

Coffee and Conversation Speaker Series

Proceedings from “Aging and Driving”
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The key question of this presentation is how we design for the negative safety impacts of aging on driving? Dr. Jing Feng, a cognitive psychologist who researches the effects of aging on cognition and traffic safety, poses this question. While Feng notes that aging does not have to be considered a negative aspect of life, it does create unique concerns of our population.

After a brief introduction to her talk, Feng begins with a brief summary of the data on aging in the United States. If we consider 65 as the age of seniority, the data from the Federal Highway Administration (FHWA) are clear that the proportion of older drivers in the population is growing (see the discussion of older drivers by Meyer, 2009). Feng points out that this trend is consistent in North Carolina as both the state population ages and more drivers move to the South. Feng shows some maps showing that by 2030, a majority of counties in North Carolina will have populations where 25%-30% are over age 65, and most of these counties are rural.

Feng then uses these data to illustrate the importance for considering older drivers in traffic safety. Her research team completed a survey of older drivers in 2017, and almost 94% of the respondents indicated that they are not considering driver cessation. There are a number of explanations for this unwillingness, but a major issue is a lack of alternatives in rural areas. Older drivers are dependent on their personal vehicles for their continued mobility, and many (72%) view driving cessation as a hugely negative event that decreases their wellbeing. The survey team also found that less than 10% use ridesharing, either due to unfamiliarity or lack of availability. The point that Feng makes is that for older drivers, especially those in rural areas, driver cessation is often not seen as a viable option, so safety for continued driving must be considered.

Next, Feng discusses what traffic safety actually looks like for older drivers. She notes that older driver risk of fatality increases as age increases. Although it may appear that the risk is low, when controlled for mileage, we see a definite spike. Feng describes the risk U-shape as a double-edged sword. Older drivers may actually be involved in less crashes, but if a crash does occur, the risk of death can be great.

A key point Feng draws from this is that risk depends on the individuals. In 2015, Feng and her colleagues conducted an attentional failures study that asked respondents to fill out a questionnaire (Choi, Grünh, and Feng, 2015). The questionnaire found that age has little effect on crash risk itself; instead, the biggest predictor of risk was individual cognitive abilities. This finding is a consistent theme of Feng’s presentation: individuals differ, so although older drivers likely all experience some physical and cognitive decline, training and education must be designed to aid the individual.

Feng moves from her survey results to discuss the myriad ways in which older drivers may face physical impairments that affect safety. First, she notes that postures may compress, which may make it harder for some older drivers to observe hazards. Second, she shows that older drivers may have difficulty rotating their necks and therefore may struggle with tight intersection angles or seeing obstructions in blind spots. Older drivers may also experience leg pain that can make it difficult to adequately interact with the pedals in a vehicle. Brake assistance may be able to assist with this issue. Diminished arm strength may make it harder to turn the wheel, although power steering in newer vehicles can help with this. Feng also points out that confounding all of these issues are pain medications that may inhibit driving ability.

Feng then transitions from physical decline to cognitive decline. There's a common myth that aging starts at 60, Feng notes, but that decline actually starts in mid-20s but also depends on the type of ability. Yes, many cognitive processes, like speed of processing and working memory, do decline as we age, but typically our world knowledge actually grows over time. Feng uses this point to illustrate that abilities vary from individual to individual, meaning that no two drivers may need the same types of assistance.

In addition to cognitive decline, we may also experience sensory decline as we age, and these sensory limitations may make it even harder to process information. For example, the visual acuity needed for hazard detection decreases over time. Contrast sensitivity, crucial for night driving, declines as we age. Some drivers also experience macular degeneration, glaucoma, and cataracts, all of which can limit our ability to perceive the roadway clearly. To accommodate these limitations, Feng notes, you need to design for visibility and legibility. These considerations affect both roadway design, especially signage and marking, as well as vehicle design, including in-vehicle displays and headlights.

Hearing, too, can decline as we age. Hearing aids may help, but the older driver will need to pay a lot of attention to distinguish the signal from the noise. Auditory information helps give us spatial awareness that can affect safety, so auditory declines may make us more reliant on visual information.

Compared to these sensory impairments, Feng indicates, the declines in attention are much more subtle and gradual.

Feng's research group has studied declines in attention, and she points out that there is a vast difference in the way younger and older drivers are able to detect targets or hazards (Choi, Kasko, and Feng, 2019). Simulation results show this, and simulators can be used to help train older drivers to improve target detection, but many older drivers suffer from simulation sickness.

Feng shows the crowd a simulated target identification exercise, and we all fail this exercise to pay attention. We laugh, but she uses this example to illustrate how hard it can be to pay attention and to identify unsafe situations. Older drivers are much better with straight motions than turning motions.

"There is training for attentional measures can help drivers learn which hazards to watch for," Feng states.

Older drivers actually actively regulate their own behavior, so the story isn't all negative. This self-regulation is driven by the individual's awareness of cognitive decline, so education efforts must be tailored to the individual. Feng concludes by noting that driving cessation can be quite controversial, so we have to be careful and use technology, policy (perhaps reverse GDL?), and education for the individual.

ABOUT THE SPEAKER

Feng is an assistant professor in the Human Factors and Applied Cognition Program at the Department of Psychology at North Carolina State University. She received her doctorate in Cognitive Psychology at the University of Toronto. Prior to moving to North Carolina, she worked as a postdoctoral researcher at the Rotman Research Institute at Baycrest and at the Department of Mechanical and Industrial Engineering at the University of Toronto.

RESOURCES

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Choi H, Kasko J, Feng J. Attention assessment technology for monitoring and intervention for older drivers' crash risks in various hazardous situations. *The Gerontologist*. 2019; in press.

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