

# From Clinical Data to AI Research and Back

*Infrastructure Integration at the Krembil Centre for Neuroinformatics*

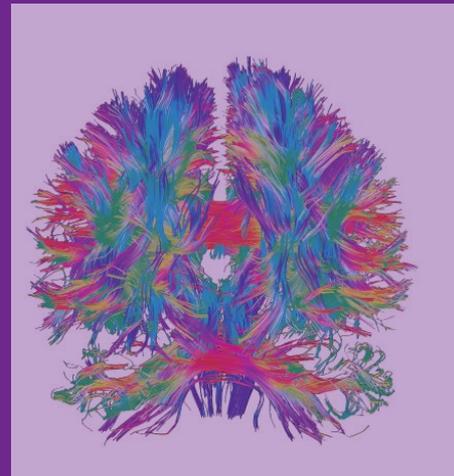
## Tristan Glatard

Scientific Director, Krembil Centre for Neuroinformatics  
BMO Chair in AI for Mental Health

March 5, 2026

**camh**

Krembil Centre for  
Neuroinformatics



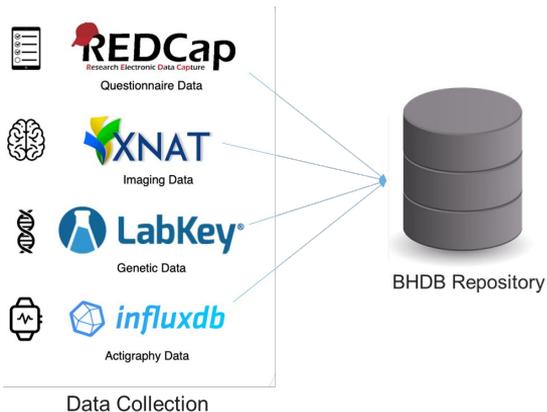
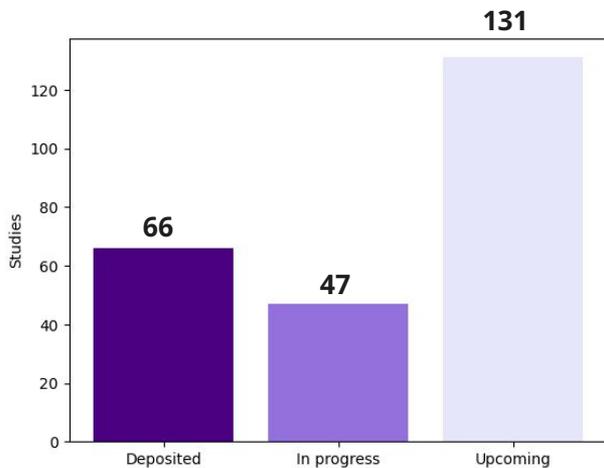
# Disclosures

Current research funded by:

- National Science and Engineering Research Council
- Brain Canada
- Canadian Foundation for Innovation

# Research Data Integration

## CAMH Brain Health Databank



**Total participants: n=17,035**

Assessments, questionnaires or surveys: n=15,901  
 Imaging: 948, MRI: n=448, PET: n=198, EEG: n=250

