

Effects of Mental Health Incidence on Crime

Spatial and Temporal Factors in Chicago

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(alphabetical order of first name)

Agenda

- Problem Statement
- Explain data collection, what does our data contain/what does it mean
- Exploring the Data
- Regression - predicting crime based on MH factors
- Time Series Analysis
- Conclusions

Problem Statement

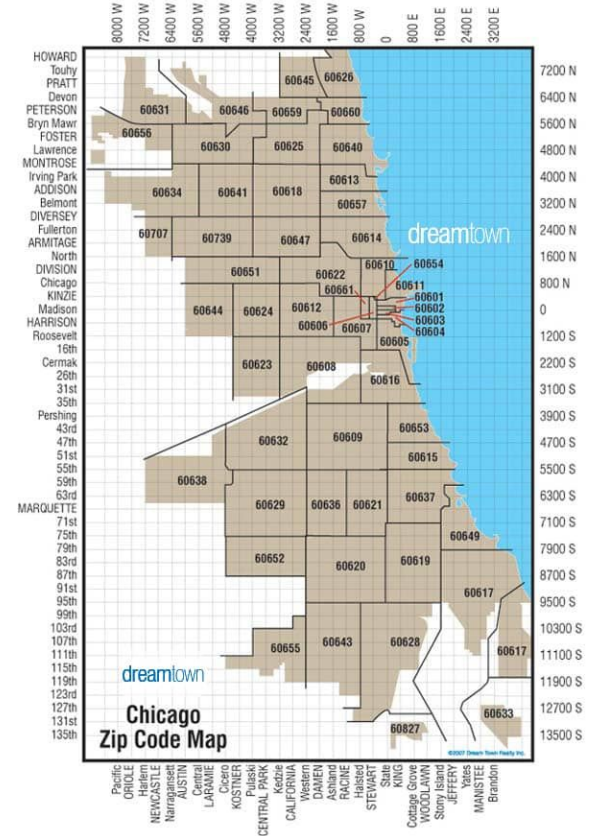
Starting point: The Cook County Jail, which serves as the primary pretrial detention facility for arrestees in Chicago, is also one of the largest psychiatric treatment centers in the U.S.

In 2019, the City of Chicago released a new Framework for Mental Health Equity, investing millions of dollars each year to improve access to treatment.

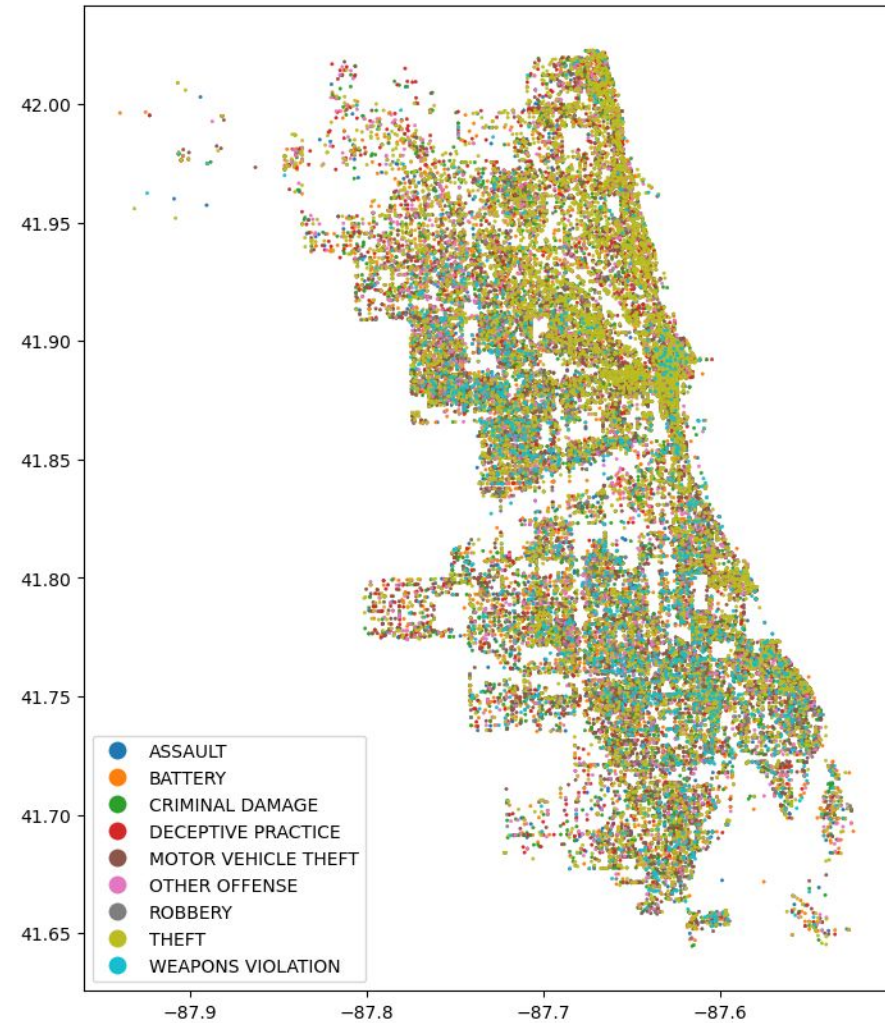
We are exploring the relationships between mental health incidence and crime in the City of Chicago, with a particular emphasis on these relationships on a neighborhood by neighborhood basis.

