INF2178 Group 54 Write Up

Experimental Data Design

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Toronto Police Service 2020-2021 Arrests and Strip Search Data Set

Abstract

The 2020-2021 Arrests and Strip Search (RBDC-ARR-TBL-001) is a public data set provided by Toronto Police Service (hereby known as TPS). Covering the 17 TPS Divisions of Toronto and crime instances that involved TPS outside of their jurisdiction, the data set provides insight into the occurrences of crime types, demographic information of alleged perpetrators, temporal information, and binary outcomes of actions that occurred at calls or arrests such as strip search, mental health issues, and combative alleged perpetrators et al.

Specifically, Division 51 has a pronounced presence in terms of the number of calls and arrests compared to the other divisions. Division 51's catchment covers the most vulnerable and distressed citizens of Toronto which include Moss Park, St. Jamestown, and Regent Park (*51 division*, 2023). Historically these areas have been neighbourhoods for low-income, newly arrived immigrants, and the unhoused. While this investigation does not propose explicit police malfeasance, there are several historic precedents of police divisions with a pronounced presence in vulnerable areas. These precedents indicate that the general police force may not express corruption, per se, however, the individual divisions could foster malfeasance. This investigation proposes that perceived race, gender, and instances at Division 51 can shed light on possible troubling tendencies.

Another facet explored in this report is instances of financial crimes committed by females. This report hopes to rebuke a logical fallacy that men commit the most crimes across all occurrences of crimes. While the sheer number of crimes committed by men does eclipse females, this report will investigate a subset, financial crimes i.e. fraud, that may have female prevalence over males.

Literature Review

Decoupling: TPS Division 51 and LAPD Rampart Division

When approaching the Arrests and Strip Search (RBDC-ARR-TBL-001) data set, an important distinction is to focus not on the whole of TPS but rather on the specific divisions and their catchments as they can vary greatly. One of the most covered cases of police corruption has been the Los Angeles Police Department's Rampart Division scandal. This division's malfeasance permeated the national conversation in North America, largely in part to the aftermath of the Rodney King beating and pursuant fictionalization on the television show *The Shield,* which was originally titled *Rampart* (Weinraub, 2002). While TPS has not been implicated in such a heinous abuse of power, there are unsettling parallels between the LAPD Rampart Division and TPS Division 51.

As stated previously, Division 51 covers some of the most vulnerable and distressed citizens in Toronto specifically the unhoused at missions and respite centres around Sherbourne, and newly arrived immigrants that predominantly live in public housing around Regent Park and St. Jamestown. Like Division 51, Rampart was also one of the busiest divisions in terms of calls for service and criminal activity (Bricker, 2023). Victims of the Rampart police were young, poor, Black or Latino, and some were recent immigrants (Bricker, 2023).

The specific instance that caused the uncovering of the Rampart corruption occurred when an officer was caught selling confiscated cocaine from the Rampart station evidence locker (Johnson, 2019). In 2008, Toronto police identified an accused officer as Kevin Bourne, a nine-year veteran based at 51 Division who was part of an illegal marijuana grow-op ring. Mr. Bourne did not act alone, he was assisted by another officer based out of Division 31 which catchment includes Jane and Finch, another area in a similar demographic to Rampart and Division 51 (Blatchford, 2004).

In both divisions, Rampart and Division 51, there was a process of decoupling, a sociological term that is defined as: "delegation of responsibility to professionals in the organization, which

may be done consciously to promote flexibility. Organizational components become decoupled from the parent organization when it ‘exists with distinctiveness and without responsiveness to the larger organizational entity ’” (Johnson, 2019). In this instance, there is no systemic police corruption, the corruption usually inhabits specific divisions that can be separated from the greater police force.

As proven in this report’s EDA, the sheer number of calls and arrests committed by Division 51 to Black Canadians is greater than all the other police divisions. While this can be attributed to catchment demographics, this still poses a serious issue for one division handling such a high rate of calls and arrests of a minority group. And to further this notion, Division 51 has a history of corruption and obstructing justice through police solidarity.

