UNIVERSITY OF TORONTO
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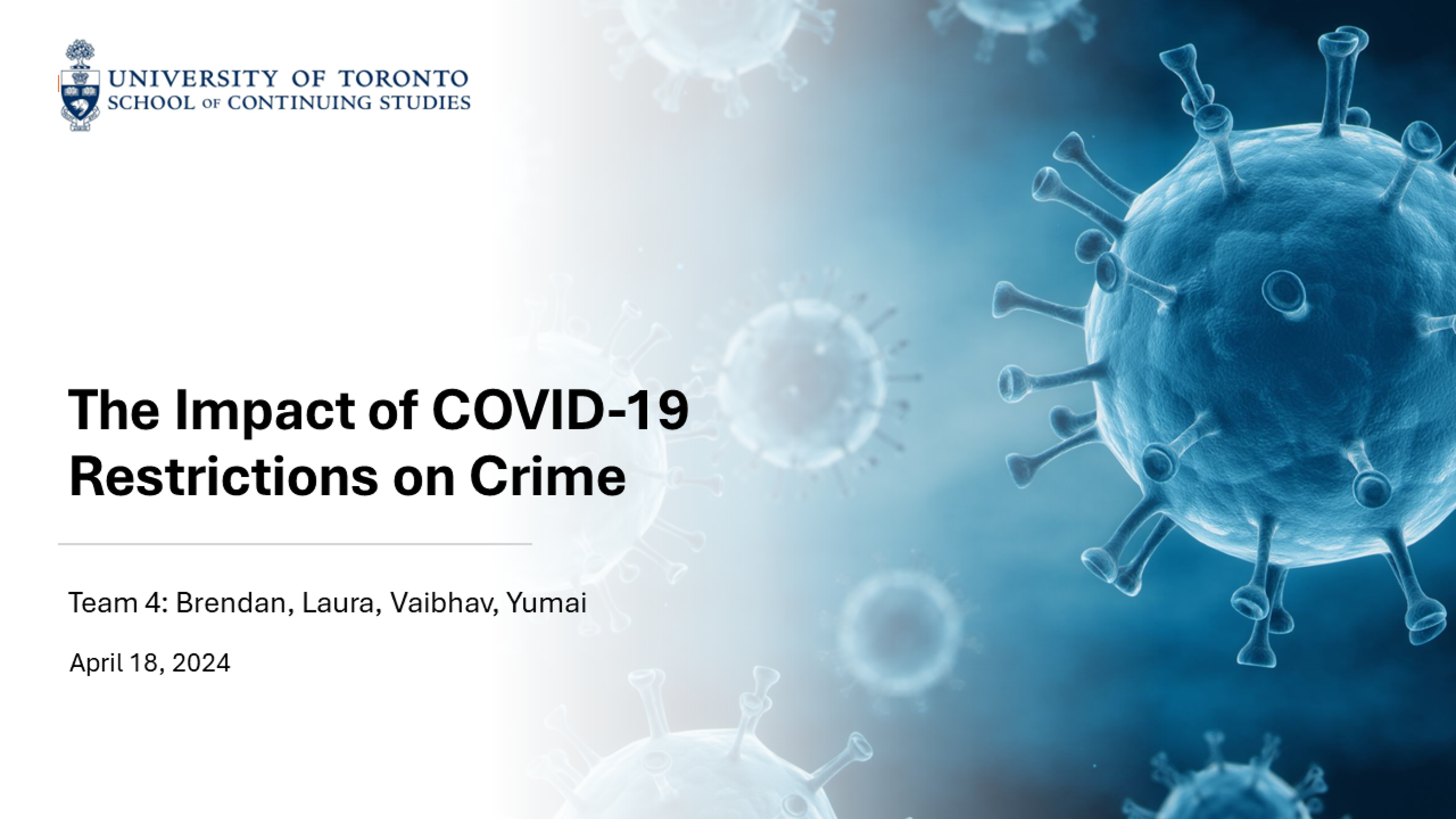

The Impact of COVID-19 Restrictions on Crime

Team 4: Brendan, Laura, Vaibhav, Yumai

April 18, 2024

TODAY’S SCHEDULE

How did COVID Restrictions affect crime metrics?

Introduction

“As COVID-19 restrictions eased, violent crimes increased in number”

Data Cleaning

- Data Set constraints
- Accessibility
- Data Interpretation
- Assumptions

Sub-Questions

(1) Total Crime

(2) Top Crime

(3) Violent Crime

(4) Victim Metrics

Conclusion

- Intra-topic and inter-topic conclusions
- Is there sufficient data and statistical support to rejection our null hypothesis?

Discussion

- Project Management
- Future Directions
- Limitations and extrapolations to be addressed






TIMEFRAMES OF INTEREST

Q1 Q2 Q3 Q4

(Restrictions Begin) (Vaccine Availability) (Booster Availability) (Restrictions End)

COVID — January 22, 2020 - First COVID case in LA

01.03.2020 — LA State of Emergency Announced

01.03.2021 — Vaccines made available early 2021

01.03.2022 — Boosters administered regularly and policy uncertainty

01.03.2023 — End of State of Emergency + COVID19 Prevention Emergency Standards Discontinued

01.03.2024 — 1 year post

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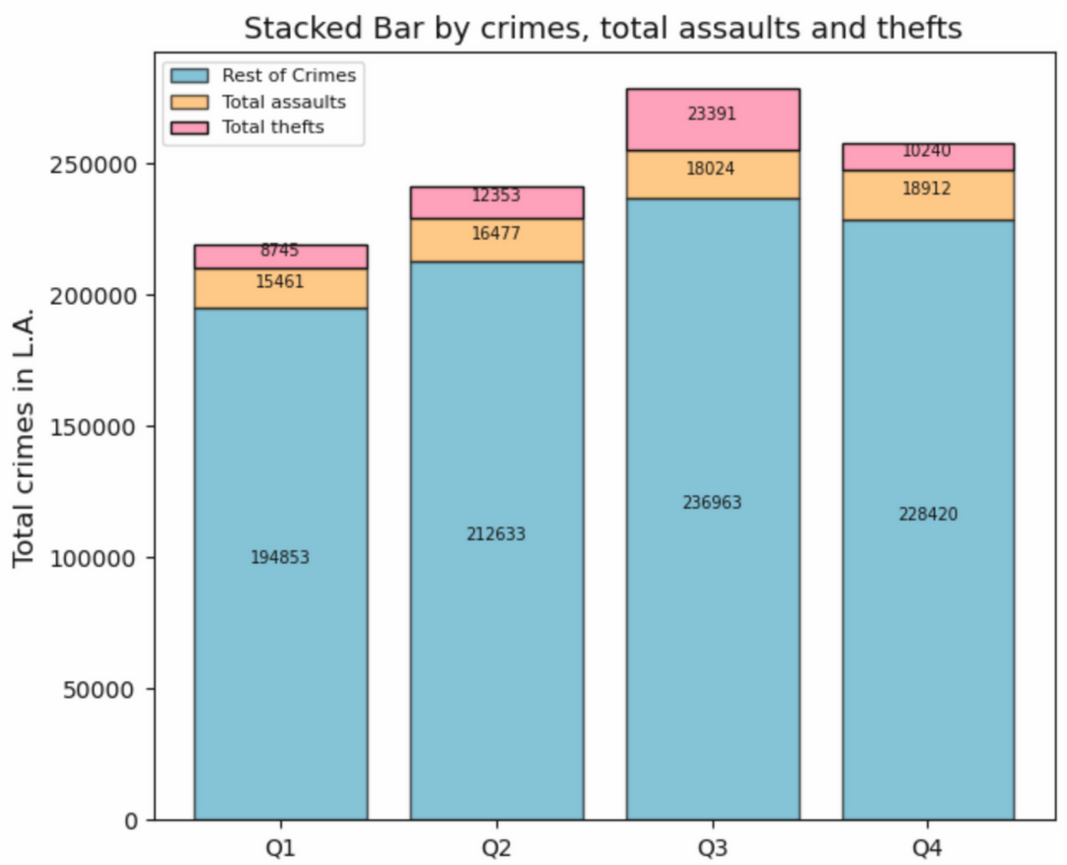
Data Cleaning

• Imported pandas, json, matplotlib and numpy libraries.