Visualizing Chicago

Chicago is organized into 77 different neighborhoods. Data for crime and mental health is often collected by neighborhood, zip code, or even census tract. One of our challenges was on catenating data organized on these disparate levels.

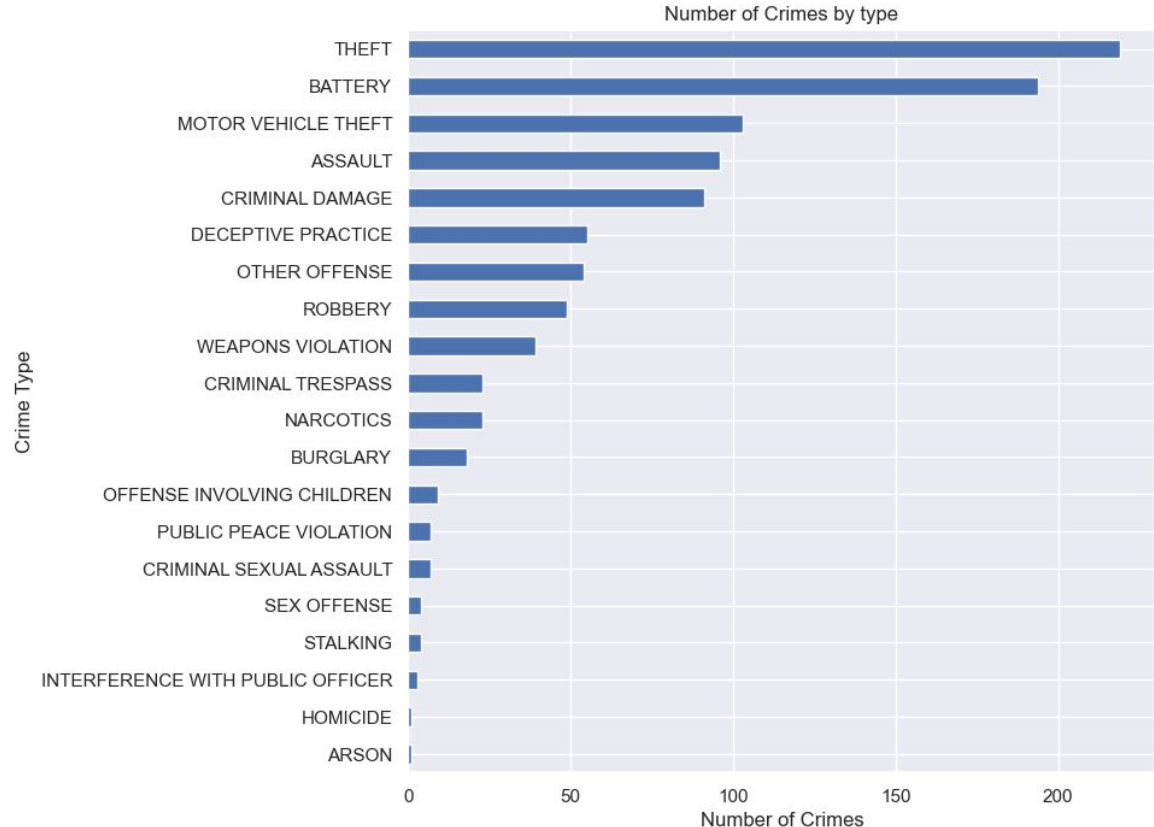


Crime Data by Area



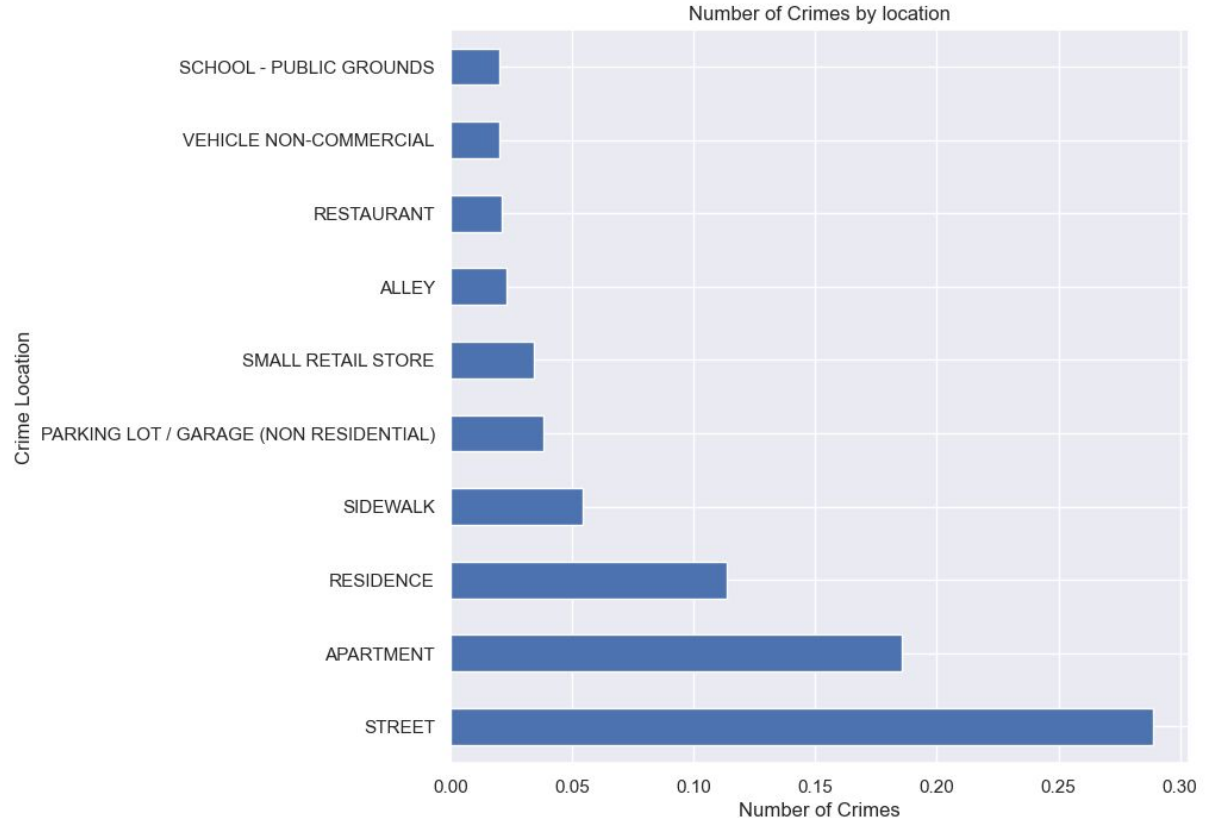
Crimes by Crime Type

The most occurred crimes were theft, battery, motor vehicle theft, assault, and criminal damage which is about 70% of all the crimes reported.

