Overview of Speeding Enforcement Strategies

NHTSA Working Group Meeting

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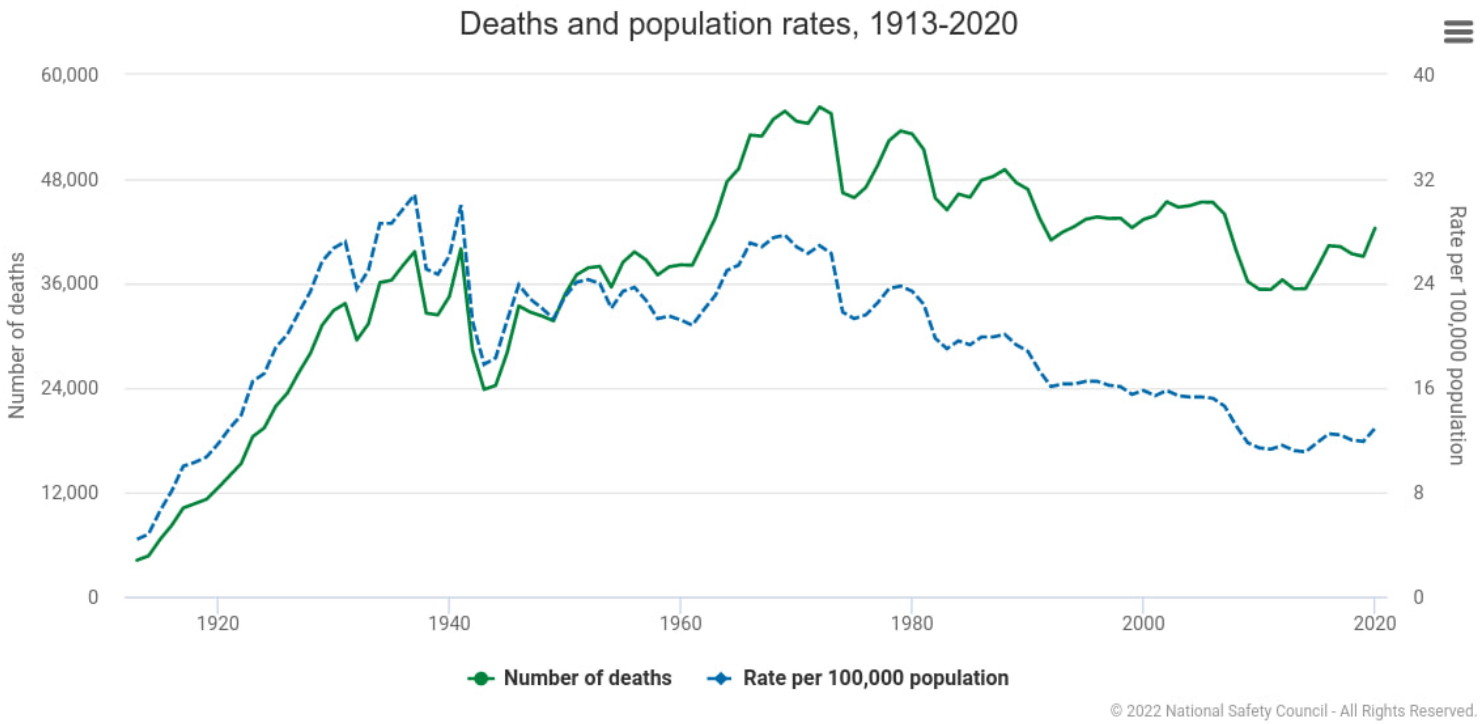
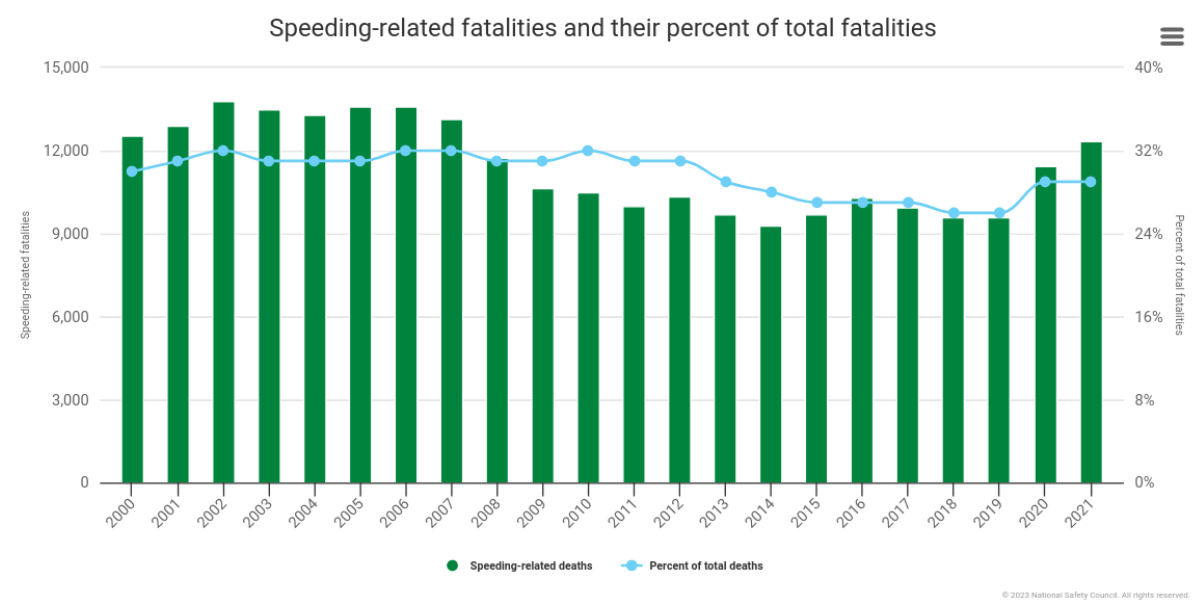
Outline