“A ‘high degree of solidarity’ either due to lack of public support or due to the ‘us vs them’ mentality, can force organizational members to engage in normalized deviance or distance themselves from the parent organization, which can initiate decoupling (Johnson, 2019). This high degree of solidarity was on display at Division 51 after Det. Wong and at least four other officers – including Constables McCormack, son of then TPS Police Captain -- were charged with serious corrupt-practice offences (Blatchford, 2004). To make matters worse, when SIU investigated, they were stalemated by Division 51. “Neither the SIU's spokeswoman nor its legal counsel could recall having had to use a warrant to acquire information from a police agency in the province before” (Freeze, 2000). This decoupling and closing of ranks at Division 51 mimic the same reaction the Rampart Division had to its investigation. LAPD could blame and did blame the specific division for corruption while absolving the greater police force of any wrongdoing. The same narrative could be applied to Division 51 and TPS. “This intentional decoupling is an attempt to distance units engaging in deviant behaviour and the parent organization as a whole. Whether because of the stigma attached to misconduct, fear of a public outcry, or cognitive dissonance, the failure to address problems, or recognize potential problems, leads to decoupling” (Johnson, 2019). This is not the only instance. There have been other cases at Division 51: officers beating alleged perpetrators at Cherry Beach (Gadd, 2002) and sexual assaults within 51’s holding cells (Freeze & Philip, 2000).

Is fraud, embezzlement, and forgery a female prevalent crime in Toronto?

As proposed by Forsyth and Marckese's academic paper," Female Participation in Three Minor Crimes…," it has been proposed that since the 1960s, since the advent of the civil rights movement in the United States, female crime has increased dramatically in a very specific field: fraud, embezzlement, and forgery. When looking at the TPS data set, Mischief & Fraud, Fraud, and Robbery & Theft are listed as discrete nominal values in the Occurrence of Crime variable. While these variables do not necessarily align with all of the claims in the thesis by Forsyth and Marckese, it is still a fascinating claim that can be investigated in this data set.

DATA SET DESCRIPTION

Toronto Police Service. (2022, November 10). *Arrests and strip searches (RBDC-arr-TBL-001)*. Toronto Police Service Public Safety Data Portal. Retrieved February 20, 2023, from https://data.torontopolice.on.ca/datasets/TorontoPS::arrests-and-strip-searches-rbdc-arr-tbl-001/about

The Arrests and Strip Searches (RBDC-arr-TBL-001) is a data set produced by the Toronto Police Service. In accordance with the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA), citizens and corporations have a reasonable right to access the information held by local governments and certain institutions. The data set has been deemed 'public' so anyone can access said data set.The data set contains 65,276 rows and 25 columns/variables and covers 2020-2021. Null/NaN values were removed. ArrestLocDivison also include "XX" values that signified arrests made outside of the TPS. These values have been removed when analyzing Divisions arrest/call instances within TPS.

Please note, the below table outlines the specific variables of interest to this report and not all variables listed.

Variable	dType	Values
Arrest_Year	int64	Categorical
Arrest_Month	object	Categorical

Perceived_Race	object	Nominal
Sex	object	Nominal
Age_group__at_arrest_	object	Categorical
Youth_at_arrest__under_18_years	object	Binary
ArrestLocDiv	object	Nominal
StripSearch	int64	Binary
Booked	Int64	Binary
Occurrence_Category	object	Nominal
Actions_at_arrest___Concealed	Int64	Binary
Actions_at_arrest___Combative	Int64	Binary
Actions_at_arrest___Resisted__d	Int64	Binary
Actions_at_arrest___Mental_inst	Int64	Binary
Actions_at_arrest___Assaulted_officer	Int64	Binary
Actions_at_arrest___Cooperative	Int64	Binary
SearchReason_CauseInjury	float64	Binary
SearchReason_AssistEscape	float64	Binary
SearchReason_PossessWeapons	float64	Binary
SearchReason_PossessEvidence	float64	Binary
ItemsFound	float64	Binary

RESEARCH OBJECTIVES AND QUESTIONS

Division 51

There are two overreaching questions that this report will attempt to answer. The focus will be investigating calls/arrests made by Division 51. And to investigate financial crimes committed by females within Toronto.

The importance of Division 51 is the fact that most calls/arrests occur at this specific station. As discussed in the research portion above, this places a greater burden on this division that could foster decoupling and be fertile grounds for police malfeasance in the form of targeting certain perceived races.

Female Financial Crimes

It is often assumed that men commit the most crimes. Is this necessarily true? As the article by Forsyth & Marckese claims, this may not be true. There has been a strong tendency for females to commit financial fraud since the civil right era that could surpass male's committing similar financial crimes in Toronto.

