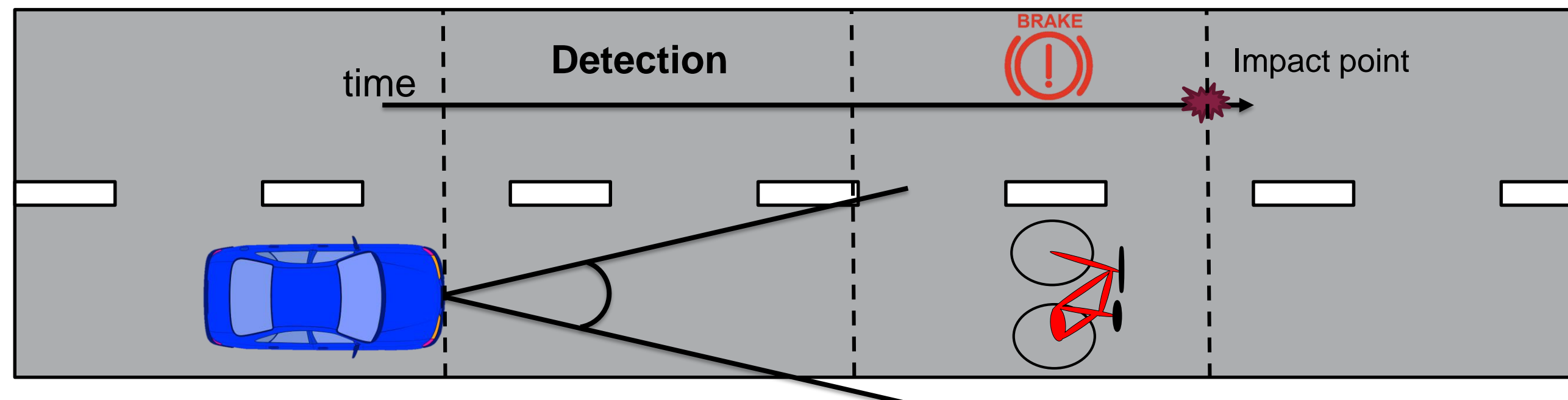


Background

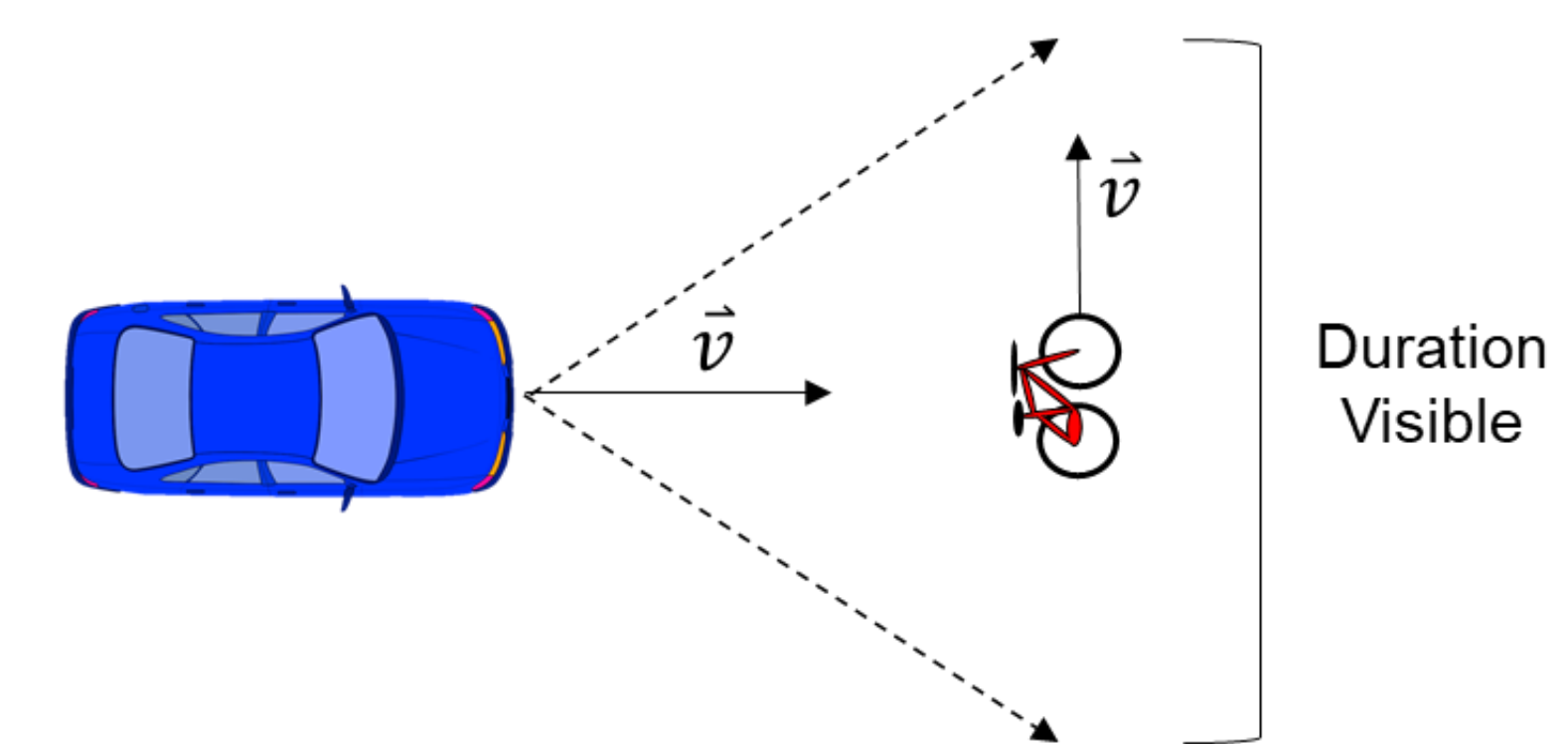
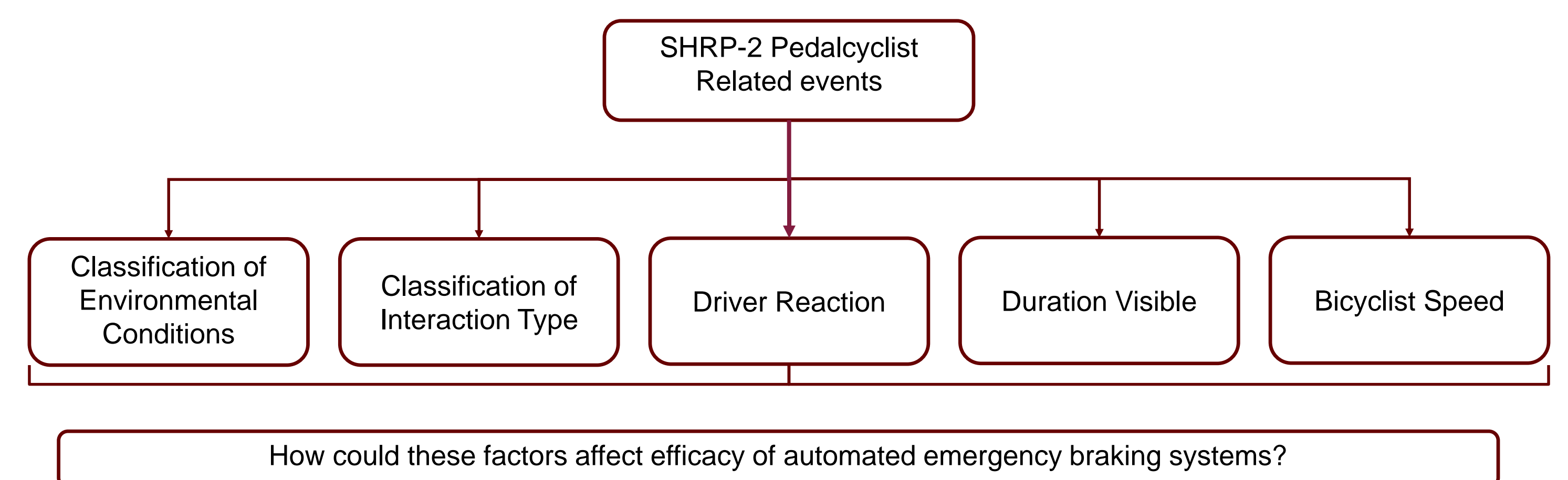
- U.S. traffic related bicycle fatalities are at their highest in the last 10 years with 840 fatalities in 2016¹
- Automatic Emergency Braking (AEB) is one proposed solution
- A few studies have looked at naturalistic data collected from bicyclists themselves^{2,3}, but little has been published in the U.S. on vehicle drivers behavior in vehicle-bicycle collisions



