Older Driver Support System (ODSS) Usability and Design Investigation

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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:
  – 2\textsuperscript{nd} highest injury and fatality rate per 10,000 licensed drivers (next to teenage drivers)
  – 1\textsuperscript{st} 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 Behavior

• 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

• Initial determination of needs through meetings with experts on older driving
  – Identified merging, intersections (left turns) and roundabouts as the most problematic environments
  – Strong consensus that a support system would be beneficial to older drivers (both with normal and slightly impaired cognitive function)
Affordable Solutions

• 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
    • Stop signs
    • Seatbelts
    • Passenger presence
    • Advanced Curve Notifications
Adapting the TDSS to Older Drivers

• Posted speed limits and speed notifications
  – Benefit those who drive too far under the speed limit

• Advanced curve, intersection, and merge warnings
  – Could improve expectancies and preparedness
  – May reduce cognitive load from complex environments

• Seatbelt reminders
  – Encourage seatbelt use and habit forming

• Advanced curfew notification
  – May give advanced sun-down warnings

• Stop sign adherence
Future Applications

• If successful, the system could be applied to other high risk populations:
  – Chemotherapy patients are susceptible to temporary MCI symptoms while undergoing treatment
  – Other neurological conditions

• Data could be securely and privately accessed by a medical professional or a trusted caregiver
  – May result in earlier identification of driving problems
  – Earlier treatment or support for symptoms associated with MCI and other age-related issues
References


