

PREDICTING POST-RELEASE INTERACTIONS WITH MENTAL HEALTH SYSTEMS



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Mental health disorders are prevalent in the United States criminal justice system



2 million

People with severe mental health disorders booked into jail every year



44 States

Where a jail or prison is the largest mental health institution



32.5%

Detection rate for inmates with mental health disorders

Our goal is to predict future interactions with the mental health system for releasees

- ▷ Identify releasees who might need post release support and connect them to resources
- ▷ Understand the effect that jail stays have on mental health disorders

The predictions are based on a rich feature set drawn from county mental health and jail datasets

Mental Health Features

- Referral Sources
- Case Information
- Length of Stay

Jail Features

- Demographics
- Case Information
- Time Spent in Jail
- Risk Assessment

Each row represents an inmate's release from jail

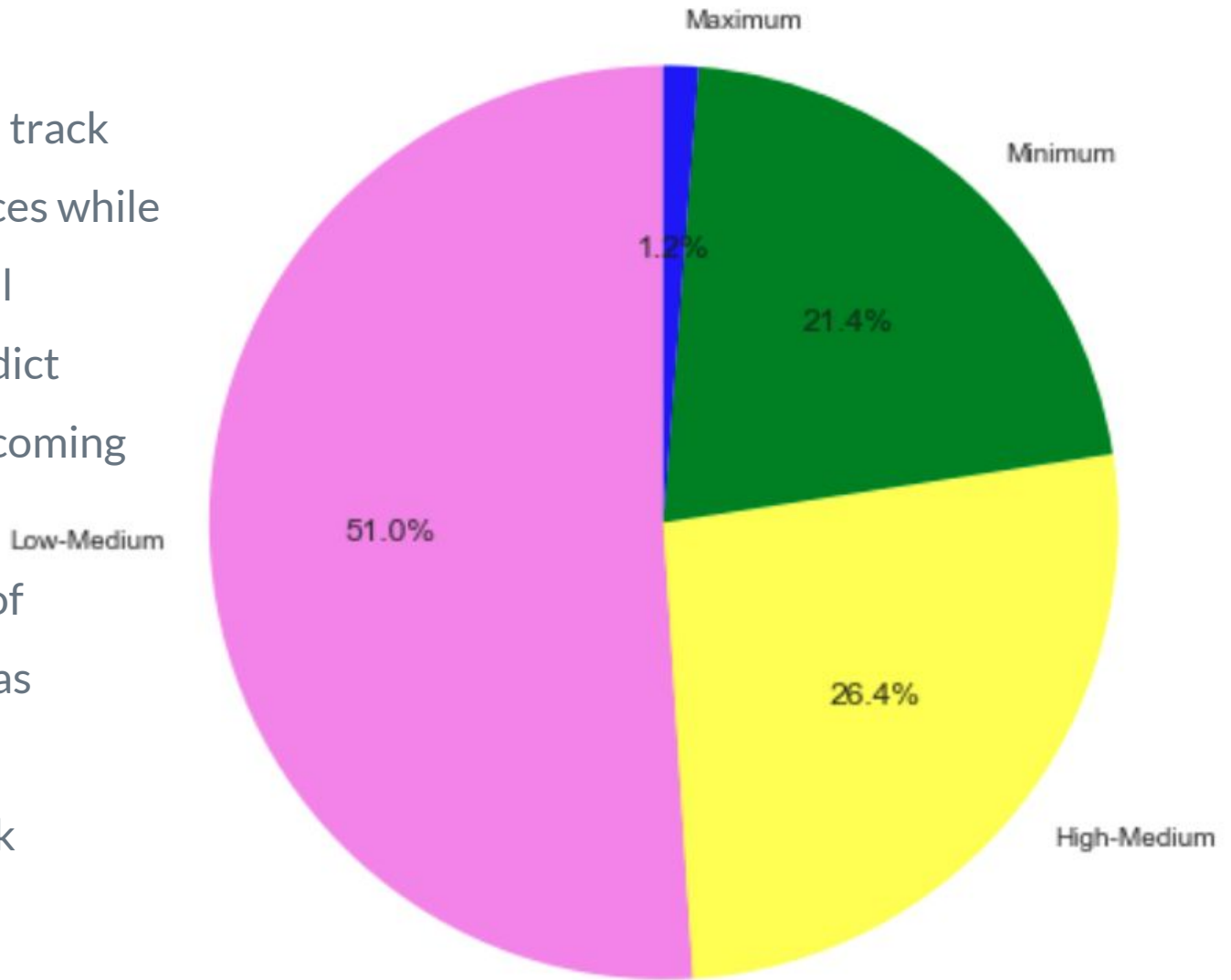
Label is whether there was an interaction with mental health services within a year of release

