



# Pedal Error Crashes

This project examined the prevalence of crashes in which the driver pressed the accelerator pedal when he or she intended to press the brake pedal, and the characteristics associated with these crashes.

Technical literature published between 1980 and 2009 included few studies regarding pedal application errors. Studies conducted using driving simulators identified two predictors of pedal errors: increased driver age and impairments in drivers' executive function as measured by clinical tests of cognitive functioning.

## Crash Reports

A search of news reports documented 899 pedal misapplication crashes in the United States over the past 10 years. These reports provided information about the drivers and driving tasks most often associated with such crashes.

Analyses of the North Carolina State crash database provided similar information on crashes resulting from pedal errors. The data covered 2,411 pedal misapplication crashes between 2004 and 2008. Unlike in most States, North Carolina police file reports on crashes that occur in parking lots.

The lack of a comprehensive listing of crashes associated with unintended acceleration limited researchers' ability to collect data for this study. Media reports covered only the most "news-worthy" crashes, and archives purge the oldest reports over time. Police crash reports lack codes for pedal misapplication, so analysts searched crash narratives from police crash reports to identify pedal error crashes. Even if such codes were present, law enforcement officers, who rely on self-reports of behavior, might not be able to apply them accurately. Further, not all crashes are reported to police. Thus, each data source likely underestimated the frequency of pedal misapplication crashes.

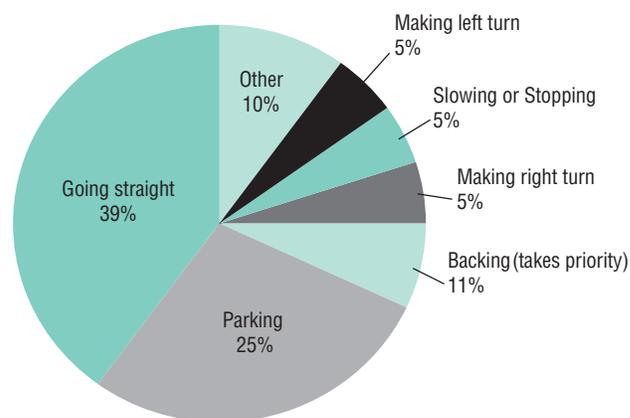
## Crash Location

Seventy-seven percent of the crashes reported by the media occurred in parking lots or driveways, with the remainder occurring on roadways. North Carolina data showed a similar pattern with most of the crashes occurring in parking lots

or driveways, but to a lesser degree; 57% of crashes were in parking lots or driveways and 42% on roadways.

Figure 1 shows the drivers' pre-crash maneuvers as reported in the North Carolina crash data. Since police reports indicated that 57% of these crashes occurred in parking lots, but only 25% of pre-crash maneuvers were "parking," a number of those going straight ahead when they crashed were probably in a parking lot.

