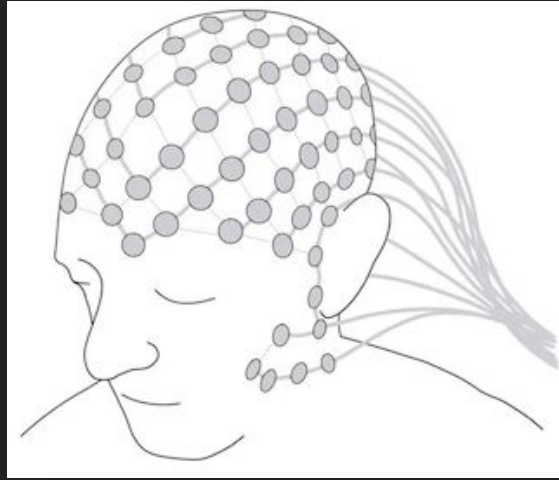


Identifying psychiatric disorders - EEG data



Path to Diagnosis:
A Machine Learning Approach

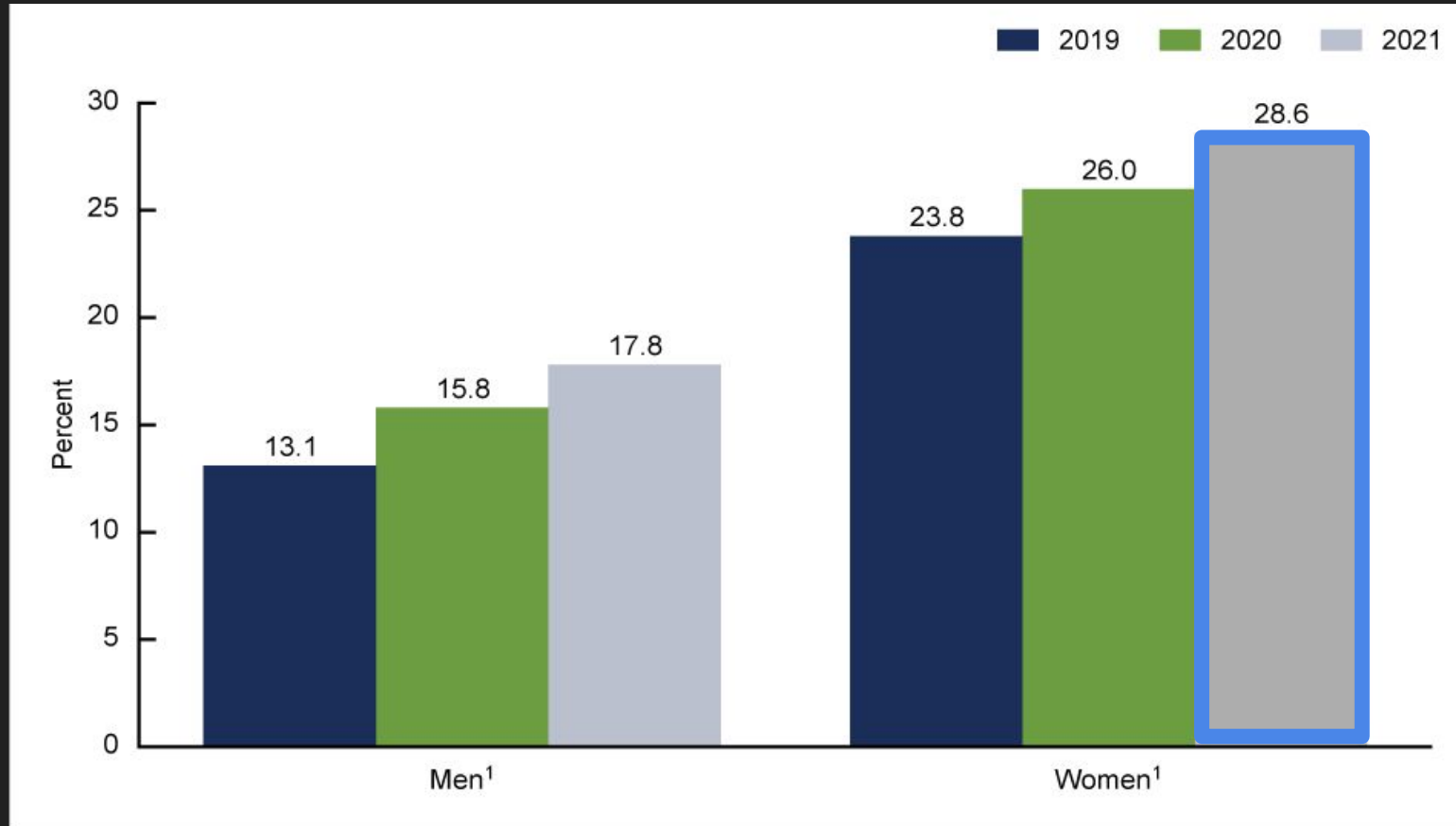
Huntsman Mental Health Institute



HMHI is a premier *institution* focused on the education, research, diagnosis and treatment of *psychiatric illnesses*.

University of Utah

Percentage of Adults age 18-44 seeking mental health care - CDC*



* CDC - NCHS Data Brief No. 444, September 2022

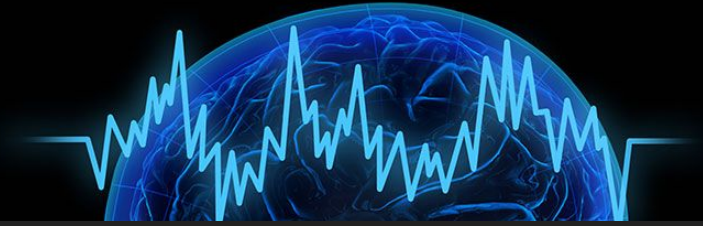
Challenges

- Mental Health Care is a secondary service
- Diagnosis happens later in life but problems often emerge in teen years.
- Assessment is a lengthy process.
- Disorders are commonly misdiagnosed - PTSD

Opportunities

- Make Primary - Integrate mental health across medical providers for earlier intervention
- Tools for Clarity - Integrate emerging technologies into diagnostic process.

Electroencephalogram (EEG)



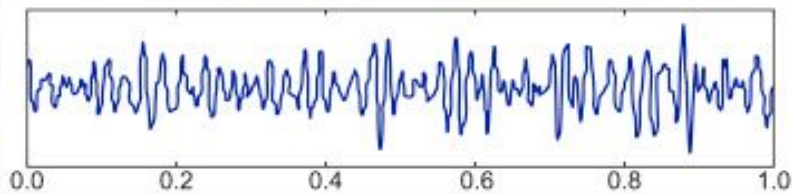
Measures electrical activity of the brain.

