General Special Study of Large Truck (Including CMVs)

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Introduction

For ease of reference, the following gives the subjects covered in this document in the order of their occurrence (major section numbers).

1.0 Some high level statistics on CMVs to put the entire document in perspective.

2.0 Comparisons of CMV with Non-CMV Large Trucks, where Non-CMV are all large trucks that are not classified as CMVs. This section gives an idea of where each of these subsets is having their crash problems compared to the other.

3.0 All of the comparisons in this major section are crashes caused by CMVs (note filter name) against all other crashes (Non-CMVs), including cars, non-CMV large trucks and all other motor vehicles where a CMV was not the causal vehicle. The filter definition for this is given in S

4.0 See the five year comparison in Section 3.3. The results there indicate that 2019 had a significant increase over 2016-2018. It was determined to eliminate 2020 from this analysis because the effects of COVID would make it non-typical. This section compares CMV-Caused crashes in 2019 (test; red bars) against CMV-Caused crashes in 2016-2018 (control; blue bars) in an attempt to surface any significant differences that may have caused the increase in 2019.

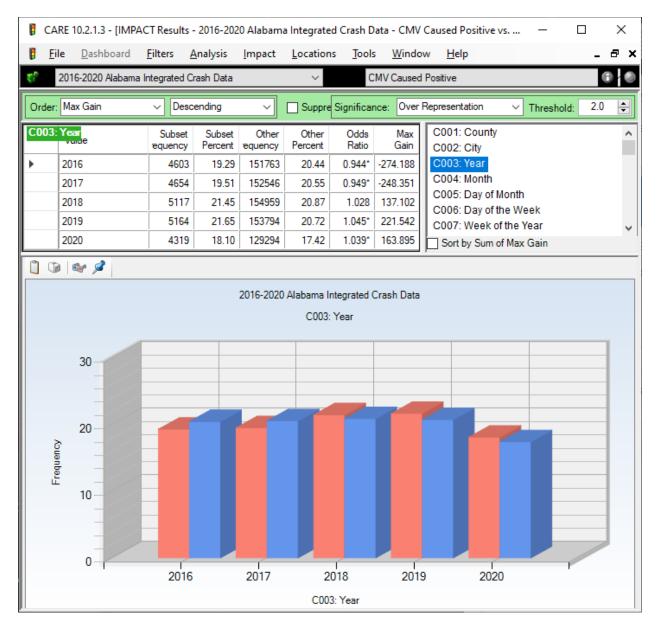
5.0 This section concentrated on the largest issue that was found in at least four attributes, and that was Improper Lane Change (ILC). ILC in these four closely-related attributes were ORed together to form the test subset. The control subset was all CMV Caused crashes. See Section 5.0 for details of filter creation.

6.0 This is a preliminary set of requirements that illustrate how the Selective Enforcement Assistant (SEA) is envisioned to operate. This is a first step in the creation of these requirements.

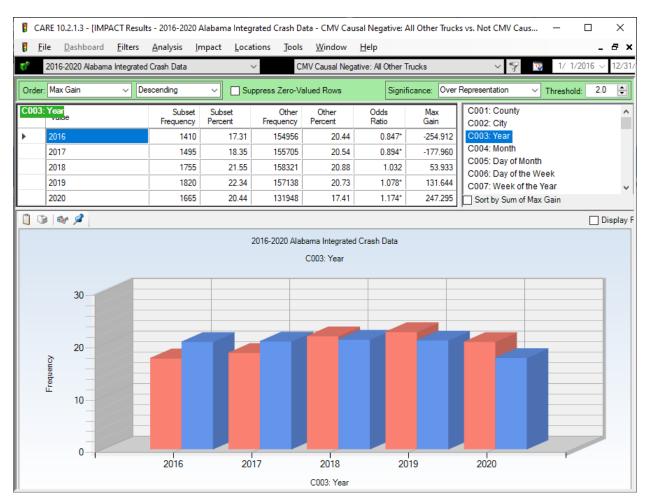
1.0 CMV and Non-CMV Large Truck Crashes General Comparisons

1.1 CMV vs All Other Crashes Per Year

Comparing CMV crashes (red) against all other crashes (blue).



CMV crash frequencies were over-represented in years 2018-2020 compared to non-CMV. The total Max Gain for these three years is 523 crashes. The severity of these crashes was generally lower than those of 2016 and 2017.



1.2 Non-CMV Large Truck Crashes by Year

Large truck crashes of non-CMV trucks were also significantly higher in 2019 and 2020. They were also over-represented in 2018, but not of statistical significance. Combining these three years as we did above for CMVs indicates an additional 433 crashes over that which would be expected compared to all other crashes.

1.3 CMV Crashes Top Primary Contributing Circumstances (PCC)

All items less than 200 crashes during the 5-year period were omitted from the display below. Comparisons are between all CMV and all non-CMV involved vehicles.

