



Central Michigan University

**Center for
Driving Evaluation, Education & Research**

The DEER Center

<http://www.deercenter.org/>

**Richard W. Backs, Ph.D., Director
Department of Psychology**

Mission Statement

- 1. Provide clinical services to evaluate cognitive fitness-to-drive**
- 2. Provide education to improve older driver safety**
- 3. Conduct research on older drivers and drivers with attention disorders**

Advisory Board

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CMU, DEER Center

Mid Michigan Physician's Group

Michigan State Police-Office of Highway Safety
Planning

Michigan Department of State

CMU, Carls Center for Clinical Care and Education

CMU, Sociology, Anthropology and Social Work

Michigan Office of Services to the Aging

SVSU. Occupational Therapy

CMU, Human Environmental Studies

CMU, Communication Disorders

Central Michigan Community Hospital

Michigan Department of Transportation

AARP MI, Driver Safety Program

General Motors Corp.

CMU, Gerontology, Human Environmental Studies

AAA MI, Auto Club Group

CMU, Psychological training & Consulting Center

Saginaw-Chippewa Indian Tribe, Andahwod Center

CMU, Herbert H. & Grace A. Dow College of health
Professions

CMU, Public Relations and Marketing

CMU, College of Humanities, Social and Behavioral
Sciences

CMU, Physical Therapy Program

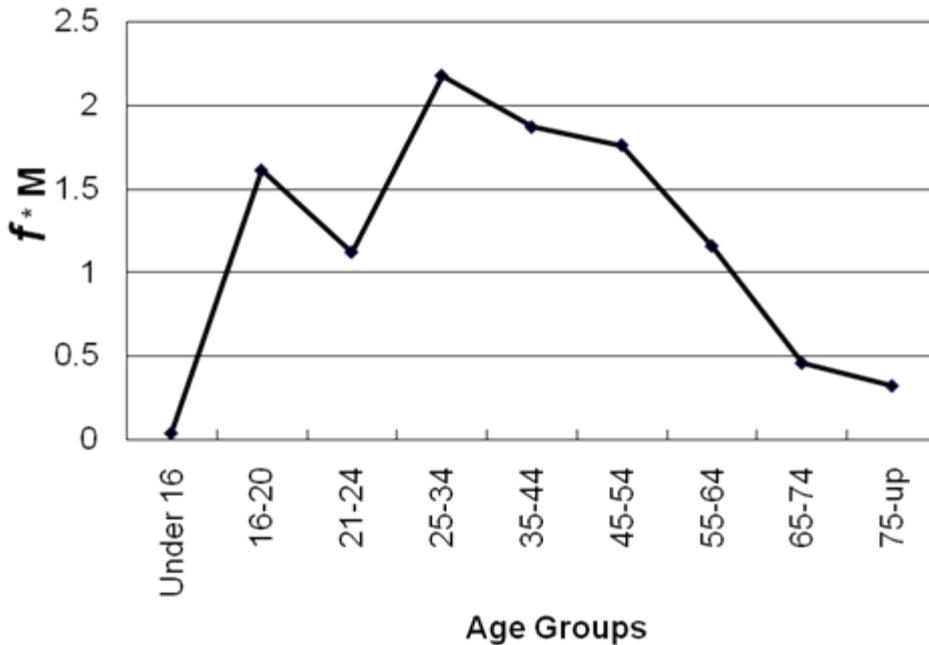
Isabella County Commission on Aging

Why do we need a DEER Center?

