INF2178 Midterm Group Project

Strip-Search Rate and Multiple Arrests: Exploring the Role of Youth Status and Sex

Group 57: Haimeng Song, Weiqian Ding

Table of Contents

1. Introduction

In the U.S., there are more than 25% of arrested people are arrested and booked multiple times every year(Jones & Sawyer, 2019). They may be arrested for the same type of crime or a different one. The repeat offenders had some significant common characteristics. Studies have shown that race and educational attainment are associated with the number of multiple arrests(Jones & Sawyer, 2019). Offenders that have been arrested multiple times in a time period (usually one year) are often in greater need of physical or mental health help(Jones & Sawyer, 2019). When people are arrested, the police may choose to strip-search them. They are required to take off all or most of their clothes so that the police can check if they are carrying any weapons, possessing any drugs, etc. The strip-searched rate of people arrested by the Toronto police was around 26% in 2000 and 22% in 2020(Lemke, 2022). This implies about 1 in 4 arrested people have been strip-searched by the Toronto police. However, prior research suggests that strip searches may cause racial and sexual trauma(Lemke, 2023).

Crime would endanger public safety, and people that are arrested multiple times continue to engage in crimes after they are released. In 2014, the Department of Justice Canada reported about 4.02% of the whole youth population in Canada was arrested for criminal offenses(Department of Justice Canada, 2016). Also, according to the Government of Canada, about 6% of offenders are women(Government of Canada, 2019). Understanding the demographics of those who are arrested is important for identifying patterns and developing appropriate policies. In this report, we want to analyze do the number of arrested times and the probability of strip-searched were influenced by the offender's sex and youth status when arrested by the Toronto police from 2020 to 2021.

2. Literature Review

In 2019, James P. Smith published a research paper, "*The Long-Term Economic Impact of Criminalization in American Childhoods*". In the research, the author calculated the multiple arrested probability before the age of 26 by race, gender, education level and age group. In terms of gender, the author concludes man is more common to be arrested multiple times compared to women in the US(Smith, 2019). Additionally, the author finds that younger individuals who have a criminal record are more likely to have multiple arrests than those who were older at the time of their first offence(Smith, 2019).

Another article, "*RACE, CRIME AND INJUSTICE? Strip Search and the Treatment of Suspects in Custody*", was published in 2004. This article analyzed the use of strip searches in Britain. They calculated the probability of being strip-searched by gender, race, and age groups based on the Kilburn police data. The author stated that about 7% of arrested females were strip-searched, and 12% of arrested males were strip-searched(Newburn et al., 2004). The strip-searched rate for males is higher than for females. In terms of age groups, the authors split the age group into '16 and younger', '17 to 23', '24 to 30, etc. From their analysis, the '17 to 23' age group has the highest rate of being strip-searched, which is 18%. On the other hand, the strip-searched rate for the '16 and younger' group is 7%. Therefore, in Newburn et al.'s analysis, the strip-searched probability is lower for '16 and younger' compared to the '17 to 23' age group.

3. Dataset Description

In this project, we used the 'Arrests and Strip Searches (RBDC-ARR-TBL-001)' dataset from the Toronto Police Service website (https://data.torontopolice.on.ca/datasets/TorontoPS::arrests-and-strip-searches-rbdc-arr-tbl-001/explore?showTable=true). This data set is collected and published by the Toronto Police Service. The purpose for the Toronto police to share this data is they want to make the police data accessible to anyone publicly(TPS Open Data, 2018).

This data set contains 65276 rows and 24 columns about arrests and strip search information from January 2020 to December 2021. Each row contains event ID, arrest ID, person ID, demographic information(e.g. age, sex, race), time at arrest, strip-searched or not, actions when arrested, search reason, and items found. The types of attributes in this data set are integers(IDs), binaries, and categorical. The full list of all attributes in this data set is listed in the appendix with the type of the data (Appendix A).

4. Research Objective and Questions

In the preliminary exploration of this data set, we found that each person is assigned a unique person ID, and he or she could have been arrested multiple times. We want to evaluate how demographic attributes interacted with the arrested times and the striped search/arrested times ratio. For this report, we proposed the following two research questions:

- RQ1: How varied are the arrested person's demographic attributes ('Youth or not at arrested' and 'sex')? Do the number of arrested times of each person differ by different combinations of these attributes?

- RQ2: Will the probability of being strip searched (the ratio of striped search and arrested times) be influenced by people's sex ('Sex') and youth status ('Youth or not Youth at arrested')?

We are going to conduct T-test and Two-way ANOVA for these two research questions in the following sections.

5. EDA

5.1 Descriptive Statistics

This data contains 65276 observations. We assumed 'Person ID' refers to the person that is arrested or strip searched by the Toronto police. We removed the rows without the 'ArrestedID', assuming these people were not arrested. After we cleaned the data set, there were 37326 unique person IDs in the data set. Then, we grouped the dataset by the 'Person ID' and counted the times this person appeared in this data set to find the number of arrested times for each person. We also find the number of striped searched times for each person and the probability of being strip-searched.

	N	Mean(SD)	%	Min	Max
Table 1. Descriptive Statistics of Selected Variables					
Number of Arrested Times	37326	1.736(2.012)		1	54
Male's Number of Arrested Times	29656	1.763(2.040)		1	54
Female's Number of Arrested Times	7670	1.633(1.900)		1	32
Youth's Number of Arrested Times	2080	1.539(1.321)		1	21
Not a Youth's Number of Arrested Times	35246	1.748(2.045)		1	54
Probability of Strip Searched	37326	0.081(0.240)		0	1
Male's Probability of Strip Searched	29656	0.085(0.244)		0	1
Female's Probability of Strip Searched	7670	0.066(0.219)		0	1
Youth's Probability of Strip Searched	2080	0.064(0.215)		0	1
Not a Youth's Probability of Strip Searched	35246	0.082(0.241)		0	1
Sex					
Male	29656		79.451%		
Female	7670		20.549%		
Youth(or Not at Arrested)					
Youth	2080		5.573%		
Not a Youth	35246		94.427%		

From Table 1, we see a large difference between the sample size of males and females and between the sample size of youth and not youth. The mean of males' number of arrested times is different from females' by 0.13. There is a difference(0.209) between the mean of youths' number of arrested times and not a youth's number of arrested times. The mean of males' probability of strip-searched is 0.019 higher than females. Also, the probability of youth being strip-searched is 0.018 lower than not youth people.

