Analyzing Trends and Patterns of Racial Bias and Unfairness in the Toronto Police Service's Arrests and Strip Searches

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INF2178: Experimental Design
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February 28, 2023

Introduction

Law enforcement institutions, particularly police services, have had a deep history of discrimination and racial bias. Research has proven that the complexity of contemporary policing culture, the enforcement of disciplinary practices, and the naturalization of violence against racialized populations, is shaped by imperialist projects that emerged from the era of slavery and colonization (Maynard, 2017). Although law enforcement institutions have implemented anti-racism training to combat this issue, the legacy of colonialism remains embedded within police culture. This has led to over-policing, hyper-surveillance, and the racial profiling of gendered and racialized groups across the globe. Consequently, the criminalization of race has resulted in a lack of trust towards law enforcement institutions.

Prior to the implementation of new policing strategies in 2020, law enforcement institutions in Canada were not mandated to collect race-based data during routine police patrols. In fact, Canadian policing services prided themselves on the fact that they do not see colour and that racism and discrimination were issues exclusive to the United States (Merritt, 2022). However, a recent demand for race-based data has helped shift this narrative and highlight the pervasiveness of systemic racism within policing institutions. As a result, the Toronto Police Service developed the "Race and Identity Based Data Collection Strategy" in 2020. The strategy mandates officers to select one of the following racial groups upon reports or arrests: Indigenous, Black, East/South Asian, South Asian, White, Latino, and Middle Eastern.

Results from the Toronto Police Service's new strategy are showcased in the "Arrests and Strip Searches" dataset, which was published in November 2022 and includes data collected from 2020 and 2021. From January 1st, 2020, all Police Services in Ontario commenced the collection of data on the race of individuals arrested or subjected to strip searches (Toronto Police Services, 2022). The goal of this strategy was to acknowledge and address occurrences of racism within routine police practice. Additionally, the Toronto Police Service considered this a new step towards implementing changes that will promote racial equality.

The primary objective of this research paper is to investigate whether or not there is evidence of racial and gender bias and/or unfairness in the Toronto Police Service's recent arrests and strip searches data, and if so, what are the specific racial groups that are most impacted. The specific research questions of this paper are detailed as follows:

Research Question 1: What is the relationship between race and strip searches? Is there a significant difference in the average number of strip searches performed between the Black and White individuals?

Research Question 2: How do age and gender affect the number of arrests and strip searches that are performed in Toronto?

Research Question 3: What is the relationship between the number of arrests for individuals with mental instability across different racial and gender groups.

Literature Review

There is extensive literature on racial bias and unfairness in policing culture within Canada. As a result, this paper relies on three key sources. The first source is Robyn Maynard's book "Policing Black Lives: State Violence in Canada from Slavery to the Present". Maynard argues that incarceration and surveillance are rooted in colonial ideas of captivity and that early associations between Blackness and criminality worked to sustain white supremacy (Maynard, 2017). This paper offers historical context, specific to Black people and how they have been historically "made into criminals by the very policing strategies that target them" (Maynard, 2017, p. 87). This is an important source, as it provides relevant background information.

To further understand the meaning of racial profiling and the impact it has had on racialized communities, this paper is influenced by Scot Wortley and Julian Tanner's study, "Discrimination or 'good' policing?". The paper argues that racial profiling, which the authors define as the practice of targeting individuals as suspect based on their race or ethnicity, is a form of prejudice and violates basic human rights (Wortley & Tanner, 2004). The paper offers a detailed definition of racial profiling and discusses the negative impact racial profiling has had on various ethnic communities across Canada.

Lastly, Katherine Merritt's "Final Report and Recommendations on the Collection of Race Based Police Data in Nova Scotia: Submitted to the Wortley Report Research Committee", serves as a fundamental source for this research paper. Merritt analyzes the "stops and searches" data from both the UK and US and the results confirm Black and Hispanic individuals were more

prone to these searches than white people (Merritt, 2022). Merritt also touches on the limitations of crime statistics and they contribute to hyper-policing.

Methods

Dataset Description

This paper used data from the Toronto Police Services. The dataset, "Arrests and Strip Searches", includes 65,276 detailed records of arrests and strip search incidents that occurred during 2020 and 2021 in the city of Toronto. Recorded individuals were each assigned an Event ID, Arrest ID, Person ID.

The dataset provides information on the individual's ethnic background, age group, and also details the use of force and the incidents associated with the "use of force" such as: carrying a weapon, date of the arrest or strip search, and age and gender information of the accused. The dataset utilizes both qualitative and quantitative data.

