NHTSA

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Speeding and Speed Management Research

NHTSA Safety Research Portfolio Public Meeting: Fall 2021

October 20, 2021

Panel Presentations

1. **Highlights of Speeding Data from Police-Reported Motor Vehicle Traffic Crashes** – Cherian Varghese
2. **Speeding Related Reporting in Records-Based Data Collection** – TrisAnn Jodon
3. **Behavioral Research Program on Speeding and Speed Management** – Randolph Atkins
4. **Current Behavioral Research on Speeding and Speed Management** – Stacy Jeleniewski

Highlights of Speeding Data from Police-Reported Motor Vehicle Traffic Crashes

Cherian Varghese

Data Sources

Fatality Analysis Reporting System (FARS)

- FARS contains data from 1975-2019 on ever fatal motor vehicle traffic crash within the 50 States, the District of Columbia, and Puerto Rico
- To be included in FARS, a traffic crash must involve a motor vehicle traveling on a public trafficway that results in the death of a vehicle occupant or a nonoccupant within 720 hours of the crash.
- The Annual Report File (ARF) is the FARS data file associated with the most recent available year, which is subject to change when it is finalized the following year to the final version known as the Final File.

Data Sources

Crash Report Sampling System (CRSS)

- Nationally representative probability sample of police-reported traffic crashes that occur annually, which estimates the number of police-reported injury and property-damage-only crashes in the United States.
- To be eligible for the sample, a crash report must be completed by the police; it must involve at least one motor vehicle traveling on a trafficway; and the crash must result in property damage, injury, or death.
- The new system, called CRSS, replaced the National Automotive Sampling System (NASS) General Estimates System (GES) in 2016.

Definition

Speeding: NHTSA considers a crash to be speeding-related if any driver in the crash was:

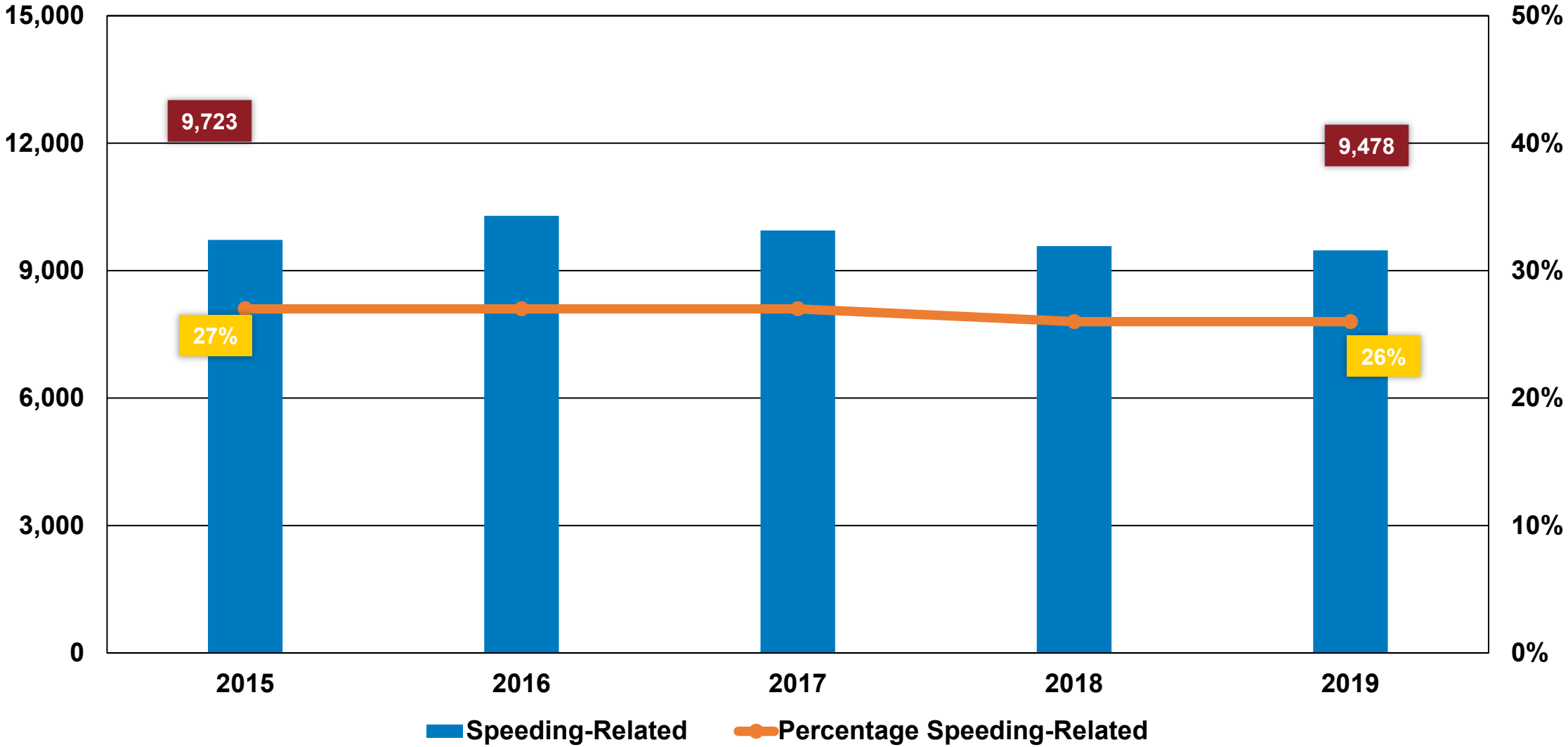
- Charged with a speeding-related offense or
- If a police officer indicated that _____ was a contributing factor in the crash.
  - Racing or
  - Driving too fast for conditions or
  - Exceeding the posted speed limit

Speeding-Related

In 2019:

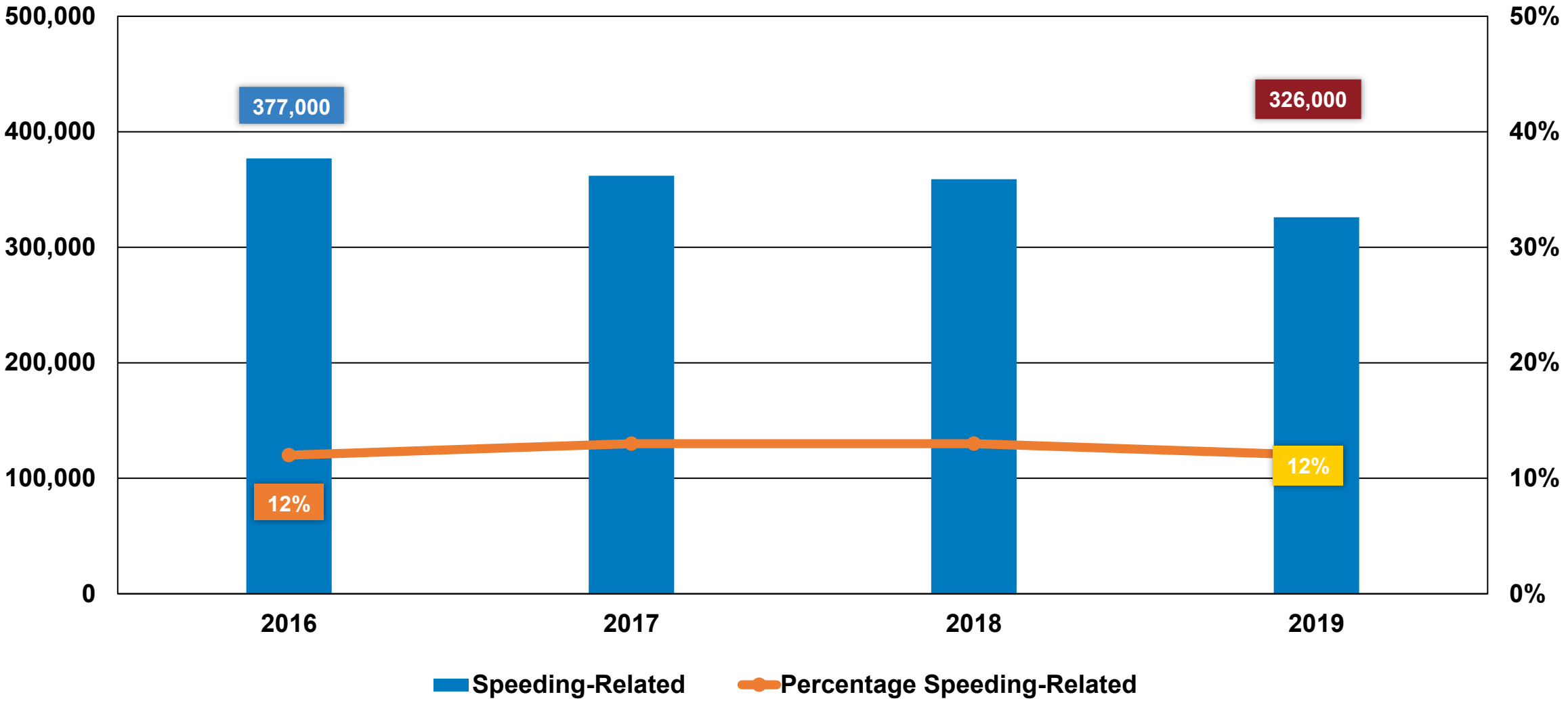
- 26 percent of fatal crashes
- 12 percent of injury crashes
- 9 percent of property-damage-only crashes

