Predicting Recidivism for Mental Health Outreach

8 Dec 2022

MCRT1

Jameson Carter
Sebastian Dodt
Sarah Nance

Agenda

- Context & Goals
- Data
- Analysis & Results
- Policy Recommendations
- Caveats
- Future Work

Mental health and recidivism

If you have been to jail before July 1, 2017,
your chance of going back to prison is…

13 %

if you do not have a
mental health issue

21 %

if you have a
mental health issue

Source: Hanak, E., Mount, J., Chappelle, C., Lund, J., Melellin-Azuara, J., & Moyle, P. (2015). What If California's Drought Continues? Public Policy Institute of California.

Cost for Kansas

$30,100

cost per inmate per year

Protecting the inmates identified in July of 2017 from re-incarceration might have saved the system at least **$6.1 million**

Source: Kansas Legislative Research Department. (2021). Follow-Up Information: Cost Per Inmate and Age of Correctional Facilities. Kansas Legislature.

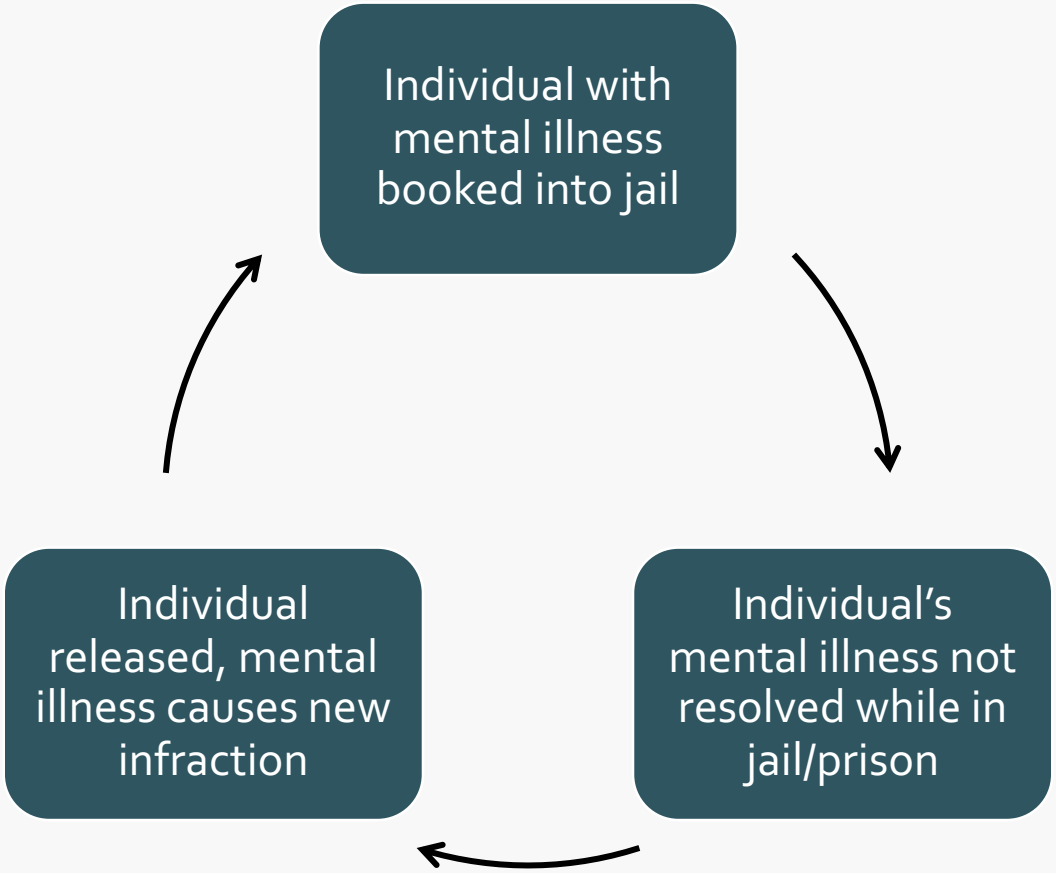
Cost on the individual

Studies show causal relationship between longer jail time and more severe mental health issues