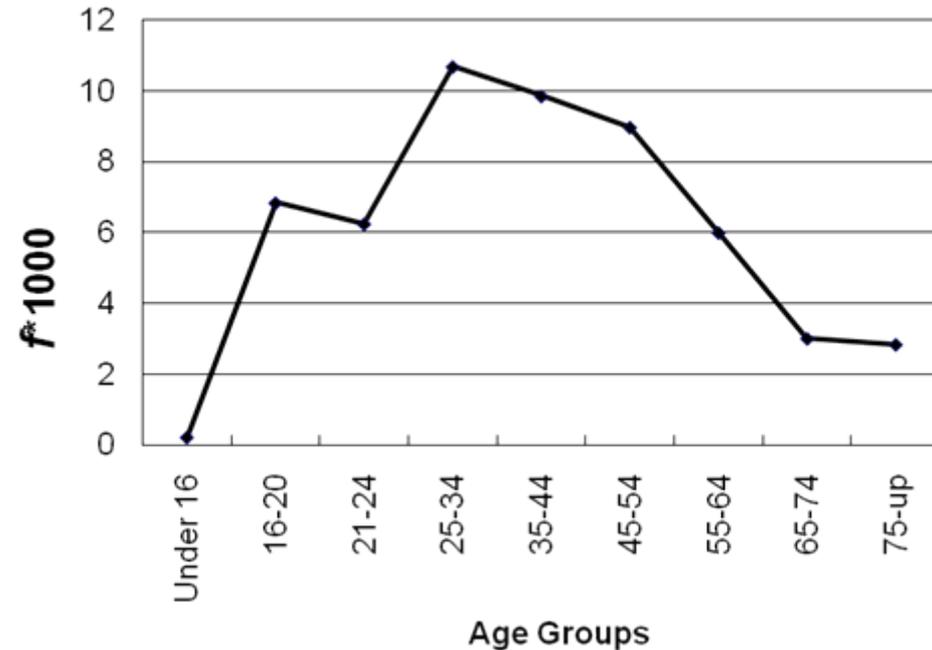
- Driving Statistics

Older Drivers are Safe Drivers!