 3%

How often released inmates accessed mental health services within a year of release from jail

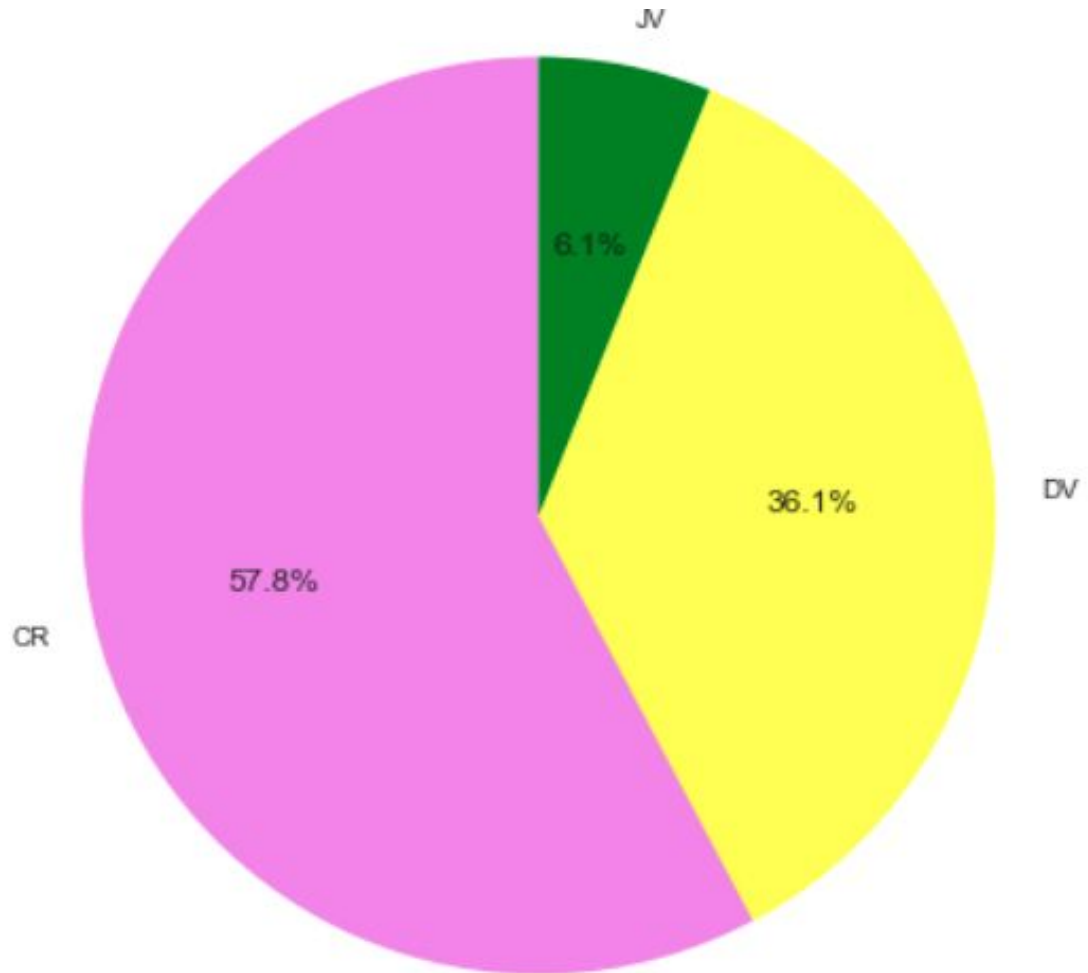
Level of Service Inventory Form

- ▷ Typically used to track delivery of services while inmates are in jail
- ▷ Also used to predict recidivism for incoming inmates
- ▷ More than 70% of inmates classify as Minimum or Low-Medium risk

