Summary Report:

Accident Analysis of Older Drivers on Freeways

The average age of the population in this country continues to increase annually, as does the use of the automobile as the primary means of transportation for older persons. In addition, there has also been an increase in the amount of driving that takes place on both urban and rural freeways. Combining these facts, it is important to gain a better understanding of the problems that older drivers may be having on freeways. Thus, better geometric and traffic control designs could be developed for the various elements of the freeway system, which would result in safer and more efficient operations that would benefit not only the older driver, but all freeway users. The analysis of freeway accidents in this effort was conducted as part of the Federal Highway Administration (FHWA) research study "Investigation of Older Driver Freeway Needs and Capabilities."

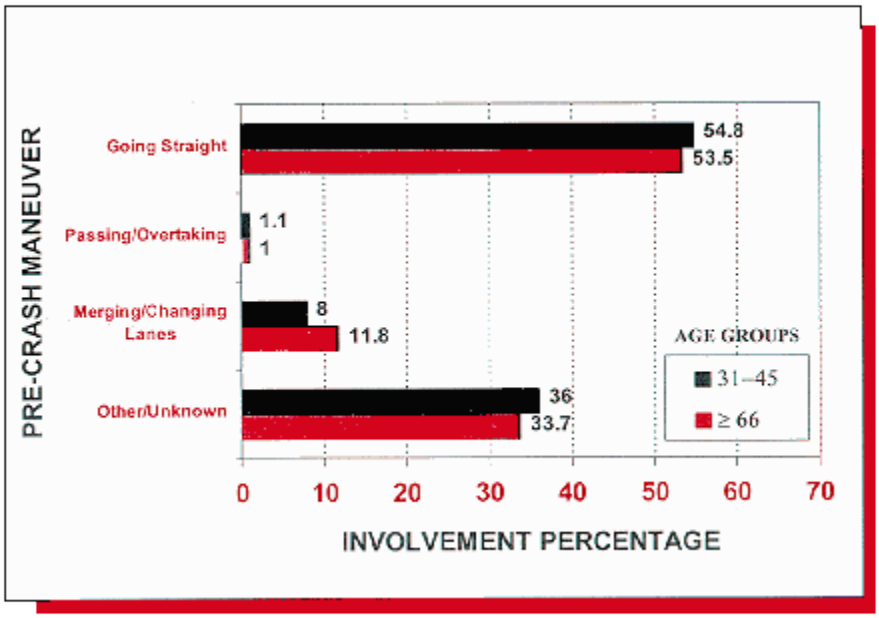

Figure 1. Involvement percentage by pre-crash maneuver for all multiple-vehicle accidents.

State Data Bases Used

The accident data bases used in achieving the study objective included files from five of the State data bases presently maintained in the Highway Safety Information System (HSIS). The years of data included in the analysis were as follows:

- Illinois (1988 – 1991).
- Michigan (1988 – 1991).
- Minnesota (1988 – 1991).
- North Carolina (1988 – 1992).
- Utah (1990 – 1992).

A total of 40,297 crashes were used in the analysis, including 36,142 crashes for drivers ages 3 t to 45, and 4,155 crashes for drivers age 66 and older.

Analysis Methods

Identifying the unique problems of elderly drivers on freeways was the principal purpose of the analysis undertaken in this effort. The methodology employed involved the examination of numerous contingency tables, looking for differences in involvement rates with respect to collision type and other accident characteristics between the two groups of drivers. The first group included elderly drivers age 66 and older, while the second group served as a comparison group that included middle–aged drivers between ages 31 and 45.