Molecular/genetics: n=160

Qualitative: 339



## Cardio-Neuro-Mind Data Platform

Royal Ottawa Hospital

19

Studies

7,448

Data Points

288

Participants



University of Ottawa  
 Faculty of Health Sciences

Renewing Contract with KCNI to support CNMDP for another 3-years

## Pan-Canadian Youth Data Platform



Health Canada



Fondation  
 Brain Canada  
 Fondation

FOUNDRY

WHERE WELLNESS TAKES SHAPE

THE MATHISON CENTRE

AT THE UNIVERSITY OF CALGARY



youth wellness hubs

ONTARIO

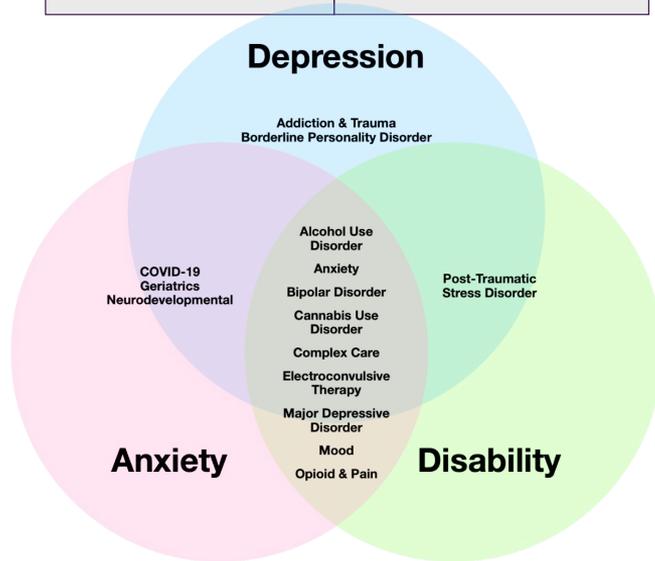
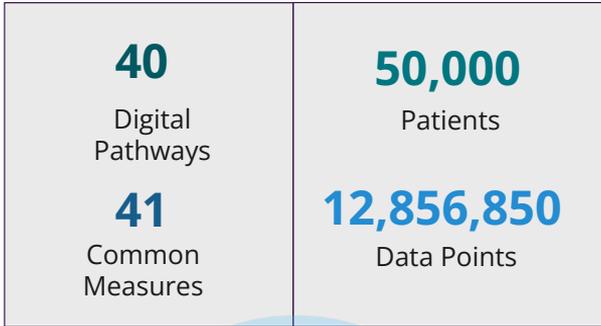
Toronto Adolescent & Youth  
 FORECAST STUDY

UNIVERSITÄT  
 QUÉBEC

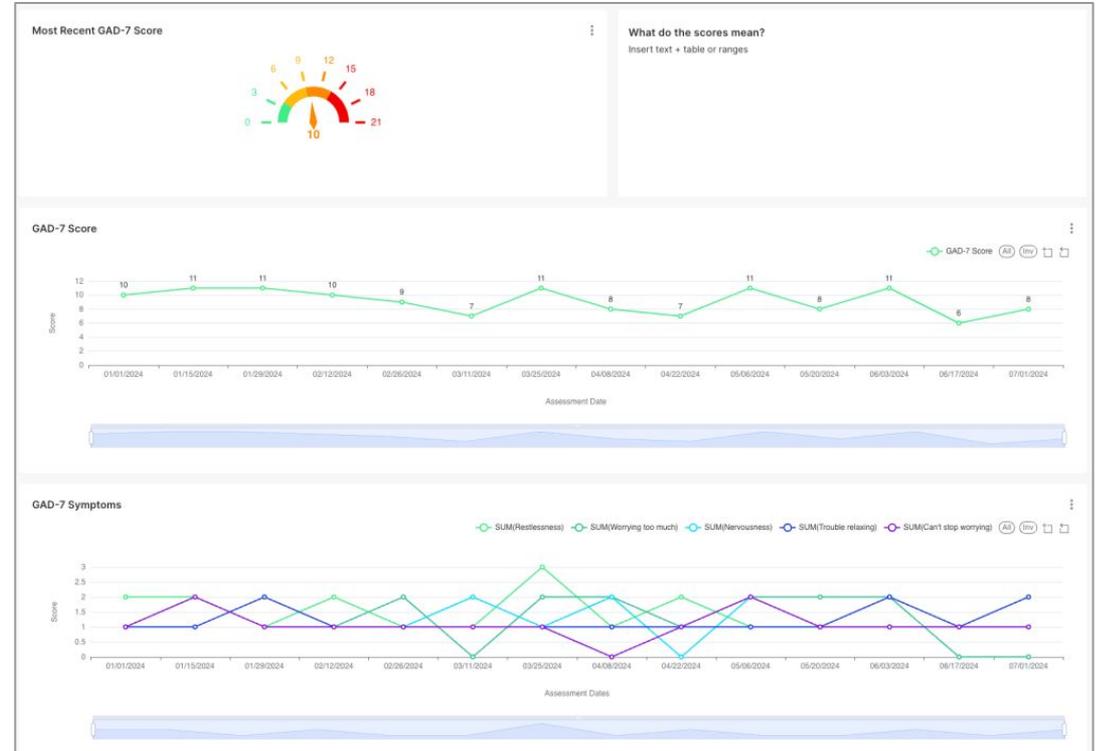
PreVenture

3

# Clinical Data Integration: Common Data Elements across ICPs



## Dashboards: Patient Journey & Clinical Support



# VITAL: Canada's Real-Time Clinical Data Infrastructure

Vital near real-time health data for Trials, AI, and a Learning Health System

## What is VITAL?

World's largest linked clinical and imaging data repository, with daily updates from 160 hospitals across 3 provinces enabling clinical trials, AI development, and health services research.