6 2	2016-2020 Alabama Integrated Crash I	Data		\sim	CM	/ Caused	Positive	G 🥥
Order:	Max Gain V Descendir	g	~ 🗹	Suppre Si	gnificance	: Over F	lepresentat	ion V Threshold: 2.0 🜩
C015:	Primary Contributing Circumstance	Subset equency	Subset Percent	Other equency	Other Percent	Odds Ratio	Max Gain	C015: Primary Contributing Circu
•	Improper Lane Change/Use	2846	14.69	39324	7.43	1.976*	1405	1
	Defective Equipment	1389	7.17	10889	2.06	3.483*	990.237	1
	Unseen Object/Person/Vehicle	2535	13.09	45645	8.63	1.517*	863.448	1
	Made Improper Turn	1214	6.27	13573	2.57	2.442*	716.947	1
	Cargo Fell or Load Shift	707	3.65	1784	0.34	10.822*	641.669	1
	Improper Backing	1199	6.19	18342	3.47	1.785*	527.303	
	E Other - No Improper Driving	576	2.97	7986	1.51	1.970*	283.547	
	E Other Improper Action	681	3.52	11864	2.24	1.567*	246.532	1
	E Crossed Centerline	567	2.93	9387	1.77	1.649*	223.241	1
	E Swerved to Avoid Vehicle	861	4.44	17767	3.36	1.323*	210.360	1
	E Over Correcting/Over Steering	369	1.90	7373	1.39	1.367*	98.996	
	E Ran off Road	610	3.15	16672	3.15	0.999	-0.540	
	E Fatigued/Asleep	423	2.18	12587	2.38	0.918	-37.945	1
	E Other Distraction Outside the Ve	221	1.14	12824	2.42	0.471*	-248.6	1
	E Other Distraction Inside the Vehi	347	1.79	16654	3.15	0.569*	-262.8	
	E Ran Traffic Signal	357	1.84	21112	3.99	0.462*	-416.1	
	Driving too Fast for Conditions	537	2.77	28603	5.41	0.513*	-510.4	1
	E Failed to Yield Right-of-Way Ma	343	1.77	31083	5.88	0.301*	-795.2	1
	E Failed to Yield Right-of-Way from	478	2.47	35782	6.76	0.365*	-832.3	1
	Misjudge Stopping Distance	1204	6.22	66020	12.48	0.498*	-1213	1
	Followed too Close	1907	9.84	103692	19.60	0.502*	-1890	Sort by Sum of Max Gain
0	i 🞯 🖉							
		2016	6-2020 Ala	ibama Inte	grated Cra	ash Data		
		C01	5: Primary	/ Contribut	ing Circur	nstance		
	20							
_								
	10							
requency	10							
		t be						
	0 Cargo Fell o	r Load Shift		E Swerved	n Misjudge Stopping			
	-		COTE: D	Avoid Vehic			e the Vehicle	Distance
			C015: Pr	imary Con	tributina C	ircumstar	ce	

The significantly over-represented items that could be attributed to driver faults are (in order of over-representation as measured by Max Gain): Improper Lane Change/Use, Defective Equipment, Made Improper Turn, Cargo Fell or Load Shift, Improper Backing, Crossed Centerline, Swerved to Avoid Vehicle and Over Correcting/Over Steering.

2.0 CMV vs Non-CMV Large Trucks

Comparisons above were against all other vehicles. Comparisons in this section will be against the two types of trucks: CMV and non-CMV (both large trucks). The total number of CMVs in the samples being compared were about three times the Non-CMV Large Trucks. The following will be compared in this major section: (1) Severity, (2) Time of Day, (3) Rural/Urban, (4) Highway Classifications, (5) First Harmful Event and (6) Manner of Crash.

× 🚦 CARE 10.2.1.3 - [IMPACT Results - 2016-2020 Alabama Integrated Crash Data - CMV Caused Positive vs. CMV Causal Negative: All ... File <u>D</u>ashboard Filters <u>W</u>indow <u>H</u>elp 8× Analysis Impact Locations Tools 2016-2020 Alabama Integrated Crash Data CMV Caused Positive 1/2016 Order: Max Gain Descending Significance: Over Representation 2.0 + Suppress Zero-Valued Rows Threshold C025: Crash Severity C024: School Bus Related Subset Subset Other Other Odds Max ۸ Frequency Percent Frequency Percent Ratio Gain C025: Crash Severit Fatal Injury C026: Intersection Related 0.68 56 0.69 0.988 -2.026 162 C027: At Intersection Suspected Serious Injury 706 2.96 191 2.34 1.262 146.554 C028: Mileposted Route Suspected Minor Injury 6 62 441 541 1 223 1580 288.295 C029: National Highway System 1713 7.18 541 1.081 128.391 Possible Injury 6.64 C030: Functional Class -411.194 Property Damage Only 19269 80 77 6719 82.49 0.979 C031: Lighting Conditions Unknown 427 1.79 197 2.42 0.740* -150.020 Sort by Sum of Max Gain 📋 🕼 🚳 💋 🔽 Dis 2016-2020 Alabama Integrated Crash Data - Filter = CMV Caused Positive vs. CMV Causal Negative: All Other Trucks C025: Crash Severity 100 Frequency 50 0 Property Damage Only Suspected Suspected Fatal Injury Possible Injury Unknown Serious Iniury Minor Injury C025: Crash Severity