Division 51

1) What is the ethnic background of alleged perpetrators for Division 51? Is there a correlation between a targeted perceived race and Division 51?
2) What is the breakdown of occurrence of crimes at Division 51? How does this differ from the greater TPS system?

Female Financial Crimes

1) Is there a mean difference between females and males that commit fraud within TPS?
2) Is there a statistically significant gender bias for fraud committed within TPS?

EXPLORATORY DATA ANALYSIS & METHOD

EDA of TPS then DIVISION 51

Visualizations were employed to see an overview of the TPS breakdown of calls/arrests made by the specific divisions. In Figure 1, Division 51 has a pronounced presence over all the over divisions.

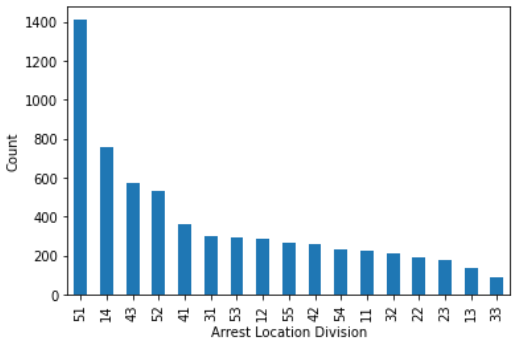


Figure 1

In Table 1, we can see the specific count for calls/arrests for each division.

TPS Division Count
51: 1411
14: 757
43: 571
52: 529
41: 360
31: 300
53: 295
12: 285
55: 268
42: 259
54: 233
11: 222
32: 212
22: 190
23: 177
13: 134
33: 90
Total count: 6293

Table 1

The **mean** calls/arrests across TPS's discrete divisions is **370**. **Division 51 accounts for 22% of all calls/arrests in the TPS** system, which is significant as the next Division, Division 14, accounts for 12%, considerably less.

In Figure 2 below, we can see the perceived race of alleged perpetrators in TPS. Per the 2021 Stats Canada Census, the Black population of Toronto city proper is 265,005 (Government of Canada, 2023). Non-visible minorities (infer Caucasian) in Toronto city proper is 1,224,000 (Government of Canada, 2023). With these values in mind, there is a disproportionate number of Black denizens interacting with TPS in Toronto.

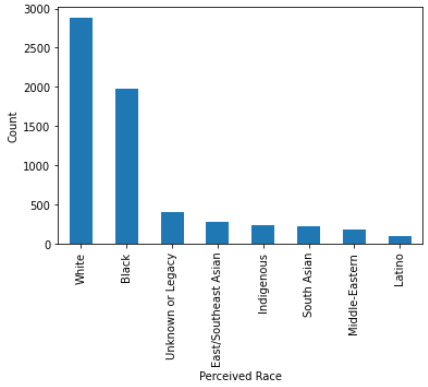


Figure 2

Perceived Race Breakdown, per TPS
White: 2883
Black: 1979
Unknown or Legacy: 404
East/Southeast Asian: 284
Indigenous: 237
South Asian: 218
Middle-Eastern: 185
Latino: 103
Total count: 6293

Table 2

Table 2 breakdown the counts of perceived race interactions with TPS. Again, Black denizens have a disproportionate presence.

Percentage of White Toronto population interaction with TPS = 0.2353%

Percentage of Black Toronto population interaction with TPS = 0.7463%

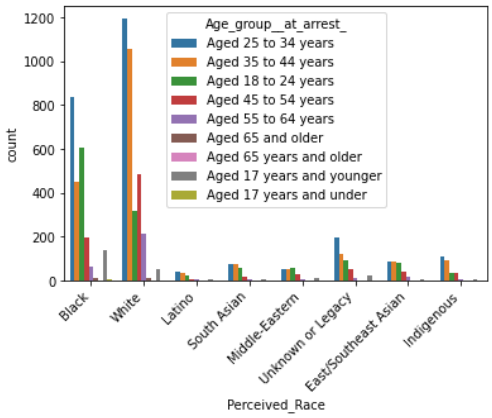


Figure 3

Figure 3 is an age and perceived race breakdown of TPS calls/arrest. White people aged 25 to 34 is the largest count for TPS. This is seconded by Black people aged 25 to 34.