The independent variables are 'sex' and 'youth'. 'Sex' is a categorical variable that indicates the sex of the arrested person. The original data set contains nine rows of 'U' for sex, The sample size of 'U' is small, so we did not analyze this category. Therefore, the two categories for 'sex' are male(M) and female(F). 'Youth' is also a categorical variable. It indicates if the person is arrested under 18 or not. If the person was 17 years old or younger when arrested, he/she is classified as 'youth'. If the youth status of the person when arrested is equal to or over 18 years old, he/she is classified as 'Not a youth'.

We created histograms and violin plots for the 'number of arrested times' and 'probability of strip searched' by different sex and youth status when arrested to visualize the distribution of our data.
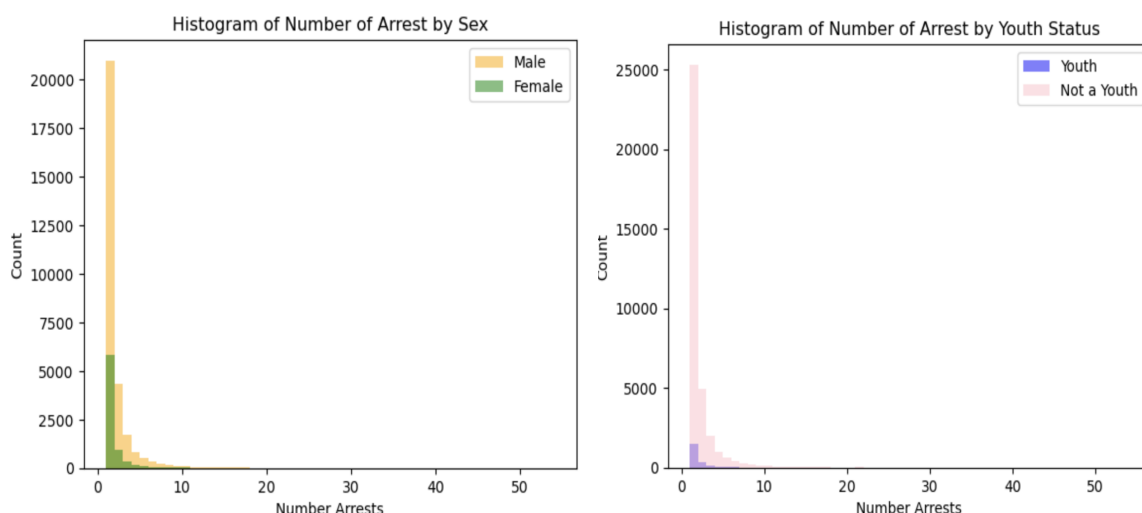
The Number of Arrested Times
We first created the histogram and the QQ plot to check the overall distribution of the number of arrested times. In figure 1, the histogram is right-skewed, and the mode is 1. The QQ plot suggests the distribution of the number of arrested times is not normal. We conducted formal statistics normality tests in the t-test section.

Figure 1. Histogram and QQ Plot of the Number of Arrested Times
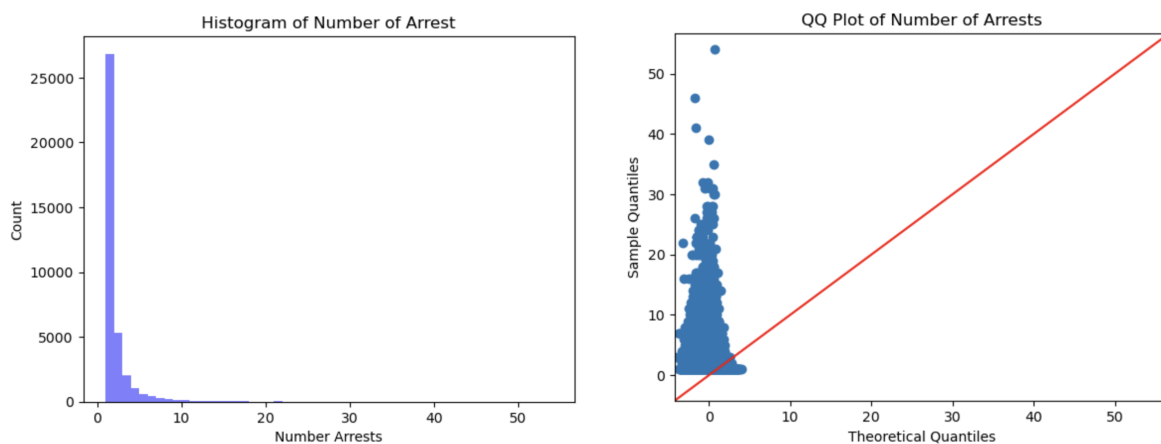
Then, we plotted the histogram of the number of arrested times by 'sex' and 'youth'.
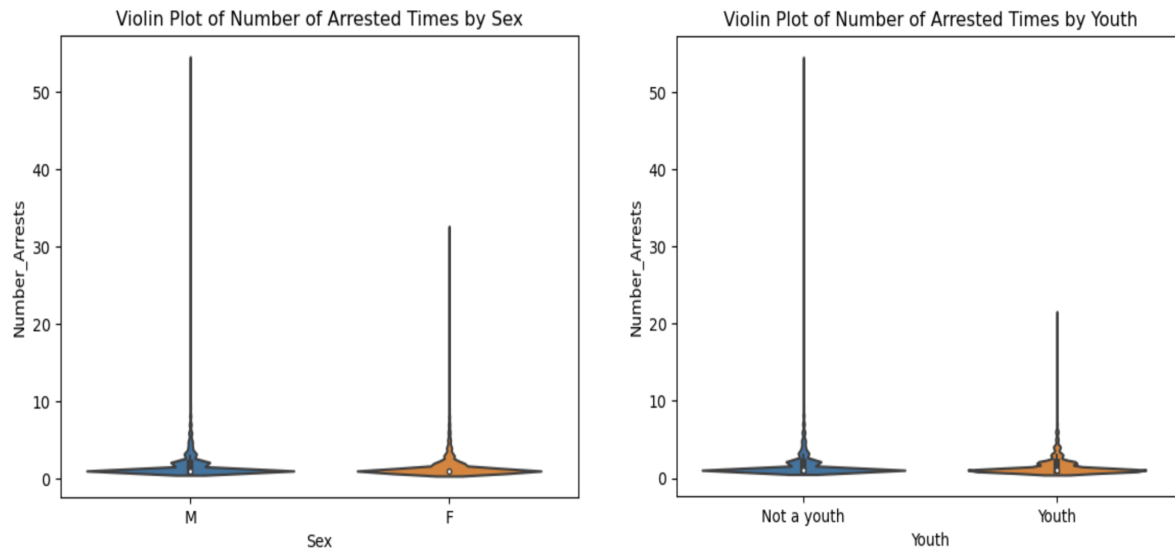
Figure 2. Histograms of the Number of Arrested Times by Sex and Youth

The histogram of the number of arrested times by sex in Figure 2 suggests the distributions of arrested times are right-skewed for both males(orange) and females(green), with the mode

around 1. Similarly, the histogram of the number of arrested times by youth shows a right-skewed distribution for both youth's(blue) and not youth's(pink) number of arrested times when arrested.