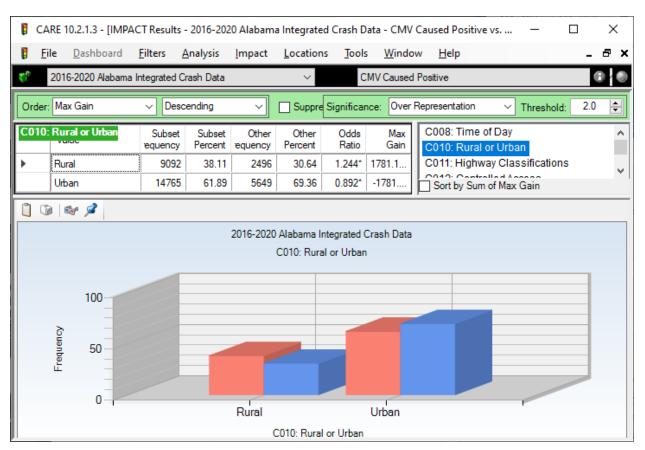
2.1 Severity CMV vs Non-CMV Large Trucks

CMV and Non-CMV vehicles had a nearly-identical proportion of Fatal Injury crashes. However, the next highest serious severities were clearly over-represented by the CMVs. The only cause that was postulated for this is that the CMVs were generally in service over a greater period of time leading to greater exposure.

CAI	RE 10.2.1.3 - [IMPACT Resul	lts - 2016-202) Alabama Int	egrated Cras	h Data - CMV	Caused Positi	ve vs. CMV C	ausal Negative: All 🗕 🗆 🗙
🔋 <u>E</u> il	e <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact <u>L</u> o	cations <u>T</u> o	ols <u>W</u> indo	w <u>H</u> elp		_ 8 1
6	2016-2020 Alabama Integrate	d Crash Data		~	CMV Caused	Positive		✓ ♥ 1/ 1/2016 ∨
Order:	Max Gain 🗸 D	escending	~ □:	Suppress Zero	p-Valued Rows	Signifi	cance: Over	Representation V Threshold: 2.0
C008:	Time of Day	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C005: Day of Month C006: Day of the Week
►	12:00 Midnight to 12:59 AM	264	1.11	44	0.54	2.048*	135.122	C007: Week of the Year
	1:00 AM to 1:59 AM	266	1.11	54	0.66	1.682*	107.832	C008: Time of Day
	2:00 AM to 2:59 AM	255	1.07	41	0.50	2.123*	134.910	C010: Rural or Urban C011: Highway Classifications
	3:00 AM to 3:59 AM	326	1.37	56	0.69	1.987*	161.974	C012: Controlled Access
	4:00 AM to 4:59 AM	402	1.69	76	0.93	1.806*	179.393	C013: E Highway Side
	5:00 AM to 5:59 AM	666	2.79	122	1.50	1.864*	308.658	C015: Primary Contributing Circumstanc
	6:00 AM to 6:59 AM	955	4.00	227	2.79	1.436*	290.109	C016: Primary Contributing Unit Number
	7:00 AM to 7:59 AM	1486	6.23	428	5.25	1.185*	232.372	C017: First Harmful Event C018: Location First Harmful Event Rel t
	8:00 AM to 8:59 AM	1498	6.28	510	6.26	1.003	4.192	C019: E Most Harmful Event
	9:00 AM to 9:59 AM	1401	5.87	561	6.89	0.853*	-242.189	C020: E Distracted Driving Opinion
	10:00 AM to 10:59 AM	1548	6.49	599	7.35	0.882*	-206.493	C021: Distance to Fixed Object
	11:00 AM to 11:59 AM	1682	7.05	669	8.21	0.858*	-277.525	C022: E Type of Roadway Junction/Featu C023: E Manner of Crash
	12:00 Noon to 12:59 PM	1730	7.25	708	8.69	0.834*	-343.758	C024: School Bus Related
	1:00 PM to 1:59 PM	1688	7.08	657	8.07	0.877*	-236.377	C025: Crash Severity
	2:00 PM to 2:59 PM	1743	7.31	658	8.08	0.904	-184.306	C026: Intersection Related
	3:00 PM to 3:59 PM	1887	7.91	656	8.05	0.982	-34.448	C027: At Intersection
	4:00 PM to 4:59 PM	1483	6.22	556	6.83	0.911	-145.544	C028: Mileposted Route C029: National Highway System
	5:00 PM to 5:59 PM	1327	5.56	500	6.14	0.906	-137.518	C029: National Fighway System C030: Functional Class
	6:00 PM to 6:59 PM	903	3.79	336	4.13	0.918	-81.156	C031: Lighting Conditions
	7:00 PM to 7:59 PM	651	2.73	190	2.33	1.170	94.483	C032: Weather
	8:00 PM to 8:59 PM	557	2.33	178	2.19	1.068	35.632	C033: Locale
	9:00 PM to 9:59 PM	462	1.94	123	1.51	1.282*	101.729	C034: E Police Present at Time of Crast C035: Police Notification Delay
	10:00 PM to 10:59 PM	360	1.51	100	1.23	1.229	67.096	C036: Police Arrival Delay
	11:00 PM to 11:59 PM	305	1.28	87	1.07	1.197	50.174	C037: EMS Arrival Delay
	Unknown	12	0.05	9	0.11	0.455	-14.361	Sort by Sum of Max Gain
10	Ser 🖉							
		20 Alabama Inte	egrated Crash		CMV Caused F 008: Time of Da		IV Causal Neg	ative: All Other Trucks
Terration of	5 0		ab	ni	11	h	h	Thomas .
		4:00 AM to 4	4:59 AM 9	:00 AM to 9:	59 AM 2:0 C008: Time	00 PM to 2:5	9 PM 7:0	0 PM to 7:59 PM Unknown