Detects abnormalities

**Alzheimers, Epilepsy, Dementia,
Sleeping disorders, Psychosis**

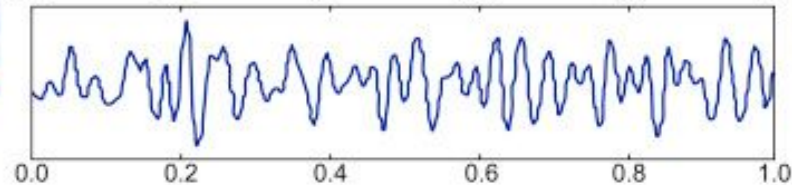
Gamma

Problem solving,
concentration



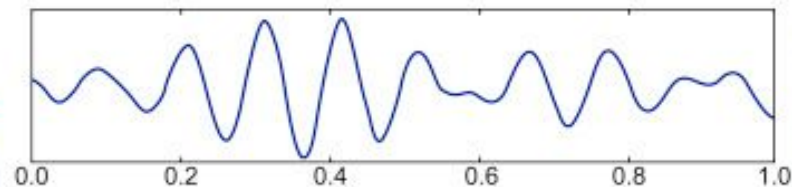
Beta

Busy, active mind



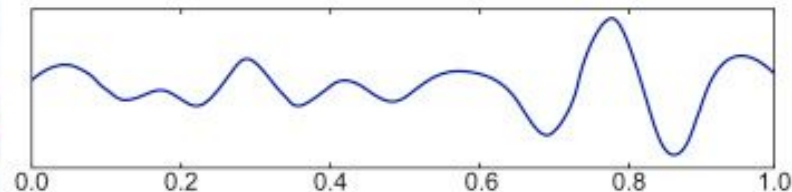
Alpha

Reflective, restful



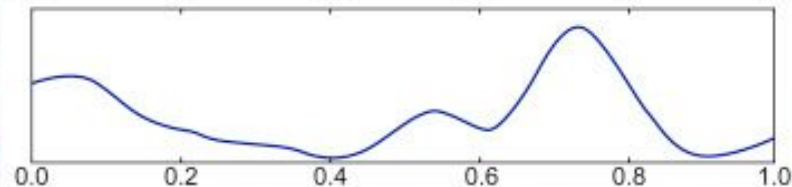
Theta

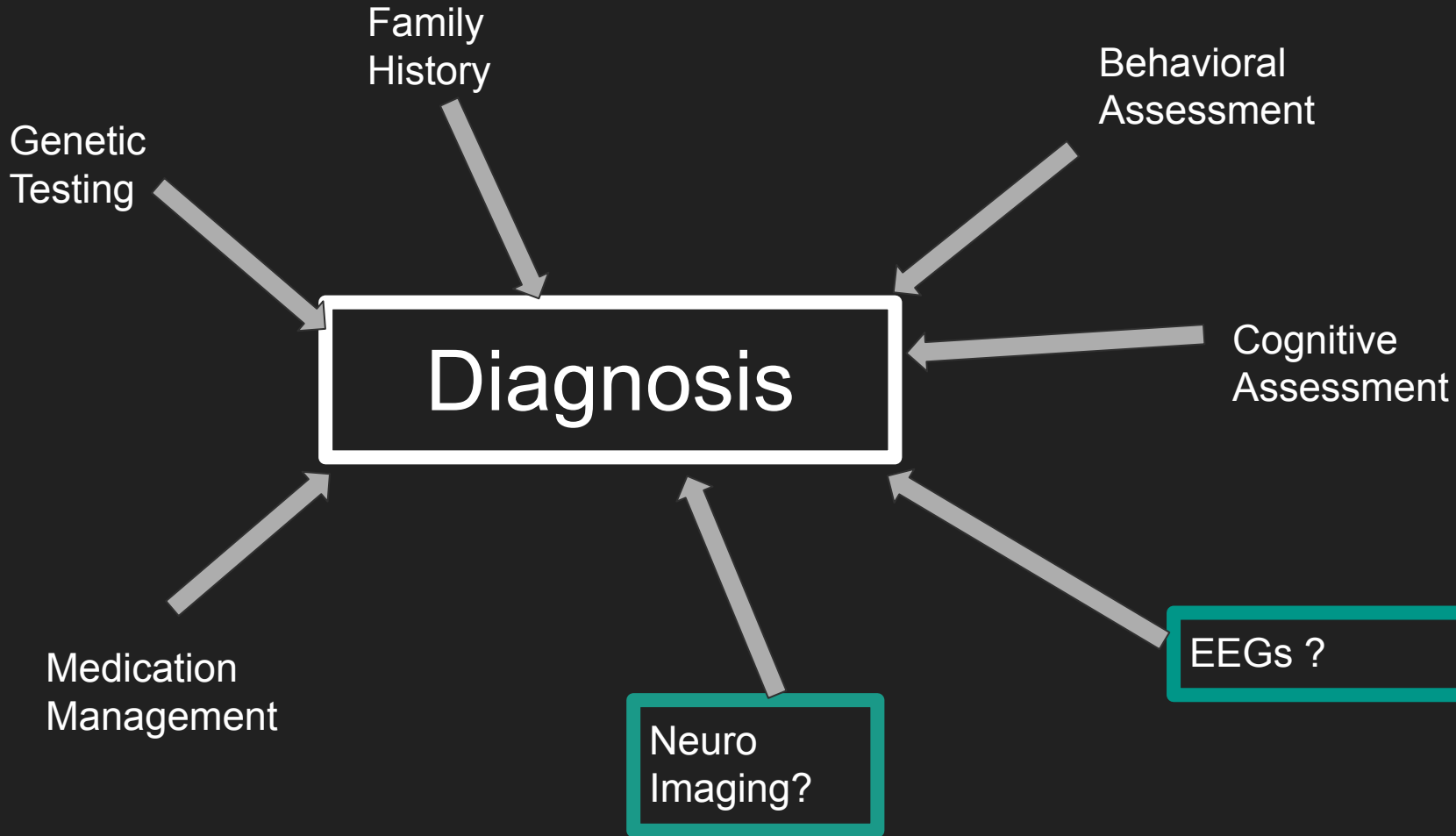
Drowsiness



Delta

Sleep, dreaming





Data Science Goals

Provide an EEG model for an added datapoint for earlier detection of psychiatric disorder.