Figure 3. Violin Plots of the Number of Arrested Times

The violin plots of the number of arrested times reveal the same distributions as the histograms. The number of arrested times is around 1.5 to 1.7 for all four categories, and they are right-skewed. Based on Table 1 and these violin plots, we found that the maximum value for males (54 times) is larger than for females (32 times). Also, the maximum number of arrested times for not a youth(54 times) when arrested is larger than for youth(21 times).

Table 2. The number of Arrested Times of all Combinations of Sex and Youth

Youth(Youth or Not at Arrest)	Sex	Mean	Standard Deviation
Not a Youth	Female	1.647710	1.926827
Not a Youth	Male	1.772975	2.073717
Youth	Female	1.433145	1.442205
Youth	Male	1.575855	1.275474

To better understand the distribution of the number of arrested times in four combination groups(female youth, female not youth, male youth, male not youth), we calculated the mean and standard deviation of them, then plotted the violin plot for each group. We can see from Table 2 that the mean of the 'male not a youth' group is the highest, which is 1.773, followed by the 'female not a youth' group with a mean of 1.648. The mean for the 'female youth' group is 1.433, and this is the smallest mean value among the four groups.
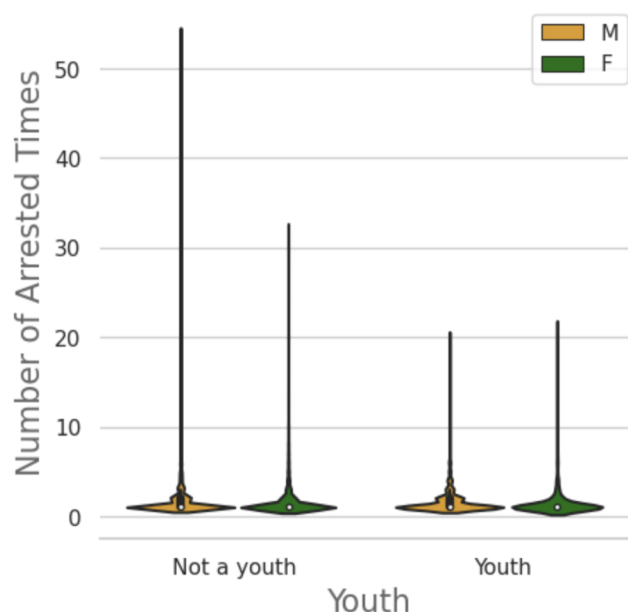
Figure 4 is the violin plot of the number of arrested times for four combination groups: male and not a youth, female and not a youth, male and youth, female and youth. We can see that the most frequent number of arrested times is around 1.5-1.7 for all four groups. The male and not youth group has the highest number of arrested times, which is 54. The distribution of youth male and youth female are similar.
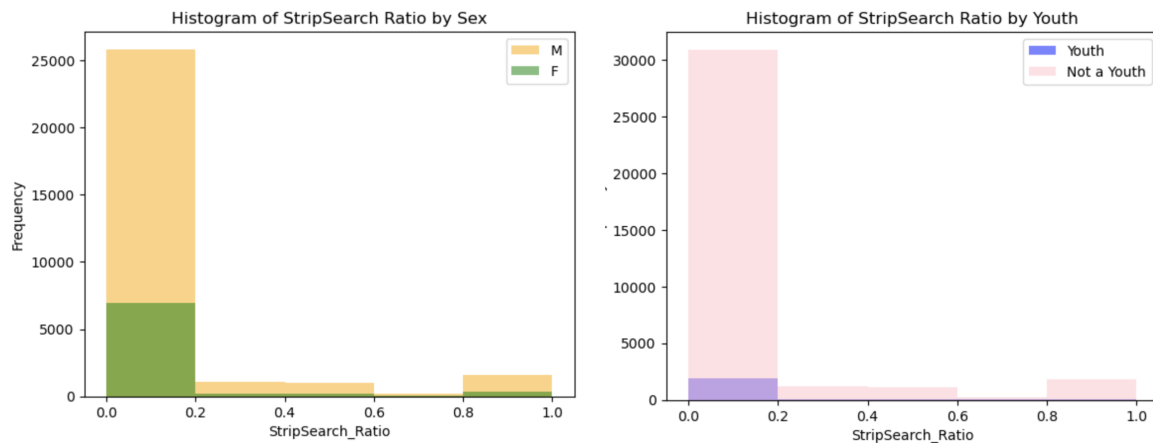
The probability of being strip searched:

**Figure 5.** Histogram and QQ Plot of the Probability of Strip Searched
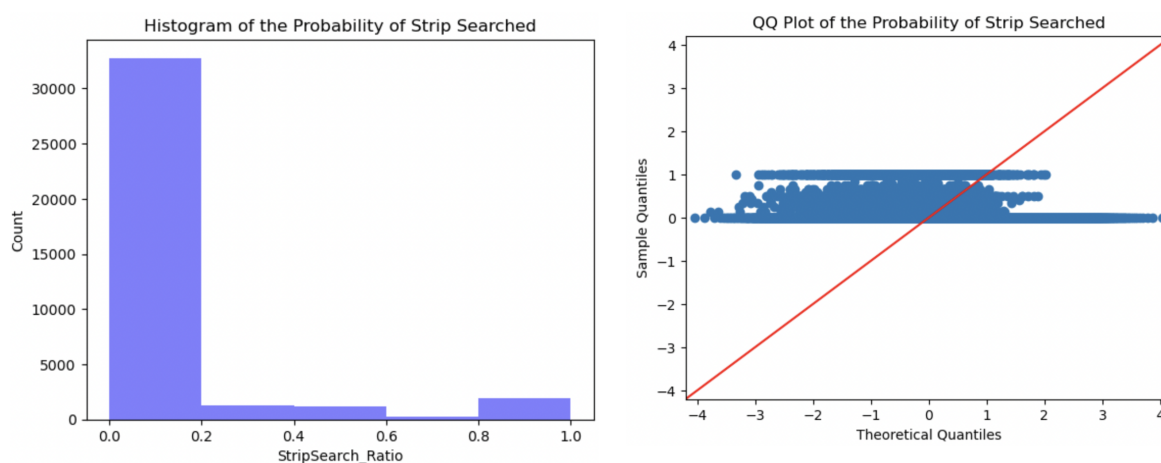
To explore the distribution for the dependent variable probability of being strip searched, we conducted the histogram and QQ plot. According to Figure 5, it indicates that the distribution for the probability of being strip searched is not a normal distribution. And based on the histogram shown, the distribution of the dependent variable is right-skew, the probability of being strip searched for most of the persons arrested is 0.0-0.2.