The quantitative data provides information related to a specific incident which can be expressed using numbers. The qualitative data provides details that assist the reader to understand and gain further insight into the specific occurrence. For instance, the type of crime committed such as "Fraud", "Theft", "Assault", etc. In addition, Arrest Month, Perceived Race, Sex, Age group at arrest are all classified as categorical variables. Individuals fell into the following age groups: 17 and under, 18 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, and 65 and above. Additionally, the racial categories included the following groups: Indigenous, Black, East/South Asian, South Asian, White, Latino, and Middle Eastern and unknown.

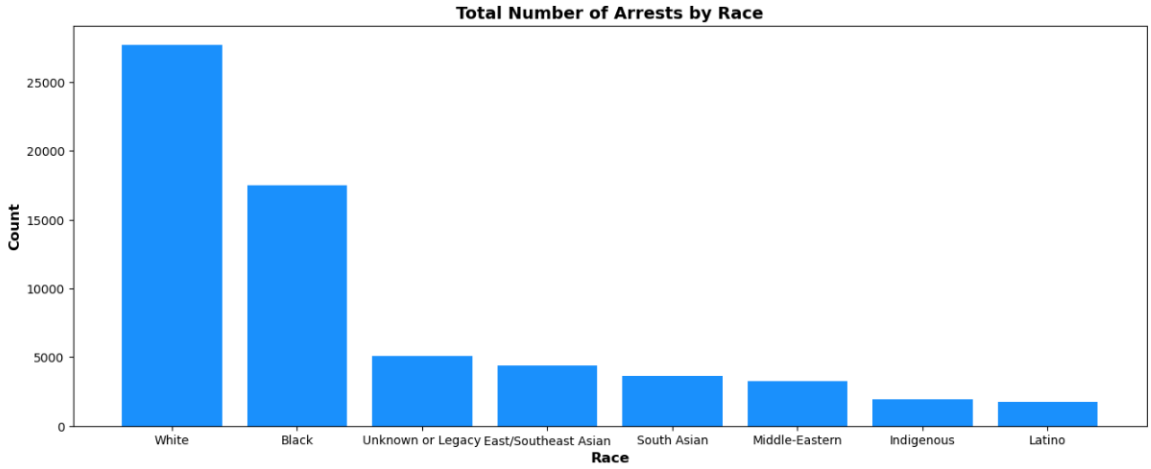
The dataset also provides insight into the Toronto Police Division where the incident or arrest took place. The Toronto Police Service has 17 geographical locations and police officers are dispatched accordingly. This information is useful in ascertaining if specific community groups are more targeted than others.

The programming environment used to conduct both exploratory data analysis and parametric statistical testing is Python. The integrated development environment used to write and run the python code is Jupyter Notebook. The packages used to format, visualize, and analyze the data include: scipy, matplotlib, statsmodel, seaborn, pandas, implotlib, plotly.express, and NumPy.

