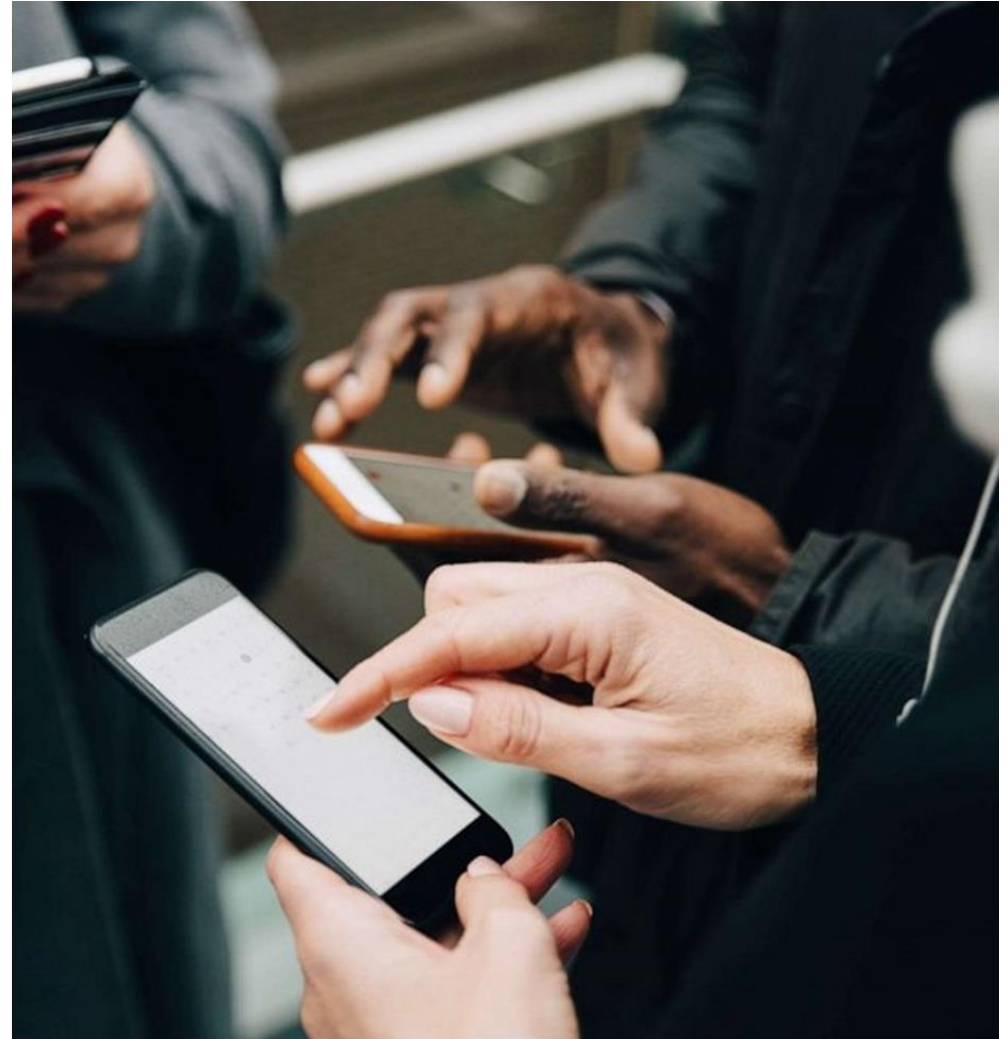
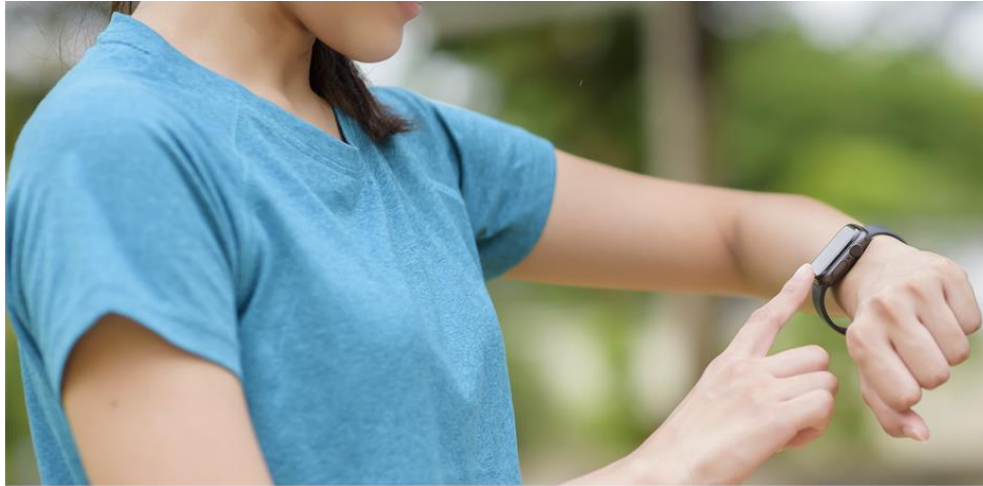
Department of Psychology
University of Wisconsin-Madison

