Commercial Motor Vehicle Driver Risk Based on Age and Driving Experience

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Study Background

- There is a widely held concern about a growing commercial motor vehicle (CMV) driver shortage.
- One possible solution may be to recruit and hire younger drivers.
- It is largely unknown what impact age has on driver risk independent of CMV driving experience, and vice versa.

National Surface Transportation Safety Center for Excellence (NSTSCE)

- The current project was sponsored by NSTSCE at VTTI
- NSTSCE research focuses on four major objectives:
  1. *Develop and test transportation devices and techniques that enhance driver performance*
  2. *Evaluate the roadway environment and infrastructure-based safety systems*
  3. *Address mobility for vulnerable road users*
  4. *Examine driver impairment issues*
- For more information on NSTSCE: *https://www.vtti.vt.edu/national/nstsce/index.html*

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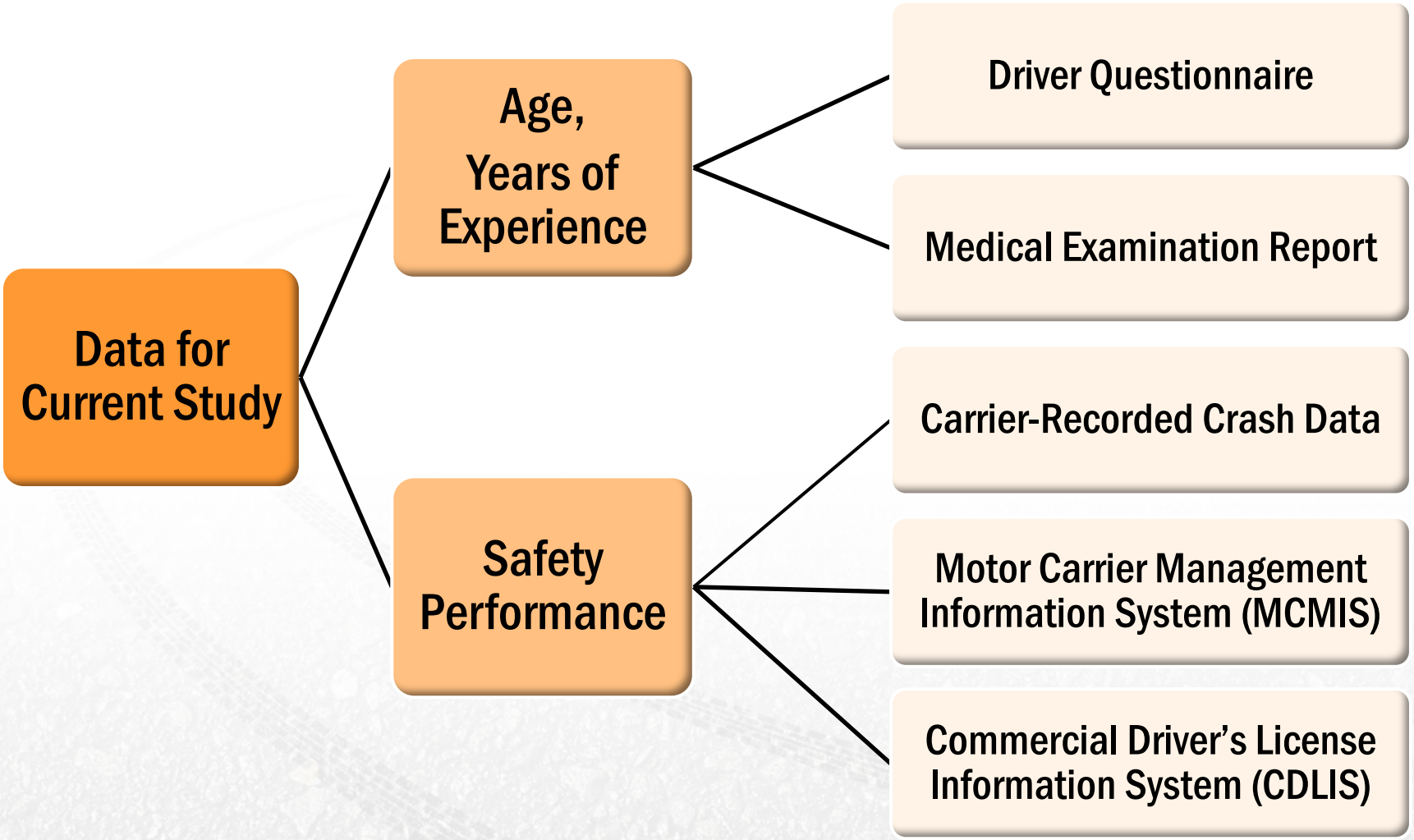
Data Collection

