Linking Bad Credentials to Safety Issues

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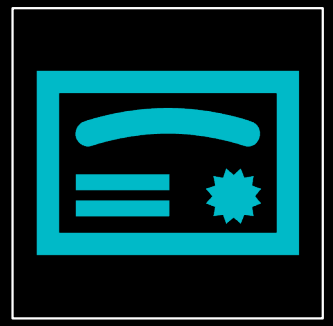
Project Background

- → Funded by FMCSA through the Innovative Technology Deployment – CMV grant program
- → Study conducted by the Kentucky Transportation Center
- → Project partners:

Project Goal

→ The primary goal of this project was to collect screening and inspection data to determine whether there is a connection between bad credentials and safety violations.

Theory



Any form of compliance (vehicle safety, driver safety, credentials) has costs

Carriers who struggle with compliance costs in one area are more likely to struggle with compliance costs in other areas

Higher levels of credentialing violations will be associated with higher levels of driver and vehicle safety violations

Data

- → Kentucky screening data from fixed and roadside inspections
- → January 2017 to August 2020
- → About 30 million vehicle screenings
- → Most screening data comes from the Kentucky Automated Truck Screening System (KATS)
- → Supplemented with PrePass/DriveWyze/RIMS records
- → Kentucky inspection data between from same period as screening data

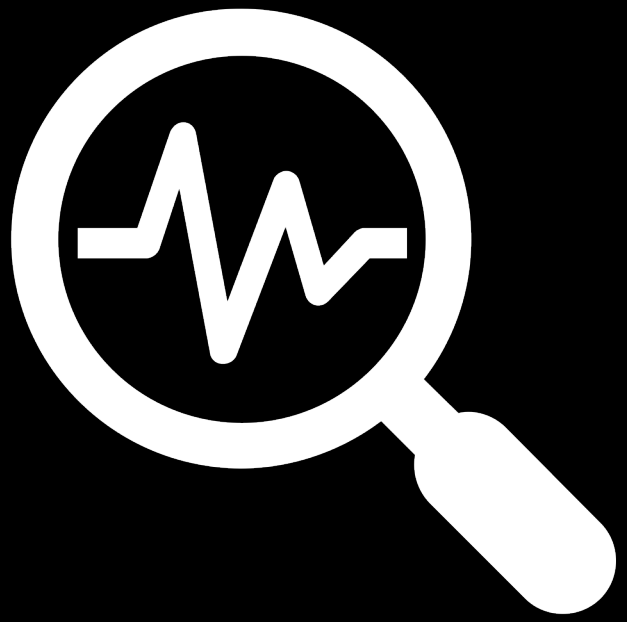
Observation Count by System

Year	KATS	PrePass	inSPECT	DriveWyze	Total
2017	6,358,449	1,929,550	18,694	0	8,306,693
2018	6,598,150	1,504,388	15,728	0	8,118,266
2019	6,305,078	1,696,995	0	523,619	8,525,692
2020	4,004,139	1,066,632	0	0	5,070,771
Total	23,265,816	6,197,565	34,422	523,619	30,021,422

Kentucky CMV Inspection Outcomes

Year	Inspections	Inspections w/ Violations	Inspections w/o Violations	Violations Found	Violation/ Inspections w/ Violations
2017	83,851	44,165	39,686	104,414	2.36
2018	78,946	36,741	42,205	85,899	2.34
2019	64,091	32,997	31,094	83,801	2.54
2020	33,331	16,477	16,854	38,827	2.36
Total/ Avg.	260,219	130,380	129,839	312,941	2.40

Method of Analysis



- → Matched screening records to fixed weigh station inspection records
- → Match rate was about 43.24 percent
- → Analyzed relationship between vehicle safety violations and credentials
  - → KYU (Kentucky weight-distance tax)
  - → IFTA
  - → UCR
  - → IRP
- → Collected data on power units per carrier

Vehicle Safety Violations to Power Unit

Carrier Status	Carrier Count	Ratio	t-score	p-value
With NO KYU Violations	11,350	0.524	-11.4346	<0.0000***
With at least 1 KYU Violation	1,459	0.979		
With NO IFTA Violations	12,160	0.550	-8.7063	<0.0000***
With at least 1 IFTA Violation	649	1.051		
With NO UCR Violations	12,419	0.551	-10.8644	<0.0000***
With at least 1 UCR Violation	390	1.348		
With NO IRP Violations	12,570	0.561	-8.2913	<0.0000***
With at least 1 IRP Violation	239	1.329		
With NO KYU, IFTA, UCR, OR IRP Violations	10,373	0.475	-16.5249	<0.0000***
With at least 1 KYU, IFTA, UCR, OR IRP Violation	2,436	1.003		
*Significant at 0.1; **Significant at 0.05; ***Significant at 0.01				