### Infrastructure Scale

**160 hospitals** in ON, AB, QC

**20M+ patients** served

**Daily updates** near real-time

**3 provincial** data centres

**Federated analysis** capability



## CAMH's Role

### Hospital Data Appliance

- 20+ Ontario hospitals automated extraction
- FHIR/OMOP standardization
- Secure real-time data flow

### Technical Infrastructure

- Data engineering & integration
- De-identification & privacy
- Daily automated pipelines
- Infrastructure at HPC4Health

# AI in Mental Health

## Predictive models

Risk factors, digital phenotyping, sub-typing, decision-support, treatment response, clinical trials stratification

SYMPOSIUM • Volume 97, Issue 9, Supplement 1, S13-S14, May 01, 2025

### AI-Based Prediction of Response to Antipsychotic Treatment: Robust Predictions in Diverse Psychosis Populations

Fiona Coultas<sup>1</sup> • Sergio Mena Ortega<sup>1</sup> • Esin Ucur<sup>2</sup> • ... • Christoph U. Correll<sup>5</sup> • Nikolaos Koutsouleris<sup>7</sup> • Paris Alexandros Lalouas<sup>1</sup> ...

Show more

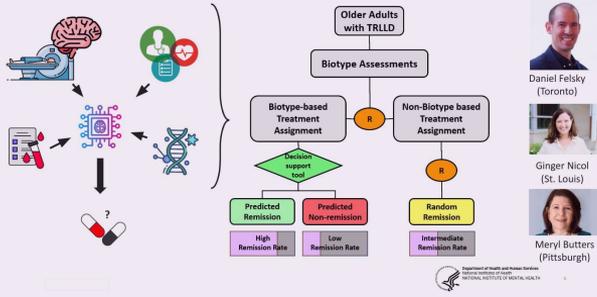
Affiliations & Notes Article Info

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#### Results

Linear total symptom severity was well-predicted and generalisable in both CATIE (discovery performance:  $r=0.68$ , external validation:  $r=0.4$ ) and EUFEST samples (discovery performance:  $r=0.44$ , external validation:  $r=0.58$ ). Binary remission according to the Andreasen criteria was also well predicted and generalisable in both CATIE (discovery performance: BAC=69%, external validation: BAC=64.6%) and EUFEST samples (discovery performance: BAC = 64.9%, external validation: BAC=64.2%). Other outcomes were poorly predicted.

### Biotype-assigned Augmentation Approach in Resistant Depression (BAARD)



Structured and unstructured EHRs, imaging, omics, wearables, etc

## Conversational agents

Talking therapies (CBT, MI), diagnosis, ambient scribes, education

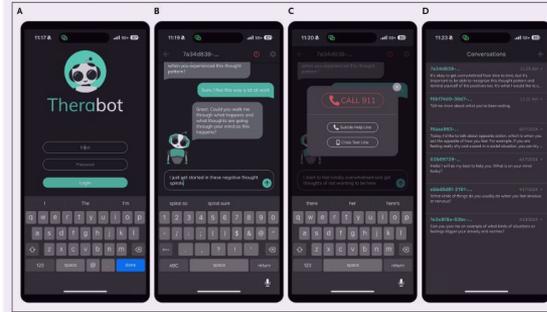


NEJM AI 2025;2(4)  
DOI: 10.1056/Aloa2400802

ORIGINAL ARTICLE

### Randomized Trial of a Generative AI Chatbot for Mental Health Treatment

Michael V. Heinz<sup>1</sup>, M.D.,<sup>1,2</sup> Daniel M. Mackin<sup>3</sup>, Ph.D.,<sup>1,2</sup> Brianna M. Trudeau<sup>4</sup>, B.A.,<sup>1</sup> Sukanya Bhattacharya<sup>5</sup>, B.A.,<sup>1</sup> Yinzhou Wang<sup>6</sup>, M.S.,<sup>1</sup> Haley A. Banta<sup>7</sup>, Abi D. Jewett<sup>8</sup>, B.A.,<sup>1</sup> Abigail J. Salzhauer<sup>9</sup>, B.A.,<sup>1</sup> Tess Z. Griffin<sup>10</sup>, Ph.D.,<sup>1</sup> ... and Mikhael P. Tranchesi<sup>11</sup>, Ph.D.<sup>1,12,13</sup>



