Nashville Software School Group Project - Team “Ride Along”
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Wego Public Transit Analysis

Does transit signal priority reduce bus delays?

Research goal and context for this data project.

Context:

- WeGo implemented Transit Signal Priority
- TSP was turned on, off and made conditional at certain times.
- This creates a real world natural experiment

Research Goal:

Figure out if buses are less likely to be late when Transit Signal Priority is active and quantify that effect with real world data.

Data Overview

Project data spans from January 2023 to May 2025 and is recorded by the WeGo Public Transit system in Nashville, TN. All of the data is collected from route 50 on Charlotte Pike. The variables we are most interested in is adherence and adjusted late count. Adherence tells us weather a bus departed on time, early or late. Late count is an indicator column that tells us if a bus is too early or late. We want to understand what may cause a bus to be late and what times are at risk. In this project we assess how tsp interplays with these variables and provide an understanding of this effect on bus timeliness.

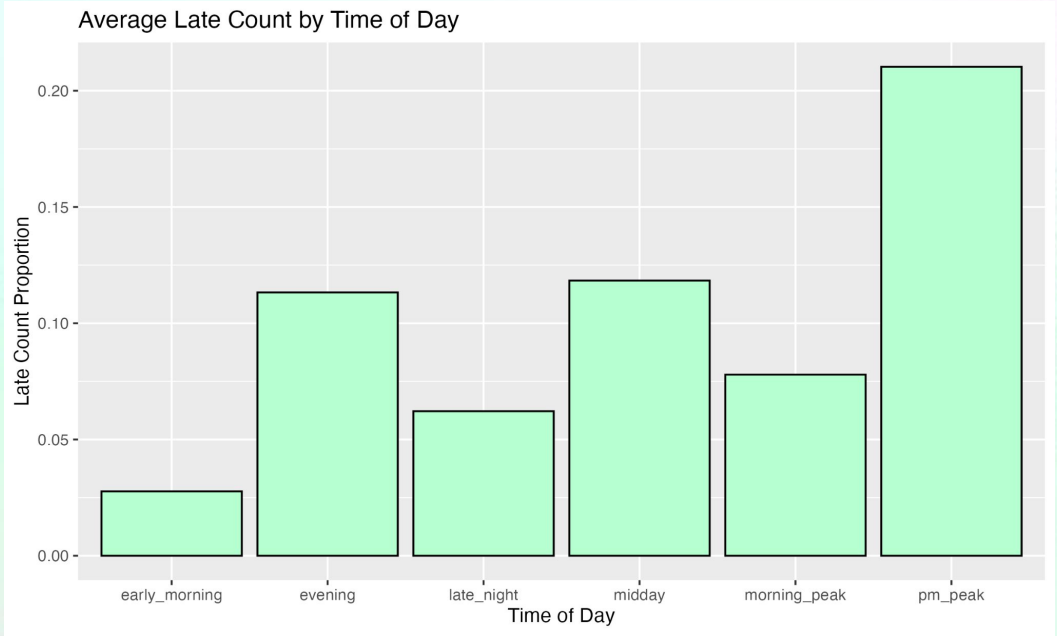
01

Transit Timeliness

What other factors contribute to buses being tardy?