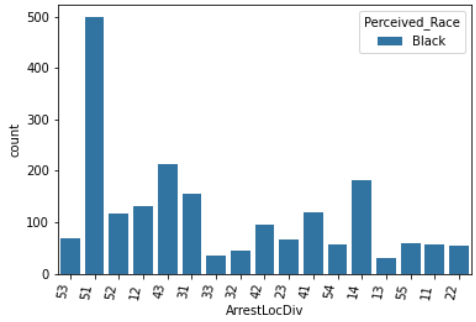


Figure 4

Figure 4 displays the breakdown of Black denziens calls/arrests by divisions. By a great amount, Division 51 has the greatest number of calls/arrests.

1-WAY ANOVA

$\mu_{arst\_51} = \mu_{arst\_13} = .. = \mu_{arst\_31}$	P = 2.31e-55	F = 78.65

Table 3

In the above table 3, we compare mean number of calls/arrests per quarter per all divisions. We have a p-value below our alpha threshold of 0.05 so we can reject the null hypothesis that there is no differences between the mean number of calls/arrests per quarter per division.

2-WAY ANOVA

	Sum_sq	df	F	PR(>F)
ethnicity	1.299168e+06	6.0	2243.689829	0.000e+00
division	2.138319e+05	16.0	138.484539	5.475e-221
ethnicity:division	4.932092e+05	96.0	53.236389	4.442e-293

Table 4

In the above Table 4, we analyse the interactive effect between divisions and ethnicities. We have a F statistic of ~53 for our interactive term showing statistically significant findings, but arguable overshadowed by effect of ethnicity itself with an F statistic of ~2243.

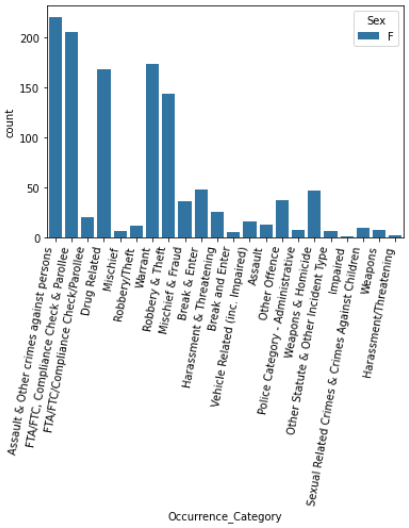
T TEST

$\mu_{arst\_51} = \mu_{arst\_\sim51}$	P = 4.32e-11	T = 18.04

Table 5

In the above Table 5, we have a p-value below our alpha threshold of 0.05 so we can reject the null hypothesis that there is no differences between the mean number of calls/arrests per quarter at division 51 vs the mean number of calls/arrests per quarter at all other divisions. There is a statistically significant difference between the means of Division 51 and all other Divisions of TPS.

<u>FEMALE CRIMES</u>



The figure above shows the count of occurrence of crimes committed by females in TPS. Overall, Assault and Compliance checks relating to parole have the highest counts.

Assault & Other crimes against persons: 221
FTA/FTC, Compliance Check & Parolee: 206
Warrant: 174
Drug Related: 168
Robbery & Theft: 144
Break & Enter: 48
Weapons & Homicide: 47
Other Offence: 37
Mischief & Fraud: 36
Harassment & Threatening: 25
FTA/FTC/Compliance Check/Parolee: 20
Vehicle Related (inc. Impaired): 16
Assault: 12
Robbery/Theft: 11
Sexual Related Crimes & Crimes Against Children: 9
Police Category - Administrative: 7
Weapons: 7
Mischief: 6
Other Statute & Other Incident Type: 6
Break and Enter: 5
Harassment/Threatening: 2
Impaired: 1
Total count: 1208

Table 6

The table above gives the count of crimes committed by females that TPS called/arrested.

