Bus Shelter Location Related to Car Collision Frequency and Distance

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Objective

This study examines the relationship between bus shelter placement and traffic accident patterns in New York City. My analysis focuses on both the frequency and distance of car collisions near bus shelters to identify optimal shelter placement strategies to enhance public safety. The findings could help inform future urban planning decisions and improve transit infrastructure safety.

Injury Type Distribution: Bus Shelters vs. Overall Population

I researched the increased vulnerability of pedestrians and cyclists in the vicinity of bus shelters. Compared to the general population of New York City, pedestrian injuries are significantly higher among bus shelter users (27.8% vs. 18.44%), representing an approximately 50.8% increase. Similarly, cyclist injuries are elevated at bus shelters (11.37% vs. 8.86%), with an approximately 28.3% increase. These findings prove the need for safety improvements, such as optimized bus shelter locations.
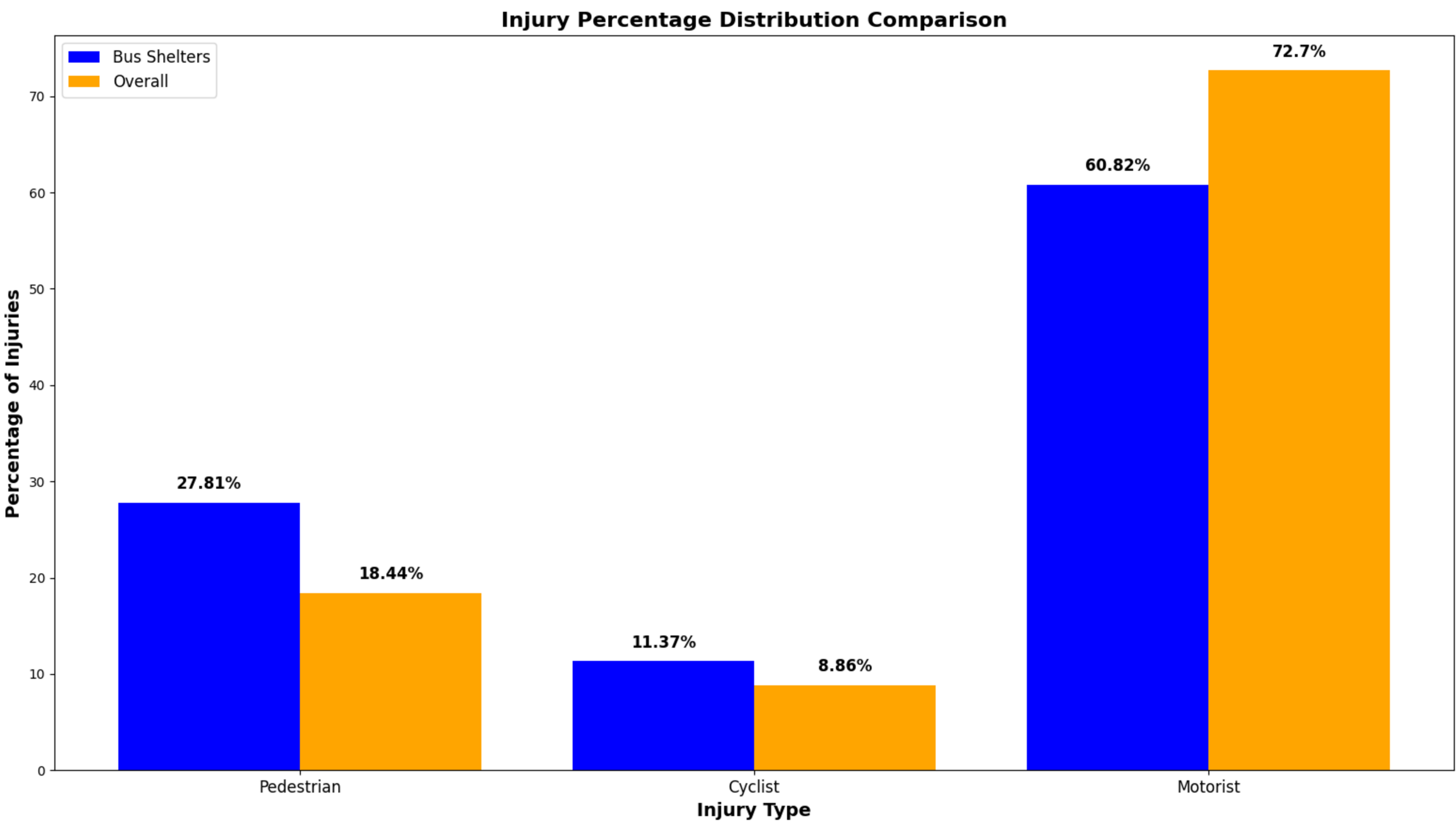

Figure 2. Comparison of Injury Types: Bus Shelter Vicinity (150-ft) vs. Citywide Distribution, New York City

Strategies for Safer Bus Shelters in High-Traffic Zones

This section details proposed relocations for two bus shelters situated along high-traffic corridors. The recommendations are based on an analysis of pedestrian and vehicular traffic patterns, as well as the distribution of car collision hotspots.

