Introduction

According to Gillis (2019), almost half of arrestees underwent a "level 3" search, commonly known as a strip search, during their arrest from 2014-2016. A recent report released by the Office of the Independent Police Review Director in 2019 which found that four out of every 10 arrests made by Toronto police officers between 2014 – 2016 involved strip searches (OIPRD, 2019; Mcneilly 2019). Research indicates that strip searches are disproportionately prevalent in Ontario, with an average of 22000 strip searches conducted each year. The number of strip search occurrences conducted by Toronto police was almost 40 times more compared to the combined rate of other Ontario police services (Gillis, 2020; Gillis, 2019; OIPRD, 2019; Perkel, 2019).

Strip Search involves physical contact, nudity and sometimes both between the officer and the recipient. Strip Searches has long been recognized as an “inherently degrading” practiced that should only be performed when necessary. Each individual in Canada has the right to be “secure against unreasonable search or seizure” (OPIRD, 2019). Illegal and unjustified strip search constitutes a violation of individual right, and potentially incurred negative physical and mental consequences, especially to females (Bernath, 2023; Hutchison, 2019).

Over the past decades, different legal cases and supreme court rulings have demonstrated the risk of strip search. Despite the guidelines, regulations and court rulings advising the use of strip search with precaution, strip search has become part of a routine in Toronto police investigation. Following the report and social media exposure on the prevalence of strip searches in Toronto Police investigations, several measures have been introduced to minimize the use of strip search while ensuring the safety of police officers and the ongoing investigation. One of the measures introduced in 2018 was a pilot project utilizing full body scanners instead of strip searches (Moon, 2018).

Given these efforts, it’s imperative to understand what factors contribute to the prevalence of police strip searchers in Toronto, and whether these new implementations have been effective in reducing strip search occurrences in Toronto. The current study aims to further explore the relationship between gender and the likelihood of strip search at time of arrest using the dataset

published by Toronto Police Services. The present study also aims to further explore whether the use of strip search have been reduced from 2020 to 2021, following the report scolding Toronto police for overly performing strip searches.

Literature Review

OIPRD (2019) conducted a systemic review of police strip searches made by law enforcements in Ontario between 2002 and 2018. The report in addition to the analysis of strip search records, also includes an examination of court cases determined by a judge that the use strip search consist of charter violations. The main concerns revolving strip search in most cases summarized in the OIPRD report are the lack of justification of strip search, inappropriate location of strip search (public place), and lack of supervisor authorization. Despite the guidance document formed decades ago, strip searches appear to be ill-defined at time of action. In most of cases where inappropriate location of strip search was identified as a violation of personal rights, the officer did not consider it as a field search. Most offenders were asked to remove their shirt or was subjected to a visual inspection onsite before moving to a private area for a formal strip search.

Another major concern is the negative consequences of strip search when misused. Being strip searched at a public location as identified above can potentially cause psychological harm to the recipient, especially when its unjustified. Many recipients felt strip search are sexual in nature and felt violated, many of the recipients, especially woman is at more risk of such sexual assault (Gillis, 2019, Hutchison, 2019). Other research also identified the risk of strip search when involving power imbalance can be used as gendered punishment (Wahidin, 2016). In 2020, following the scathing report from OPIRD, Toronto police department aims to reduce the use of strip searches under new regulations (Gillis, 2020). However, this effectiveness of these new methods has not been examined. The present study aims to gauge the problem of strip search occurrence in both 2020 and 2021. The present study aims to explore factors that may affect the likelihood of strip search being conducted. The following research questions were formed:

Research Question:

- Does gender have a significant effect on the likelihood of being strip-searched

    - **Hypothesis 0**: Gender does not have a significant effect on the likelihood of being strip-searched.
    - **Hypothesis 1**: Gender has a significant effect on the likelihood of being strip-searched.
- Is there a significant difference in the likelihood of being strip-searched between males and females, controlling for the effect of year?
    - **Hypothesis 0:** There is no significant difference in the likelihood of being strip-searched between males and females, after controlling for the effect of year.
    - **Hypothesis 1:** There is a significant difference in the likelihood of being strip-searched between males and females, after controlling for the effect of year