More prison time increases likelihood to commit a crime after release

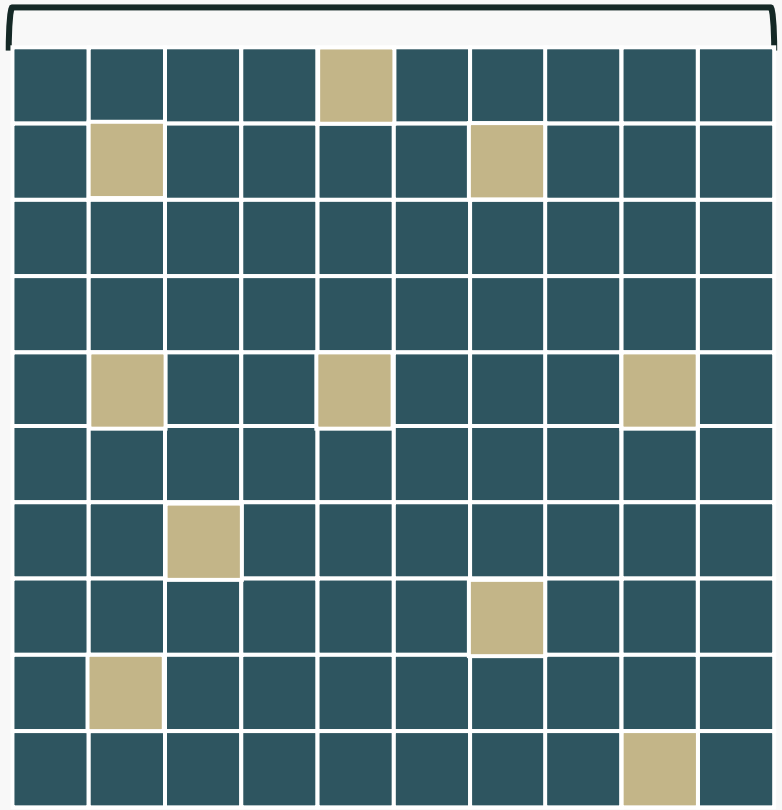
Source: Gendreau, P., Goggin, C., & Cullen, F. T. (1999). The effects of prison sentences on recidivism, 1999-3. Solicitor General.

How do we break the cycle?



Our solution

All ex-inmates with mental health illness



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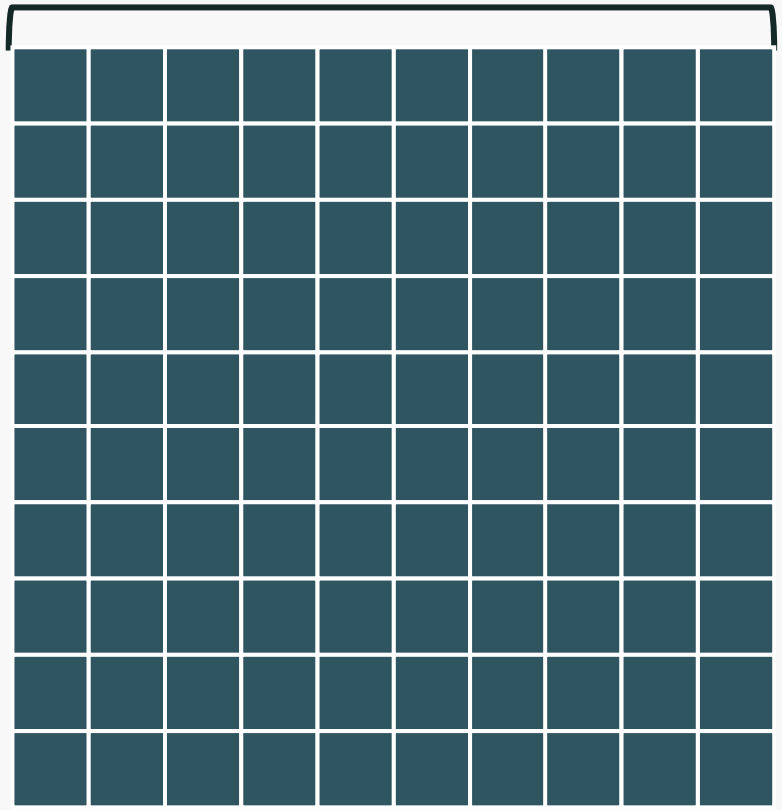
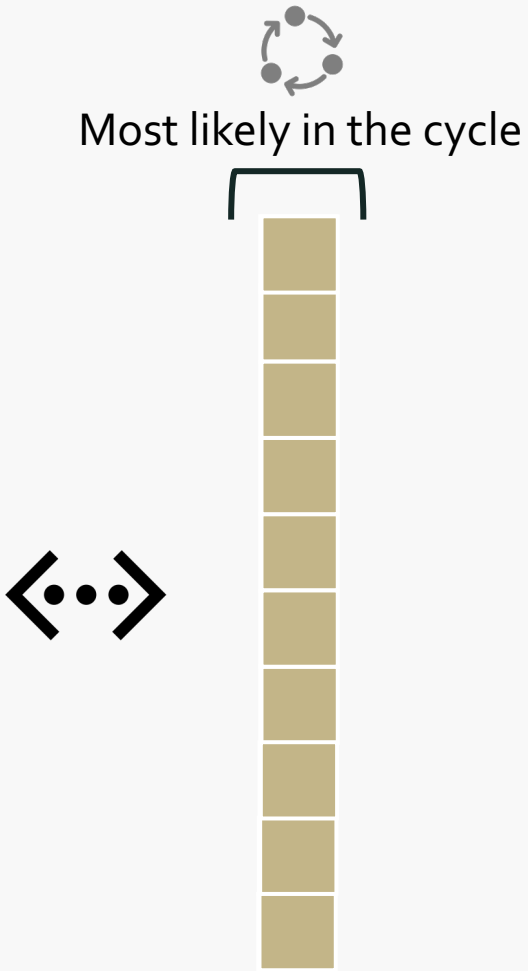