Figure 6. Histograms of the Probability of Strip Searched by Sex, Youth

In addition, histograms of the probability of being strip-searched by sex and youth status were plotted as well. As Figure 6 shows, there is a right-skewness in the distribution for both males (orange) and females (green), indicating that there are some extreme values in the higher end of the distribution. And it is evident that the male proportion is relatively high compared to women. Based on the histogram of the probability of being strip searched for youth, it shows that there is a right-skewed distribution for both youth (purple) and not a youth (pink). Also, the histogram suggests that the majority of youth and not a youth who were subjected to strip searches at the time of arrest have a probability range between 0 and 0.2.

**Figure 7.** Violin Plots of the Probability of Strip Searched
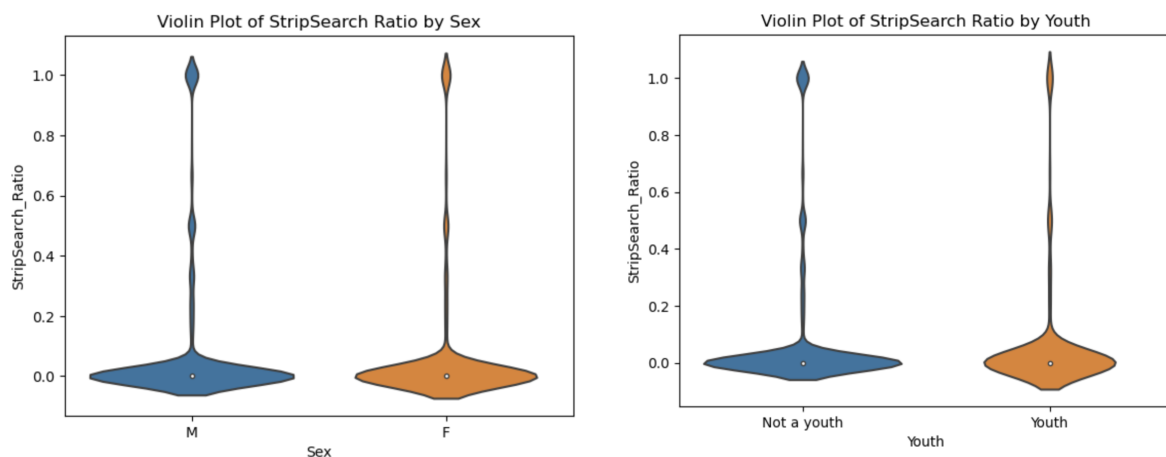
To get a better understanding of the data distribution for the variables, the violin plots of the probability of being strip searched were plotted. From the violin plot of the probability of being strip-searched by sex, the density of the distribution is higher for males than females, indicating that a higher proportion of males have a higher probability of being strip-searched compared to females. From the violin plot of the probability of being strip-searched by youth, the IQR is wider for the youth group, indicating that there is more variability in the probability of being strip-searched for this group.

Table 3. Probability of Strip-Searched of all Combinations of Sex and Youth

Youth(Youth or Not at Arrest)	Sex	Mean	Standard Deviation
Not a Youth	Female	0.069070	0.224466
Not a Youth	Male	0.085735	0.244931
Youth	Female	0.022896	0.128663
Youth	Male	0.078086	0.235334

Table 3 shows that males who are not a youth have a higher mean probability of being strip searched (0.086) in these combinations. According to Figure 8, male youth have a higher density on probability of being strip searched compared to female youth. And it is also shown in Table 3 that the mean probability of being strip searched for youth males (0.078) is higher than youth females (0.023). To further check their relationship and assess its significance, t-tests will be conducted.

Figure 8. Violin Plot of Probability of Strip-Searched of all Combinations of Sex and Yout
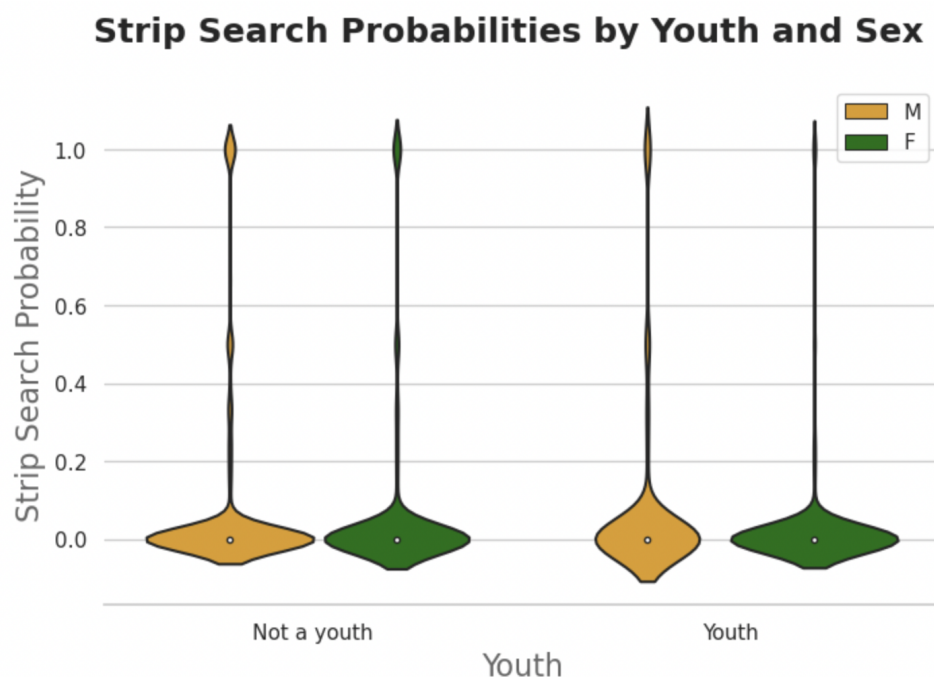
5.2 T-Tests

To determine whether the mean of the dependent variables varies across each attribute, we applied the Welch's t-test to some designated categorical variables in the dataset.

Assumptions Check

We used the Shapiro-Wilk test to check the normality. The result is shown below in Table 4. The null hypothesis(H0) for the Shapiro-Wilk test is the sample is normally distributed. The alternative hypothesis(H1) is the sample is not normally distributed.

