

COUNTERMEASURES TO REDUCE DROWSY DRIVING: RESULTS OF A LITERATURE REVIEW AND DISCUSSIONS WITH EXPERTS

INTRODUCTION

Drowsy driving is a significant threat to traffic safety and public health. Although underreported in government statistics, previous research by the AAA Foundation for Traffic Safety has estimated that 6% to 11% of all police-reported motor-vehicle crashes and 16% to 21% of fatal crashes likely involve drowsy driving. There is a need to identify effective strategies for reducing the prevalence of drowsy driving and the crashes, injuries, and deaths that result from it.

The purpose of this research was to describe the current state of knowledge regarding the effectiveness of countermeasures intended to combat drowsy driving or mitigate its consequences. This was accomplished through a review of recent literature as well as discussions with experts.

KEY FINDINGS

The results of this research highlight the complexity of reducing drowsy driving and suggest the following conclusions:

- There is evidence that obtaining sufficient sleep, napping, and consuming caffeine reduce the risk of drowsy driving. Numerous other behavioral countermeasures were identified, but there is insufficient or mixed evidence regarding their effectiveness.
- There is evidence that advanced driver assistance systems, such as forward collision warning/automatic emergency braking and lane departure warning/lane keeping assistance, reduce rates of crashes in general, however, more research is needed to determine their effectiveness with respect to drowsy driving crashes specifically. There is insufficient or mixed evidence of the effectiveness of other types of technology-based countermeasures.
- Infrastructure-based countermeasures can prevent or mitigate the severity of crashes, but they are not specifically designed to keep drivers alert or to reverse drowsiness. There is evidence that shoulder and centerline rumble strips are highly effective in reducing crash rates overall, though more research is needed on their effectiveness with respect to drowsy driving crashes specifically.
- Education is important for at-risk populations, but it is insufficient to reduce drowsy driving by itself and must be combined with other countermeasures.
- Sleep disorders contribute to drowsy driving. Treatments are available for sleep disorders, though more research is needed to determine their effects on drowsy driving.
- Policy countermeasures including drowsy driving laws as well as workplace policies require further research to examine their effectiveness in preventing drowsy driving.



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ABOUT

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.



The literature review and discussions with experts also identified three key cross-cutting issues for future research and action:

- Many countermeasures have been examined in laboratory settings and appear promising. However, drivers may react to drowsiness or use the countermeasure differently in real-world situations. There is a need for research in naturalistic settings or with real-world data to evaluate their effectiveness and to understand how they may interact with various contextual factors.
- Reliable and informative data are critical to understanding the prevalence of drowsy driving, educating the public, and evaluating countermeasures. However, driver drowsiness is difficult to measure, especially after a crash. There is a need for improved data on drowsy driving.
- Disclosing drowsiness or medical conditions that cause drowsiness is often stigmatized in the workplace. This stigma is a barrier to addressing drowsy driving. Efforts are needed to combat drowsiness-related stigma in the workplace.

METHODOLOGY

Researchers from NORC at the University of Chicago and the National Advanced Driving Simulator at the University of Iowa performed a literature review and environmental scan, convened a panel of subject matter experts, and interviewed several additional experts to document the current state of knowledge regarding drowsy driving countermeasures and their effectiveness.

The literature review searched the University of Chicago online library system and the Transport Research International Documentation integrated database for research on drowsy driving published in English between 2010 and 2020 that pertained to drowsy driving countermeasures. The environmental scan used Google, Google Scholar, and organizational websites to identify projects, white papers, toolkits, and unpublished papers focused on drowsy driving countermeasures.

A technical expert panel was convened in April 2021 to review and discuss results of the literature review and environmental scan as well as to identify additional resources, research needs, and implementation issues related to drowsy driving countermeasures. Panelists included seven researchers and practitioners representing government, academia, and nonprofit research and advocacy organizations, with expertise in drowsy driving, traffic safety, and sleep science. Nine additional experts were also interviewed individually.

The researchers ultimately identified 152 articles or reports with information about 207 countermeasure evaluations related to drowsy driving. Key details of relevant references were entered into a database. The accompanying technical report summarizes the findings of the literature review as well as key points raised in the technical expert panel meeting and interviews.

REFERENCE

Bayne, A., Trivedi, N., Liotta, M., Siegfried, A., Gaspar, J., & Carney, C. (2022). *Countermeasures to Reduce Drowsy Driving: Results of a Literature Review and Discussions with Experts* (Technical Report). Washington, D.C.: AAA Foundation for Traffic Safety.

MORE INFORMATION

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