Fatalities in Speeding-Related Crashes



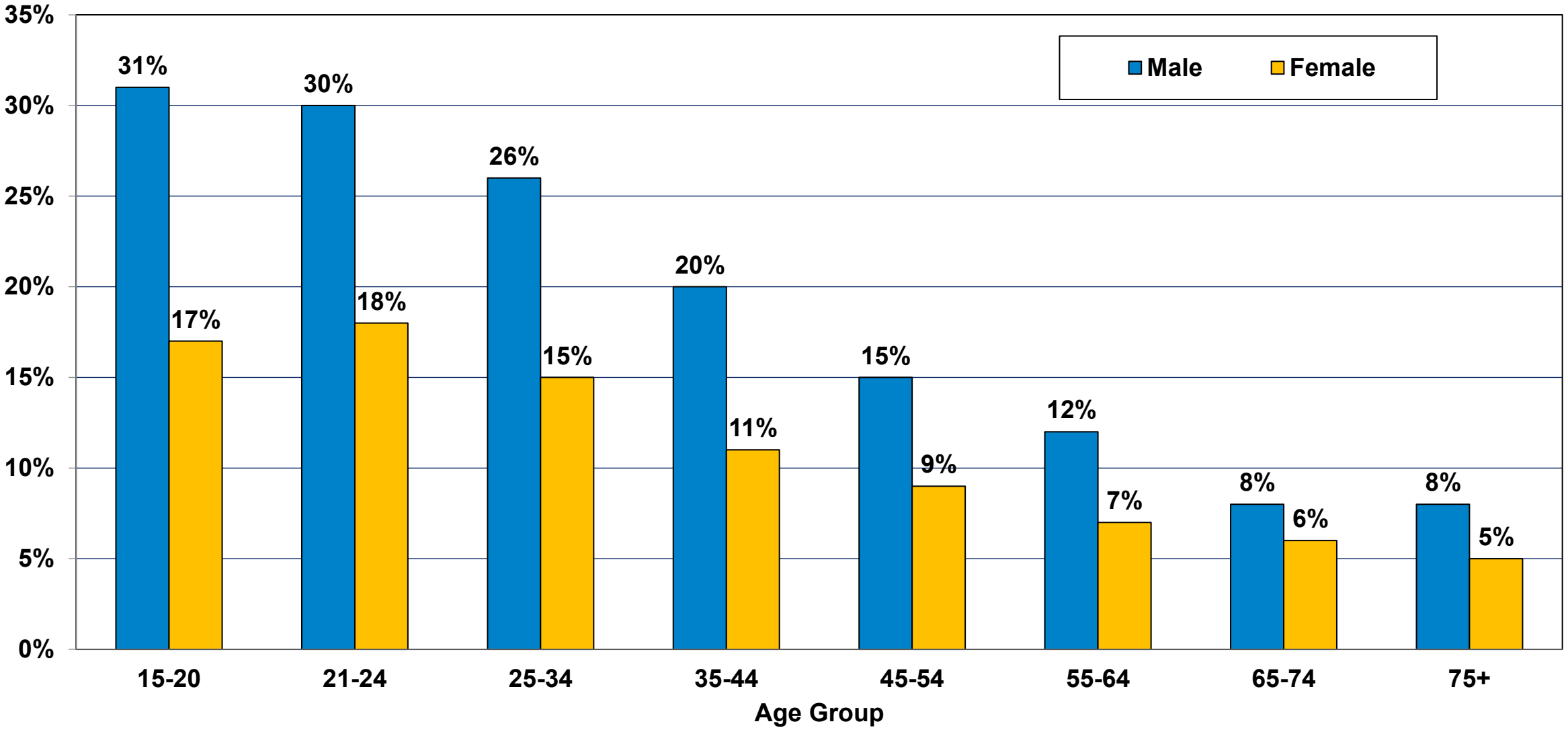
Source: FARS 2015-2018 Final & 2019 ARF

People Injured in Speeding-Related Crashes



Source: FARS 2016-2018 Final & 2019 ARF, CRSS 2016-2019

Speeding Drivers in Fatal Crashes, 2019



Source: FARS 2019 ARF

Speeding Drivers in Fatal Crashes, 2019

Time of Day	Day of Week						Total		
	Weekday			Weekend					
	Drivers Involved	Speeding Drivers		Drivers Involved	Speeding Drivers		Drivers Involved	Speeding Drivers	
		Number	Percent		Number	Percent		Number	Percent
Daytime (6 a.m. – 5:59 p.m.)	19,923	2,666	13%	6,862	1,271	19%	26,785	3,937	15%
Nighttime (6 p.m. – 5:59 a.m.)	11,465	2,116	18%	12,409	2,645	21%	23,874	4,761	20%
Total*	**31,503**	**4,801**	**15%**	**19,344**	**3,933**	**20%**	**50,930**	**8,746**	**17%**

Weekday: Monday 6 a.m. – Friday 5:59 p.m.
Weekend: Friday 6 p.m. – Monday 5:59 a.m.

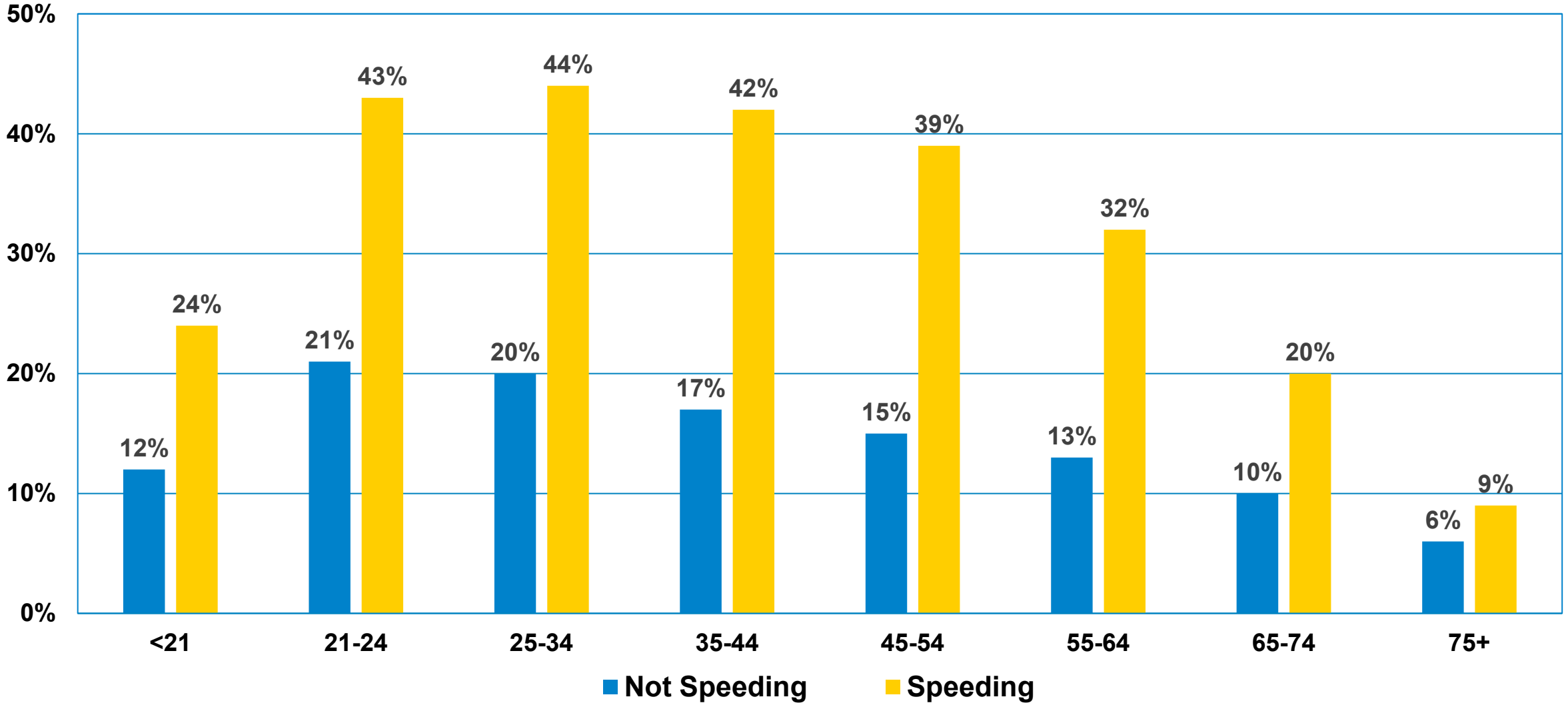
Source: FARS 2019 ARF

Alcohol Involvement of Drivers in Fatal Crashes, by Speeding Involvement, 2019

Speeding Involvement	No Alcohol (BAC=.00 g/dL)		BAC=.01+ g/dL		Alcohol-Impaired			
					BAC=.08+ g/dL		BAC=.15+ g/dL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Speeding	5,007	57%	3,739	43%	3,255	37%	2,236	26%
Not Speeding	34,474	82%	7,710	18%	6,344	15%	4,161	10%
Total	**39,481**	**78%**	**11,449**	**22%**	**9,598**	**19%**	**6,398**	**13%**

Source: FARS 2019 ARF

Percentage of Alcohol-Impaired Drivers in Fatal Crashes, by Age Group and Speeding Involvement, 2019



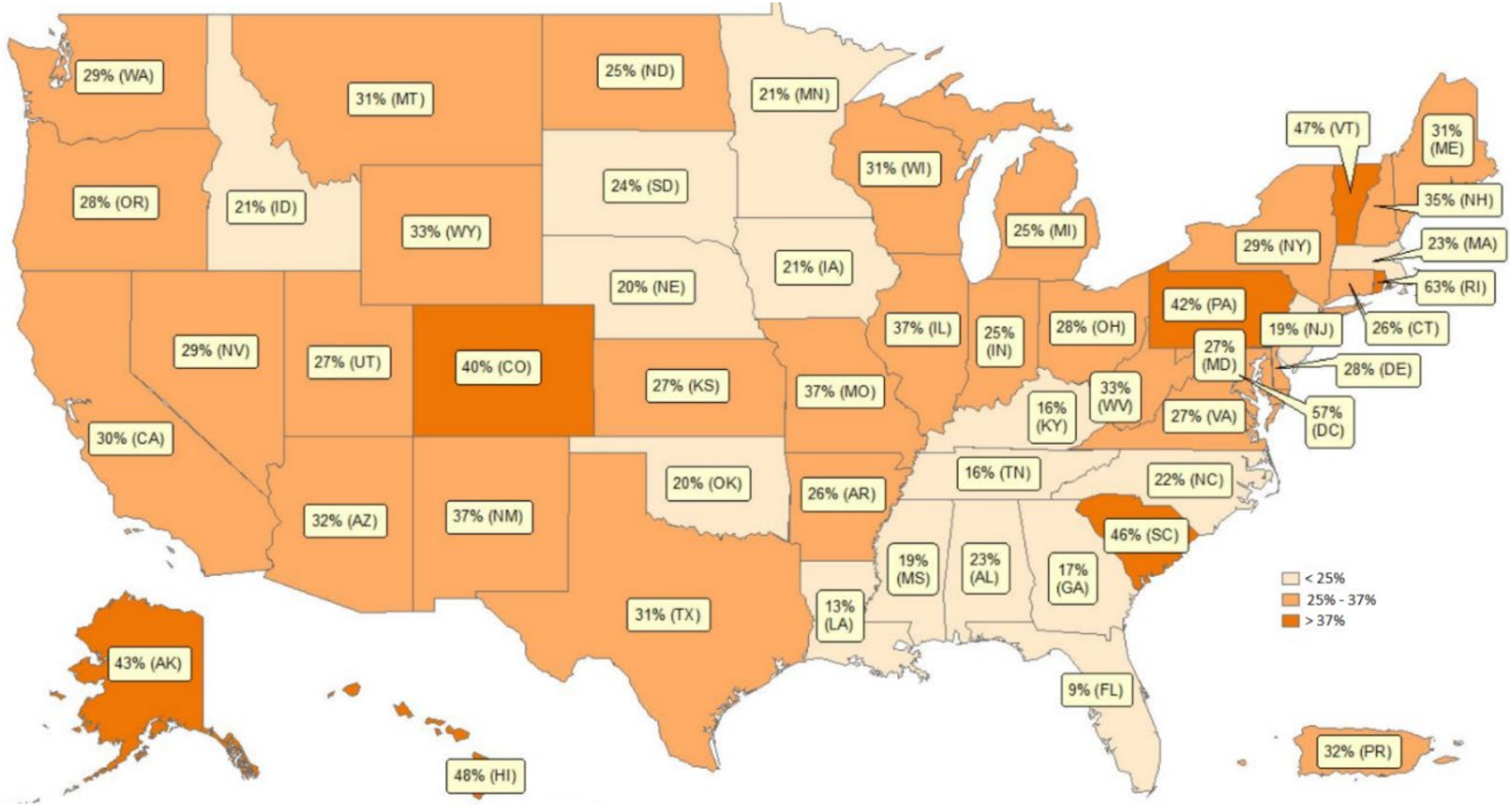
Source: FARS 2019 ARF

Passenger Vehicle Drivers Involved in Fatal Crashes, by Speeding Involvement and Restraint Use, 2019