### A Fully Generative Motivational Interviewing Counsellor Chatbot for Moving Smokers Towards the Decision to Quit

Zafarullah Mahmood<sup>\*</sup> Soliman Ali<sup>\*</sup> Jiading Zhu<sup>\*</sup> Mohamed Abdelwahab<sup>\*</sup>  
Michelle Yu Collins<sup>\*</sup> Sihan Chen<sup>\*</sup> Yi Cheng Zhao<sup>\*</sup> Jodi Wolff<sup>†</sup>  
Osnat Melamed<sup>†</sup> Nadia Minian<sup>†</sup> Marta Maslej<sup>†</sup> Carolyne Cooper<sup>†</sup>  
Matt Ratto<sup>†</sup> Peter Selby<sup>†</sup> Jonathan Rose<sup>†</sup> §

<sup>\*</sup>University of Toronto

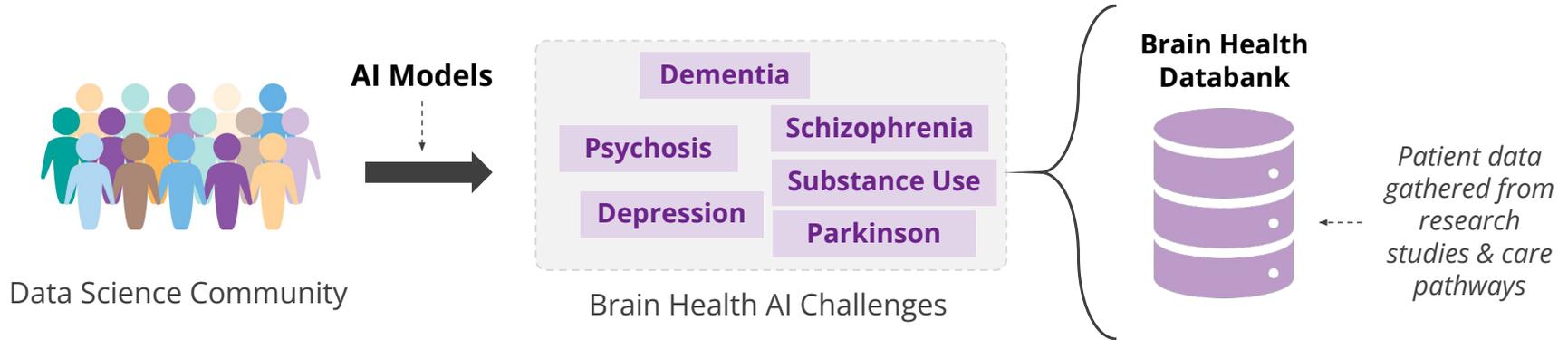
<sup>†</sup>Centre for Addiction and Mental Health, Toronto, ON, Canada



# Brain Health Data Challenge Platform

Reliable AI model evaluations for brain health through data challenges

<https://www.bhdc-pdsc.ca>



# KCNI Clinical Trials Infrastructure

Integrated Systems Supporting Clinical Research at CAMH

camh

## Clinical Data Sources

### I-CARE (EHR)

Assessments, orders, scheduling, medications, referrals

### Clinical REDCap

Patient-reported outcomes, MBC pathways, structured assessments

### STRIDES / HIVE

Patient & staff events, incident data, HR & operational records

### External Sources

Provincial registries (DAD, NACRS, OHMRS), 988 crisis data



*ETL & Data Integration*



## Secure Clinical Data Warehouse



### Privacy & De-identification

Automated de-identification, consent management, REB compliance



### Data Modelling & Harmonization

FHIR/OMOP standards, clinical-research data linkage, quality control



### MLOps & Analytics Engine

ML model training & deployment, predictive analytics, statistical computing



### BrainHealth Databank

64+ study deposits, 15,800+ participants — stores data collected for research & retrospective research