Most likely in the cycle



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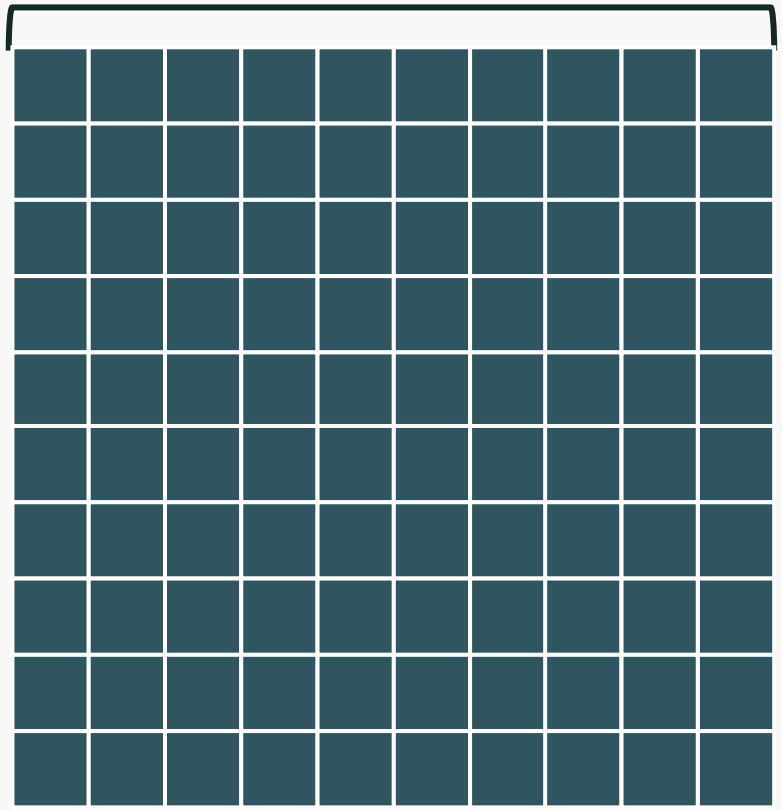

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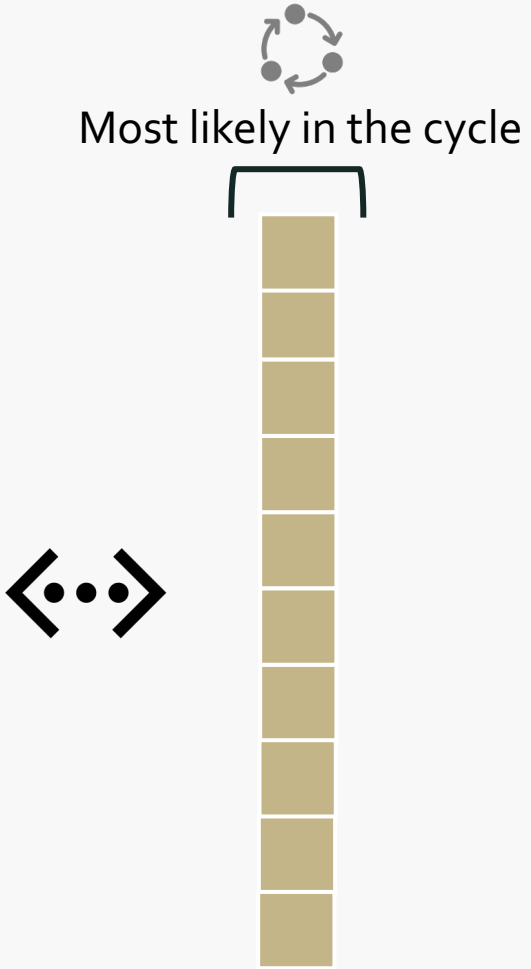
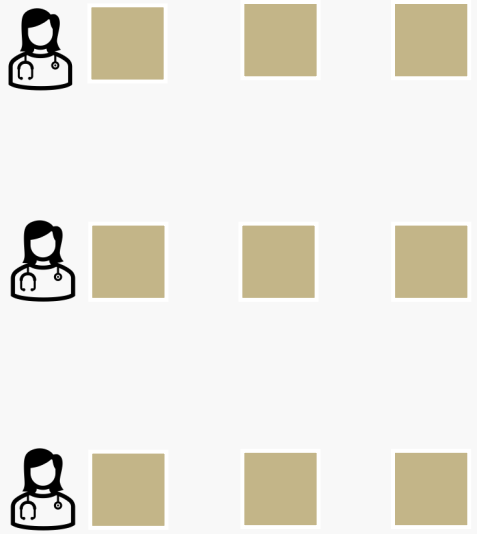


Outreach



Our goals

Efficiency

- Maximizing the number of people who are outreached that actually need help

Effectiveness

- Reducing recidivism rates of community members with mental health issues and criminal records

Equity

- Distributing outreach attempts equitably among people with different racial identities

Data Sources

Jail and Police data

- Jail bookings
- Arrests
- Court cases

Mental health data

- Calls
- Services
- Diagnoses

Health data

- Demographics
- Health data

Emergency Services

- 911 call information

Image by Morgan Housal, Unsplash

Who are we attempting to serve?