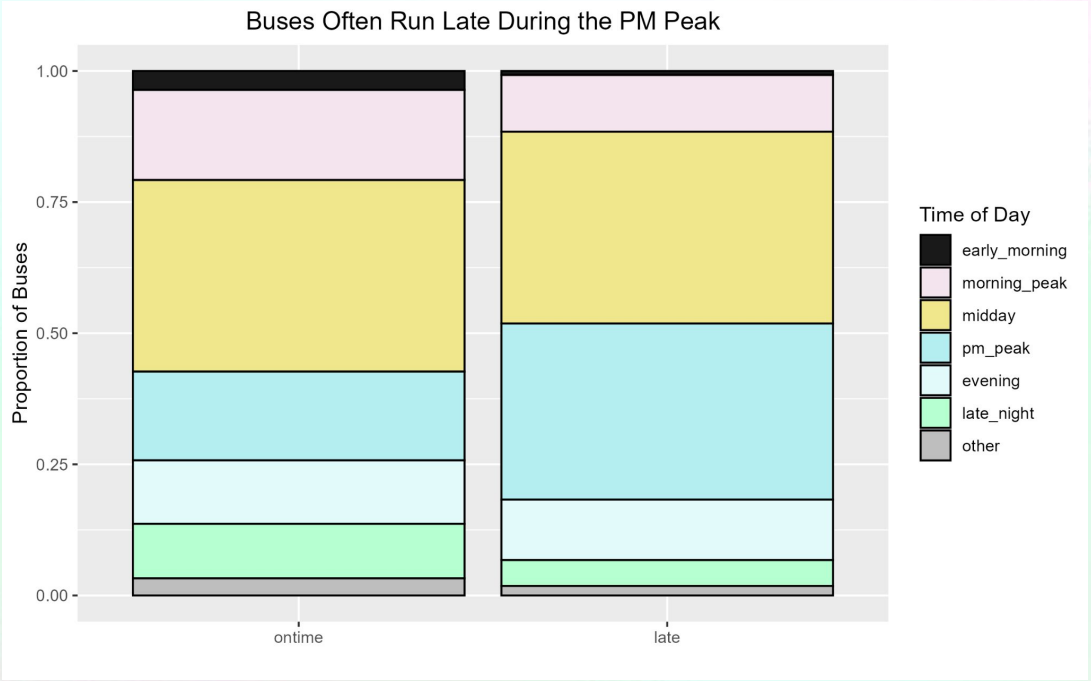
Average Late Count

Organized by time of day



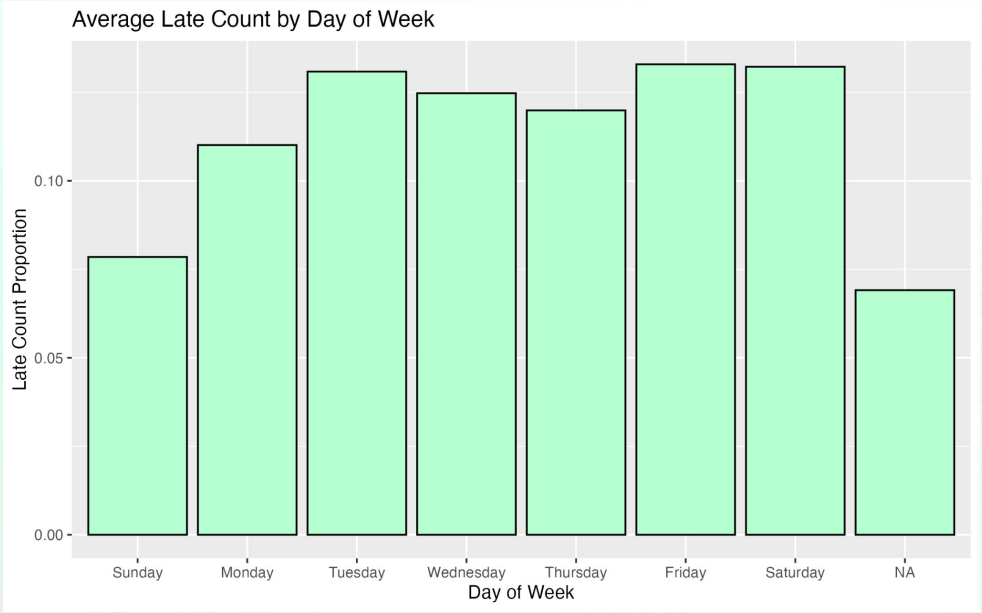
Late Count Proportion

Organized by time of day



Average Late Count

Organized by day of week



02

TSP Impact

What other factors contribute to buses being tardy?

What is the effect of TSP on bus timeliness?

TSP Inactive

Our model predicts the likelihood of a bus being late without TSP to be roughly 12.05%. This is not controlling for any other variables in the data.

TSP Implemented

When TSP is active, our model predicts the likelihood of a bus being late to be 11.45%. We have observed a difference of 0.5%.

Multivariable Logistic Regression

01 - Effect of TSP

TSP has a statistically significant effect after controlling for time of day, day of week, and hour. TSP has a modest effect on the probability of buses being late.