• Converted dataset into json and print the outcome as DataFrame.

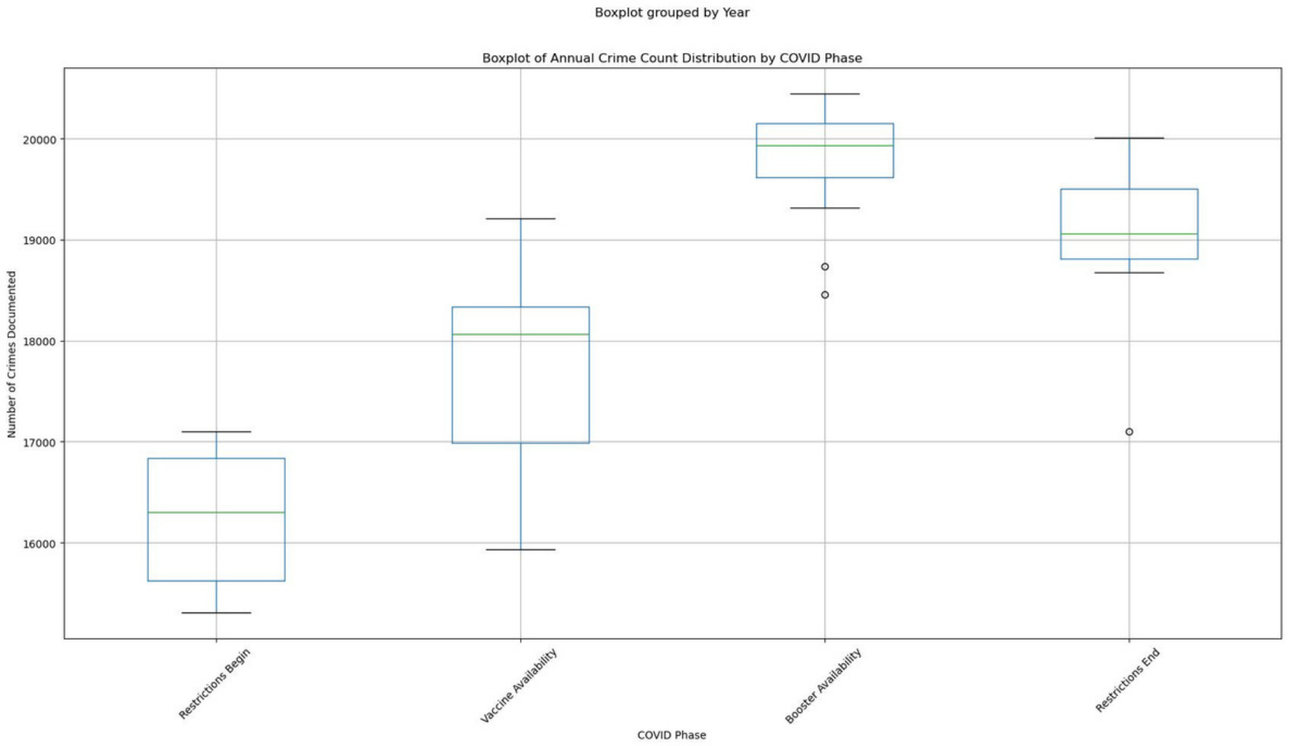
• Grouped customized start-end dates (Q1, Q2, Q3, Q4 12-month period)
• Removed irrelevant data (lat, lon = 0)

• Formatted location lat, lon, converted date type to datetime.



Data Limitation

•API’s not all available for free
•A very large dataset, (> 900,000 rows) - high memory usage.
•Not all data was available in readable format. (Modus operandi codes)
•Many plots - understand data

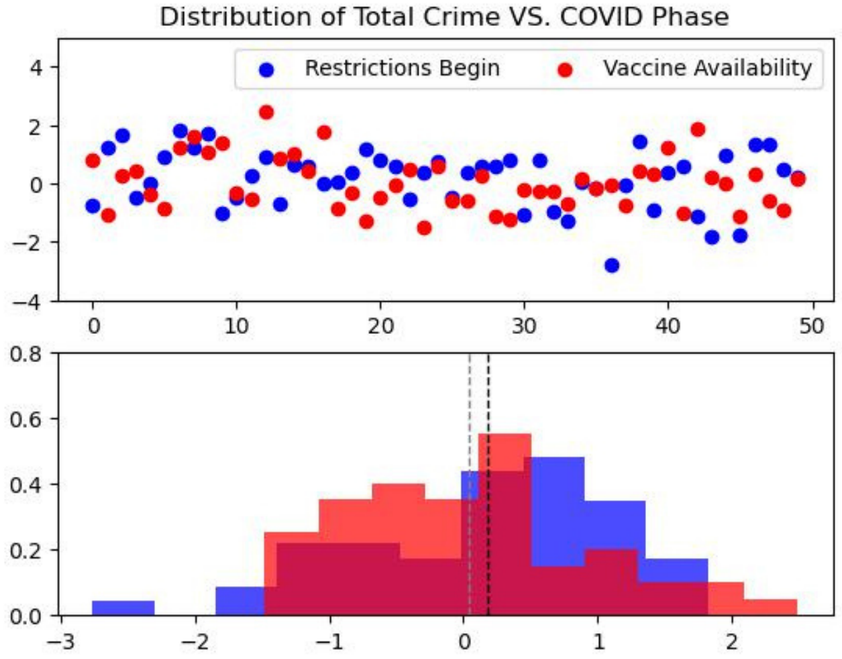


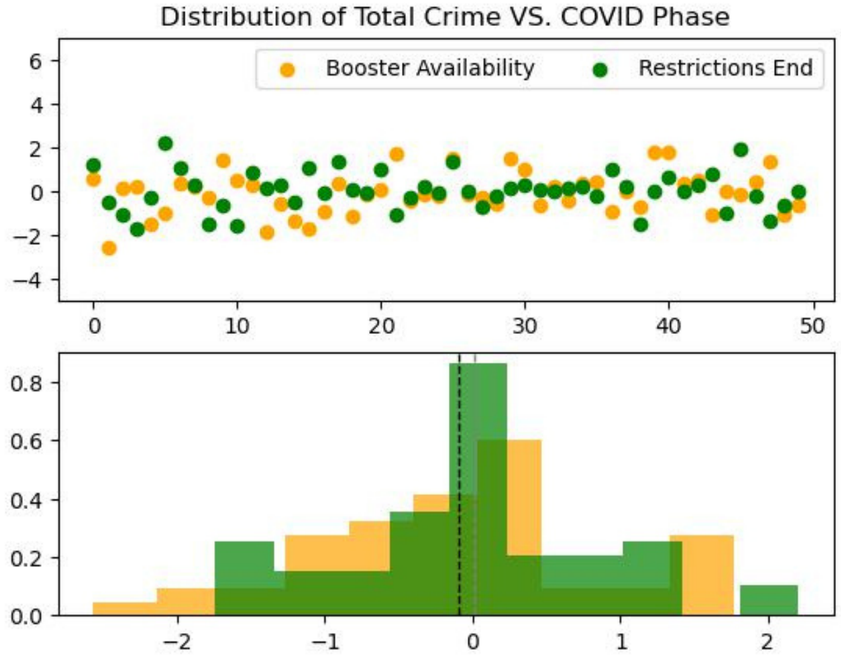
DATA DISTRIBUTION FOR TOTAL CRIME

- Identify possible outliers (Q3, Q4)
- Visualize data distribution
- Confirm ANOVA parameters (eligibility)
- Dispersion of data
- pvalue = 6.362651834258752e-14

