



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**



Traffic Tech

TECHNOLOGY TRANSFER SERIES

DOT HS 813 555

April 2024

Older Drivers' Use of Rearview Video Systems

Background

In 2014 NHTSA specified an area behind the vehicle that must be displayed to the driver while backing, which applied to new passenger vehicles beginning with model year 2018. Most manufacturers responded by adding rearview video systems (RVSs) to their vehicles. Research has shown that using RVSs can reduce crash risk (Hurwitz et al., 2010); however, RVSs are most effective if drivers use the displays.

Methods

This study compared older drivers' performance as they completed common backing tasks using traditional rearview mirrors to mirrors and RVSs. The research team used an instrumented study vehicle to collect measures of backing performance from 80 licensed drivers. Half the participants were 60 to 69 years old, and the remainder were 70 and older. Half of each age group were familiar with RVSs, and the others were unfamiliar.

The full study had five backing tasks, which included short backing (backing out of a parking space) and a surprise trial that occurred after the participant assumed that data collection was complete. Participants completed the short backing task three times, twice with access to the RVS (once with and once without an obstacle), and once without access to the RVS, without an obstacle. The obstacle was a low-contrast traffic cone placed behind the vehicle. The same obstacle was placed behind the vehicle for the single surprise trial.

Participants completed the backing tasks on Virginia Tech Transportation Institute's Smart Road Surface Street, which is a flat, paved, closed road course that allowed for "backing stations" with easy transition between tasks.

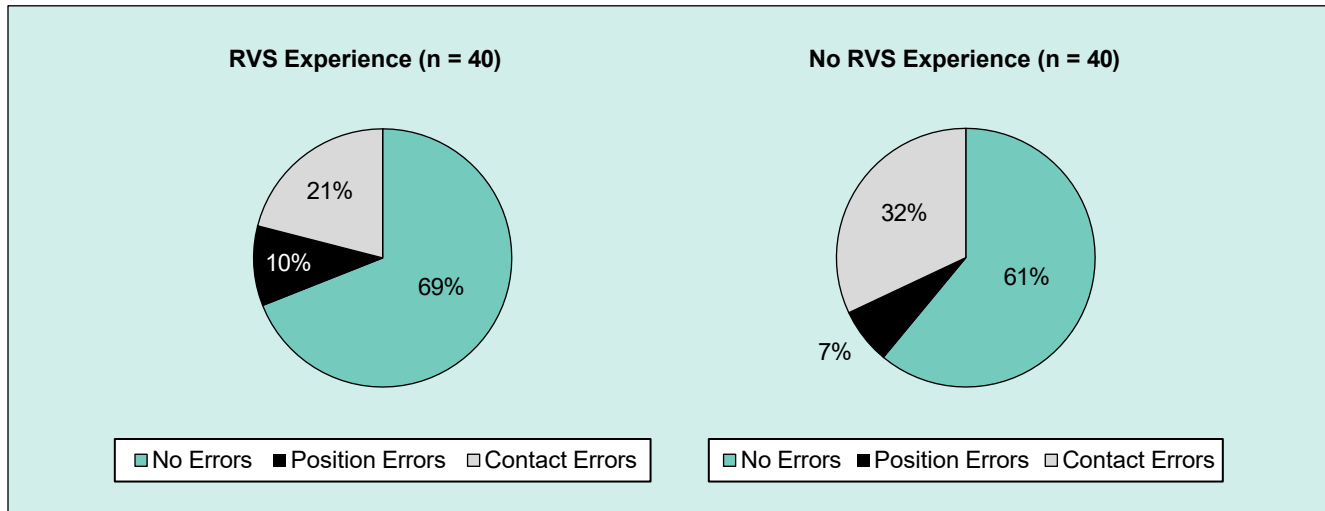
The research team analyzed two types of backing errors, contact errors in which the participant hit an obstacle or other object, and position errors in which the vehicle was out of alignment. Group differences described below were statistically significant at $p < .05$.