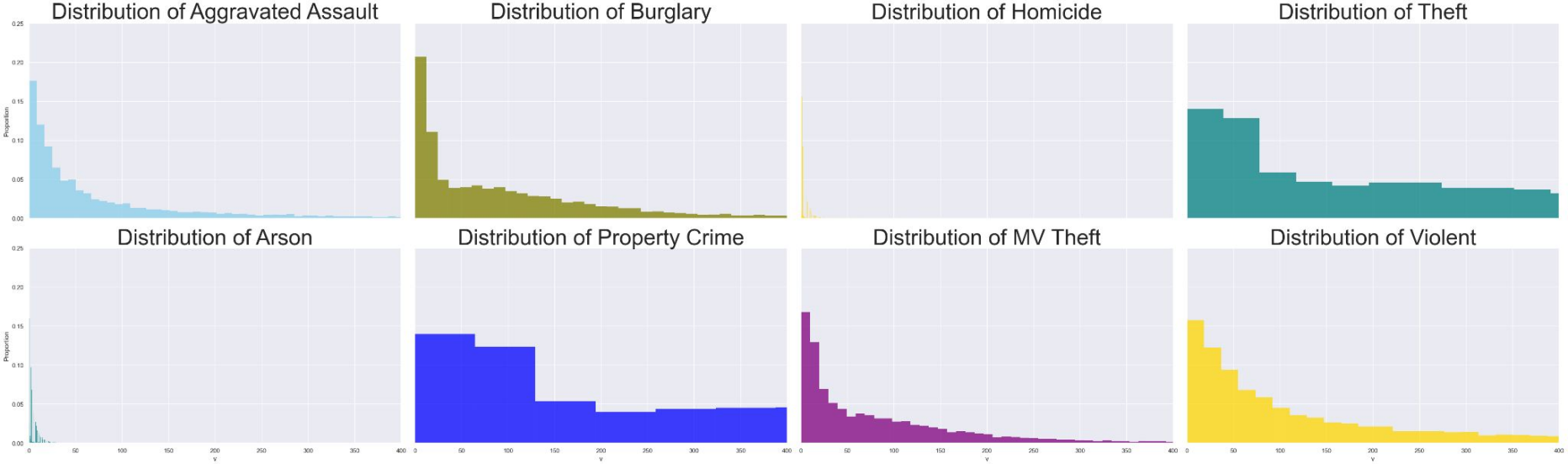


Crimes by Location

The most common locations to occur the crimes are at street, apartment, sidewalks, residence, where people are ordinarily at.