Boxplot Displaying Total Crime per Milestone

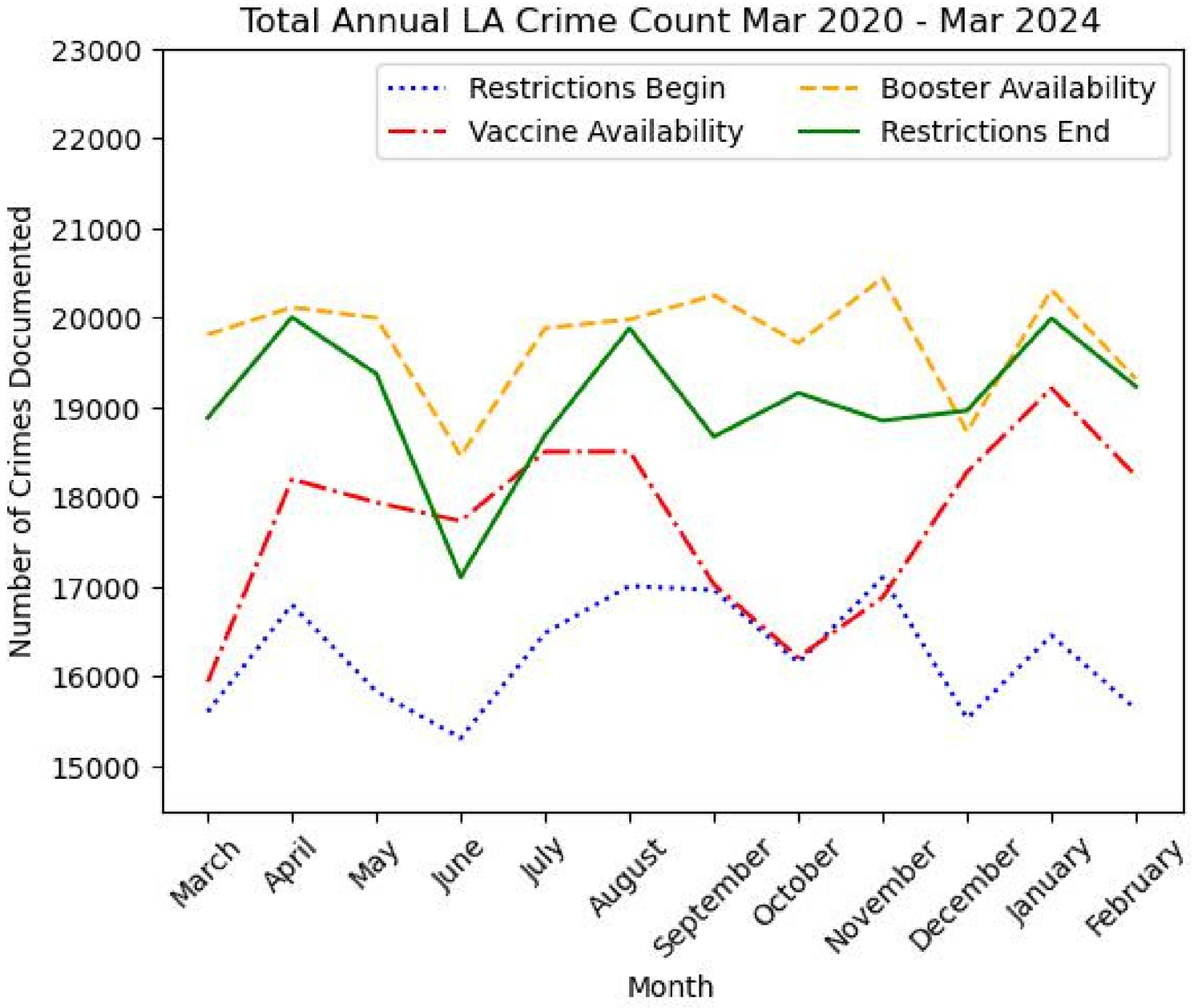
Scatter Plot & Histogram Displaying Total Crime per Milestone





LA CRIME COUNT BY MONTH AND COVID MILESTONE

- Gradual overall increase in crime
- Crime rate stayed elevated 1 year post COVID SOE end
- Correlate with outliers identified in the boxplot