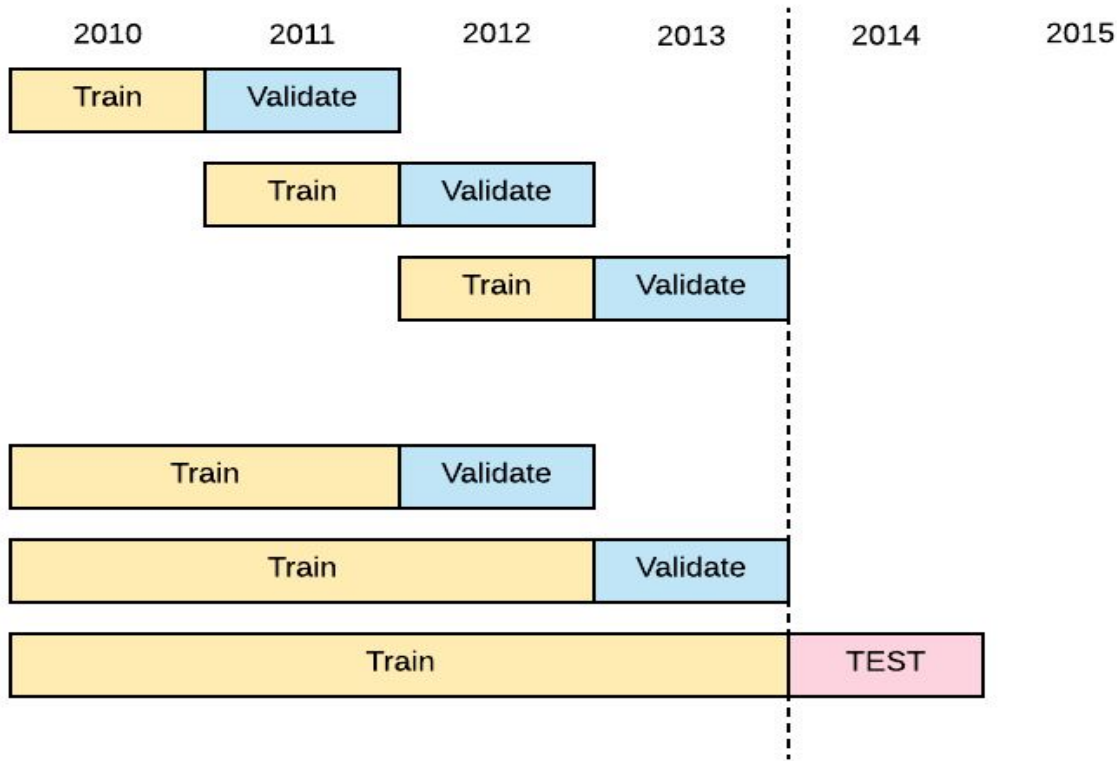


94% of reported cases are Criminal & Domestic Violence offenses

- ▷ Criminal and domestic violence cases also have more interactions with mental health within 1 and 3 year spans from the time of release



Our analysis ran several training and validations splits



- ▷ Trained final model using data from 2010-2013
- ▷ Tested on data from 2014, the last year we have labels for mental health interactions 1 year out from release date

Precision will be more important than recall

High Precision

Correctly identifying the populations most likely to need mental health services is critical

Limited Funds

Johnson County only has enough resources to invest on a small subset of the population

Recall Not Critical

Given limited resources, recall is not as critical of a measure in this analysis

The models ran

Method	Precision at 5% of Pop.	AUC-ROC
Logistic Regression	24%	0.55
K Nearest Neighbors	22%	0.56
Decision Trees	25%	0.60
Random Forests	27%	0.55
Ada Boosting	5%	0.59