Speeding Involvement	Restraint Use						Total	Percent Based on Known Restraint Use	
	Restrained		Unrestrained		Unknown				
	Number	Percent	Number	Percent	Number	Percent		Restrained	Unrestrained
Speeding	3,051	47%	2,715	42%	730	11%	6,496	53%	47%
Not Speeding	23,661	72%	6,341	19%	2,675	8%	32,677	79%	21%
Total	**26,712**	**68%**	**9,056**	**23%**	**3,405**	**9%**	**39,173**	**75%**	**25%**

Source: FARS 2019 ARF

Percentage of Speeding-Related Fatalities, 2019



Source: FARS 2019 ARF

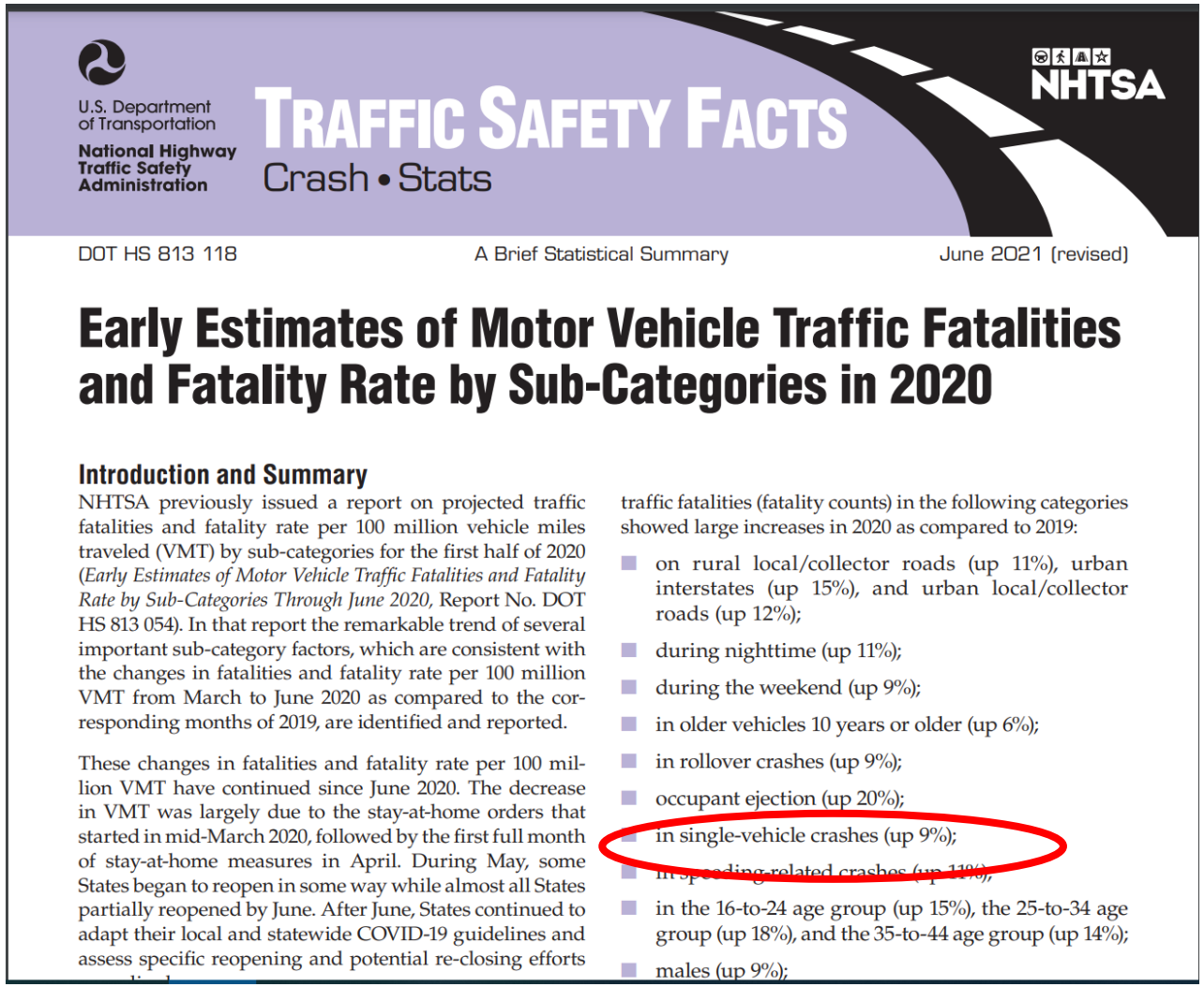
Other Key Findings

In 2019,

- Among speeding drivers involved in fatal crashes, 26 percent did not have valid driver licenses at the time of the crashes, compared to 12 percent of non-speeding drivers.
- Thirty-three percent of motorcycle riders involved in fatal crashes were speeding, compared to 19 percent of passenger car drivers, 15 percent of light-truck drivers, and 8 percent of large-truck drivers.
- When roadway function class was known, 86 percent of speeding-related fatalities occurred on non-interstate roadways.

2020 Early Estimates of Motor Vehicle Traffic Fatalities

Show a 11 percent increase in fatalities in speeding-related crashes.



U.S. Department of Transportation
National Highway Traffic Safety Administration

TRAFFIC SAFETY FACTS
Crash • Stats

NHTSA

DOT HS 813 118 | A Brief Statistical Summary | June 2021 (revised)

Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories in 2020

Introduction and Summary

NHTSA previously issued a report on projected traffic fatalities and fatality rate per 100 million vehicle miles traveled (VMT) by sub-categories for the first half of 2020 (*Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories Through June 2020*, Report No. DOT HS 813 054). In that report the remarkable trend of several important sub-category factors, which are consistent with the changes in fatalities and fatality rate per 100 million VMT from March to June 2020 as compared to the corresponding months of 2019, are identified and reported.

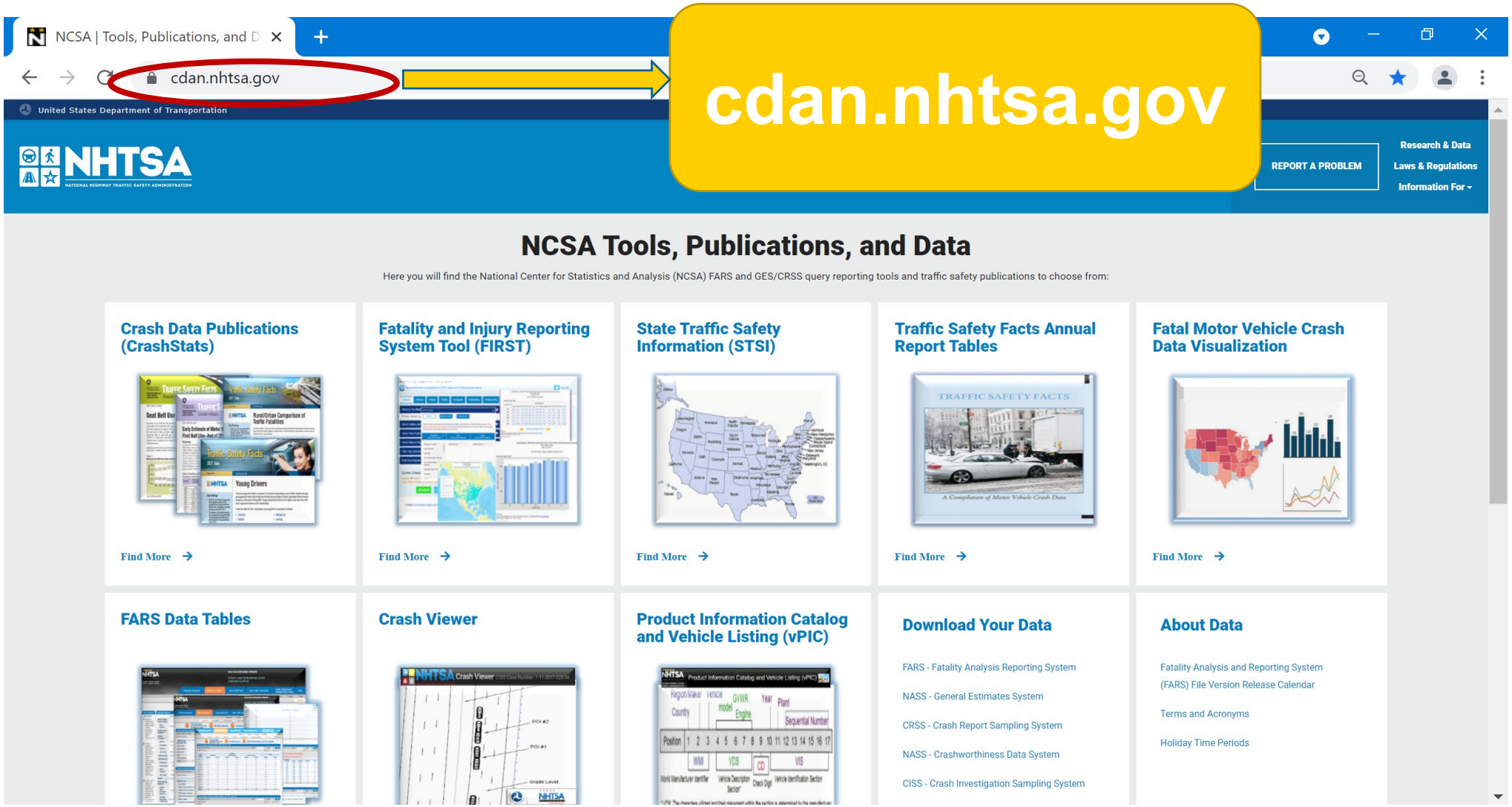
These changes in fatalities and fatality rate per 100 million VMT have continued since June 2020. The decrease in VMT was largely due to the stay-at-home orders that started in mid-March 2020, followed by the first full month of stay-at-home measures in April. During May, some States began to reopen in some way while almost all States partially reopened by June. After June, States continued to adapt their local and statewide COVID-19 guidelines and assess specific reopening and potential re-closing efforts

traffic fatalities (fatality counts) in the following categories showed large increases in 2020 as compared to 2019:

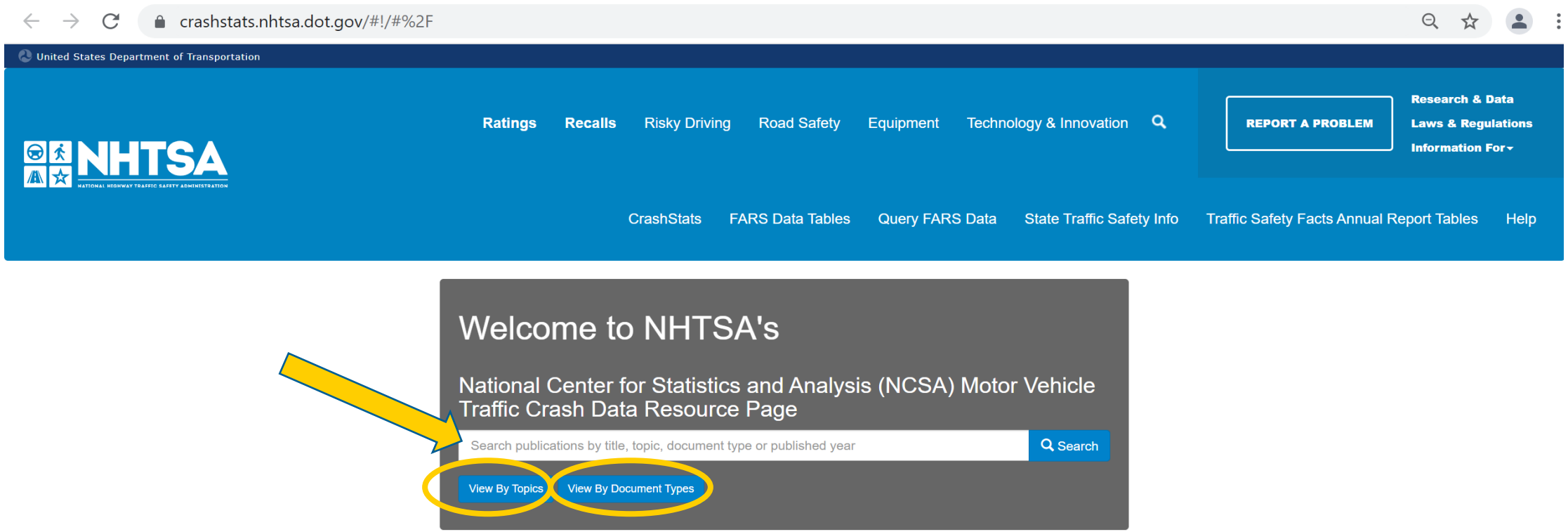
- on rural local/collector roads (up 11%), urban interstates (up 15%), and urban local/collector roads (up 12%);
- during nighttime (up 11%);
- during the weekend (up 9%);
- in older vehicles 10 years or older (up 6%);
- in rollover crashes (up 9%);
- occupant ejection (up 20%);
- in single-vehicle crashes (up 9%);
- in speeding-related crashes (up 11%);
- in the 16-to-24 age group (up 15%), the 25-to-34 age group (up 18%), and the 35-to-44 age group (up 14%);
- males (up 9%);

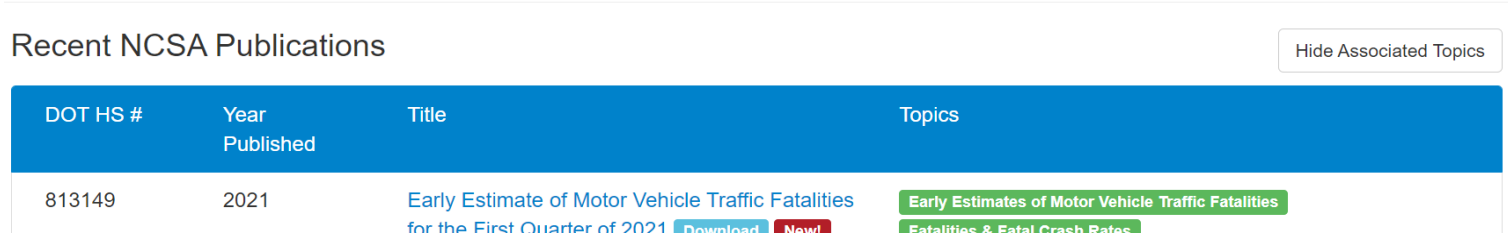
https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813118

NCSA Tools, Publications, and Data



NCSA Tools, Publications, and Data





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- Brochures 10
- Crash*Stats 124
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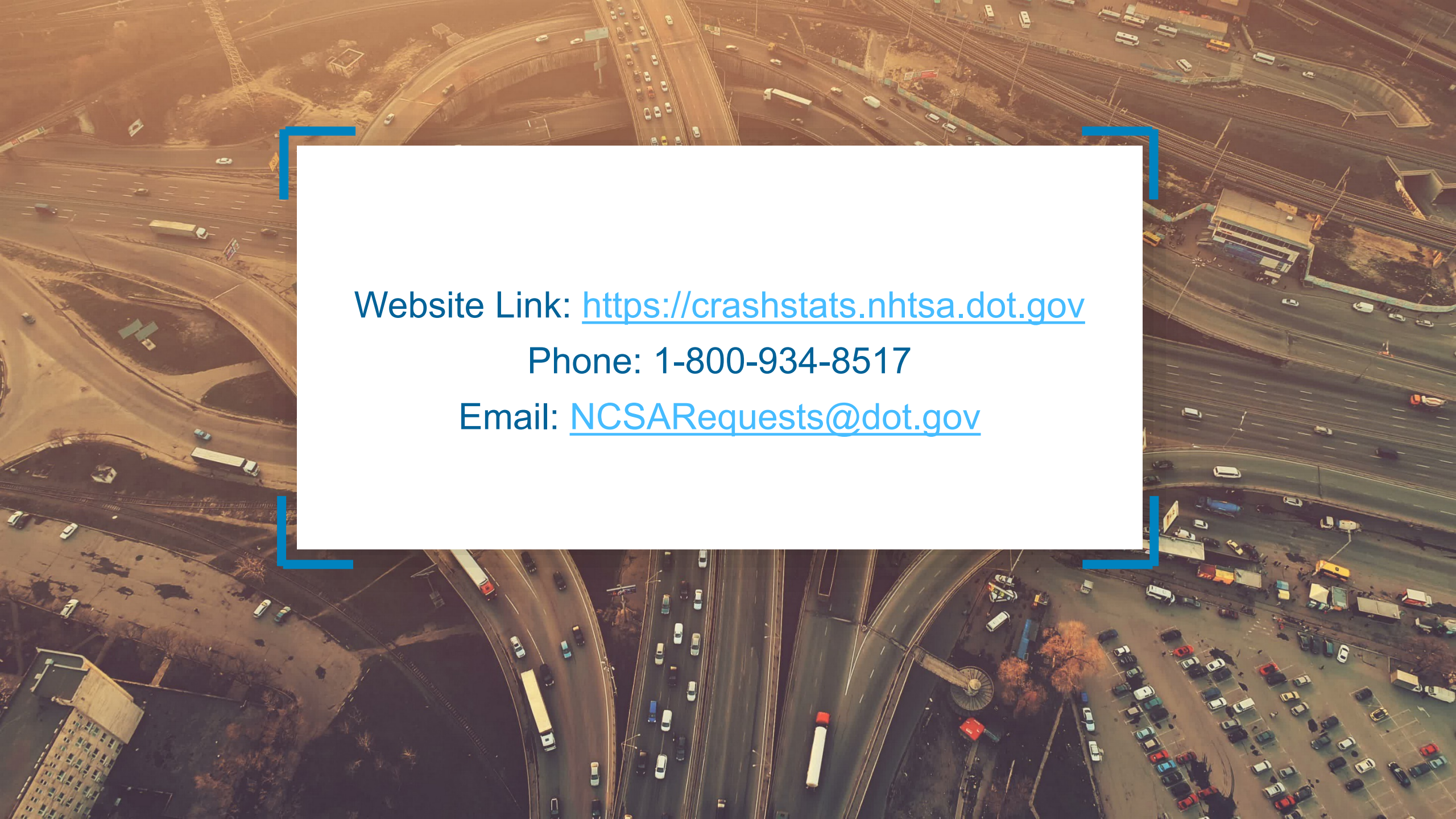
- Presentations 28
- Reports 340
- Research Notes 259
- SCI Reports 249
- Traffic Safety Fact Sheets 417
- Traffic Safety Facts Annual Report 35

Traffic Safety Fact Sheets

Filter Publication in Current Document Type

Type to Filter Publications

DOT HS #	Year Published	Title
813106	2021	2019 State Alcohol-Impaired-Driving Estimates Traffic Safety Fact Sheet Download
813079	2021	2019 Pedestrians Traffic Safety Fact Sheet Download
813105	2021	2019 School-Transportation Related Crashes Traffic Safety Fact Sheet Download
813120	2021	2019 Alcohol-Impaired Driving Traffic Safety Fact Sheet Download
813130	2021	2019 Young Drivers Traffic Safety Fact Sheet Download
813152	2021	2019 Passenger Vehicles Traffic Safety Fact Sheet Download
813122	2021	2019 Children Traffic Safety Fact Sheet Download
813121	2021	2019 Older Population Traffic Safety Fact Sheet Download
813110	2021	2019 Large Trucks Traffic Safety Fact Sheet Download



Website Link: https://crashstats.nhtsa.dot.gov

Phone: 1-800-934-8517

Email: NCSARequests@dot.gov

Speeding Related Reporting in Records-Based Data Collection

TrisAnn Jodon

NHTSA's Records-based State Data Reporting Systems

- ***Fatality Analysis Reporting System (FARS)*** – maintains an annual census of all motor vehicle crashes in the 50 States, DC & Puerto Rico involving at least 1 motor vehicle in transport, occurring on a public traffic way where at least one person died within 720 hours from the crash date and time as a result of injuries sustained in the crash
- ***Crash Report Sampling System (CRSS)*** – reports a statistical sample of motor vehicle crashes from select jurisdictions in several States covering property damage only, injury only and fatal crashes.
- ***Non-Traffic Surveillance (NTS)*** – reports crashes occurring outside of public traffic ways including private property locations and incidents associated with vehicles involving hyperthermia, unintentional CO poisoning, window crush, trunk entrapment and other not-in-motion incidences

FARS/CRSS Coding & Validation Manual – D22

Definition: D22 – SPEEDING RELATED identifies

- ***IF*** the driver was speeding
  - *Racing*
  - *Exceeded Speed Limit*
  - *Too Fast for Conditions*
  - *Speeding, Specifics Unknown (e.g., "high rate of speed")*
- ***AND*** speeding was related to the crash
- *as identified by law enforcement (excludes witness statement)*
- *NOT a comparison of TRAVEL SPEED vs SPEED LIMIT*

SPEEDING RELATED is one of 140+ data elements collected in FARS for each fatal crash

Records-based Crash Reporting

- Primary source document is the State crash report
  - May be one or more versions submitted per State – EDT & paper
  - Various degrees of MMUCC compliance
- May be fatal supplemental form (FARS)
  - Often developed to capture data not available on the primary crash report
- Crash reconstruction report
  - More highly detailed that standard crash report form
  - Submission to State crash reporting unit / FARS unit from reconstruction unit often disconnected and not available to CRSS sampling
- Early notification document (FARS)
  - Initial impressions may not be borne out in official crash report

SPEEDING RELATED reporting must be standardized from disparate source documents

Creating Uniform Reporting Using State Specific Coding Instructions

SPEEDING RELATED

- Use PCR field "Driver Actions at Time of Crash" to code this element.
  - If the case materials state that more than one condition was present at the same time, then code the lowest mapped value that is not equal to **0 (No)**.
- **Mapping Table: 1 of 1**

If PCR Field Equals:	Then FARS/CRSS Equals:
8- Exceeded Posted Speed Limit	3 (Yes, Exceeded Speed Limit)
9- Drove Too Fast for Conditions	4 (Yes, Too Fast for Conditions)
16- Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0 (No)[1]
19- Other Contributing Action	0 (No)[2]
20- Unknown	9 (Reported as Unknown)
Blank	0 (No)[2]

1 Use when it is the only information on the Crash Report. If two or more state attributes are coded and one or more map to FARS/CRSS codes **3** or **4**, then FARS/CRSS codes **3** or **4** take priority over FARS/CRSS code **0 (No)**. If there is more detailed information in the case materials, then code the specific SPEEDING RELATED attribute.