Results

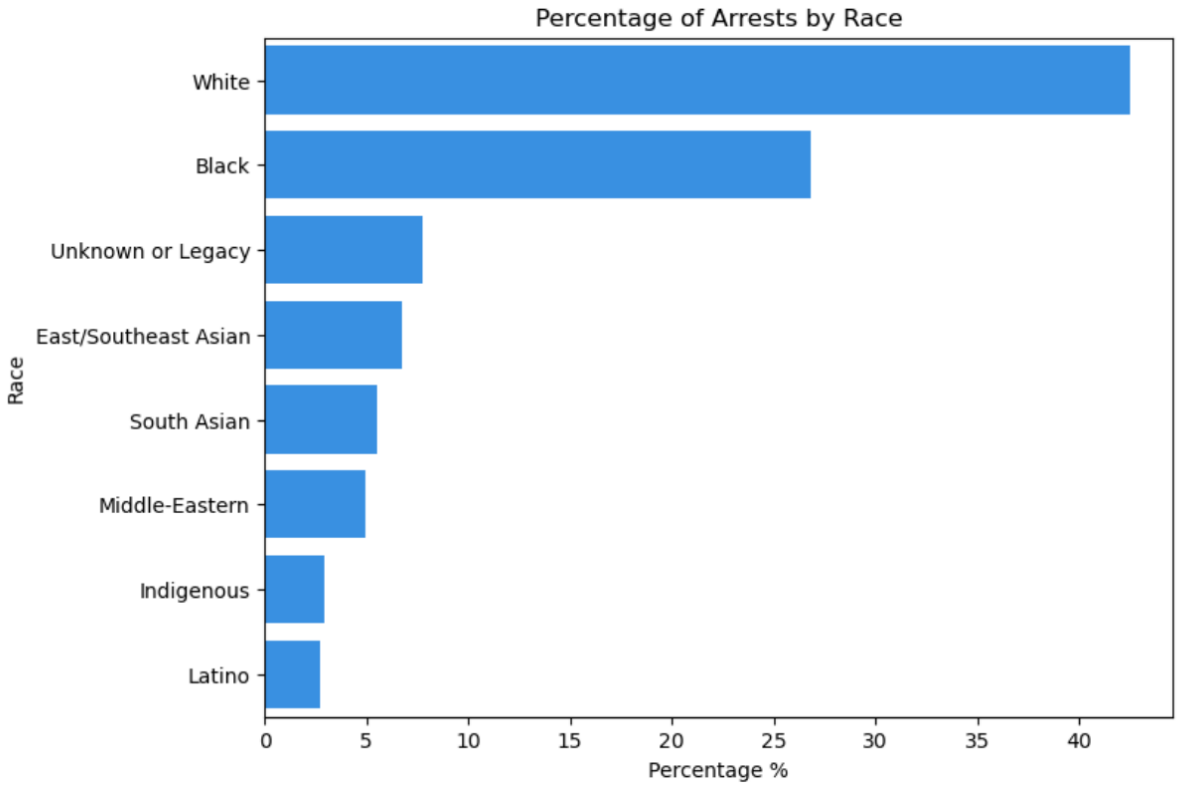
Exploratory Data Analysis

Figure 1: Bar graph comparing the number of total arrests across racial groups in Toronto during 2020 and 2021



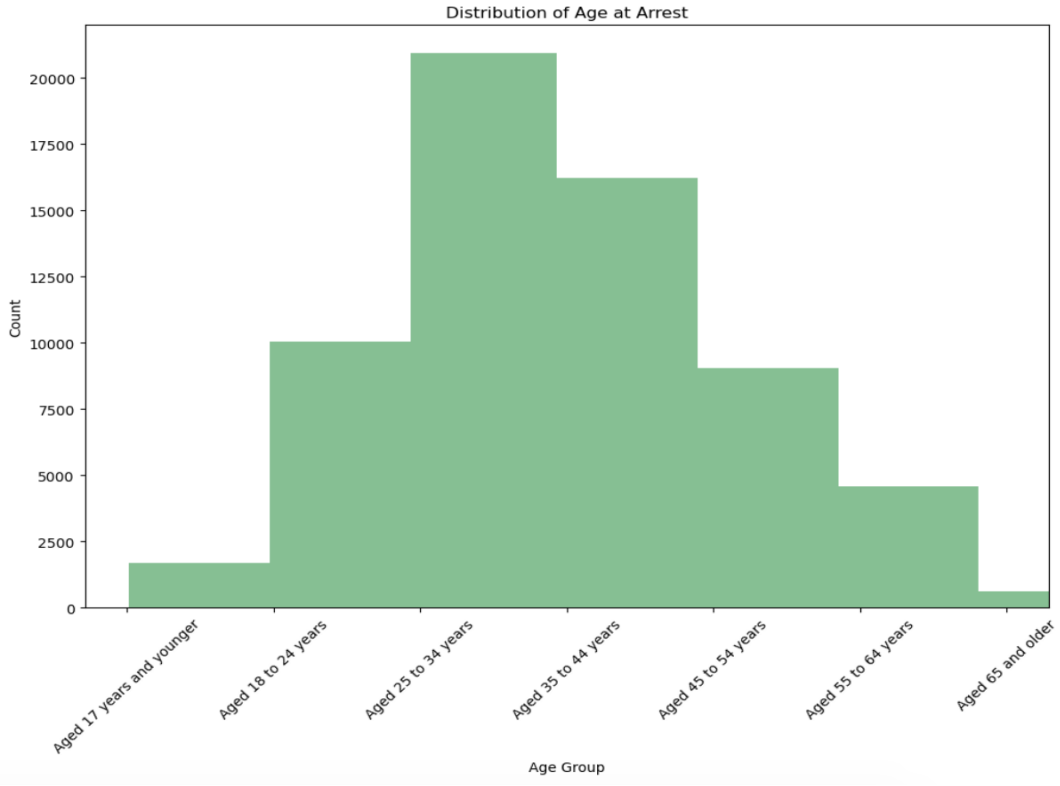
Prior to statistical analysis, this study explores the dataset and provides various visualizations to supplement some key insights. The total number of arrests (combining data from 2020 and 2021) for each racial group is presented in Figure 1. White individuals had the highest total number of arrests, which amounted to 27,723, compared to the other racial groups. Black individuals had the second highest number of recorded arrests, with a total of 17,526. Quite a large portion of the recorded arrests had an "unknown" racial category. The total number of arrested individuals that were not placed into a specific racial category is 5056, which is also larger than all of the other racial groups.