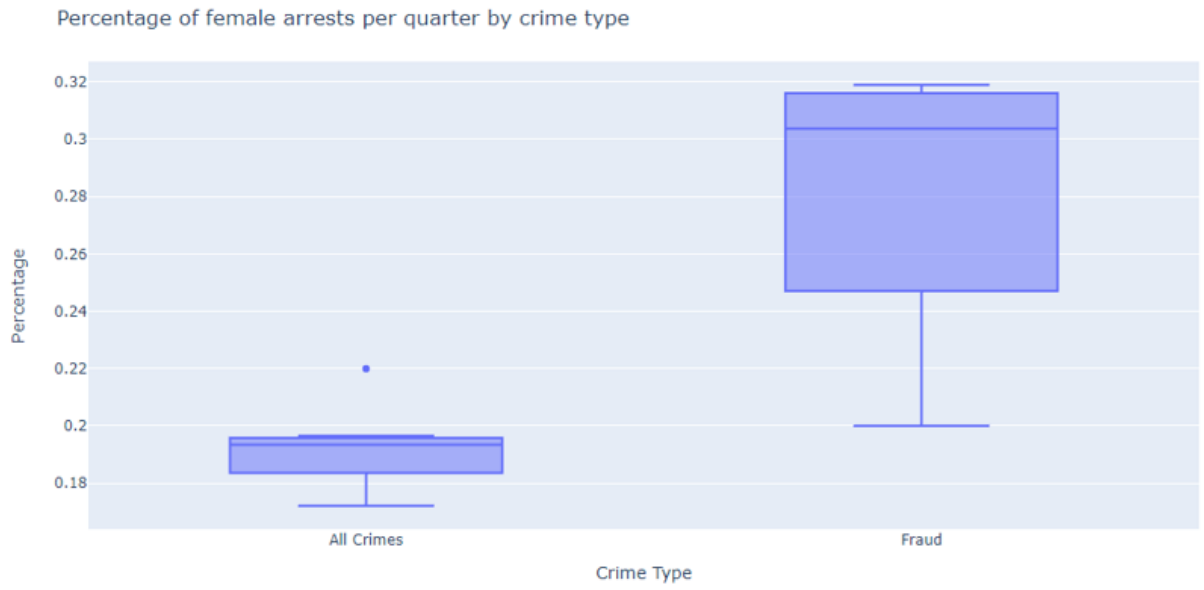


Figure 7

In Figure 7 , we see that Fraud is about 33% of the crimes committed by Females.

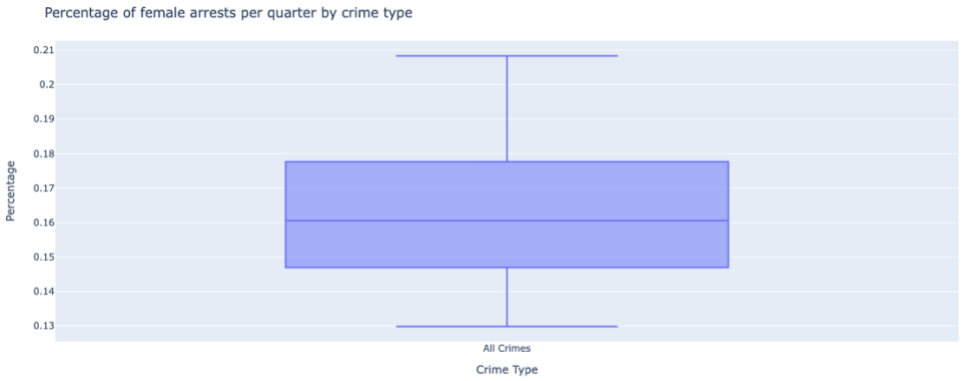


Figure 8

In the Figure 8 above, we see 16% is the median of female crimes committed of all crimes.

T TEST

$\mu_{f\_crime} = \mu_{f\_fraud}$	P = 0.00116	T = 4.4894

Table 7

In the above Table 7, we compare mean percentage of calls/arrests per yearly quarters committed by females against the mean percentage of calls/arrests per yearly quarters committed by females given that the crime is classified as fraud. We have a p-value below our alpha threshold of 0.05

so we can reject the null hypothesis that there is no differences between the mean percentage of female calls/arrests per quarter irrespective of crime type.

