

Deliverable 2 Report - Team 4

Key questions:

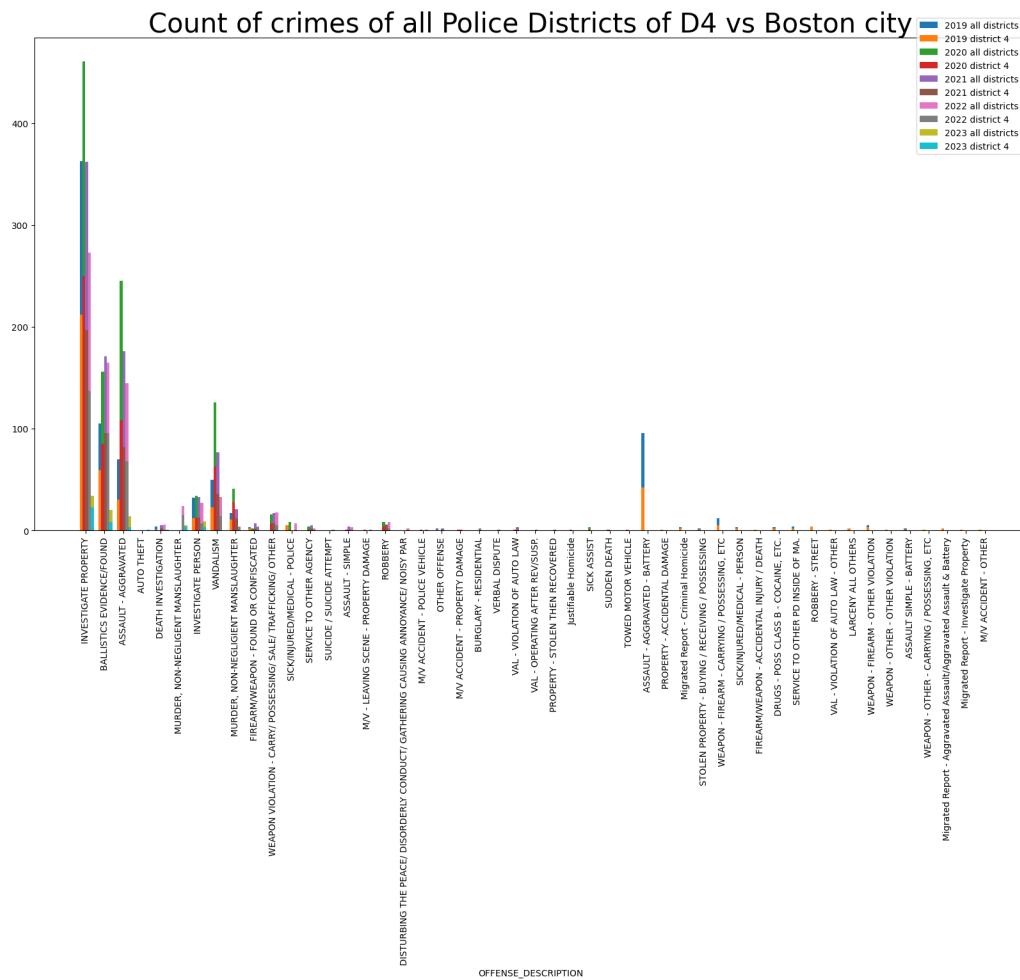
- What is the rate of gun violence in District 4? How does this compare to the rest of the city?
- Are there patterns of violence in terms of location in District 4? How does this compare to the rest of the city?

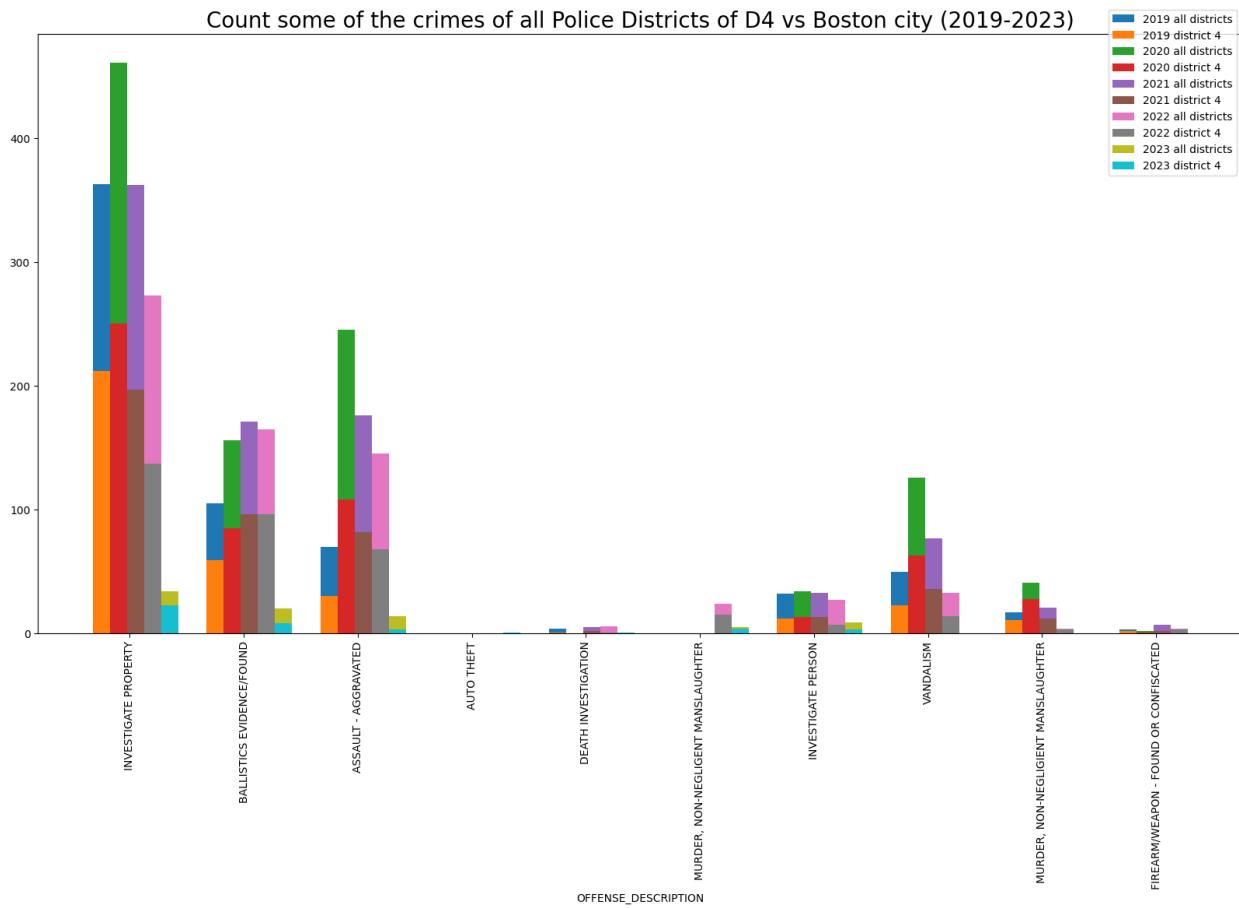
Individual Contributions and Observations:

Snigdha Reddy Pulim:

Question analyzed: Are there patterns of violence in terms of location in District 4? How does this compare to the rest of the city?

- Data :
 - [CRIME INCIDENT REPORTS](#) from 2019-2023
- Jupyter notebook file:
 - File: shooting_crime_patterns.ipynb
 - Location: code / shooting_crime_patterns.ipynb
- Key Graphs :



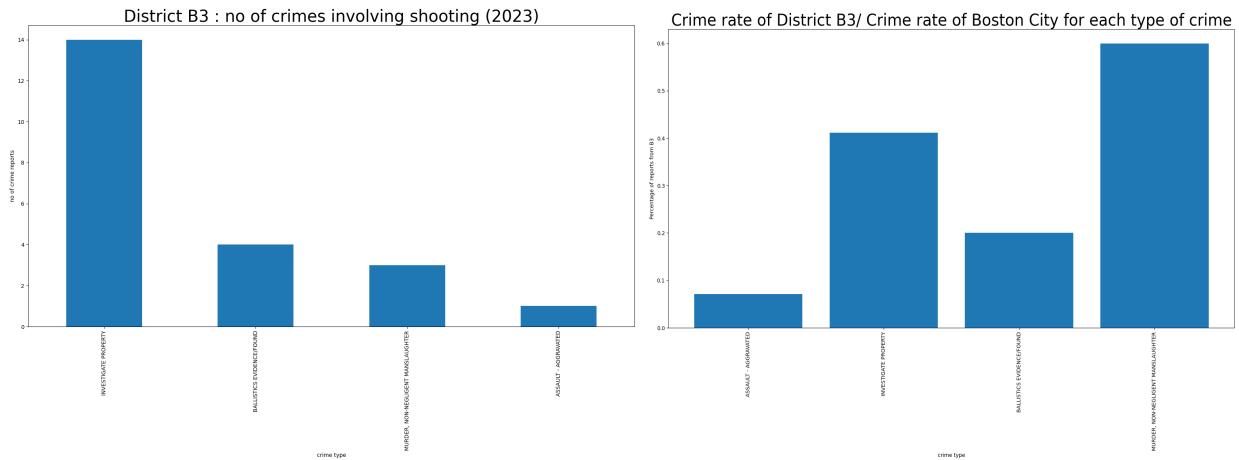


➤ Observations:

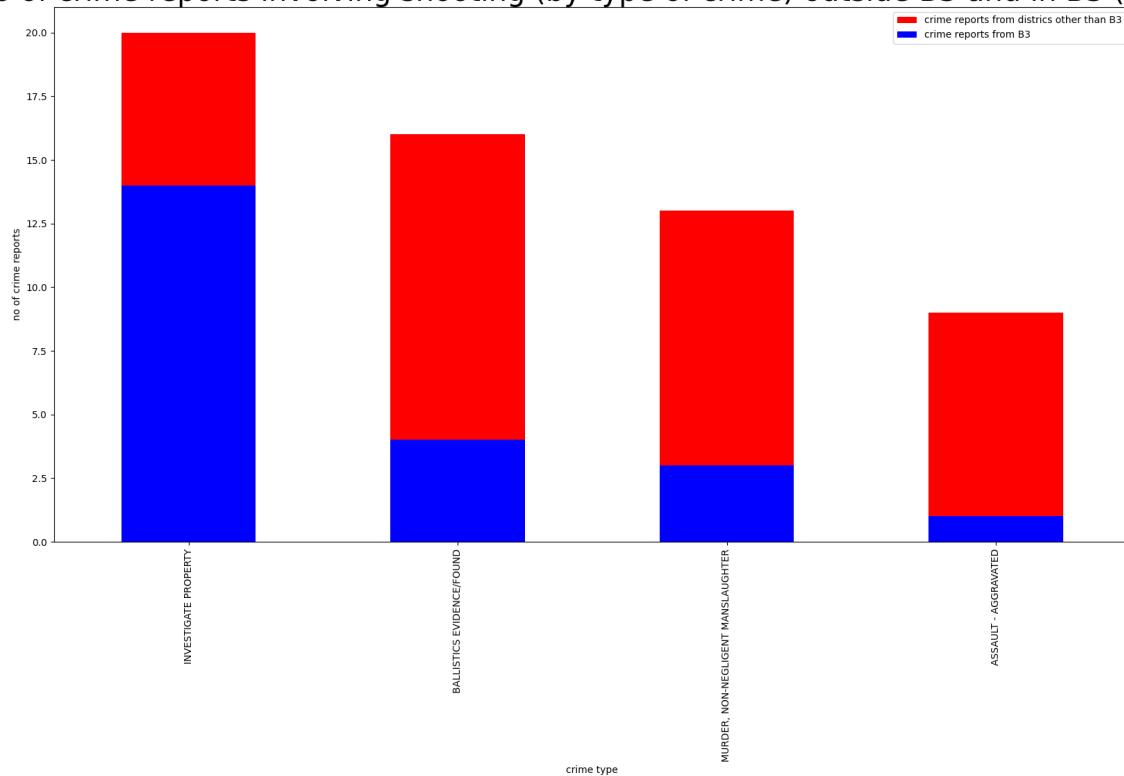
- Based on the “Count of crimes of all Police Districts of D4 vs Boston city” graph, the most frequent crimes involving shooting are:
 - Investigate Property
 - Ballistics evidence / Found
 - Assault - Aggravated
 - Vandalism
 - Investigate Person
 - Murder, Non-Negligent Manslaughter
- From the “Count of some Crimes of all Police Districts of D4 vs Boston City (2019-2023)” data, it is evident that:
 - Both D4 and the rest of the city experienced a significant decrease in crime rate starting in 2020. However, for Ballistics evidence, this decrease began in 2021.
 - 2020 witnessed a significant increase in most types of crimes, leading to a peak for all crimes. This could be a possible response to the lockdown measures.

➤ Other graphs plotted on the same data:

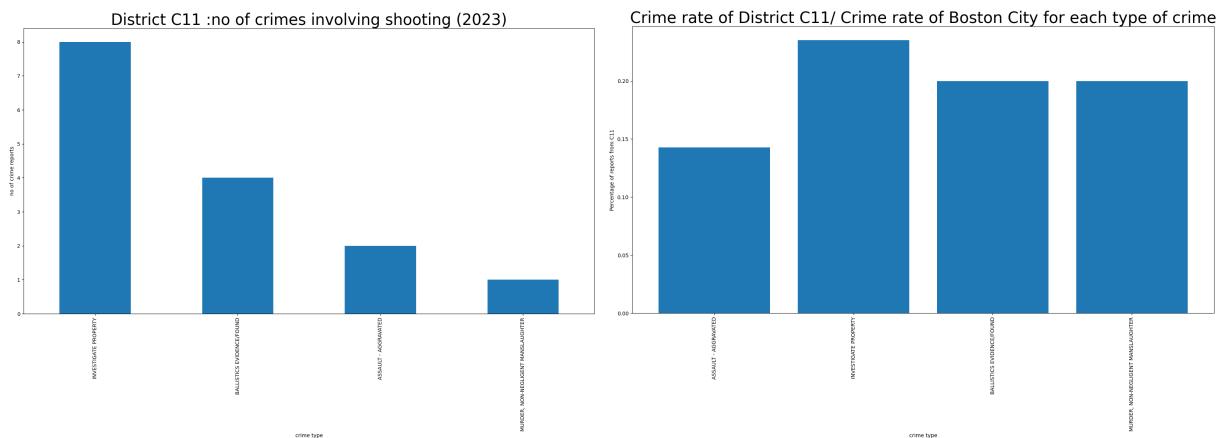
- Crimes involving shooting in B3 :



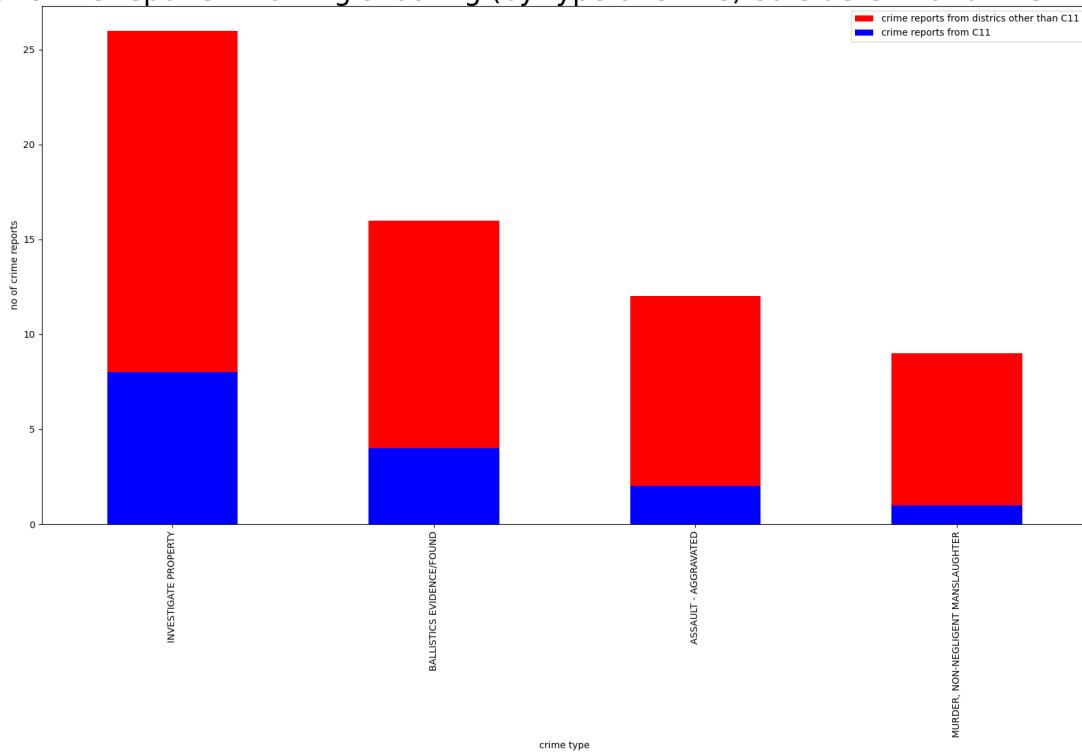
no of crime reports involving shooting (by type of crime) outside B3 and in B3 (2023)