Alcohol Use Disorder

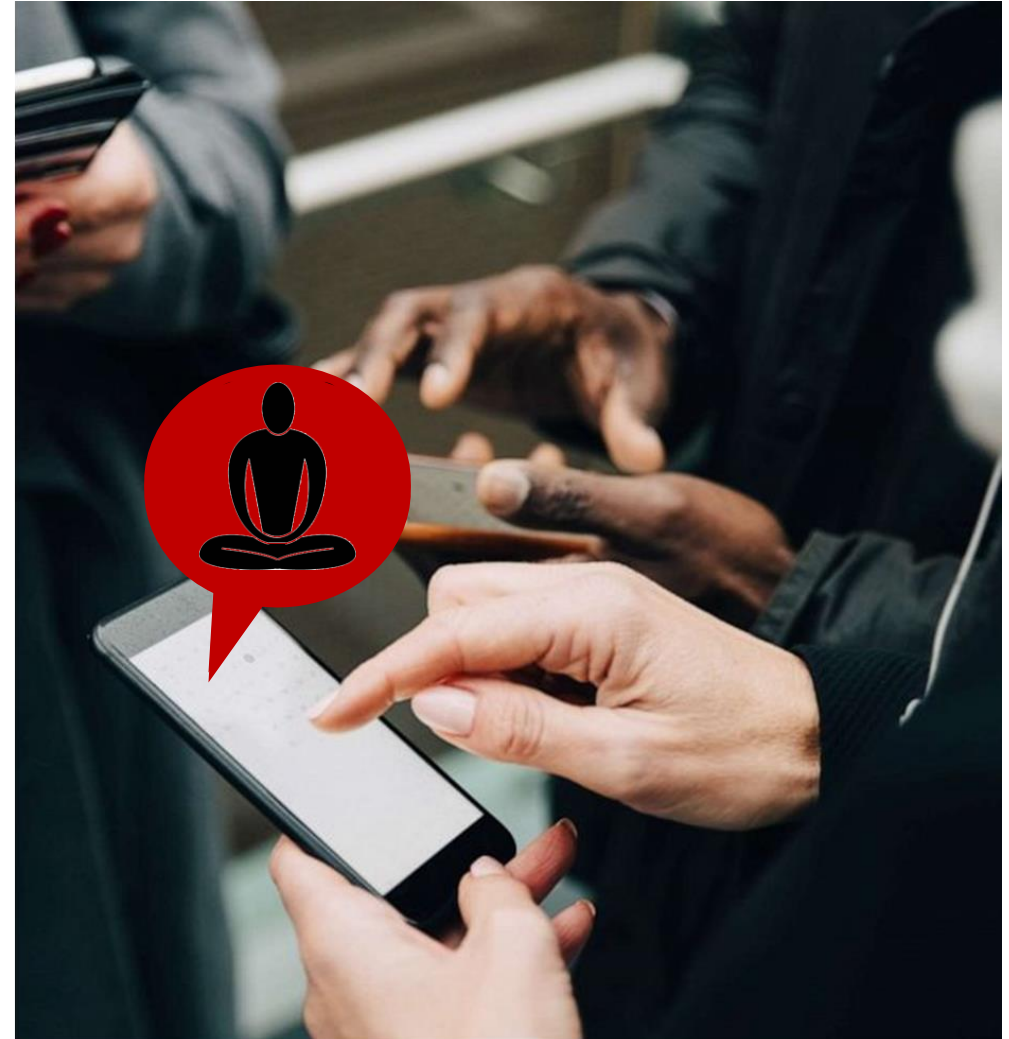
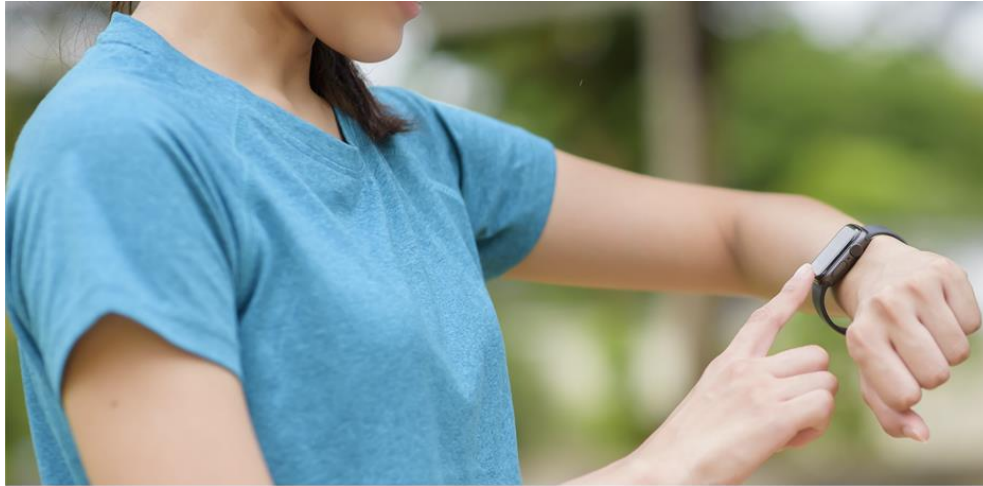
- 6% of US adult population
- Chronic relapsing disease
- Digital therapeutics



