Designing Vehicles for Older Drivers: Has the Time Come for an Older Driver Vehicle?*

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Populations are Aging Globally

- The world’s population is older now than in any time in history.
- Projections from the United Nations (2009) show:
  - Global proportion of people age 60 and older was 8% in 1950, 11% in 2009, and is expected to be 22% in 2050.
  - These proportions are even greater for more developed countries where by 2050 one-third of each country’s population is expected to be age 60 or older.
## Populations are Aging Globally

<table>
<thead>
<tr>
<th>Country</th>
<th>% Country Population Age 60 and Older</th>
<th>World Ranking (Out of 196)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
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<tr>
<td>Sweden</td>
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<tr>
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<td>Canada</td>
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<tr>
<td>China</td>
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<td>India</td>
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<tr>
<td>Qatar</td>
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</tr>
</tbody>
</table>

United Nations, 2009
Driving is Likely to Remain the Primary Mode of Travel for Older Adults

• Older adults prefer to maintain mobility through the use of a personal vehicle.
  • This will likely be the case for the next generation of older drivers.
• Most older adults currently travel by car either as a driver OR passenger.
  • A recent Michigan study* found that 99 percent of older adults most often rely on driving or riding as a passenger to get around.

* Eby, et al., 2011
Driving is Likely to Remain the Primary Mode of Travel for Older Adults

- Older people are holding licenses longer and driving more miles than previous cohorts.
  - US Men/Women age 65+: 90%; 80%
  - Adults age 70+ in Sweden with a driver’s license increased from about 28% in 1983 to about 72% in 2008*
- Lack of effective and acceptable non-driving alternatives in most jurisdictions.

*Sivak & Schoettle, 2011
Functional Declines in Older Adults

- As people they are more likely to have medical conditions (and take medications) that can compromise driving safety:
  - Visual Abilities
  - Cognitive Abilities
  - Psychomotor Abilities
- Fragility: increasing inability to withstand disease or injury.
- Frailty: ability to recover from a disease or injury.
Crash Risk Increases In Older Adulthood in US

US Driver Fatality Rates, 2008

- Miles Driven
- Licensed Driver
- Population

Insurance Institute for Highway Safety, 2007; FHWA 2008
Crash Risk Increases In Older Adulthood in Other Countries

OECD/ITF, 2011
Possible Global Market for Vehicles Designed for Older Adults

- Vehicles could be designed that take into account and help overcome some of the deficits in abilities common in older people.
- Advanced technologies could also help.
- Crashworthiness issues.
- Marketing issues.
Vehicle Design and Advanced Technologies

- Categories of vehicle design that are most relevant for older adults:
  - Ingress/Egress
  - Seating
  - Visibility
  - Cargo Areas
  - Dashboard Controls
Vehicle Design and Advanced Technologies

- Advanced technologies that could provide greatest benefit to older adults:
  - Night vision enhancement
  - Collision warnings
  - Adaptive cruise control
  - Lane departure warning
  - Navigation assistance
  - Automatic crash notification
- Need to ensure that technologies do not produce undue distraction.
Crashworthiness

• Encompasses various vehicle features intended to provide crash protection to occupants.
• Older vehicle occupants present unique challenges for improving crashworthiness:
  • Increased fragility and frailty relative to younger people
  • Different types of crashes (e.g., intersection and multiple vehicle)
  • Increased susceptibility to injury in crashes
  • Differences in patterns of injury – risk of chest injury increases with age
Crashworthiness

• Advances in crashworthiness:
  • Improvements in structural design (e.g., added head impact protection in frontal crashes)
  • Increased acceptability of belt systems as a result of improved ease of use, fit, comfort
  • More protective seat belt designs (e.g., 4-point belts, inflatable belts)
  • Other belt system advancements (belt force limiters, pretensioners, dynamic optimization, identification technologies, integrated seat belt systems, height adjustors, reminder systems)
  • Airbag sensors and side airbags
Marketing Issues

- Aging baby boomers significant market segment.
- Consumer patterns among older adults:
  - For most, self-perceived age is younger than actual age
  - Often drawn to products aimed at younger market
  - Safety important to vehicle buyers but other considerations come into play (e.g., price, appearance)
  - Lack of knowledge about vehicle safety features
  - May differ from previous older cohorts in expectations for how technology can improve their lives
  - Increasing expectations bring greater need for training
  - Age-related declines pave way for new/specialized products but also need to be considered in advertising/marketing
Marketing Issues

- General marketing strategies:
  - Develop better understanding of effects of aging (e.g., cognitive, psychomotor, visual declines)
  - Develop products with intergenerational or universal appeal (products that can satisfy needs of both younger and older consumers even though they may benefit older adults most)
  - In segmenting the market, focus on life events or circumstances rather than age
  - Promote products based on youthful self-concept and not old age or disability status
Discussion and Recommendations

• Answer to the question “Has the time come for an older driver vehicle?” is a qualified yes.
• Opportunity exists to improve safety, mobility, quality of life by designing vehicles and vehicle technologies to help overcome age-related declines.
• Aging trends point to large market of older adults interested in buying vehicles to extend safe driving.
• Marketing of these vehicles will be challenging.
Discussion and Recommendations

• Future vehicle development should be guided by:
  • Knowledge of frailty/fragility and effects on crash outcomes
  • Knowledge of common age-related declines
  • Principles of universal design (although may not work for improving crashworthiness)
  • Heterogeneity of older adults which suggests need for some degree of customization

• Improvements in training and education are needed.
• Marketing will be complicated and will likely require more research.