**Figure 1. Pre-Crash Maneuver From North Carolina Data**

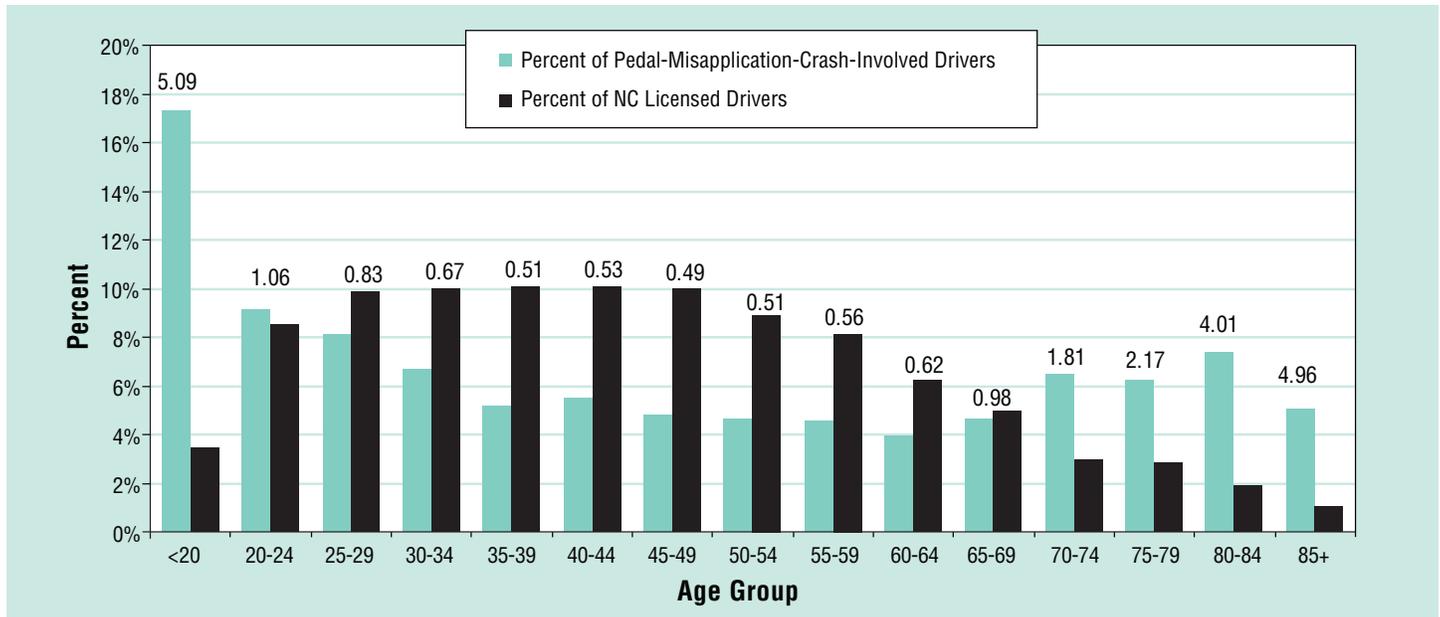


## Driver Age

Plotting the age of crash-involved drivers for both the NC database and the news media reports demonstrated a marked U-shaped distribution. Older drivers were particularly over involved in pedal misapplication crashes in the media reports. The sensational nature of these events may increase the likelihood of the media reporting them, often in multiple outlets.

Figure 2 shows the relationship between the percentages of different age groups of drivers involved in pedal application crashes (left bar) based on data from the North Carolina database as compared to their representation in all licensed drivers (right bar).

**Figure 2. Percentage of Drivers in Pedal Misapplication Crashes in 2004-2008 vs. Percentage of Licensed Drivers in North Carolina, by 5-Year Age Groupings**



The numbers above each pair of bars are the proportion of pedal error crashes divided by the proportion of all licensed drivers. Values greater than one indicate overrepresentation and less than one indicate underrepresentation; for example, drivers younger than 20 accounted for just over 3% of all crashes, but nearly 18% of pedal error crashes, resulting in more than a 5-fold overrepresentation.

Normal age-related changes in neural function may contribute to the over involvement in pedal misapplication crashes at both ends of the driver age distribution. The areas of the brain that support performing complex tasks do not fully develop until around age 25, and those areas have been shown to decline with advanced age. A panel of driver rehabilitation specialists, who provided information about their clinical experience with drivers making pedal errors, supported this premise. They reported that clients who performed poorly in clinical tests of executive function made pedal application errors. This was not limited to older drivers—panelists noted that young clients with diagnoses of autism and attention-deficit disorder were prone to these errors.

### Driver Sex

A consistent finding across data sources was the overrepresentation of female drivers in pedal misapplication crashes. Females were the drivers in nearly two-thirds of the pedal misapplication crashes identified in the North Carolina crash database analysis and in the media scan. By contrast,

female drivers account for just under half of all crashes (44%). Possible explanations include:

- Women doing more of their driving in parking lots where these crashes occur most often; and
- Poorer “fit” in cars due to shorter stature, making it more difficult to reach the pedals.

Explaining this anomaly would be a good starting point in designing crash countermeasures.

### Conclusions

Conclusions based on this project are tentative, given the limited data available; however, the data suggest some patterns that researchers should explore further. Pedal misapplication crashes tended to occur in parking lots. Women were more likely than men to have crashes due to pedal errors. The youngest and the oldest drivers were overrepresented. Further research would help to better understand why these groups are overrepresented, and would be useful in guiding development of countermeasures to reduce pedal error crashes.

### How to Order

Download a copy of *Pedal Application Errors* (98 pages plus appendices), prepared by Highway Safety Research Center, University of North Carolina, from [www.nhtsa.gov/staticfiles/nti/pdf/811597.pdf](http://www.nhtsa.gov/staticfiles/nti/pdf/811597.pdf). Kathy Sifrit, Ph.D., was the project manager.