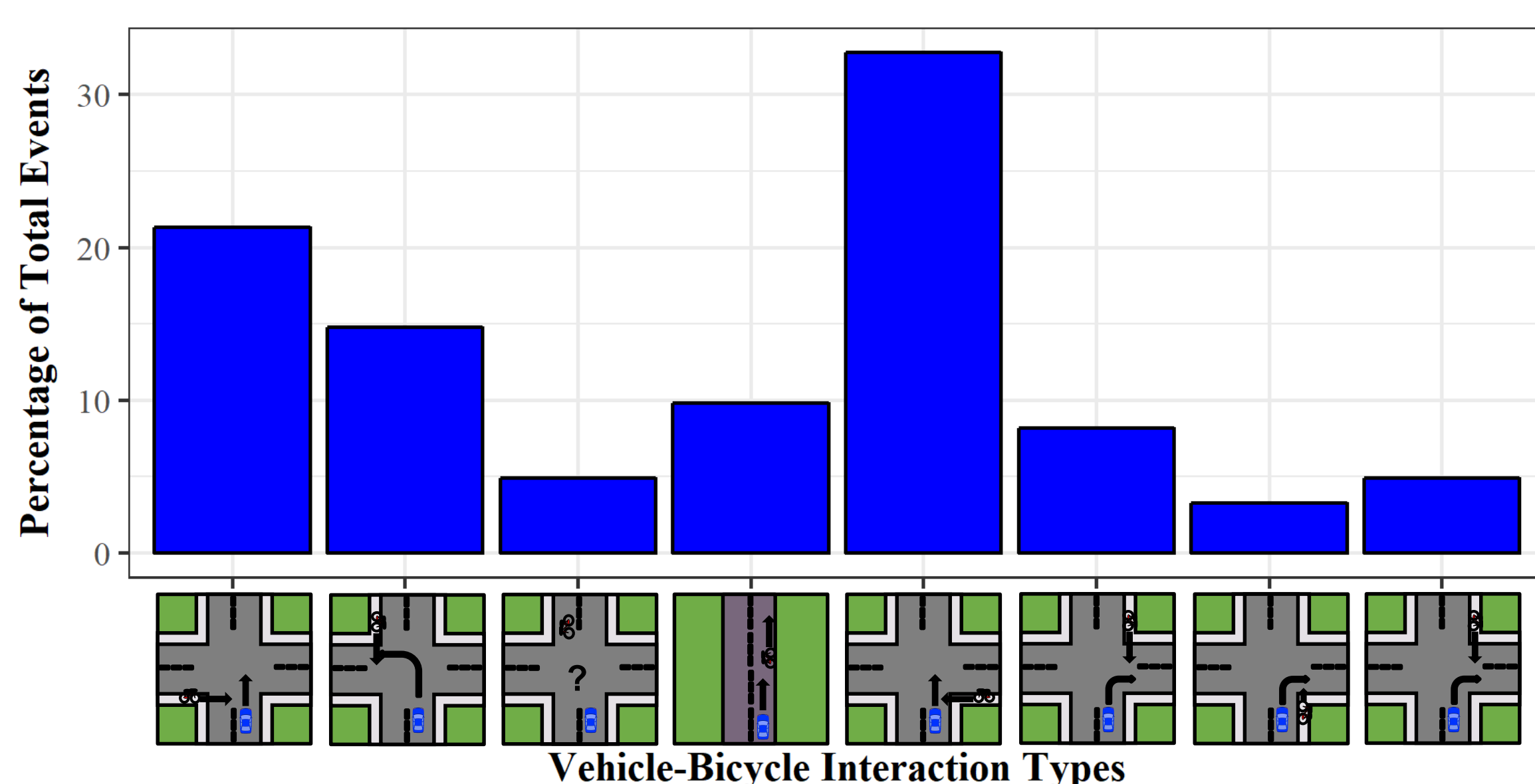
This objective of this study was to use SHRP-2 to quantify driver behavior in vehicle-bicycle conflicts and estimate the effectiveness of proposed bicyclist AEB systems.