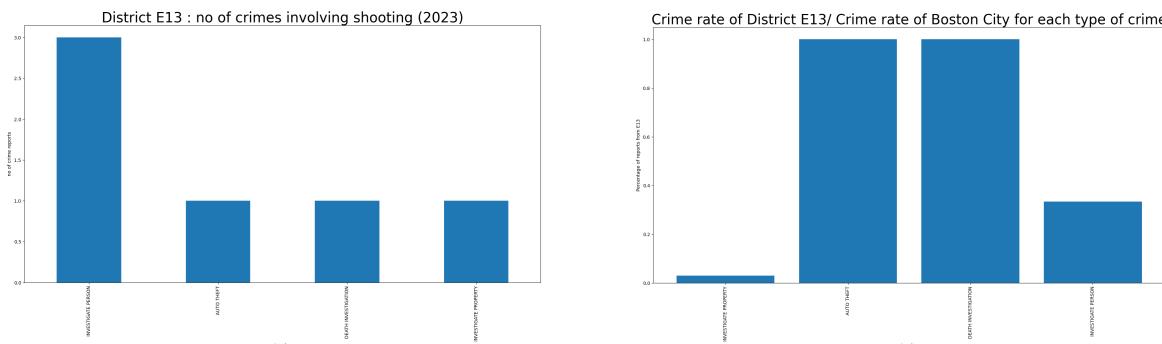
○ Crimes involving shooting in C11:



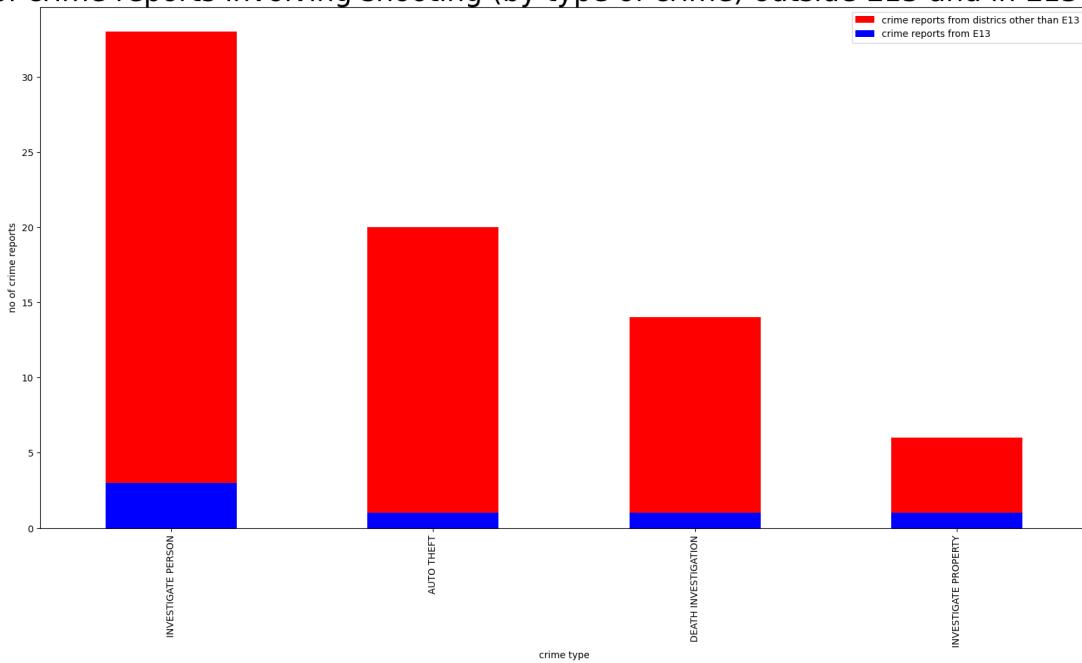
no of crime reports involving shooting (by type of crime) outside C11 and in C11 (2023)



○ Crimes involving shooting in E13:

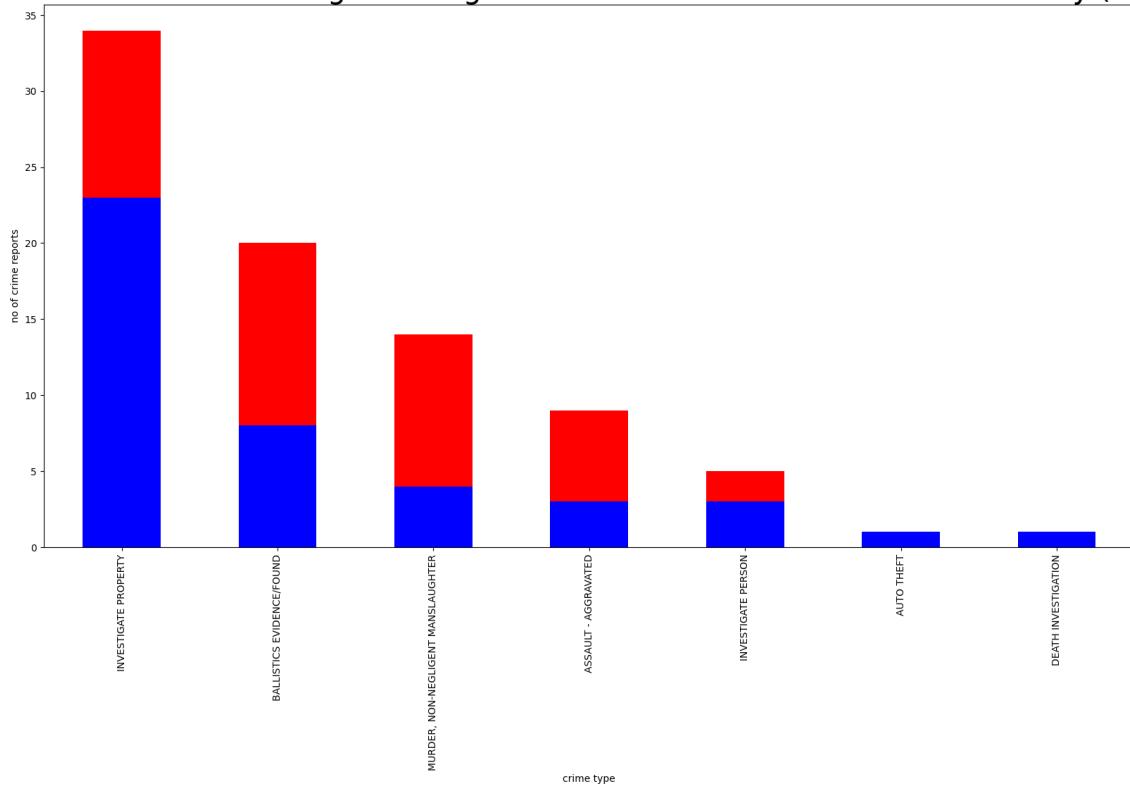


no of crime reports involving shooting (by type of crime) outside E13 and in E13 (2023)



- Crimes involving shooting for D4 and all districts:

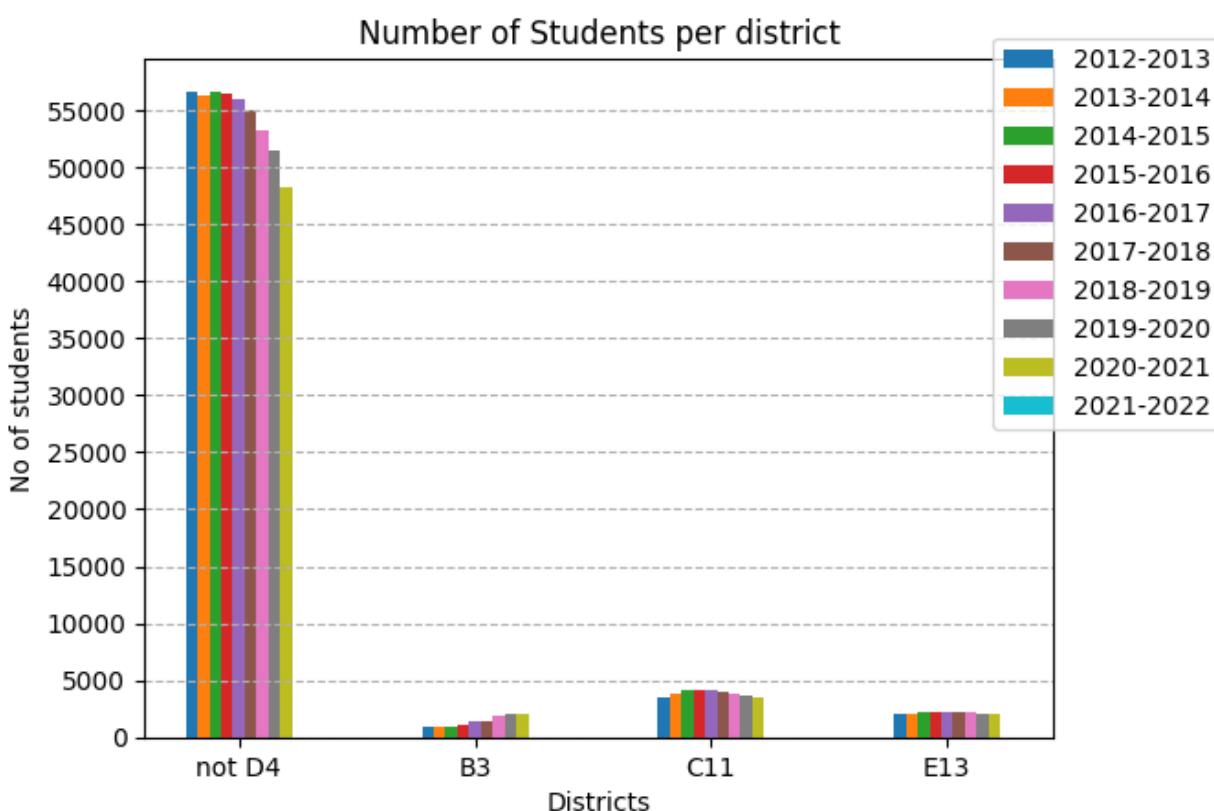
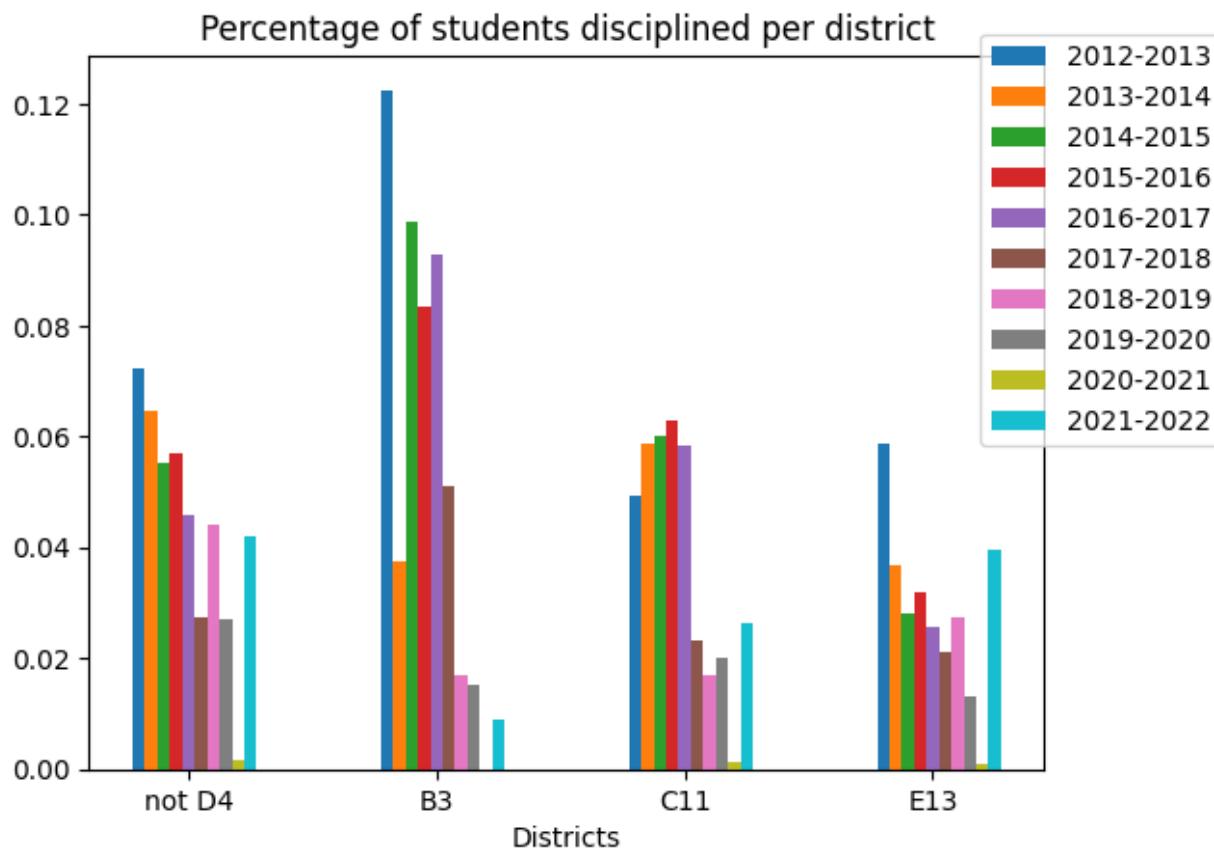
Count of crimes involving shooting of all Police Districts of D4 vs Boston city (2023):

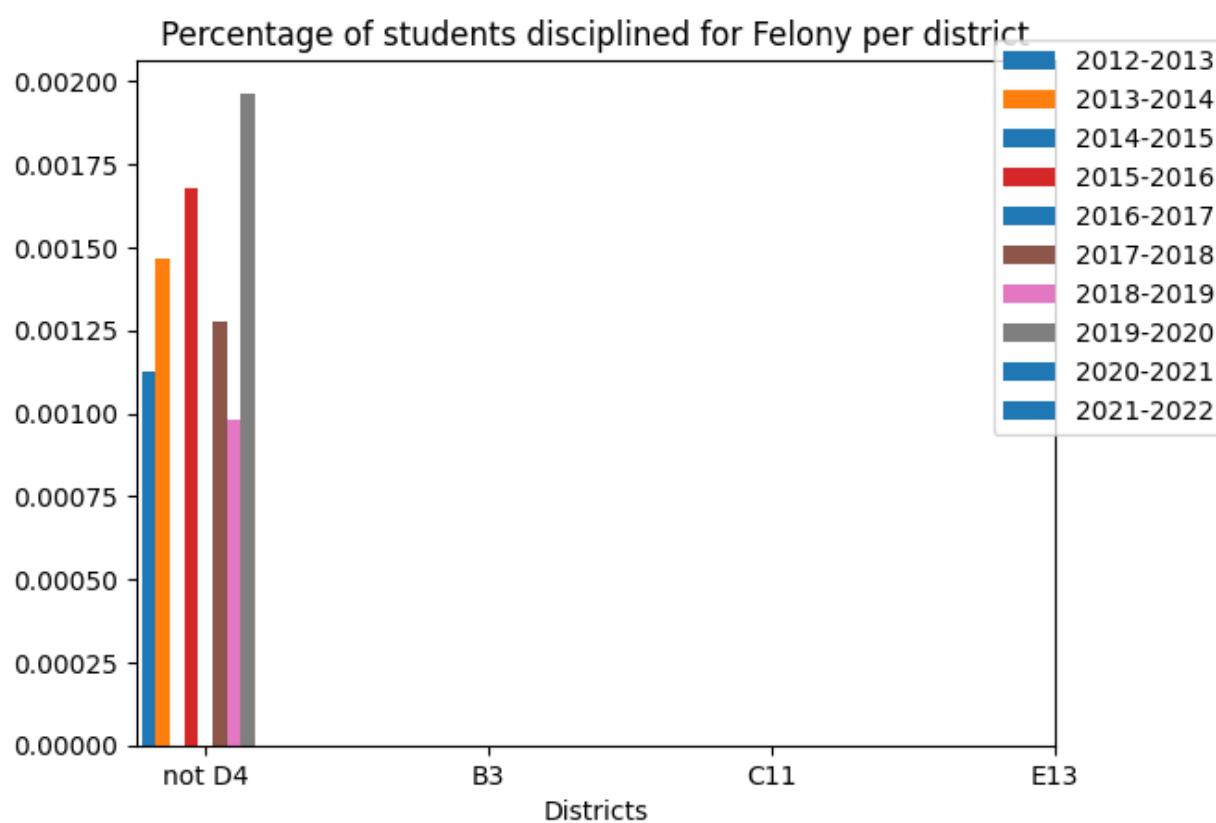
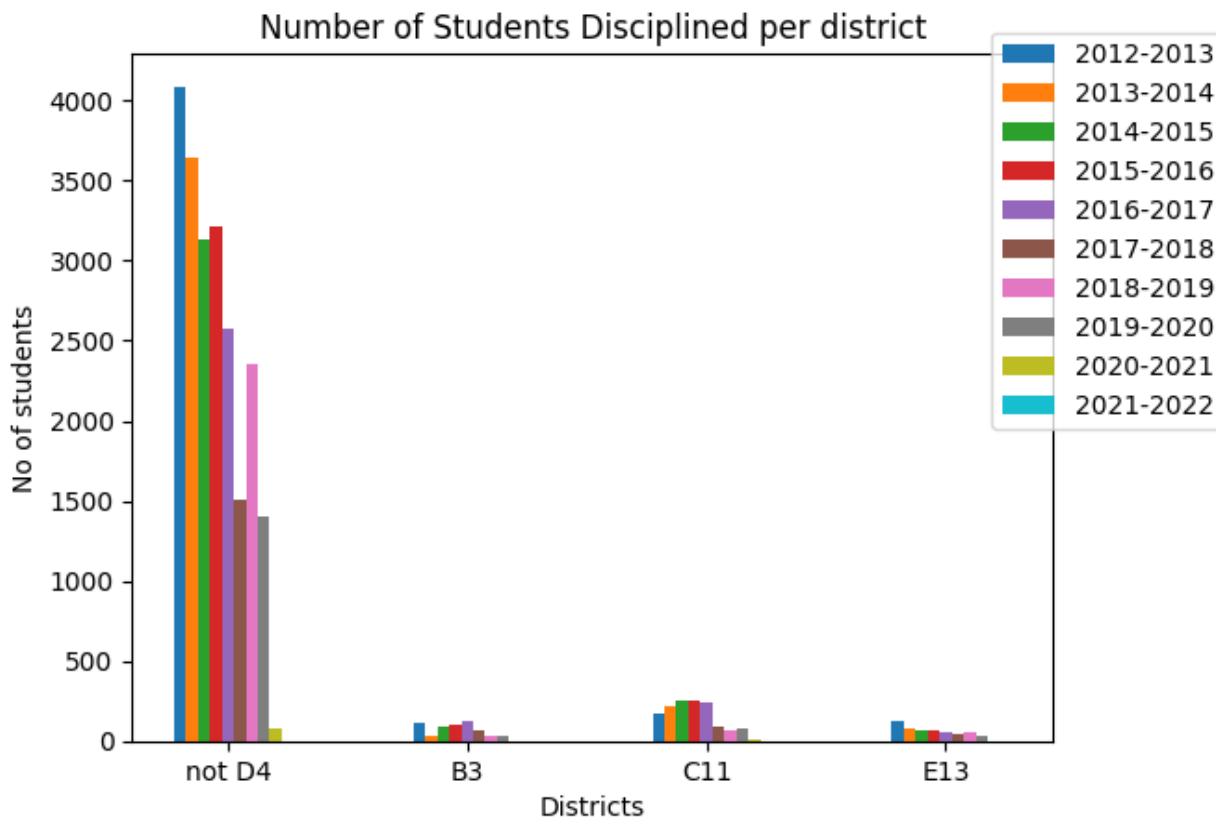