2.2 Time of Day CMV vs Non-CMV Large Trucks

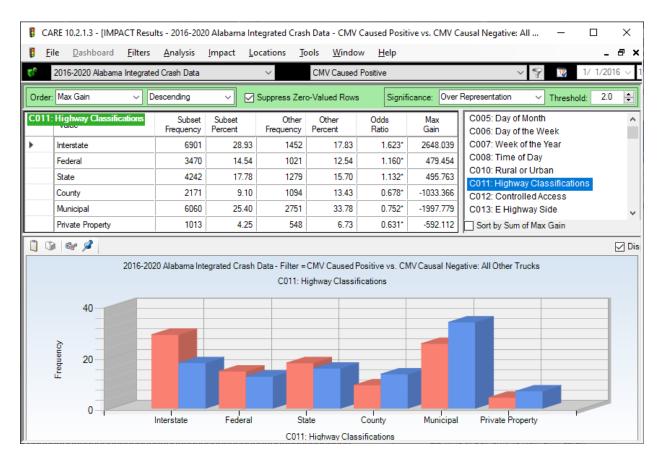
CMVs are working the early-morning hours more at twice their non-CMV counterparts for midnight to 12:59 AM an 2:00 AM to 2:59 AM. Several of the other Odds Ratios are very close to 2 in the very early morning, indicating some cause.



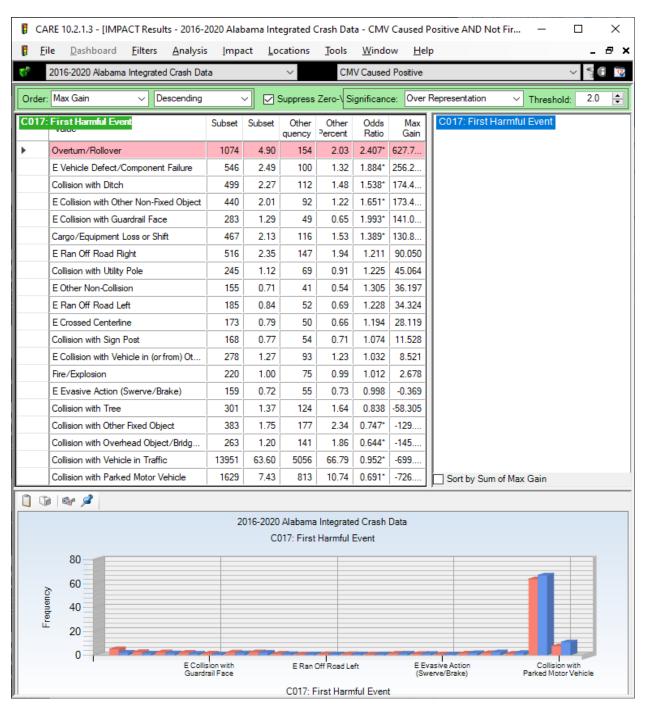
2.3 Rural-Urban CMV vs Non-CMV Large Trucks

CMVs have a greater proportion of crashes in the rural areas probably because they spend more of their time on the Interstates. This is shown by the next attribute as well.

2.4 Highway Classification; CMV vs Non-CMV



Interstate highways have about 62.3% greater proportion of CMV than non-CMV traffic. CMVs are also over-represented on Federal and State Roads with 0.160 and 1.132 greater than expected, respectively (see Odds Ratios).



2.5 First Harmful Event CMV vs Non-CMV Large Trucks

Considerable differences between CMVs and non-CMVs in first 10 items.

3.0 CMVs vs All Other Vehicles

This will answer the question: what types of crashes do CMVs get into that are different from those encountered by all other types of vehicles

All of the comparisons in this major section will be crashes caused by CMVs (note filter name) against all other crashes (All Others), including cars, non-CMV large trucks and all other motor vehicles where a CMV was not the causal vehicle. The filter called "CMV Causal Positive" is defined as follows:

Filter Logic: CMV	Caused Positive		_		×
Logic Tree	Logic Text				
⊡ One or more of the 2016-2020 Ala	-	(OR) Crash Data: CU CMV Indicator is equal f	to Yes - CU is a	CMV	
23857 records selected	by this filter.				:

Simply put, it just states that the causal vehicle in any crash included in the dataset will be a CMV.