	Statistics	**P-Value**
	Table 4. Shapiro-Wilk Test Results	
Number of Arrested Times		
Male	0.407	0.0
Female	0.367	0.0
Youth	0.449	0.0
Not a Youth	0.399	0.0
Probability of Strip Searched		
Male	0.390	0.0
Female	0.329	0.0
Youth	0.327	0.0
Not a Youth	0.381	0.0

Based on the results shown in Table 4, we found that the p-value for each variable is 0. So, we reject the null hypothesis. This means the number of arrested times and the probability of being strip searched for each sex ('Sex') category and youth status ('Youth or not Youth at arrested') category differs significantly from the normal distribution. While the assumption of normality may not hold, all other assumptions were met. The study includes a nominal two-level explanatory variable and a quantitative outcome variable. Additionally, we confirmed the independence of the two samples by treating each arrest as a separate observation.

Sex and the number of arrested times

From table 1, histograms, and violin plots, we noticed that there are differences between males' and females' mean arrested times. We conducted Welch's t-test to analyze whether there is a significant difference between males' and females' number of arrested times, assuming the variance is not equal. The following hypothesis was tested:

H0 (Null Hypothesis): The population mean of the two independent groups, male and female, are equal. ($\mu1 = \mu2$)

H1(Alternative Hypothesis): The population mean of the two independent groups, male and female, are not equal. ($\mu1 \neq \mu2$)

The t-statistic is 5.26, and the p-value is 1.49e-7, 95% CI [0.081, 0.178]. We set the significance level as 0.05. The p-value is smaller than 0.05, which is statistically significant, so we have enough evidence to reject the null hypothesis. There is a significant difference in the number of arrested times between men and women.

Youth and the number of arrested times
We also find that the mean number of arrested times for the 'youth' group and the 'not youth' group are different. Therefore, we conducted a Welch's t-test to analyze does the number of arrested times differ for the youth group(youth at arrested) and the not youth group(not a youth when arrested), assuming unequal variance. The following hypothesis was tested:

H0 (Null Hypothesis): The population mean of the two independent groups, youth and not a youth, are equal. ($\mu1 = \mu2$)

H1(Alternative Hypothesis): The population mean of the two independent groups, youth and not a youth, are unequal. ($\mu1 \neq \mu2$)

The t-statistic is -6.73, and the p-value is 2.11e-11, 95% CI [-0.269, -0.147]. We set the significance level as 0.05. The p-value is smaller than 0.05, which is statistically significant, so we have enough evidence to reject the null hypothesis. There is a significant difference in the number of arrested times between the youth group and the not youth group.

Sex and the probability of being strip searched
We computed the mean probability of being strip searched separately for male and female, and the result showed that men had a slightly higher mean probability of being searched compared to women. To further investigate the relationship between the variables, we performed a Welch's t-test to analyze whether the mean probability of being strip searched differs according to the arrested person's sex. The following hypothesis was tested:

H0 (Null Hypothesis): The population mean of the two independent groups, male and female, are equal. ($\mu1 = \mu2$)

H1(Alternative Hypothesis): The population mean of the two independent groups, male and female, are not equal. ($\mu1 \neq \mu2$)

As mentioned earlier, our t-test results indicated that the mean probability of being strip-searched for males (M=0.085, SD=0.24) was higher than that of females (M=0.066, SD=0.22). Based on the results, the p-value is 1.47e-11, which is less than the significance level set at 0.05. This suggests that there is a statistically significant difference in the mean probability of being strip searched between males and females, 95% CI [0.014, 0.025], which means we rejected the null hypothesis that the population mean between gender is equal.

Youth status and the probability of being strip searched

As with the previous test, we conducted a Welch's t-test to determine whether the mean probability of being strip searched differs according to the arrested person's youth status ('Youth or not Youth at arrested'). We established the following two hypotheses:

H0 (Null Hypothesis): The population mean of the two independent groups, youth and not a youth, are equal. ($\mu 1 = \mu 2$)

H1(Alternative Hypothesis): The population mean of the two independent groups, youth and not a youth, are not equal. ($\mu 1 \neq \mu 2$)

The result indicates that the mean probability of being strip searched when an adult is arrested is moderately higher than when a youth is arrested. Furthermore, based on the set significance level of 0.05, we can reject the null hypothesis because the p-value is 0.00017, 95% CI [0.0088, 0.0279]. Therefore, there is a statistically significant difference in the mean probability of being strip searched between youth and not a youth.

7. Methods

Research Question One

The result of the Welch's t-test suggests there is a significant difference between the number of arrested times for males and females group, and there is a significant difference between the number of arrested times for the 'youth' group and 'not a youth' group. We decided to conduct a two-way ANOVA test to explore further the effect of 'sex' and 'youth or not when arrested' on the dependent variable 'the number of arrested times'.

The dependent variable 'number of arrested times' is continuous data. The histogram and the QQ plot in the descriptive statistics section show the distribution of this dependent variable. After we conducted the Shapiro-Wilk test, we found the dependent variable is not normally distributed. The independent variables are 'Sex' and 'Youth. They are categorical variables with two categories each. To check the homogeneity of variances for each combination groups, we performed a Levene's test, and the result statistics is 2.85 with a p-value of 0.0362. Therefore, we have enough evidence to reject the null hypothesis that the variance is equal. We will address these issues in the discussion.

The following three sets of hypotheses for the two-way ANOVA test of research question one:

Set 1:

H0 (Null Hypothesis): The means of the two sex groups (male and female) are equal.

H1(Alternative Hypothesis): The mean of the two sex groups (male and female) are not equal.

Set 2:

H0 (Null Hypothesis): The means of the two youth status groups (youth or not when arrested) are equal.

H1(Alternative Hypothesis): The means of the two youth status groups (youth or not when arrested) are not equal.

Set 3:

H0 (Null Hypothesis): There is no interaction between 'sex' and 'youth or not when arrested'.

H1(Alternative Hypothesis): There exists an interaction between 'sex' and 'youth or not when arrested'.

After performing the two-way ANOVA, in order to determine exactly which group means are significantly different, we conducted Tukey's HSD test. The hypothesis of Tukey's test are:

H0 (Null Hypothesis): The mean of number of arrested times among all groups are equal ($\mu1 = \mu2 = \mu3 = \mu4$).

H1(Alternative Hypothesis): There are at least two means of groups which are significantly different from each other.

Research Question Two

Based on the Welch's t-test results calculated above, we discovered that there is a significant difference in mean probability of being strip searched depending on the gender and youth status of the arrested person. Therefore, we employed a two-way ANOVA to investigate whether the probability of being strip searched was associated with both the youth status and gender of the arrested person.