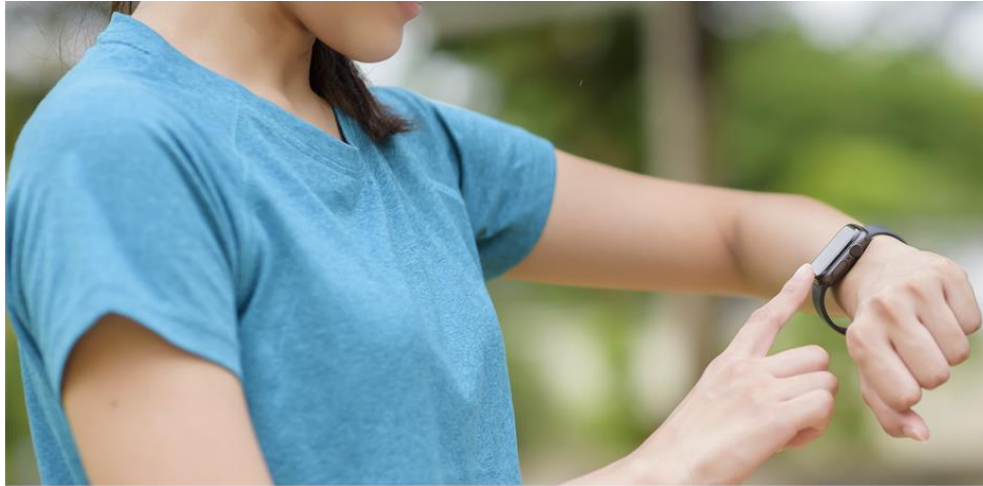
Personal Sensing



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Voice and Text Message Logs

- Passive
- Capture risk factors in varying time windows
- Can be contextualized with little added burden
- Context could increase predictive power