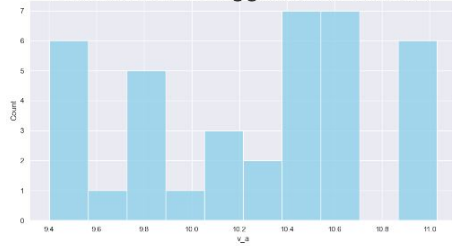


Crime Data by Neighborhoods: Raw

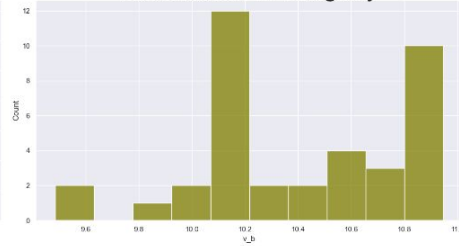


Crime Data by Neighborhoods: Log-transformed

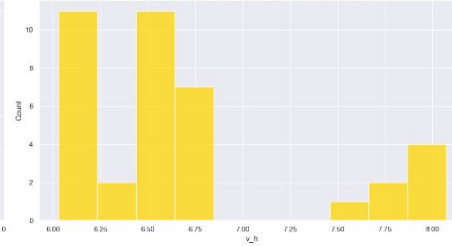
Distribution of Aggravated Assault



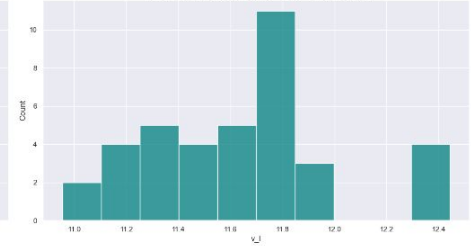
Distribution of Burglary



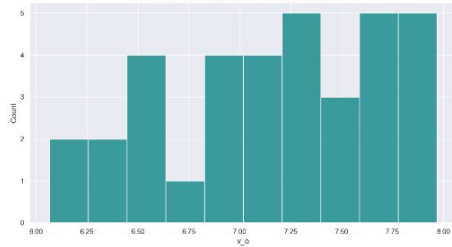
Distribution of Homicide



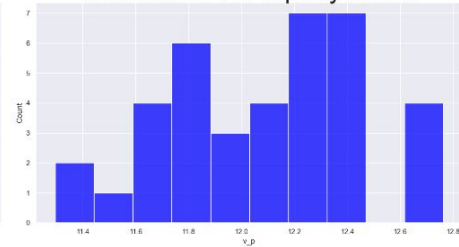
Distribution of Theft



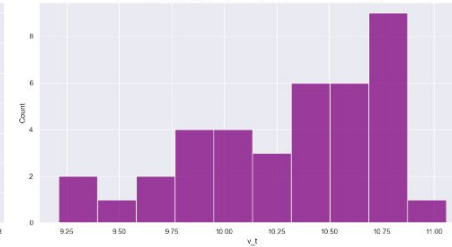