- As seen in the above police districts' crime (involving shooting) data, E13's addition to the crime rate of D4 is very small.
- For 2023 data:
 - The top crimes in B3 and C11 are:
 - Investigate Property
 - Ballistics evidence / Found
 - Murder, Non-Negligent Manslaughter
 - Assault - Aggravated
 - For E13:
 - Investigate Person
 - Auto Theft
 - Death Investigation
 - Investigate Property

Additional analysis: Student Discipline Data Report analysis

- Data :
 - [Student Discipline Data Report](#) from 2012-2022
- Jupyter notebook file:
 - File: student_discipline.ipynb
 - Location: code / student_discipline.ipynb
- Key Graphs :





➤ Observations:

- Based on the "Percentage of Students Disciplined" metric:
 - B3 had the highest percentage of students being disciplined until the 2017-2018 academic year.

- However, the percentage has decreased significantly since 2018-2019 and has continued to consistently decrease.
 - C11 has a higher percentage of students being disciplined.
 - Nonetheless, C11 has maintained a lower percentage since 2017-2018.
- Based on the "Number of Students per District" metric:
 - Non-district4 schools have shown a slight decrease in the number of students each year since 2014-2015.
 - B3 has experienced an increase or maintained a similar student count over the years.
 - E13 has maintained its student count while C11 has followed the pattern of non-district4 schools.
- From the "Number of Students Disciplined per District" metric, it can be observed that there has been a decrease in the number of students disciplined across District 4 since the 2016-2017 academic year.
- Based on the "Percentage of Students Disciplined for Felony per District" metric, there have been no students disciplined for felony convictions or complaints in District 4 between 2012 and 2022.

Vaishnavi Vadlamudi (U19250166)

Questions analyzed:

1. What is the rate of gun violence in District 4?
2. How does this compare to the rest of the city?
3. Are there patterns of violence in terms of location in District 4?

Data:

[Crime Incident Reports - Datasets - Analyze Boston](#) (under Police Reports)

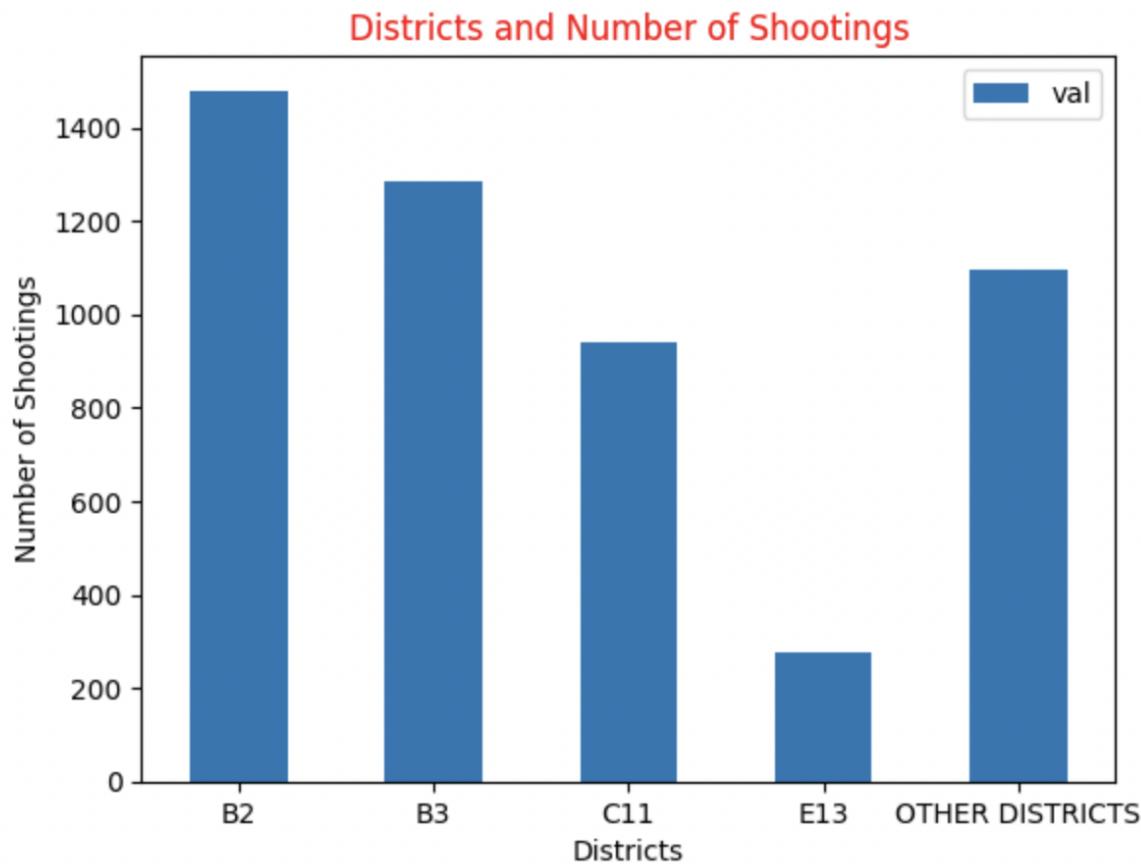
Jupyter Notebooks Contributed:

File: CrimeIncidentReport_AllYears_Vaishnavi.ipynb

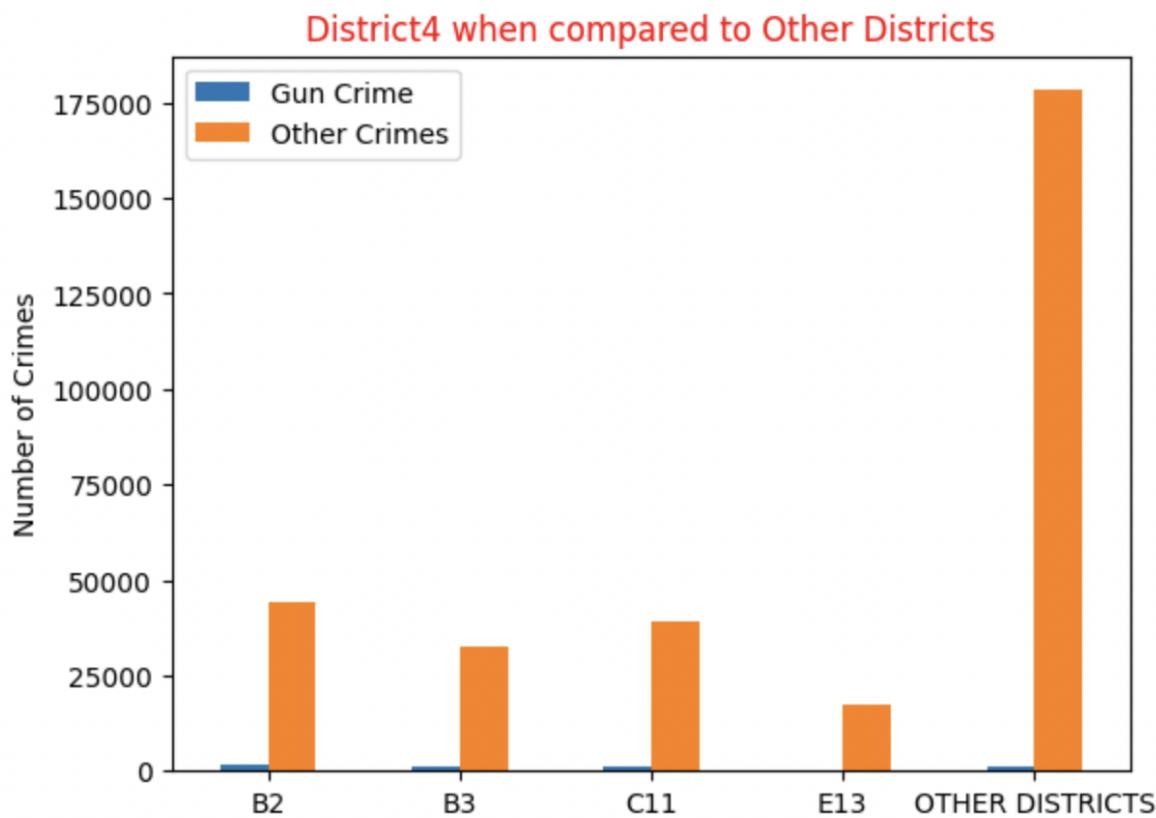
Location: code / CrimeIncidentReport_AllYears_Vaishnavi.ipynb

Key Graphs and Insights:

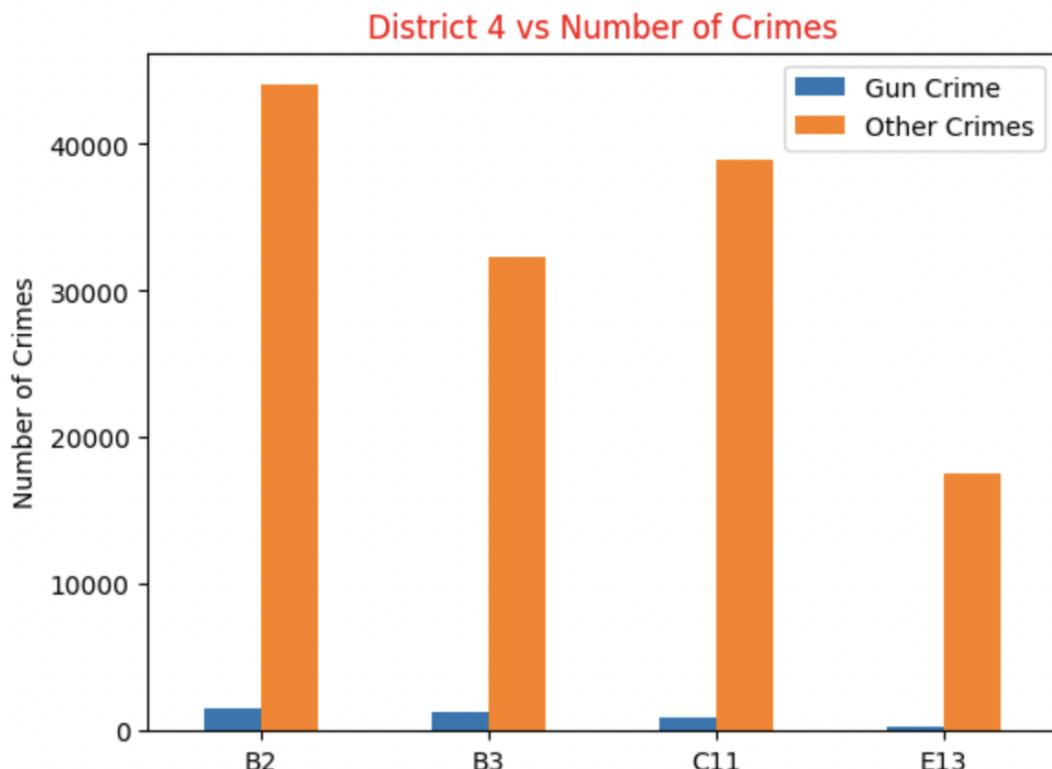
The below graph illustrates Districts B2, B3, C11, E13 and their respective number of shootings through out the past 7 years.



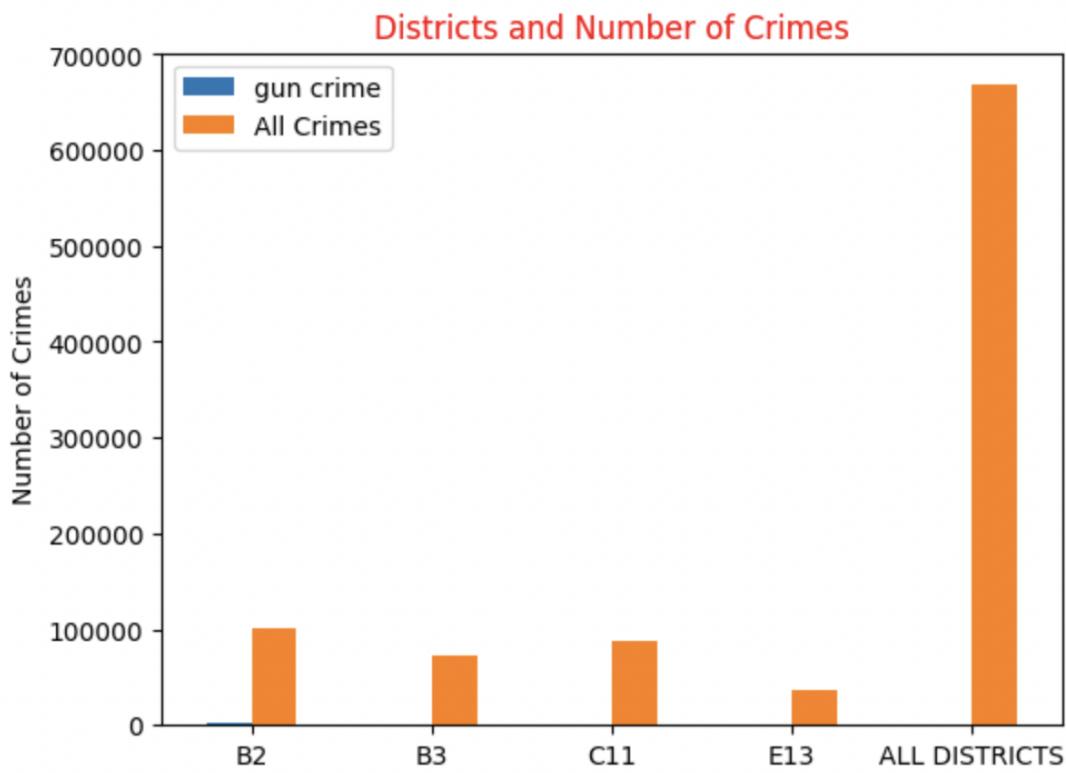
The below graph illustrates District 4 crimes(All Crimes) when compared to the rest of the districts.