Figure 2: Bar graph comparing the percentage of arrests by each racial group in Toronto during 2020 and 2021



Additionally, Figure 2 also visualizes the relationship between arrests and race. However, this bar graph uses percentages to differentiate between the groups. As shown in Figure 2, approximately 42.4% of recorded arrests were from White individuals and 26.8% were from Black individuals. According to the 2021 Census Canada data, 44.3% of Torontonians do not identify as belonging to a racialized group. The remaining 55.7% identify as a racialized minority. In Toronto, only 8.9% of the population is Black and yet, 26.8% of arrests were of Black people (Statistics Canada, 2022). Additionally, only 0.8% of the population identifies as Indigenous and 2.9% of arrested individuals were of Indigenous.

Figure 3: Histogram showing the distribution of age groups at arrest



According to Figure 3, individuals between the ages of 25 and 34, make up the largest number of arrested individuals across the different age groups, with a total of 20,949. This is evident in the normal distribution of the graph. The mean age of arrested individuals falls in between the ages of 25 and 34. There is an upward trend, with a steady increase once it hits the 18 to 24 age group. An increase in the number of arrests progresses up until the ages of 25 and 34. This is followed by a decline with individuals aged 35 to 45 years. Arrested individuals aged 17 and under, along with those aged 65 and over, account for the smallest number of arrested occurrences.

Figure 4: Line graph showing the distribution of ages at arrest across racial groups

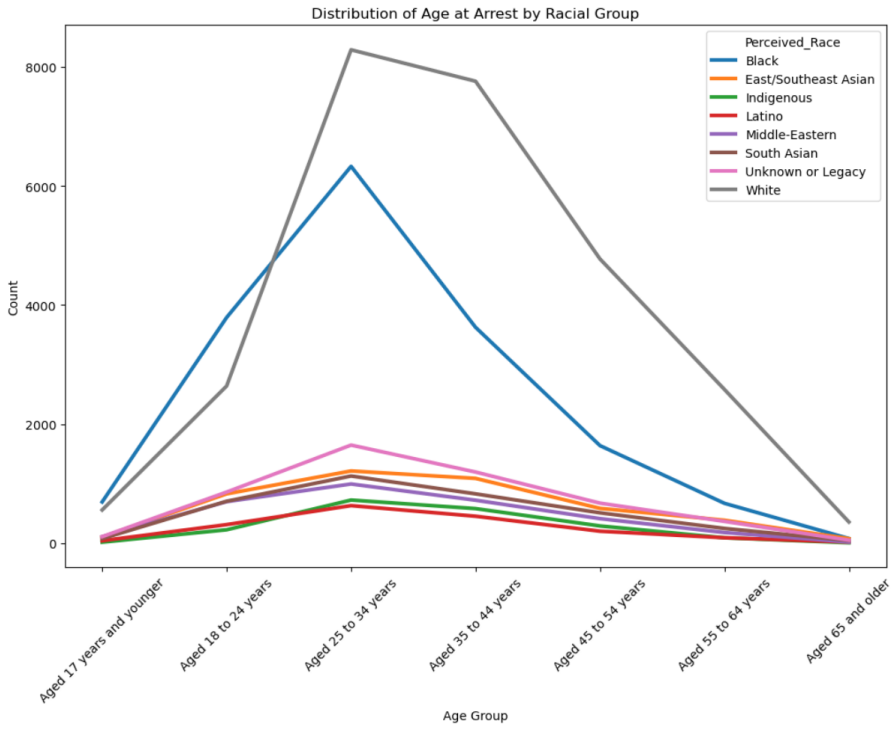


Figure 4 shows the rate of change using the information from Figure 3, by comparing the distribution of age against race, with regards to arrests. Upon first glance, there is a stark difference between the distribution of age with Black and White groups, compared to the remaining racial groups. Both lines are quite dynamic, with the majority of the arrested individuals falling between 25 and 34. While White individuals make up the majority of the offenders, there is a higher number of Black individuals that are arrested between 17 years old and 24 years old. Essentially, within this dataset, there are more Black youth that are arrested in comparison to the other racial groups.