RESULTS & FINDINGS

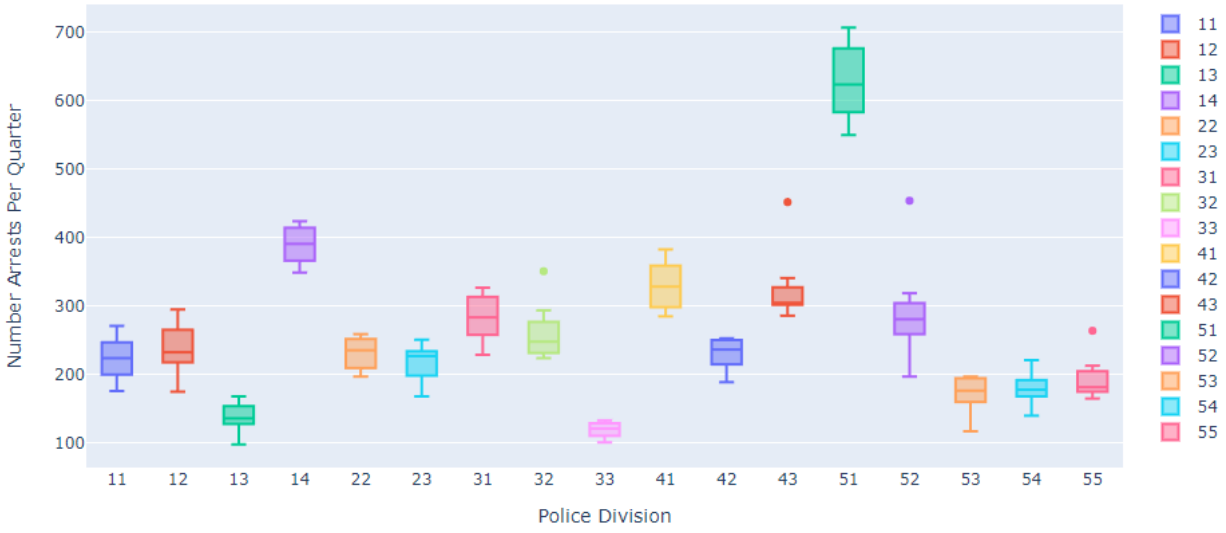


Figure 9

In Figure 9, Looking at the number of arrests per yearly quarter, we can visually see that Division 51 (teal) has the greatest number of calls/arrests. We were able to find statistically significant evidence that the mean number of arrests per quarter does vary between divisions (P = 2.31e-55, F = 78.65) and that the mean number of arrests at Division 51 against the mean number of arrests in all other divisions also vary with a T test statistic of ~18. The statistical significance of which is convincing.

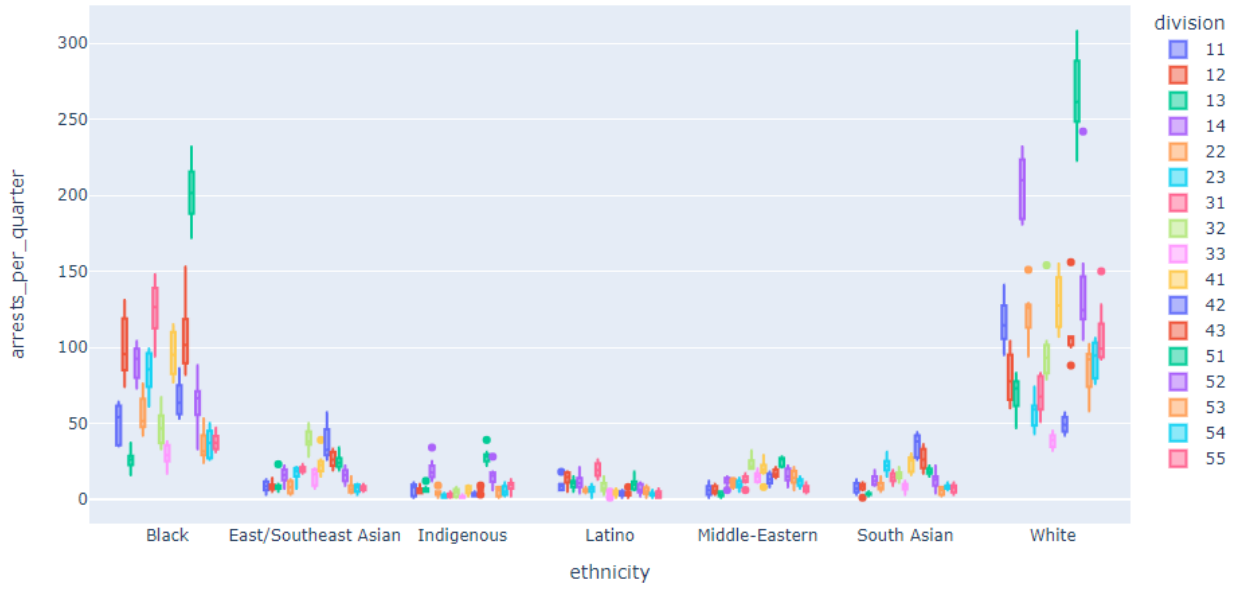


Figure 10

We also wanted to see how ethnic backgrounds of alleged perpetrators vary between divisions. Our 2-way ANOVA analysis showed that there is statistically significant relationship in interaction between perceived race and discrete divisions with an F score of ~53, but we also saw that the F score for ethnicity alone was ~2243 completely dwarfing the interactive term in comparison.