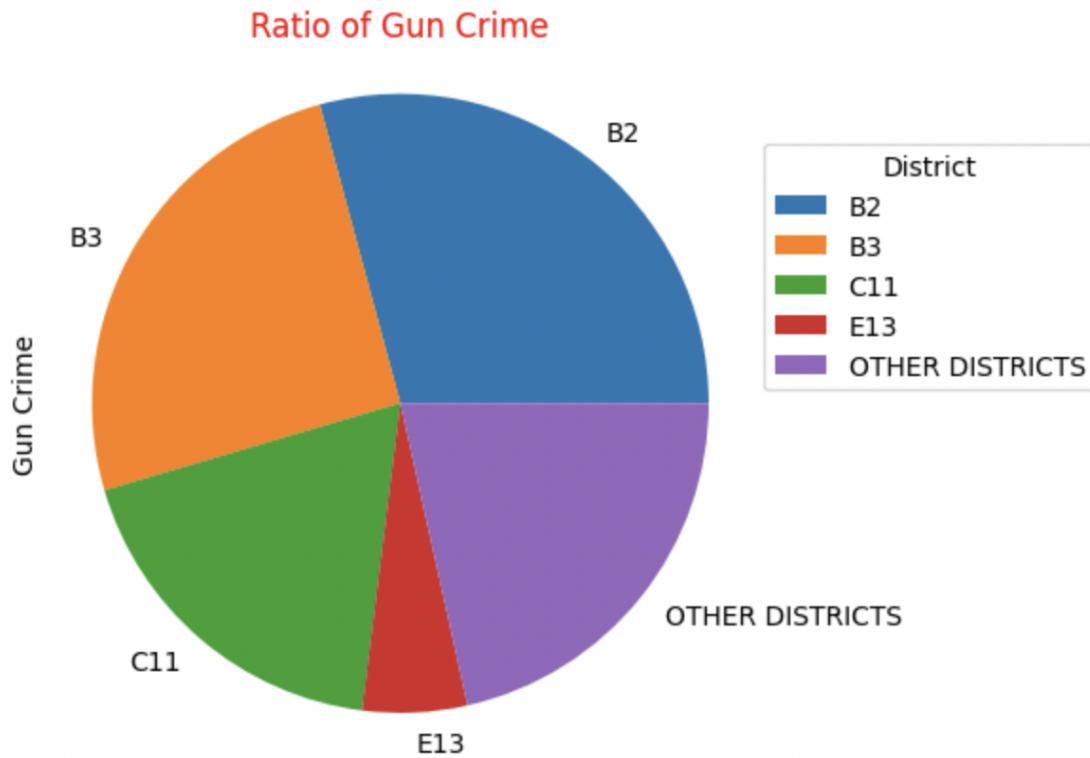
The below graph illustrates District 4 Gun crimes when compared to the other crimes.



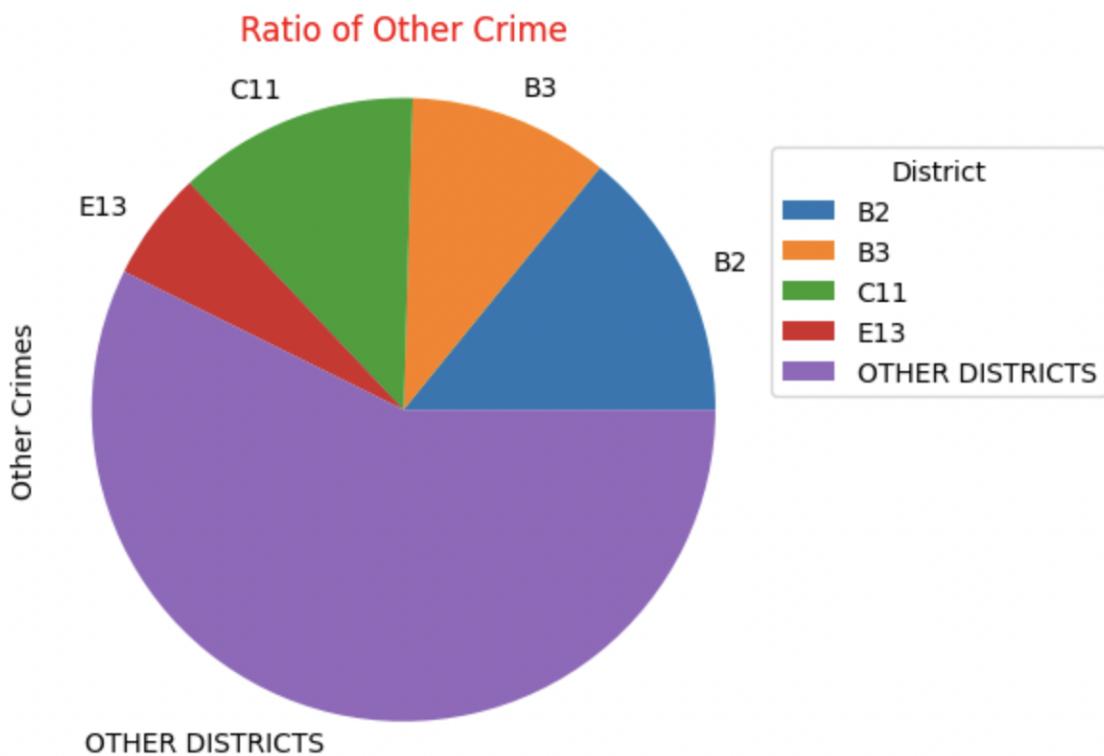
The below graph illustrates District 4 crimes when compared to the rest of the city.



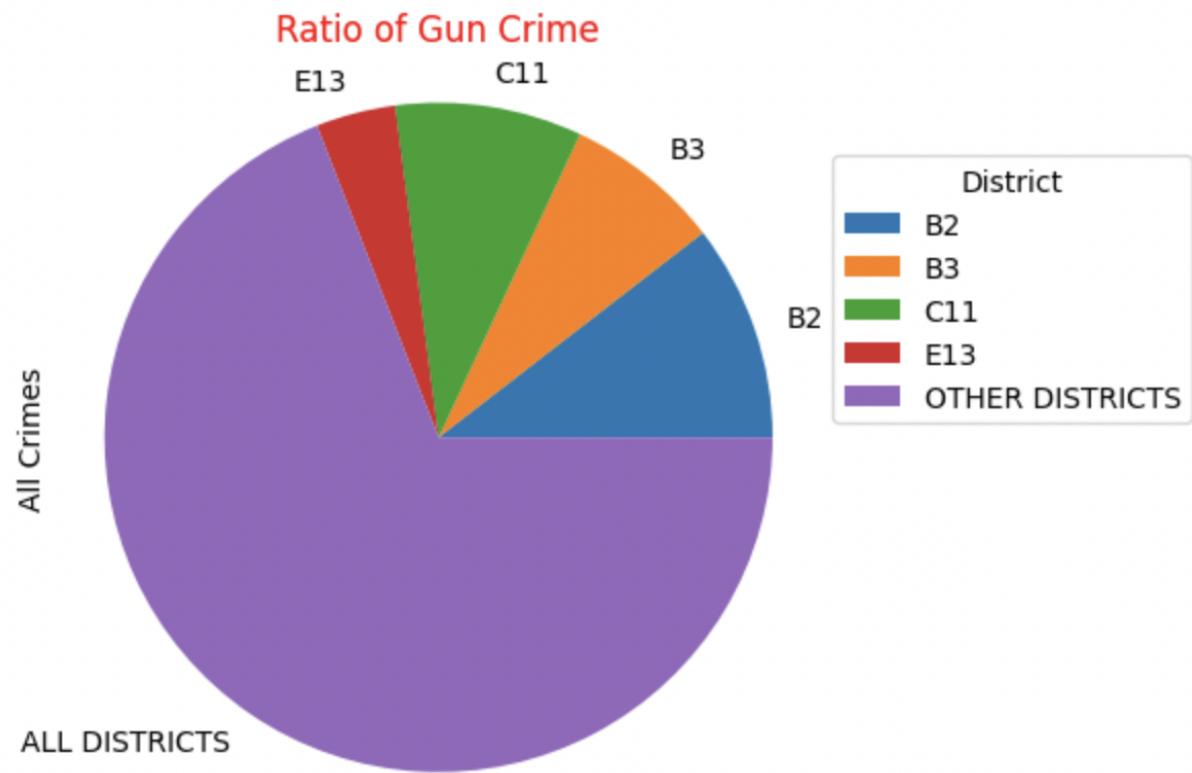
The below pie chart illustrates Ratio of Gun Crime in District 4 when compared to the rest of the city.



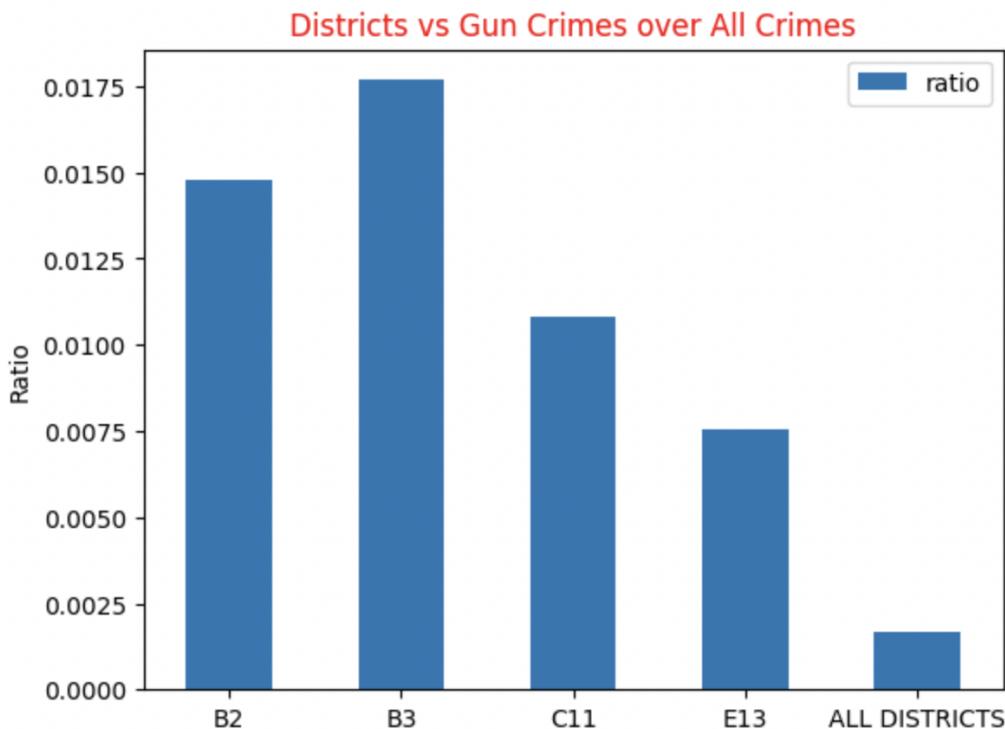
The below pie chart illustrates ratio of other crimes in District 4 when compared to the rest of the city.



The below pie chart illustrates ratio of all crimes in District 4 when compared to the rest of the city.



The below bar graph illustrates the ratios of gun crimes over all crimes in District 4 and the rest of the city.



Observations and KeyInsights:

TRENDS OF REPORTED GUN CRIME :

It appears that the numbers are decreasing in a consistent trend over the past few months.

However, we can calculate the year-on-year growth rate to identify any patterns.

Year-on-year growth rates:

From 2015 to 2016: $((302-196)/196)*100 = 54.08\%$

From 2016 to 2017: $((352-302)/302)*100 = 16.56\%$

From 2017 to 2018: $((318-352)/352)*100 = -9.66\%$

From 2018 to 2019: $((647-318)/318)*100 = 103.77\%$

From 2019 to 2020: $((889-647)/647)*100 = 37.39\%$

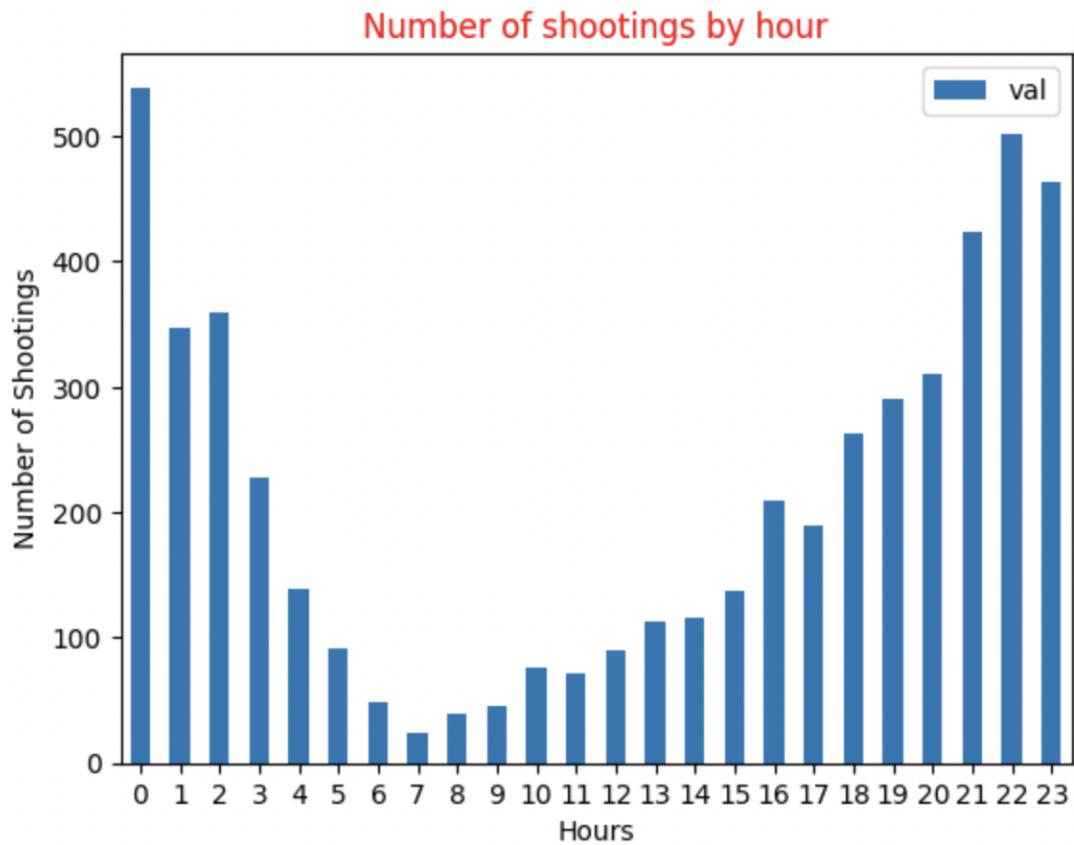
From 2020 to 2021: $((713-889)/889)*100 = -19.80\%$

From 2021 to 2022: $((529-713)/713)*100 = -25.80\%$

Based on the above calculation, we can see that the year-on-year growth rate has been decreasing over the past few years. This suggests that the trend has been slowing down, and the numbers are not growing as quickly as they have in the past. However, as noted earlier, the latest observation for February 2023 is lower than the previous year's observation, suggesting a decrease in the trend.

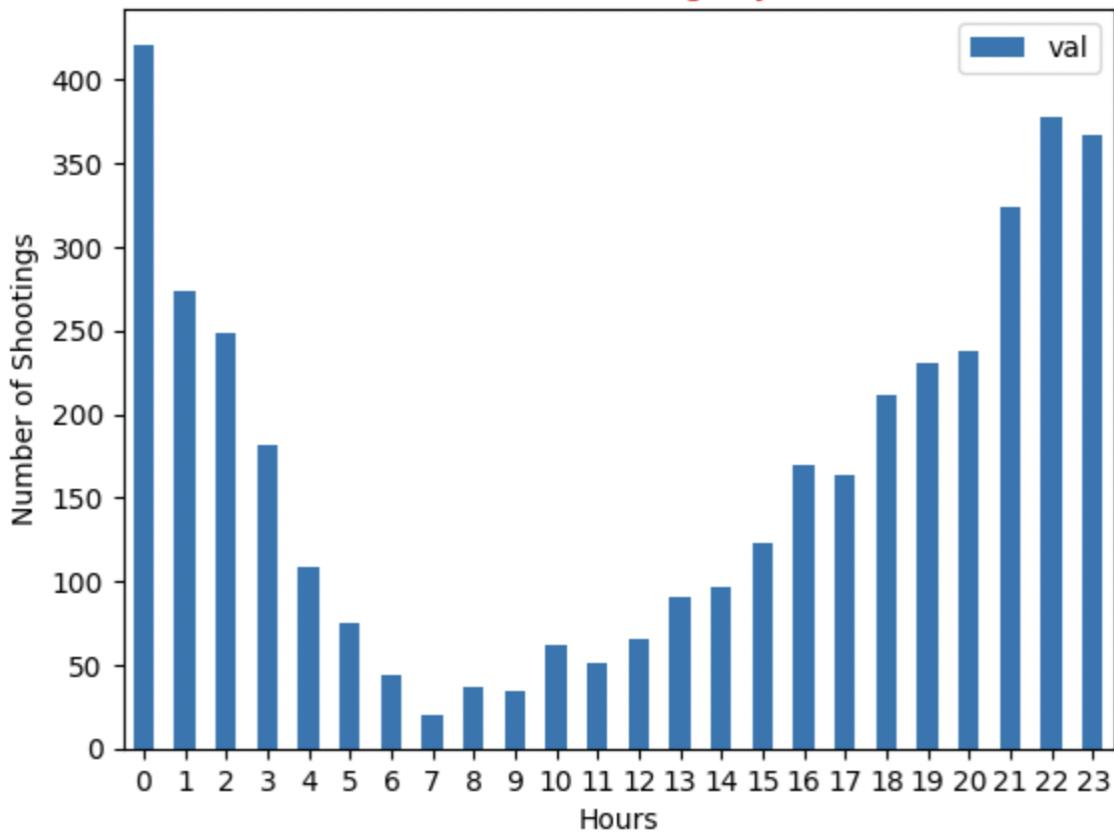
Additional Analysis:

The below graph is for the number of shootings per hour all the districts through out the last 7 years.