Figure 3. Analysis of Bus Shelters in Relation to Car Collision Hotspots within a 150-foot Radius

Spatial Analysis of Traffic Accidents Near Bus Shelters

This spatial analysis observes the relationship between bus shelter locations and car collision locations by examining collision data within 100 and 150 feet of bus shelters. Using Python and GeoDataFrames, I processed geographical data to identify accident hotspots near public transit infrastructure. The bar chart (left) demonstrates that 72.16% of bus shelters have car collision hotspots within 100 feet. The bar chart (right) shows that 92.82% of bus shelters have car collision hotspots within 150 feet. These findings suggest that the presence of bus shelters exhibits a strong correlation with vehicular collision frequency.
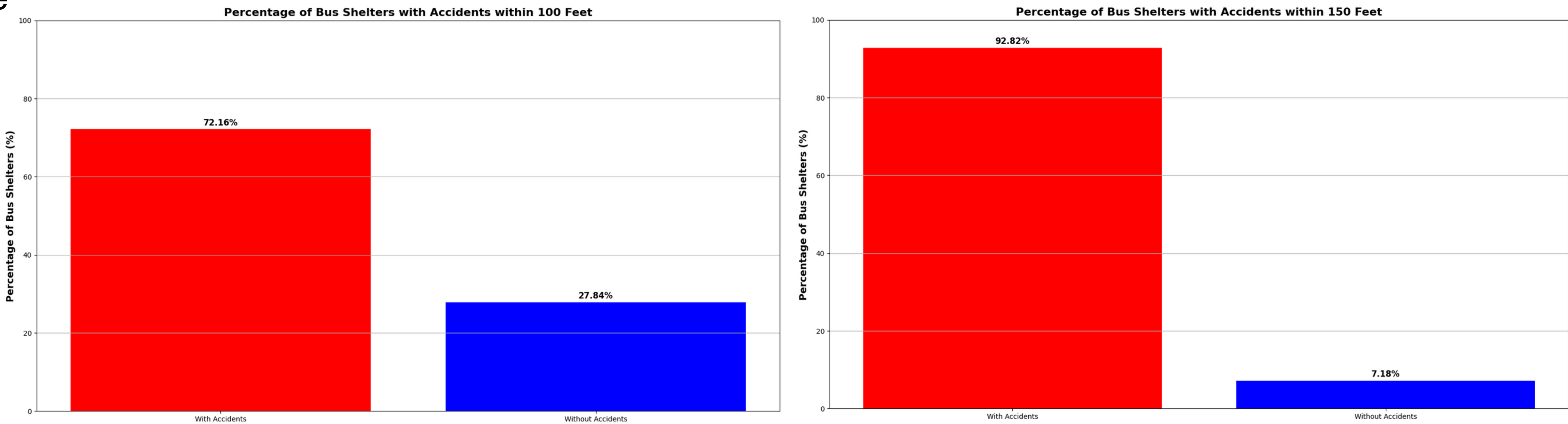

Figure 1. Percentage of bus shelters with collisions within 100 feet (left) Percentage of bus shelters with collisions within 150 feet (Right).

Summary of Research Findings & Recommendations

This study highlights a strong spatial correlation between bus shelter locations and car collision hotspots in New York City. This study found that 72.16% of bus shelters in New York City have car collision hotspots within 100 feet, increasing to 92.82% within a 150-foot radius, indicating that collisions frequently cluster around these shelters. Injury data shows pedestrians near bus shelters face a 50.8% higher injury risk compared to citywide averages, while cyclists experience a 28.3% increase, indicating heightened dangers for vulnerable road users. To mitigate risks, strategic relocations are recommended, such as moving shelters away from high-conflict areas like sharp corners or intersections and repositioning them toward safer zones, such as the middle of street blocks with lower traffic density.

Figure 3 presents an analysis of bus shelter locations and proposes relocations for optimal safety and efficiency. Bus shelter MN01674 is recommended for relocation southward along East 57th Street, while SI05204 should be repositioned away from the immediate vicinity of Hylan Boulevard. These recommendations are based on an assessment of pedestrian and vehicular traffic patterns. This is done to move bus shelters to areas of lower traffic density.

References

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