ROADWAY SAFETY INSTITUTE

Advancing roadway safety with user-centered solutions

DESIGNING A USER-CENTRIC OLDER DRIVER SUPPORT SYSTEM:

A CASE FOR UNIVERSAL DESIGN TO SUPPORT ALL VULNERABLE DRIVER GROUPS

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Older Driver Risks

- The US population 65 years and older is expected to increase from **13.5%** in 2012 to **20%** in 2030 [2,3]
- Older drivers represent:
  - 2nd highest injury and fatality rate per 10,000 licensed drivers (next to teenage drivers)
  - 1st in fatalities per 100 million miles driven [1, 4]
- Older drivers (75+ years) are represented in a relatively low percent of total US crashes (~3%), but account for nearly 11% of driver deaths [10]

Older Driver Crash Involvement

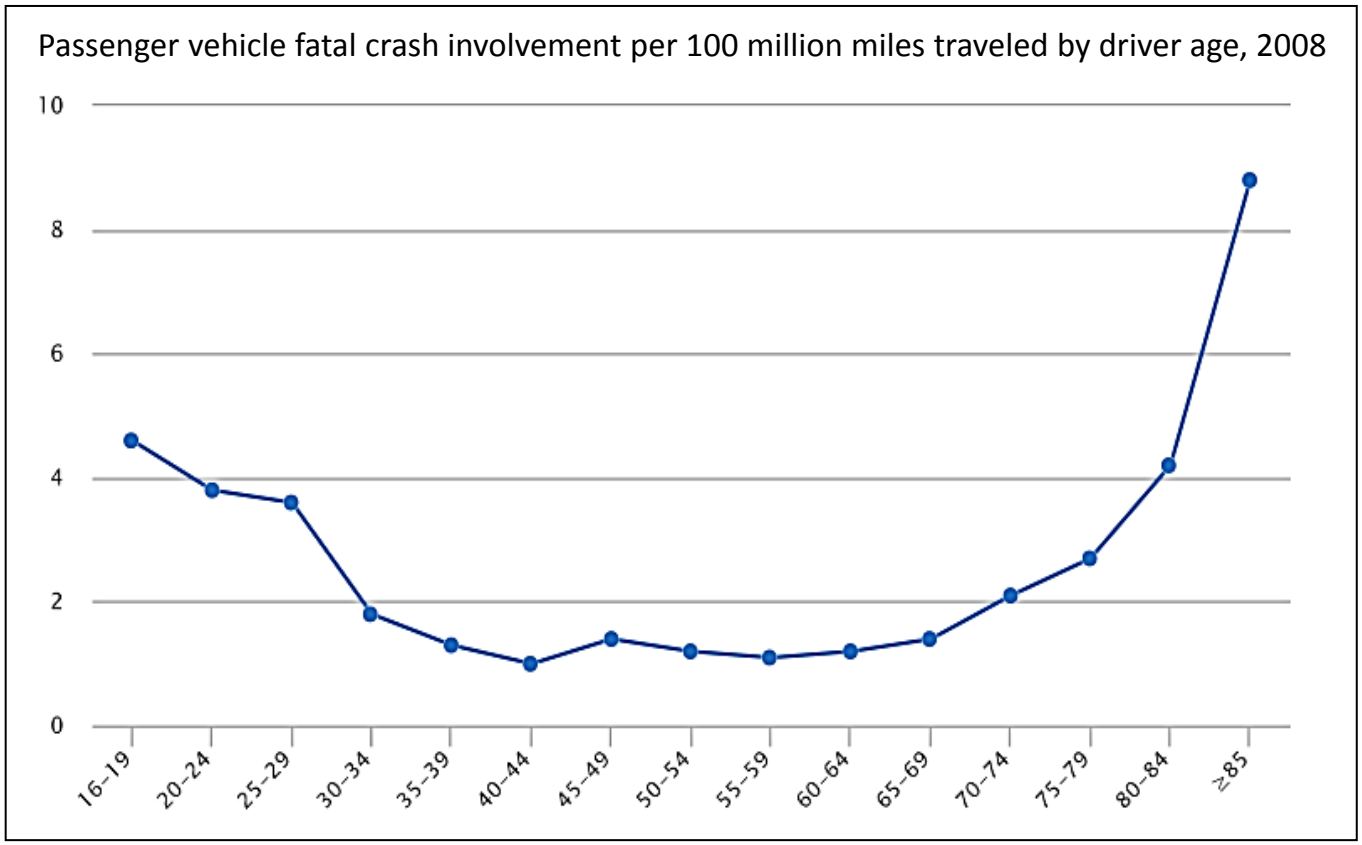

Figure 1. FARS National fatal passenger vehicle driver crash involvements per 100 million vehicle miles traveled by age group, 2008 [9].

Older Driver Risks

- Disproportionate fatality risk is linked to:
  - Normal declines in information processing [5]
  - Decreased visual search abilities [6]
  - Declined physical factors and maladaptive behavioral factors:
    - Failure to yield [7]
    - Lower seatbelt use [7]
    - Overall fragility [8, 10]

Addressing Older Driver Needs

- **Study Purpose**: adapt the Teen Driver Support System (TDSS) smartphone application into an Older Driver Support System
  - Carefully the needs and limitations of an aging drivers.
- Advanced in-vehicle sensing and warning systems are well-positioned to offer tailored support for older drivers
  - Iterative design and testing to determine user requirements
- **Study Results:**
  - Older drivers can best be supported with a **universally designed system**, created to address the needs and risks of all drivers: Not specifically targeted for older drivers.

Universal Design

- "The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design." *–Mace (1997; 11)*
- Re-examining older driver shared risks
  - Novices also have poorer information processing and visual search strategies [12]
  - Rural drivers are also less likely to wear seatbelts[13]
  - Both older drivers and novice drivers inaccurately judge their own hazard detection skills [14]

Talking with Older Drivers

- Focus Groups:
  - Tech-Savvy Older Drivers
    - Rejected ODSS premise
    - Did not want a system catered for their age group
    - Resisted notion of needing support in 10 years time
    - **Wanted system for ALL Drivers**
  - Non-tech Savvy Older Drivers
    - Far more accepting of system
    - Open to use

Recommending System Changes

- Teen Driver Support System (TDSS)
  - Smartphone-based software & hardware package that provides in-vehicle feedback to teens about potentially unsafe driving behaviors
    - Excessive maneuvers (braking, acceleration, turning)
    - Speeding
    - Advanced Curve Notifications
    - Stop sign violations

Adapting the TDSS to Older Drivers

- In-depth interviews with older drivers and experts
  - Recommended modifications to interface icons to provide additional contextual information (i.e., current speed limit and upcoming speed limit), under-speed feedback
- Tested interface in driving simulator
  - Recorded user feedback
- Results:
  - Drivers reported lower than expected mental workload and distraction from system
  - Additional contextual information felt like overkill
  - Under-speeding feedback went unnoticed

Universal Design

- Final recommendations for adapting the teen system for older drivers revealed *few to no significant necessary changes*
- Outcome: Create a universal platform of the TDSS to serve all drivers
  - RoadCoach
  - Increase buy-in of all age groups to use the system

DRIVERS OF ALL AGES ARE AT RISK ON OUR ROADS

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Thank you!

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