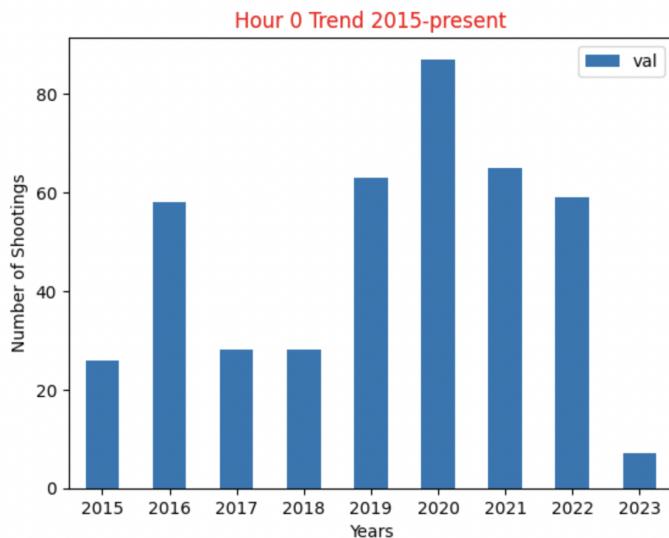
The Below bar graph illustrates the number of shooting per hour in district 4 throughout the past 7 years.

Number of shootings by hour



The below bar graph illustrates Hour 0 trend in District 4 in the past 7 years.

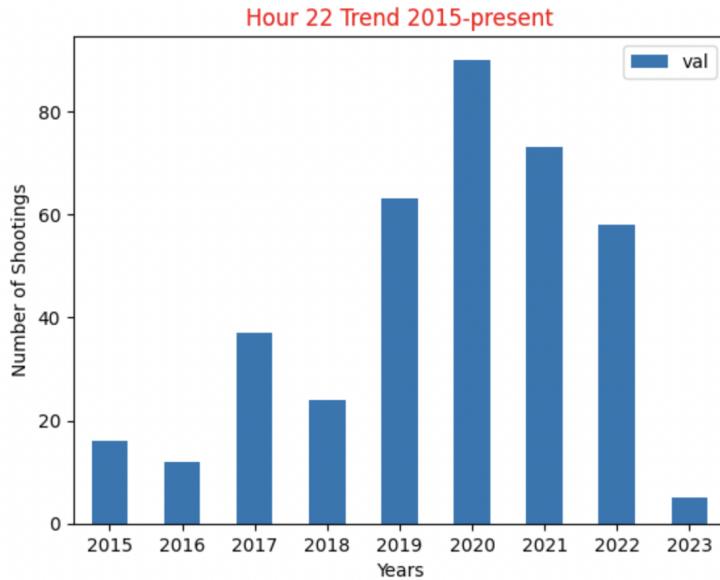
The number of shootings range from 26 to 87. The mean is 49.25. The standard deviation is 23.38. We can say that the data is moderately spread out with a slightly skewed distribution towards the lower end.



The below bar graph illustrates the Hour 22 Trend in the past 7 years.

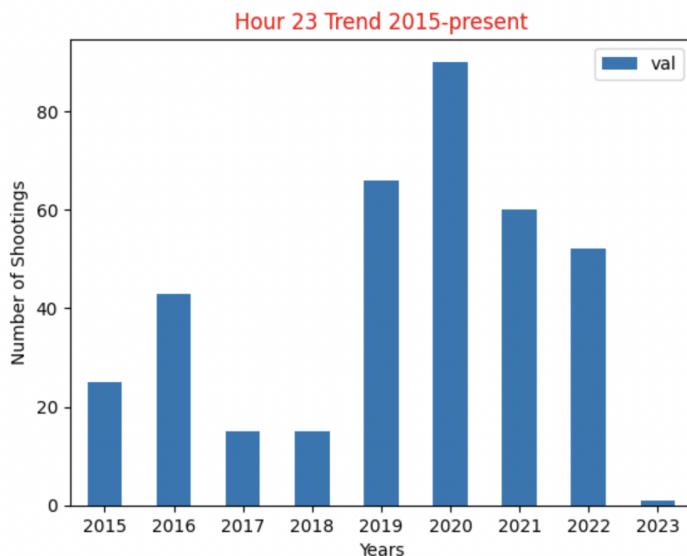
The number of shootings in Hour 22 ranges from 12 to 90. The mean is 47.125, and the standard deviation is 27.362. The data is moderately spread out, with a slightly skewed distribution towards the higher end.

It's worth noting that while the mean for Hour 22 is close to the mean for Hour 0, the range and standard deviation are slightly larger. This suggests that there is more variability in the number of shootings for Hour 22, and the distribution is slightly more spread out than it was for Hour 0.



The below bar graph illustrates the Hour 23 trend in District 4 in the past 7 years. The number of shootings in Hour 23 ranges from 15 to 90. The mean is 47.5, and the standard deviation is 25.267. The data is moderately spread out, with a slightly skewed distribution towards the higher end.

Compared to Hour 0 and Hour 22, the range of Hour 23 is similar to Hour 22, but the standard deviation is closer to Hour 0. This suggests that there is a moderate amount of variability in the number of shootings for Hour 23, and the distribution is slightly more spread out than it was for Hour 0.



Tarek Mourad (U30214686)

Questions analyzed:

- What are the counts of filed contacts for each year from 2016-2022
- What are the counts of field contacts for each month from 2016-2022
- How are field contacts spread out in districts C11/B3/E13 and D4 from 2017-2022

Data:

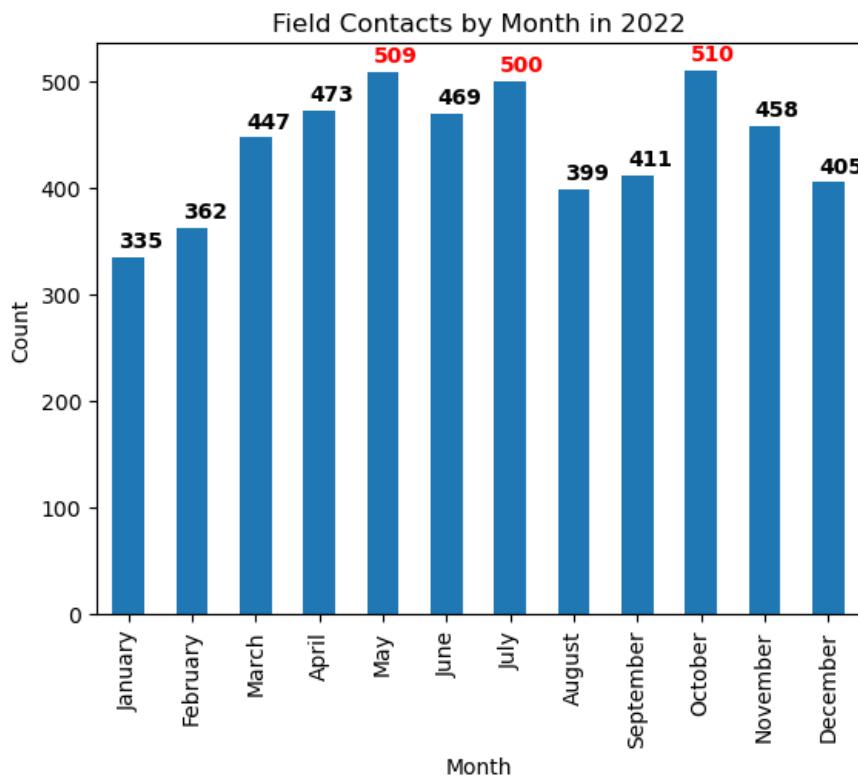
- <https://data.boston.gov/dataset/boston-police-department-fio>
- ^ Data from 2016 until 2022

Jupyter Notebooks Contributed:

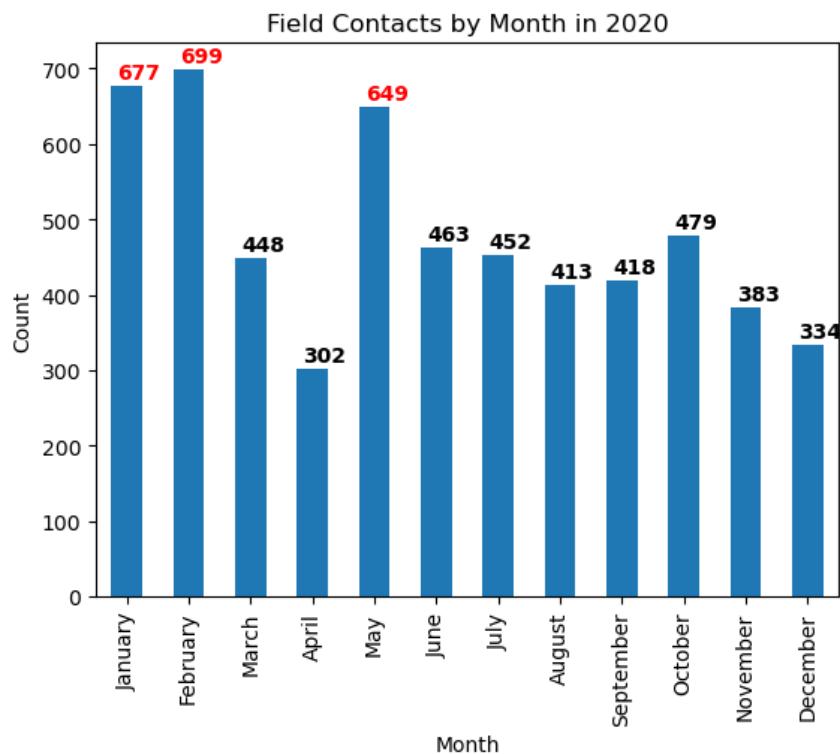
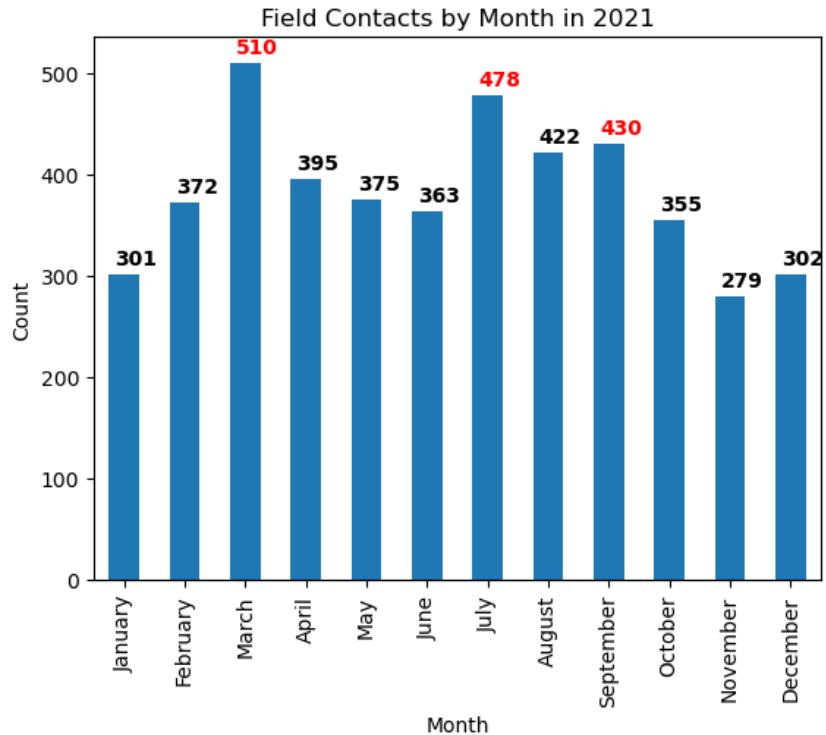
- Location: code / Field_Contacts_Data.ipynb

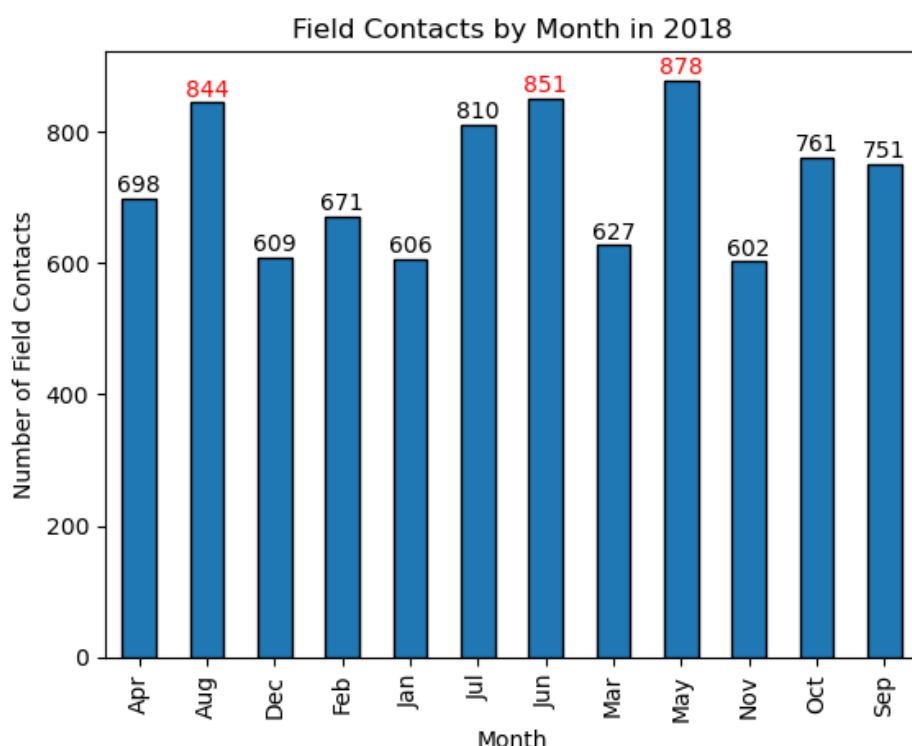
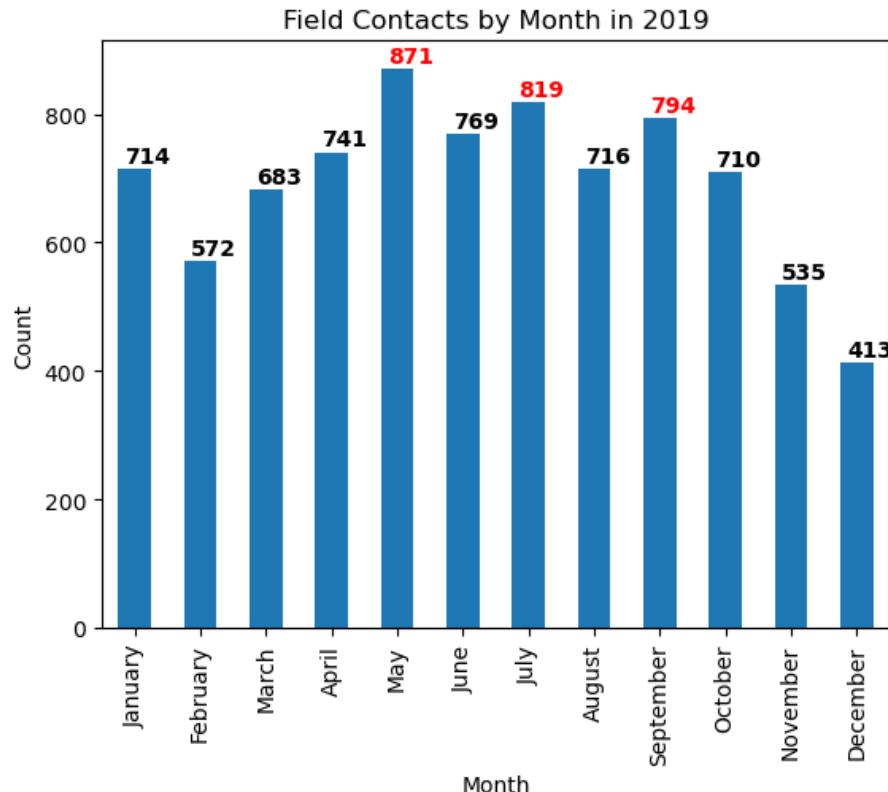
Key Graphs + Insights:

- **Field contacts by month for each individual year (2018 until 2022)**



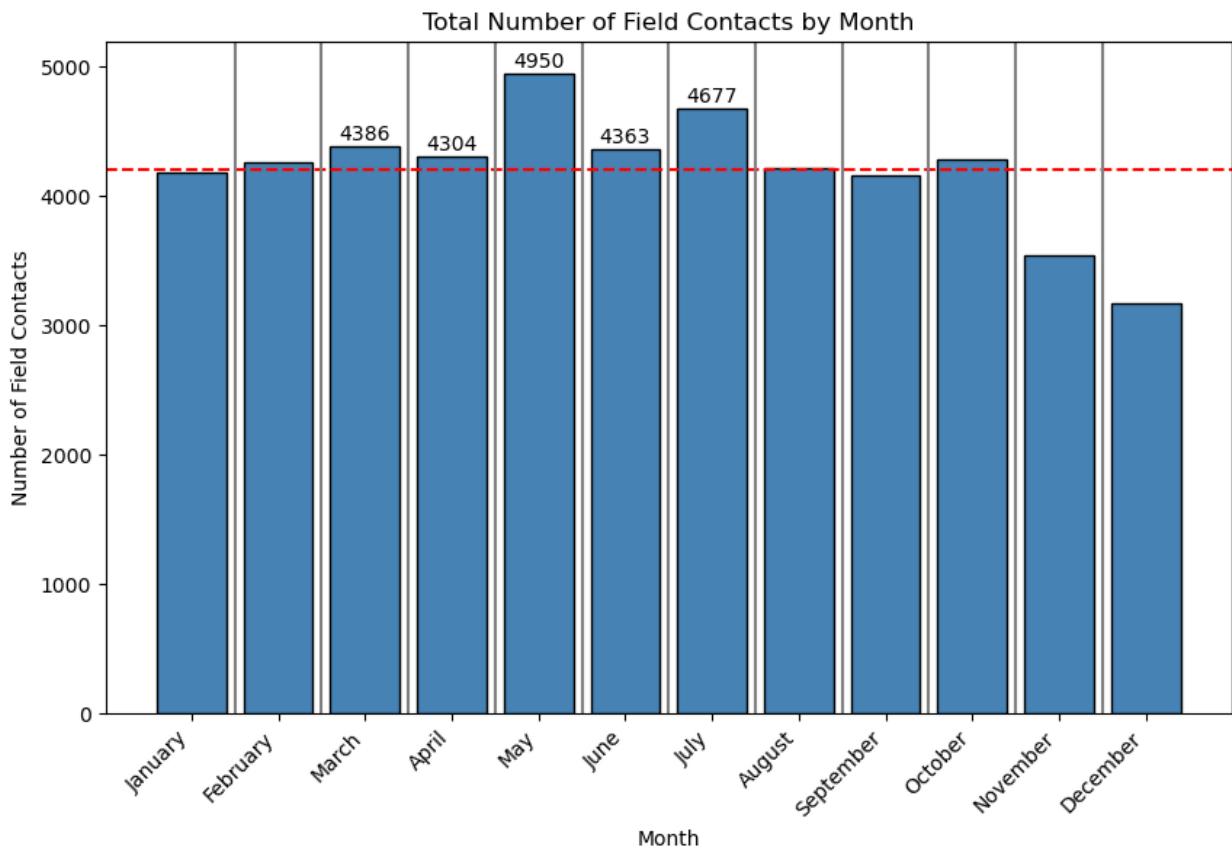
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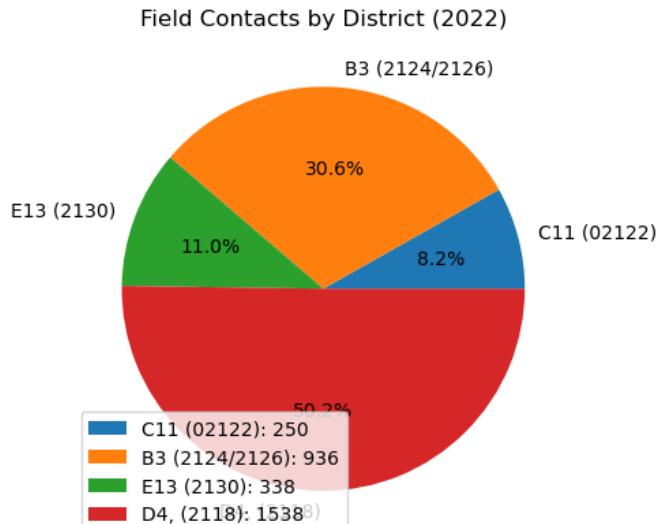


- The 5 charts above represent the count of field contacts for each individual year from 2018 until 2022
- **Key Takeaways:**
 - There are some irregularities from the data that represents the year in which covid appeared.
 - In general, the months with the highest counts of field contacts are in the spring/summertime.

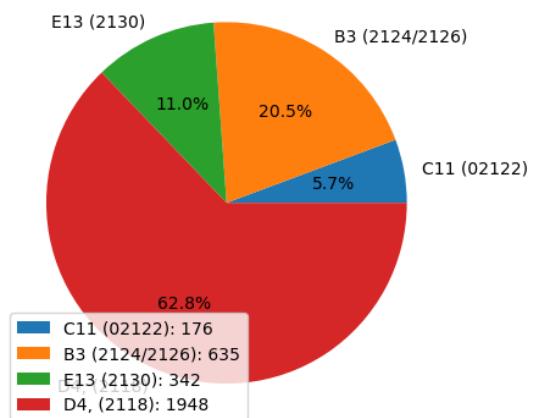
- Sum of field contacts for each month from 2016 until 2022



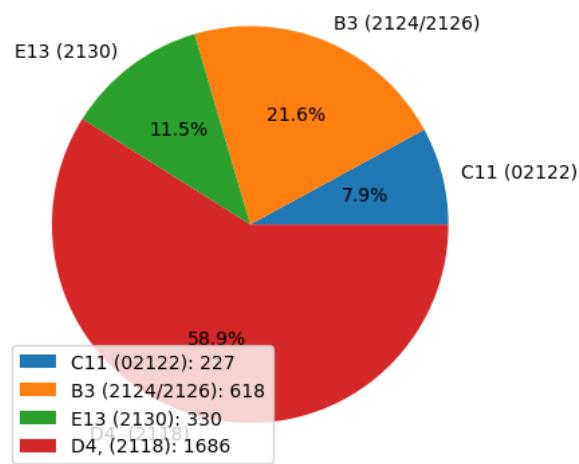
- This chart represents a bar chart of the sum of the counts of field contacts for each month from 2016 until 2022. It has the average count for all months as well as the labeled count of the top 5 months with the most counts of field contacts.
- **Key takeaway:** Top 5 counts for all months all revolve within and around the summer
 - Average counts for all months is around 4200.
- **Field contact pie charts by district (B3/C11/E13/D4) for each individual year from 2017 until 2022**



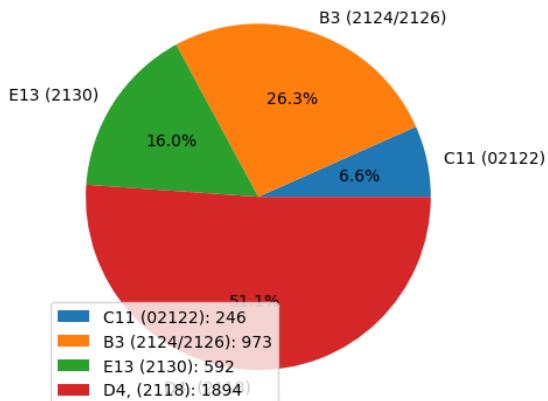
Field Contacts by District (2020)

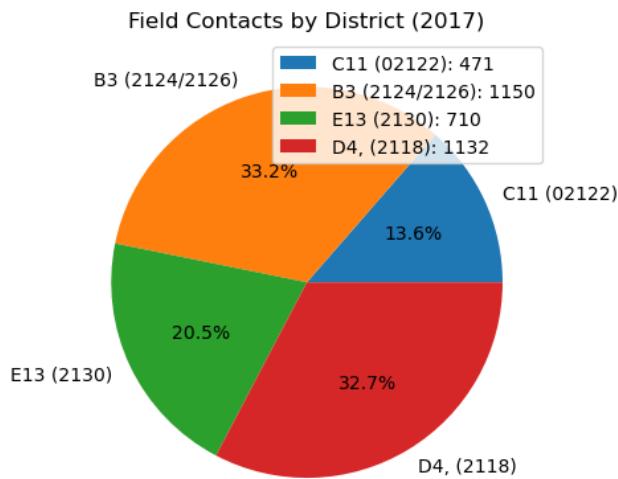
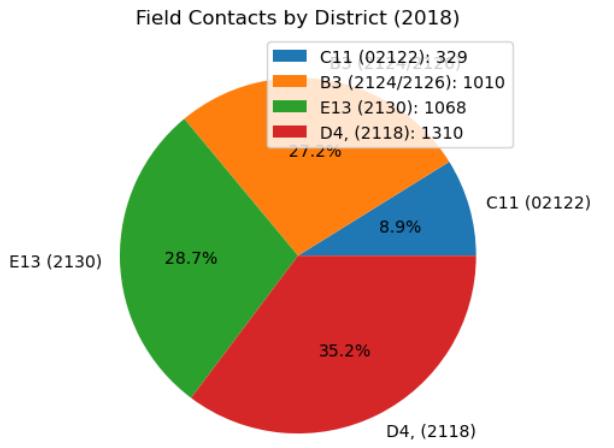


Field Contacts by District (2021)



Field Contacts by District (2019)





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- The 6 pie charts above represent the percentage of field contacts within districts E13, B3, C11 and D4.
- **Key takeaways:**
 - District D4 has a much higher number of field contacts compared to other districts
 - District D4 field contacts have increased by almost 100% since 2017.
 - District E13 field contacts have decreased from around 20% to 11%.

Key questions:

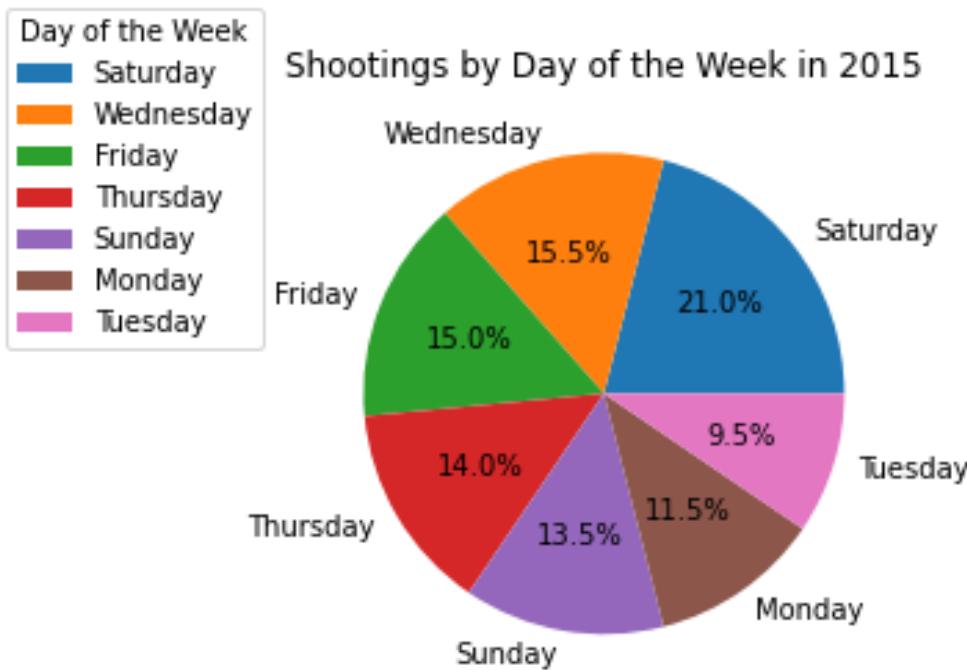
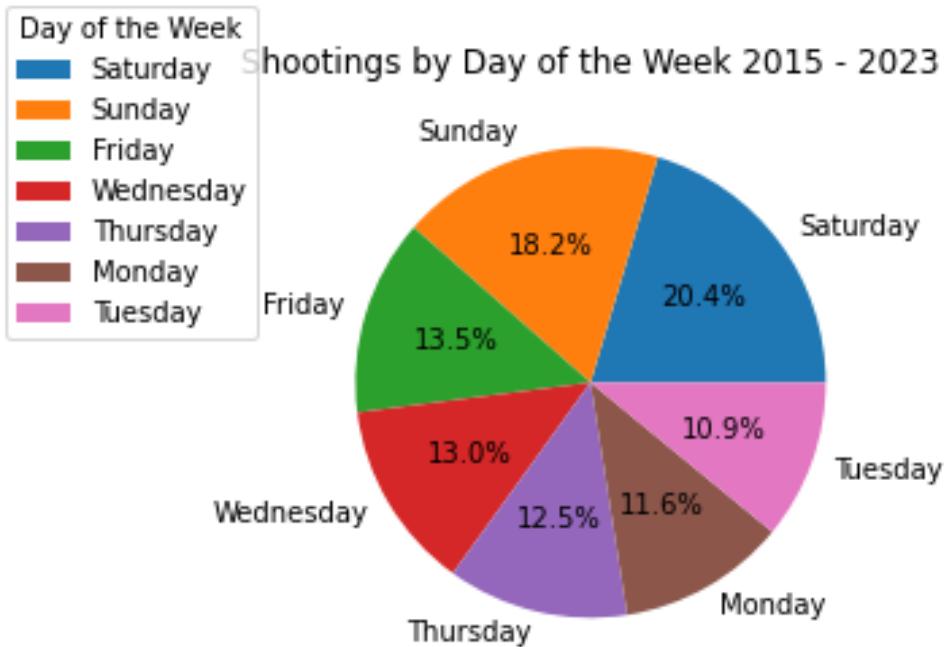
- Within district 4, on which days do most shootings occur within our dataset which contains information about all shootings reported from 2015 to about present day?
- Also looking at all the shootings that have taken place just within district 4, what is the number of shootings victims by race per year from 2015 - 2023?
- Lastly, using the same dataset as above, what is the number of shooting victims by gender per year from 2015 - 2023?

Patrick Wright:

Question Analyzed: Within district 4, on which days do most shootings occur within our dataset which contains information about all shootings reported from 2015 to about present day?

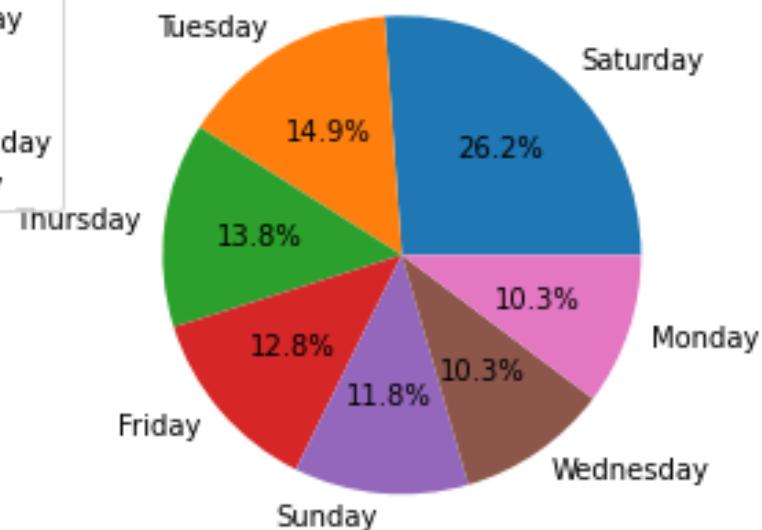
➤ Data :

- [SHOOTINGS](#) data from 2015 - 2023
- Jupyter notebook file:
 - File: [gun_violence_PatW.ipynb](#)
 - Location: code / gun_violence_PatW.ipynb
- Key Graphs :

