Left on Read:
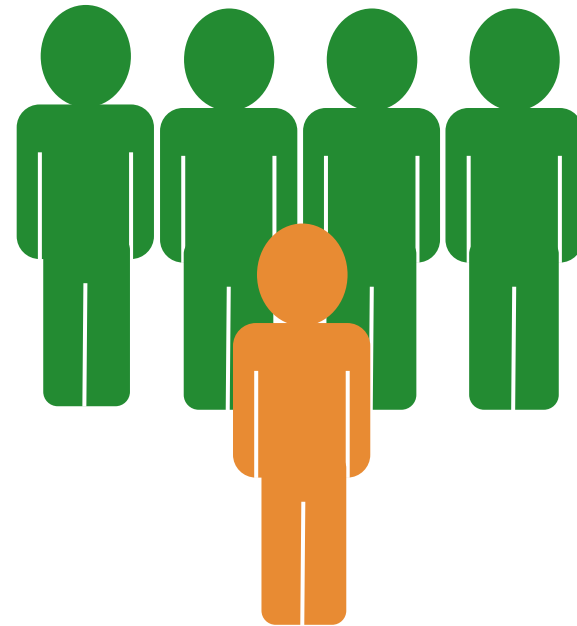## Reply Latency for Anxiety & Depression Screening

ML TLACHAC, *BRYANT UNIVERSITY*

SAMUEL S. OGDEN, *CSUMB*

Mental Illnesses are Prevalent and Costly

Annually, more than

1 in 5

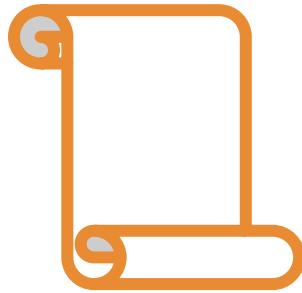U.S. **adults** experience mental illnesses

"Key substance use and mental health indicators in the united states: Results from the 2019 national survey on drug use and health," 2020.
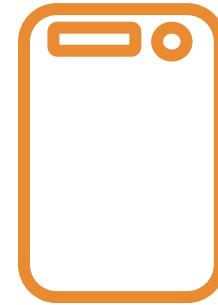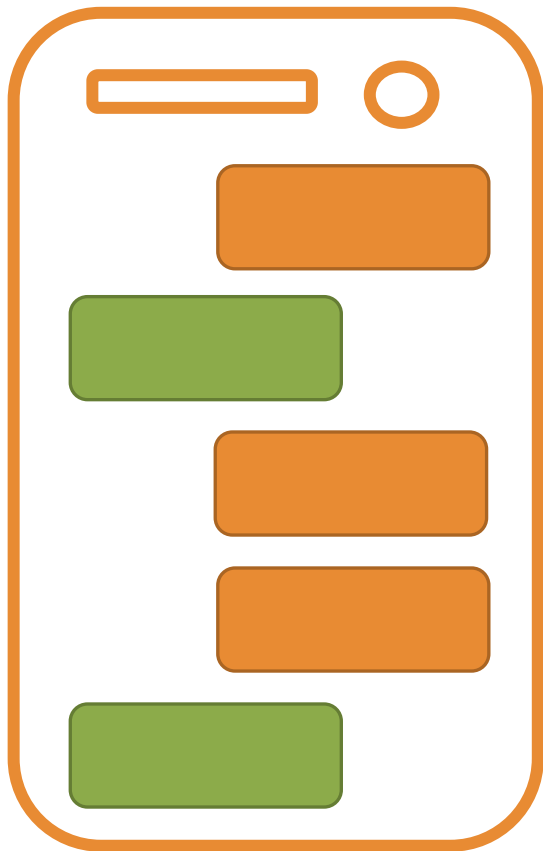
Mental Illness Screening Options

