

# RESEARCH SPOTLIGHT

## Project Information

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## Insights into the Effective Use of Dynamic Message Signs for Traffic Safety

Dynamic message signs (DMSs) have been used successfully by many transportation agencies to display travel and weather information. Increasingly, the Michigan Department of Transportation (MDOT) and other agencies use DMSs to communicate safety messages as well. There has been little study, however, on how effective these messages are in improving traffic safety. An MDOT research project provided guidance on the best ways to use DMSs for safety messaging, and the results are consistent with federal recommendations.

### PROBLEM

Many states, including Michigan, have used programmable electronic DMSs for years to display current travel and weather information. More recently, DMSs have been used to convey a variety of safety messages. While vehicles have become safer and more investments have been made in crash countermeasures, traffic fatalities have increased over the past decade in Michigan and across the United States due to driver behavior and other factors.

To encourage safer driving, MDOT has used DMSs to display both factual and more creative messages as part of a safety



Dynamic message signs can display up-to-date fatality statistics throughout the state.

campaign since 2013. However, there has been little study about the effectiveness of safety messaging on driver behavior and traffic safety. MDOT engaged researchers to understand how the public perceives these messages and if the messaging is decreasing crashes and other incidents.

*"This research provides MDOT clear direction in setting future guidance for using these invaluable devices for communicating to the motoring public. The messages we display must benefit their daily travels."*

**Mark Bott, P.E.**  
Project Manager

## RESEARCH

Researchers employed a variety of methods to understand whether DMSs are effective in improving traffic safety. A literature review found that while the impact of DMSs on traffic operations has been broadly researched, there has been limited exploration into the use of DMSs for safety messaging.

Researchers examined public opinions on DMSs by analyzing commentary on safety messaging over a six-year period. The team collected data from e-mails to MDOT and comments on social media, relevant newspaper articles and MLive, Michigan's largest news and information website. Additionally, a statewide survey yielded 937 responses to questions eliciting feedback on various safety messages on DMSs and self-reported changes in driving behavior in response to the messages.

To further assess the relationship between safety messaging on DMSs and traffic safety, researchers combined five years of historical DMS messaging with crash, roadway and traffic volume data into a geospatial dataset and analyzed possible correlations. Finally, the researchers conducted field studies at three sites to evaluate drivers' responses to DMS messages, including those related to Michigan's Move Over law, which requires drivers to

slow down and change lanes when passing stopped emergency and service vehicles.

## RESULTS

The research showed that almost half of the public commenters thought the DMSs' safety messages were valuable for raising traffic safety awareness. A concern raised by the commenters included the DMSs' potential for causing distracted driving (by drawing drivers' attention away from the road to read the sign) and the preference for the signs to be used for travel times. Others appreciated the DMSs and safety messaging.

Of the survey respondents, more than 90 percent supported the use of DMSs for communicating travel and weather-related information, while about half supported using DMSs for safety messages and crash facts. The survey also found that messages eliciting positive emotions, such as "Don't drive wild. Think of your child," were more likely to improve driving behavior – both immediately and over the long-term – than were messages eliciting negative emotions, such as "Don't drive wicked, avoid a ticket."

The researchers' analysis of historical messages and crash data showed that speed-related crashes decreased as the frequency of speed- and tailgating-related messages increased. In the field studies, drivers were more likely to comply with targeted messages relating to Michigan's Move Over law when a police car was also parked along the roadside than when an MDOT service vehicle was present. Drivers' responses to speeding-related messages were less definitive, leaving researchers to recommend these types of targeted safety messages be combined with enforcement campaigns.

## VALUE

With research results in hand, MDOT now has a better understanding of best practices for effective messaging. This study supports the notion that safety messages displayed for short durations

are supported by the public, as travel and weather advisory information are the more popular subjects for DMS messages. Also, these results are consistent with current Federal Highway Administration guidance and upcoming changes to the Manual on Uniform Traffic Control Devices on the use of DMSs for safety messaging, suggesting that safety messaging should be simple and straightforward and is most effective when part of a larger safety campaign with a clear law enforcement component. This study reinforces MDOT's alignment with federal guidance and suggests the best uses of DMSs.

## Research Administration

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**This final report is available  
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