Results

Short backing

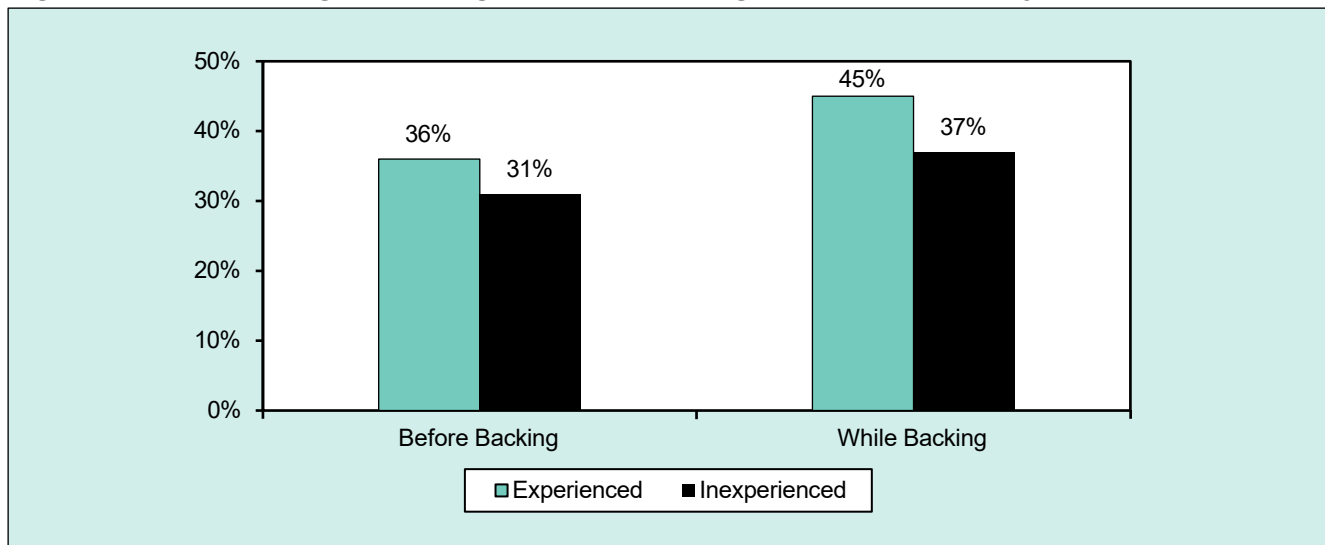
When participants had access to the RVS, they completed this task with and without an obstacle behind the vehicle. During the trials that included an obstacle, those with experience using an RVS were 11 percentage points less likely to hit the obstacle than were those without such experience. However, the experienced and inexperienced groups performed similarly on trials when the RVS was not available.

Figure 1. Short Backing, RVS Available by RVS Experience



Researchers also analyzed eye movement data during this task. They found that participants with RVS experience spent a larger percentage of time looking toward the RVS both before they began to back (a difference of 5 percentage points) and during the backing task (a difference of 8 percentage points).