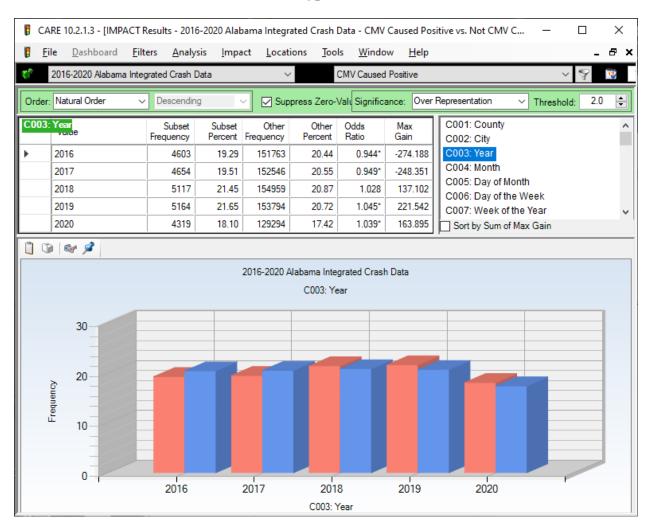
<u>?</u>	2016-2020 Alabama	Integrated Crash	Data		\sim	CMV Cau	sed Positive	•	~ 7
Order:	Max Gain	 ✓ Descendi 	ng	<u> </u>	ouppress Zer	o-Valı Signi	ficance: [Over	Representation V Threshold: 2.0
:001:	County	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain	^	C001: County C002: City
•	St Clair	541	2.27	9775	1.32	1.722*	226.862		C003: Year
	Cleburne	251	1.05	1954	0.26	3.997*	188.205		C004: Month
	Talladega	480	2.01	9668	1.30	1.545*	169.301		C005: Day of Month
	Greene	209	0.88	1301	0.18	4.999*	167.190		C006: Day of the Week C007: Week of the Year
	Macon	273	1.14	3431	0.46	2.476*	162.738		C008: Time of Day
	Sumter	189	0.79	1124	0.15	5.232*	152.878		C010: Rural or Urban
	Tuscaloosa	1426	5.98	39780	5.36	1.115*	147.595	-	C011: Highway Classifications
	Conecuh	200	0.84	1798	0.24	3.461*	142.218		C012: Controlled Access
	Butler	233	0.98	3271	0.44	2.217*	127.880	-	C013: E Highway Side
	Cullman	483	2.02	11222	1.51	1.339*	127.000		C015: Primary Contributing Circumstan C016: Primary Contributing Unit Numbe
	Lowndes	483	0.71	1620	0.22	3.246*	122.360		C017: First Harmful Event
								-	C018: Location First Harmful Event Rel
	Jefferson	5104	21.39	155301	20.92	1.023	113.112	-	C019: E Most Harmful Event
	Limestone	356	1.49	8466	1.14	1.308*	83.929	- 1	C020: E Distracted Driving Opinion
	Dallas	223	0.93	4469	0.60	1.553*	79.380	- 1	C021: Distance to Fixed Object
	Jackson	245	1.03	5245	0.71	1.454*	76.442	- 1	C022: E Type of Roadway Junction/Feat C023: E Manner of Crash
	Marion	151	0.63	2386	0.32	1.969*	74.321		C024: School Bus Related
	Marengo	119	0.50	1518	0.20	2.439*	70.216		C025: Crash Severity
	Pike	231	0.97	5101	0.69	1.409*	67.070	_	C026: Intersection Related
	Escambia	190	0.80	3929	0.53	1.505*	63.734	_	C027: At Intersection
	Cherokee	142	0.60	2475	0.33	1.785*	62.461		C028: Mileposted Route
	Chilton	222	0.93	5085	0.68	1.358*	58.584		C029: National Highway System C030: Functional Class
	Clarke	125	0.52	2133	0.29	1.824*	56.452		C031: Lighting Conditions
	Monroe	108	0.45	1623	0.22	2.071*	55.842		C032: Weather
	Dekalb	215	0.90	5079	0.68	1.317*	51.777		C033: Locale
	Wilcox	67	0.28	676	0.09	3.084*	45.275		C034: E Police Present at Time of Cras
	Washington	77	0.32	1011	0.14	2.370*	44.510		C035: Police Notification Delay
	Choctaw	72	0.30	888	0.12	2.523*	43.462		C036: Police Arrival Delay C037: EMS Arrival Delay
	Bibb	95	0.40	1646	0.22	1.796*	42.103	- 1	C038: Adjusted EMS Arrival Delay
	Pickens	81	0.34	1305	0.18	1.931*	39.061	- 1	Sort by Sum of Max Gain
1 0) 🗞 🖉								
				2016-202	0 Alabama li	ntegrated Cr	ash Data		
					C001: (-			
	30								
ğ	20								
Frequency									
E e	10								a all
	0	tellectell		-		The second se		-	
			Che	erokee		(Crenshaw		Elmore