Method

The present study explores the dataset published by Toronto Police Services on Arrests and Strip Searches. The current dataset contains 24 attributes including Arrest year, month, perceived race, sex, age group, youth at arrest, and actions at arrest. Based on the research question, several attributes in the data set were identified as the targets of interest: Arrest Year, Strip Search, and gender. Data cleaning, exploratory data analysis, and data visualization was conducted prior to examining the hypothesis using the data set. A logistic regression was conducted to examine the effect of gender on the likelihood of Strip Searched at time of arrest. A one-way ANCOVA was conducted to examine the effect of gender on the likelihood of Strip Searched at time of arrest while controlling for the year of arrest.

Data Cleaning

Before conducting analysis, the dataset was cleaned to ensure the quality and validity of the analysis results. A dictionary of key value pairs was created to replace categorical variables of object data type in pandas to a numerical data type in order to make quantifying easier for the later analysis. In the dataset, the “Sex” category may contain three different entries, “Male”, “Female” and “Unknown”. These categories were recorded into numerical data to assist quantitative analysis. The “Unknown” entries were presumed to be missing gender information in the data set, and were excluded for the current analysis. The variable of year contains either

2020 and 2021, they are considered as a categorical variable of its own and remain unchanged for this analysis.

EDA

	Arrest_Month	Perceived_Race	Sex	Age Group at Arrest
count	65276.00	65276.00	65276.00	65276.00
mean	2.468319	5.120856	1.806851	3.570424
std	1.126876	3.037227	0.395121	1.333958

Figure 1: Descriptive Analysis

To better understand the dataset, we conducted descriptive analysis and displayed some of the important variables of interest in the table above. The dataset included information on 65276 arrests between 2020 and 2021. We found that the crime occurrence remain consistent between 2020 and 2021 (Figure 2), since severe crimes such as armed robbery presumably may have caused more strip searches than shoplifting, the pattern of occurrence will support our analysis on strip search occurance over the years under similar conditions (types of crime).

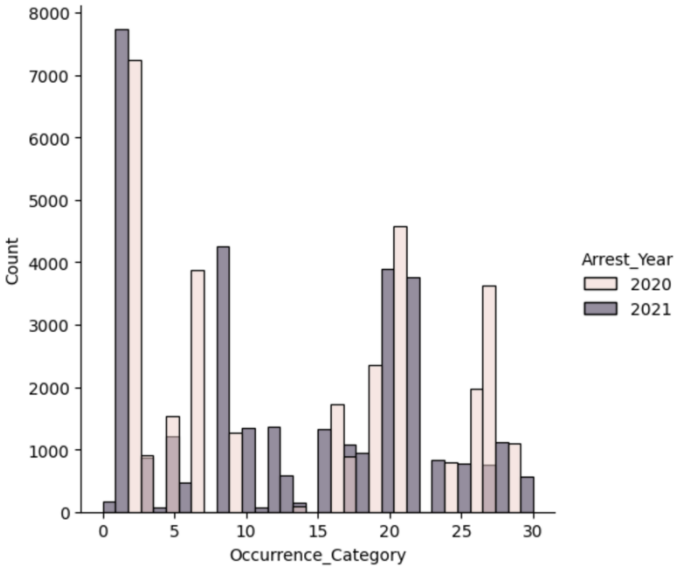

Figure 2: Arrest year and Crime Type

A correlation heatmap were also generated as part of our exploratory analysis to examine the variables of interest. A weak correlation (<0.5) was found across the variables of interest such as arrest year, sex and strip search occurrence (Figure 3). However, moderate to strong correlation (<0.4) were evident between strip search and different search reasons. We also found a different in terms of correlation between the arrest year and strip searched. Further analyses are conducted to explore these relationships.