Figure 5: Bar graph comparing the total number of strip searches that occurred across different racial groups

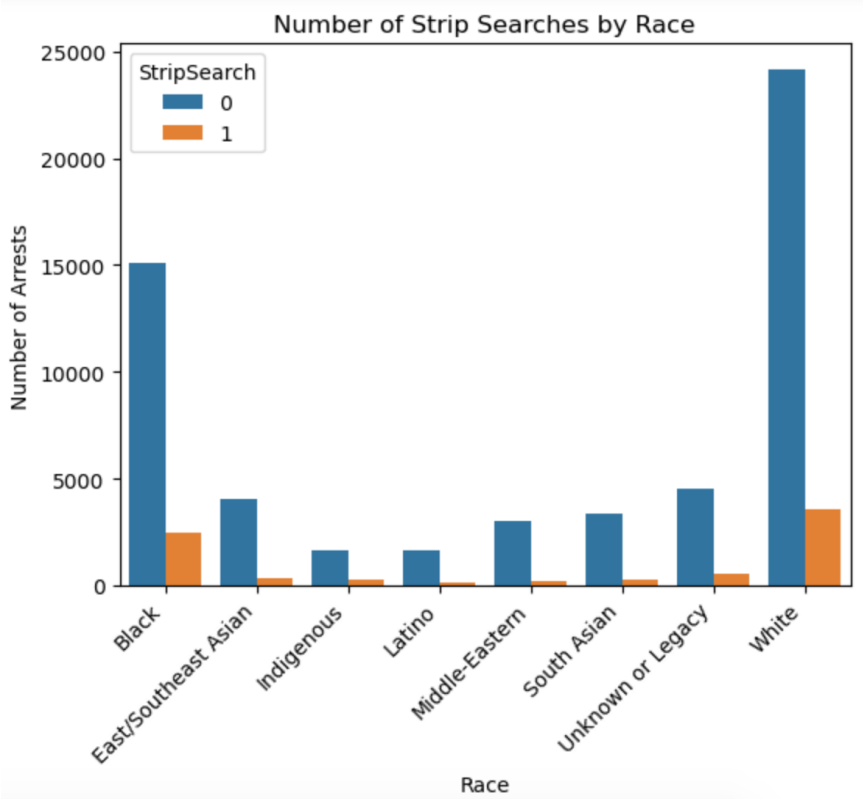


Figure 6: Bar graph comparing number of strip searches between Black and White groups

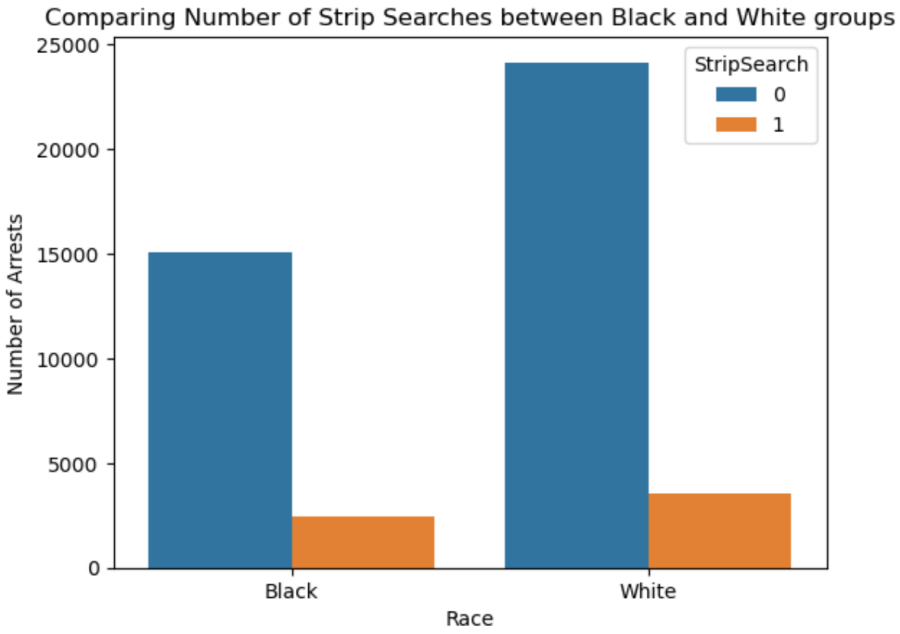


Figure 5 shows the number of strip searches that do not occur for every racial group and Figure 6 shows a close up of the relationship between race and strip searches with a focus on Black and White groups. The 0 denotes that a strip search did not take place, whereas 1 denotes that a strip search has occurred upon arrest. Out of the total 6000 number of strip searches that occurred, 3566 were of White individuals and 2434 were of Black individuals. There is approximately a 1100 difference between the two groups, even though Black individuals only make up 8.9% of the Toronto population.