Introduction



Speeding: A Critical Concern in Traffic Management

- Speeding is a major contributor to road accidents, fatalities, and injuries.
- Speeding-related incidents have been increasing in recent years, with 29% of traffic fatalities in 2021 attributed to speeding.
- Addressing speeding behavior requires an a social science expertise.



Speeding: A Critical Concern in Traffic Management

- Enforcement strategies are categorized into staffed and inanimate/automated approaches.
- Staffed enforcement, such as police patrols, is effective but high-cost and operationally limited.
- Inanimate and automated strategies, like speed cameras and scarecrow police cars, offer cost-effective and 24/7 operation solutions, but have other setbacks usually connected to drivers' adaptability and attitudes.

Outline

Staffed vs Automated Enforcement Strategies

- While both staffed and automated speed enforcement strategies impact total crashes, staffed enforcement significantly impacts serious crashes. This difference could be due to staffed enforcement targeting high-risk drivers specifically, while automated enforcement deters a broader spectrum of the driving population (Tay, 2009).
- Increased enforcement or reduced speeds by other drivers had the most significant impact on individual speed choice. Stricter sanctions appeared to only marginally affect speed choice (Ryeng, 2012).
- Key ingredient of both strategies: perceptual deterrence and hot spots policing. Additionally, staffed strategies do not specifically target speeding but address a wider spectrum of driving issues. We know that it is effective across the board but is costly and personnel is limited.

Inanimate Automated Enforcement: General Overview

- Inanimate and automated enforcement strategies form a crucial part of modern traffic management.
- Devices like speed cameras, point-to-point cameras, scarecrow police cars, etc., are used to deter speeding.
- Key advantages: cost-effective (due to high VoL), continuous 24/7 monitoring and enforcement, and substantial returns on investment.
- Such strategies can effectively reduce accident frequency and severity, proving economically viable in the long term.

Outline

Stationary Speed Cameras

- Description: Fixed installations that monitor vehicle speeds, usually deployed in high-risk areas.
- Effectiveness: Visible presence of cameras encourages adherence to speed limits, reducing speeds and accidents (Tavolinejad et al., 2021; De Pauw et al., 2014).
- Main Issue: ”Kangaroo-jumping” - drivers slow down near cameras and speed up afterward (Tavolinejad et al., 2021).
- Cost-Benefit: Every dollar spent on traffic cameras returns $12 under prevailing conditions (Fries et al., 2007). (NB! We have very limited CBA)
- Strategic camera placement is critical for optimum safety effects (Li et al., 2020).