3.1 County CMVs vs Non-CMVs (MaxGain > 40)

8	2016-2020 Alabama Inte	egrated Crash	Data		\sim	CMV Cau	sed Positive	;	~ 💡 🏆
Order:	Max Gain	Descend	ing	∽ ⊽s	uppress Zer	o-Valı Sign	ificance: 🕻	Dver R	Representation V Threshold: 2.0
C002:	City	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain	^	C001: County C002: City
•	Birmingham	3281	13.76	85899	11.57	1.189*	520.722		C003: Year
	Rural Tuscaloosa	714	2.99	8263	1.11	2.689*	448.477		C004: Month
	Rural St. Clair	357	1.50	3662	0.49	3.034*	239.325		C005: Day of Month
	Rural Jefferson	754	3.16	18013	2.43	1.303*	175.170		C006: Day of the Week C007: Week of the Year
	Rural Cleburne	222	0.93	1617	0.22	4.272*	170.039		C008: Time of Day
	Rural Greene	197	0.83	1078	0.15	5.687*	162.360		C010: Rural or Urban
	Rural Macon	232	0.97	2372	0.32	3.044*	155.778		C011: Highway Classifications
	Rural Talladega	285	1.19	4115	0.55	2.155*	152.769		C012: Controlled Access
	Rural Cullman	314	1.32	5177	0.70	1.887*	147.642		C013: E Highway Side C015: Primary Contributing Circumstan
	Rural Sumter	162	0.68	741	0.10	6.803*	138.189		C016: Primary Contributing Unit Number
	Rural Montgomery	251	1.05	3879	0.52	2.014*	126.352		C017: First Harmful Event
	Rural Baldwin	335	1.40	6654	0.90	1.567*	121.180		C018: Location First Harmful Event Rel t
	Rural Lowndes	158	0.66	1393	0.19	3.530*	113.237		C019: E Most Harmful Event
	Opelika	412	1.73	9320	1.26	1.376*	112.511		C020: E Distracted Driving Opinion C021: Distance to Fixed Object
	Rural Conecuh	148	0.62	1199	0.16	3.841*	109.471		C022: E Type of Roadway Junction/Featu
	Rural Etowah	169	0.71	2344	0.32	2.244*	93.678		C023: E Manner of Crash
	Rural Butler	148	0.62	1764	0.24	2.611*	91,316	- 11	C024: School Bus Related
	Rural Limestone	243	1.02	4723	0.64	1.601*	91,231		C025: Crash Severity C026: Intersection Related
	Rural Escambia	148	0.62	2015	0.04	2.286*	83.250		C026: Intersection Related
	Rural Morgan	186	0.78	3460	0.27	1.673*	74.816		C028: Mileposted Route
	Rural Dekalb	139	0.58	2103	0.47	2.057*	71.422		C029: National Highway System
	Rural Dallas	133	0.53	1773	0.20	2.037	70.026	- 11	C030: Functional Class
	Rural Chilton	127	0.65	2775	0.24	1.749*	66.828		C031: Lighting Conditions C032: Weather
	Rural Autauga	136	0.65	2370	0.37	1.851*	64.842	- 11	C032: Weather
	Rural Walker		0.55	3255		1.606*	63.404	- 11	C034: E Police Present at Time of Crasl
		168	0.70		0.44				C035: Police Notification Delay
	Rural Colbert	120		1795	0.24	2.080*	62.319	- 11	C036: Police Arrival Delay
	Rural Marion	91	0.38	906	0.12	3.126*	61.887	- 11	C037: EMS Arrival Delay Sort by Sum of Max Gain
	Rural Monroe	76	0.32	693	0.09	3.413*	53.731	× ,	Sort by Sum of Max Gain
	&r ∮			2016-2020) Alabama Ir C002:	-	ash Data		
Frequency	15 10 5				0002.				
	0 Mitthinson		Demopoli	s	F	Pisgah C002: City		S	Spanish Fort Daphne

3.2 City CMVs vs Non-CMVs (Max Gain >60)

Crashes tend to occur in the rural areas of the counties – they are designated as virtual cities.



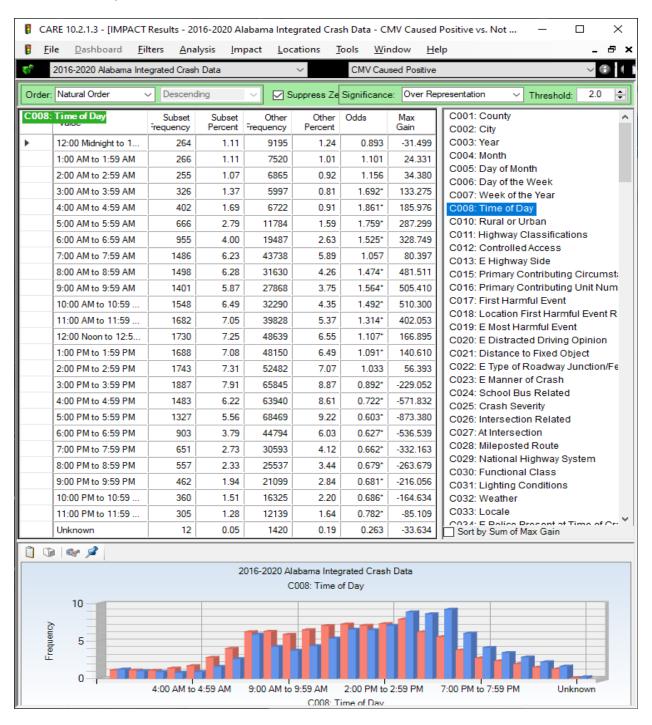
3.3 Year CMVs vs Non-CMVs (all vehicle types)

CMV crash frequencies were over-represented in years 2018-2020. The total Max Gain for these three years is 523 over the three years. The severity of these crashes was generally lower than those of 2016 and 2017.



3.4 Day of the Week; CMVs vs Non-CMVs

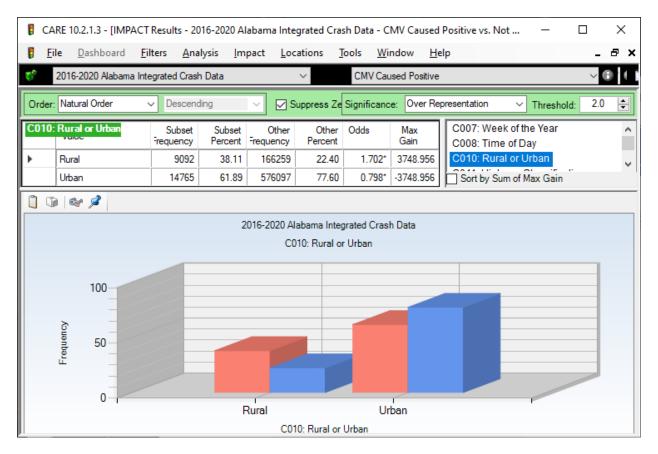
This distribution is as expected for truckers who work more during the week than on weekends.



