

Have public transport delays in toronto gotten worse over time? An Analysis of the TTC Street Car Delays*

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January 24, 2024

The TTC (Toronto Transit Commission) has been a core part of all residents of the city for decades - keeping each part of the city connected. That being said, the TTC is under constant scrutiny and criticism, especially in recent years regarding delays worsening - inconveniencing people's commutes. This paper examines the TTC Delays, using data from OpenDataToronto, and disproves the notion that delays have been getting increasingly worse over the past few years.

1 Introduction

As the COVID-19 pandemic died down, riders returned to the TTC, making the public transit around the city active once more. However, with their return came rampant criticism about the delays regarding the TTC. Pseudo-studies claim confidently that the TTC is deteriorating as time passes (sources) and adding to the commutes of residents of the city.

However, these are empty claims yet to be strongly supported or disproved. This study looks more closely at TTC data - specifically at streetcar delays, to reveal whether these claims are truly founded or not.

This paper is organized in the following sections: Data, Results, Conclusion...

*Code and data are available at: <https://github.com/sid19arya/TTC-Delay-Analysis.git>

2 Data

The data utilized in this paper is from OpenDataToronto Library, the Datasets used are entitled: “TTC-Streetcar-Delays”. The data was collected, sorted and analyzed through the help of ... (Cite all the packages).

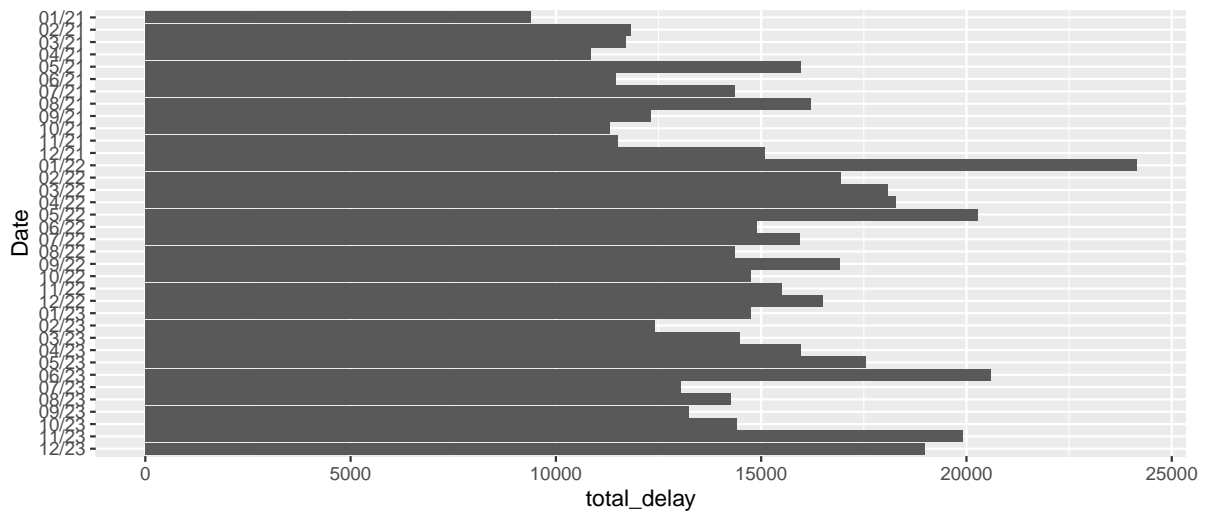
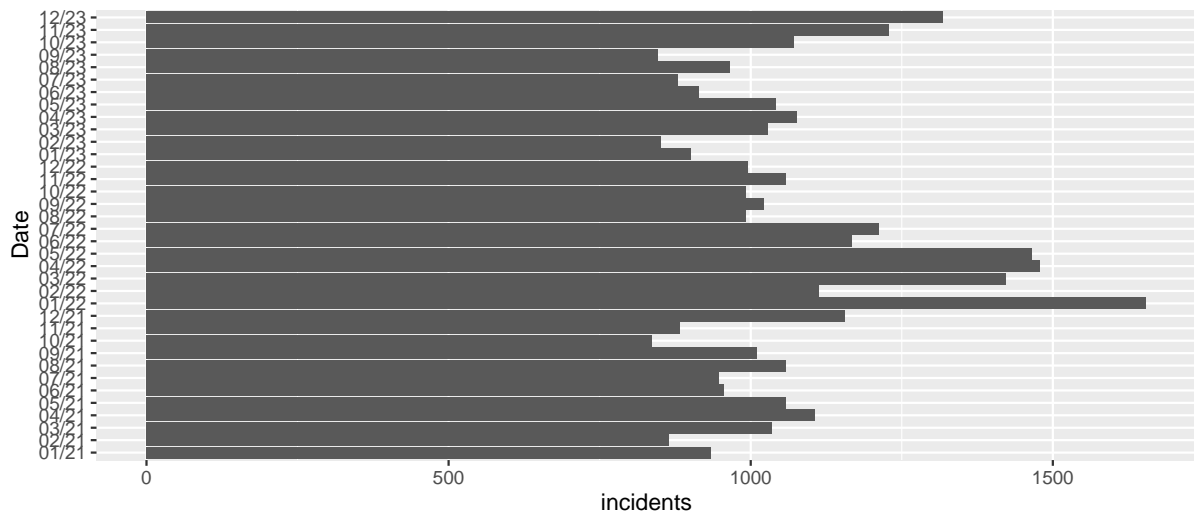
The data in its raw form includes all these values (table 1)