*Insights & Delivery*

## Trial Support Outputs

### Trial Data Capture

Custom REDCap instruments, eCRF design, data validation rules

### Cohort Identification

AI-driven patient stratification for targeted trial enrollment

### Real-Time Monitoring

Dashboards for trial metrics, safety signals, enrollment tracking

### Multi-Site Coordination

Federated analysis, cross-site data harmonization (OBI, VITAL)

### Regulatory Reporting

ICH E6 GCP-compliant data exports, audit trails, quality assurance

# Clinical Trial: Smoking Cessation Chatbot for Women

## A Fully Generative Motivational Interviewing Counsellor Chatbot for Moving Smokers Towards the Decision to Quit

Zafarullah Mahmood\* Soliman Ali\* Jiading Zhu\* Mohamed Abdelwahab\*  
Michelle Yu Collins\* Sihan Chen\* Yi Cheng Zhao\* Jodi Wolff †  
Osnat Melamed\*† Nadia Minian\*† Marta Maslej\*† Carolynne Cooper\*†  
Matt Ratto\* Peter Selby\*† Jonathan Rose\*† §

\*University of Toronto

†Centre for Addiction and Mental Health, Toronto, ON, Canada

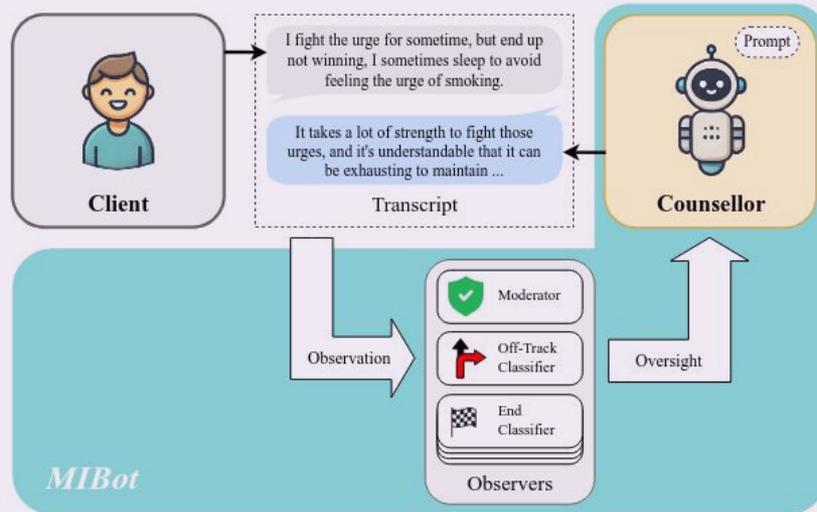


Figure 1: Overview of the *MIBot* system and observer agents.