REPRESENTATIVE TREND

ELEVATION

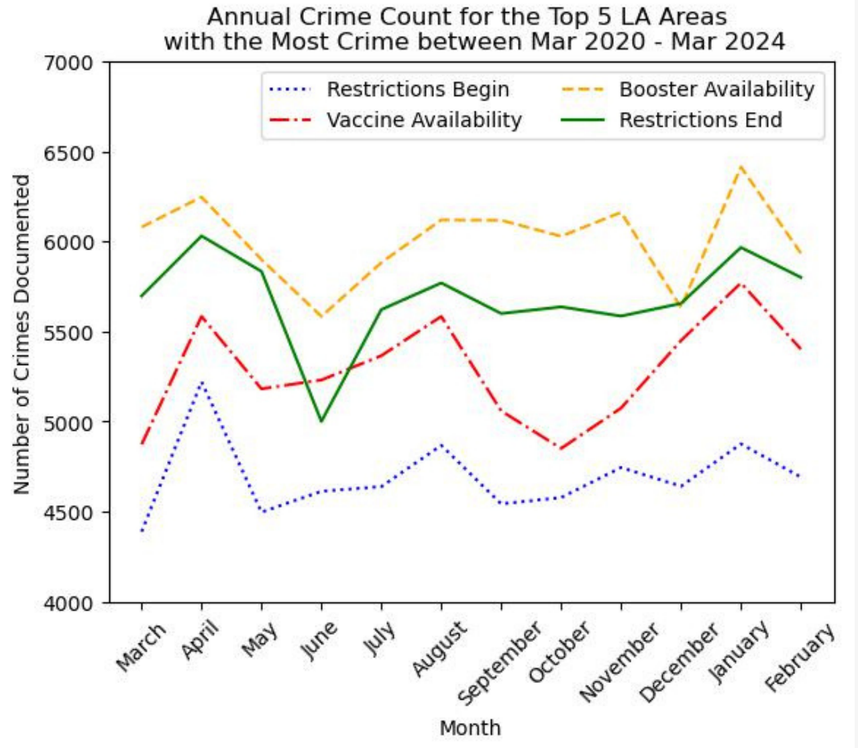
Total Crime Count

SIGNIFICANCE

at a p threshold of p<0.05

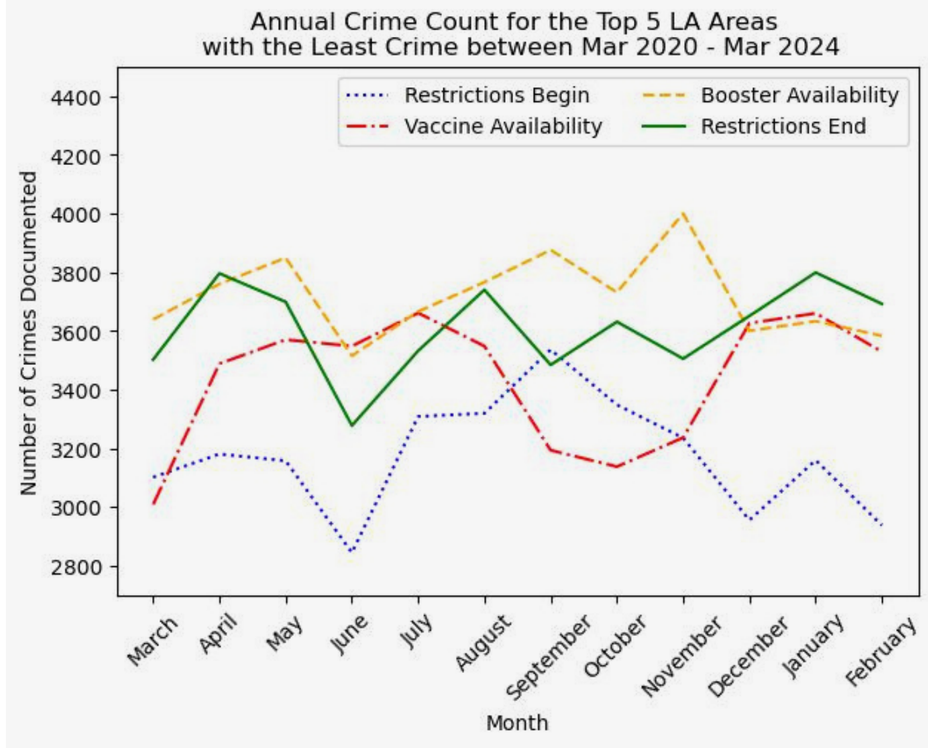
CONSISTENCY

In the observed pattern



LA TOP 5 AREAS OF HIGHEST CRIME

pvalue=1.252749677
8422165e-15



LA TOP 5 AREAS OF LOWEST CRIME

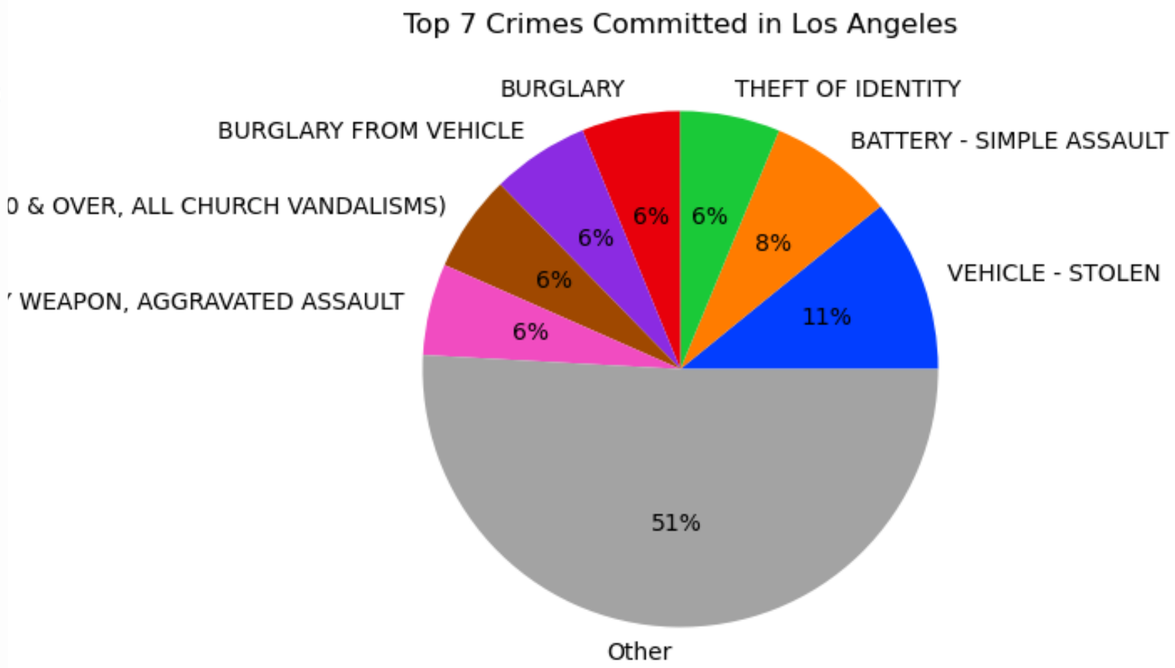
pvalue=1.921301387
8468996e-08

Top Crimes

Top Crimes Committed in the City of Los Angeles

01

Deep Dive into the top Crimes committed and the major areas impacted

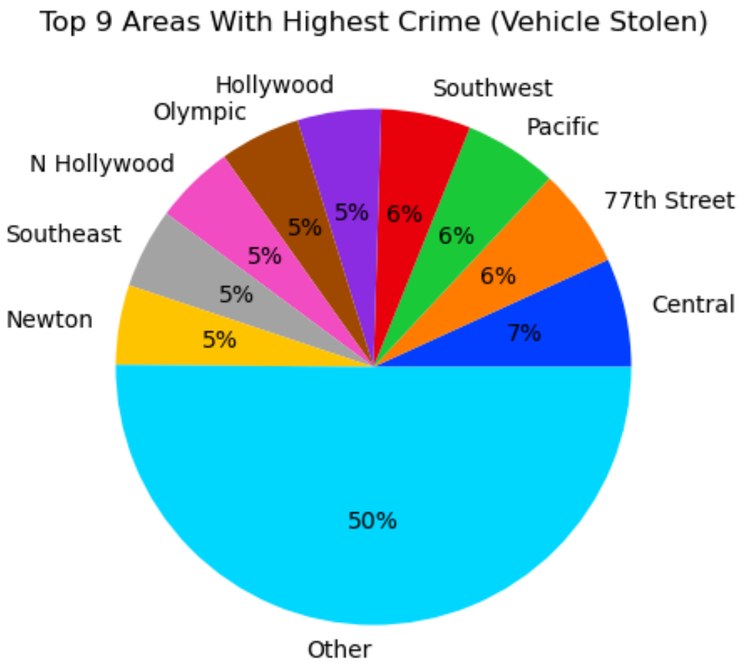


Areas with Highest Crimes

Top Crimes Committed and major areas affected in City of Los Angeles

02

Deep Dive into the top Crimes committed and the major areas impacted

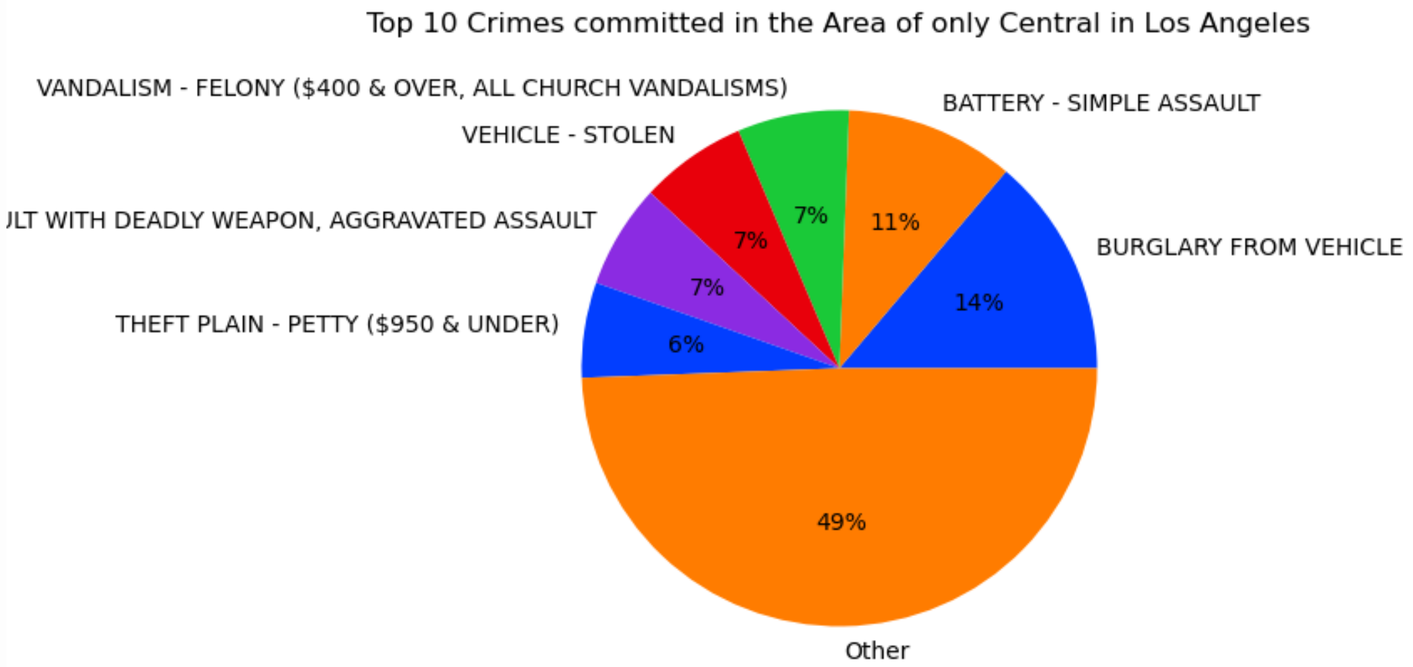


Top Crimes in Area with Highest Crime

Top Crimes Committed in Area of Central Where Highest number of Crimes were committed