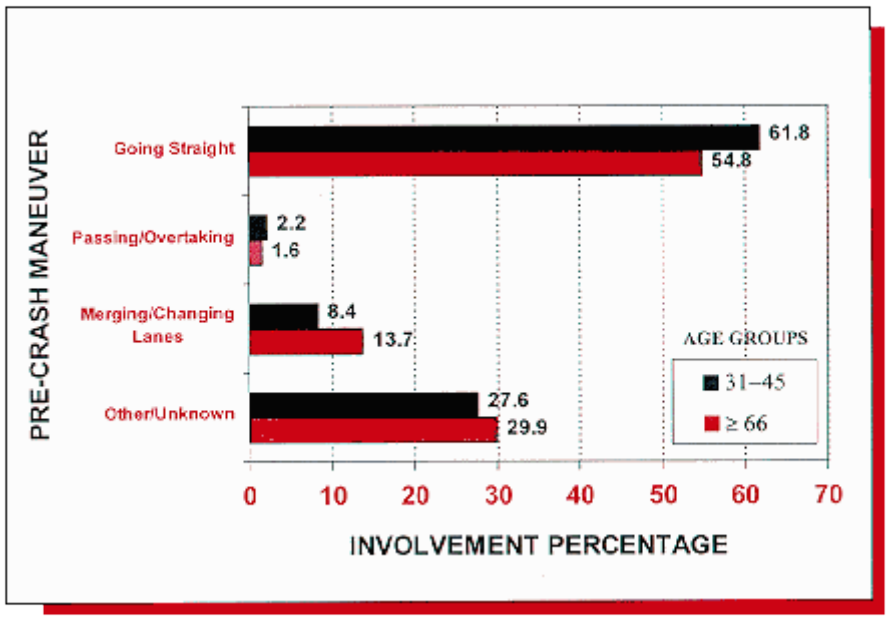

Figure 2. Involvement percentage by pre-crash maneuver for the paired-vehicle accidents

The initial analyses included all freeway accidents in which at least one driver from either age group was involved. For this effort, only the latest year of data available in each State was included. The first step in the analysis was an examination of single–vehicle vs. multip1e–vehicle accidents to determine relative involvement for each driver age group. Within each

category (single–vehicle vs. multiple–vehicle), contingency table analyses were then conducted to determine relative involvement of older drivers with respect to the following variables:

- Area (rural vs. urban).
- Roadway location (mainline vs. ramp).
- Weather condition.
- Road surface condition.
- Lighting condition.
- Collision type.
- Accident severity.
- Contributing factor.
- Pre–crash maneuver.

One of the problems with this analysis was the lack of exposure data by driver age. There are no data available that show the number of freeway drivers in the traffic stream by age in any of the data bases used, or any other known data base. Thus, it is not always possible to know if the overinvolvement of a particular age group is due to a safety problem of that age group or simply due to differences in exposure. For example, the contingency tables may show older drivers to be overinvolved in daylight accidents when compared to younger drivers. This may simply be the result of older persons performing a greater percentage of their driving during the daylight hours when compared to younger drivers. Thus, the result, either fully or partially, would be due to exposure differences.

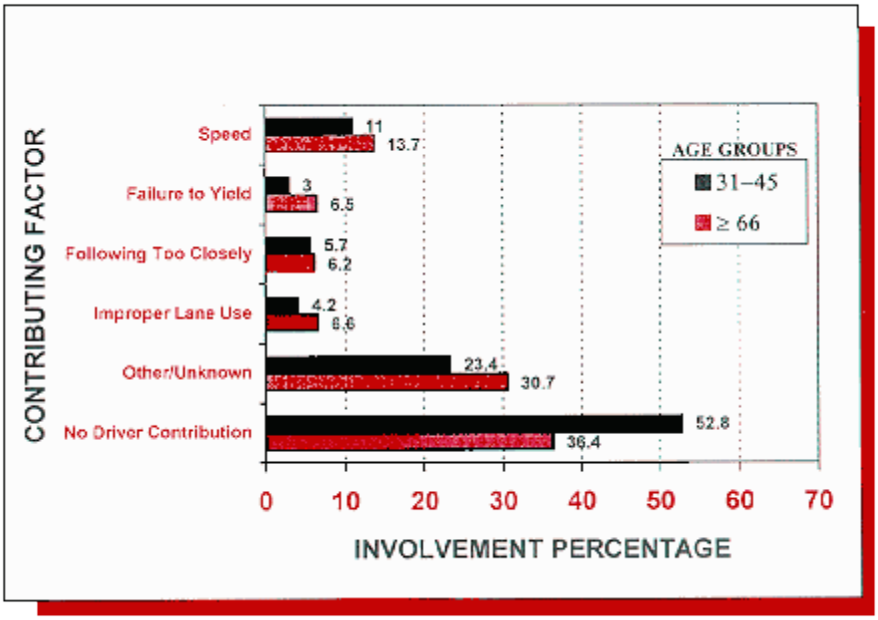

Figure 3. Involvement percentage by contributing factor for the paired-vehicle accidents

The second set of analyses was undertaken to help control for the lack of exposure data. This "paired–vehicle" analysis effort included only the 2,516 freeway accidents within the five States in which one older driver (age 66 or older) and one younger driver (between ages 31 to 45) were involved. This analysis effort also controlled for a number of other variables common to the accident, including area, roadway location, weather condition, road surface condition, lighting condition, collision type, and accident severity.