Data originally collected from over 21,000 drivers as part of FMCSA-sponsored *Commercial Driver Safety Risk Factors (CDSRF)* study (Hickman, et al., 2020)

Data Sources

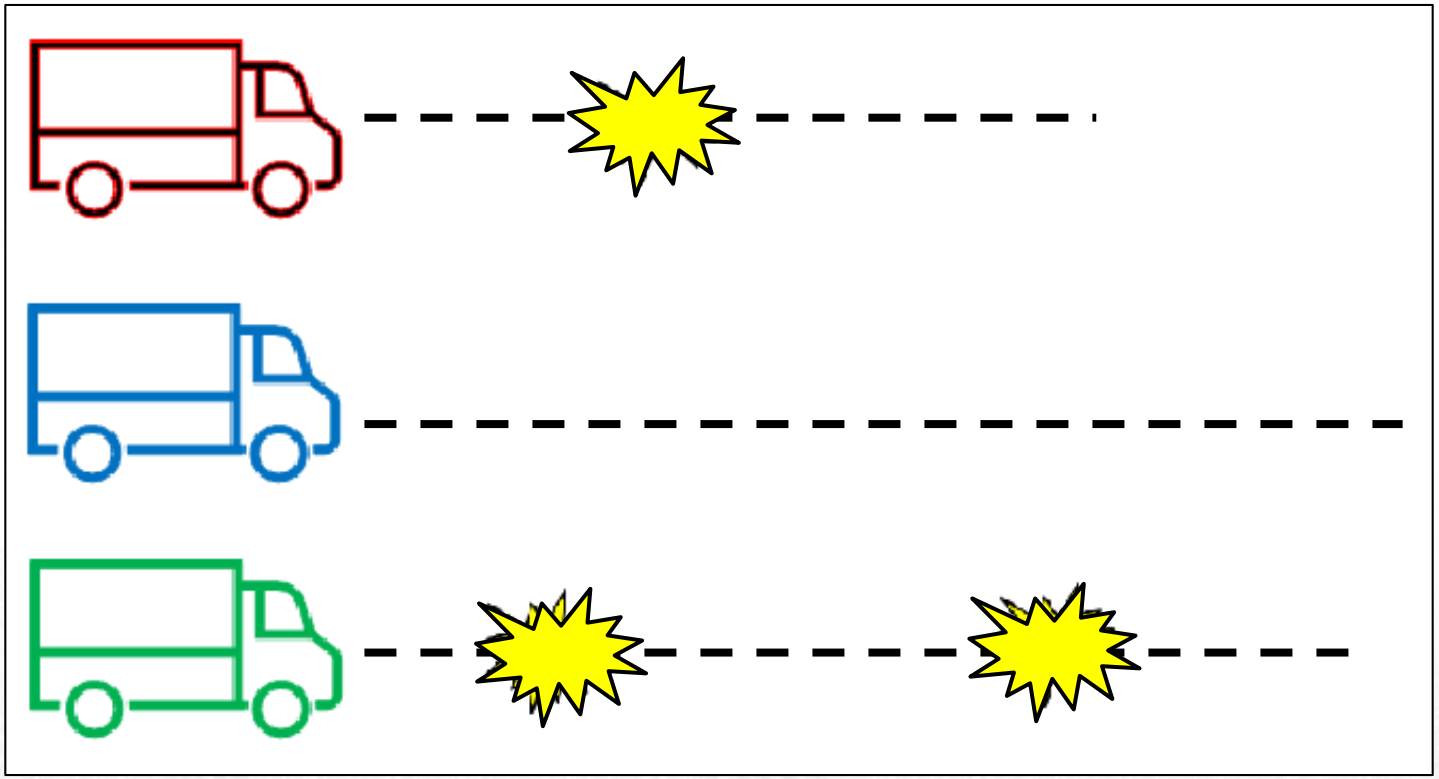


Age Category	CMV Driving Experience Category								Total
	6 mos. or less	7 m-1 yr	1-2 yrs	2-5 yrs	5-10 yrs	10-20 yrs	20-30 yrs	30 yrs or more	
21-24 y/o	184	183	119	60	6	0	0	0	552
25-34 y/o	386	384	423	530	395	99	0	0	2,217
35-44 y/o	248	296	302	450	512	788	82	1	2,679
45-54 y/o	193	178	210	322	387	705	404	64	2,463
55-64 y/o	61	59	85	118	151	261	218	141	1,094
65 yrs or older	10	2	7	2	11	25	25	49	131
Total	1,082	1,102	1,146	1,482	1,462	1,878	729	255	**9,136**

Analysis Goals

1) Compare drivers of different ages with the same reported experience level
2) Compare drivers of different experience levels with the same age
3) Assess safety performance using:
    1) carrier-recorded crash involvement
    2) MCMIS crash involvement
    3) moving violation involvement

Analysis Methods



Results

Carrier-Recorded Crashes

Drivers Involved in Carrier-Recorded Crash: Compare Different Ages for Driving Experience

CMV Driving Experience	Age Group 1	Age Group 2	Odds Ratio Estimate	95% Confidence Interval Estimate
7 months-1 year	21-24 y/o	55-64 y/o	0.45	(0.25, 0.82)
	25-34 y/o	35-44 y/o	0.72	(0.52, <1.00)
		45-54 y/o	0.63	(0.43, 0.91)