2 Use when it is the only information on the Crash Report; however, if there is more detailed information in the case materials, then code the specific SPEEDING RELATED attribute.

Contradictory reporting? "Narrative trumps checkbox"

Mapping the SPEEDING RELATED attributes supports consistent interpretation of disparate source documents & uniform reporting in NHTSA's records-based reporting systems

Records-based Reporting for *SPEEDING-RELATED in the Balance*

- Construction of NHTSA's SPEEDING-RELATED data element accommodates range of most common speeding characteristics
- Most crash documents provide some means of communicating SPEEDING-RELATED information
- Records-based sources may overreport "Not speeding-related" since the lack of affirmative documentation (yes, speeding-related) may be interpreted as speed not being a factor in the crash -- per FARS:
  - Generally, 20% of drivers affirmed as SPEEDING-RELATED factor
  - Generally, 75% of drivers coded NO, speeding not a related characteristic of this crash
  - Generally, 5% of drivers reported as "unknown" if speeding-related
- Investigation-based reporting provides more empirical data than records-based reporting for SPEEDING-RELATED

Behavioral Research Program on Speeding and Speed Management

Randolph Atkins

Overview: Office of Behavioral Safety Research Speeding and Speed Management Program

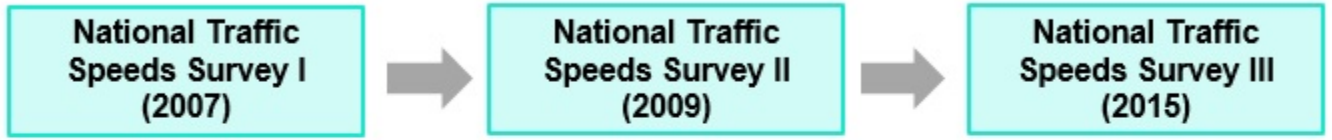
22 OBSR speeding projects over the last 13 years

Major focus of our behavioral speeding research:

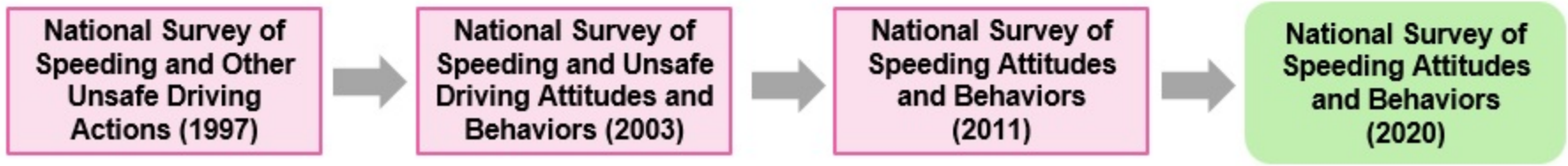
- Identifying the magnitude and scope of the problem over time
- Understanding the nature of the problem
- Developing and testing countermeasures
- Disseminating research findings

Identifying the Problem

Nationally representative surveys of traffic speeds



Nationally representative surveys of attitudes and behaviors



Examining Technology

In-vehicle Countermeasures

Using Feedback to Improve Safe Driving Behavior (2011) → Automated Feedback to Foster Safe Driving in Young Drivers (2011)

Investigate the Use & Feasibility of Speed Warning Systems (2013)

Non-vehicle Technology

System Analysis of Automated Speed Enforcement (ASE) Implementation (2014)

Meta-Analysis of Research on Dynamic Speed Feedback Signs (2019)

Other Speeding Projects

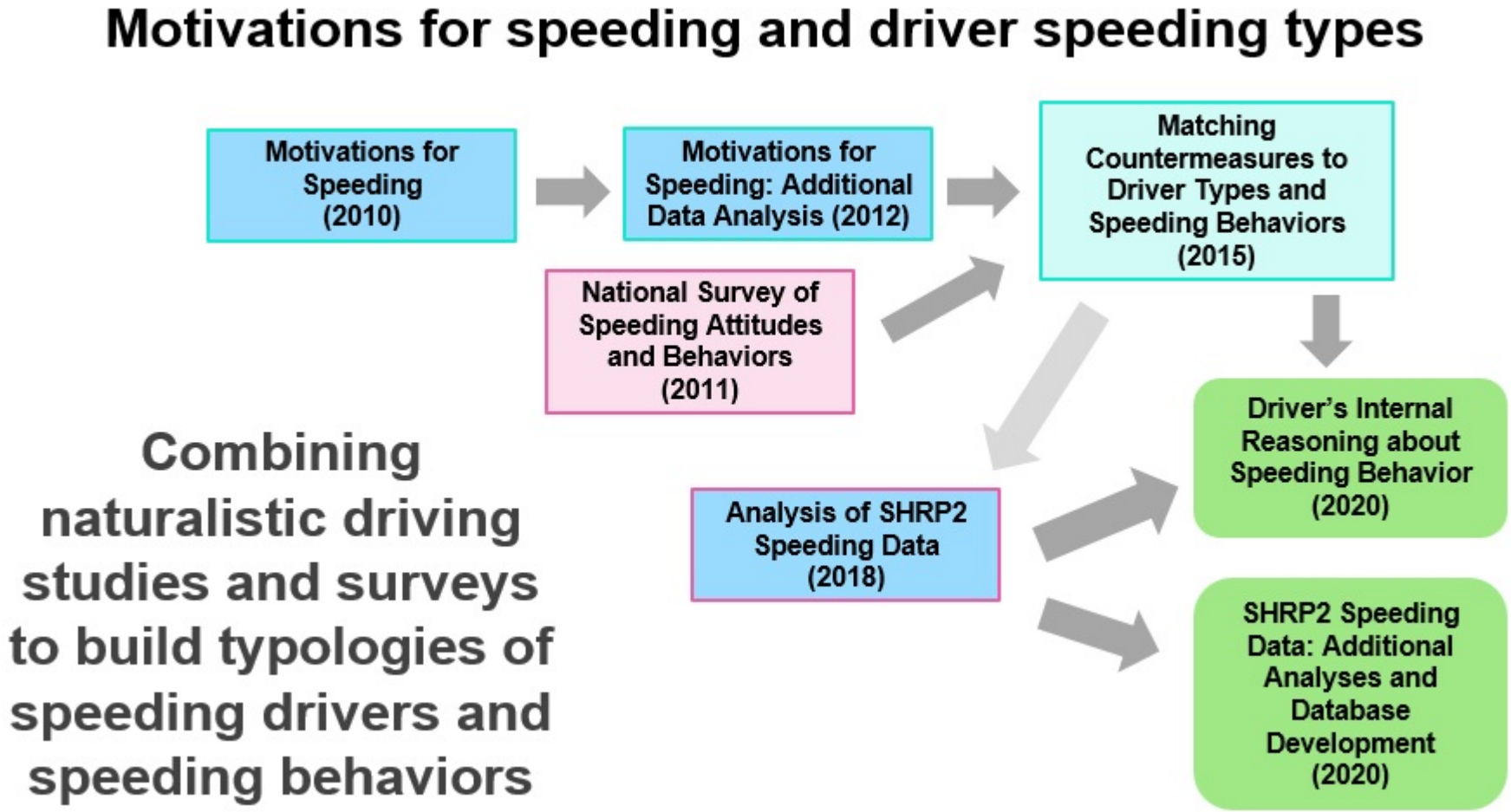
Vulnerable Road Users

- Demonstration and Evaluation of the *Heed the Speed* Pedestrian Safety Program (2011)
- Impact of Lowering Speeds on Pedestrian and Bicyclist Safety (2020)

Other Speeding Research

- Instrumented Roadways for Speeding Related Problems (2018)
- State of Knowledge on Speed, Speeding, and Traffic Safety (2020)
- Effects of Education on Speeding Behavior (2020)