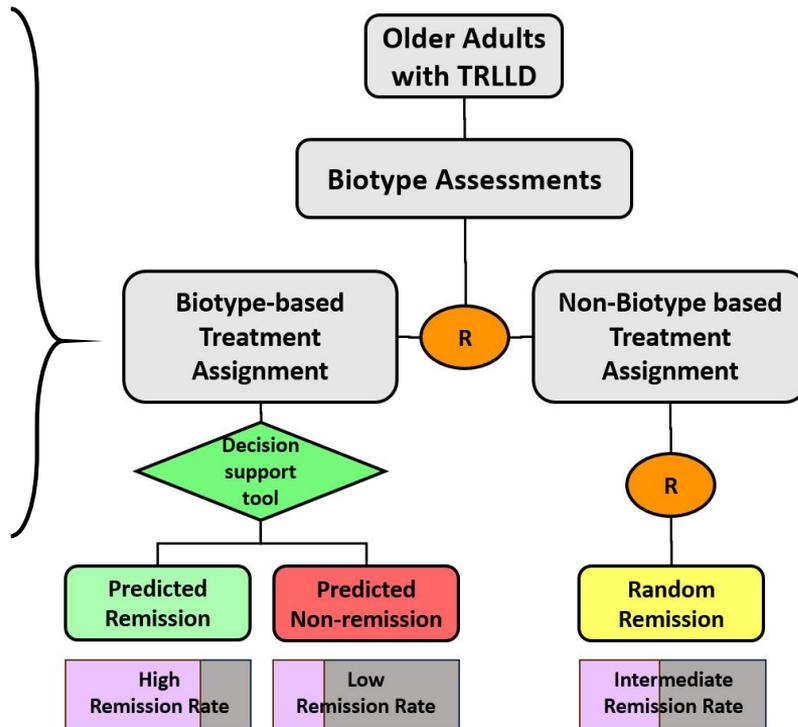
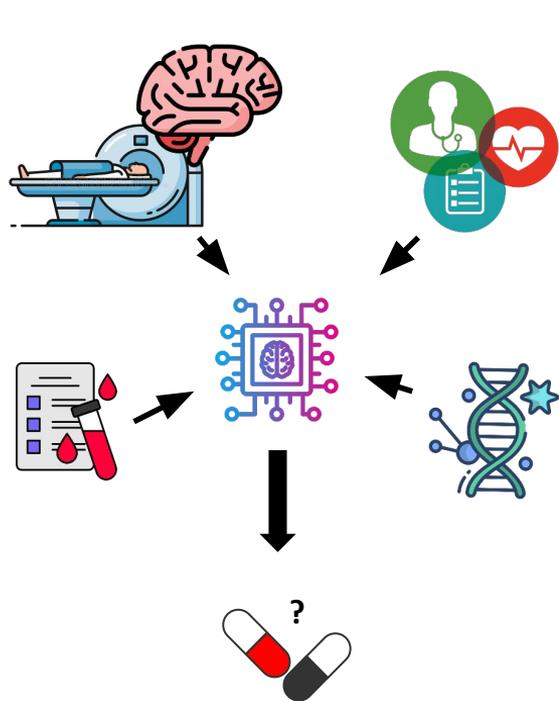
Osnat Melamed



Laura Sikstrom



# Clinical Trial: Biotype-assigned Augmentation Approach in Resistant (late-life) Depression (BAARD)



Daniel Felsky  
(Toronto)

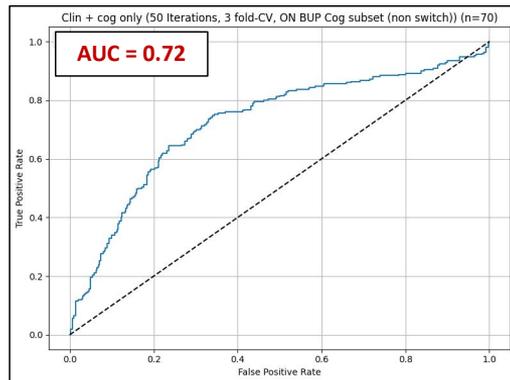
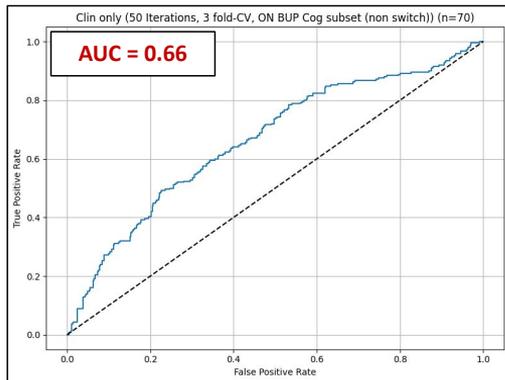


Ginger Nicol  
(St. Louis)

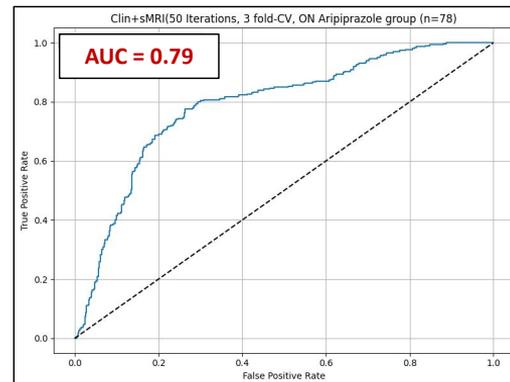
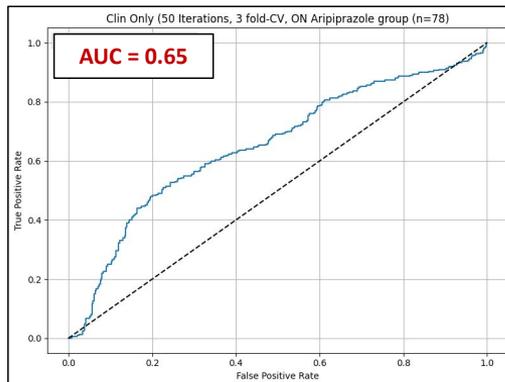