02 - Time of Day

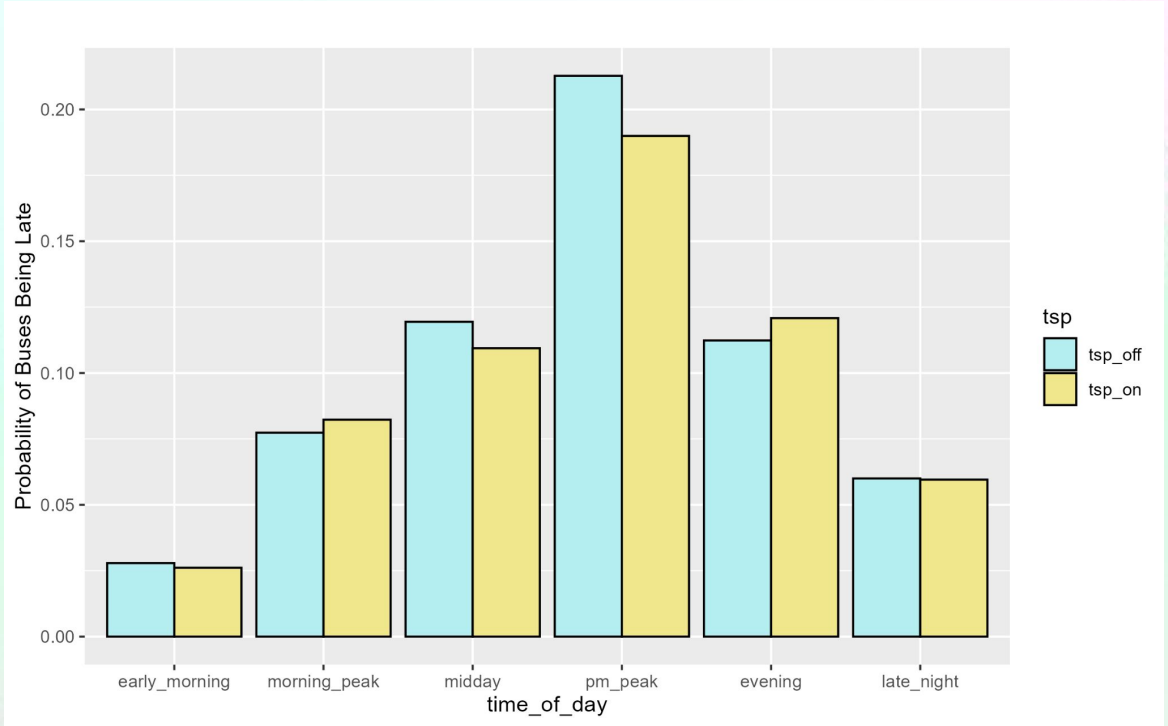
Time of day matters more than TSP. The time of day coefficients in our model reflect a much larger impact on buses being late than TSP alone.

03 - Hour Variable

Buses are more likely to be late as the day progresses. After controlling for time of day, day of week, and TSP, we observed that later hours are associated with higher probabilities of late buses.

The Effect of TSP on the Probability of Buses Being Late

Organized by time of day



Logistic Regression Model: TSP and Time of Day

	Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	-3.55137	0.04518	-78.609	<2e-16	***
tsp	-0.06663	0.14162	-0.471	0.638	
time_of_daymorning_peak	1.07271	0.04686	22.894	<2e-16	***
time_of_daymidday	1.55349	0.04570	33.996	<2e-16	***
time_of_daypm_peak	2.24291	0.04581	48.964	<2e-16	***
time_of_dayevening	1.48443	0.04681	31.709	<2e-16	***
time_of_daylate_night	0.79994	0.04869	16.430	<2e-16	***
time_of_dayother	0.95078	0.05340	17.804	<2e-16	***
tsp:time_of_daymorning_peak	0.13380	0.14638	0.914	0.361	
tsp:time_of_daymidday	-0.03235	0.14327	-0.226	0.821	
tsp:time_of_daypm_peak	-0.07528	0.14364	-0.524	0.600	
tsp:time_of_dayevening	0.14890	0.14623	1.018	0.309	
tsp:time_of_daylate_night	0.05855	0.15214	0.385	0.700	
tsp:time_of_dayother	NA	NA	NA	NA	

03

Conclusion

Final thoughts and deliverables

Key Takeaways

Does Transit Signal Priority reduce bus delays?

There is no clear improvement in ontime buses with TSP. There is a small but insignificant effect on bus lateness. Other factors like time of day and day of week contribute in addition to TSP. Bus lateness is ultimately determined by those other factors like traffic congestion. According to our model, it is unclear whether the Transit Signal Priority helps buses to show up on time.

Thank you

Do you have any questions?

WeGo Public Transit