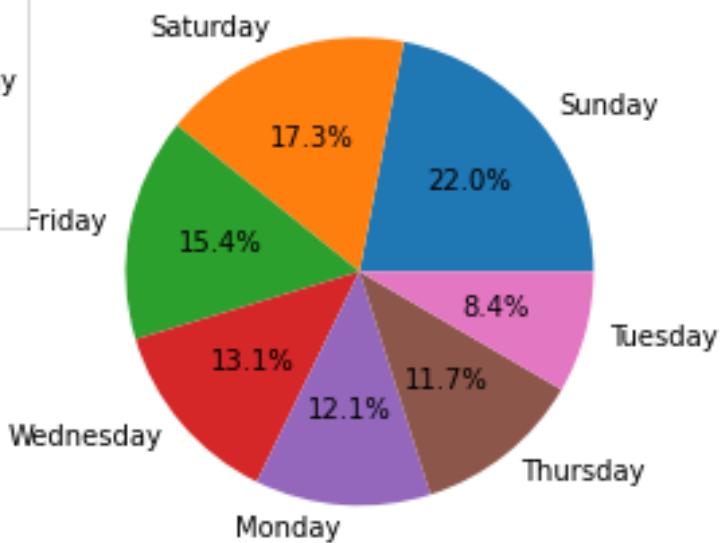




Shootings by Day of the Week in 2016

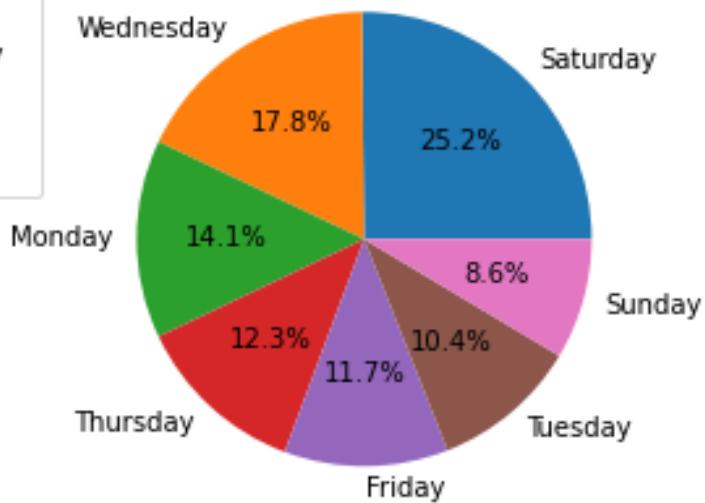


Shootings by Day of the Week in 2017

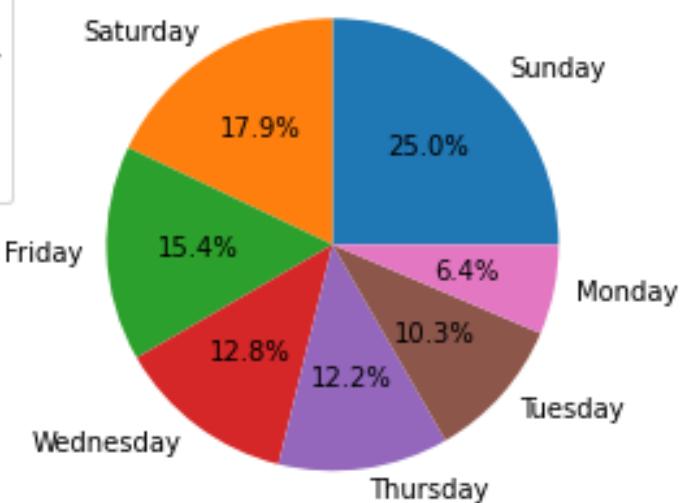




Shootings by Day of the Week in 2018

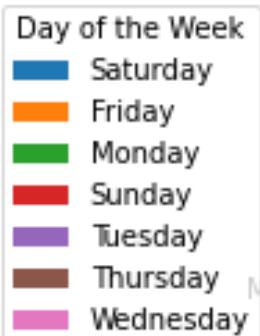
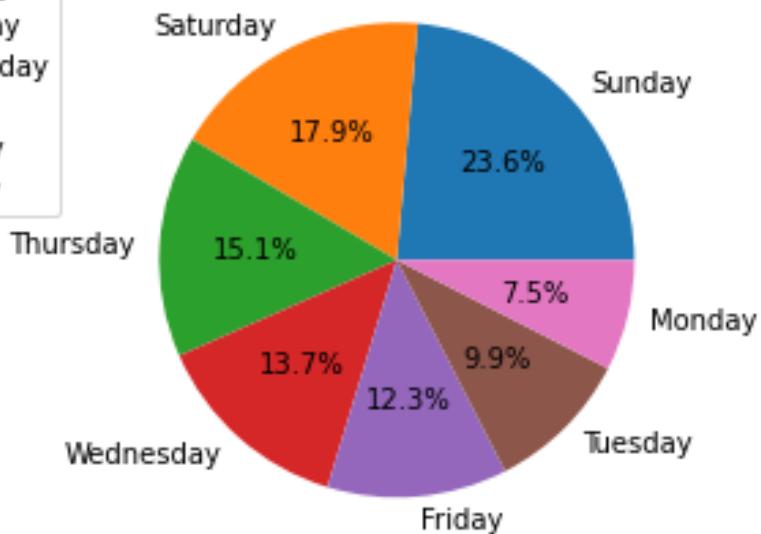


Shootings by Day of the Week in 2019

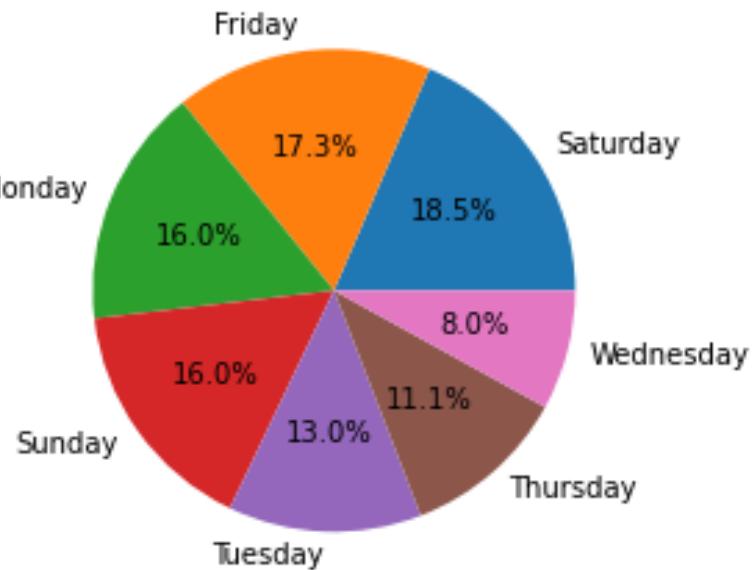




Shootings by Day of the Week in 2020

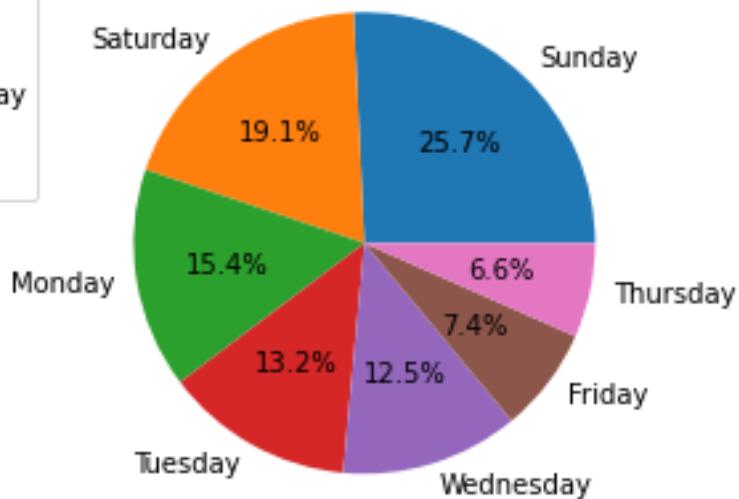


Shootings by Day of the Week in 2021

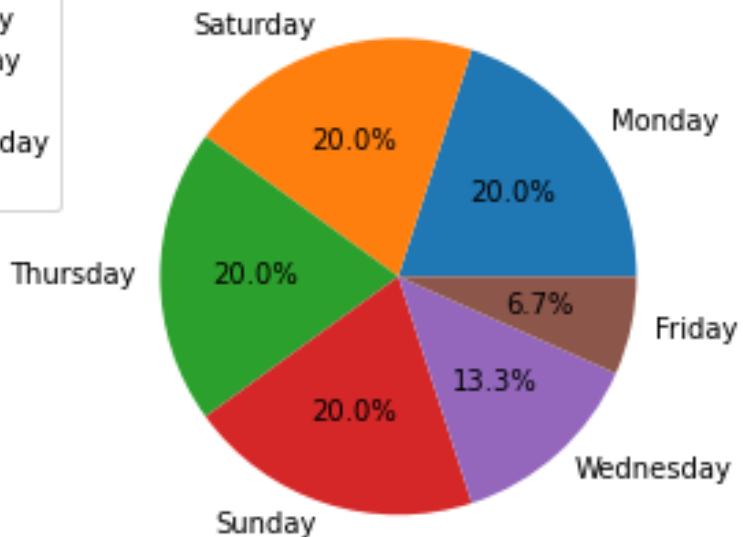




Shootings by Day of the Week in 2022



Shootings by Day of the Week in 2023



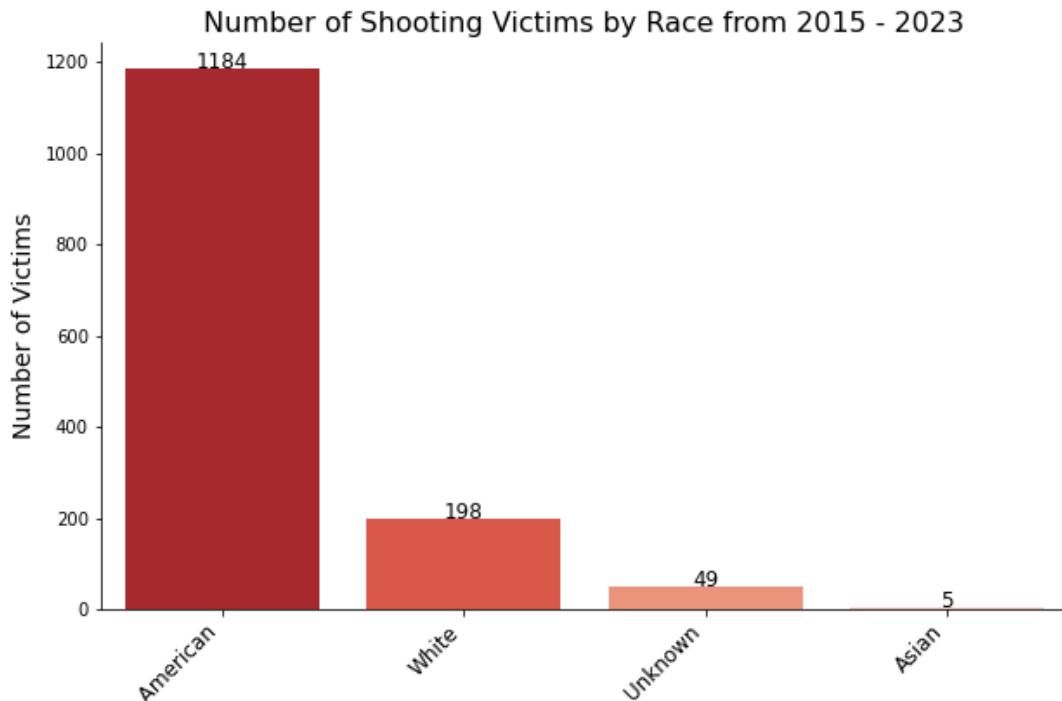
➤ Observations:

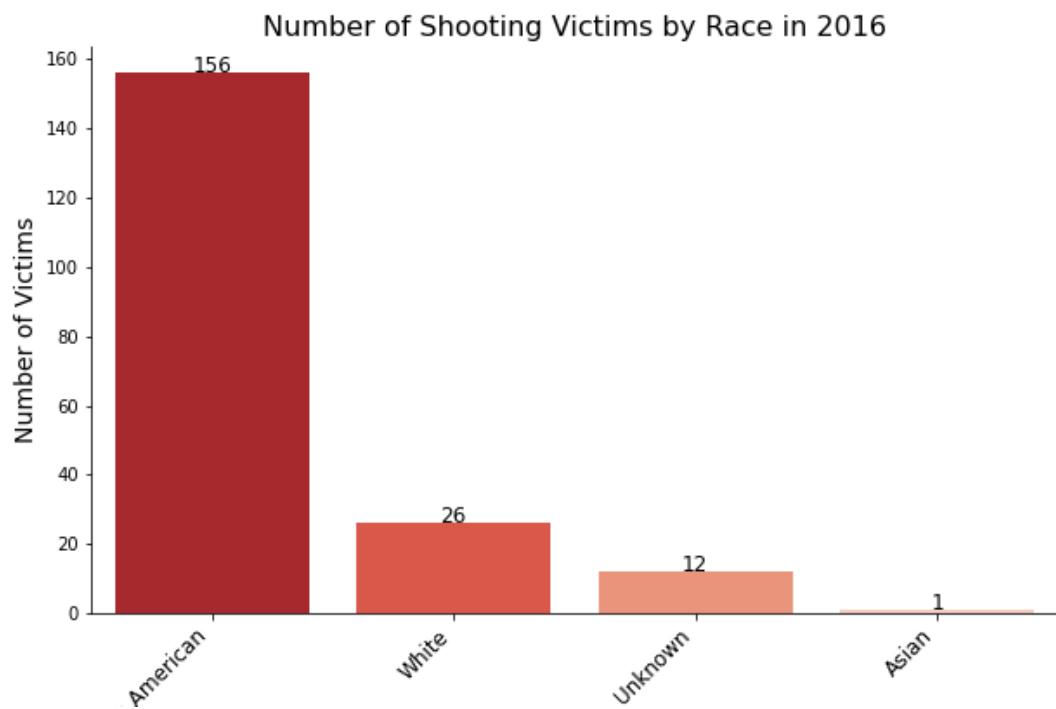
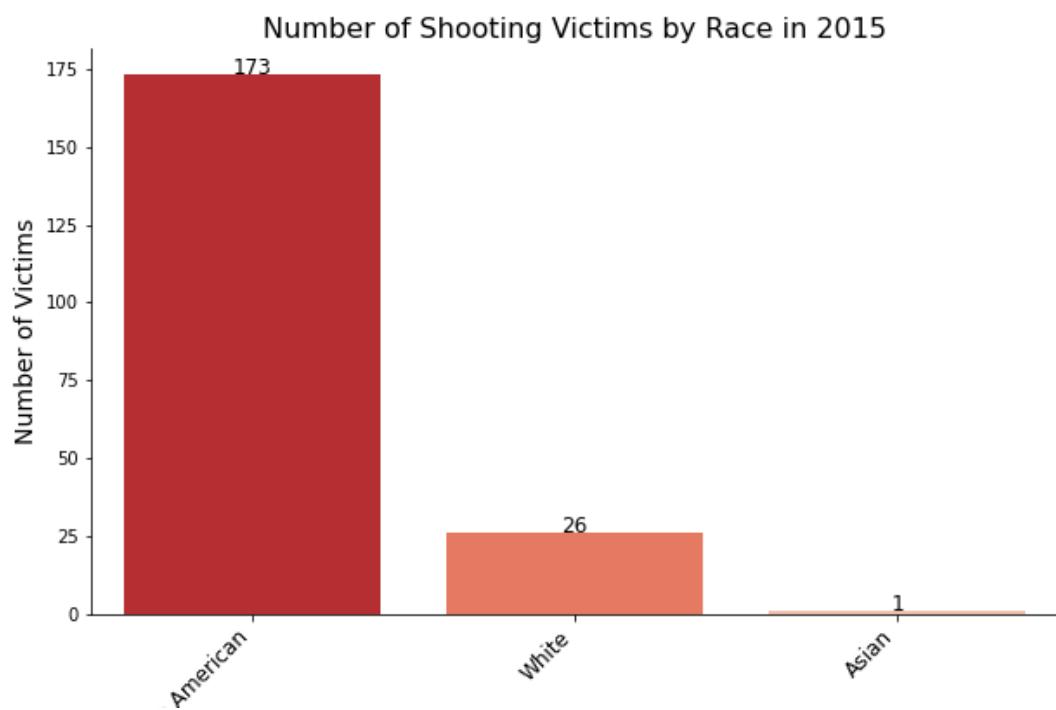
- Within D4, the days on which most shootings occur are:
 - **Saturday** - based upon the graphs Saturday shooting percentages are consistently higher than all other days, if Saturday is not the highest percentage then it is the second highest percentage in each year. However, there still was a slight dip in percentages after 2019 and I wonder if this is due to more police presence on Saturdays in D4.

- **Sunday** - Sunday was the second highest percentage within our dataset. In 2017, Sunday had the highest percentage out of all the days, which was unique to the first 4 years of the dataset because in every year within that 4 year span, Saturday had the highest percentage over Sunday by a decent margin. But after 2018, there was a spike in shootings that occurred on Sundays within D4 excluding one of the years. Excluding 2023 due to limited data, Sunday had the highest percentage of shootings in 3 out of 4 years from 2019 - 2022. I wonder if this change has to do with the number of patrols or police presence within D4 or if there is another reason for this change in the data.
- **Friday** - It seems like the rest of the days of the week all jumped around a little bit from year to year, but Friday was the third highest percentage within this span right next to Wednesday and Thursday. Monday and Tuesday not falling too far behind them either. Most of the shootings happen from Friday to Sunday: a little over 50% of shootings have happened from Friday to Sunday in our 9 years (2015 - 2023) of data covering shootings within D4. It might be best to increase the patrols within D4 during these days of the week.

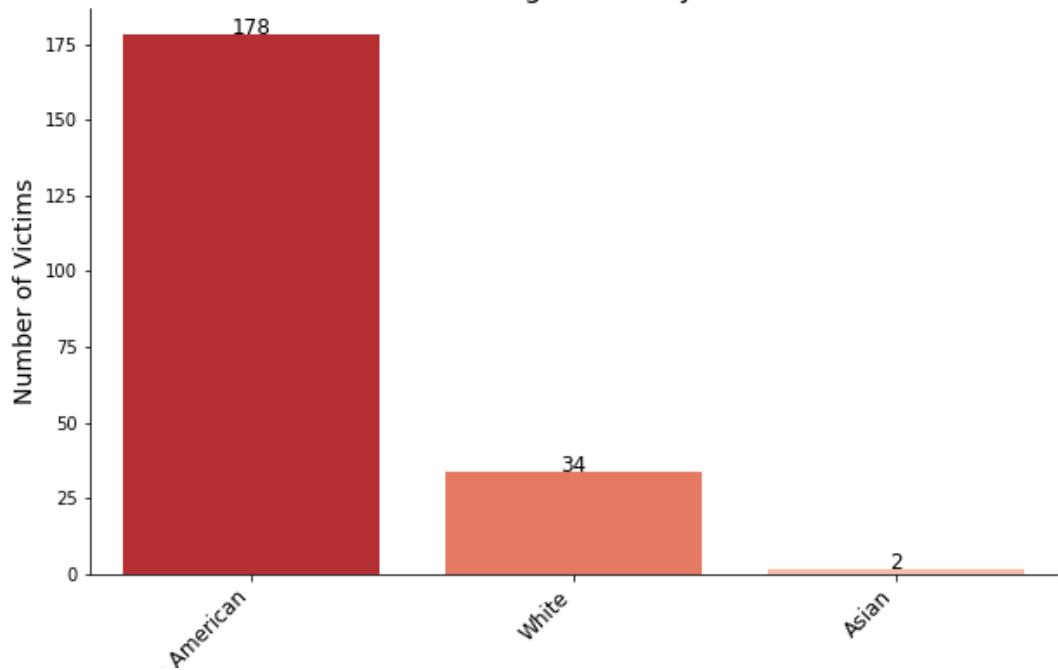
➤ Additional Graph Data:

Questions Analyzed: Also looking at all the shootings that have taken place just within District 4, what is the number of shooting victims by race/ethnicity per year from 2015 - 2023? Lastly, using the same dataset as above, what is the number of shooting victims by gender per year from 2015 - 2023?