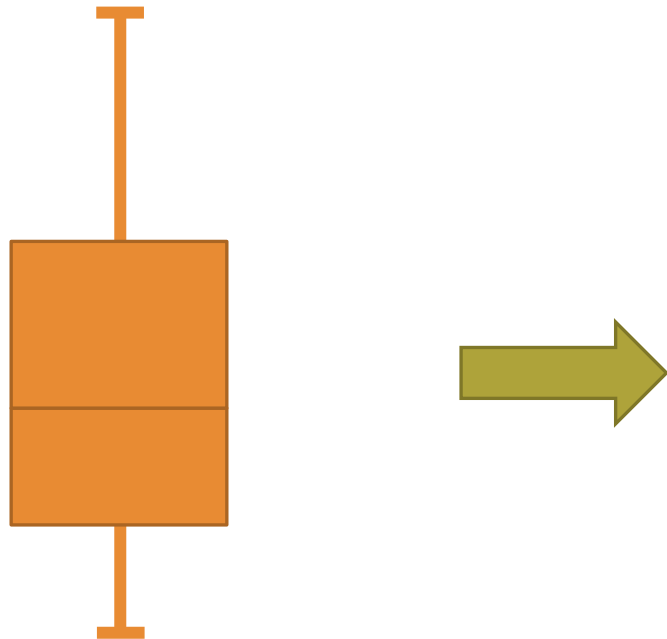Interview ▸ Survey ▸ App

Reply Latency for Mental Illness Screening

Number of seconds between receiving and sending a text message

Reply Latency Distribution & Features

1. Number of contacts
2. Number of replies
3. Minimum latency
4. 10% quantile latency
5. 25% quantile latency
6. 50% quantile latency
7. 75% quantile latency
8. 90% quantile latency
9. Maximum latency

Crowd-Sourced Datasets

Dataset	Collected	Data Labels	Participants with 7+ replies
DepreST-CAT	After COVID-19	PHQ-9 (depression), GAD-7 (anxiety)	49
Moodable/EMU	Before COVID-19	PHQ-9 (depression)	46

At scores for moderate depression and anxiety, classes are relatively balanced
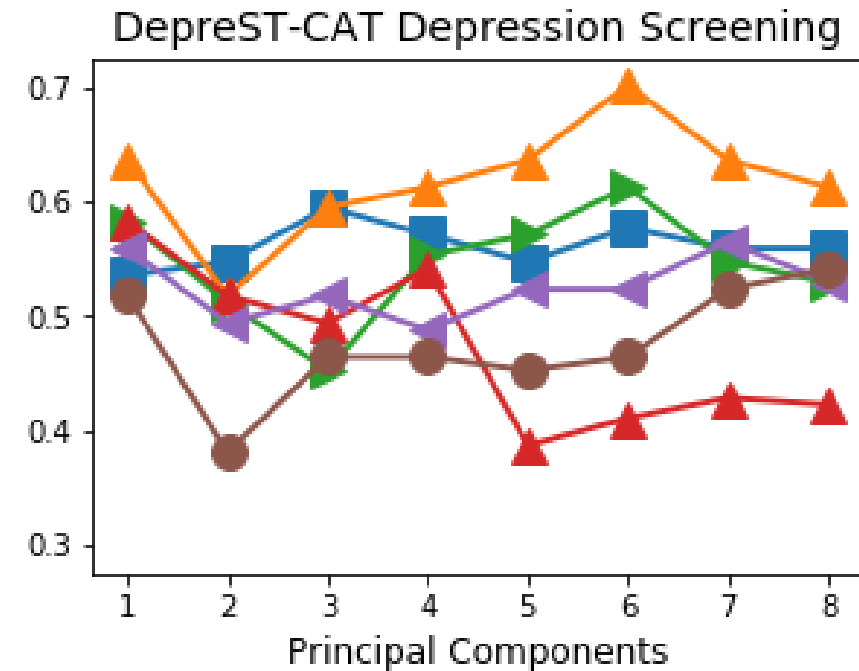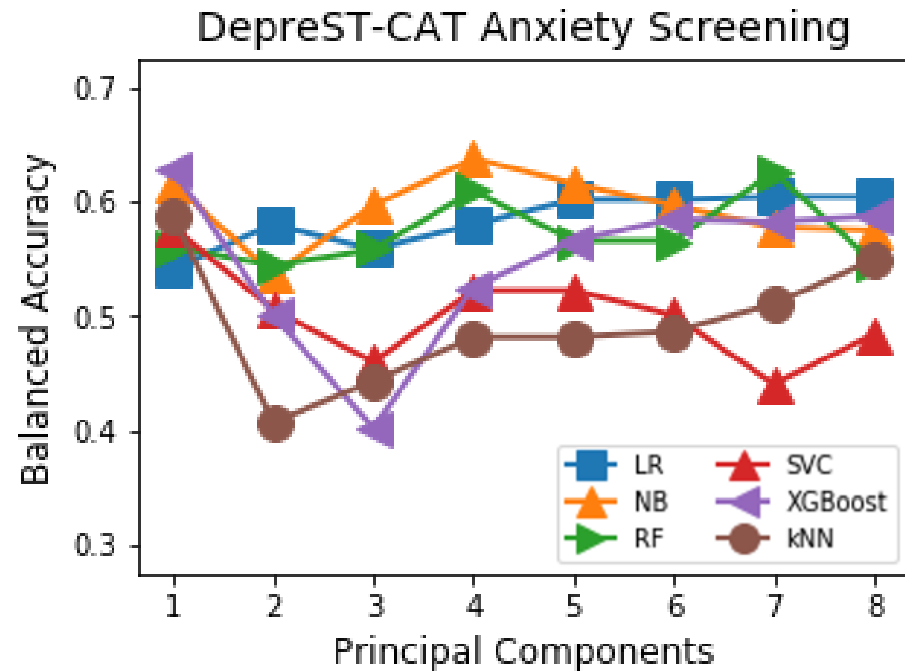
Data References:
Tlachac et al, "DepreST-CAT", IMWUT, 2022
Tlachac et al, "EMU", ICMLA, 2021
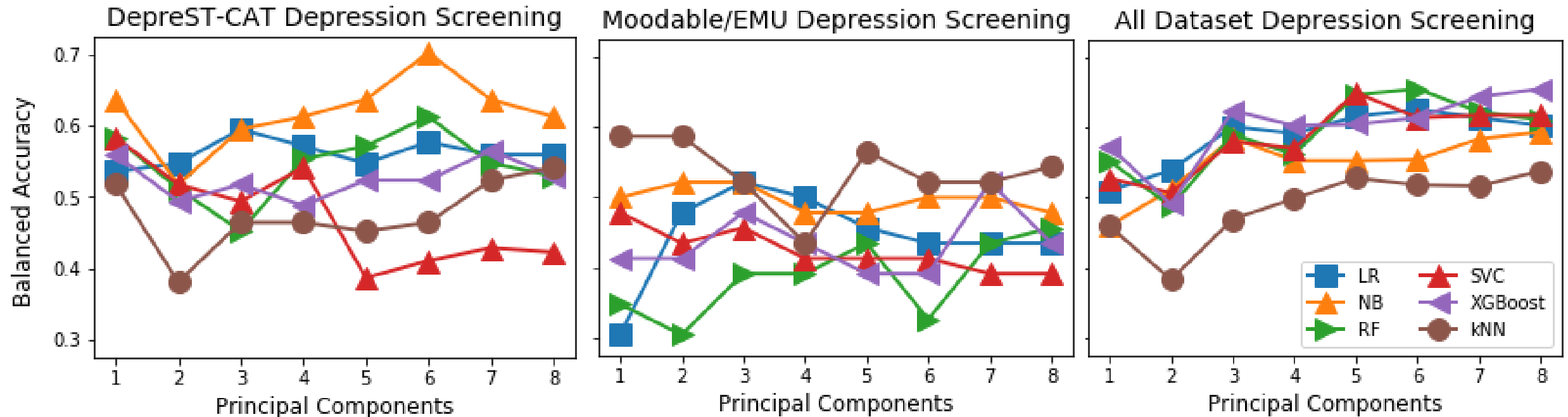Dogrucu et al, "Moodable", Smart Health, 2020