Point-to-Point (P2P) Cameras

- Description: Description: Measure average speed of a vehicle over a distance, not just instantaneous speed at a specific point. P2P cameras help overcome ”kangaroo-jumping” as they encourage consistent, legal speed across the entire monitored stretch.
- Takeaway: P2P systems have proven more effective than stationary cameras in reducing speeding and accidents (Montella et al., 2015).
- Main Concern: Effectiveness may decline over time as drivers learn to manipulate the system. Most effectiveness evaluations have been done using European data, calling for additional studies across diverse global contexts.

Driver Attitudes Perceptions Towards Traffic Enforcement Cameras

- Majority of drivers in cities with longstanding camera programs, such as red light cameras, believe they enhance safety and support their continued use (McCartt and Eichelberger, 2012).
- Drivers perceive that cameras fail to account for the nuances of individual situations and their personal driving skills, influencing their attitudes towards stationary speeding cameras (Blincoe et al., 2006).

Driver Attitudes Perceptions Towards Traffic Enforcement Cameras: Cont.

- Drivers tend to support and comply more with non-camera-based methods of speed enforcement compared to camera-based methods. Drivers who conform to speed limits are more receptive and supportive of cameras, compared to those who manipulate or defy them (Corbett, 2000).
- The effectiveness and acceptance of traffic enforcement cameras depend on a range of factors, including public perception, enforcement methods, and individual driving behaviors. Public education and strategic deployment of these technologies can help improve their acceptance and effectiveness.

Speeding Cameras: Preliminary Conclusion

- Inanimate and automated enforcement strategies offer a cost-effective, around-the-clock solution to improving road safety and reducing speeding.
- The return on investment further solidifies their role as critical components in traffic management.
- Despite certain limitations, both stationary and P2P camera systems show promise in changing driving behaviors and enhancing road safety.
- Due to dubious legal status in many US jurisdictions our knowledge about these strategies is somewhat limited.
- It is not a universal solution for equity issues.

Outline

Effectiveness of Scarecrow Cars

- Scarecrow cars effectively reduce dispatched calls and crime rates during deployment (Worrall et al., 2022). An interrupted time-series analysis in Mesquite, Texas, confirmed the intervention's effectiveness. However, there was a noted increase in dispatched calls post-deployment, indicating the temporary nature of its impact.
- Scarecrow cars, particularly realistic police cut-outs (like "Constable Scarecrow"), can significantly reduce speeding (Simpson et al., 2020). A study conducted in two Canadian cities (British Columbia) found a reduction in speeding along arterial roadways when a scarecrow car was present. Scarecrow cars represent a low-cost, easily implemented intervention for controlling speed and reducing traffic collisions.

Impacts of Road Layout Geometry on Traffic Management

- The risk of injuries in different types of crashes is influenced by traffic flow conditions and various roadway features (Xu et al., 2018). Factors like the radius of horizontal curves, heavy vehicle traffic percentage, and deployment of covert speed cameras significantly influence speeding behavior (Afghari et al., 2018).
- Street characteristics and site-specific unobserved effects have a profound influence on vehicle speed proportions (Eluru et al., 2013).The radius of horizontal curves, grade at the point of curvature, and truck load status significantly influence heavy vehicle speeds on two-lane rural roads (Llopis-Castelló et al., 2018). Horizontal curve radius has a larger influence on passenger car speeds, while vertical grades impact truck speeds more significantly (Morris and Donnell, 2014).

Impacts of Road Layout Geometry on Traffic Management: Cont.

- Other influencing factors include the use of speed cameras, handheld cell phone and text messaging bans, and sociocultural characteristics (Dong et al., 2017). Moreover, most of our knowledge about road layout and speeding comes from engeneering and not behavioral research.

Conclusion: Challenges and Prospects

- Every strategy has its limitations. Adaptation effects pose significant challenges in enforcement effectiveness.
- The combination of various enforcement strategies appears to be the most promising approach.
- Future research and technological advancements can further refine these strategies. I.e., no ”silver bullet” solution. Most likely we need a creative combination of various strategies.

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