03

Drill Down into Major Crimes Committed, in Area with max number of crimes



Violent Crimes

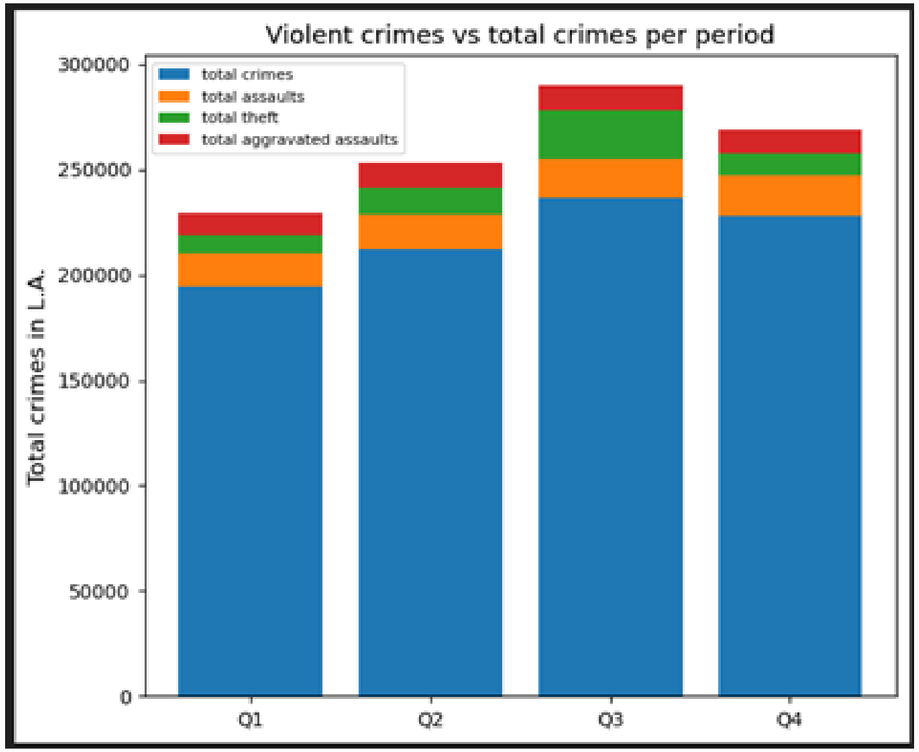
Simple Assault s = 8%
Aggravated Assaults = 6%
Theft = 6%**

>>> 14% of total crimes in L.A. were violent within past 4 years.

Aggravated assaults:
Q2 vs Q1 = 11% increase
Q3 vs Q2 = (1%) decrease
Q4 vs Q3 = (1%) decrease

**Theft of identify, mostly family houses/apartment

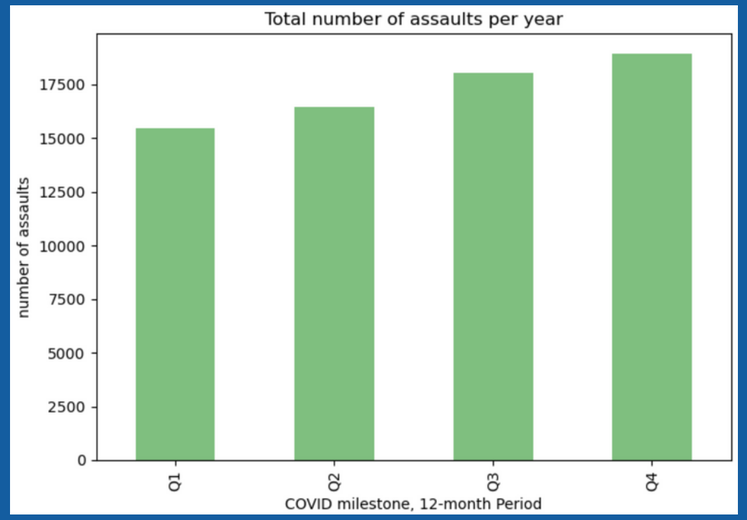
Did COVID-19 influence the amount of violent crimes as restrictions eased



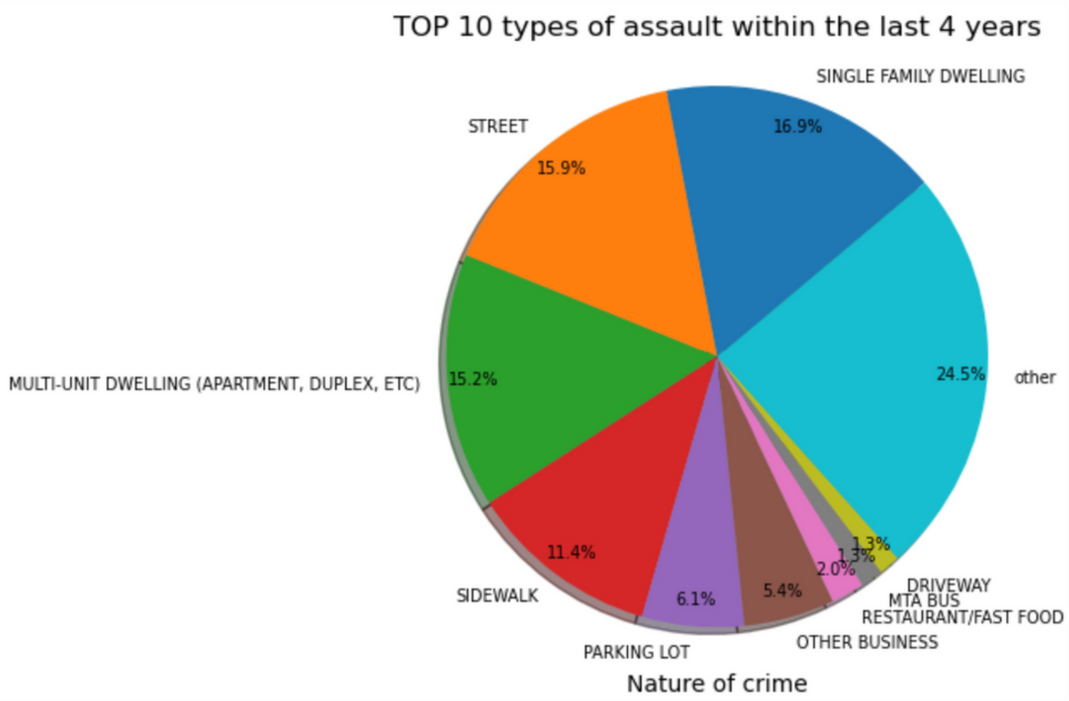
27% were committed in streets and sidewalks.

- Street assaults, steady 12% incr.

- Sidewalk assaults, Q2 incr 5%, Q3 incr 12%, Q4 0% incr.