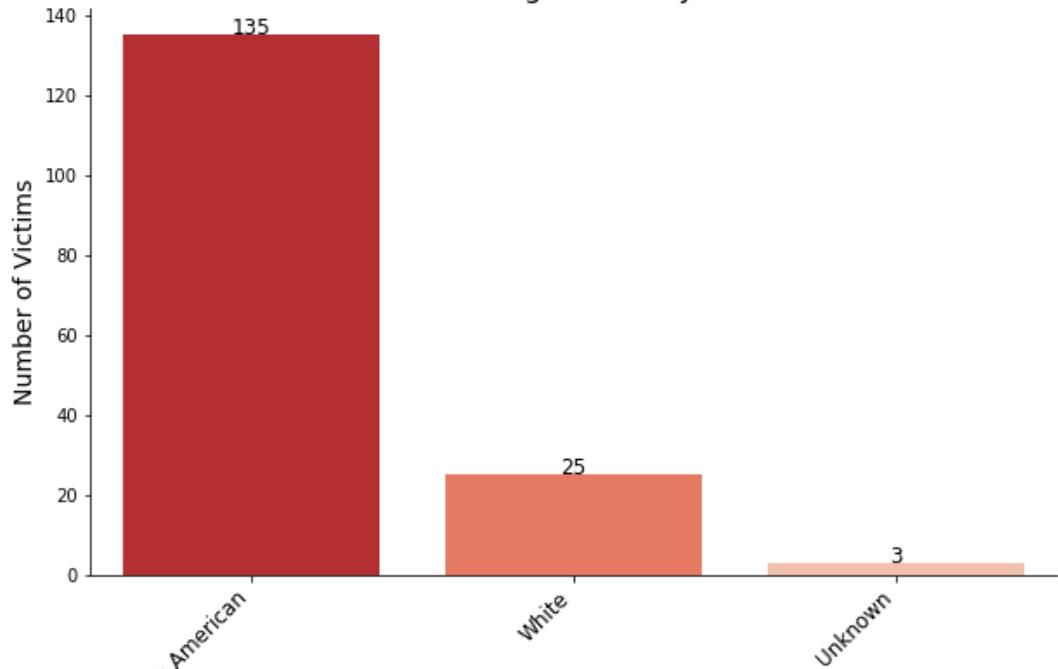




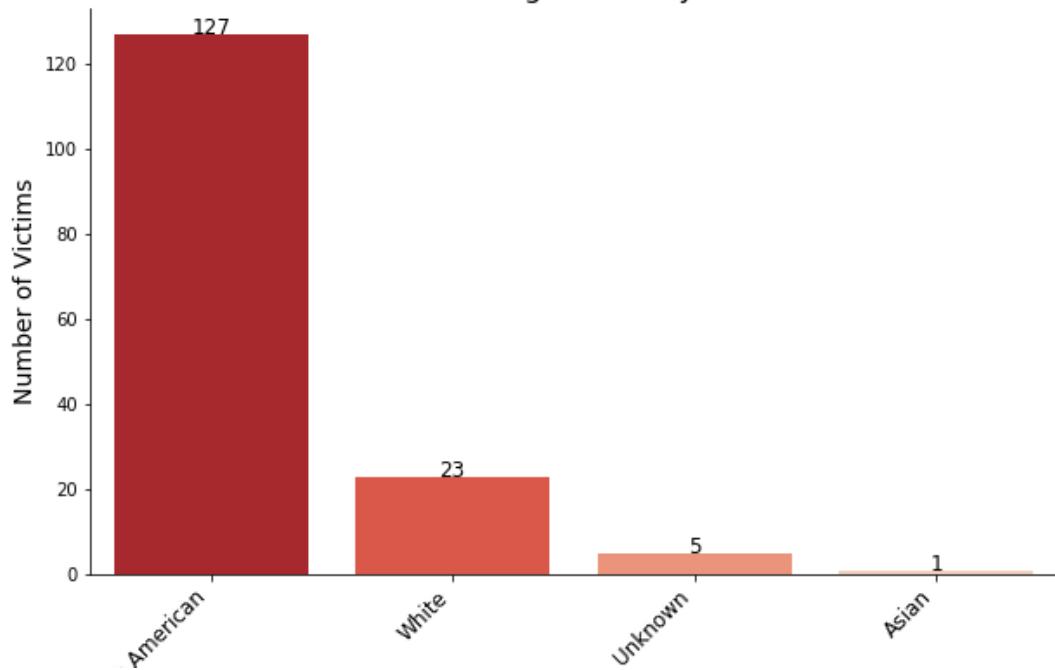
Number of Shooting Victims by Race in 2017



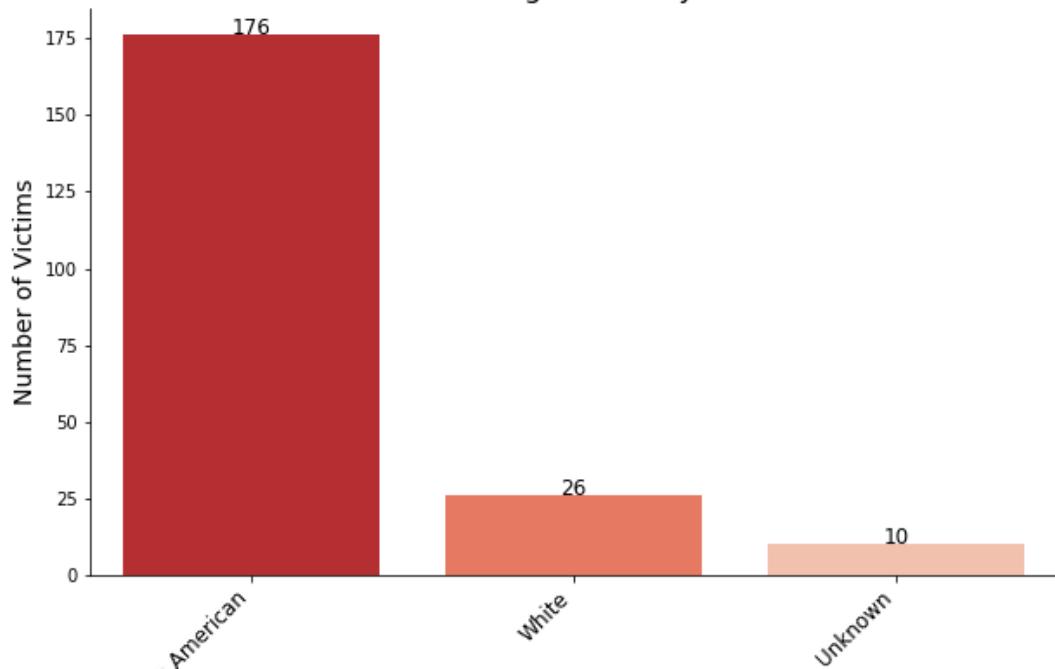
Number of Shooting Victims by Race in 2018



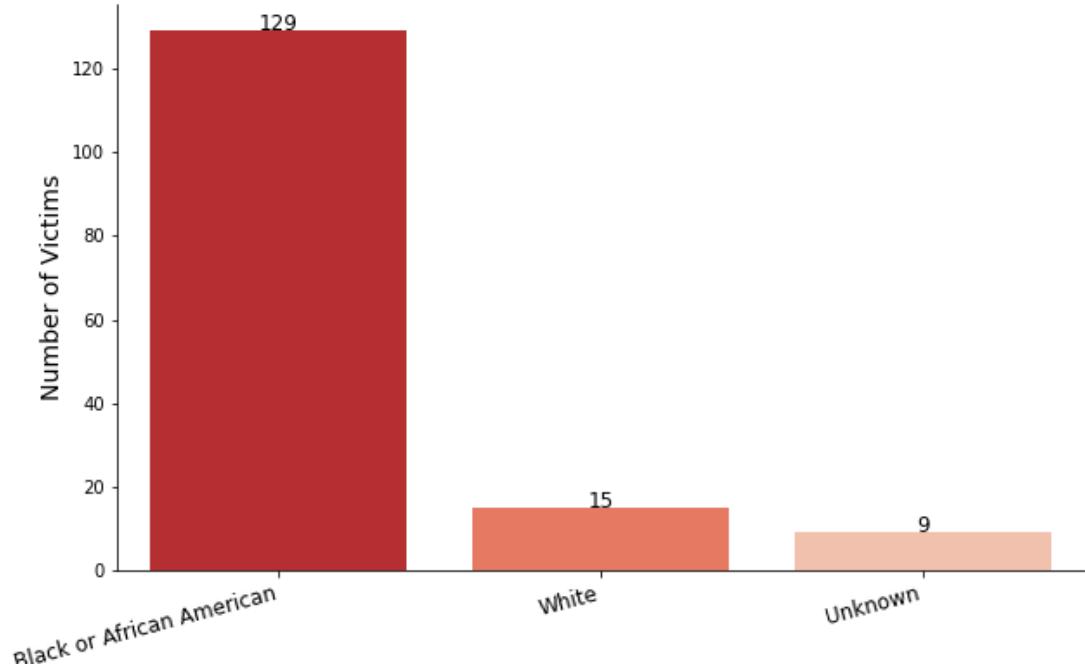
Number of Shooting Victims by Race in 2019



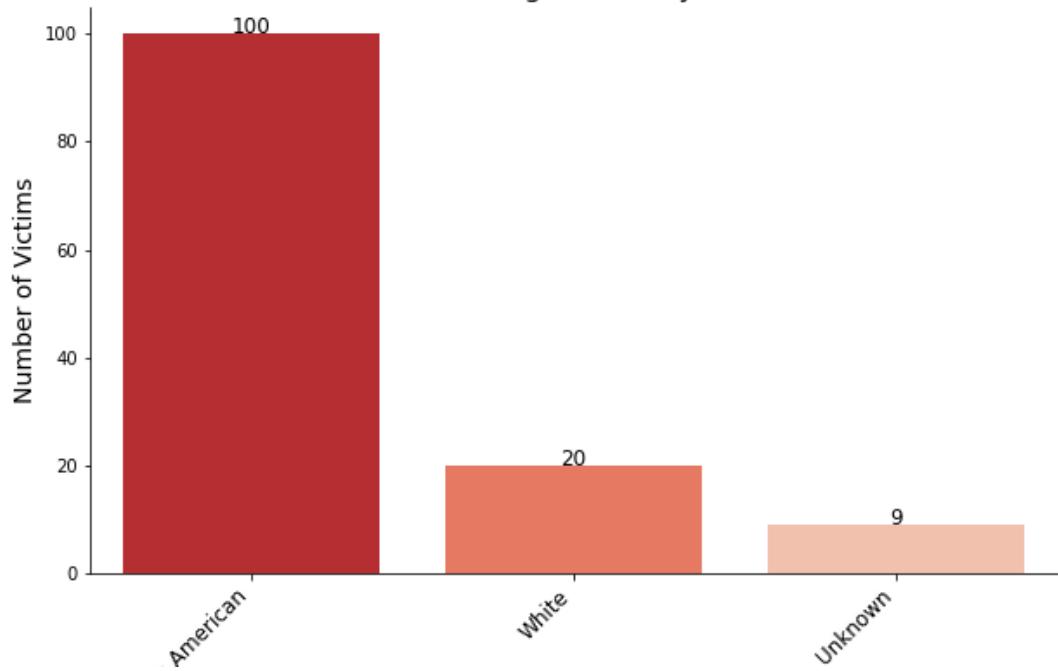
Number of Shooting Victims by Race in 2020

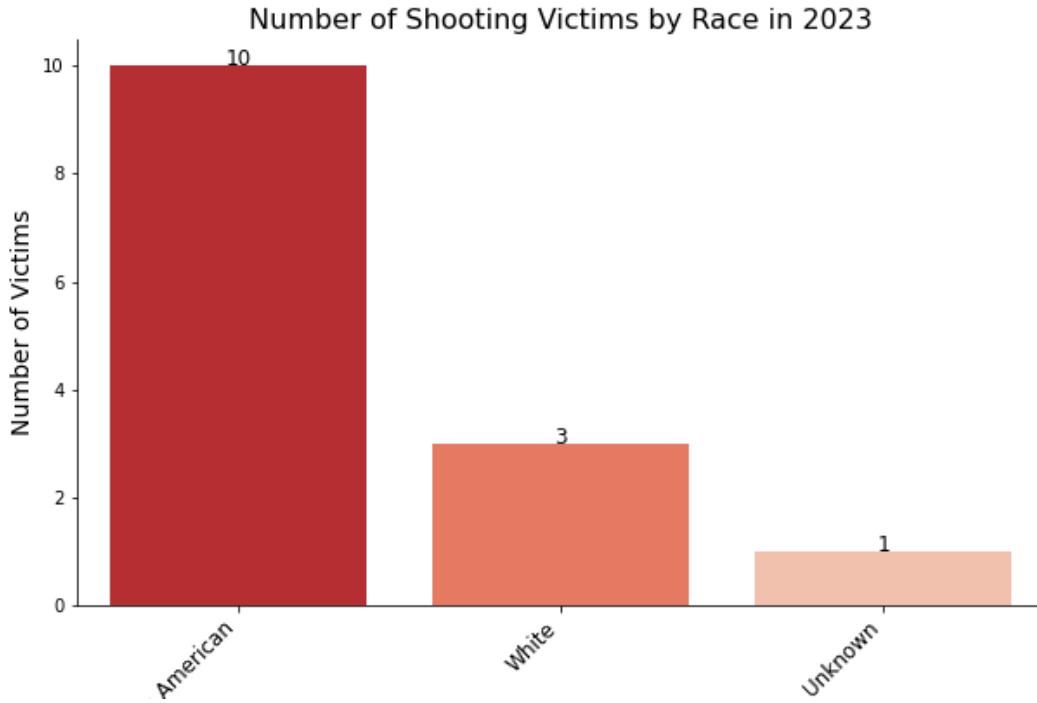


Number of Shooting Victims by Race in 2021



Number of Shooting Victims by Race in 2022



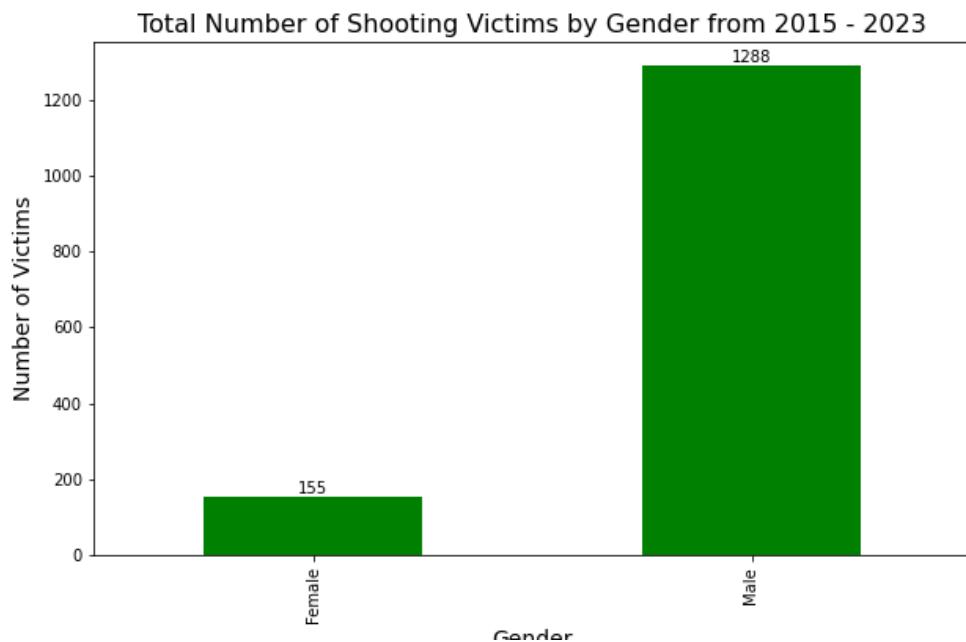


➤ Observations:

- Here I am using the same modified dataset as before that focuses on shootings that have occurred within D4 from 2015 - 2023. I am focusing on data that has more to do with the victims themselves
 - This data above shows the race of the victims within this time period, Black/African American victims are by far the highest compared to any other race.
 - Due to D4 being a predominantly black area this data makes sense, but hopefully there is a solution we can find to drastically decrease the number of black shootings within D4 as well as decrease the number of shootings within D4 as a whole.
 - The number of black victims is nearly 6x that of the next highest race/ethnicity of victims within D4.

➤ More graphs for Victim Data Analysis:





➤ Final Observations:

- This again reflects the victim data for D4 shootings.
 - This data as well comes as no surprise due to the fact that most of the shootings that happen within D4 are gang-related and most gang members, so I've been told, are male rather than female.
 - The number of male victims is over 8x that of the number of female victims within D4.
 - I believe to limit and disrupt gang activity within D4 would hopefully lead to fewer shootings within the district.