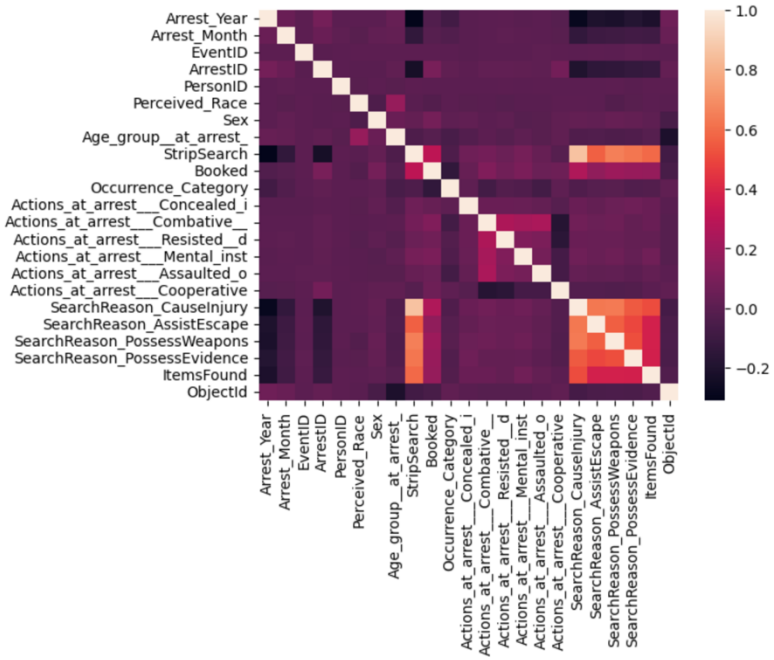

Figure 3. Correlation Plot

Data Analysis:

The present study conducted a Logistic Regression to examine the relationship between gender and strip search (Research Question 1). A One-Way ANCOVA was also conducted to examine the relationship between gender and strip search while controlling for the arrest year, given the change in policy in between 2020 and 2021. A power analysis was subsequently conducted only to validate the results of the logistic regression and ANCOVA given all sample data were already collected within the data set, and sample sizes cannot be increased.

Logistic Regression

RQ1: Does sex have a significant effect on the likelihood of being strip-searched

- Hypothesis 0: Sex does not have a significant effect on the likelihood of being strip-searched.
- Hypothesis 1: Sex has a significant effect on the likelihood of being strip-searched.

A logistic regression was conducted to examine the effect of sex on the likelihood of experiencing strip search at time of arrest. A pseudo-R-squared of 0.15 was found, indicating that the model has poor goodness-of-fit to the data. LLR P-value represents the significant difference in predictability between the predictor model and the null model. A likelihood ratio test p-value (LLR p-value) of 0.0 was found, indicating that a statistically significant difference was found for the regression model. Based on the results, we reject the null hypothesis in research question 1.

	std err	z	P > |z|	[0.025	0.975]
Arrest Year	0.045	-57.392	0.00	-2.697	-2.519
F	128.448	0.071	0.944	-242.677	260.830
M	128.448	0.072	0.942	-242.444	261.063

Figure 4: Logistic Regression Results

One-Way ANCOVA

Research Question 2: Is there a significant difference in the likelihood of being strip-searched between males and females, controlling for the effect of year?

- Hypothesis 0: There is no significant difference in the likelihood of being strip-searched between males and females, after controlling for the effect of year.
- Hypothesis 1: There is a significant difference in the likelihood of being strip-searched between males and females, after controlling for the effect of year

An analysis of covariance was conducted to examine the effects of sex on the likelihood of being strip searched at time of arrest while controlling for the arrest year. The main effect of sex on the dependent variable was found, $F(2,65272) = 25.36$, $p < .001$. A small effect size was found with partial eta squared = .0008. The main effect of the arrest year was also statistically significant,

F(1, 65272) = 6997.62, p <.001, partial eta squared = .097 indicating a large effect size (>.06). The results of the ANCOVA suggest that there is a significant difference in the likelihood of a strip search between male and female suspects at time of arrest. No significant interaction was found between year of arrest and sex on the likelihood of strip search. The results of the above analysis suggested that the null hypothesis (H0) was successfully rejected.