In Table 4, we may have found statistically significant evidence to show that the number of calls/arrests in Division 51 is greater than the mean number of arrests, but we were not able to show a significant perceived race bias given the data. The interaction between perceived race and Division 51 is modest at best. However, furthermore, the reason for the greater number of arrests at Division 51 has not been uncovered but could be inferred by the catchment's demographics.

FEMALE FRAUD CLAIM

In Table 7, we found statistically significant evidence supporting the claim proposed by Forsyth and Marckese's academic paper that female crime has increased in financial crimes, specifically fraud. We found, with a p-value of 0.00116, that the mean percentage of female

arrests does not equal against all crimes. Our t-test seems to indicate that gender is more likely to be female if the crime type is in fact fraud.

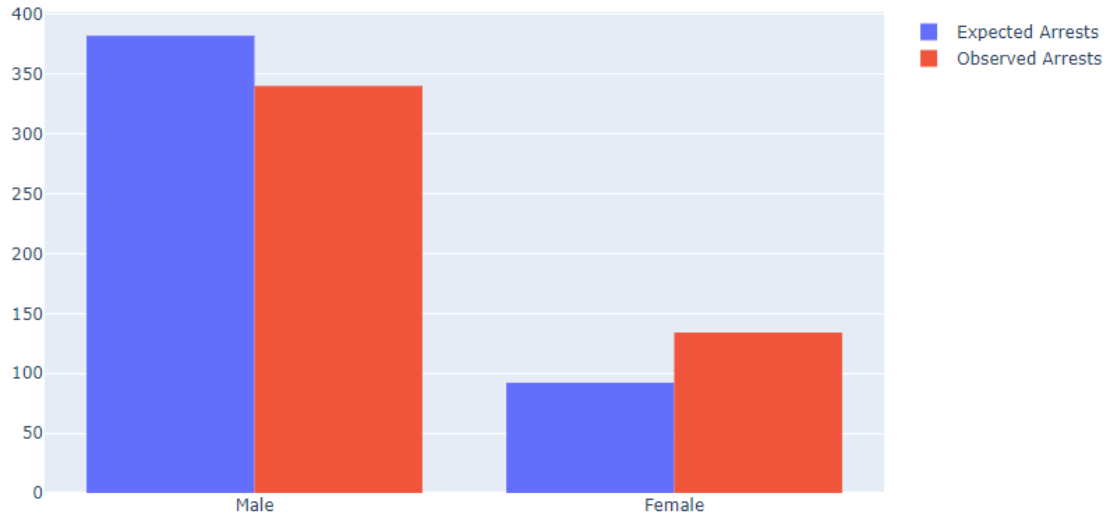


FIGURE 11, Expected Arrests for Fraud

In our data set, we observed that ~80.67% of the arrests had a male alleged perpetrator. We also found 474 cases involving fraud. So if gender was independent of number of arrests, we would expect 92 cases to involve a female alleged perpetrator and 382 involving a male. However, we observed that only 340 cases involved males, whereas 134 cases involved females. These findings are visualized in Figure 11 above.

After conducting a chi square test of independence, we found statistically significant evidence (p-value = 1.0734e-06) that also seems to indicate that gender is not independent of when the crime type is fraud. This supports our findings that there is in fact a gender bias to fraud that does skew female.