Figure 7: Histogram showing the number of arrests and searches by gender for both 2020 and 2021

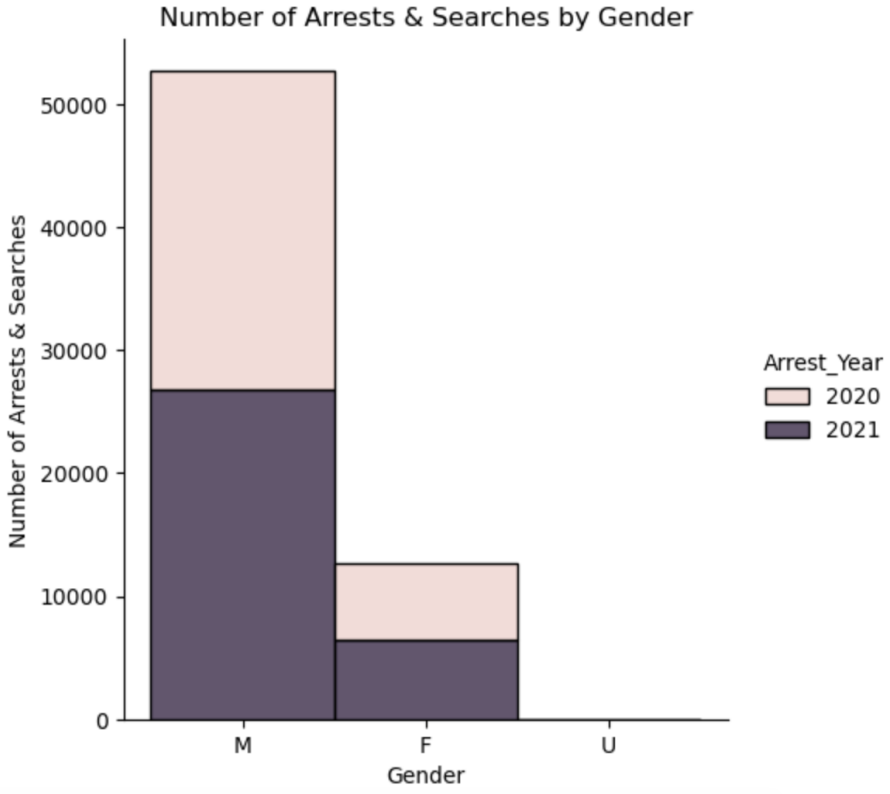


Figure 7 shows the Number of Arrests & Strip Searches by Gender. The chart shows a significant difference between Men and Women. In fact, 81% of Arrests and Strip Searches were male and 19% were women.

Figure 8: Line graph comparing the number of arrests between males and females in both 2020 and 2021