Power Analysis

A power analysis was conducted to validate the results of the above analysis (Figure 4). The effect size (Cohen's D) for the year of 2020, examining the relationship between gender and strip search occurrence is 0.095. The required sample size to achieve an 80% power (P < .05) for male participants is 1087.216, and the actual sample size of male participants is 25835. The required sample size for female participants is 4576, and the actual sample size was 6138.

The effect size (Cohen's D) for the year of 2021, examining the relationship between gender and strip searches is 0.029. The required sample size to achieve an 80% power (P<0.05) for male participants is 11589, and the actual sample size of male participants is 26815. The required sample size for female participants is 47963, and the actual size of female participants is 6479. Insufficient power and weak effect size were found for both years, the implications of the power analysis will be further discussed in the section below.

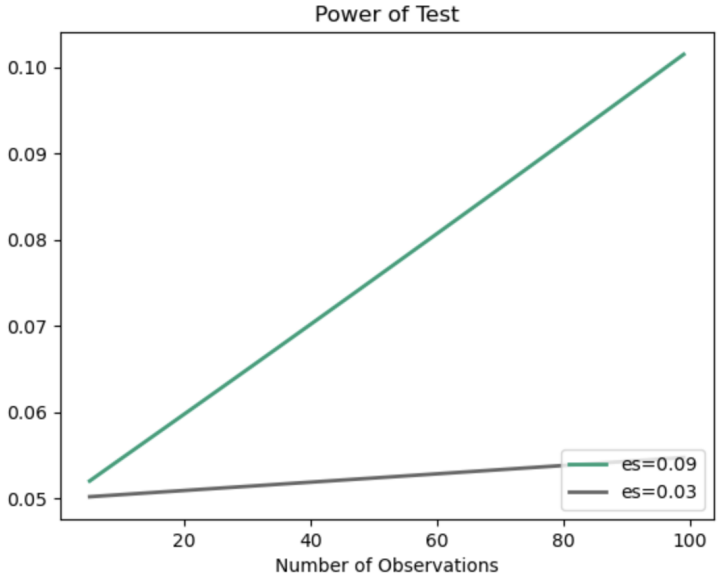

Figure 5: Power Analysis

Discussion

The present study hopes to examine two things: Whether gender has an effect on the likelihood of strip search occurrence, and to examine patterns of strip-search over a two-year period after concerns on the use of strip search were raised. In the present study, we reject the null hypothesis for research question one on the sex of the likelihood of police conducting strip search at the time of arrest, but we successfully reject the null hypothesis of research question 2. A significant effect for gender on the likelihood of strip search were found while controlling for arrest year. However, this result does not necessarily mean that gender has an effect on the likelihood of strip search occurrence. Our regression analysis did not take the effect of the arrest year into account, and several different pilot programs and regulations were in place after the report from OIPRD in late 2019.

One limitation of the present study is that the results of the regression analysis were inconclusive in determining the effect of gender on the likelihood of experiencing strip search at time of arrest. The power analysis above revealed a relatively small effect size, consistent with the findings of both logistic regression and the One-way ANCOVA. Such small effect size undermines the predictability of the results from both logistic regression and the ANCOVA on a practical basis. Future research exploring data from previous years are needed to further support the findings in the current paper. Furthermore, an imbalance between sample size between 2020 and 2021 may also be a potential confound in the present analysis.

The present study also recognizes the Covid-19 pandemic as an important confound. As mentioned above, conducting strip search requires physical contact between the officer and the recipient. During the Covid-19 pandemic, close contact was discouraged according to public health guidelines. Although strip search is not restricted under Covid-19 guidelines, the potential risk of exposure to the virus may have influenced officers' decisions to conduct strip searches. Thus, while a main effect for arrest year on strip search occurrence was found, it is unclear whether the overused of strip search was improved without data from pre- and post-pandemic.

Conclusion

The current study draws from a body of research studying the effect of gender on the likelihood of strip search using data published by Toronto Police Services. Exploratory data analysis, One-Way ANCOVA, logistic regression and power analysis were conducted. Significant effects were found for gender and likelihood of strip search occurrence while controlling for arrest year. The present study also hopes to examine the use of strip search across a two year period after concerns of overuse were raised. Some limitations to the current study and future directions were discussed.

Citation

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