Results

The clearest result from this analysis effort was related to the pre–crash maneuvers and contributing factors of older drivers in multiple–vehicle accidents. It appears that older drivers were overinvolved to the greatest degree in accidents in which they had to change lanes. As shown in figure 1, the analysis of all freeway accidents indicated that older drivers were more likely than younger drivers to have been involved in an accident in which the pre–crash maneuver was merging or changing lanes (11.8 percent vs. 8.0 percent, respectively). The paired–vehicle analysis produced similar results, as shown in figure 2, indicating that older drivers were much more likely than younger drivers to be merging or changing lapse (13.7 percent vs. 8.4 percent, respectively). Further examination of the paired–vehicle data revealed the contributing factor with which older drivers were most often cited was failure to yield. Older drivers were cited twice as often as younger drivers for all accidents and five times as often for those accidents involving a lane–change maneuver (see figures 3 and 4). On freeway facilities, lane changes typically occur when a vehicle is entering the freeway from an on–ramp, exiting the freeway onto an off–ramp, passing a vehicle on the freeway, or simply changing lanes on the freeway. The results with regard to location (ramp vs. mainline) showed virtually no differences between the two age groups with respect to multiple–vehicle accidents. Mainline multiple–vehicle accident involvement for older and younger drivers was 77.3 percent and 79.2 percent, respectively, while ramp–related involvement was 15.0 and 14.0 percent, respectively. Thus, it cannot be assumed that older drivers are having more problems with this lane– change maneuver at the on– and off–ramps as opposed to the mainline itself. A more detailed analysis of those accidents involving a lane–change maneuver may be needed in future research efforts to better define the problem area.

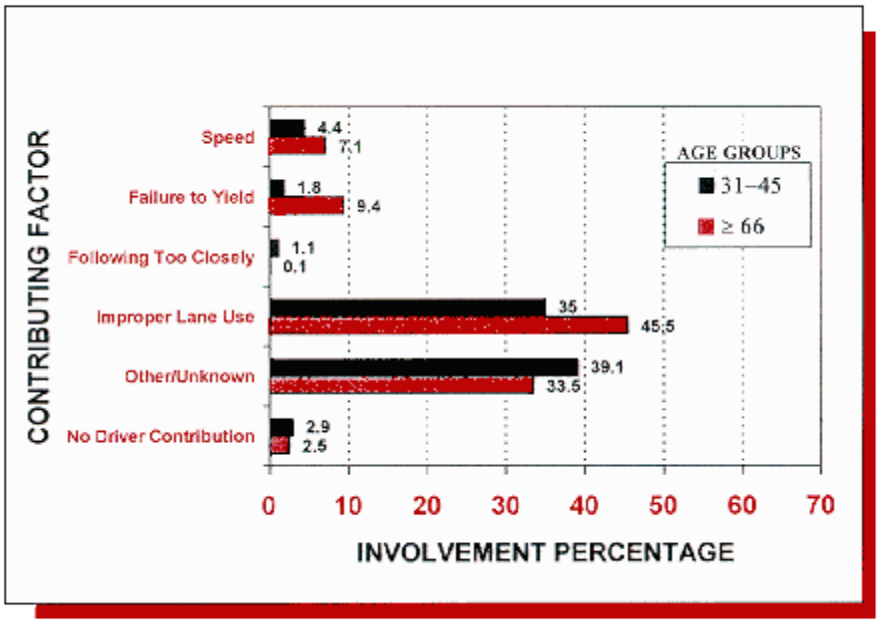

Figure 4. Involvement percentage by contributing factor for the paired-vehicle accidents involving a lane change or merge maneuver.