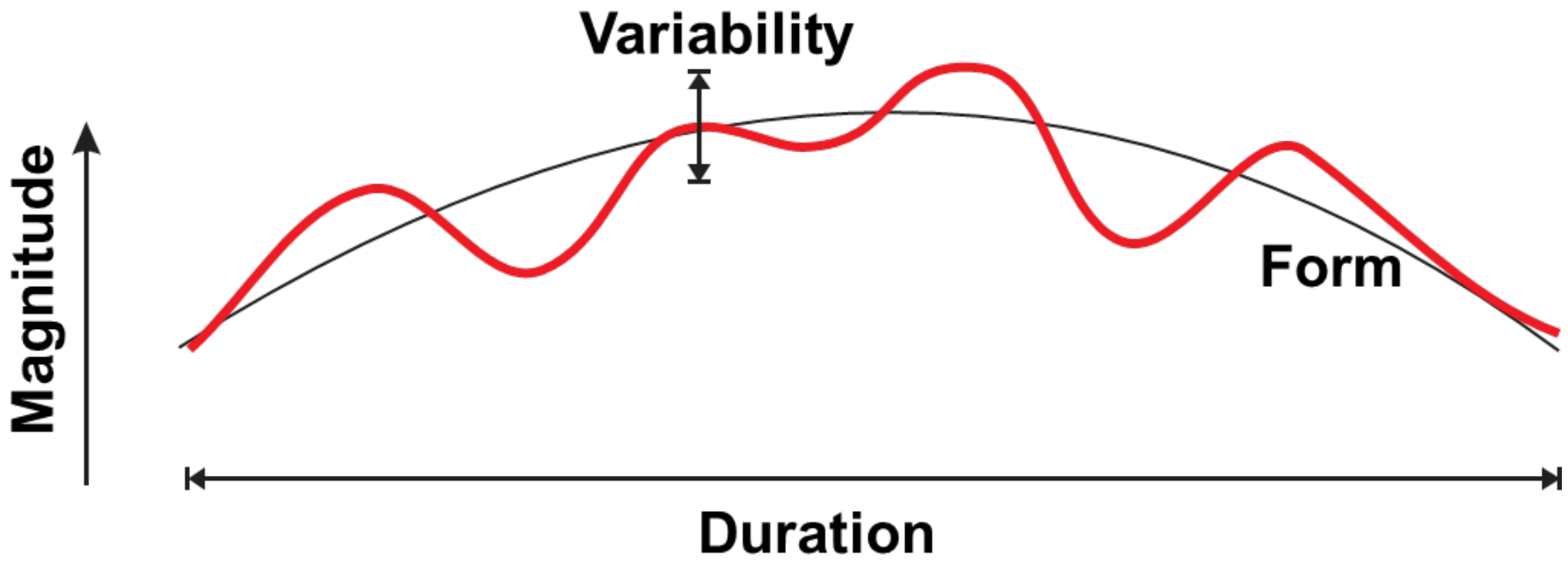
Why Drivers Speed



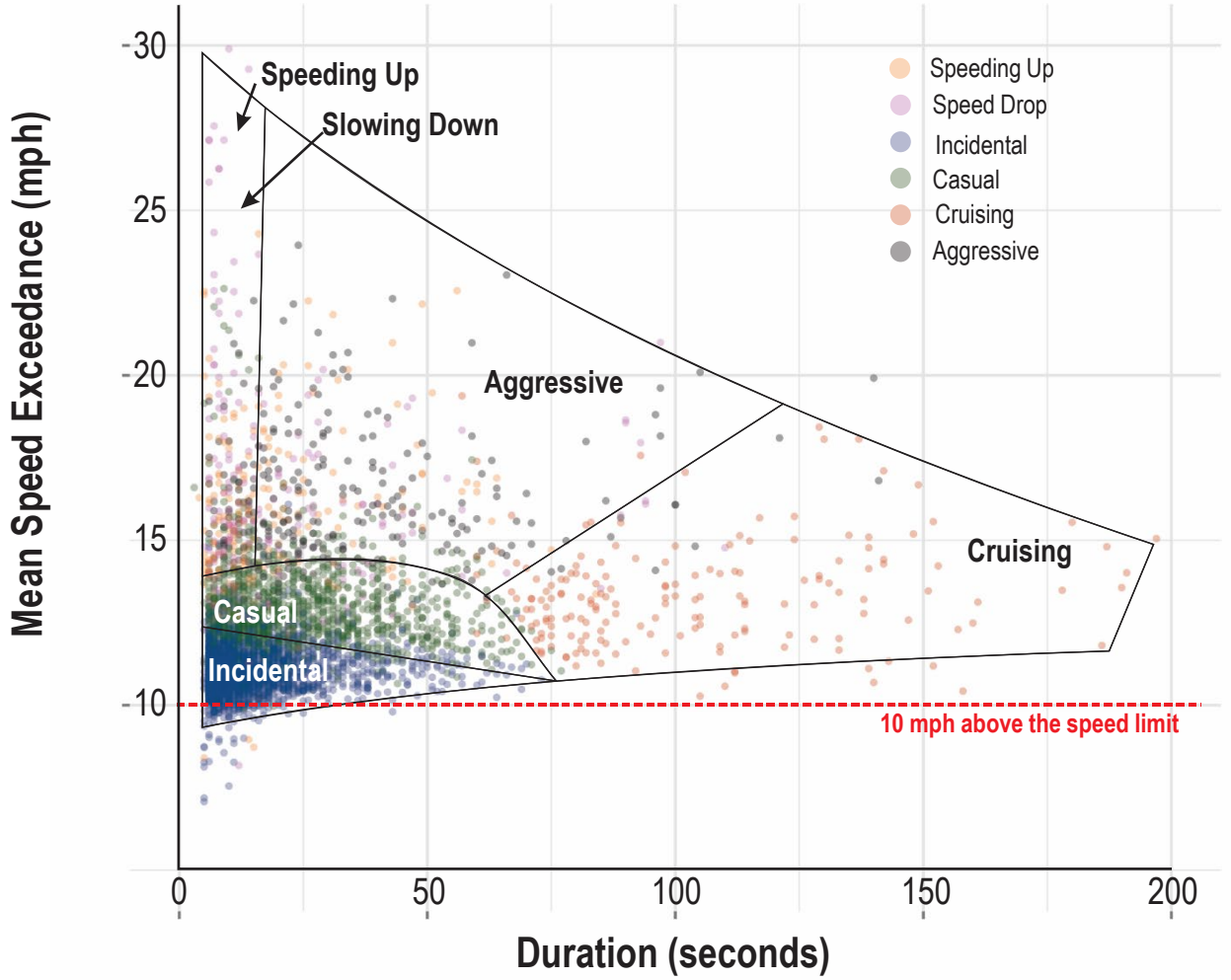
Types of Speeding Behavior and Types of Speeding Drivers