Methods

- Data Source: Strategic Highway Research Program 2 (SHRP 2)
 - Vehicle-Bicycle Interactions
 - 65 events (3 crashes, 62 near-crashes)
 - Examined forward facing video and vehicle dynamic data
- Duration Visible
 - Time from when the bicyclist was in the road until the impact proximity point
 - Does not account for potential driver distraction
 - Forward facing camera captures at 30fps with a 67.4° horizontal field of view
- Time to Collision of Braking
 - Time between when the driver first initiated an evasive maneuver and the impact proximity point

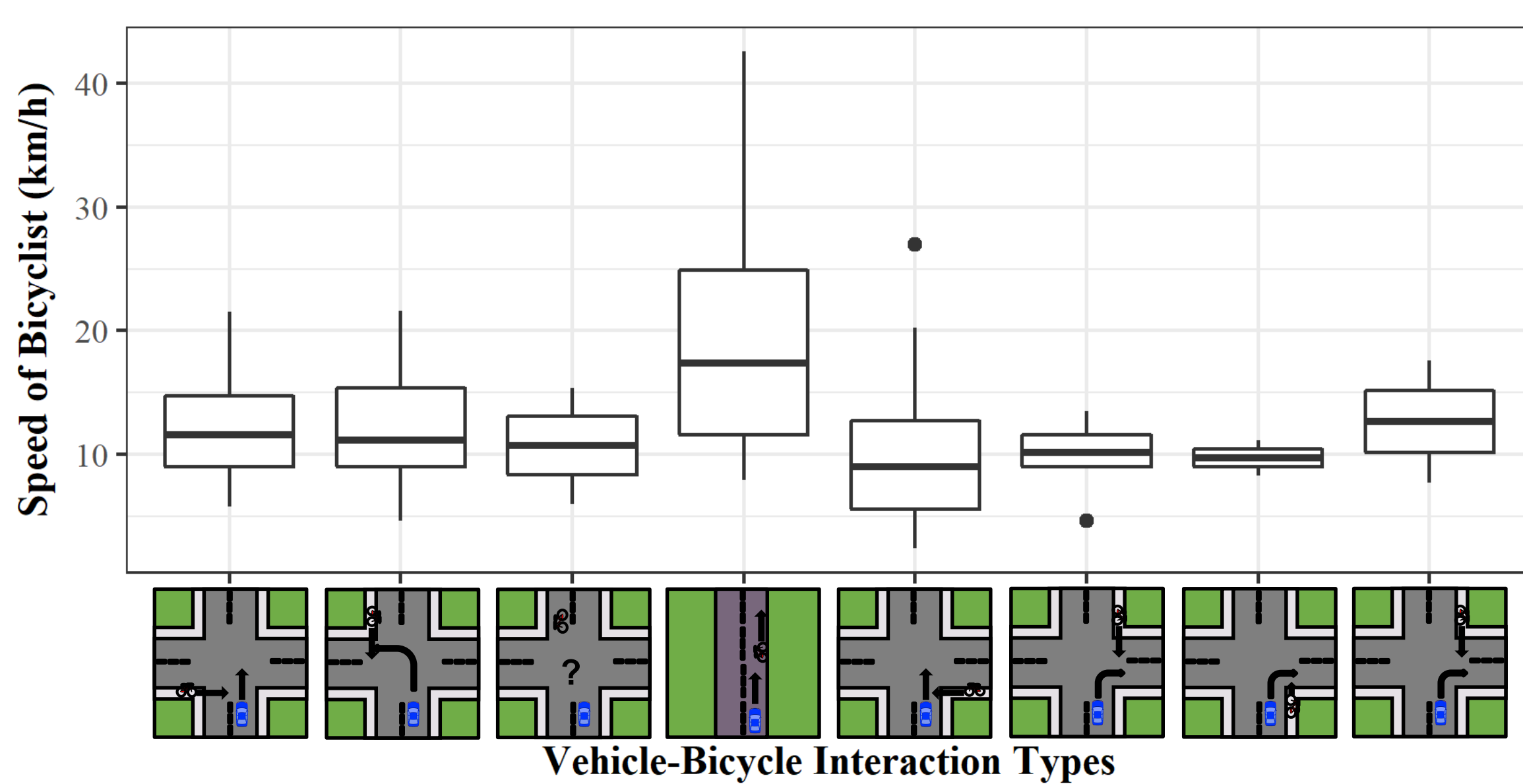


Results

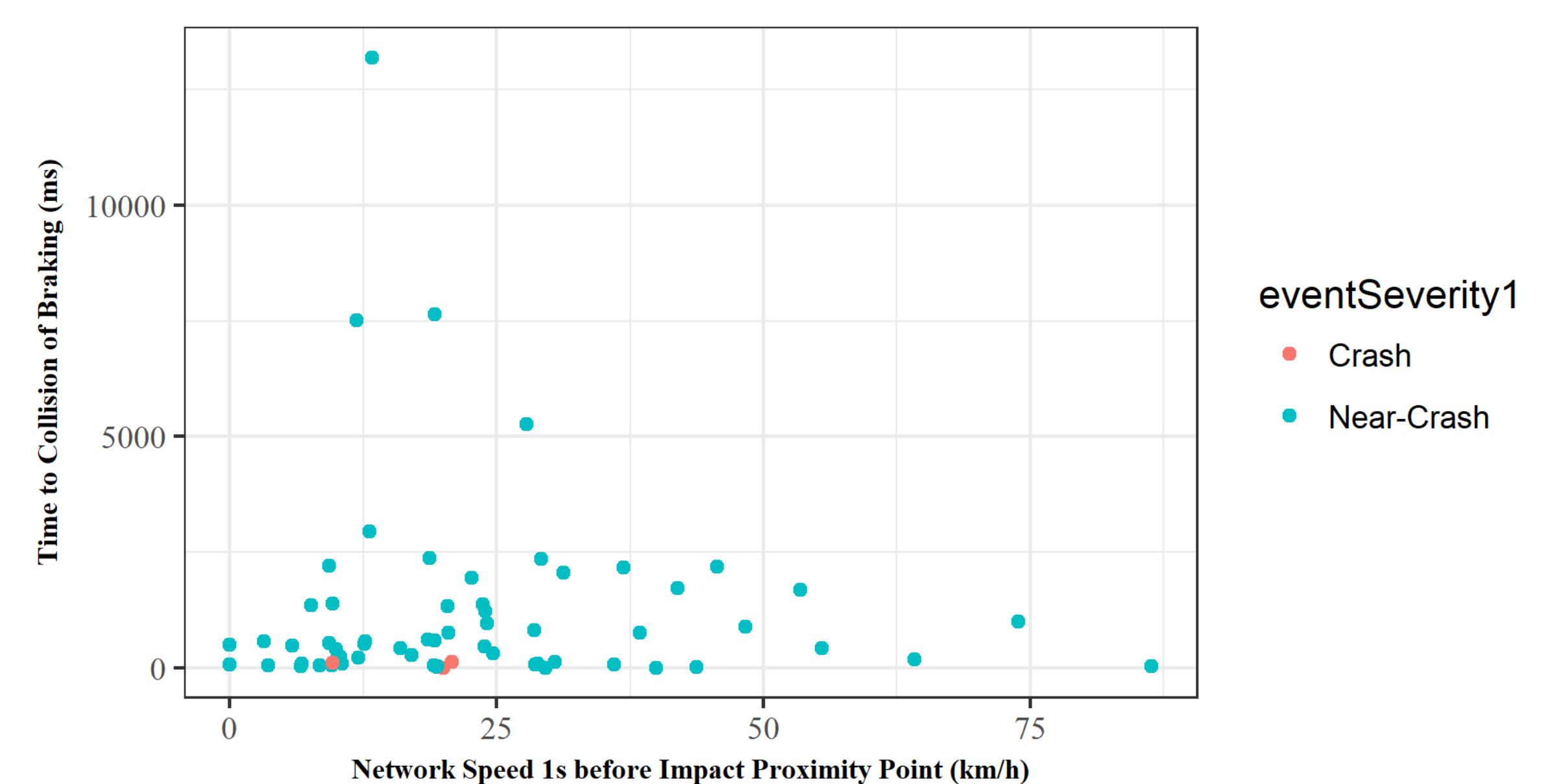
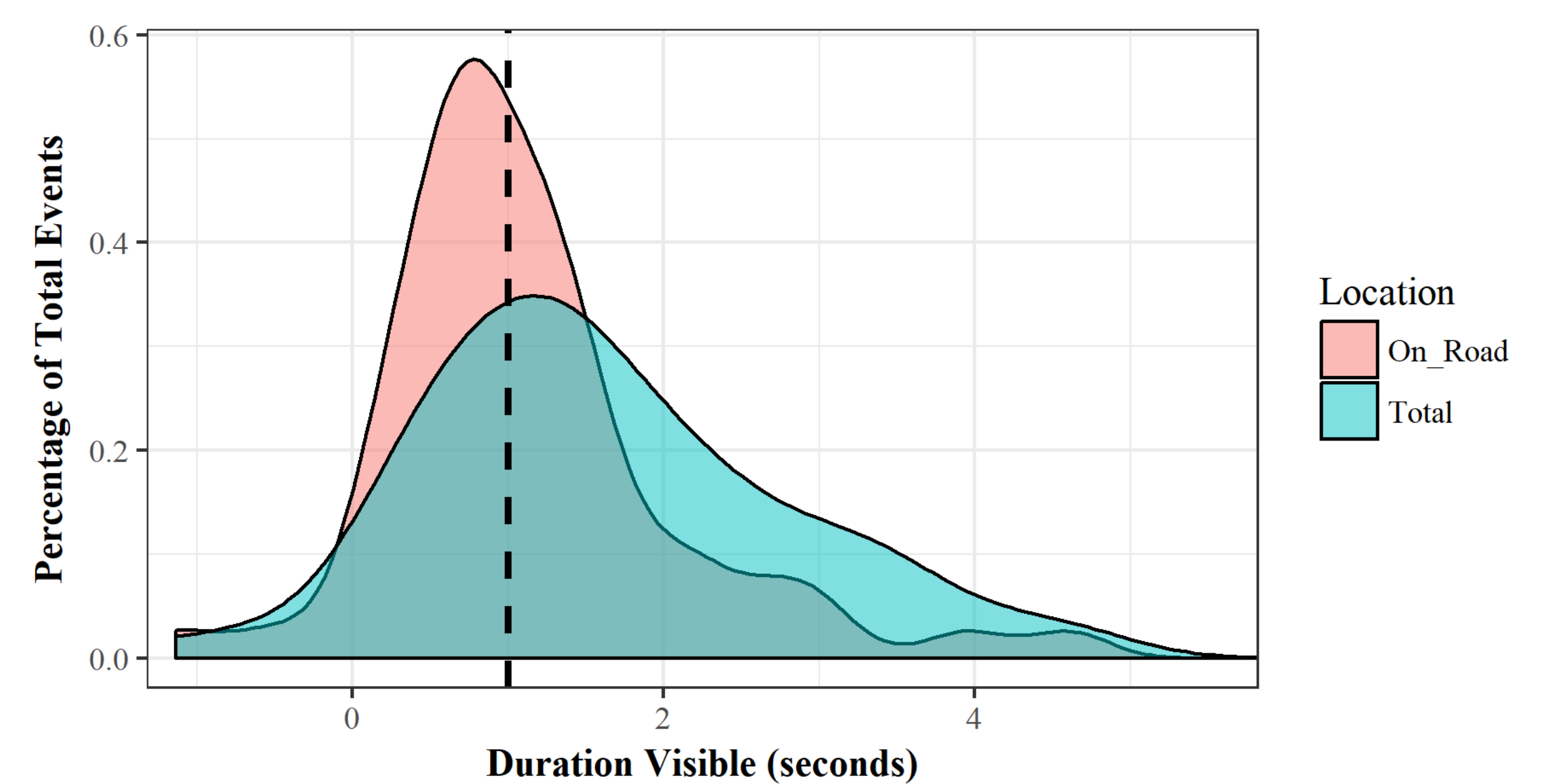