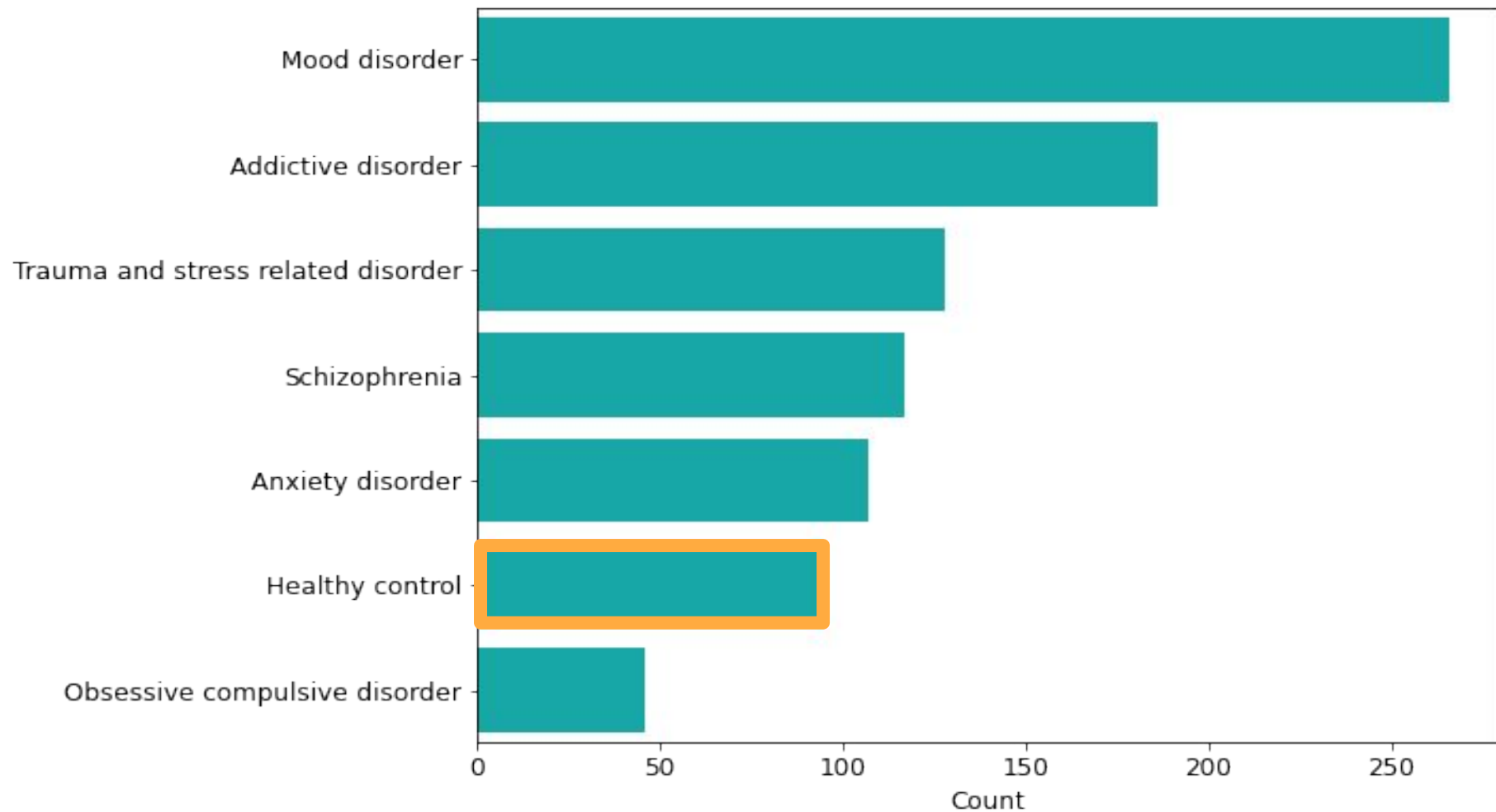
Provide a screening tool that can be used by a wider range of medical providers.