Ex-inmates released from jail in the last 3 years

Demonstrated mental health need over the past 5 years

At highest risk of returning to jail in the next year

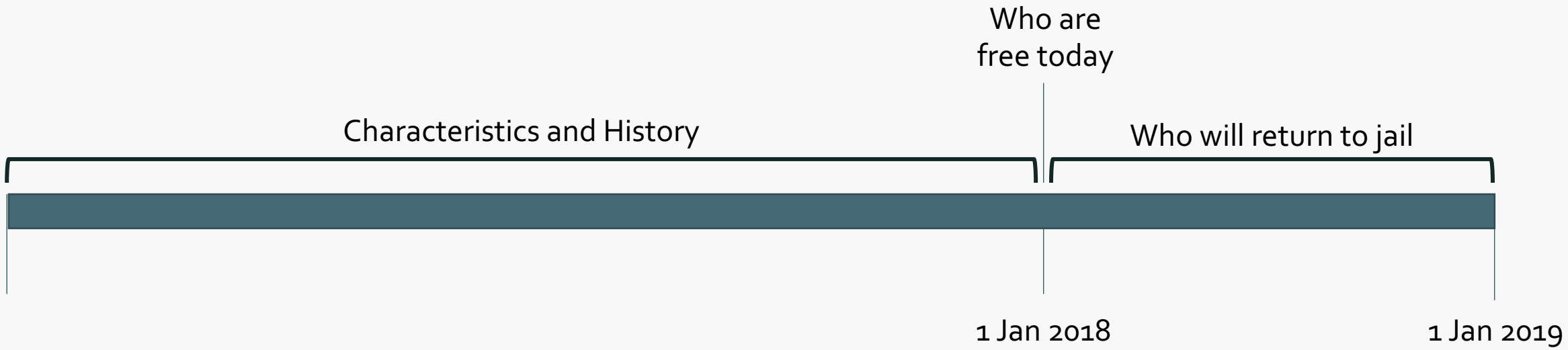
How would we serve these people

Once a month, caseworkers use our machine learning algorithm

which identifies ex-inmates at **highest risk of re-incarceration**

and use the results to provide proactive outreach services.

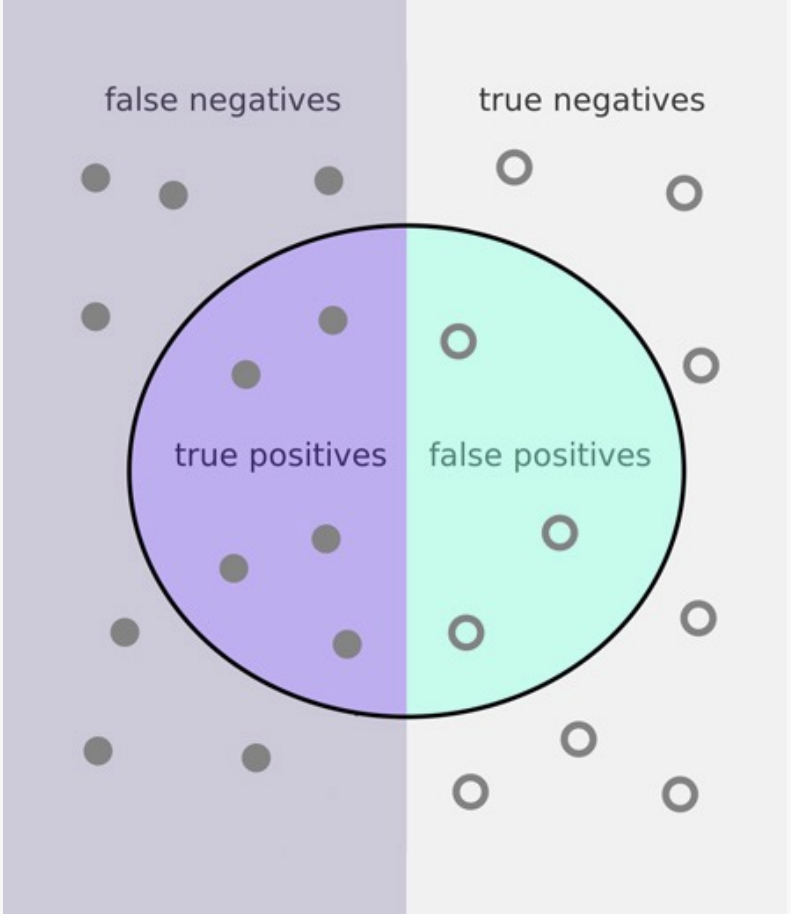
To make these predictions, the model learns…



The trained model could then be used live, when we do not know if an individual will be re-incarcerated.