Voice and Text Message Logs

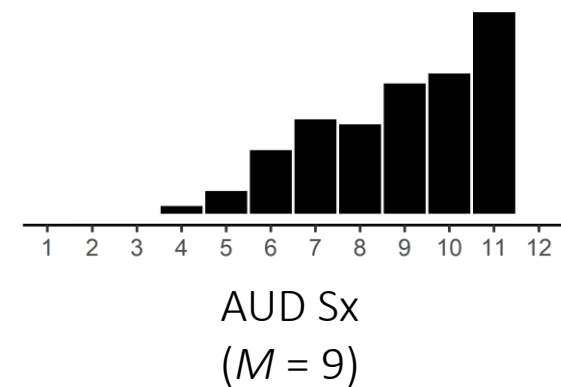
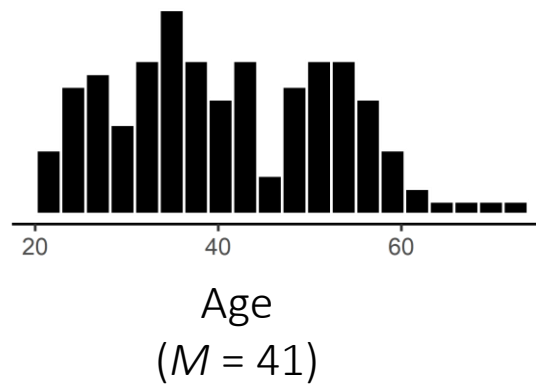
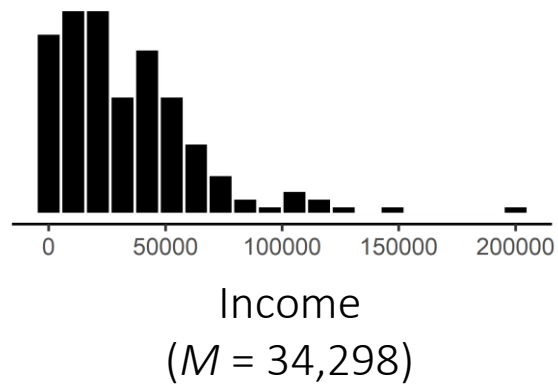
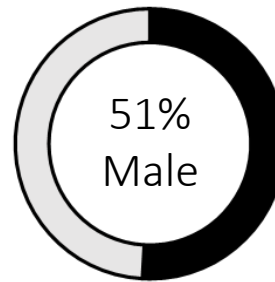
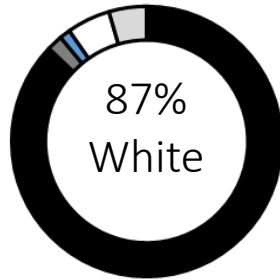
- Passive
- Capture risk factors in varying time windows
- Can be contextualized with little added burden
- Context could increase predictive power



1. Can we predict when someone will lapse?

2. Does context matter?

Participants



Date and Time	Phone Number	Type	Direction	Duration (sec)
2019-10-12 15:51:25	608-555-1234	voice	outgoing	0
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2019-10-12 18:56:48	608-555-1234	sms	incoming	NA
2019-10-12 19:27:57	608-555-1234	voice	outgoing	47
2019-10-13 11:02:56	608-222-4321	voice	Incoming	0
2019-10-13 15:48:00	608-333-5678	sms	incoming	NA
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What type of relationship do you have with this person?

Have you drunk alcohol with this person?

What is their drinking status?

Would you expect them to drink in your presence?

Are they currently in recovery from alcohol or other substances?

Are they supportive of your recovery goals?

How would you describe your typical experience with this person?

