

Uncovering the Spillover Effect from Posted Speed Limit Changes: A Tool to Examine Potential Safety Concerns

INTRODUCTION

This research investigated whether changing to higher posted speed limits on Interstates can cause spillover effects, or a systemic propagation of unsafe behaviors that results in more crashes at nearby road segments.

The spillover effect is a complex phenomenon that can encompass a range of driving behaviors attributed to a change in a nearby roadway environment. Although earlier studies have employed methods, such as speed studies, crash data analysis, and driving simulator experiments, the continuing expansion of analytical methods is crucial in improving our understanding on the consequences of posted speed limit changes and better informing safety practices aimed at ending speed-related fatalities and injuries.

This study purported to: (a) conduct a systematic literature review of spillover effects, including safety interventions and evaluation methods, and construct a set of research themes related to speeding and spillover effects; (b) develop a spatial analysis method as a screening and diagnostic tool to categorize crash trends and patterns associated with speeding; and (c) present three case studies using the proposed spatial analysis method and identify potential traffic safety concerns on adjacent roads after posted speed limits on Interstates were raised.

Results presented in this study are useful in raising awareness of the safety impact after regulatory posted speed limits on Interstates were raised, especially among local agencies that may not have the tools to quantify any unintended safety consequences along adjacent roadways within their networks.

METHODOLOGY

The study included two interconnected activities to examine the spillover effect. The first task was a systematic review of relevant literature on the spillover phenomenon. Additionally, this activity explored related subjects, including general speeding behaviors, speeding countermeasures, and alternative methods for measuring any unanticipated effects of implementing roadway treatments.

TECHNICAL REPORT:

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ABOUT THE AAA FOUNDATION FOR TRAFFIC SAFETY

Founded in 1947, the AAA Foundation for Traffic Safety in Washington, D.C., is a nonprofit, publicly supported charitable research and educational organization dedicated to saving lives by preventing traffic crashes and reducing injuries when crashes occur. Funding for this research was provided by voluntary contributions from AAA/CAA and their affiliated motor clubs, individual members, AAA-affiliated insurance companies, and other organizations or sources.

**607 14TH STREET, NW, STE 701
WASHINGTON, DC 20005
202-638-5944
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The second activity was to understand spillover from a geographic perspective and explore patterns, trends, and relationships among speed-related crashes occurring on adjacent roadways near Interstates that have raised posted speed limits. Hot spot analyses were conducted on roads within a 1-mile radius of Interstates. The purpose of this task was to quantify and visualize differences in speed-related crash clusters in areas surrounding the Interstate segments before and after a regulatory speed increase became effective. The sites selected for the spatial analysis included communities in Georgia, Michigan, and Oregon. Before and after comparisons were performed with QGIS software using available crash data from the adjacent roadways.

KEY FINDINGS

The objective of this project was to ensure road networks in communities across the United States can be safe for their users by identifying potential safety risks caused by the spillover effect. The following takeaways from this research offer insights into the importance of evaluating safety impacts on nearby traffic networks when posted speed limits on Interstates are raised:

- The literature provided evidence that spillover effects did manifest in many of the conditions and interventions in which they have been studied, though results are not consistent across speeding contexts. There is a need to continue developing the depth and breadth of literature on the impact of speed limit changes with more investigations in a wider variety of roadway environments, safety considerations, and spatial and temporal effects.
- After the posted speed limits were raised on Interstates, comparing ‘before’ and ‘after’ crashes alone may not yield the true safety impact. Spatial analyses identified safety concerns (i.e., hot spots) on multiple adjacent roads along the Interstates examined in this project. Such an approach offers a repeatable and systemic way to examine unintended impacts from posted speed limit changes. State and local transportation agencies can consider using spatial analysis to accurately assess traffic safety impacts.
- When posted speed limits on Interstates were raised to accommodate operating speeds of vehicles and to increase traffic flow and throughput, adjacent roads being operated and managed by counties, cities, and towns could see increases in traffic safety concerns because of the spillover effect. To minimize unintended traffic safety consequences, it is important for state-level departments to coordinate and work closely with local transportation agencies when considering posted speed limit adjustments on Interstates and state highways.
- The tool used in this project measures how speed-related crashes are correlated with each other in space across a study area, and graphically presents areas of traffic safety concerns. When state and other local transportation departments can visually identify hot spots on their roads, comprehensive plans can be developed with strategies and countermeasures to address these concerns.
- Figures from the spatial analysis presented in this document not only identified hot spots, but also categorized them to different “levels of concerns.” Public transportation agencies can use these categories of hot spots to prioritize funding and countermeasure implementation decisions.
- Case study findings presented in this project demonstrated that raising the posted speed limit resulted in adverse effects on other parts of the transportation network. To minimize unintended consequences, transportation departments at various levels need to work collaboratively to identify potential safety issues and mitigation strategies and to allocate resources to implement countermeasures. Adopting a Safe System approach is an example of proactively managing and operating a transportation network. Instead of focusing on procedures for adjusting posted speed limits based on operating speeds of vehicles or increasing throughputs, facilitating accurate assessments that consider potential unintended consequences can lead to targeted and more impactful interventions that place emphasis on educating drivers about the benefits of following the posted speed limit and the dangers of speeding, utilize technology to manage traffic flows and monitor dangerous driving behaviors and modify various components of roadway designs to promote safe driving behaviors.