Results

Best Model(s):

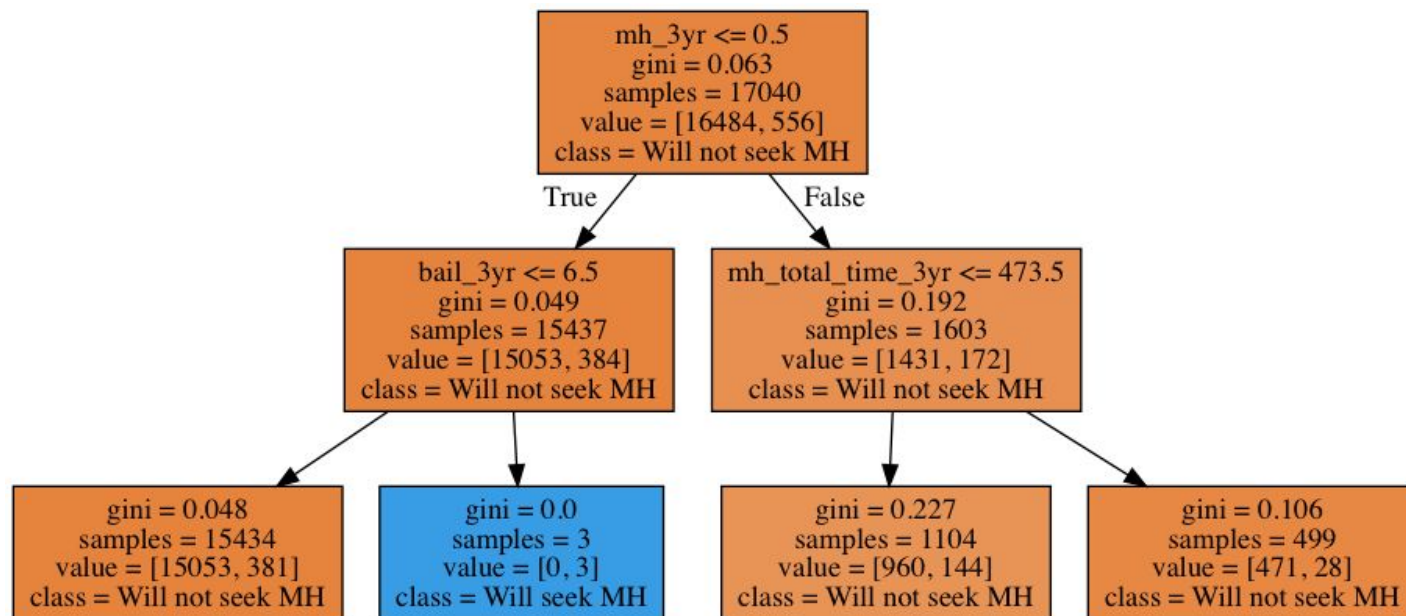
Random Forest with

- Max Depth 5, 10
- Min Samples / Split: 5, 10

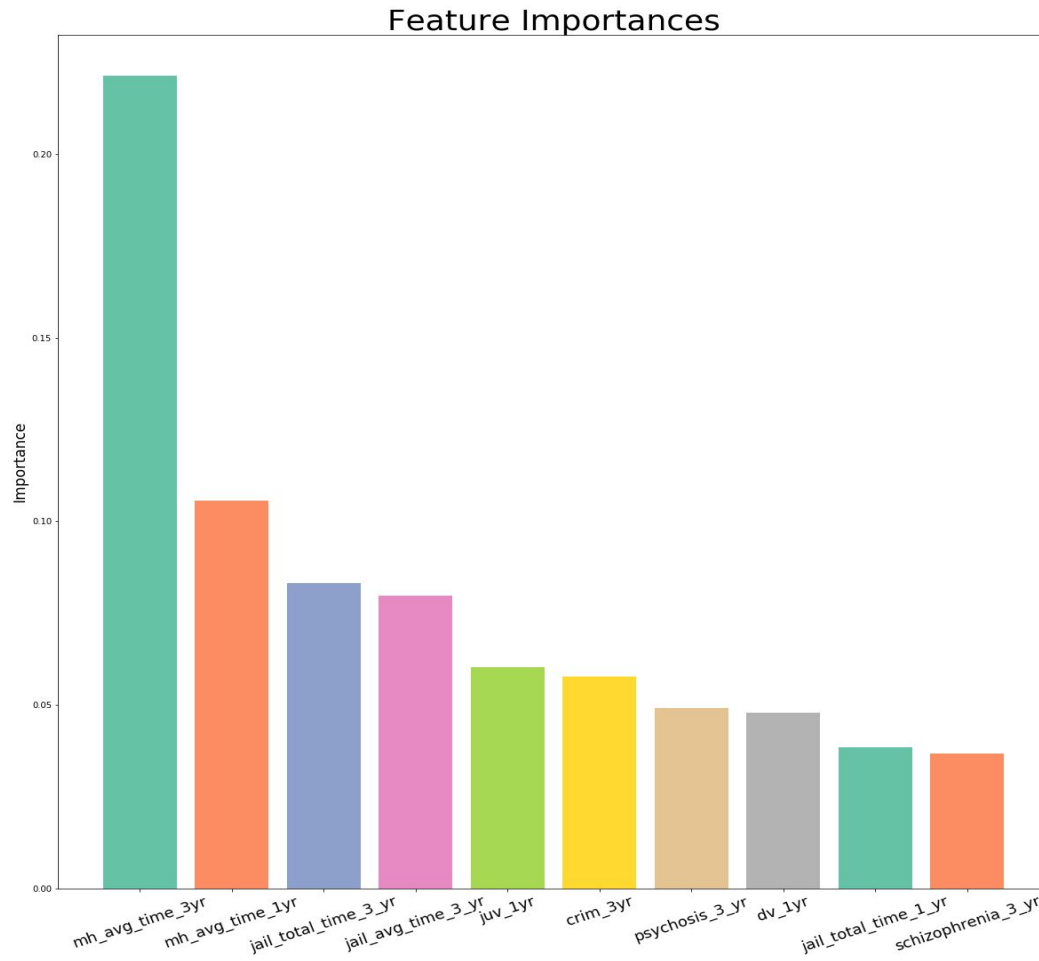
Validation Date	Baseline	Precision at 5%	Precision at 10%
12/31/11	3.4	67.7	33.8
12/31/12	2.2	45.2	22.6
12/31/13	1.3	25.4	12.7
12/31/14	1.3	27.7	13.7

Our models perform better than the baseline, but are generally weak

- Precision based on simple **2-level decision tree**: 4.6 %
- Precision based only on **3 year mental health history**: 4.3%



Prior Mental Health Predicts Mental Health Encounters



The model is biased on race and gender

attribute_name	attribute_value	fdr_disparity	fpr_disparity	for_disparity	fnr_disparity
race	AMERICAN INDIAN OR ALASKA NATIVE	NaN	0.000000	0.000000	NaN
race	ASIAN	NaN	0.000000	0.000000	NaN
race	BLACK OR AFRICAN AMERICAN	1.023810	0.595741	0.459790	1.086957
race	WHITE	1.000000	1.000000	1.000000	1.000000
sex	FEMALE	1.015085	2.168252	2.318542	1.057471
sex	MALE	1.000000	1.000000	1.000000	1.000000

We recommend that Johnson County implement programs that help connect releasees to needed support

- ▷ Evaluate the list of 200 individuals identified by model to confirm validity
- ▷ Assign case workers with mental health expertise to at-risk releasees
- ▷ Form partnerships with county mental health to strengthen wraparound services for releasees

Future work

- ▷ Incorporate bias measures into analysis for more robust results
- ▷ Add EMS data to understand events that potentially lead to mental health interactions post-release
- ▷ Expand feature set for better results

Thanks!

Any questions?