Drivers in All Crashes



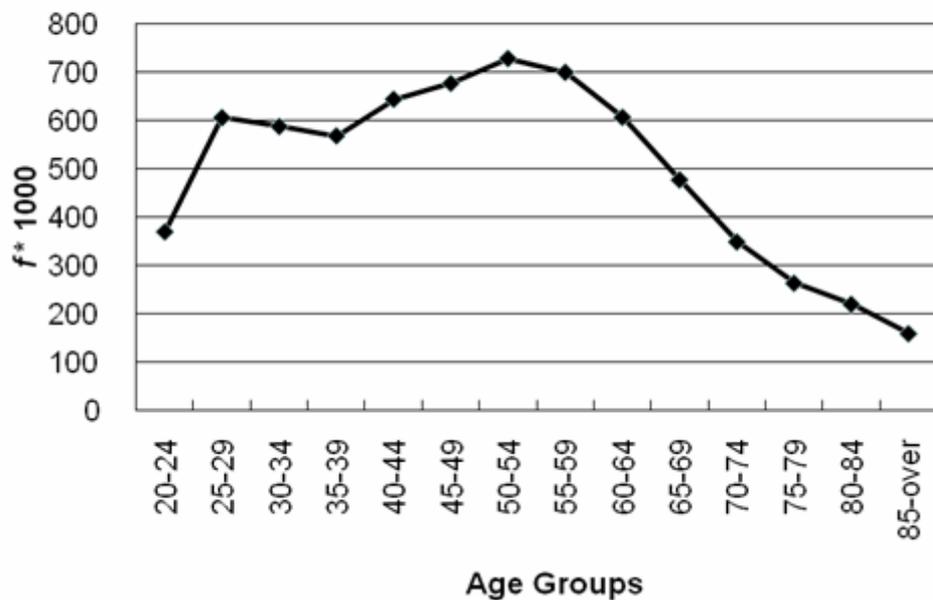
Drivers in Fatal Crashes



2007 Traffic Safety Facts (NHTSA)

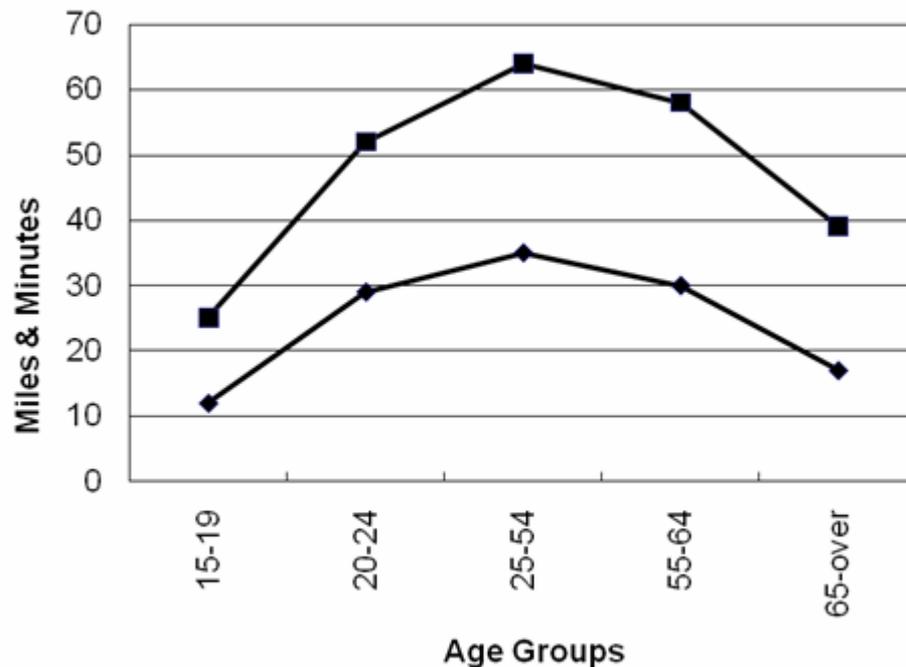
But, Fewer Older Drivers and They Drive Less

MI Licensed Drivers



2007 Highway Statistics FHWA

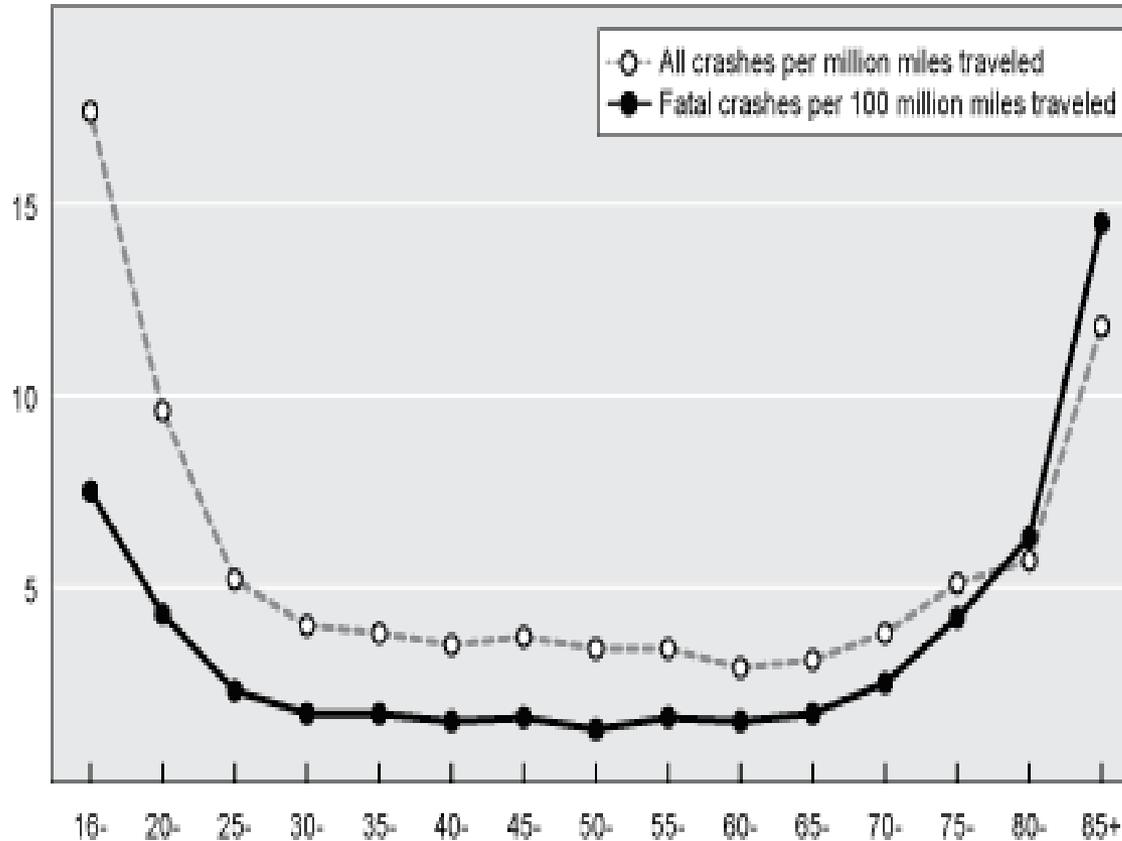
Average Daily Travel



2001 NHTS

Older Drivers are Unsafe Drivers!