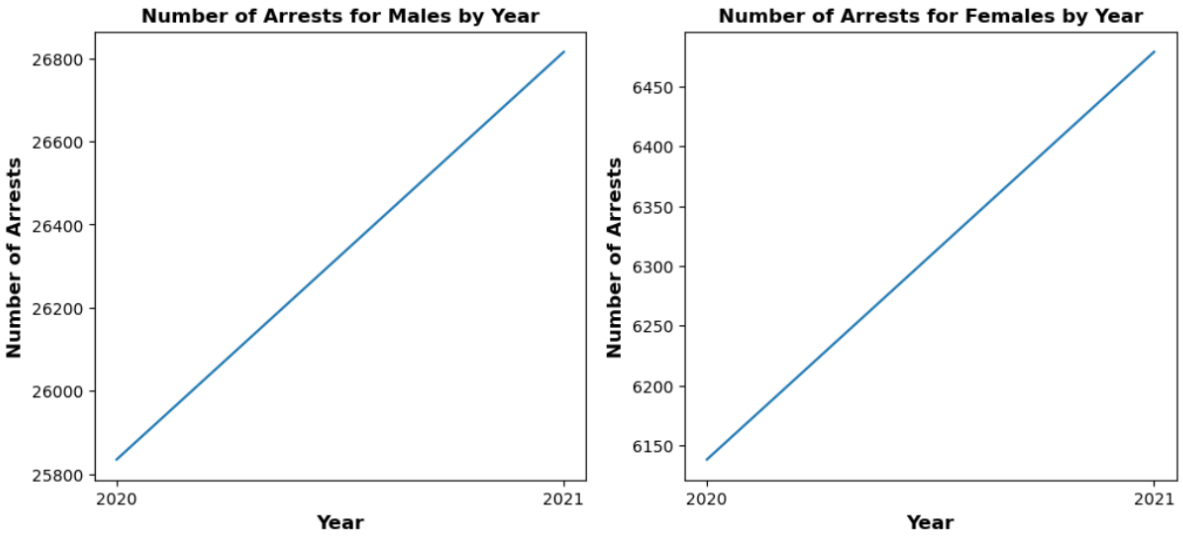


Figure 8 indicates an increase in Arrests & Strip Searches for both Males and Females from 2020 to 2021. The data was collected during the pandemic when society was undergoing factors such as disruptions, social & economic impact, health concerns, increase in death rates and increases in unemployment and inflation. These factors may have contributed to the increase in incidences.

T-tests

To test research question 1, this study compared the mean of strip searches between the two racial groups, Black and White, through an independent two-sample t-test. The independent variable was "perceived race" and the dependent variable was "total number of arrests". The null and alternative hypotheses, along with the results, are outlined as follows:

Null hypothesis (H_0): $\mu_1 = \mu_2$

There are no differences in the average number of strip searches conducted by the Toronto Police between Black and White individuals.

Alternative hypothesis (H_1): $\mu_1 \neq \mu_2$

There is a difference in the average number of strip searches conducted by the Toronto Police between Black and White individuals.

Results:

```
t-value: 3.132027931633524
p-value: 0.001737139892022894
```

The p-value is 0.001, which is less than 0.05. From the p-value, we can conclude that the average number of strip searches between the arrested individuals who are Black is different from the average number of strip searches who are White. There is sufficient evidence to state that there is a difference between the two groups, and so, we reject the null hypothesis.

To test research question 2 and to further assess the results highlighted in Figure 4, this study compared the number of arrests between Black and White individuals that are 17 and under. The age group 17 and under was held constant, with the independent variable as "perceived race" and the dependent variable as "total number of arrests". The null and alternative hypotheses, along with the results, are outlined as follows:

Null hypothesis (H_0): $\mu_1 = \mu_2$

There are no differences in the average number of arrests between Black and White individuals that are 17 and under.

Alternative hypothesis (H_1): $\mu_1 \neq \mu_2$

There is a difference in the average number of arrests between Black and White individuals that are 17 and under.

Results:

```
t-value: 12.278418039818384
p-value: 1.3430147976016232e-34
```

The t-value is 12.27, which is quite large. This is an indication that there is a significant difference in the number of strip searches that occurred between Black youth aged 17 and under, and White youth aged 17 and under. Additionally, the p-value is extremely small: 1.34e-34. This is extremely significant as it is much less than the threshold for statistical significance. As a result we reject the null hypothesis.

Based on the observed gender differences shown in our EDA Analysis, a T-test was completed to measure statistically significant differences between gender and the various "Arrest" categories. The null and alternative hypothesis are outlined as follows:

Null hypothesis (H_0): $\mu_1 = \mu_2$

A significant difference between Men and Women who resist arrest does not exist.

Alternative hypothesis (H_1): $\mu_1 \neq \mu_2$

A significant difference between Men and Women who resist arrest exists

Result:

```
Ttest_indResult(statistic=2.6159752331837014, pvalue=0.008899349168217038)
```

The P-value result is less than 0.05 therefore, we can reject the null hypothesis and conclude that we have sufficient evidence to say that the alternative hypothesis is true. The result confirms that the difference in men and women who resist arrest is statistically significant.

Null hypothesis (H_0): $\mu_1 = \mu_2$

A significant difference between men and women arrested due to "Assault" does not exist.

Alternative hypothesis (H_1): $\mu_1 \neq \mu_2$

A significant difference between men and women arrested due to “Assault”exists.

Result:

```
Ttest_indResult(statistic=-3.089680728166269, pvalue=0.0020045596502630183)
```

P-value result is less than 0.05 therefore, we can reject the null hypothesis and conclude that we have sufficient evidence to say that the alternative hypothesis is true. The result confirms that the difference in men and women who are arrested due to Assault is statistically significant.

Null hypothesis (H_0): $\mu_1 = \mu_2$

A significant difference between men and women arrested due to “Mental Instability” does not exist.