		55-64 y/o	0.38	(0.22, 0.67)
	35-44 y/o	55-64 y/o	0.53	(0.30, 0.93)
1-2 years	21-24 y/o	55-64 y/o	0.51	(0.27, 0.96)
	35-44 y/o	55-64 y/o	0.54	(0.32, 0.91)

Drivers Involved in Carrier-Recorded Crash: Compare Different Experience Levels for Age

Age Group	CMV Driving Experience 1	CMV Driving Experience 2	Odds Ratio Estimate	95% Confidence Interval Estimate
21-24 y/o	7 months-1 year	1-2 years	1.75	(1.02, 2.99)
25-34 y/o	6 months or less	5-10 years	1.76	(1.26, 2.45)
		10-20 years	2.02	(1.15, 3.56)
	7 months-1 year	5-10 years	1.66	(1.19, 2.32)
		10-20 years	1.91	(1.08, 3.37)
	1-2 years	5-10 years	1.64	(1.18, 2.28)
		10-20 years	1.89	(1.08, 3.32)

Drivers Involved in Carrier-Recorded Crash: Compare Different Experience Levels for Age

Age Group	CMV Driving Experience 1	CMV Driving Experience 2	Odds Ratio Estimate	95% Confidence Interval Estimate
35-44 y/o	6 months or less	1-2 years	1.73	(1.19, 2.54)
		2-5 years	1.50	(1.07, 2.11)
		5-10 years	1.79	(1.28, 2.52)
		10-20 years	2.29	(1.65, 3.16)
		20-30 years	3.93	(1.87, 8.26)
	7 months-1 year	1-2 years	1.97	(1.37, 2.82)
		2-5 years	1.70	(1.23, 2.34)
		5-10 years	2.03	(1.48, 2.80)
		10-20 years	2.59	(1.92, 3.50)
		20-30 years	4.46	(2.14, 9.27)
	1-2 years	20-30 years	2.27	(1.08, 4.78)

Drivers Involved in Carrier-Recorded Crash:
Compare Different Experience Levels for Age

