Impact of road sign distance on driving performance of older and middle-aged drivers on rural highways


According to the US Census Bureau, the population of older adults in North Dakota will increase from 15% in 2010 to 25% in 2030, with the highest concentration of older adults in rural areas. Physical (e.g., poorer visual acuity) and cognitive (e.g., cognitive slowing) changes with age have been shown to affect older adults’ driving performance (Carr et al., 1994; Dulsie, 1997; Kortelling, 1994). Previous studies have assessed older adults’ driving performance in rural areas (e.g., high amount of ambient traffic and road signs). The NDDOT is interested in how to increase driving safety for older adults in rural areas of North Dakota. We examined older adults’ driving performance (e.g., preparatory behaviors at intersections) and manipulated the presence and distance of signs on a simulated rural highway to assess low-cost sign improvements that could increase driving safety for older adults.

**Method**

**Participants:**
- 19 middle-aged adults (40-58 years; M = 49 years; 10 F) and 19 older adults (60-84 years; M = 70 years; 13 F).
- Average near visual acuity was similar for middle-aged and older adults. (M = 20/23).
- All participants had a valid driver’s license.

**Stimuli and Procedure:**
- Participants completed 36 driving scenarios (18 daytime and 18 nighttime) in a Drive Safety DS 600 C driving simulator that sampled at 10 Hz.
- The presence and distance of road signs was manipulated (Figure 1).
  - Destination road signs were placed 200, 400, or 600 ft (close, middle, or far distances) from the intersections.
  - An intersection warning sign could be present or absent.
- Participants drove and turned left or right at the target intersection (ABCville).

**General Traveling Speed**
- Older adults were slower than middle-aged adults, p < .05, but light condition did not impact traveling speed, p > .35.

**References**


**Speed Going into the Turn**

**Discussion**

Older adults drove more slowly than middle-aged adults, but other driving behaviors did not vary by age. Both middle-aged and older adults slowed down more at the destination sign when a warning sign was present than absent, particularly at night. Destination sign distance also impacted driving speed of both age groups. When a destination sign was close to the intersection, drivers slowed down more at the sign, but went faster into the turn, than when the sign was at greater distances. In conclusion, these findings suggest that, in rural areas, low-cost changes such as moving the destination road sign farther from the intersection and using warning signs, increases preparatory turn behaviors in middle-aged and older drivers and increases driving safety.