Drivers 85-years and older have the highest rate of fatal crashes per miles driven except 16 and under AND have the highest fatality rate per miles driven



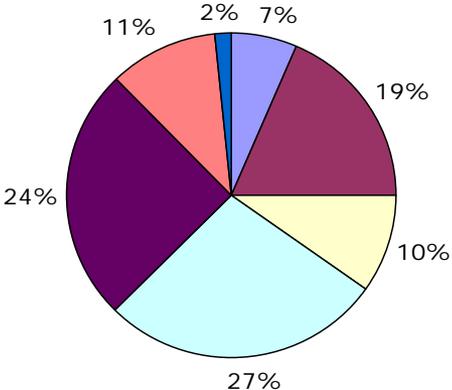
Why do we need a DEER Center?

- Driving Statistics
- Demographics

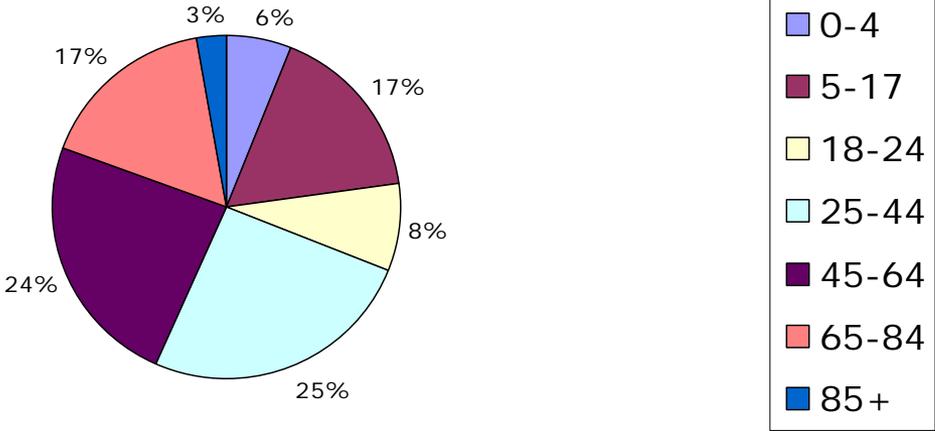
Michigan Demographics

- **Baby Boom is aging - 76 million adults were born during the years from 1946 to 1964**
- **In Michigan about 12.2% of the population was age 65 or above in 2005**
- **In 2030, this age group will be 19.5% of the Michigan population**