How do we know if the model is good?

- With precision!
- The proportion of people selected by the algorithm for outreach, who were actually re-incarcerated.
- This is a measure of how effective our algorithm is at selecting people who might **actually** benefit from intervention.



How do we choose the right model?

- We train several different models 26 times, once every 4 months going back to 2009.
- For each of these iterations of the model we:
  - Maximize precision
  - Look at only the **previous** 5 years of data
  - Hold out some future data from each model to test, where **we pretend that we do not know who returns to jail**
- We select the model generated in this way which has the lowest variance and most precise average performance on the held-out future data.

That's a lot of work…
What can ML do vs. a simple baseline?

Baseline:

Select the top 100 ex-inmates with mental illness issues who were most frequently booked over the past 5 years.

Best ML model:

Random forest with 3,000 estimators, maximum depth 75, 100 minimum sample split.

Result

Baseline:

50.7%

of all selected individuals
actually returned to jail

Best ML model:

61.2%

of all selected individuals
actually returned to jail

Who was selected?

People with more interaction with criminal justice system

The top 100 individuals were booked in jail

22 times

on average

The individuals not selected by our model were booked

7 times

on average

Who was selected?

Those with more interaction with mental health services

The top 100 individuals selected by our model visited JCMHC

21 times

on average

The individuals not selected by our model visited JCMHC

10 times

on average

Who was selected?

People with substance abuse issues

The top 100 individuals had a history of substance abuse

33%

of the time, on average

Individuals who were <u>not</u> selected had a history of substance abuse

15%

Of the time, on average

Other important predictors

Recent interactions with criminal justice system

- Who was released most recently?
- Who was booked most recently?

History with criminal justice system

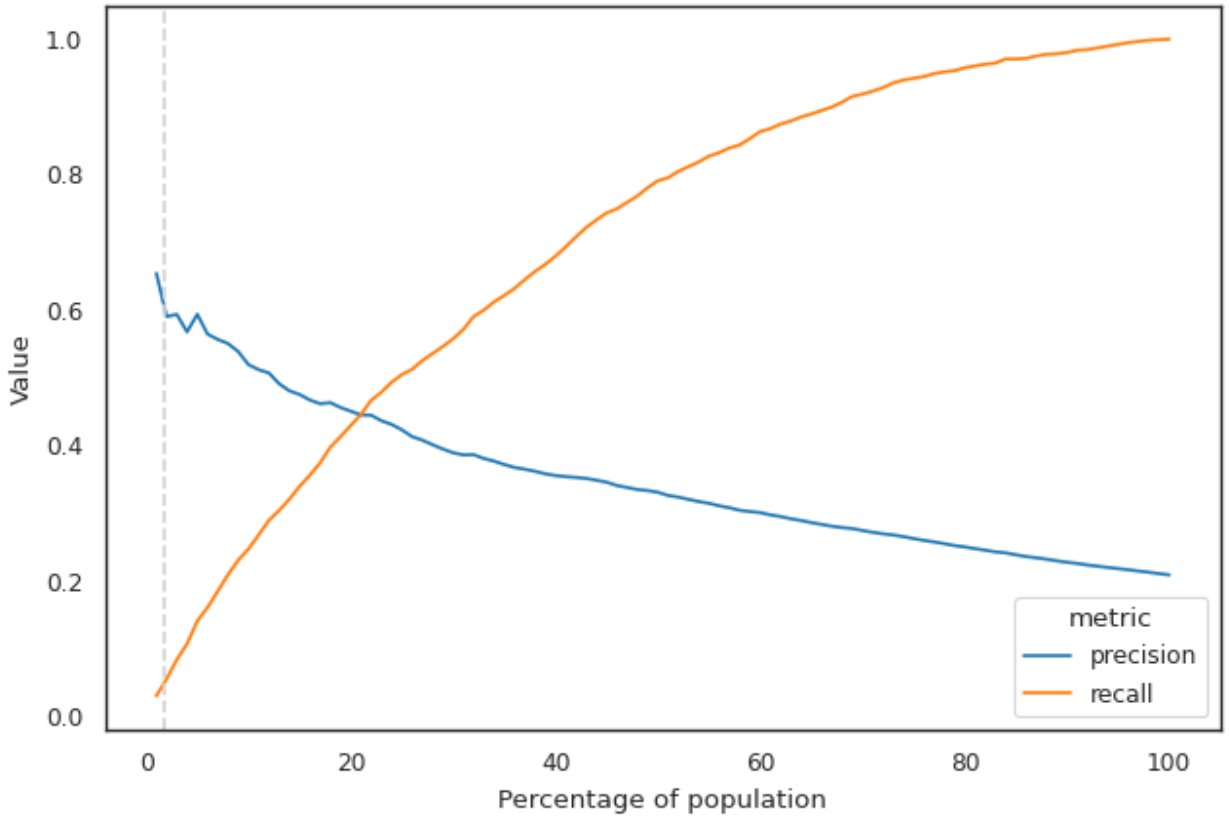
- How many times booked?
- How many times booked on a bench warrant?