Date	Line	Time	Day	Location	Incident	Min Delay	N
2021-01-01	501	03:15:00	Friday	QUEEN AND MCCAUL	Operations	19	
2021-01-01	504	03:37:00	Friday	BROADVIEW AND QUEEN	Operations	15	
2021-01-01	504	04:00:00	Friday	BROADVIEW STATION	Cleaning	15	
2021-01-01	504	04:03:00	Friday	DUNDAS WEST STATION	Cleaning	15	
2021-01-01	506	05:37:00	Friday	MAIN STATION	Mechanical	10	
2021-01-01	555	06:00:00	Friday	TORONTO TRANSIT COMMIS	General Delay	0	

We clean the data, and join the data sets for all 3 years to get a table that looks like this (table 2) Important part to note is we grouped over all the incidents for a particular month and aggregated to get the incidents and total_delay values.

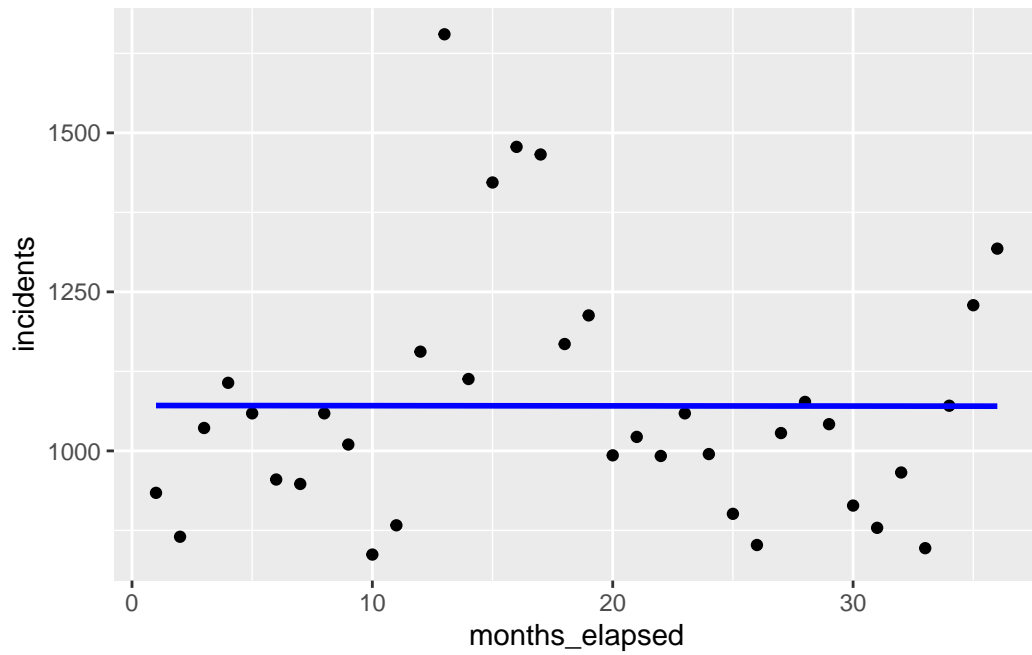
From this we can create visualizations that are able to clearly indicate the change in number of incidents and total delay time over the months of 2021, 2022, 20223, as seen in graph 1 and 2 respectively.

