Longitudinal Research On Aging Drivers (LongROAD)

Tara Kelley-Baker, Ph.D.
Data and Information Group Leader, AAA Foundation for Traffic Safety

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Project Objective

To understand and meet the safety and mobility needs of the nation’s growing population of older adult drivers.
Study Design

- Prospective cohort
  - Random from healthcare system
  - Age 65-79 at baseline
- Multisite
  - CA, CO, MI, NY, and MD
- In-vehicle data recording device
- Longitudinal
  - Baseline assessment
  - Annual follow up (in-person and phone)
Research Questions

• What are the risk and protective factors for driving safety during the process of aging?

• What are the effects of medications on driving behavior and driving safety in older adults?

• How do older adult drivers cope with physical and cognitive function declines through self-regulation of driving?

• What are the prevalence and user perception of in-vehicle technologies and aftermarket vehicle adaptations in old adult drivers?

• What are the determinants and consequences of driving cessation?
Study Model

Person-level
- Cognitive function
- Physical function
- Health status
- Diseases & Medications
- Demographic & social

Environment-Level
- Geographic region
- Road/traffic condition
- Licensing policy
- Residential type

Vehicle-Level
- Vehicle make/model
- Safety device/technology

Exposure

Aging

Driving safety
Driving cessation
Alternative transport
Health outcomes

Dynamics
Determinants
Mechanisms
Consequences

Process

Outcome
Key Components of the Research Protocol

- Recruitment procedures
- Informed consent
- Web based data entry
- In-vehicle data recording device
- Vehicle inspection
- Vehicle technology questionnaire

- Driving health and functioning questionnaire
- In-person assessments
- Medical records
- Driving crash records
- Driving cessation
- Mortality data
Recruitment

• Random sample from potentially-eligible healthcare system patients
• Mailed letters with information about how to opt-out
  • Over 20 months, sites mailed 40,806 letters
• Subsequent recruitment calls
• Overall recruitment yield (enrollments per letters mailed) was 7.3%
  • Range: 5.1%-18.3%
Recruiting Sequence

40,806 Letters → Phone Contacts → Eligibility Screened → Eligible → Enrolled

2,990 Participants

% of Initially Contacted Group
LongROAD Cumulative Enrollment by Week
Current Total as of April 2017 = 2990

Week 1: Study Begins, July 6, 2015
# Demographic Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N=2990</th>
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<tr>
<td>Age at baseline</td>
<td>71.3 ± 4.1 yrs</td>
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<tr>
<td>65-69</td>
<td>41%</td>
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<tr>
<td>70-74</td>
<td>35%</td>
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<tr>
<td>75-79</td>
<td>24%</td>
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<tr>
<td>Male</td>
<td>47%</td>
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<td>White</td>
<td>87%</td>
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<td>Black</td>
<td>8%</td>
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<td>Married</td>
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<td>Bachelor/graduate degree</td>
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<td>Veteran</td>
<td>23%</td>
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<td>Annual household income ≥ $100,000</td>
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<td>Work for pay (previous month)</td>
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Prevalence of Self-Report Medical Conditions

- High blood pressure: 57.4%
- Joint pain or swelling: 54%
- Other arthritis: 52.2%
- Cataracts: 45.4%
- Cancer: 33.2%
- Sleep disorders eg. apnea: 21%
- Depression: 18.1%
- Thyroid imbalance: 17.1%
- Diabetes: 16.3%
- Osteoporosis: 15%
Prevalence of In-Vehicle Technology

[Bar chart showing the percentage reporting various in-vehicle technologies, including integrated Bluetooth, backup camera, navigation assistance, voice control, in-vehicle concierge, blind spot warning, emergency response, forward collision warning, adaptive cruise control, cross traffic detection, lane departure warning, adaptive headlights, fatigue/rollover driver alert, semi-autonomous parking assist, and night vision enhancement.]
Data Collection Timeline

**In-Person Visit:** Vehicle Inspection; Driving, Health and Functioning Questionnaire; Functional Assessment; Brown-Bag Review of Medications; and Vehicle Technology Questionnaire

**Telephone Interview:** Driving, Health, Functioning Questionnaire; Abbreviated Review of Medications; and Vehicle Technology Questionnaire

**In-Vehicle Data Recording Device:** DataLogger (installed at the baseline in-person visit)

**Archival Data Collection:** Medical records, driving records, and crash records

**Incidental Data Collection:** driving cessation, change in primary vehicle, and death

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**Follow-up**
LongROAD Follow-up Cumulative by Week

Current Total as of October 2017: 1st Yr = 2317 2nd Yr = 305 of 2990
Current and Future Work (Planned Studies)

- Medical conditions and medications
- Driving patterns, exposure, and safety
- Self-regulation
- Functional abilities
- Driving cessation
- Automotive technology and vehicle modification
Value

• One of a kind in the United States

• The greatest value of the study derives from:
  • Longitudinal nature of data collection
  • Comprehensive set of vehicle data, including naturalistic driving
  • Large number of participants
  • Broad geographic areas included in the study (5 sites)