Distribution of Arson



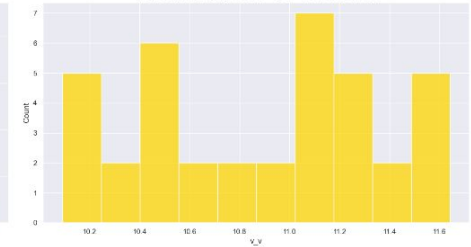
Distribution of Property Crime



Distribution of MV Theft

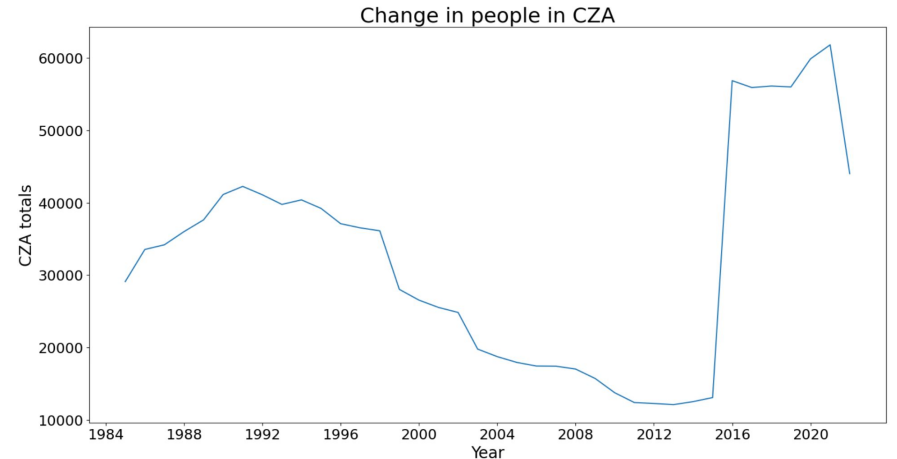


Distribution of Violent

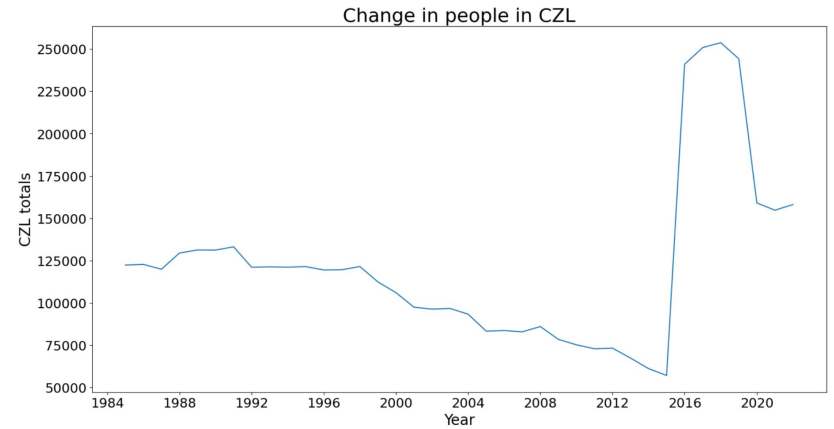
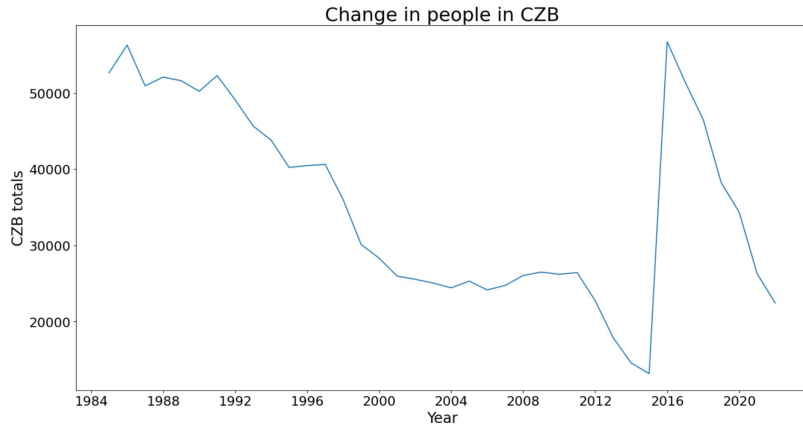


Time Series Analysis of Crime in Chicago

- Of twelve types, eight have been operating since 1985
- Totals for each year since then were compiled
- Due to skews in our EDA, decided to log transform the data