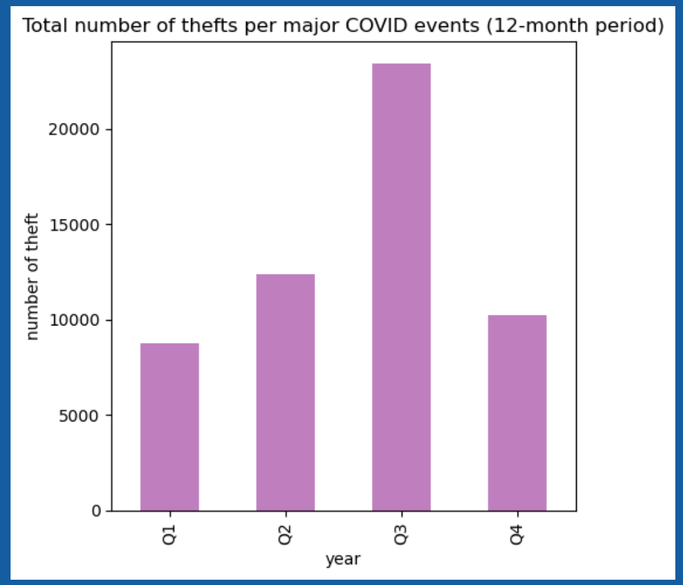
Simple Assault

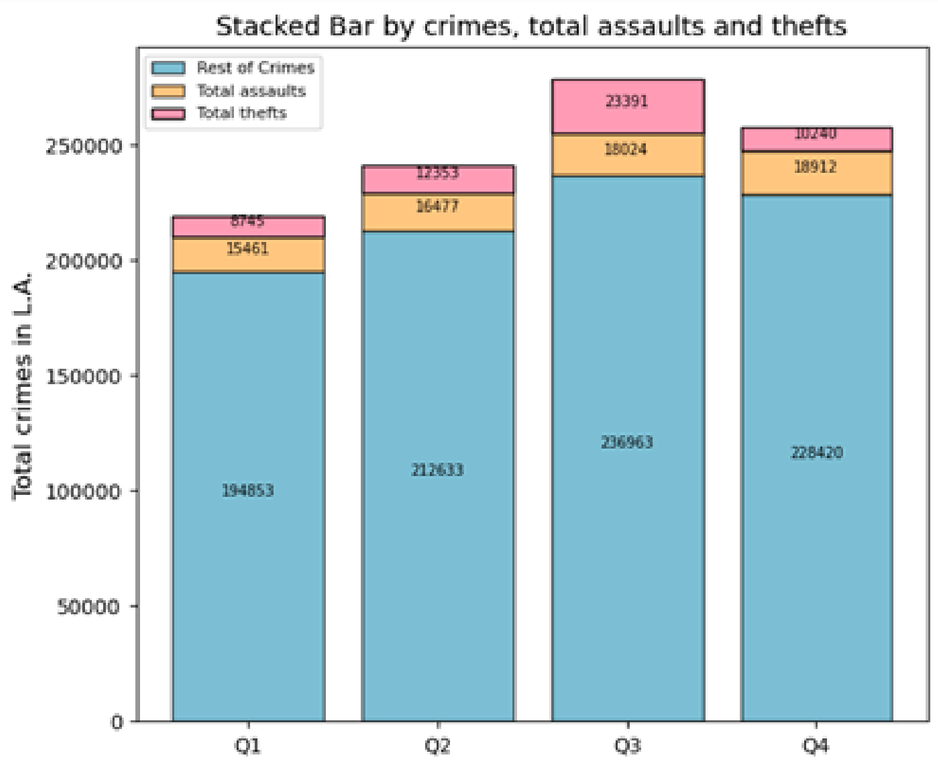


Theft

Sharing 6.3% of TOP 3 violent crimes,
has the most fluctuated behaviour

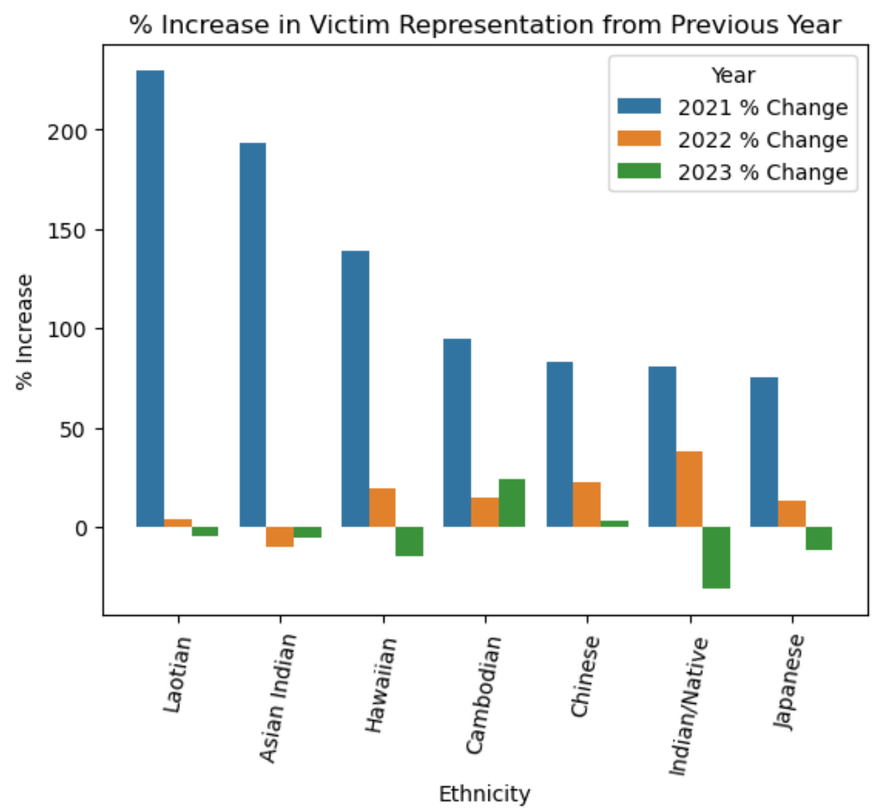
Q2 vs Q1 = 41% increase
Q3 vs Q2 = 89% increase
Q4 vs Q3 = (56%) decrease



