More Riders, Fewer Accidents: The Role of Public Transportation in Road Safety

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The Importance of Public Transit in Safer Roads

Public transportation plays a vital role in urban life, offering affordable, efficient, and reliable mobility for millions. It enables access to work, essential errands, and services. Beyond convenience, public transit impacts public health and safety, especially when disruptions occur.

This research examines the connection between public transportation usage and road safety. By analyzing monthly subway and bus ridership data alongside collision data from the National Student Data Corps (NSDC), this study visualizes how increased public transit ridership may reduce traffic accidents.

How I Measured the Impact

For this research, two separate datasets were analyzed: MTA Daily Ridership (Starting 2020)[1] from Data.gov and Motor Vehicle Collisions in NYC[2] provided from NYC Open Data. Data processing and analysis were conducted in Python using Google Colab.
Key steps:

- **Data Cleaning:** Removed inconsistencies, and ensured uniform formats and labels to prepare datasets for analysis.
- **Time Series Analysis:** Used Python's **Pandas** library to calculate the monthly rates of public transit ridership and vehicle collisions between 2020-2024.
- **Visualization:** Created clear and informative plots with **Seaborn** and **Matplotlib** to highlight trends and correlations.

```python
fig, ax = plt.subplots(figsize=(10, 6))
#First Plot: Monthly Subway Ridership
ax.plot(monthly_ridership['Date'], monthly_ridership['Subways: Total Estimated Ridership'], label='Subways: M
#Labels and tick params for first plot
ax.set_xlabel('Date')
ax.set_ylabel('Subways: Monthly Ridership', color='blue')
ax.tick_params('y', color='blue')
#Twin axes
ax2 = ax.twinx()
#Second Plot: Monthly Collisions
ax2.plot(monthly_crashes['CRASH DATE'], monthly_crashes['Collisions'], color='red', label='Collisions')
#Labels and tick params for second plot
ax2.set_ylabel('Collisions', color='red')
ax2.tick_params('y', color='red')
#Plot title and legend
ax.set_title('Subways: Monthly Ridership vs Collisions')
ax.legend(loc='lower center')
ax2.legend(loc='lower center', bbox_to_anchor = (0.5, 0.05))
#Save plot as an image
plt.tight_layout()
plt.savefig('subway_monthly_ridership_vs_collisions.png', dpi=300, bbox_inches='tight')
plt.show()
```

Figure 1. Code snippet of twin axes plot, plotting monthly bus ridership vs monthly collisions.

Findings: More Riders = Fewer Accidents

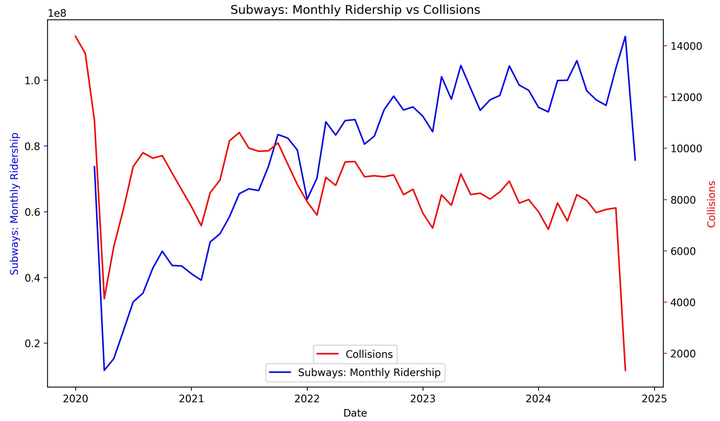

Figure 2. Seaborn plot displaying monthly subway ridership vs. monthly collisions.

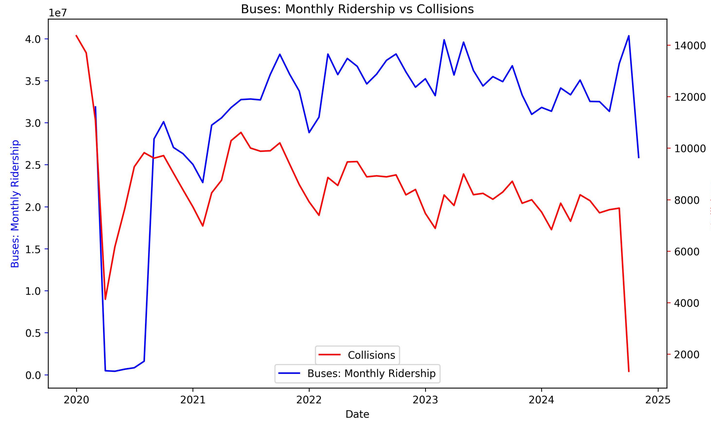

Figure 3. Seaborn plot displaying monthly bus ridership vs. monthly collisions.

Looking Ahead: Lessons and Opportunities

The graphs above demonstrate a clear inverse relationship between public transit ridership and the number of vehicle collisions. While collisions initially declined during the COVID-19 pandemic due to reduced travel, this drop was accompanied by a shift toward car usage among essential commuters, driven by government-imposed social distancing measures. However, as restrictions were lifted and vaccine distribution increased, public transit ridership rebounded. With this resurgence, a significant decrease in collisions was observed, underscoring the role of public transit in improving road safety. These findings highlight both the public's preference for and reliance on public transportation when available. **This reinforces the need for increased investment in transit infrastructure to enhance accessibility, efficiency, and safety.**

References (Arial, 36 points, bold)

1. NY Open Data. (2022). MTA Daily Ridership Data: Beginning 2020. data.ny.gov. https://data.ny.gov/d/vxuj-8kew
2. NYC Open Data. (2014). Motor Vehicle Collisions - Crashes. NYC Open Data. https://data.cityofnewyork.us/Public-Safety/Motor-Vehicle-Collisions-Crashes/h9gi-nx95/about_data