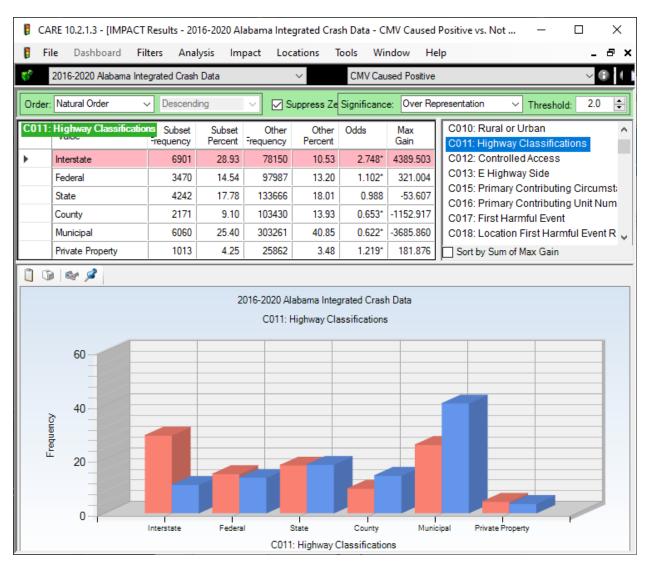
3.5 Time of Day; CMVs vs Non-CMVs

This also reflects the times that CMVs are on the road. Afternoons are probably affected by the daily hourly limitations placed on the drivers.

3.6 Rural/Urban CMVs vs Non-CMVs



CMVs are more rural probably because they are more on the Interstates. See next.



3.7 Highway Classification CMVs vs Non-CMVs

CMVs are close to three times the proportion of other vehicles on interstates. Federal is also significantly higher than expected, but only by a little over 10%. All other roadway classifications are under-represented for CMS.

3.8 Primary Contributing Circumstances (PCCs) CMVs vs Non-CMVs

🚦 CA	RE 10.2.1.3 - [IMPACT Resu	ults - 2016-202	0 Alabama	Integrated Cr	ash Data - CN	IV Caused P	ositive vs. Not CN	/V Caused Positive] − □ ×
🔋 Ei	le <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact	<u>L</u> ocations	Tools <u>W</u> ine	dow <u>H</u> elp)	_ & ×
6	2016-2020 Alabama Integrate	ed Crash Data		\sim	CMV Caus	ed Positive		✓ ♥ 〒 1/ 1/2016 ∨ 1
Order:	Max Gain 🗸 🗸	Descending	~ [Suppress Z	ero-Valued Ro	ws Si	gnificance: Over	Representation V Threshold: 2.0
C015:	Primary Contributing Circ	umstance _{set} Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max 🚽 ^	C011: Highway Classifications
•	Improper Lane Change/	2846	11.93	39324	5.30	2.252*	1582.250	C013: E Highway Side
	Unseen Object/Person/	2535	10.63	45645	6.15	1.728*	1068.112	C015: Primary Contributing Circumstand
	Defective Equipment	1389	5.82	10889	1.47	3.969*	1039.062	C016: Primary Contributing Unit Numbe C017: First Harmful Event
	Made Improper Turn	1214	5.09	13573	1.83	2.783*	777.806	C018: Location First Harmful Event Rel t
	Cargo Fell or Load Shift	707	2.96	1784	0.24	12.332*	649.668	C019: E Most Harmful Event
	Improper Backing	1199	5.03	18342	2.47	2.034*	609.545	C020: E Distracted Driving Opinion
	Other	1214	5.09	24179	3.26	1.562*	436.963	C021: Distance to Fixed Object
	E Other - No Improper Dr	576	2.41	7986	1.08	2.244*	319.355	C022: E Type of Roadway Junction/Featu C023: E Manner of Crash
	E Other Improper Action	681	2.85	11864	1.60	1.786*	299.728	C024: School Bus Related
	E Swerved to Avoid Vehi	861	3.61	17767	2.39	1.508*	290.024	C025: Crash Severity
	E Crossed Centerline	567	2.38	9387	1.26	1.880*	265.331	C026: Intersection Related
	E Over Correcting/Over	369	1.55	7373	0.99	1.557*	132.055	C027: At Intersection
	Improper Load/Size	102	0.43	187	0.03	16.973*	95.990	C028: Mileposted Route C029: National Highway System
	E Ran off Road	610	2.56	16672	2.25	1.139*	74.214	C029. National Highway System
	E Disregarded Traffic Sig	59	0.25	854	0.12	2.150*	31,555	C031: Lighting Conditions
	Improper Parking/Stopp	90	0.38	1969	0.27	1.422*	26,722	C032: Weather
	E Fatigued/Asleep	423	1.77	12587	1.70	1.046	18 493	C033: Locale
	E Disregarded other Roa	25	0.10	290	0.04	2.682*	15.680	C034: E Police Present at Time of Crast
	Improper Attachment	23	0.10	238	0.03	3.007*	15.351	C035: Police Notification Delay
	Improper Actornment	23	0.10	250	0.05	5.007	10.001	Sort by Sum of Max Gain
	2	016-2020 Alab	ama Integrate		- Filter = CMV ary Contributin		itive vs. Not CMV (nce	Caused Positive
France		ulu.u						
		Imp	roper or No	Signal	E	Not Visible		E Ran Stop Sign
				C015	5: Primary Cont	ributina Circ	umstance	