When basic accident types were compared, older drivers also appeared to be overinvolved in run–off–road, single– vehicle accidents, both to the left and to the right (see figure 5). These results indicate that older drivers are either running off the road into a resultant accident more often than younger drivers, or are running off the road no more often, but are unable to recover and avoid an accident as often as younger drivers. The latter may be a result of the diminished reaction and response times of older persons. One potential countermeasure for these types of accidents is the installation of rumble strips on freeway shoulders to alert drivers of their encroachment onto a shoulder. Such an advance warning device may provide the additional time necessary for older drivers to react and recover, thus avoiding an accident.

An increased vulnerability of older persons who do become involved in accidents was also found in this analysis, even though it is possible that older drivers may be more likely to drive larger cars, wear seat belts more often, and drive more slowly than younger drivers. In all of the analyses undertaken, the older driver was more likely to have been injured or killed in an accident when compared to the younger driver.

Finally, older drivers appeared to be overinvolved in both single–vehicle and multiple–vehicle accidents during daylight hours, clear/cloudy weather conditions, and on dry road surfaces when compared to the younger age group. These results are most likely due to exposure differences, reflecting the fact that older drivers conduct a larger percentage of their driving under these "good" conditions as compared to younger drivers.

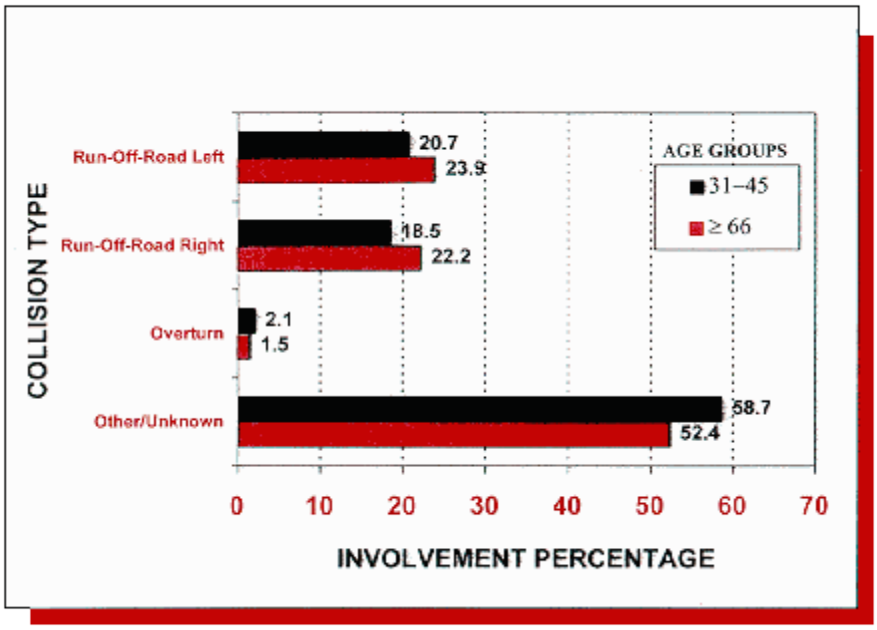

Figure 5. Involvement percentage by collision type for all single vehicle accidents

Study Implications

The results from this analysis were combined with the results of a literature review, focus group discussions, and other tasks conducted in the FHWA study "Investigation of Older Driver Freeway Needs and Capabilities" to develop a series of recommended research ideas to address the identified problems of older drivers on freeways. The problems identified in this accident analysis were related to lane–change and merge maneuvers of older drivers and their likelihood of being the driver at fault by failing to yield. Recommended research that has been identified as the result of this accident analysis includes.[(1)]

- Identification of the ramp and mainline geometrics and characteristics that contribute to freeway merge problems.
- Identification of geometric features and traffic control devices that can be used to minimize problems in transition areas.
- Analysis of the behavior exhibited during lane–change and passing/ overtaking maneuvers.

Reference

1. R.L. Knoblauch, M. Nitzburg, and R.F. Seifert, *Investigation of Older Driver Freeway Needs and Capabilifies, Final Report*, Publication No. FHWA–RD–95–194, Federal Highway Administration, Washington, DC, 1995.