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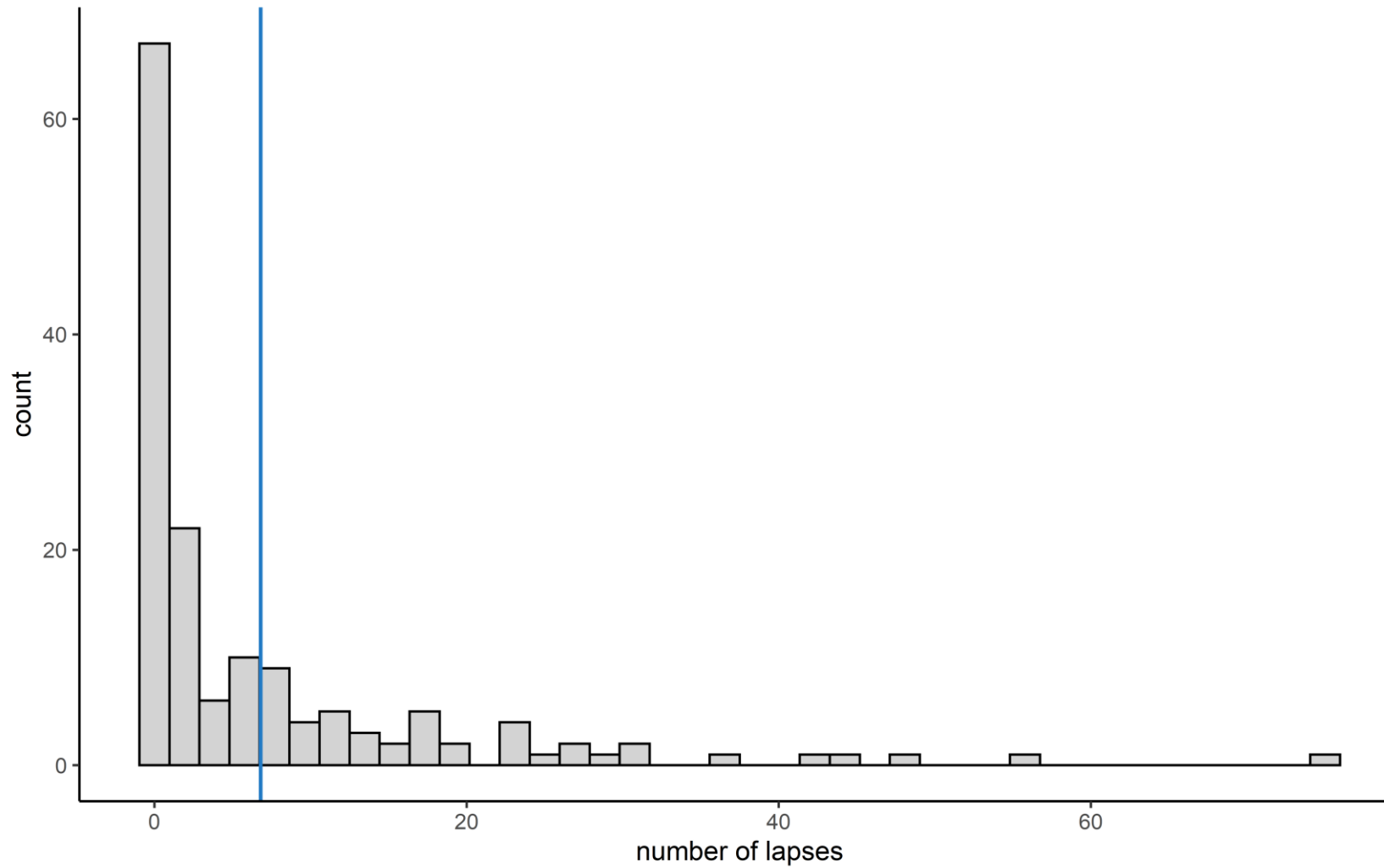
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Method

- Machine learning and cross-validation
- glmnet, knn, random forest
- Active and passive feature sets
- Class resampling
- Feature engineering
- Next hour prediction