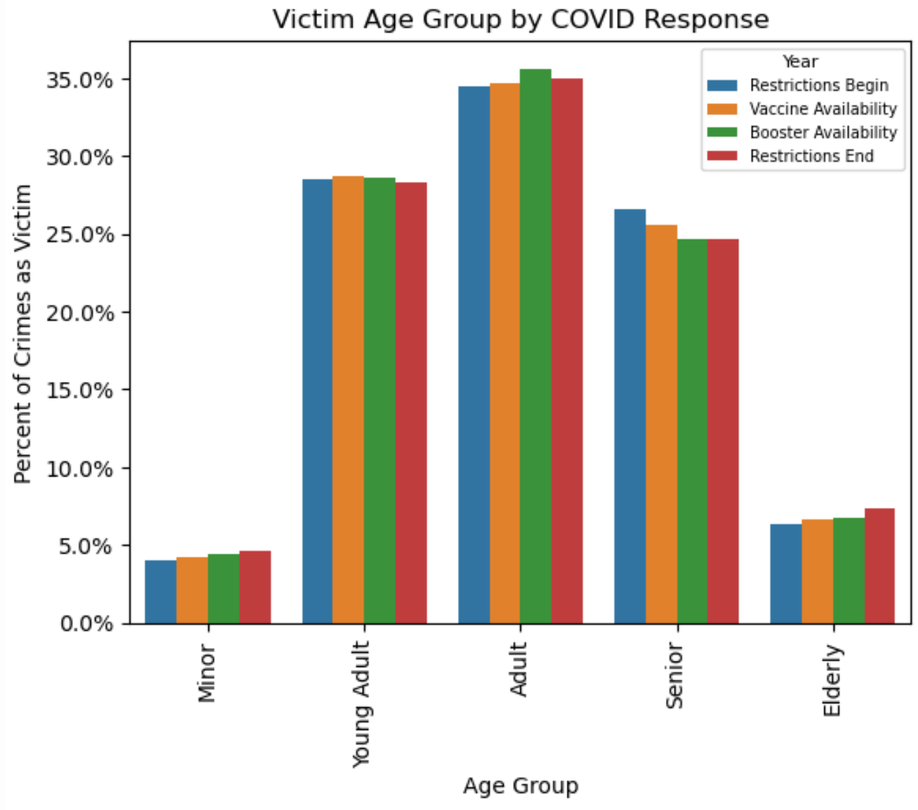


COVID's Impact on Victim Distribution

ETHNICITY



AGE

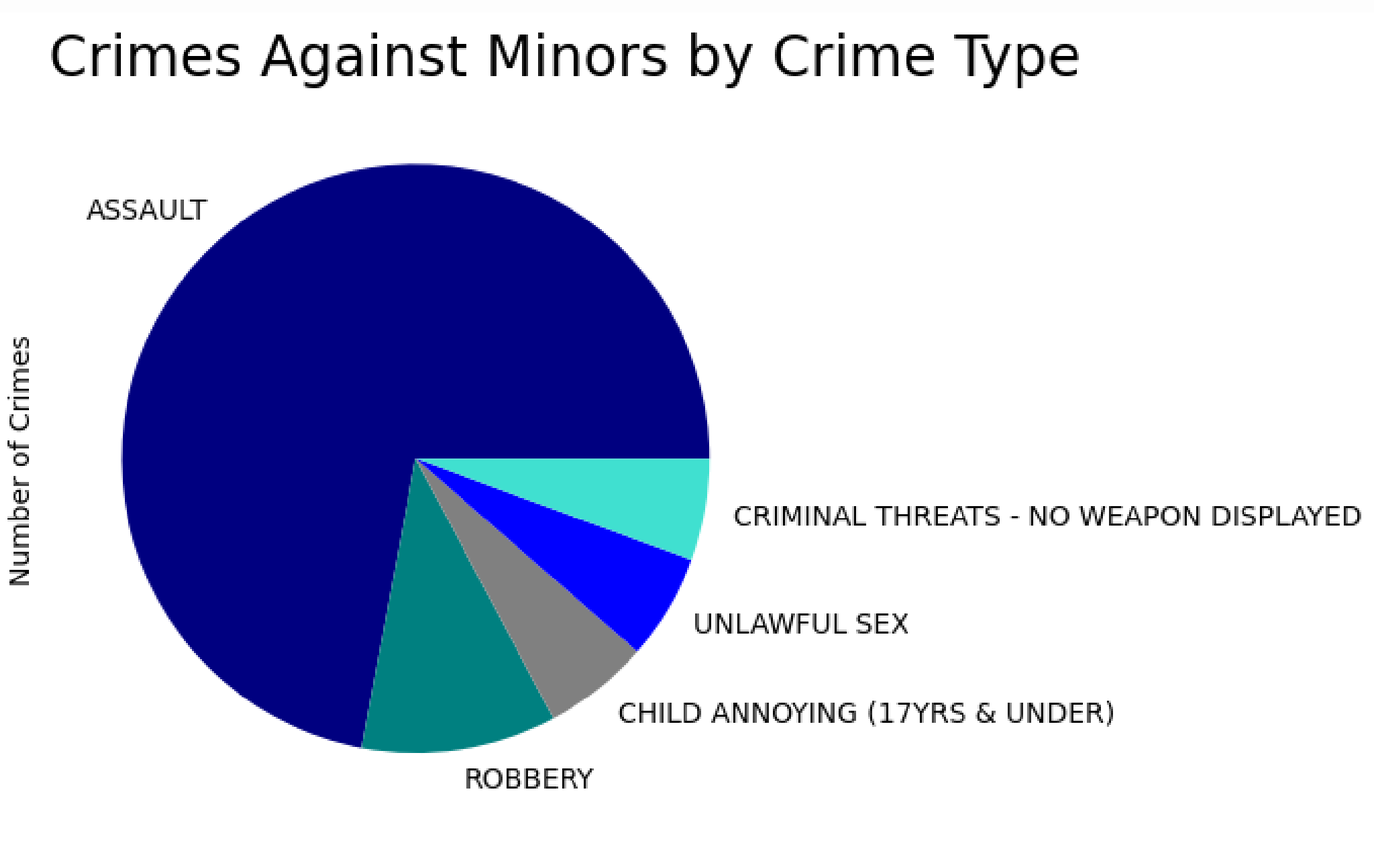


A Tale of Two Trends

Differently trending patterns can be found within the same dataset - not every trend needs to follow the categorical trend!

01

As COVID restrictions lessened, crime against minors increased, with assault remaining the highest category of crime against minors



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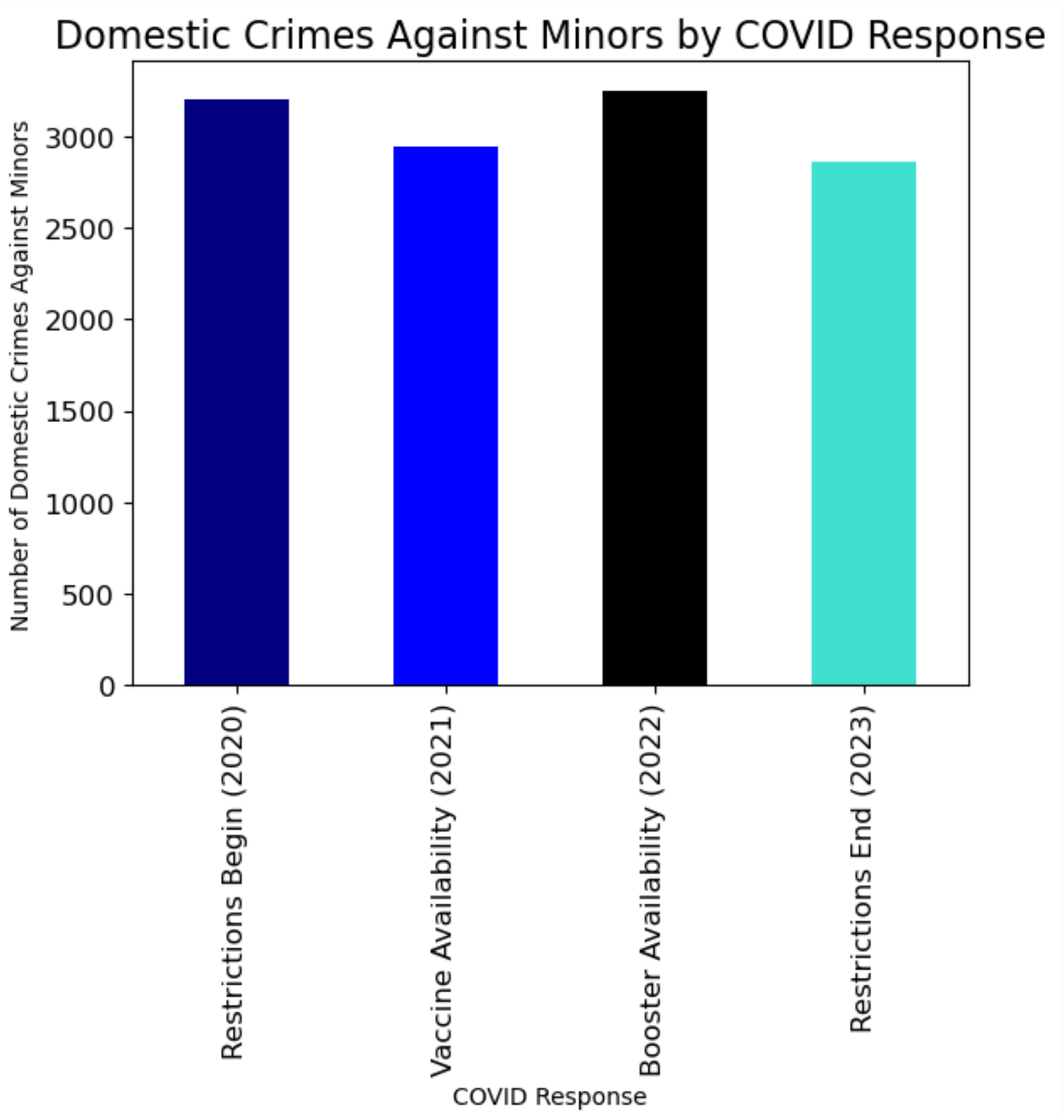