Demographics

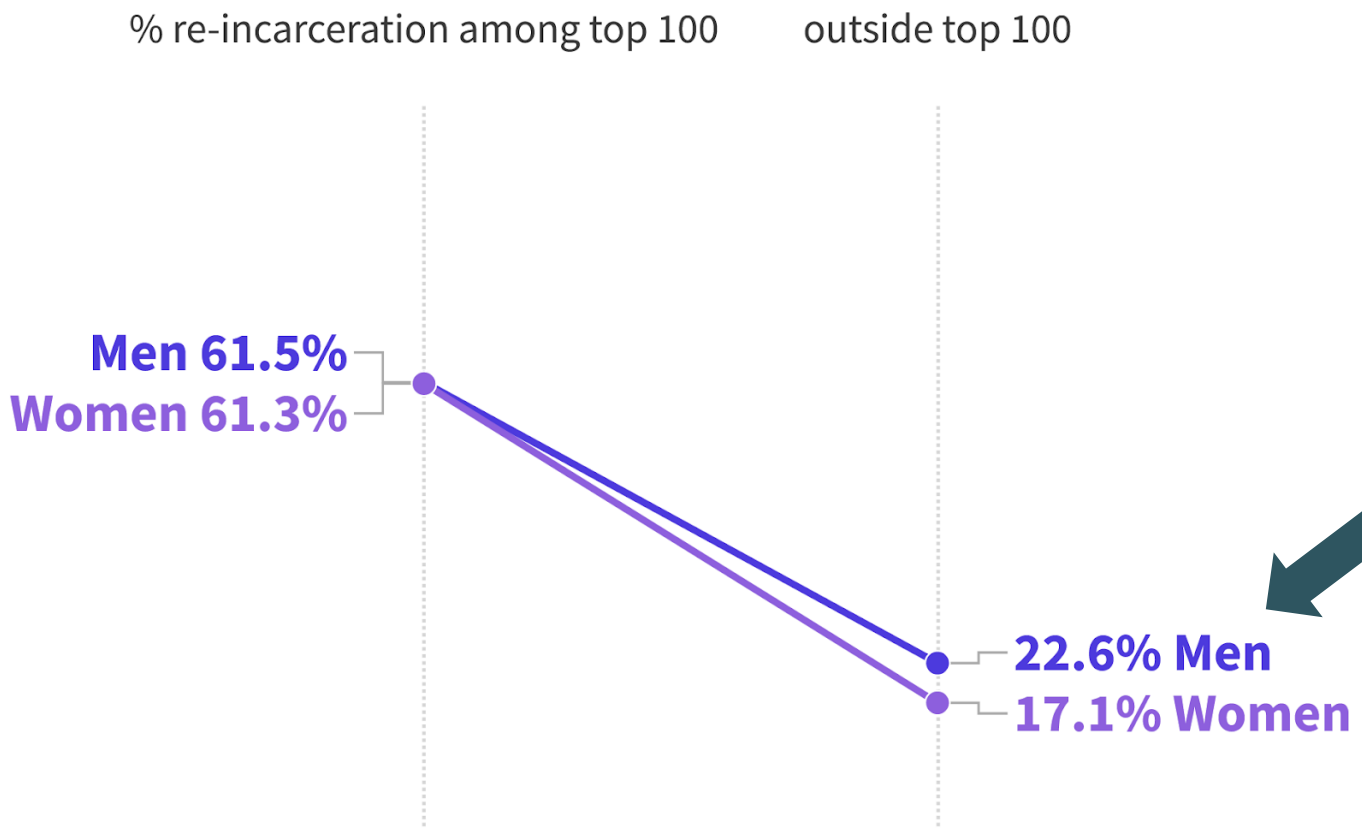
- How old were they at time of first booking?
- How old were they when they were booked?
- What is the recidivism rate in their zip code?

Recall

- If we just identify the top 100 as proposed, we would help **5%** of the people being re-incarcerated with mental health problems
- If we helped 500 instead, we could support **23%** of all who need help.