Lapse Labels



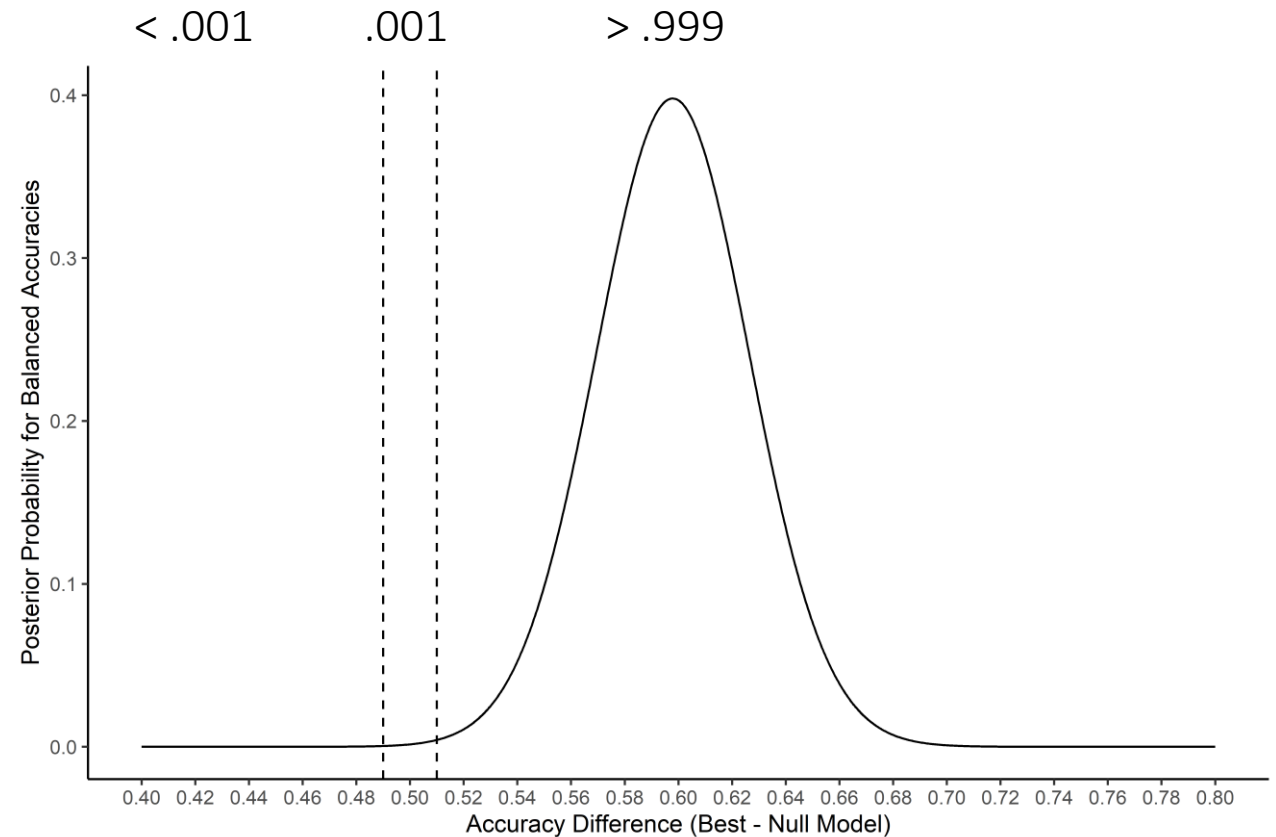
N lapses = 1029

1. Can we predict when someone will lapse?

Best Model Performance

passive random forest

Metric	Estimate
balanced accuracy	.60
accuracy	.72
sensitivity	.46
specificity	.73
positive predictive value	.09
negative predictive value	.96
area under the ROC curve	.64