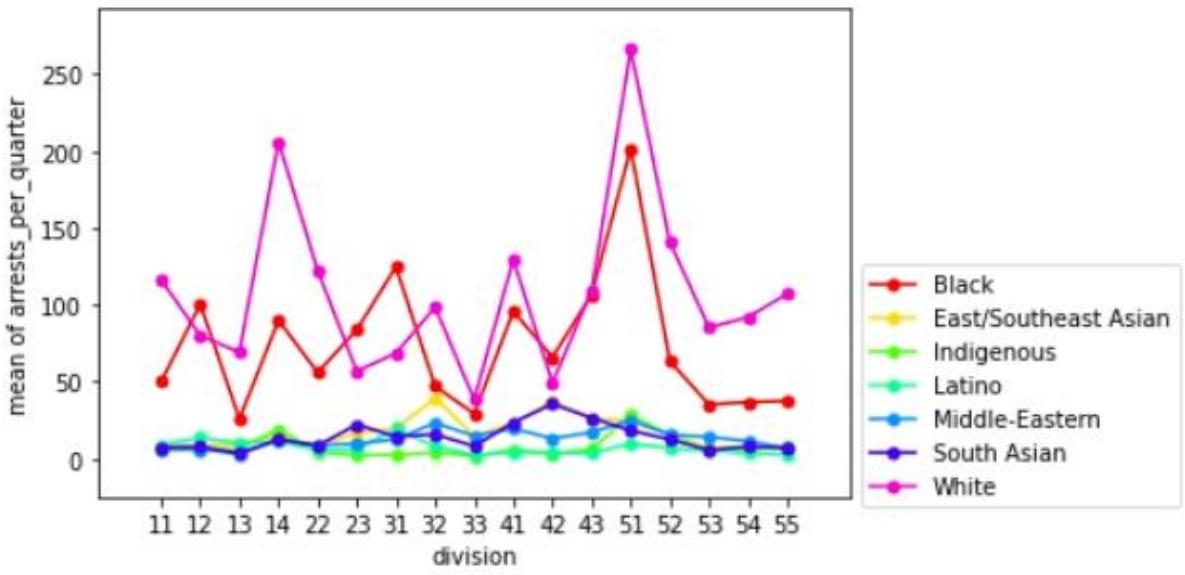


Figure 12

Figure 12 shows an interaction plot of perceived race and divisions. We can see that Division 51 has a pronounced mean of arrests compared to the other divisions.

group1	group2	meandiff	p-adj	lower	upper	reject
11	51	404.5	0.001	338.1469	470.8531	True
12	51	390.375	0.001	324.0219	456.7281	True
13	51	490.375	0.001	424.0219	556.7281	True
14	51	238.5	0.001	172.1469	304.8531	True
22	51	396.875	0.001	330.5219	463.2281	True
23	51	410.875	0.001	344.5219	477.2281	True
31	51	344.875	0.001	278.5219	411.2281	True
32	51	367.125	0.001	300.7719	433.4781	True
33	51	508.75	0.001	442.3969	575.1031	True
41	51	298.125	0.001	231.7719	364.4781	True
42	51	397.375	0.001	331.0219	463.7281	True
43	51	302.25	0.001	235.8969	368.6031	True
51	52	-335.625	0.001	-401.9781	-269.2719	True
51	53	-456.125	0.001	-522.4781	-389.7719	True
51	54	-448.5	0.001	-514.8531	-382.1469	True
51	55	-434.125	0.001	-500.4781	-367.7719	True

Table 8

In Table 8, the Tukey Test displays mean difference between Division 51 and every other division. All p-values are below our alpha threshold of .05, therefore we can reject the null hypothesis. Division 51's arrest rate is different from all other divisions in TPS.

CONCLUSION

When investigating this data set, the EDA expressed several peculiar traits that steered the investigation. Namely, the amount of calls/arrests within Division 51's catchment and the unusual claim that female fraud has been gaining moment since the 1960s. For Division 51, the report was not able to expressly prove the sociological phenomena within police divisions known as "decoupling." However, the report does find striking similarities to divisions where decoupling does take place, namely the Los Angeles Police Department's Rampart Division. A catchment that skews toward visible minorities with a pronounced volume of calls/arrests compared to other divisions. We were unable to explore the underlying catchment demographic so were not able to prove household incomes which could further find similarities between Division 51 and Rampart Division.

There is some noise to the data in the form of 'XX' in the Division's variable. While this was removed from the data when conducting tests, this also lowered the sample data. Another aspect to the Division's variable that is missing are crimes occurred on the TTC. Instances have been rising since Covid lock downs in 2020 (Harvey, 2022).

The claims made by Forsyth and Marckese's paper regarding the tendency of female fraud is statistically significant. While there is not an explicit rising trend in female fraud in TPS, there is a greater percentage of fraud by females compared to when the fraud is committed by an unknown gender. The sample amount of fraud in Toronto was lower compared to other crimes being committed. If the sample was greater, the report could have found more tendencies between crimes committed by females. Another issue are the specific values listed in the occurrence of crime having some overlap i.e. Fraud and Mischief & Fraud. These values are discrete in the column however have some overlap in reality. The values were kept as presented in the data set as a domain expert in criminology was not able to be consulted.

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