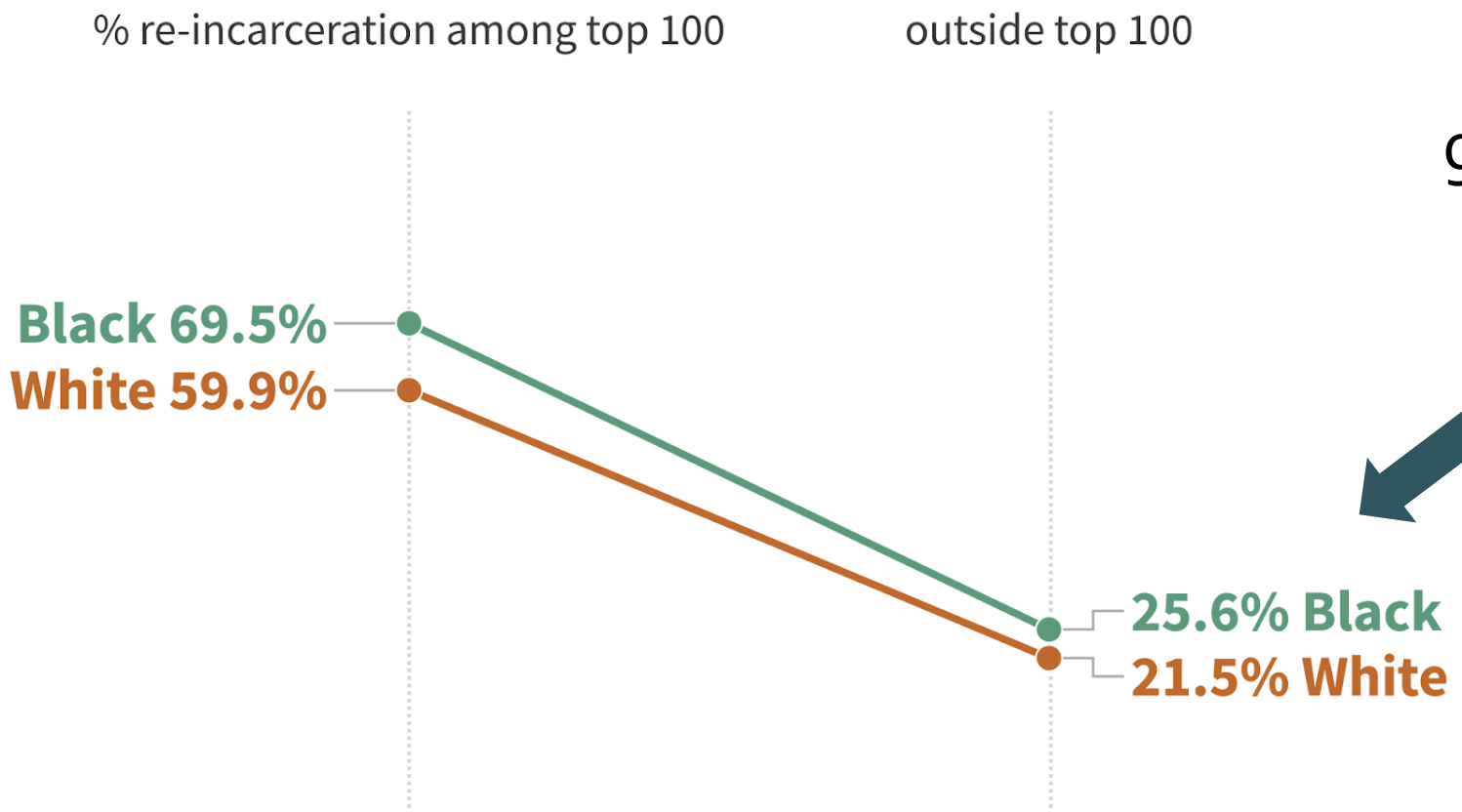
Bias



The model is relatively good at selecting women who will be re-incarcerated

Note: Calculated as a mean across all test splits using most frequent sex listed in the data. Scale is 0-100%