Before conducting the two-way ANOVA, we check the assumptions for two-way ANOVA. After considering the results from the previously mentioned histograms and Shapiro-Wilk test for the dependent variable, it can be concluded that the distribution for the dependent variable is not normally distributed. And the independent variables "Sex" and "Youth" are independent of each other, since we each arrest as an independent observation. Also, we employed the Levene's test to check the homogeneity of variances for each combination groups, and found that the result statistics is 0.83 and the p-value is 0.48. It indicates that we failed to reject the null hypothesis and the variances are not equal.

The following are three sets of hypotheses for the research question two used in the two-way ANOVA:

Set 1:

H0 (Null Hypothesis): The means of two sex groups (male and female) are equal.

H1(Alternative Hypothesis): The mean of the two sex groups (male and female) are not equal.

Set 2:

H0 (Null Hypothesis): The means of two youth status groups (youth or not a youth at arrest) are equal.

H1(Alternative Hypothesis): The means of two youth status groups (youth or not a youth at arrest) are not equal.

Set 3:

H0 (Null Hypothesis): There is no interaction between 'sex' and 'youth or not a youth at arrest'.

H1(Alternative Hypothesis): There is an interaction effect between 'sex' and 'youth or not a youth at arrest'.

After performing the two-way ANOVA, in order to determine exactly which group means are significantly different, we conducted Tukey's HSD test. The hypothesis of Tukey's test are:

H0 (Null Hypothesis): There are no significant differences between the means of groups.

H1(Alternative Hypothesis): There are at least two means of groups which are significantly different from each other.

8. Results and Findings

Result for Research Question 1

The result of the first two-way ANOVA is shown below in table 4. The F-value for youth(youth or not when arrested) is 19.697, and its associated p-value is 9.0988e-06. The p-value is smaller than the predetermined significance level($\alpha = 0.05$). Therefore, we reject the null hypothesis and conclude the means of the two youth status groups are not equal. The F-value for sex(male and female) is 24.044, and its associated p-value is 9.4530e-07. The p-value for sex is also smaller than 0.05, so we reject the null hypothesis. The means of the two sex groups are not equal. Lastly, the p-value of the interaction of 'sex' and 'youth' is 0.86754, which is larger than 0.05. We failed to reject the null hypothesis and conclude there is no interaction between 'sex' and 'youth or not when arrested'.

Table 5. Two-Way ANOVA Result of RQ1

	Sum of Squares	df	F-value	PR(>F)
Youth(Youth or not when arrested)	79.685460	1.0	19.697	9.0988e-06
Sex	97.271912	1.0	24.044	9.4530e-07
Sex: Youth	0.112533	1.0	0.0278	0.86754
Residual	150986.055279	37322.0	N/A	N/A

Figure 5 is the interaction plot of 'youth(youth or not when arrested)' and 'sex'. We can see that the two lines in the interaction plot are nearly parallel. Combined with the result from Table 4 above, we conclude that there is no interaction between these two factors.

Figure 9. Interaction Plot for RQ1
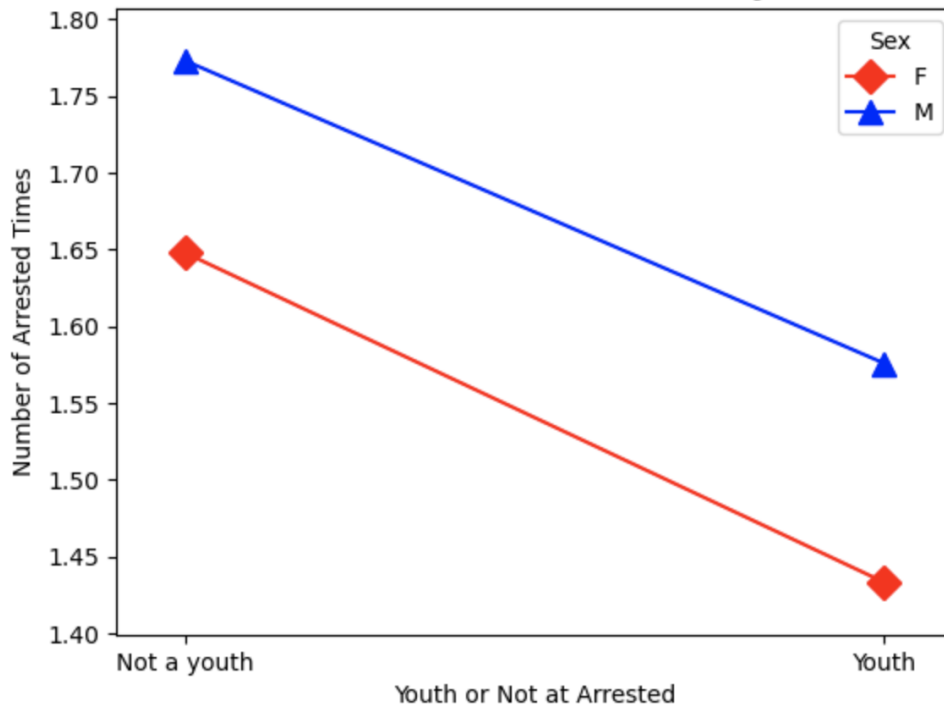
Then, we conduct a post hoc test to see which group's mean significantly differs from the others. We set the significance level as 0.05 and got the following result. The p-value for the 'female and not a youth' group compared to the 'male not a youth' group is 0.0, which is significant. The p-value for the 'female and youth' group compare to 'male and not a youth' is 0.0007, which is also significant. In addition, the p-value for the 'male and not a youth' group compared to the 'male and youth' group is 0.001, which is significant. The other comparison's p-values are not statistically significant. From this, we can conclude that the 'male and not a youth' group's mean significantly differs from the other three groups.

|		Table 6. Multiple Comparison of Means-Tukey HSD for RQ1				
Group 1	**Group 2**	**Mean Diff**	**P-adj**	**Lower**	**Upper**	**Reject**
F-Not a Youth	F-Youth	-0.2146	0.0826	-0.447	0.0179	False
F-Not a Youth	M-Not a Youth	0.1253	0.0	0.0568	0.1938	True
F-Not a Youth	M-Youth	-0.0719	0.5792	-0.2167	0.073	False
F-Youth	M-Not a Youth	0.3398	0.0007	0.1135	0.5662	True
F-Youth	M-Youth	0.1427	0.4924	-0.1171	0.4026	False
M-Not a Youth	M-Youth	-0.1971	0.001	-0.332	-0.0623	True

Result for Research Question 2

We performed a two-way ANOVA for this research question. As table 7 indicated, the p-value of the interaction effect between sex and youth was determined to be p=1.98e-03, which is smaller than the significance level of 0.05 commonly set in statistical analysis. This indicates that there is a statistically significant interaction effect between sex and youth (F=9.57), which means the probability of being strip searched is influenced by the combined effect of both variables, rather than just one variable alone. In addition, simple main effects indicated that both sex (p=4.27e-10) and youth (p=1.33e-03) have statistically significant effects on the probability of being strip searched. Therefore, We reject all null hypotheses that suggest the means of the two youth status groups are not equal, the means of the two sex groups are not equal, and there is an interaction effect between youth status and sex.