2005 MI Population by Age Group 10.2 M Total



Est 2030 MI Population by Age Group 10.7 M Total



Michigan Demographics

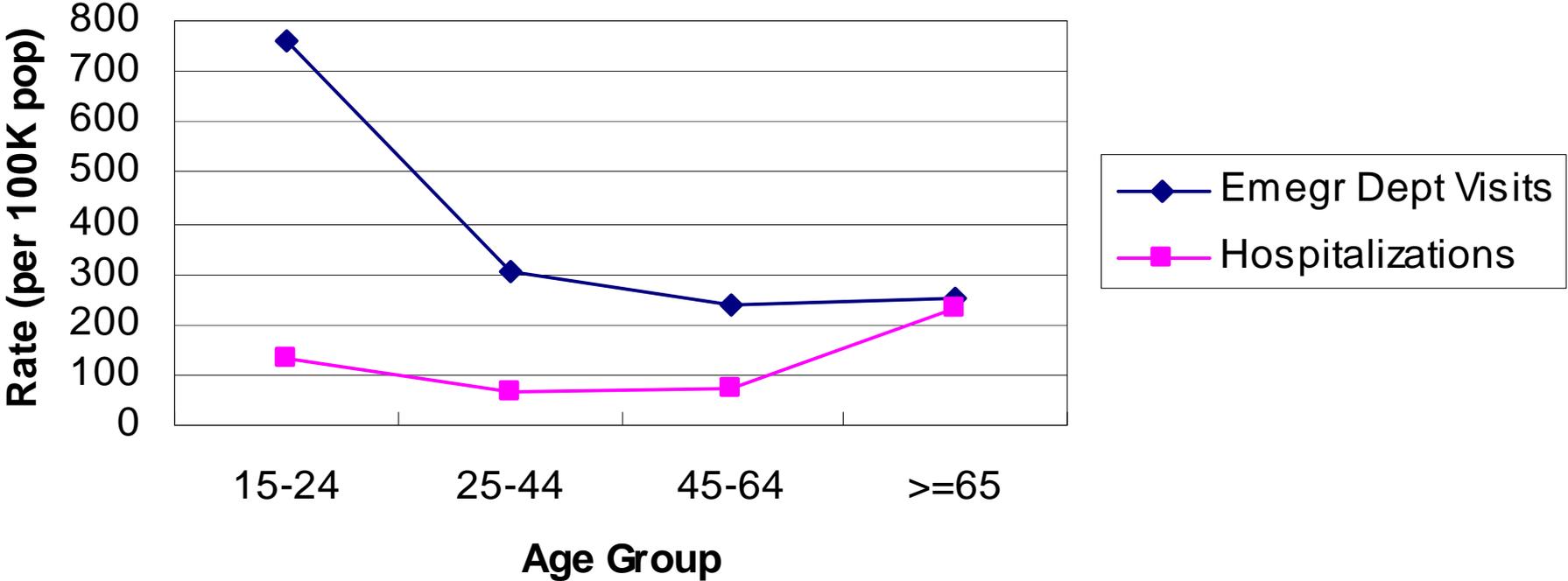
- **Adults 85 years-of-age or older are the fastest growing segment of the population in percentage terms**
 - **predicted to increase more than 92% over the 25 years to a total of 2.7% of all Michigan residents**

- **The number of fatal crashes for older drivers is expected to increase 155% over the next 25 years** (Lyman et al. (2002) *Injury Prevention*)
 - compared to a 39% increase for all drivers
 - because of the demographic changes
 - because older drivers are driving more miles
- **Older drivers expect to drive as their primary means of transportation for many years, often for years beyond the point at which they believe they begin to experience problems driving** (Kostyniuk & Shope (2003) *Journal of Safety Research*)

Why do we need a DEER Center?

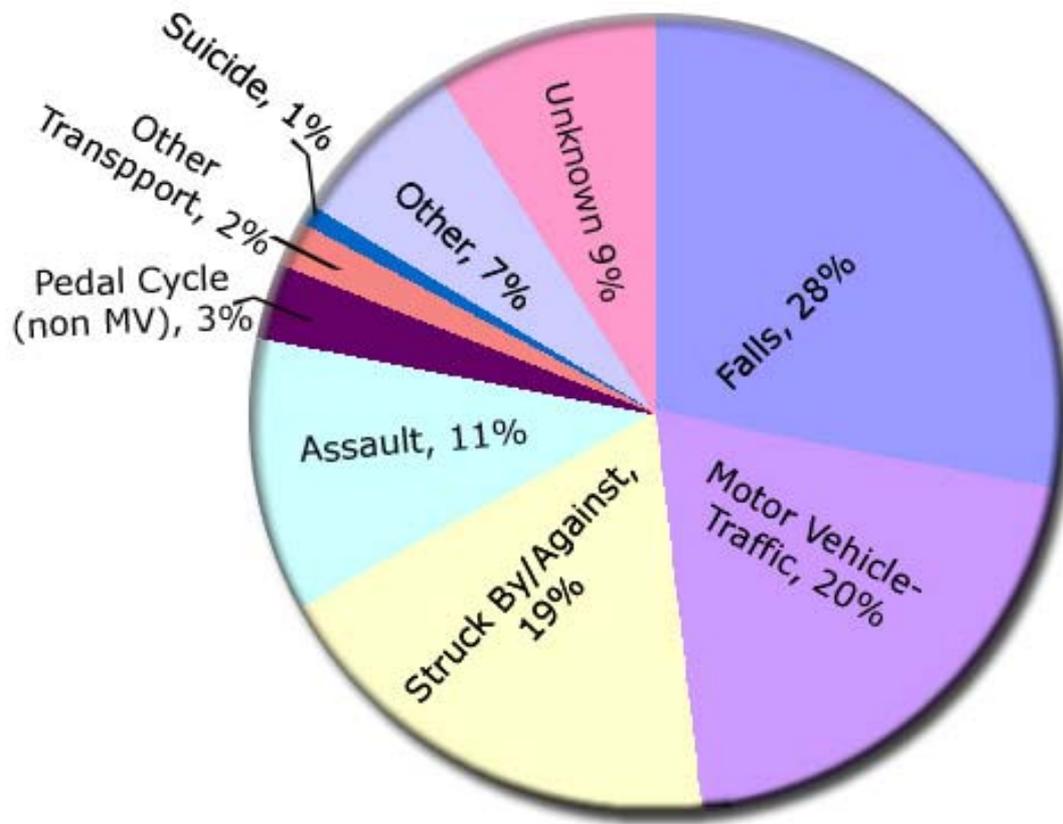
- Driving Statistics
- Demographics
- Incidence
 - Traumatic Brain Injury, Stroke, Neurodegenerative Diseases, etc.