Predictors of Vehicle Safety Violations

Explanatory Variable	Coefficient	t	p-value	[95% conf. interval]	
(Constant)	1.6850	14.570	< 0.000***	1.464052	1.91555
KYU	1.0081	4.900	< 0.000***	.586995	1.396773
IFTA	4.2043	9.190	0.002**	3.310676	5.103022
UCR	0.0571	0.100	0.917	-1.021725	1.133209
IRP	8.8701	5.460	< 0.000***	5.686139	12.05432
Power Unit	0.0006	1.910	0.056*	-.0000148	.001206

*Significant at 0.1; **Significant at 0.05; ***Significant at 0.01; F= 29.48; df (5, 10,049); $p < 0.000$; $R^2 = 0.2998$.

Driver Safety Violations to Power Unit

Carrier Status	Carrier Count	Ratio	t	p-value
With NO KYU Violations	11,350	0.095	-2.2608	0.0238**
With at least 1 KYU Violation	1,459	0.118		
With NO IFTA Violations	12,160	0.091	-9.4349	<0.0000***
With at least 1 IFTA Violation	649	0.227		
With NO UCR Violations	12,419	0.089	-15.2011	<0.0000***
With at least 1 UCR Violation	390	0.365		
With NO IRP Violations	12,570	0.096	-3.6311	0.0003***
With at least 1 IRP Violation	239	0.180		
With NO KYU, IFTA, UCR, OR IRP Violations	10,373	0.080	-11.1961	0.0000***
With at least 1 KYU, IFTA, UCR, OR IRP Violation	2,436	0.170		
*Significant at 0.1; **Significant at 0.05; ***Significant at 0.01				

CMV Crashes to Power Unit

Carrier Status	Carrier Count	Ratio	t	p-value
With NO KYU Violations	6,466	0.182	-4.3923	<0.0000***
With at least 1 KYU Violation	1,837	0.236		
With NO IFTA Violations	7,505	0.190	-2.0069	0.0448**
With at least 1 IFTA Violation	798	0.229		
With NO UCR Violations	8,126	0.192	-3.1828	0.0015**
With at least 1 UCR Violation	177	0.316		
With NO IRP Violations	8,020	0.192	-2.0479	0.0406**
With at least 1 IRP Violation	283	0.256		
With NO KYU, IFTA, UCR, OR IRP Violations	5,733	0.175	-3.1457	<0.0000***
With at least 1 KYU, IFTA, UCR, OR IRP Violation	2,570	0.237		
*Significant at 0.1; **Significant at 0.05; ***Significant at 0.01				

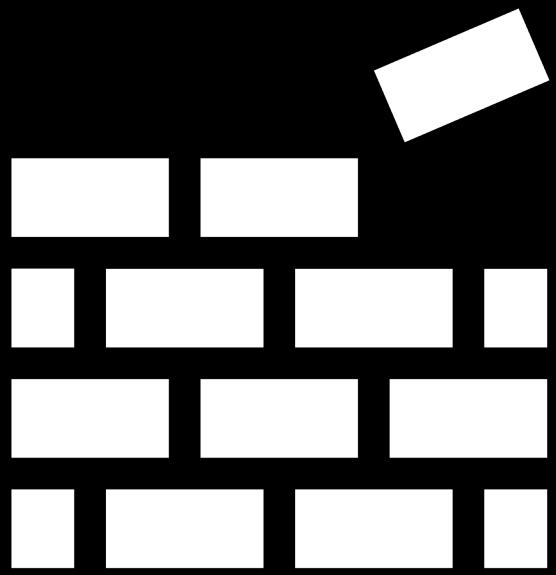
Conclusions

→ Carriers with more credentialing violations were significantly more likely to have more vehicle and driver violations

→ Carriers with more credentialing violations were also significantly more likely to be involved in serious crashes

→ IRP and IFTA violations were associated with a greater magnitude of vehicle and driver safety violations than KYU or UCR

Best Practices



- → Continue data quality improvement
- → Address IRP data sensitivity issues
- → Increase scrutiny of IRP violations
- → Continue analysis of KATS, PrePass, DriveWyze and RIMS data
- → Continue enhancements of KATS, PrePass, DriveWyze and RIMS data
- → Revisit automated enforcement and screening
- → Improve KATS data verification rate
- → Improve KATS LPR/USDOT capture rate
- → Capture roadside screening data