Age Group	CMV Driving Experience 1	CMV Driving Experience 2	Odds Ratio Estimate	95% Confidence Interval Estimate
45-54 y/o	6 months or less	5-10 years	1.61	(1.09, 2.38)
		10-20 years	1.60	(1.12, 2.28)
		20-30 years	1.70	(1.15, 2.52)
		30 years or more	2.38	(1.13, 4.99)
	7 months-1 year	1-2 years	1.66	(1.08, 2.54)
		2-5 years	1.88	(1.27, 2.79)
		5-10 years	2.32	(1.57, 3.42)
		10-20 years	2.30	(1.62, 3.27)
		20-30 years	2.45	(1.66, 3.60)
		30 years or more	3.42	(1.63, 7.16)
	1-2 years	20-30 years	1.48	(1.00, 2.17)
55-64 y/o	6 months or less	7 months-1 year	0.47	(0.23, 0.99)
		10-20 years	1.91	(1.04, 3.54)
		20-30 years	1.93	(1.03, 3.63)
	7 months-1 year	1-2 years	2.00	(1.01, 3.94)
		2-5 years	2.78	(1.45, 5.34)
		5-10 years	3.19	(1.70, 5.99)
		10-20 years	4.06	(2.24, 7.35)
		20-30 years	4.09	(2.23, 7.52)
		30 years or more	3.67	(1.92, 7.01)
	1-2 years	10-20 years	2.03	(1.18, 3.49)
		20-30 years	2.05	(1.17, 3.58)
		30 years or more	1.84	(1.01, 3.35)

MCMIS Crashes

Drivers Involved in MCMIS Crash:
Compare Different Ages for Driving Experience

CMV Driving Experience	Age Group 1	Age Group 2	Odds Ratio Estimate	95% Confidence Interval Estimate
2-5 years	25-34 y/o	45-54 y/o	0.41	(0.17, 0.97)
	35-44 y/o	45-54 y/o	0.38	(0.15, 0.95)

Drivers Involved in MCMIS Crash:
Compare Different Experience Levels for Age

Age Group	CMV Driving Experience 1	CMV Driving Experience 2	Odds Ratio Estimate	95% Confidence Interval Estimate
45-54 y/o	2-5 years	5-10 years	4.03	(1.30, 12.48)
		10-20 years	2.24	(1.03, 4.89)

Moving Violations

Drivers Involved in Moving Violations:
Compare Different Ages for Driving Experience

CMV Driving Experience	Age Group 1	Age Group 2	Odds Ratio Estimate	95% Confidence Interval Estimate
6 months or less	21-24 y/o	45-54 y/o	4.10	(1.62, 10.39)
	25-34 y/o	45-54 y/o	3.52	(1.46, 8.44)
1-2 years	21-24 y/o	35-44 y/o	2.04	(1.04, 3.98)
	35-44 y/o	55-64 y/o	0.39	(0.19, 0.77)
5-10 years	25-34 y/o	35-44 y/o	1.73	(1.09, 2.79)
	35-44 y/o	65 yrs or older	0.20	(0.05, 0.77)
20-30 years	45-54 y/o	55-64 y/o	4.02	(1.19, 13.57)

Drivers Involved in Moving Violations:
Compare Different Experience Levels for Age

Age Group	CMV Driving Experience 1	CMV Driving Experience 2	Odds Ratio Estimate	95% Confidence Interval Estimate
35-44 y/o	7 months-1 year	5-10 years	1.69	(1.02, 2.80)
		20-30 years	4.52	(1.06, 19.22)
45-54 y/o	6 months or less	7 months-1 year	0.25	(0.10, 0.62)
		1-2 years	0.24	(0.10, 0.59)
		2-5 years	0.32	(0.13, 0.80)
		5-10 years	0.33	(0.14, 0.80)
		10-20 years	0.35	(0.15, 0.82)
	7 months-1 year	20-30 years	2.17	(1.17, 4.03)
	1-2 years	20-30 years	2.26	(1.24, 4.11)
55-64 y/o	6 months or less	1-2 years	0.31	(0.10, 0.97)
	7 months-1 year	20-30 years	6.08	(1.48, 24.94)
	1-2 years	5-10 years	2.39	(1.08, 5.30)
		10-20 years	3.00	(1.45, 6.19)
		20-30 years	14.24	(4.04, 50.14)
		30 years or more	4.52	(1.70, 12.01)
	2-5 years	20-30 years	7.62	(2.11, 27.53)
	5-10 years	20-30 years	5.96	(1.65, 21.47)
	10-20 years	20-30 years	4.75	(1.38, 16.43)

Conclusions

- The sample reflected the age-related issues with driver retention and employment:
  - Low counts of CMV drivers 65 years and older
  - Low counts of CMV drivers with more than 20 years of driving experience
  - Low counts of CMV drivers in the 21- to 24-year age category
- Driving experience, rather than age, had a greater impact on driving risk.
- As such, this study found no safety-based reason NOT to use younger drivers when structured training, mentoring, and coaching systems are in place.