Bias

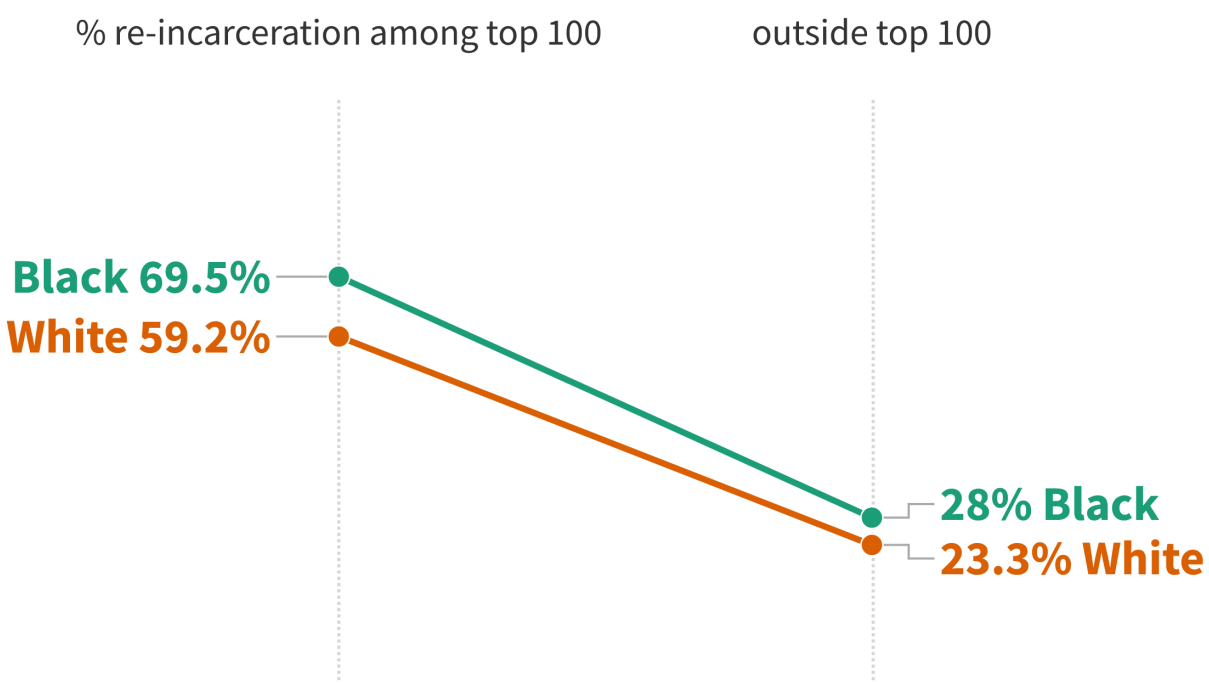


The model is relatively good at selecting Black folks who will be re-incarcerated

Note: Calculated as a mean across all test splits using most frequent sex listed in the data. Scale is 0-100%

This trend remains consistent when controlling for gender

Men



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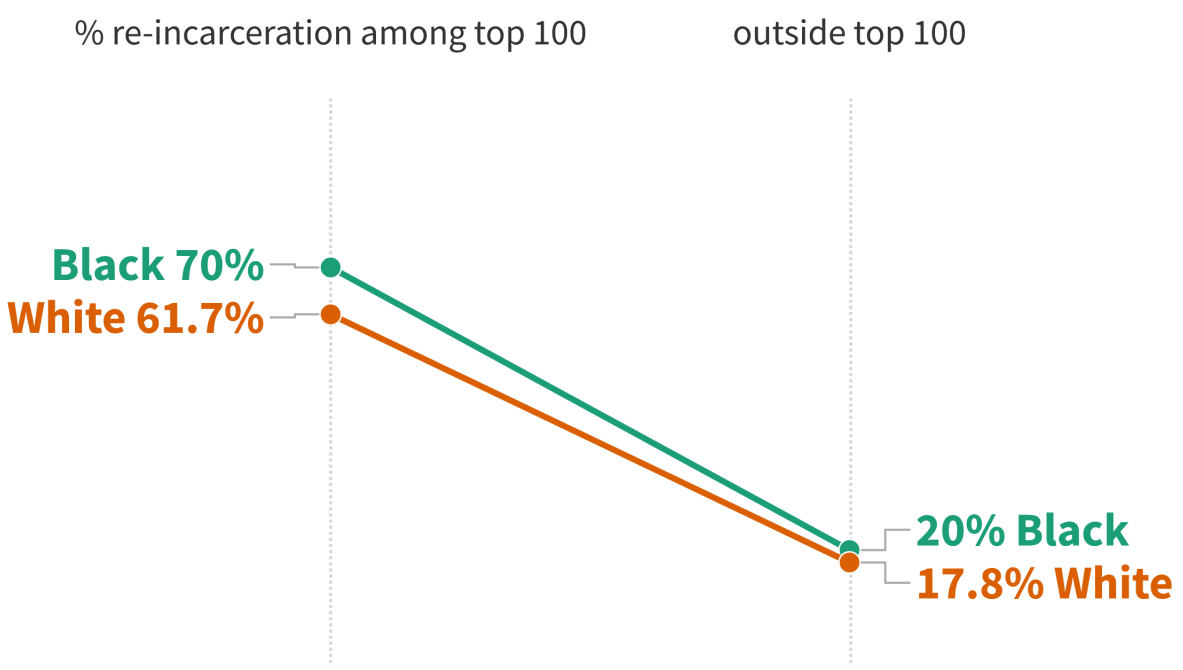
Women



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Policy Recommendations

Use the model to identify people for outreach

- Create new program under Johnson County Mental Health Center
- Train outreach coordinators to use case histories to understand individual cases
- Make timely intervention in each case

Optimize the type of outreach

- Provide case-specific outreach
  (e.g., CRA, SBIRT, or ADU for substance abuse)
- Ensure accessibility of programs

Caveats of our analysis

We predict re-incarceration **among** mentally ill

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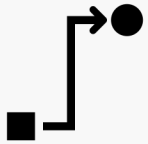
We want re-incarceration **caused** by mental health



We find those that are most likely to return to jail

≠

Individuals for whom outreach is most effective

Each individual is different.

Being in “the cycle” may mean different things

Caveats of our data

- Real-word biases influence our data

- No single conclusive indicator of mental health need

- Only jail data for Johnson County
- Structural data differences across time

Future Work

Add more data, e.g., incarceration outside of Johnson County jail

Verify assumptions through on-the-ground experience

Field test our model

Field Trial

Field Trial

Control Group

Check recidivism rate to see **if our model was precise**

Treatment Group

Check recidivism rate to see **if our outreach was effective**

↳ Pattern?

Q&A

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