TBI Rate by Age Group



2006 TBI in the US (CDC)

Causes of TBI



2006 TBI in the US (CDC)

Why do we need a DEER Center?

- Driving Statistics
- Demographics
- Incidence
- Age-Related Cognitive Decline

- **Approximately 22% of crashes and near-crashes are caused by driver distraction**
- **Older adults and persons with attention disorders are likely to be at greater risk for accidents due to inattention**
- **Attention functions may be more degraded in these populations than others**
- **Research is needed to develop methods to diagnose and hopefully to some extent remediate attention deficits to increase older driver safety**

What Will the DEER Center Do?

Assessment Protocol

- 3 Components
 - Visual & Physical Function Testing
 - Cognitive Function Test Battery
 - Simulated Driving

Visual Function Testing



**Titmus i500
Visual Screening**



**UFOV
Useful Field of View**

Physical Functional Tests

- Handgrip



- Cervical Range of Motion



Cognitive Function Testing



Computer-based Cognitive Tests

Cognitive and Neuropsychological Tests

- Computer-based cognitive functions
 - Perceptual speed
 - Sustained attention (vigilance)
 - Divided attention
 - Selection/inhibition
 - Visual Search
- Neuropsychological
 - Mini Mental State Exam
 - Clock drawing
 - Wisconsin Card Sort Task

Simulated Driving in the AAA Michigan Driving Simulator



DriveSafety DS-600



Driving Scenarios

- Merge on to freeway
- 4-way stop
- Situation Awareness
- Divided Attention
- Left/Right turns
- Navigation from memory

Results

Results

Results

Quantify Driving Behaviors



Driving Error Coding Scheme

Inappropriate merge	Hazardous	Merging too soon or too late
Lack of signal use	Hazardous	Not using turn signal to make lane changes
Driving at inappropriate speeds	Critical	Driving 10 mph below or above 65 mph on freeway
Inappropriate space between vehicles	Critical	Pulling in front of another vehicle or following too closely
Inappropriate stop	Critical	Not coming to a complete stop
Not obeying signs and signals	Critical	Waiting for one's turn to proceed in a 4-way stop
Crossing lanes or drifting	Critical	Going over the marked lines into other lanes or curb/shoulder
Defensive driving	Critical	Colliding with vehicle that pulls out
Failing to yield to a pedestrian	Critical	Not giving the bicyclist the right of way
Not getting lost	Hazardous	Failure to follow directions and navigate correctly

Make Recommendation to Referrer

- **Hazardous Driver:** Send to DMV for road test
- **Restricted Driver:** Needs further assessment
 - Ophthalmologic examination
 - Neuropsychological examination
- **Safe Driver:** No action needed at this time

Education

- AARP Driver Safety Program
- CMU Driving Multi-Task Battery Development



Research

- MDOT Senior Transportation Toolkit
- CMU ADHD Attention and Negative Emotion
- CMU Left-turn Study