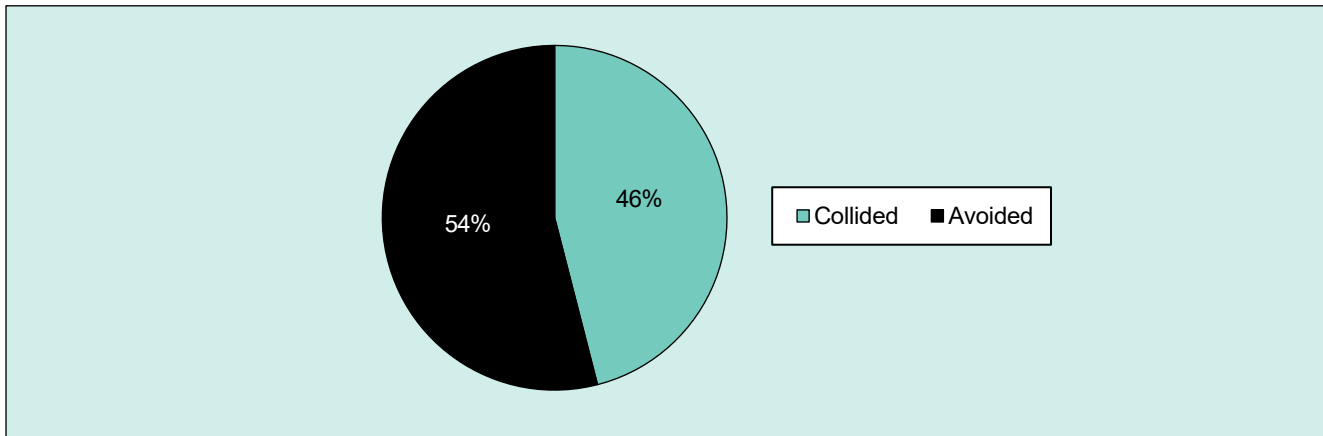
Figure 2. Short Backing, Percentage of Time Glancing Toward RVS Display



Surprise Trial

After completing the backing tasks described above, the participants were instructed to drive forward into a parking space for debriefing. As one researcher occupied the participants, another research assistant placed a low-contrast traffic cone 2 feet behind the rear of the vehicle at the centerline, such that it was only visible via the RVS. Data for two participants were not available due to technical failure.

While 54% of participants who used the RVS during the trial avoided the cone, only 5% (1 participant) who did not use the RVS avoided it. That participant turned sharply while backing and avoided the cone without knowing it was there. Overall, the participants 60 to 69 years old who had RVS experience exhibited the best performance with 70% avoiding the obstacle. Participants without RVS experience from both age groups exhibited the poorest performance, with only 20% avoiding the obstacle. Participants 70 and older who had RVS experience were in the middle with 55% avoiding the obstacle.

Figure 3. Surprise Trail Performance Among Those Who Used the RVS (n = 57)

The findings showed that older drivers who used the RVS, and particularly those who had experience with the technology, were better able to avoid obstacles while completing common backing tasks regardless of age. However, even those with RVS experience made errors, suggesting that they may not receive the full benefit of the RVS. This finding suggests that training in RVS use may enhance even experienced drivers' ability to use the technology more effectively.

For information on programs shown effective in improving older driver safety, see Chapter 7 in:

Venkatraman, V., Richard, C. M., Magee, K., & Johnson, K. (2021, July). *Countermeasures that work: A highway safety countermeasure guide for State Highway Safety Offices*, 10th edition, 2020 (Report No. DOT HS 813 097). National Highway Traffic Safety Administration. <https://rosap.nhtsa.gov/view/dot/57466>

Reference

Hurwitz, D. S., Pradhan, A., Fisher, D. L., Knodler, M. A., Muttart, J. W., Menon, R., & Meissner, U. (2010, April). Backing collisions: A study of drivers' eye and backing behaviour using combined rear-view camera and sensor systems, *Injury Prevention*, 16(2), 79-84.

Download a copy of *Older Drivers' Use of Rearview Video Systems* (DOT HS 813 565) from the National Transportation Library (https://rosap.nhtsa.gov/collection/nhtsa_bsr).

The suggested APA format citation for this document is:

Staplin, L., Owens, J., Wotring, B., Mastromatto, T., Lococo, K. H., & Sifrit, K. J. (2024, April). *Older drivers' use of rearview video systems* (Traffic Tech Technology Transfer Series. Report No. DOT HS 813 555). National Highway Traffic Safety Administration.



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

TRAFFIC TECH is a publication to disseminate information about traffic safety programs, including evaluations, innovative programs, and new publications. Feel free to copy it as you wish.