

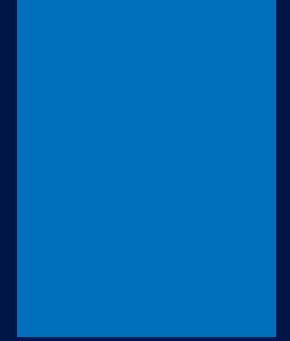
Analysis of Naturalistic Driving Data to Assess Distraction and Drowsiness in Drivers of Commercial Motor Trucks and Buses



U.S. Department of Transportation
Federal Motor Carrier Safety Administration

UMassSafe Webinar

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Analysis of Naturalistic Driving Data to Assess Distraction and Drowsiness in Drivers of Commercial Motor Trucks and Buses

- Examined safety-critical events (SCEs) in the context of driver behaviors
- Over 3.8 million miles of naturalistic data were collected from 7 fleets and 10 locations
- Data were collected continuously from cameras and from kinematic sensors

Five camera views used in the study



Driver Sample

Fleet	Location	Operation	Vehicles	Drivers	Participation
A	Baton Rouge, LA	Grocery—Reefer	65	58	1 year
B	Escanaba, MI	Dry goods – long-haul, regional; company and owner-operator drivers	8	9	3 months
C	Selma, NC	Fuel-tanker	35	47	3 weeks
D	Tampa, FL	Fuel-tanker	42	23	6 months
D	Taft, FL	Fuel-tanker			6 months
E	Los Angeles, CA	Motorcoach	22	38	1 year
F	San Antonio, TX	Motorcoach	21	35	2 years
G	Coraopolis, PA	Oil Field	14	17	1 month
G	Williamsport, PA	Oil Field			3 weeks
H	Pembroke, NH	Grocery—Reefer	18	18	1 year

Truck Secondary Tasks with Significant Odds Ratios

- Research Question 1 What are the odds of being involved in an SCE while engaging in a secondary task?

Secondary Task	Odds Ratio	Lower confidence limit	Upper confidence limit
Talking/singing	0.60*	0.47	0.76
Dancing	0.40*	0.24	0.67
Reading	3.27*	1.63	6.59
Reaching for object	4.57*	3.27	6.39
Electronic dispatching device	1.44*	1.05	1.98
Other electronic device (e.g., GPS)	2.87*	1.54	5.36
External distraction	1.21*	1.04	1.41
Reaching for food- or drink-related object	1.67*	1.19	2.33

Motorcoach Secondary Tasks with Significant Odds Ratios

- Research Question 1 What are the odds of being involved in an SCE while engaging in a secondary task?

Secondary Task	Odds Ratio	Lower confidence limit	Upper confidence limit
Dancing	0.37*	0.16	0.83
Reaching for object	2.46*	1.57	3.86
Intercom use	2.74*	1.49	5.03
Adjusting instrument panel (radio)	1.34*	1.03	1.75
Adjusting/monitoring other devices integral to vehicle (seatbelt, mirrors)	1.59*	1.07	2.38
External distraction	1.57*	1.29	1.93
Removing/adjusting clothing	2.29*	1.27	4.13

Truck Odds Ratios of Cell Phone Tasks

Research Question 2 What are the odds of being involved in an SCE while talking on a handheld or hands-free cell phone?

Cell Phone Task	Odds Ratio	Lower confidence limit	Upper confidence limit
Hand-held locate/reach/answer	1.90	0.93	3.87
Hand-held talk/listen	0.71	0.30	1.67
Hand-held holding	2.26*	1.11	4.61
Hand-held browsing	4.35*	3.08	6.17
Hand-held texting	3.07*	1.03	9.15
Hands-free call via headset/earpiece	0.50*	0.37	0.68
Hands-free talk/listen	0.51*	0.38	0.69

Motorcoach Odds Ratios of Cell Phone Tasks

Research Question 2 What are the odds of being involved in an SCE while talking on a handheld or hands-free cell phone?

Cell Phone Task	Odds Ratio	Lower confidence limit	Upper confidence limit
Hand-held talk/listen	1.97	0.76	5.10
Hand-held holding	3.96*	1.18	13.26
Hand-held browsing	2.58*	1.29	5.18
Hands-free call via headset/earpiece	0.50	0.24	1.02
Hands-free talk/listen	0.45*	0.22	0.93

Truck Odds Ratios of Eyes off Forward Roadway

- Research Question 4 What are the odds of being involved in an SCE while eyes were off the forward roadway?

Total Eyes Off Forward Roadway	Odds Ratio	Lower confidence limit	Upper confidence limit
Less than or equal to 0.5 seconds	1.17	0.82	1.66
Greater than 0.5 seconds but less than or equal to 1.0 second	0.99	0.75	1.29
Greater than 1.0 second but less than or equal to 1.5 seconds	1.28	0.98	1.67
Greater than 1.5 seconds but less than or equal to 2.0 seconds	1.45*	1.07	1.95
Greater than 2.0 seconds	2.73*	2.21	3.37

Findings: The longer the driver's eyes were off the forward roadway, the greater the risk of being involved in an SCE.

Motorcoach Odds Ratios of Eyes off Forward Roadway

Research Question 4 What are the odds of being involved in an SCE while eyes were off the forward roadway?

Total Eyes Off Forward Roadway	Odds Ratio	Lower confidence limit	Upper confidence limit
Less than or equal to 0.5 seconds	0.86	0.54	1.35
Greater than 0.5 seconds but less than or equal to 1.0 second	0.75	0.54	1.05
Greater than 1.0 second but less than or equal to 1.5 seconds	0.95	0.69	1.31
Greater than 1.5 seconds but less than or equal to 2.0 seconds	1.24	0.85	1.81
Greater than 2.0 seconds	1.50*	1.13	1.98

Conclusion

- Visual-manual intensive tasks on a hand-held phone showed increased risk
- Cell phone use was lower for motorcoach drivers
- Texting occurred infrequently in the data
- The longer the driver's eyes were off the forward roadway, the greater the risk of being involved in an SCE
 - Both motorcoach and truck drivers

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Links to the research brief and report

Research Brief: <https://rosap.ntl.bts.gov/view/dot/57154>

Report: <https://rosap.ntl.bts.gov/view/dot/57153>

Website Information

To find more information about FMCSA's Office of Analysis, Research, and Technology, visit our website:

<https://www.fmcsa.dot.gov/safety/analysis-research-technology>