Time Series Visualized



VAR Modeling

Best Model - CZA, CZB, CZL all differen

AIC -> -17.6479

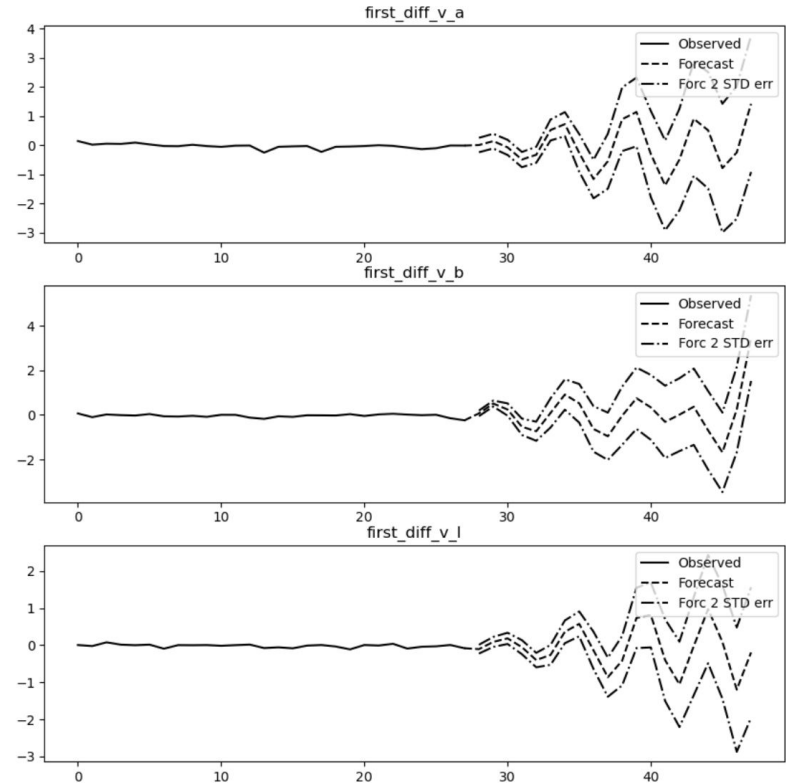
Individual mean squared error -

CZA 1st Diff - 0.465232

CZB 1st Diff - 0.500432

CZL 1st Diff - 0.315641

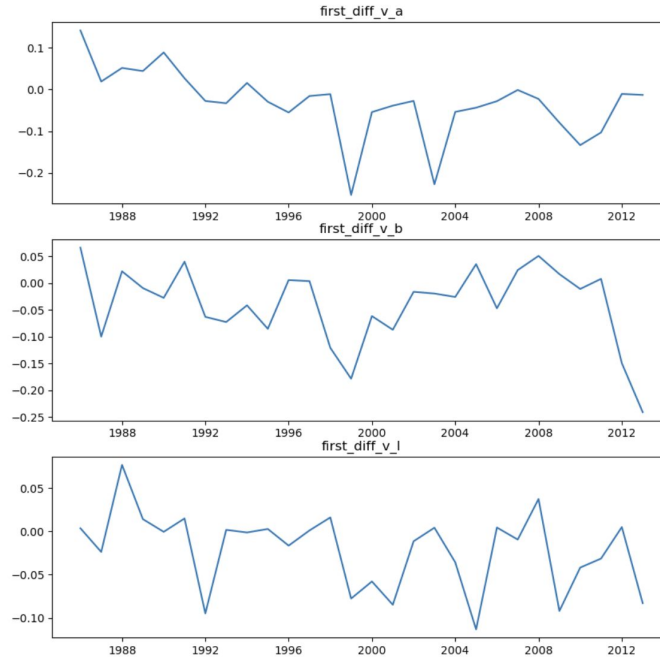
Forecasted 20 Years Into The Future



VAR Modeling Only Health Programs

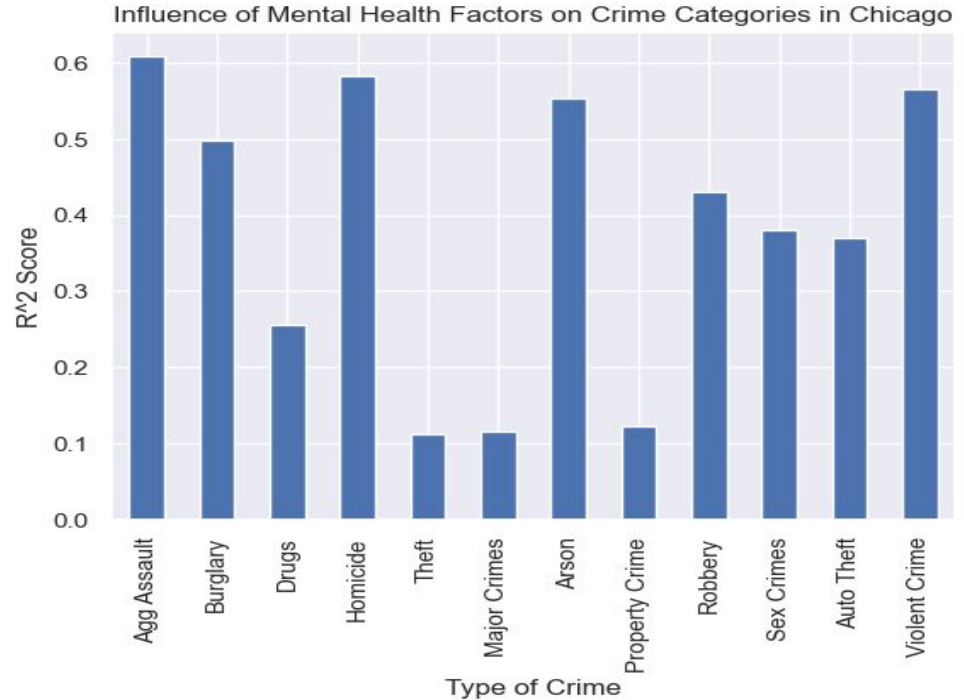
AIC - Slightly better at -16.69

- Not enough temporal data

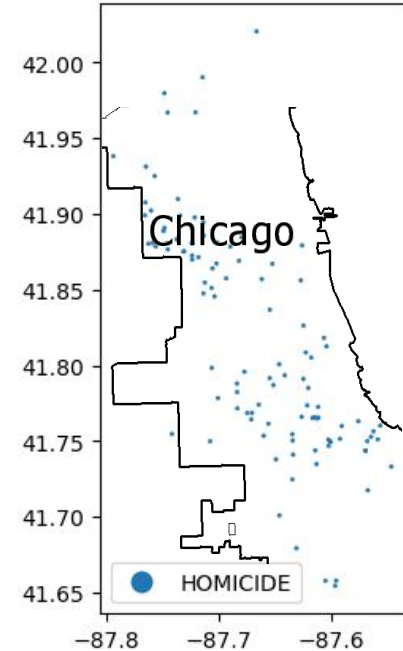
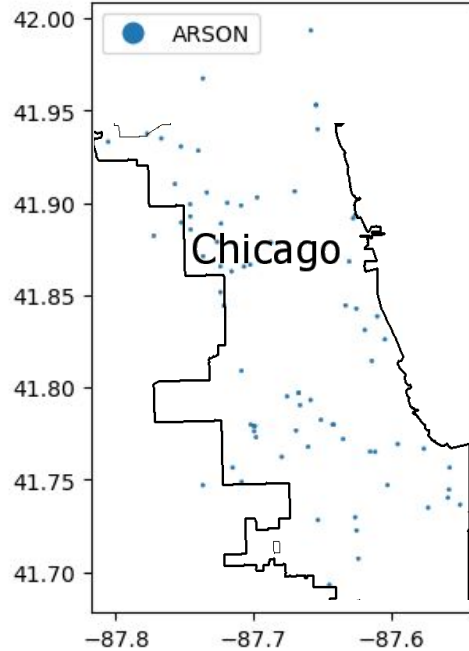
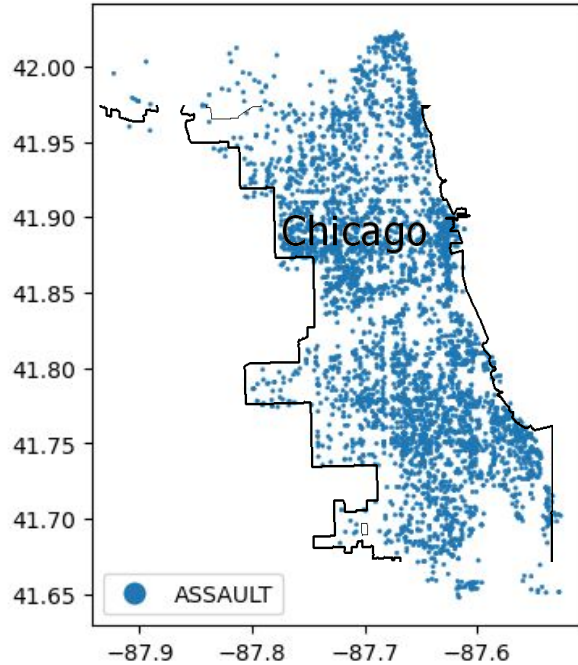


Influence of Mental Health Factors on Crime

- Lasso Model
($\alpha = 0.01$)



Mental Health-Influenced Crimes by Area



Conclusions

-Mental health incidents are more highly correlated with crimes that are more violent in nature:

High violence: Homicide, Arson, Agg Assault

Med violence: Burglary, Robbery, Drugs

Low violence: Theft, Auto Theft, Property

-Recommend interrupted time series analysis on the data, based on dramatic spike around 2016

Citations

Chicago Health Atlas

City of Chicago Data (data.cityofchicago.org)

Images: <https://www.dreamtown.com/assets/img/maps/chicago-zipcode-map.jpg>