Alternative hypothesis (H_1): $\mu_1 \neq \mu_2$

A significant difference between men and women arrested due to “Mental Instability” exists.

Result:

```
Ttest_indResult(statistic=-4.646279126584512, pvalue=3.3863443348731328e-06)
```

The P-value result is greater than 0.05 therefore, we fail to reject the null hypothesis and conclude that we do not have sufficient evidence to say that the alternative hypothesis is true. A p-value result greater than 0.05 indicates statistically the result is insignificant.

Discussion

ANOVA Test

In order to explore the "Mental Instability" variable further, a two-way ANOVA was conducted to confirm if significant differences exist by gender and race. The null and alternative hypotheses are outlined as follows:

Null hypothesis (H_0): $\mu_1 = \mu_2$

The mean values of "Mental Instability" [Actions_at_arrest___Mental_inst] for Race & Gender are equal.

Alternative hypothesis (H_1): $\mu_1 \neq \mu_2$

The mean value of "Mental Instability" [Actions_at_arrest___Mental_inst] for Race & Gender is significantly different.

In examining the relationship between Arrests specific to "Mental Instability" and the relation to race and gender bias it is evident from the test that a significant statistical difference exists. This is consistent with the Wortley Report Literature which indicates that a contrast exists with law enforcement policing based on race (Merritt, 2022). Further research and the addition of other independent variables such as location would provide further insight into communities most impacted by this issue.

The results of both the exploratory data analysis and statistical testing show that Black people are significantly over-represented in arrests and strip searches ($p < 0.05$), while accounting for only 8.9% of the Toronto population. There is a large amount of White people who were also arrested and strip searched, however, it is imperative that these results are interpreted in relation to population and demography statistics. Racial bias and unfairness is prevalent within the Toronto Police Service. The disproportionate representation of Black people, particularly, black youth, can be heavily associated with hyper-policing and a policing practice referred to as carding (Maynard, 2017). The practice of carding originated in Toronto during the 1950s, which allowed police officers to stop people on the street and request identification and personal information for no reason. Although discounted, this practice is

deep-rooted within the Toronto Police Service system (Maynard). The over-surveillance of racialized individuals is not given as much attention as police brutality, but is equally as harmful. The results of this study also show that there is a statistical significance difference between Black youth aged 17 and under, and White youth aged 17 and under ($p < 0.001$). There is a large number of Black youth that interact with law enforcement institutions. However, this cannot be understood by discussing the impact of poverty, discrimination, the school to prison pipeline, and various other factors. Racial profiling increases the chances that a Black person interacts with law enforcement and adds to crime statistics that assume Black people are more "deviant" than other racial groups. Crime statistics cannot be analyzed in a vacuum, but rather placed within the context of race, gender, socioeconomic status, and history. Transparent race-based data is transformative and can help in challenging racist narratives.

In addition, the results show that females account for a substantially lower Strip Search and Arrests compared to men. The focus was to confirm if there was a significant statistical difference between gender based on the different arrest categories. The results confirm that a significant difference does exist. Moreover, when adding the arrest variable "Mental Instability", the relationship between the number of arrests for individuals with mental instability across different racial and gender groups is significant. Mental Instability may cause violent behaviour which may lead law enforcement to exert use of force. This leads to questions about whether police are appropriately trained to deal with these situations and how use of force can further impact the mental state of the individual. Further analysis is needed to promote best practices and implement proper protocol.

Some of the limitations of this study included the large portion of arrested individuals that were not categorized within a particular racial group. The Toronto Police Service did not provide an explanation for this in the dataset summary. This is significant because unknown racial groups account for the third largest number of arrests. It is possible that such a large number of non-responses for race can contribute to bias within the data. For this reason, this study did not remove this from the dataset and decided to explore the relationship between the unknown racial category and the other racial groups. Additionally, this study is also very limited and only provides a small snapshot of a larger issue. With such a robust dataset, there were a lot more opportunities to dive deeper into the relationship between race and the variables actions at

arrest and type of offences. It is a known fact that racialized groups are arrested at a higher rate for petty crimes, compared to their white counterparts. It would have been interesting to explore this in the context of Toronto.

Conclusion

The "Arrests and Strip Searches" dataset from the Toronto Police Service provides an opportunity to explore how the police interact with the Toronto population. Through descriptive statistics and hypothesis testing, this study showed that racialized groups, particularly Black people, are disproportionately arrested and strip searched. Additionally, this study also assessed the relationship between arrests and strip searches with relation to gender. We concluded that there is statistical significance between men and women when it comes to resistance during arrests.

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