DepreST-CAT Modeling Results

Leave-One-Out Cross-Validation

Depression Modeling Results

DepreST-CAT Depression Screening — Moodable/EMU Depression Screening — All Dataset Depression Screening

Legend: LR, NB, RF, SVC, XGBoost, kNN

Leave-One-Out Cross-Validation

Takeaways of Using Reply Latency Features

1. Reply latency preserves privacy when mental illness screening

2. Screened for anxiety with a balanced accuracy of 0.62

3. Screened for depression with a balanced accuracy of 0.70 with the same participants

4. Comparable results when combining datasets collected before and after COVID-19

5. Reply latency features demonstrate generalizability for mental illness screening

6. Future digital phenotype research should consider adding reply latency features

Thank You!
Questions?

mltlachac@bryant.edu
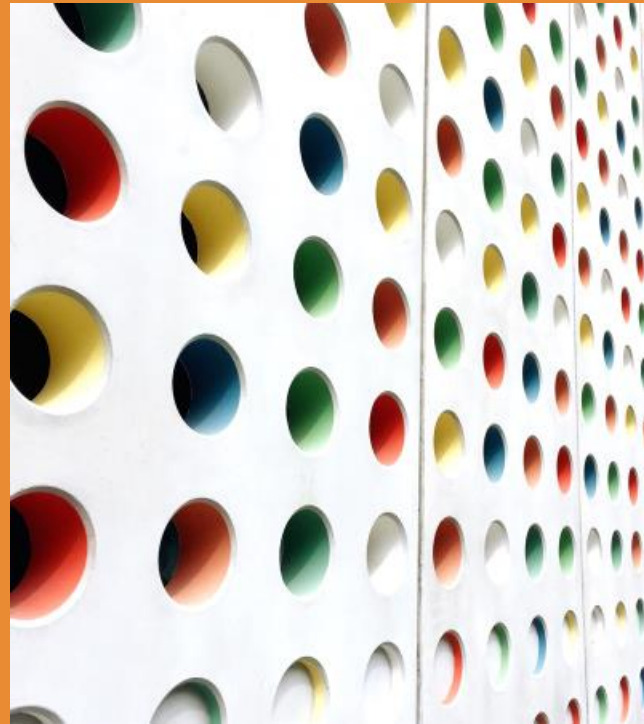
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