Straight crossing path interactions were the most common interaction type

Most bicyclists were visible for longer than one second



The driver braked an average of 1.18s (median 0.49s) prior to the impact proximity point



Conclusions

- The SHRP-2 naturalistic driving study provided an in-depth look at the characteristics of these interactions which can inform the design and testing of potential interventions.
- While active safety systems like AEB are a promising solution to these collisions, current technology may not prevent all vehicle-bicycle collisions.

Acknowledgements

The authors would like to acknowledge the Toyota Collaborative Safety Research Center (CSRC) and Toyota Motor Corporation for funding this study. Our special thanks to Rini Sherony of Toyota for sharing her technical insights and expertise throughout the project.

References

- [1] National Center for Statistics and Analysis, "Bicyclists and other cyclists: 2016 data," in "Traffic Safety Facts," Washington, DC: National Highway Traffic Safety Administration, DOT HS 812 507, 2018.
- [2] B. Beck et al., "Bicycling crash characteristics: An in-depth crash investigation study," *Accident Analysis & Prevention*, vol. 96, pp. 219-227, 11// 2016.
- [3] C. J. Hamann and C. Peek-Asa, "Examination of adult and child bicyclist safety-relevant events using naturalistic bicycling methodology," *Accident Analysis & Prevention*, vol. 102, pp. 1-11, 2017/05/01/ 2017.