Date	incidents	total_delay	months_elapsed
01/21	934	9382	1
02/21	865	11819	2
03/21	1036	11708	3
04/21	1107	10847	4
05/21	1059	15955	5
06/21	955	11471	6



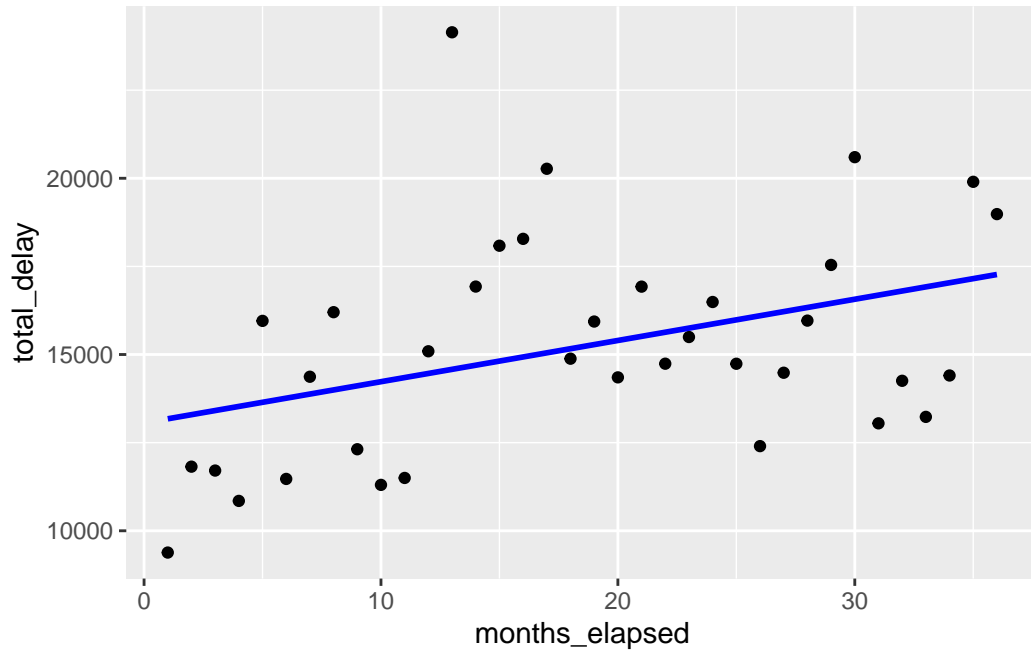
```
ggplot(analysis_data, aes(x = months_elapsed, y = incidents)) +
  geom_point() +
  geom_smooth(method = "lm", se = FALSE, color = "blue") # Add a line of best fit
```

`geom_smooth()` using formula = 'y ~ x'



```
ggplot(analysis_data, aes(x = months_elapsed, y = total_delay)) +  
  geom_point() +  
  geom_smooth(method = "lm", se = FALSE, color = "blue") # Add a line of best fit
```

``geom_smooth()`` using formula = `'y ~ x'`



```
incidents_correlation <- cor(analysis_data$months_elapsed, analysis_data$incidents)
delay_correlation <- cor(analysis_data$months_elapsed, analysis_data$total_delay)
print(paste("Incidents_Correlation (R value):", incidents_correlation))
```

```
[1] "Incidents_Correlation (R value): -0.00155711284854218"
```

```
print(paste("Delay_Correlation (R value):", delay_correlation))
```

```
[1] "Delay_Correlation (R value): 0.388129231071415"
```

3 Results

Clearly, there is no such trend, there is no evidence that the delays have been getting worse for the past 2 years.

4 Discussion

5 Conclusion

This paper investigated TTC delays spanning the years 2021, 2022, 2023 to see if a trend over time could be spotted. The paper concluded that there was no noticeable

6 References