1. Can we predict when someone will lapse?

2. Does context matter?

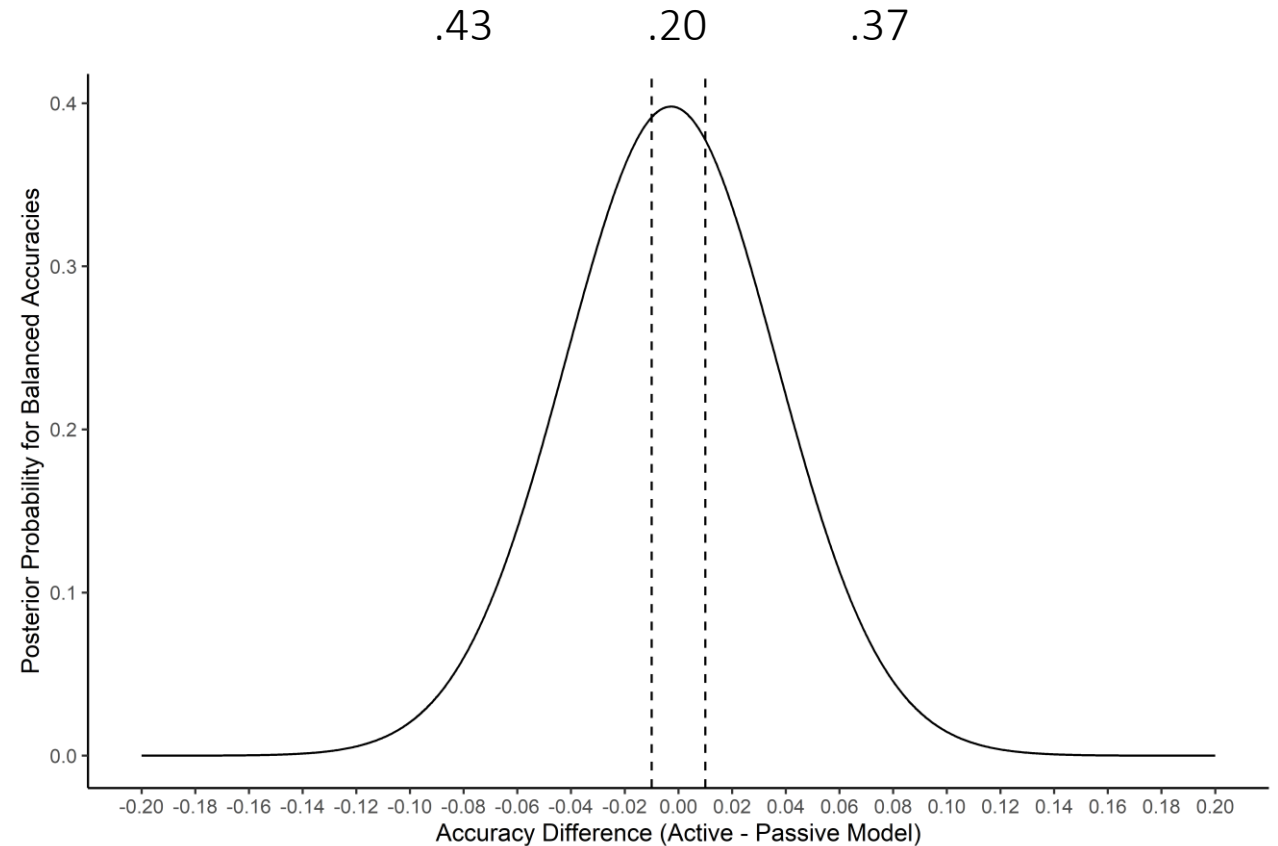
Model Comparison

active glmnet

Metric	Estimate
balanced accuracy	.59

passive random forest

Metric	Estimate
balanced accuracy	.60



What does this all mean?

Can we predict when someone will lapse?

Does context matter?

What does this all mean?

Can we predict when someone will lapse?

Maybe

Does context matter?

Maybe not

Mentor

John Curtin

Committee

Kate Walsh

Mike Koenigs

Andrew Quanbeck

Addiction Research Center

Gaylen Fronk

Sarah Sant'Ana

Hannah Moshontz

Ali Colmenares

Susan Wanta