Study Limitations

- Data limited to employment period with the participating carrier
- CMV driving experience was self-reported by driver
- Differences in routes, schedules, loads, and truck are unknown and could be a confounding factor
- An exploratory study with large numbers of statistical comparisons (raising the risk of a type 1 error)

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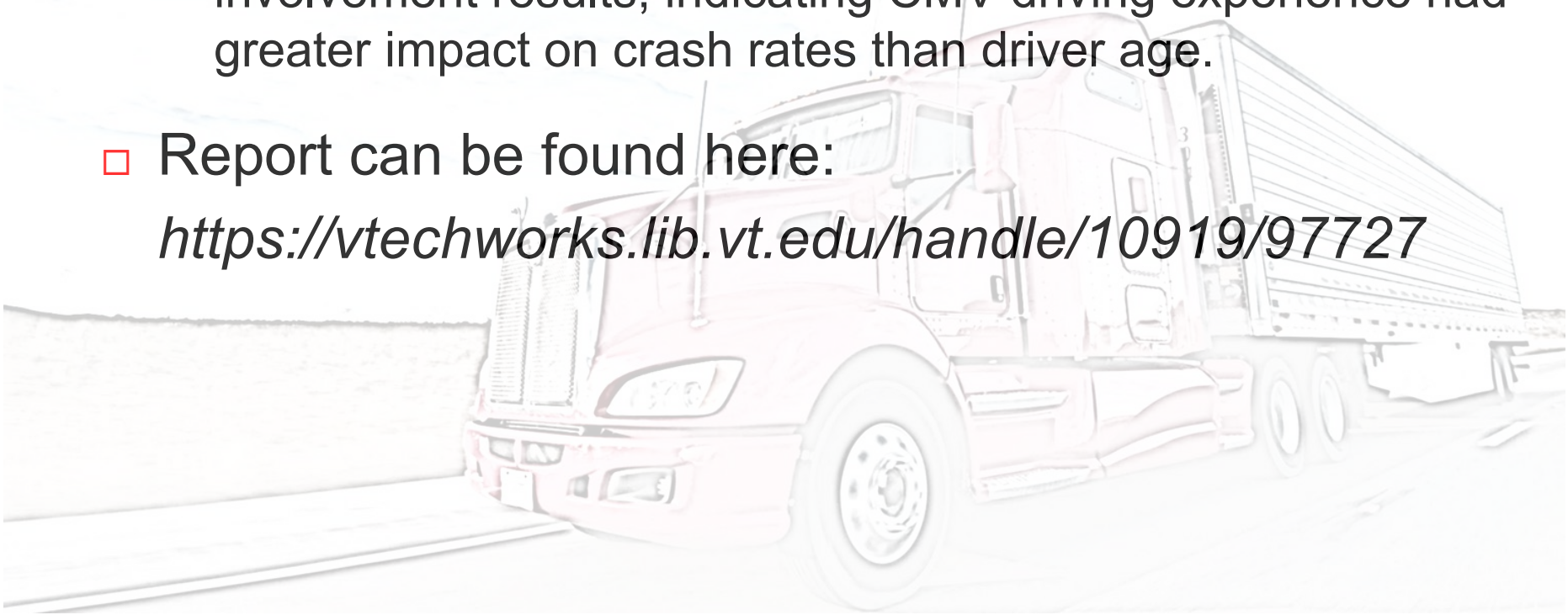
Additional Analyses in Report

- Driver crash & moving violation **rates** compared for all experience levels and age groups
  - Crash rate analysis results consistent with crash involvement results, indicating CMV driving experience had greater impact on crash rates than driver age.
- Report can be found here:

  https://vtechworks.lib.vt.edu/handle/10919/97727



Thank you

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