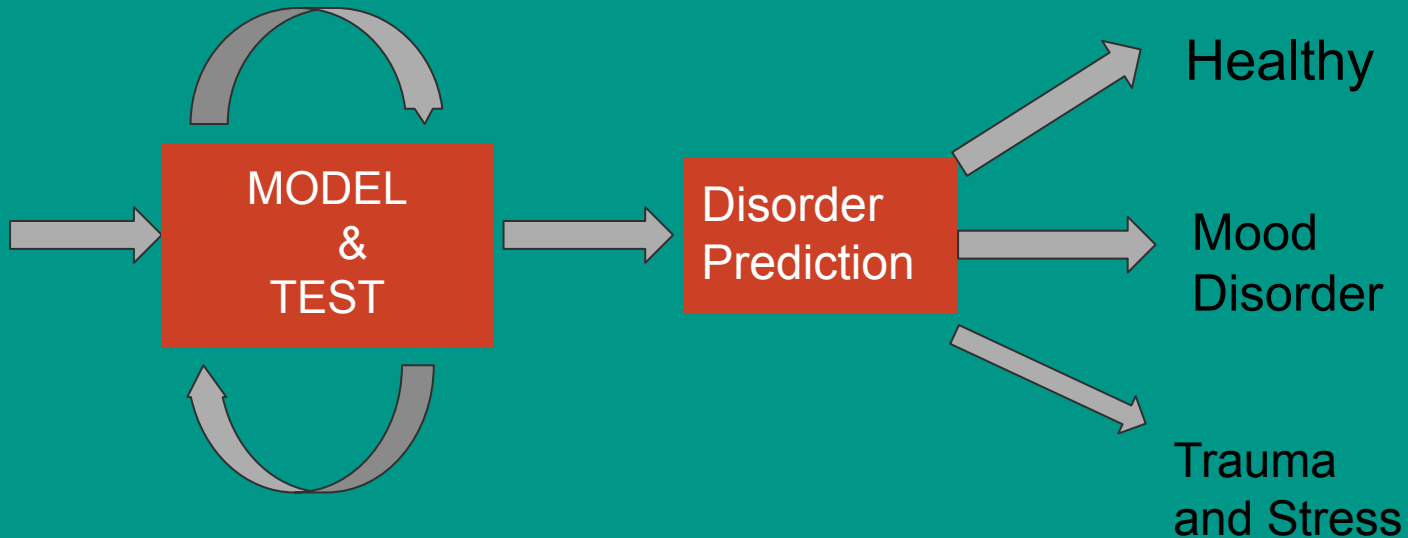
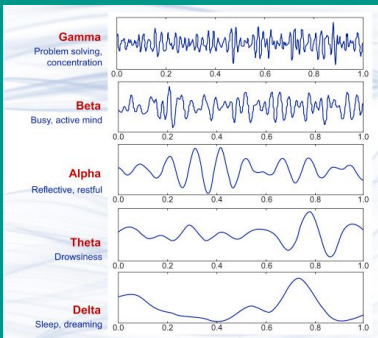


