



TECHNICAL SUMMARY

Questions?

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Investigator:

Nichole Morris, University of Minnesota

TOTAL PROJECT COST:

\$270,520

LRRB PROJECT COST:

\$135,260



Safety treatments include signs encouraging drivers of turning vehicles to look for pedestrians.



Improving Driver Yielding to Pedestrians at Intersections

What Was the Need?

Pedestrian deaths are at a 30-year high nationally—a trend that is mirrored in Minnesota. [Previous research](#) in Saint Paul found that driver yielding significantly increased at unsignalized crosswalks following a multifaceted approach that included the installation of signage and other low-cost engineering solutions combined with enforcement through the city's [Stop for Me](#) campaign. It was unclear, however, which methods were most effective.

Most serious pedestrian crashes often happen at signalized intersections. As more communities are encouraging multimodal travel, the Local Road Research Board (LRRB) and MnDOT wanted a broader research effort that included signalized intersections to understand the comparative effectiveness of enforcement and engineering solutions.

What Was Our Goal?

The goal of this study was to evaluate existing and new engineering countermeasures to improve driver yielding to pedestrians at both signalized and unsignalized intersections across the Twin Cities.

What Did We Do?

This project began with an update to an earlier literature review of research on police enforcement of crosswalk laws and other pedestrian safety countermeasures. Then researchers undertook a 26-week data collection effort, from April to November 2021, in both Saint Paul and Minneapolis.

The initial intent of the study included a component that compared the effects of police enforcement with engineering countermeasures such as signage on driver yielding to pedestrians. However, that component was removed at the study's start because of the socio-political climate surrounding police in the region and uncertainty over capacity to successfully implement enforcement of crosswalk laws. The final study design compared the effects of engineering treatment to no treatment at signalized and unsignalized intersections.

To select study sites, researchers worked with city, county and state partners to review pedestrian crash analyses in both Saint Paul and Minneapolis. Priority was given to sites with a history of pedestrian crashes. Half of the chosen sites were signalized intersections that included an adjacent unsignalized, marked intersection with similar pedestrian crash risks.

Engineering countermeasures were installed after 10 weeks of baseline data collection at seven signalized and seven unsignalized intersections across the two cities. At unsignalized intersections in Minneapolis, pedestrian crossing signs and temporary pedestrian refuges were installed; at signalized intersections in Saint Paul, hardened centerlines and advanced stop bars were installed. Eighteen intersections without additional treatments were identified as generalization sites to determine if increased yielding behavior at treated sites was spread to nearby untreated intersections.

Additionally, community feedback, or social norming, signs were posted at eight locations in Saint Paul and six locations in Minneapolis. Updated weekly, the signs displayed the previous week's yielding percentage from all study sites in each city.

Improving the rates of drivers yielding to pedestrians has been challenging despite crosswalk laws. Expanding on a previous study, researchers further explored the effectiveness of engineering treatments at road crossings, giving agencies a deeper understanding of how to maximize pedestrian safety.

“This research showed that no single countermeasure will increase driver yielding rates toward pedestrians. Combinations of different strategies are needed for pedestrian safety. We still have some issues to explore to ensure safe multimodal travel for everyone.”

—**Amber Dallman**,
Director, MnDOT Office of Sustainability and Public Health

“We learned through this work that while localized safety treatments can effectively increase yielding at high-risk intersections, a more general cultural shift in drivers will likely require an enforcement component.”

—**Nichole Morris**,
Associate Research Professor, University of Minnesota Department of Mechanical Engineering

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Community feedback signs are most effective when the display indicates over 50% are engaging in the activity. During the study, Saint Paul drivers saw yielding rates above 50%; Minneapolis drivers saw lower values.

To ensure community buy-in and understanding of the study, investigators conducted outreach efforts. Various stakeholders and community groups were identified for discussions and email campaigns.

What Did We Learn?

The study found modest improvements in yielding at the treated unsignalized intersections. Yielding increased from a baseline of 48.1% to 65.5% at the Saint Paul sites and from 19.8% to 38% at the Minneapolis sites. Yielding rates at sites without treatment, however, decreased from 35.1% to 31.4% at unsignalized intersections in Saint Paul and from 26% to 24.9% in Minneapolis.

Right turn yielding improved at signalized intersections in Minneapolis but did not significantly improve in Saint Paul. The decreases at the generalization sites, however, may indicate the treatments worked in Saint Paul since the yielding rates at treated signalized intersections did not decrease.

Unlike the previous study, investigators found no evidence of citywide cultural shifts due to engineering or outreach. While the 2018 study had an enforcement component, this study expanded the treatments and the range of intersections receiving them, and included signalized intersections. Many unintended intervening factors, such as the strained community–police relations and the COVID-19 pandemic, may have skewed this study’s results by exacerbating risky driving behaviors or limiting the effect of outreach due to competing public safety topics.

Additional findings from the study suggest that effective interventions vary for right and left turns at signalized intersections. Community feedback signs are most effective when used with other interventions and when yielding rates are above 50%. Unsignalized crosswalks, even when marked, should have additional treatments. Finally, if police enforcement at crosswalks is planned as part of an educational outreach effort, it should be widely announced in advance and warnings should be issued rather than ticketing. Additionally, other community members should be present during these outreach events.

What’s Next?

Pedestrian safety will continue to be a priority for MnDOT and local transportation agencies. Potential issues to explore that ensure safe driver behavior include the role of speed in driver yielding behavior and equity issues. MnDOT is also interested in exploring creative enforcement measures, potentially using speed cameras.

This Technical Summary pertains to Report 2023-11, “Multi-City Study of an Engineering and Outreach Program to Increase Driver Yielding at Signalized and Unsignalized Crosswalks,” published January 2023. More information is available at mdl.mndot.gov.