Motivations for Speeding: Additional Analysis

Characteristics of a Speeding Episode

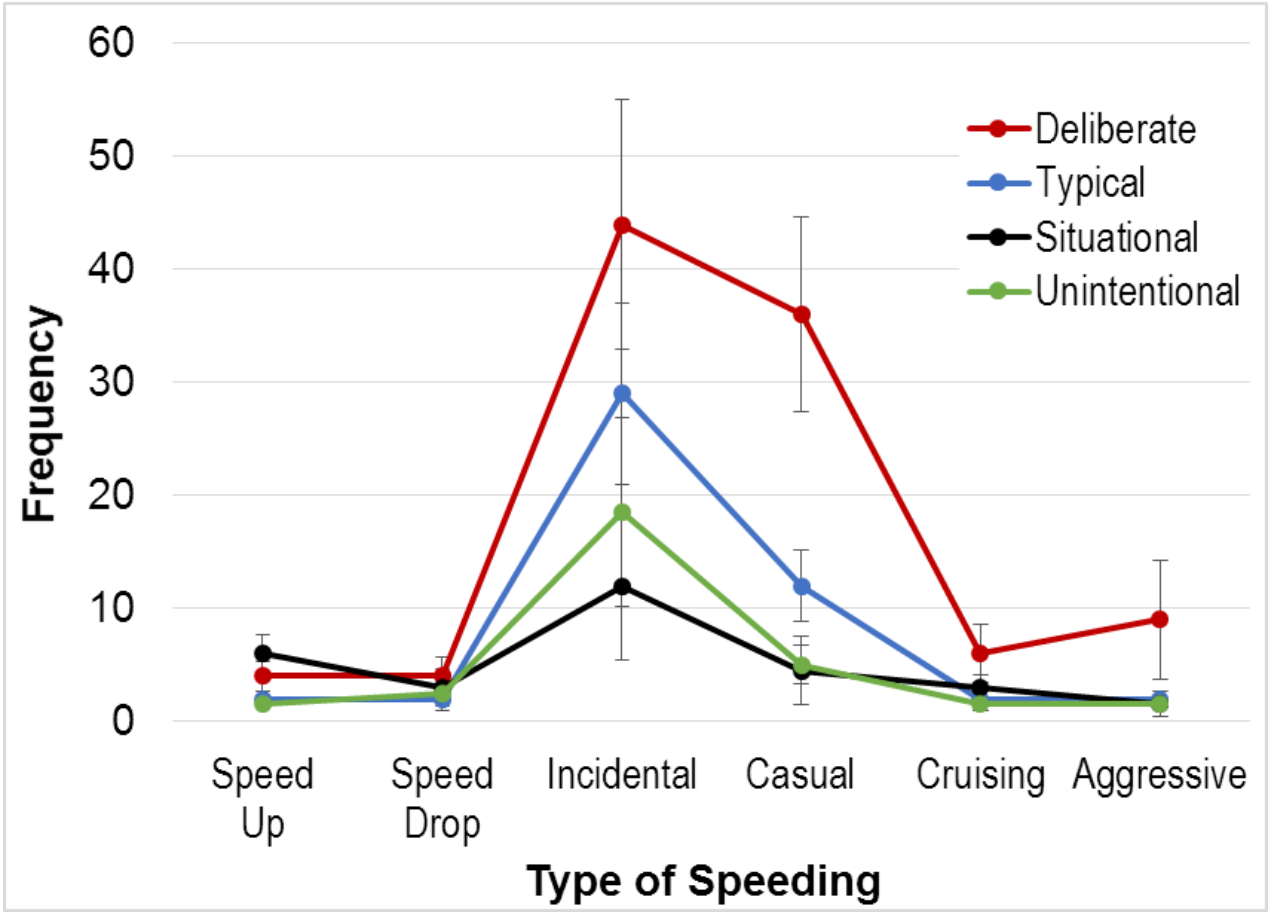


Motivations for Speeding: Additional Analysis



Motivations for Speeding: Additional Analysis

Median Frequency of Types of Speeding by Driver Type



Motivations for Speeding: Additional Analysis

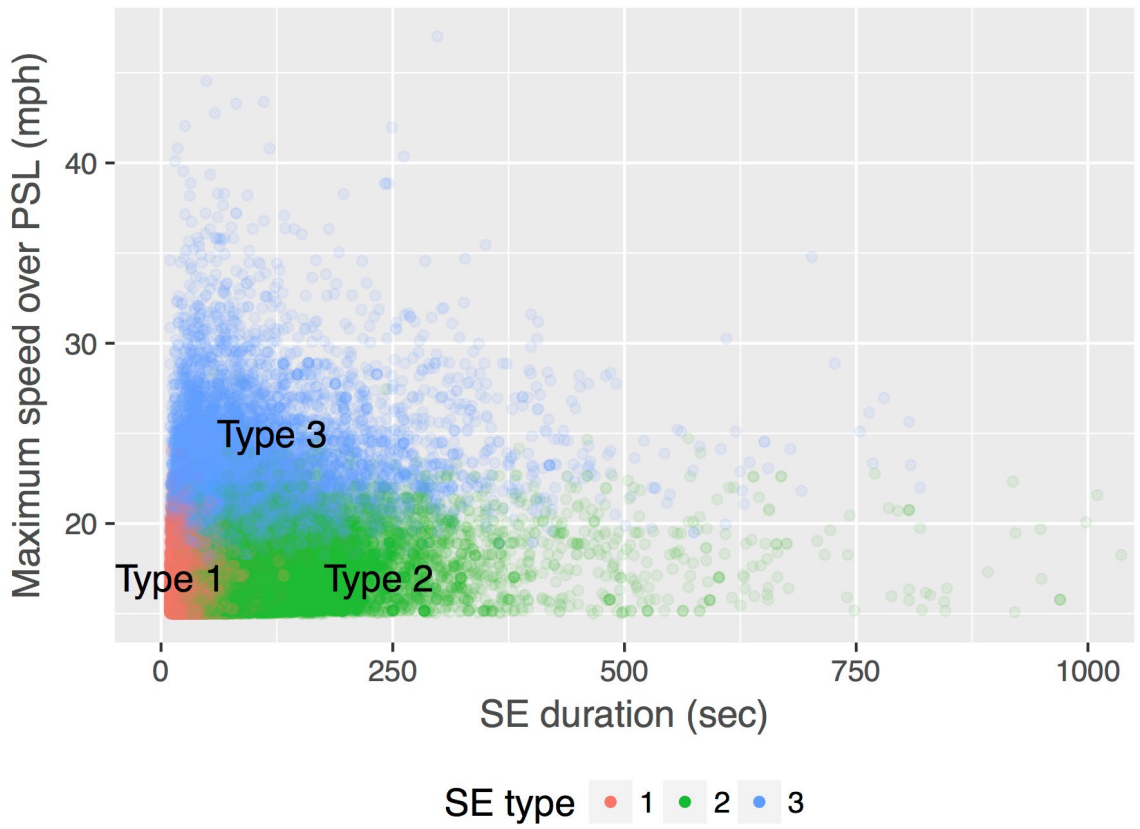
Relative "Riskiness" of Speeding Types

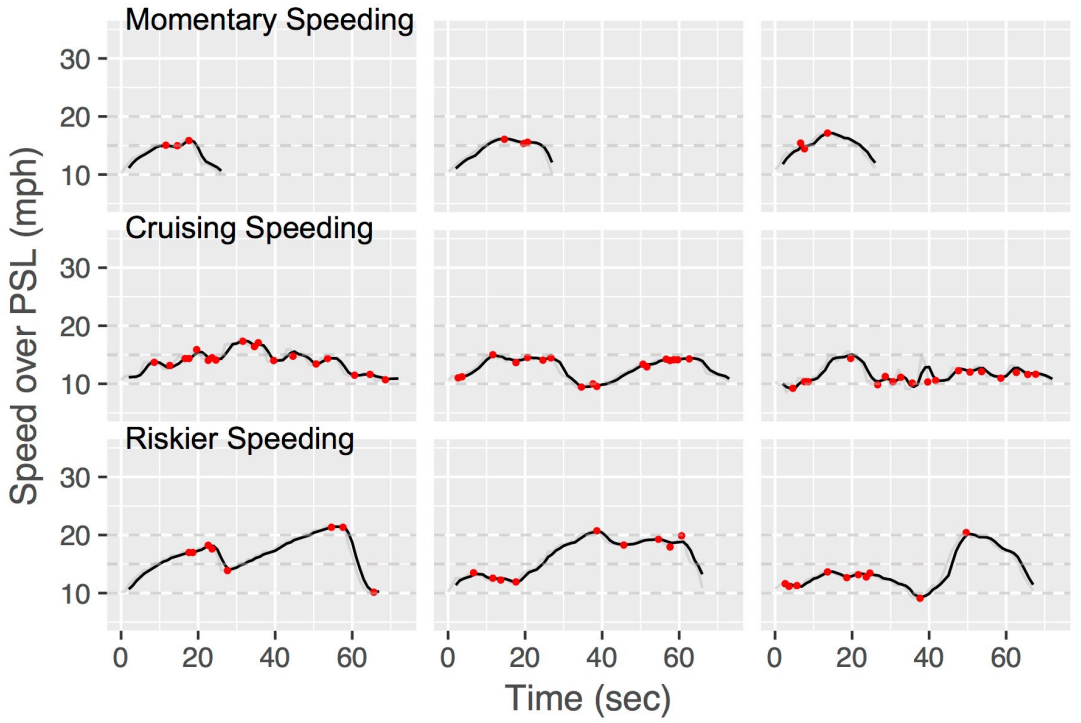
Four measures that have some relationship to risk and exposure were available

These measures were multiplied together to approximate relative "riskiness" across types of speeding

	Speeding Up	Speed Drop	Incidental	Casual	Cruising	Aggressive
Exceed by 20 mph	31%	33%	0%	2%	8%	**39%**
Not Controlled Access	**70%**	55%	47%	51%	28%	50%
Night (8pm-6am)	10%	12%	11%	11%	13%	**16%**
Riskiness	*0.022*	*0.021*	*0.000*	*0.001*	*0.003*	*0.031*
Average Duration	19.1	21.0	14.8	24.5	**109.6**	35.4
Riskiness x Duration (Exposure)	0.422	0.449	0.000	0.027	0.337	1.093

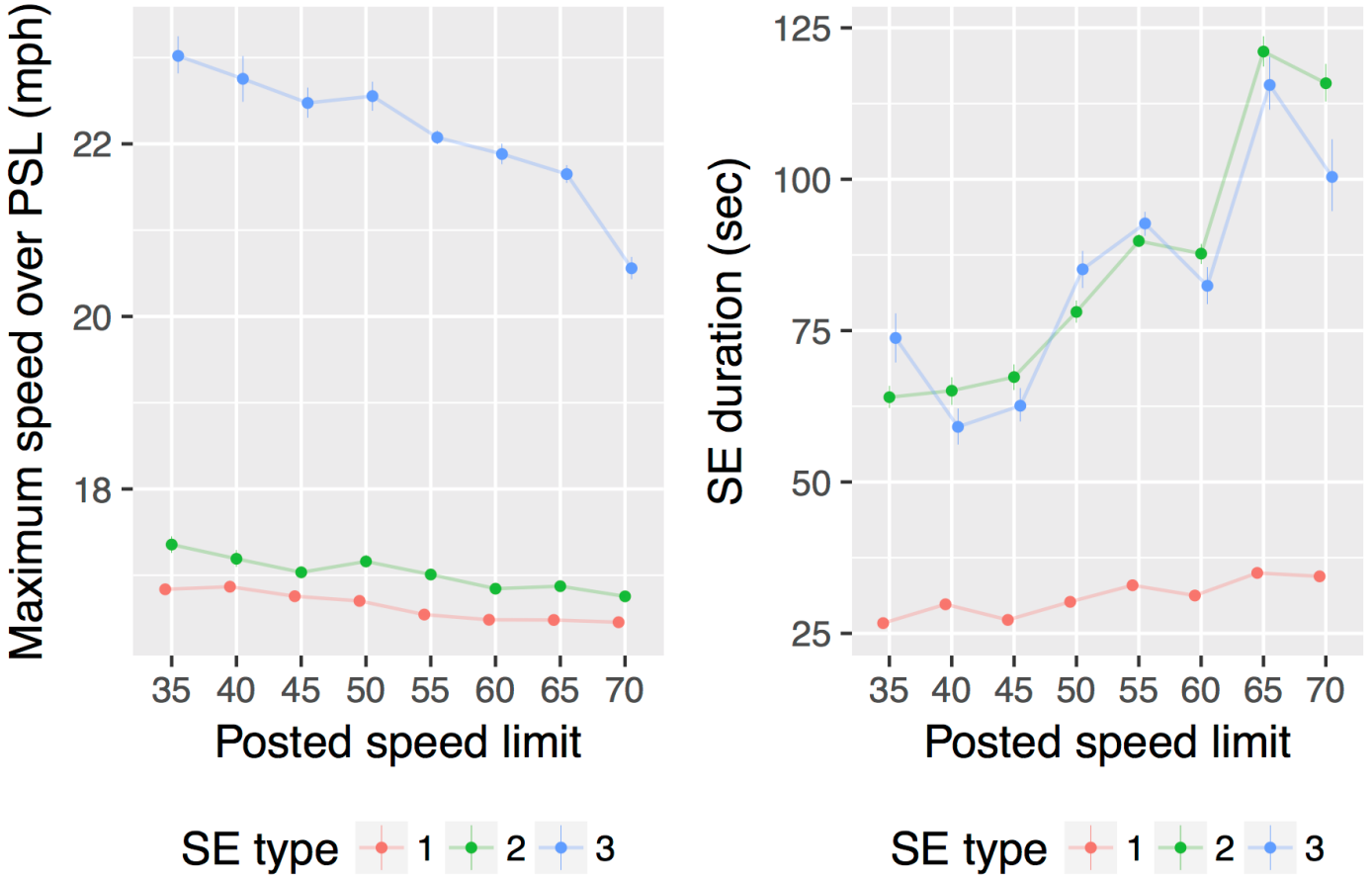
Analysis of SHRP2 Speeding Data
Cluster Analysis: Three Types of Speeding Episodes





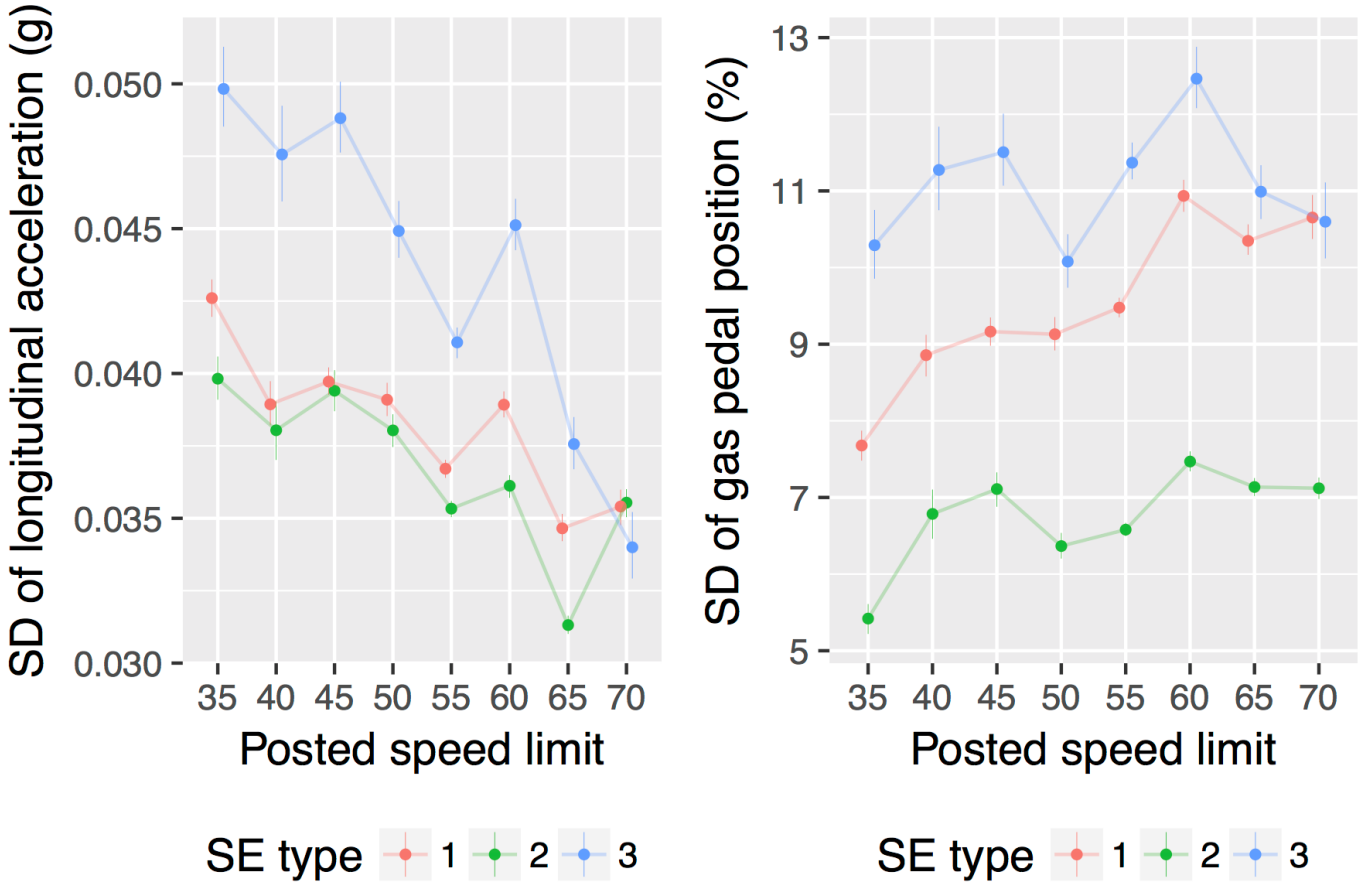
Analysis of SHRP2 Speeding Data
Characteristics of Speeding Episode Types Across PSL

