

**REPORT 15-2** 

## ABSTRACT

### Motivation:

Drivers age 65 and over have higher rates of crashes and of crash-related fatalities than middle-age drivers. Drivers in this age group are especially overrepresented in crashes during left turns at signalized intersections. This study was proposed to learn more about the factors contributing to this trend, utilizing information collected through the SHRP2 (the second Strategic Highway Research Program) naturalistic driving study (NDS). The study was also designed as a proof of concept project to assess the usefulness of NDS data for examining such research questions.

### Methods:

The NDS data used for this study included information on drivers, vehicles, and trips. The data were entered into different regression and machine learning models to see which factors most influenced the occurrence of left-turn signalized intersection crashes among drivers age 65 and over.

### **Results:**

In the dataset, the most common left turn intersection crashes (71% of the total) involved vehicles hitting a curb or leaving the roadway. Most of the statistically significant variables impacting whether the drivers crashed were related to health, vision, and cognitive factors.

## ACKNOWLEDGMENTS

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### NEW ENGLAND TRANSPORTATION CONSORTIUM

# USING THE NEW SHRP2 NATURALISTIC DRIVING STUDY SAFETY DATABASES TO EXAMINE SAFETY CONCERNS FOR OLDER DRIVERS

AUTHORS: Dr. Michael Knodler, PI; Dr. Siby Samuel; Dr. Song Gao, Tracy Zafian, Ravi Agrawal

## DATA & ANALYSIS

### NDS Data from Virginia Tech Transportation Institute

- Drivers age 65+, trips with signalized intersections, focus on trips with intersection left turns; comparison group 30-49 year olds
- Driver data: from pre-study questionnaires & screenings
- Vehicle data: speed, acceleration
- Event data: crash, near crash, baseline, event severity
- Video data: scored at UMass; 868 videos, 285 with left turns

## RESULTS

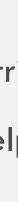
- The shown health, vision, and cognitive factors had the biggest statistically significant impact on whether a driver age 65+ had a left-turn crash.
- The presence of these conditions affected drivers' ability to monitor oncoming traffic, and to see monitor oncoming traffic and to see and gauge the edges of the road well.

Of Drivers 65 & Over with Left Turn Crashes, % with Condition or Cha For those with with hig correlations to crashi

**Condition or challenge** Visual Search Impairment (mild or more) Visual Field of View Impairment (mild or more) **Clock Drawing Test Errors** (minor or more) **Psychiatric Conditions** Nervous System/Sleep Disorders

## CONCLUSIONS

- The study's data and finding provide information to help understand contributing factors for older driver left-turn crashes at signalized intersections.
- Past research has shown that older drivers can benefit from training to help them negotiate signalized intersections and left turns, and adjust to agerelated and physical limitations.
- dataset.



• Developed and tested a number of regression and machine learning models, using the NDS data, to learn more about the key factors contributing to the left turn crashes, for drivers age 65+

Type of Event	Count of Trips Left Turns Drivers Age 65+		
Crash	26		
Near Crash	72		
Baseline	102		

Crash Severity	Count of Trips Left Turns Drivers Age 65+		
I – Most Severe	4 3		
II—Police Reportable			
III – Minor	10		
IV – Tire strike, low risk	9		
Total	26		

### **Data Models for Analysis**

### Best Performing Models for Predicting Left Turn Crash or No Crash Among Drivers 65 & Over

<u>allenge</u> ghest ing		Significant Variables (P-values)	R- Squared & Adj. R- Squared	Inputs	Model	Performance
	%	Nervous System/Sleep	0.730/	Medical,	Logistic	Training Accuracy:
	87.0%	Conditions (0.001) Severe Arthritis (0.049)	0.669	Behavior, Video and	Regression	83.8% Validation Accuracy:
ł	56.5%	Impaired Field of View (0.038)		Vehicle Data (10 Variables)		76.5%
	95.7%	Gap Decision (0.037) Nervous System/Sleep	0.803/ 0.728	Medical, Behavior,	Random Forest	Training Accuracy: 100.0%
	65.2%	Conditions (0.003) Severe Arthritis (0.052)		Video and Vehicle		Validation Accuracy: 83.0%
ſS	34.8%			Data (15 Variables)		

• The generalizability of the findings of this study, and the statistical significance of the results, may be limited somewhat by the small number of crashes

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