EEG Data

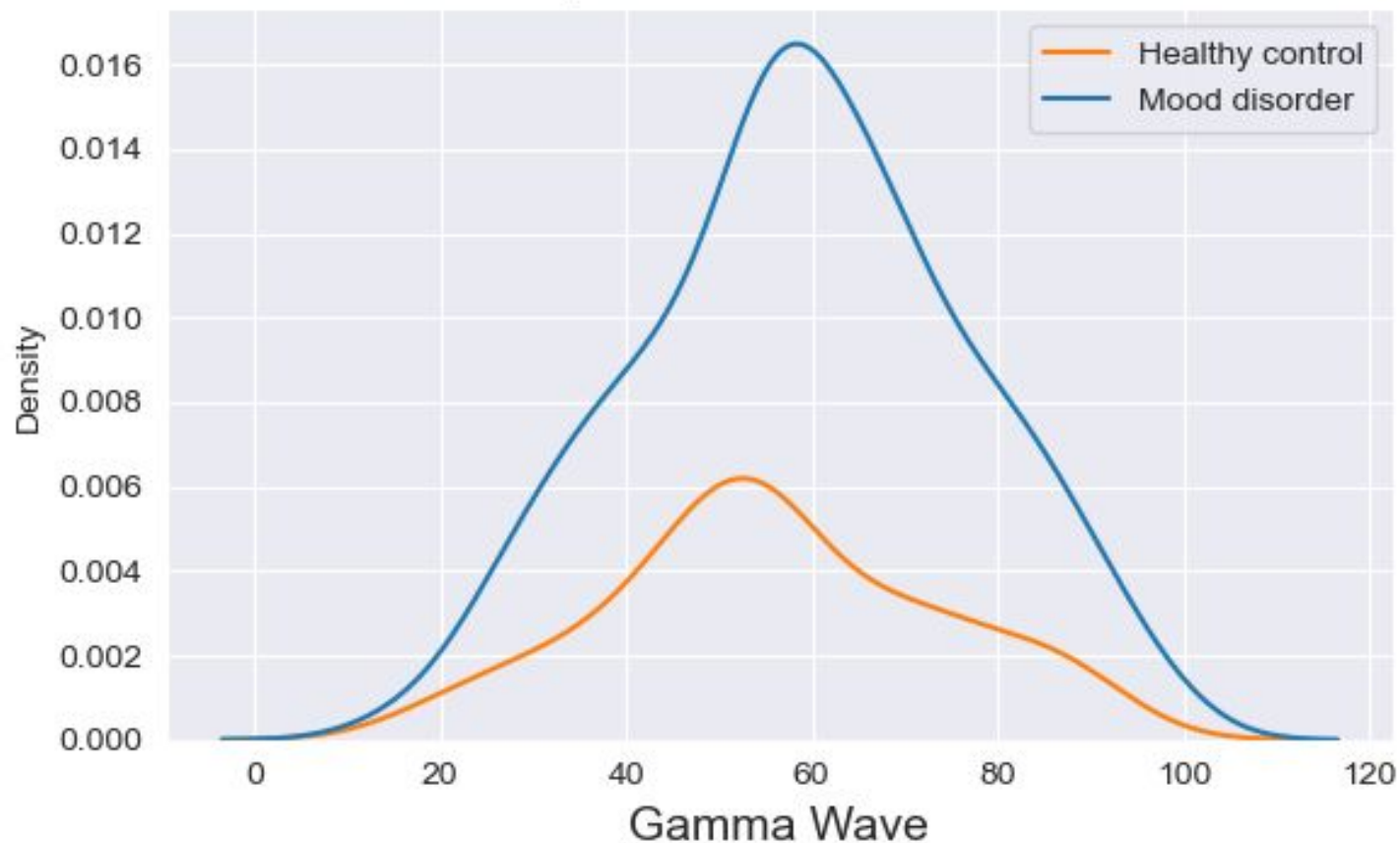
~ 1000 Patients

- **Age, IQ, Education, Gender**
- **Diagnosis**
- **6 Brain wavelengths**
- **19 Nodes within and across brain hemispheres**