Meryl Butters  
(Pittsburgh)

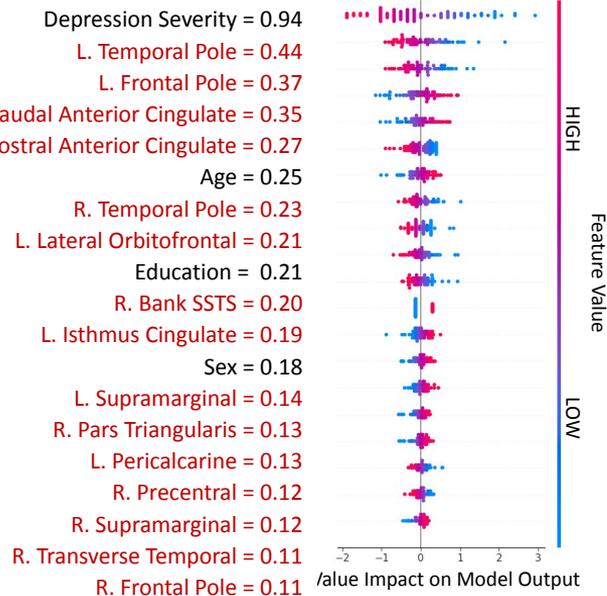
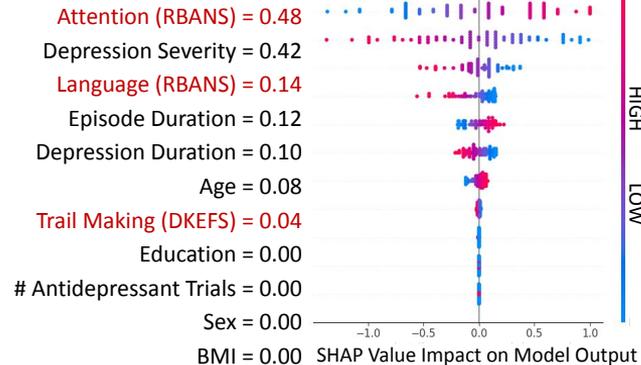
## Bupropion Augmentation: +/- Cognitive Profile



## Aripiprazole Augmentation: +/- Neuroimaging



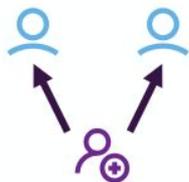
Daniel Felsky



# Patient and Family Engagement



Nelson Shen

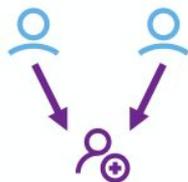


## INFORM

P&F are updated

*BHDB FAQ*

*Informed consent*

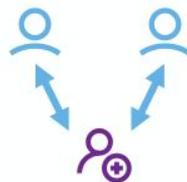


## CONSULT

P&F provides input

*Requirement gathering workshop*

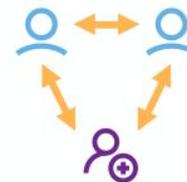
*Patient journey dashboard user research.*



## INVOLVE

P&F shape decisions

*Patient and family engagement group*

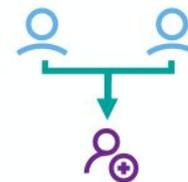


## COLLABORATE

P&F share decision-making

*Representation in governance*

*Co-designing research study*



## EMPOWER

P&F make decisions

*Dashboard content*

# Ingredients to advance precision mental health with AI

## → Clinical & Research Data Integration

*Privacy, ethics, security*

## → Reliable Evaluations of AI Models

*AI challenges, clinical trials*

## → Involving People with Lived Experience

*A different perspective*

## → Federated Learning

*A path to corporate partnerships*

# Thank you!

