Engineering Countermeasures to Mitigate Reckless Driving Behavior

Objectives

- Enhance understanding of the role of reckless driving in traffic safety on Wisconsin roads
- Identify effective countermeasures to mitigate the impacts of reckless driving

Benefits

- Offers a data-driven foundation for prioritizing safety interventions
- Improves safety resource allocation and supports targeted efforts to reduce reckless driving crashes in Wisconsin

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Background

Despite great advancements in vehicle technology and infrastructure, reckless driving remains a significant risk to the safety of roadways. This project sought to enhance understanding of reckless driving, identify engineering-focused countermeasures to mitigate its impact, and identify locations most likely to experience reckless driving crashes in Wisconsin.

According to WisDOT's 2022 year-end crash statistics, there were 17,895 speed-related crashes, 29,237 distracted driving related crashes, and 7,048 impaired driving related crashes, which accounted for 13.9%, 22.7% and 5.5% of all crashes in the state, respectively.

Methodology

The study consisted of a literature review, stakeholder interviews and the development of data-driven crash risk models. The literature review synthesized national findings on countermeasures such as dynamic speed feedback signs, rumble strips, high-tension cable barriers, and infrastructure adjustments like road diets and traffic calming features. These interventions were evaluated using crash modification factors (CMFs), simulations, and empirical studies. Interviews with stakeholders—including other state DOTs' insurance companies, and vehicle manufacturers—provided insight into practical challenges and innovative solutions. These included automated speed enforcement systems, intelligent speed assistance (ISA), and in-vehicle drowsiness alerts.
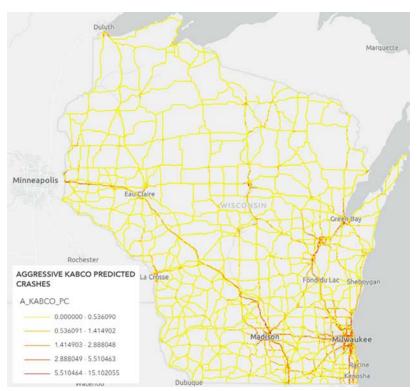
The research team also developed statistical models using Wisconsin-specific crash, roadway, and public health data. These models predict the likelihood of reckless driving crashes on various roadway types and have been integrated into a network screening tool. This tool can enable WisDOT to prioritize high-risk locations for targeted intervention.

To support visual interpretation of these results, the predicted crash risks and observed crashes were mapped across the statewide network, enabling spatial identification of high-risk roadway segments. The maps provide a clear and intuitive way to highlight locations where specific reckless driving behaviors are more likely to result in crashes, helping agencies focus safety efforts geographically.

Map showing predicted aggressive driving-related crashes by segment

Results

Based on the study, sites with higher predicted crashes are often associated with factors such as higher annual average daily traffic, longer segment lengths, and undivided or relatively wide roadways. On the other hand, sites with lower predicted crashes are often associated with relatively higher posted speed limits and the presence of wider shoulders. Additionally, speeding was identified as having a relatively higher risk of resulting in crashes.

Recommendations for Implementation

Based on the research results, the team recommends that WisDOT prioritize network screening at sites with higher risks and consider targeted countermeasures such as median installation, shoulder widening, and traffic calming treatments. At sites where speeding contributes significantly to crash risk, it is recommended that WisDOT consider implementing speed management strategies, such as speed feedback signs or geometric modifications.

To maintain the effectiveness of the tool, regular model updates and validation with the most recent crash data are encouraged, alongside ongoing training for users to correctly interpret outputs and implement appropriate safety improvements.

Interested in finding out more?
Final report is available at:
WisDOT Research website

This brief summarizes Project 0092-24-11
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