		Table 7. Two-Way ANOVA Result of RQ2		
	Sum of Squares	**df**	**F-value**	**PR(>F)**
Youth	2.236930	1.0	39.008	4.2671e-10
Sex	0.590849	1.0	10.303	1.3291e-03
Sex:Youth	0.548753	1.0	9.570	1.9802e-03
Residual	2140.260073	37322.0	N/A	N/A

The interaction plot was performed to explore the interaction effect between sex and youth status on the probability of being strip-searched. Figure 10 shows that the lines have some interaction, indicating that there is a significant interaction effect between the two independent variables.

Figure 10. Interaction Plot for RQ1
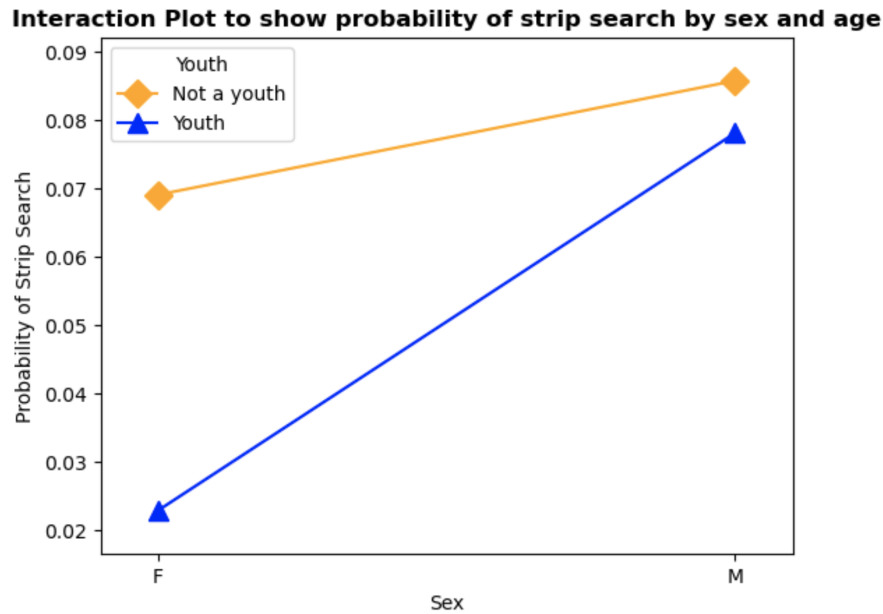
Tukey's Test result is shown in Table 8. Based on the set significance level of 0.05, the result shows that the p-value for comparing the mean between youth females and non-youth females is 0.0001, which suggests that the means of the two groups are significantly different from each other. The p-values of 0.0 for the three groups, which are not youth females and not youth males, youth females and not youth males, and youth females and youth males, indicate that their means are also significantly different from each other. In addition, "male and not a youth" and "female and youth" groups' means are significantly higher compared to other groups. Therefore, we rejected the null hypothesis which there are at least two means of groups that are significantly different from each other.

Table 8. Multiple Comparison of Means-Tukey HSD for RQ2

Group 1	Group 2	Mean Diff	P-adj	Lower	Upper	Reject
F-Not a Youth	F-Youth	-0.0462	0.0001	-0.0738	-0.0185	True
F-Not a Youth	M-Not a Youth	0.0167	0.0	0.0085	0.0248	True
F-Not a Youth	M-Youth	0.009	0.5353	-0.0082	0.0263	False
F-Youth	M-Not a Youth	0.0628	0.0	0.0359	0.0898	True
F-Youth	M-Youth	0.0552	0.0	0.0243	0.0861	True
M-Not a Youth	M-Youth	-0.0076	0.6116	-0.0237	0.0084	False

9. Discussion

The findings of this project have to be seen in the light of some limitations. Firstly, the normality assumption for the t-test and ANOVAs does not meet from the histograms and Shapiro-Wilk test previously shown. However, based on the central limit theorem, our sample size is large enough that it is unlikely to significantly impact our final findings. There is another limitation also regarding the assumption check for ANOVAs, which is the homogeneity of variances for research question 2. We found that the variances for each combination group are not equal, which could lead to inaccurate results about the significance of the interaction effect. To address the issue of unequal variances, we might consider combining two factors into one in the analysis and performing a Welch's ANOVA in the future, which does not require the assumption about homogeneity of variances. And we used the Levene test to check the homogeneity of variances, however, due to the population size exceeding 5000, the p-values may not be precise which could potentially impact our final results to some extent.

Our findings indicate that the demographic attributes of arrested individuals, specifically their sex and youth status, have a significant impact on the number of times they have been arrested. Also, our results show that the male and not a youth group have a higher number of arrests compared to other groups. The analysis of our survey data and findings reveals that adult males have a higher likelihood of being arrested than females or youth. This suggests that there may be higher crime rates among males compared to females in society, which can be attributed to various social and cultural factors. At the same time, the higher likelihood of arrest among adult males also raises concerns about potential biases and deficiencies in the criminal justice system and process of arrest, which may have disproportionately negatively affected certain groups in the society. Understanding the specific factors that increase the likelihood of arrest can help develop a fairer and more equitable arrest process, which could ultimately lead to improvements in the criminal justice system.

Another noteworthy finding of this report is that sex and youth status have a significant effect on the probability of being strip searched. And our results indicate that adult male and youth females have significantly higher mean on the probability of being strip searched. Therefore, this highlights potential imperfections and partiality in the arrest search procedure, where certain groups have a greater likelihood of strip searches because of their gender and youth status, which may result in negative psychological impact or even adverse social impact for them. This, in turn, could create a sense of mistrust towards the police's ability to uphold the law for certain individuals. Furthermore, although the data distribution includes a small number of females, the probability of being strip searched is still significant, which indicates a potential gender bias in the strip search and arrest process. This issue warrants further investigation and attention.

10. Conclusion

This report aims to evaluate the relationship between demographic attributes ('Sex' and 'Youth or not at arrested') and the number of arrests, as well as the relationship with the probability of being strip searched. Based on the ANOVA tests and post-hoc tests, the project concludes that both sex and youth status significantly affected the number of arrested times and the probability of being strip searched. Also, we found that the mean number of arrests times for the male and not youth group was significantly higher than other groups. But the interaction effect of sex and youth status on the number of arrested times was found to be not significant. For the interaction effect of research question 2, there is a significant interaction effect between sex and youth status on the probability of being strip searched. And the last finding we found is that the means of groups for youth females and not youth males are statistically higher than other combination groups.