02

As COVID restrictions lessened, crime against minors increased, with assault remaining the highest category of crime against minors

For Future Use: Successes, Inefficiencies, and Next Steps

What Worked

CLEAR EXPECTATIONS

ENCOURAGING EXPERIMENTATION

LINKING INSIGHTS

What Could've Worked Better

DATASET LINKED TO INTERESTS

SMALLER AND MORE FREQUENT GIT UPLOADS

Taking it to the Next Level

PULLING SUPPLEMENTAL DATA

EXPLORE NEW GRAPHICS

CONTINUING THE STORY

Thank You

Sources

https://www.nature.com/articles/s41562-022-01493-6
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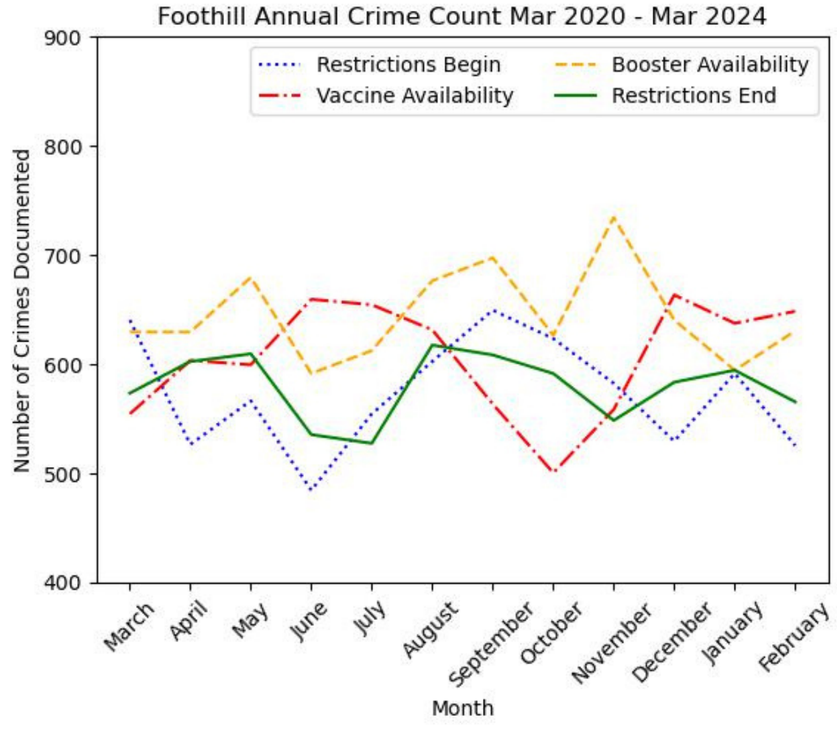
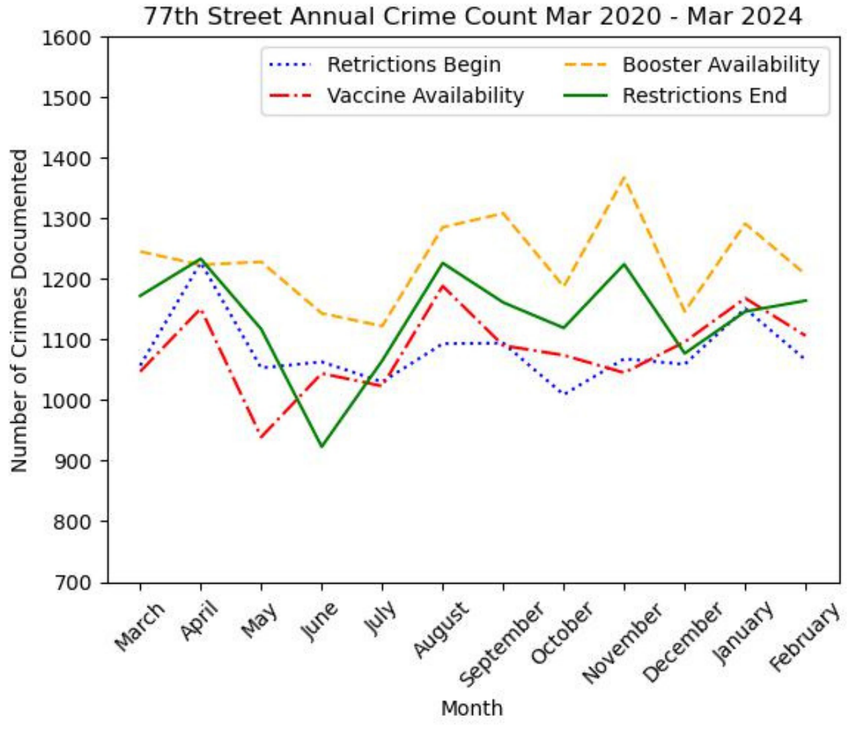
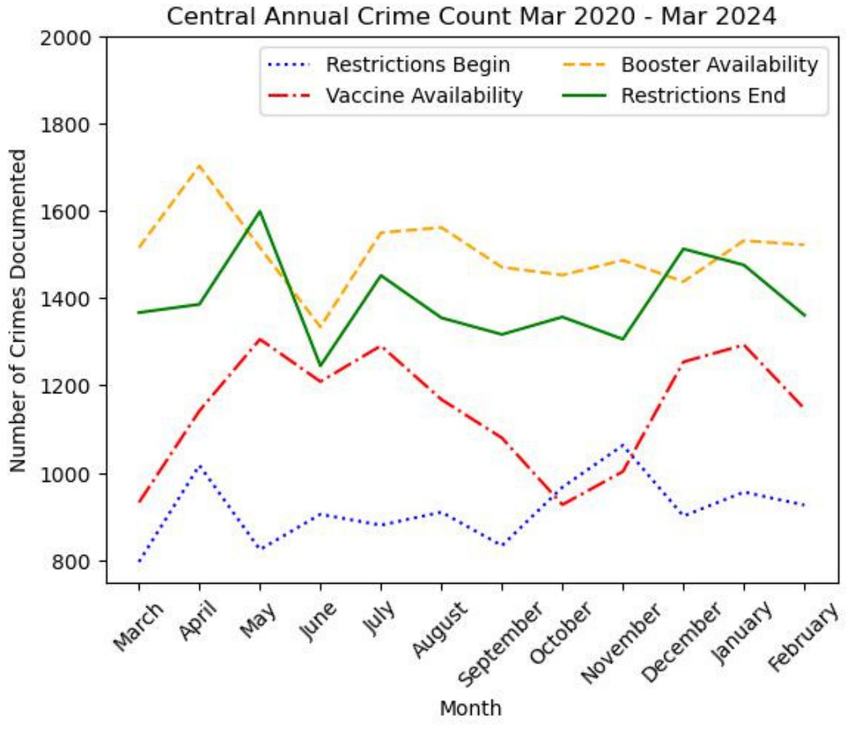
Appendices (I)







Appendices (II)