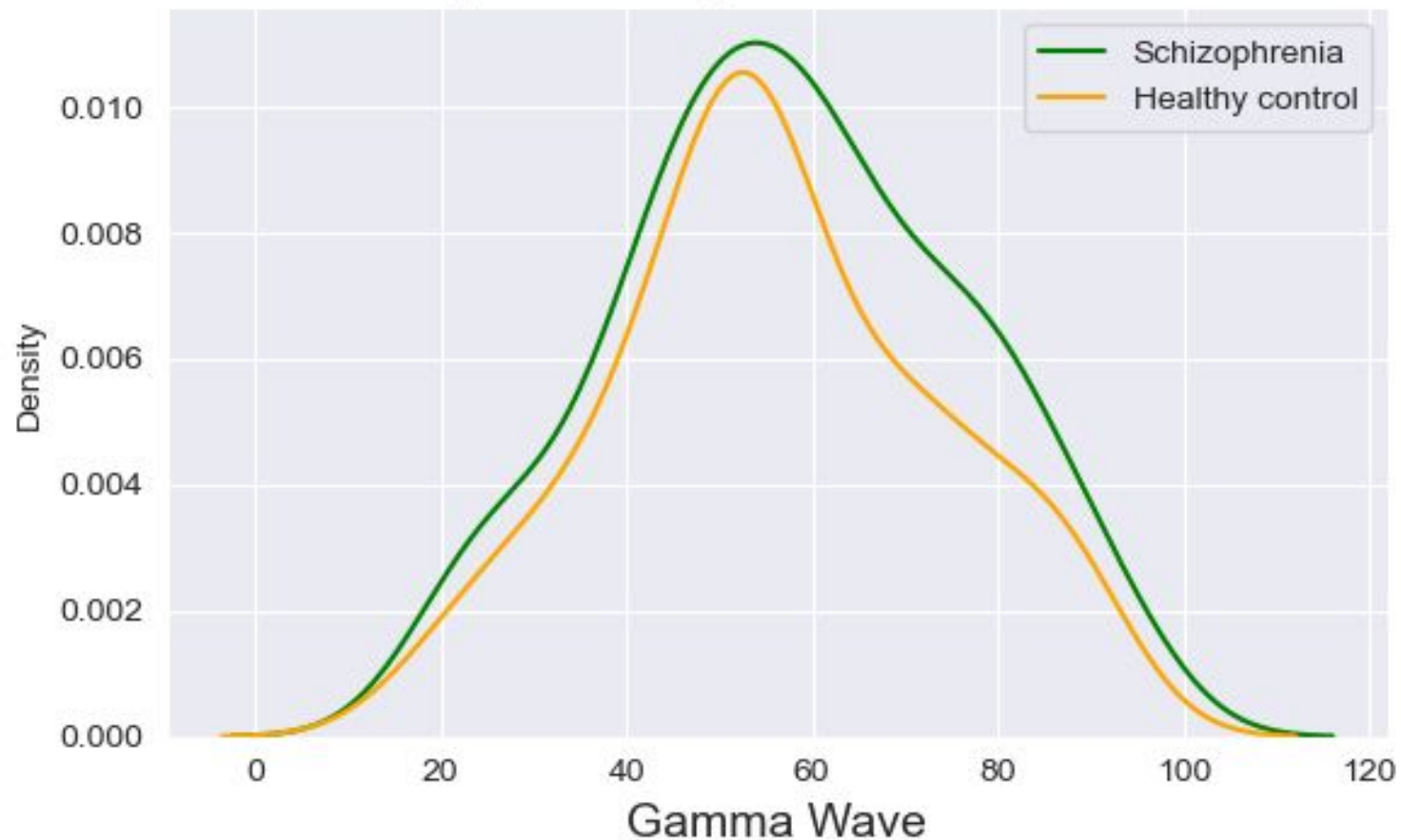




Healthy v. Mood - Parietal Lobe



Healthy v. Schizophrenia - Parietal Lobe



Predicted

Mood Disorder

48

24

Mood Disorder

Addictive Disorder

Actual



Multiclass Accuracy Results

Healthy control	68%	Obsessive compulsive disorder	40%
Anxiety disorder	6%	Schizophrenia	15%
Mood disorder	49%	Trauma and Stress related disorder	18%

Mood Disorder vs Healthy Control results

Mood Disorder - 85 % Accuracy

Recommendations

1. **Integrate mood disorder model early in diagnostic process for added datapoint. Screen for addictive disorder.**
 2. **Use specifically with those who suffer from decreased non-verbal abilities —> Autism, MDD, Psychosis**
-

References

Mental Health Treatment Among Adults Aged 18–44: United States, 2019–2021

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Identification of Major Psychiatric Disorders From Resting-State Electroencephalography Using a Machine Learning Approach

<https://www.frontiersin.org/articles/10.3389/fpsyt.2021.707581/full>

Rates of Detection of Mood and Anxiety Disorders in Primary Care: A Descriptive, Cross-Sectional Study

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3184591/>

thank you

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[LinkedIn](#)