Type 3 **Riskier SEs** had the fastest speeds and nearly the longest durations



Analysis of SHRP2 Speeding Data
Characteristics of Speeding Episode Types Across PSL

- Type 3 **Riskier SEs** had higher speed variability, suggesting active speed control
- Type 2 **Cruising SEs** had the lowest speed variability



Common Traits of Speeders Across Studies

Driver psychology matters

NSSAB	Motivations for Speeding	SHRP2 Speeding
Less regard for speeding laws; Impatient, in a hurry	Attitudes showing hostility towards other drivers	Attitudes associated with anti-social behavior
Less concerned with risks; Less likely to connect speed with risk	Attitudes supportive of reckless and aggressive driving	Attitudes associated with aggressive driving, risk taking
Felt had superior driving skills that offset risk of speeding	Less aware of speeding laws and signage	Poor driving behaviors

- Speeders have riskier beliefs and attitudes
- Can be targeted with education & public information campaigns

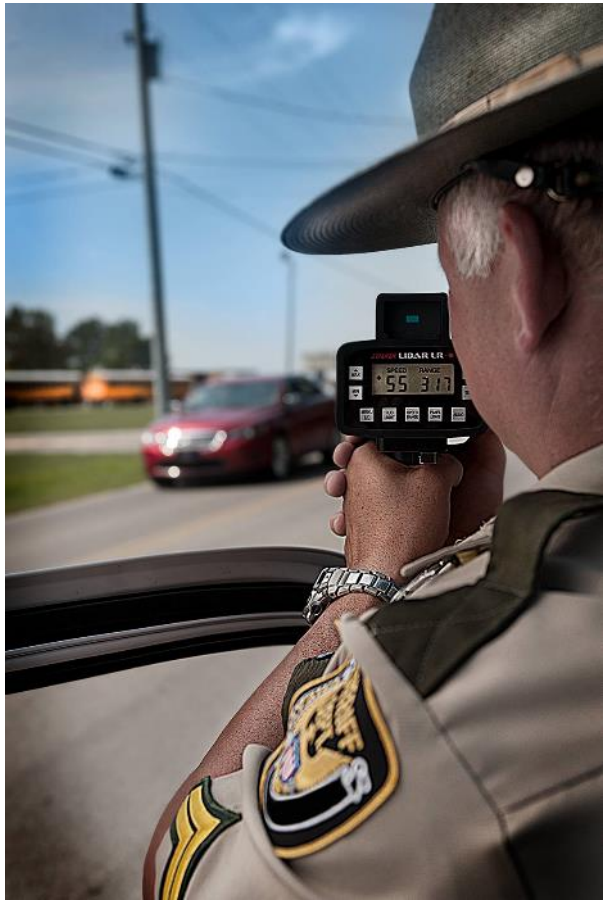
Current Behavioral Research on Speeding and Speed Management

Stacy Jeleniewski

Current Projects

- **State of Knowledge (SOK) on Speeding**
- **SHRP2 Speeding Data: Additional Analyses and Database Development**
- **Influence of Drivers' Internal Reasoning on Speeding**

State of Knowledge (SOK) on Speeding



SOK on Speeding: Overview

- An extensive and comprehensive literature review exploring the topics of speeding and speed management.
- Period of Performance: Sept. 2017-Sept. 2021

SOK on Speeding: Background

- NHTSA has published periodic State of Knowledge reports on various topics (e.g., Impaired Driving, Drowsy Driving);
- This will be NHTSA's first SOK report on speeding and speed management.

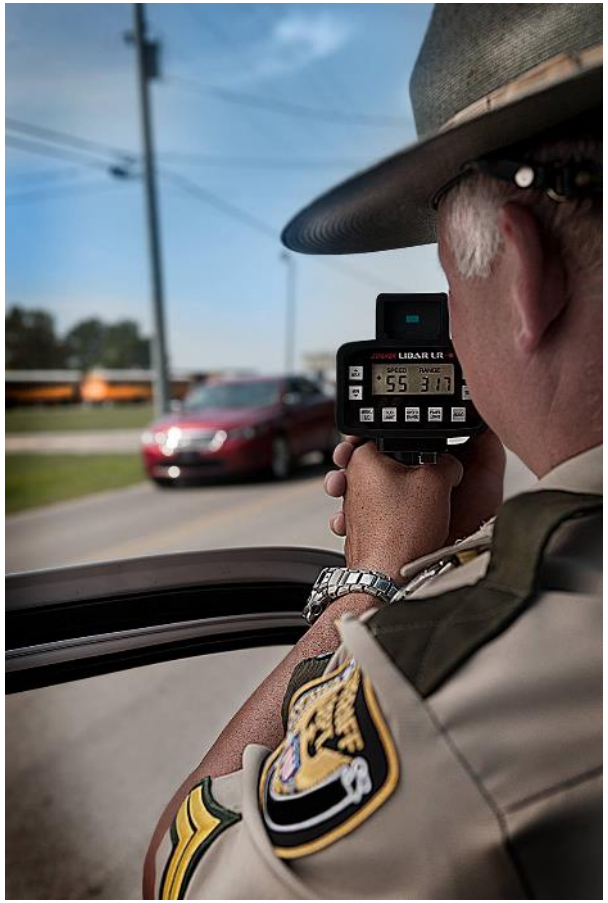
SOK on Speeding: Methodology

- Comprehensive scan of the existing literature;
- Obtain and compile necessary documents;
- Critically review and objectively synthesize the literature;
- Draw conclusions that allow a solid understanding of the topic.

SOK on Speeding: Outcomes & Implications

- Final deliverables to include a final briefing and SOK Report that includes the following chapters:
  - Crash Risk and Consequences
  - Speed Limits
  - Driving Environment
  - Driver Internal Factors (e.g., attitudes, personality traits)
  - Associated Risky Behaviors
  - Emerging Approaches in Prevention
- Findings will serve as:
  - A critical update of our knowledge of speeding and speed management;
  - An important reference document for NHTSA; and
  - An important resource in traffic safety, including for other Federal agencies, State governments, advocates, researchers, and the public.

SHRP2 Speeding Data: Additional Analyses and Database Development



SHRP2 Speeding Data: Overview

- An examination of SHRP2 naturalistic driving data to better understand the role of driver and situational factors associated with speeding-related crashes and near crashes.
- Period of Performance: Sept. 2020-Sept. 2022

SHRP2 Speeding Data: Background

- A follow-on study from the initial SHRP2 Speeding study;
- Explores two primary research questions:
  - RQ1: What is the role of certain driver and situational factors associated with speeding-related crashes and near crashes?
  - RQ2: What is the nature of speeding and aggressive driving behaviors in ambient traffic?

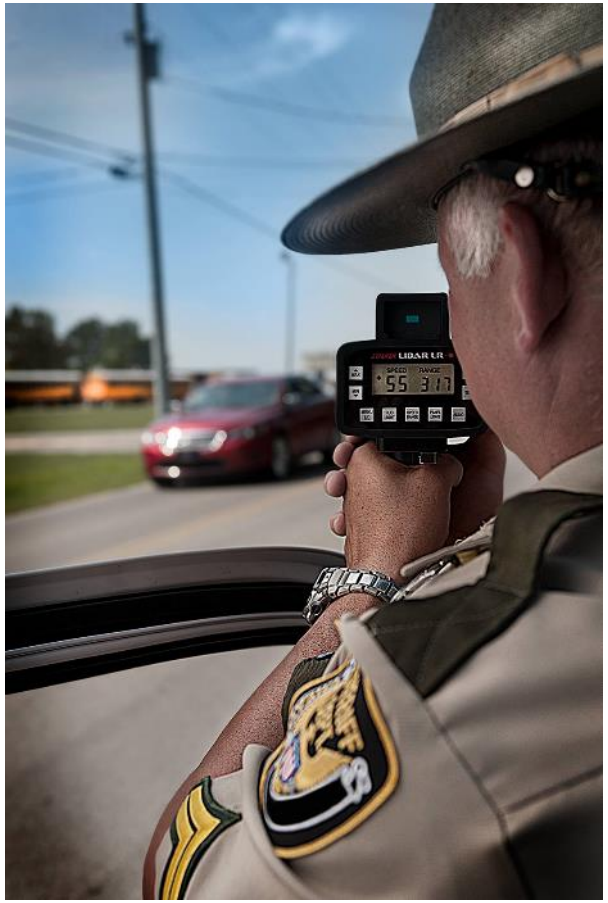
SHRP2 Speeding Data: Methodology

- Establish a data-sharing agreement with Virginia Tech Transportation Institute (VTTI) and access existing SHRP2 naturalistic driving data;
- Epochs of interest are periods when a vehicle was in a free-flow episode, traveling 10 mph over the posted speed limit (PSL), and there was a crash or near crash;
- Identify “matched control epochs” (e.g., same driver, speed over PSL, road class) to compare to epochs of interest;
- Examine different data to answer the research questions of interest (e.g., radar, gps, lane-positioning, and video data);
- Develop algorithms to automatically identify variables of interest in the data.

SHRP2 Speeding Data: Outcomes & Implications

- Final products to include a final report, final briefing, Traffic Tech, and journal article for peer-reviewed publication;
- Findings will:
  - Increase knowledge of the driver personal factors and situational factors associated with speeding and aggressive driving;
  - Inform the development of new and tailored countermeasures; and
  - Provide a better SHRP2 speeding dataset for future research, with new variables incorporated from the current study.

Influence of Drivers' Internal Reasoning on Speeding



Drivers' Internal Reasoning on Speeding: Overview

- An examination of driver records and self-report survey data to explore driver internal factors associated with speeding behavior.
- Period of Performance: Sept. 2020-Sept. 2023

Drivers' Internal Reasoning on Speeding: Background

- Expands upon two previous NHTSA studies:
  - *Motivations for Speeding*, which explored and developed speeder-typologies; and
  - *Matching Countermeasures to Driver Types and Speeding Behavior*, which further examined speeder-typologies, countermeasures by typology, and self-reported vs. driver records of speeding.
- Explores how well-established internal factors associated with other types of rule-violating behavior (i.e., internal reasoning about the law and right-and-wrong) are associated with speeding behavior.
- Explores a primary research question: Is drivers' internal reasoning about speeding associated with their speeding behavior?

Drivers' Internal Reasoning on Speeding: Methodology

- Follows the methodology for NHTSA's study, *Matching Countermeasures to Driver Types and Speeding Behavior;*
- A partner State will be selected;
- Participants will be selected from the DMV, stratified by driver age, gender, and number of speeding convictions (0, 1, 2+);
- Invitation materials will be sent by the DMV;
- Participants will complete a questionnaire that asks about their:
  - Attitudes about speeding as a legal and moral issue;
  - past speeding behavior and intent to engage in future speeding behavior.
- Self-report data will be examined in relation to drivers' records.

Drivers' Internal Reasoning on Speeding: Outcomes & Implications

- Final products to include a final report, final briefing, Traffic Tech, and journal article appropriate for peer-reviewed publication;
- Findings will:
  - Increase knowledge of driver internal factors associated with speeding behavior; and
  - Inform the development of new and tailored countermeasures.

Thank you for your time and attention

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National Center for Statistics and Analysis

https://www.nhtsa.gov/data/national-center-statistics-and-analysis

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