References

Department of Justice Canada, Youth Criminal Justice in Canada: A compendium of statistics (2016).

Government of Canada, C. S. of C. (2019, May 16). Statistics and research on women offenders. Government of Canada, Correctional Service of Canada, Communications. Retrieved February 28, 2023, from https://www.csc-scc.gc.ca/women/002002-0008-en.shtml

Jones, A., & Sawyer, W. (2019, August 26). *Arrest, release, repeat: How police and jails are misused to respond to social problems*. Arrest, release, repeat: How police and jails are misused to respond to social problems | Prison Policy Initiative. Retrieved February 25, 2023, from https://www.prisonpolicy.org/reports/repeatarrests.html

Lemke, M. (2022, July 18). *Policing toronto: Strip searching in a divided city - the bullet*. Socialist Project. Retrieved February 28, 2023, from https://socialistproject.ca/2022/07/policing-toronto-strip-searching-in-a-divided-city/

Lemke, M. (2023, January 3). *Strip searches are ineffective, unnecessary and target racialized Canadians*. The Conversation. Retrieved February 28, 2023, from https://theconversation.com/strip-searches-are-ineffective-unnecessary-and-target-racialized-canadians-185187

Newburn, T., Shiner, M., & Hayman, S. (2004). RACE, CRIME AND INJUSTICE? Strip Search and the Treatment of Suspects in Custody. British Journal of Criminology, 44(5), 677–694. https://doi.org/10.1093/bjc/azh043

Smith, J. P. (2019). The long-term economic impact of criminalization in American childhoods. *Crime and Delinquency 65 Crime & Delinquency*, *65*(3), 422–444. https://doi.org/10.1177/0011128718787514

TPS Open Data. (2018). *Tps - Public Safety Data Portal - Tutorial #2. YouTube*. Retrieved February 26, 2023, from https://www.youtube.com/watch?v=pJCYbieqK10&t=49s.

Zach. (2021, December 21). *The Complete Guide: How To Report Two-way ANOVA results*. Statology. Retrieved February 28, 2023, from https://www.statology.org/how-to-report-two-way-anova-results/

Appendix

Appendix A. Full List of Attributes and the Data Type in the 'Arrests and Strip Searches' Data Set

Attributes	Data Type
Arrested_Year	Integer
Arrested_Month	Object-Categorical
EventID	Integer
ArrestID	Integer
PersonID	Integer
Perceived_Race	Object-Categorical
Sex	Object-Categorical
Age_group_at_Arrest	Object-Categorical
Youth_at_arrest_uner_18_years	Object-Categorical
ArrestLocDiv	Object-Categorical
StripSearch	Binary
Booked	Binary
Occurrence_Category	Object-Categorical
Actions_at_arrest_Concealed_i	Binary
Actions_at_arrest_Combative	Binary
Actions_at_arrest_Resisted_d	Binary
Actions_at_arrest_Mental_inst	Binary
Actions_at_arrest_Assaulted_o	Binary
Actions_at_arrest_Cooperative	Binary
SearchReason_CauseInjury	Binary
SearchReason_AssistEscape	Binary
SearchReason_PossessWeapons	Binary
SearchReason_PossessEvidence	Binary
ItemsFound	Binary

Appendix B. Histograms of Number of Arrested Times in four combination groups
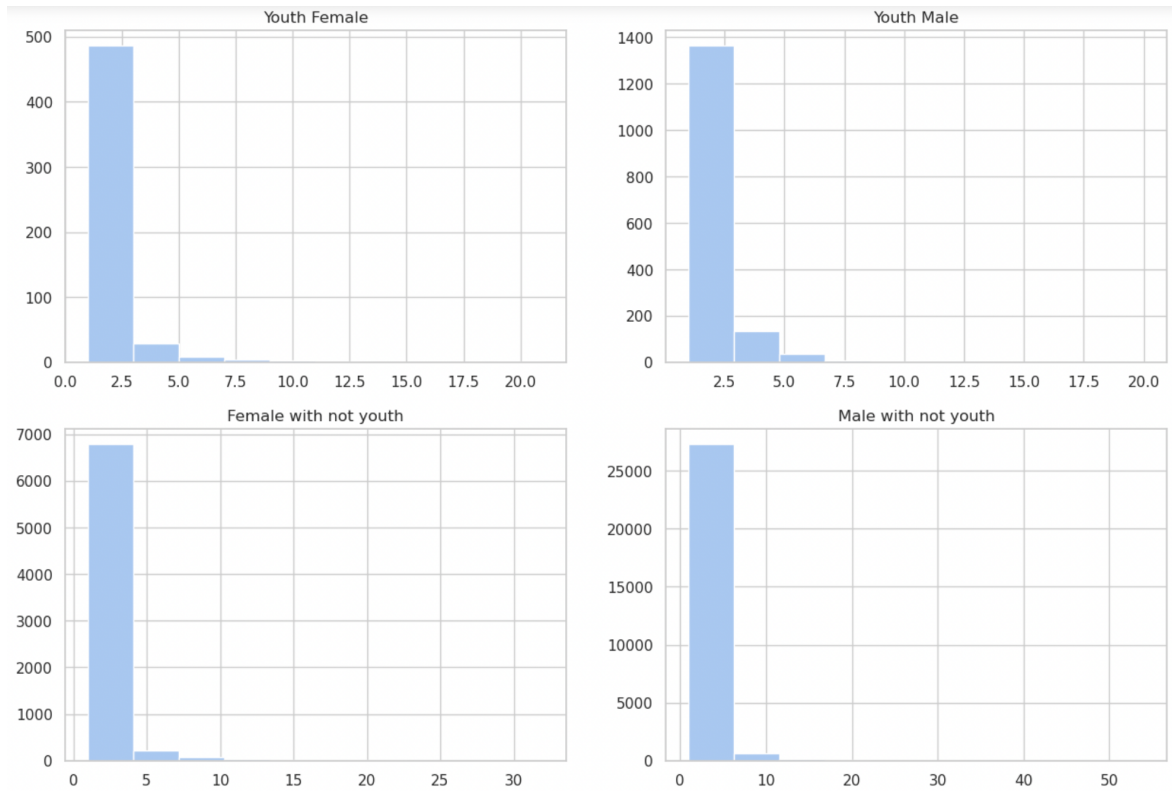
Appendix C. Histograms of the Strip-Searched Rate in four combination groups