This analysis will indicate problems that CMVs have that are not as typical in other motor vehicles. The above is for all PCCs that are twice the expected from all other non-CMV vehicles, the Max Gain for all of them is above 15 crashes over the five years. Improper Lane Change/Use has the highest Max Gain of 1,582, which is well over 300 crashes per year, The major problems being faced by CMVs is Improper Lane Change and Unseen Object/Person (which could be a vehicle in the CMV's blind spot.).

3.9 First Harmful Event CMVs vs Non-CMVs (Max Gains > 50 Crashes in 5 Years)

🖡 CA	RE 10.2.1.3 - [IMP/	ACT Resul	lts - 2016-202	0 Alabama	Integrated C	Crash Data	- CMV Cau	sed Positiv	ve vs. Not	CMV	Caused Positive] — 🗆 🗙
E E	le <u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact	<u>L</u> ocations	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp			_ & >
5	2016-2020 Alabama	a Integrate	d Crash Data		\sim	CMV	Caused Pos	itive			✓ ♥ 1/ 1/2016 ∨ 1:
Order	Max Gain	~ D	escending	~ 6	Suppress	Zero-Value	d Rows	Signi	ficance:	Over R	Representation V Threshold: 2.0
C017:	First Harmful Eve	nt		Subset	Percent	Other requency	Other Percent	Odds Ratio	Max Gain		C011: Highway Classifications
	Overtum/Rollover			1074		6369	0.86	5.247*	869.328	- 11	C013: E Highway Side C015: Primary Contributing Circumstanc
	Collision with Parke			162		34900	4.70	1.452*	507.464		C016: Primary Contributing Unit Number
	E Vehicle Defect/0			540		2056	0.28	8.264*	479.929		C017: First Harmful Event
	Cargo/Equipment I			46		1034	0.14	14.054*	433.772		C018: Location First Harmful Event Rel t
	E Collision with Oth			440		5007	0.67	2.735*	279.097	- 11	C019: E Most Harmful Event C020: E Distracted Driving Opinion
	Collision with Over					413	0.06	19.816*	249.728	- 11	C020: E Distracted Driving Opinion C021: Distance to Fixed Object
	Collision with Other	Fixed Obj	ect	383		4949	0.67	2.408*	223.960	- 11	C022: E Type of Roadway Junction/Featu
•	Fire/Explosion	1.45		220		1114	0.15	6.145*	184.201		C023: E Manner of Crash
	E Collision with Gu	ardrail Fac	e	283		4454	0.60	1.977*	139.868		C024: School Bus Related
	Jackknife			13		218	0.03	18.699*	123.994	- 11	C025: Crash Severity C026: Intersection Related
	E Collision with Fall	-	g Cargo	132		723	0.10	5.681*	108.766	- 11	C027: At Intersection
	E Other Non-Collisi			15		1620	0.22	2.977*	102.940	- 11	C028: Mileposted Route
	Collision with Bridge		it/Rail	140		1727	0.23	2.523*	84.502	- 11	C029: National Highway System
	E Thrown or Falling			95		417	0.06	7.089*	81.599	- 11	C030: Functional Class C031: Lighting Conditions
	E Collision with Ani		'Ranch	10		1600	0.22	2.081*	55.583		C032: Weather
	Collision with Utility			24		5906	0.80	1.291*	55.207	- 11	C033: Locale Y
	E Collision with Cat	ole Barrier		133	3 0.56	2493	0.34	1.660*	52.886	×	Sort by Sum of Max Gain
00) 🗞 🖉 📄										🗹 Disp
		2	016-2020 Alat	ama Integra	ted Crash Da	ata - Filter =	CMV Caus	ed Positive	evs. Not Cl	MV Ca	used Positive
					C	017: First	Harmful Eve	ent			
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	60										
	40										
	20										
	0	Mailar	Calle	on with Sign Po	vet	P.Pond a	r Bridge Collap	sed	E Eelli luee	ned from	m Motor Vehicle E Ran Off Road Left
			Collis	on with aigh Po			г вподе Сопар First Harmfu		2 reivjum	peunor	n Protor Venicle E Ran On Road Left

This display is for all items that had a Max Gain of greater than 50 crashes over the five years of the study. Notice that some items near the top of the list apply to trucks much more than to cars. Apart from these, this attribute generally answers that question: What did CMVs most often hit first when they crashed?

¢°	2016-2020 Alabama Integrated Crash	n Data		\sim	CM	/ Caused	Positive				~ (f	
Or	der: Max Gain 🗸 Descend	ling	~ 2] Suppress	Zer Signif	icance: [Over Repre	sentation	∼ Tł	nreshold:	2.0	* *
C0	22: E Type of Roadway Junction/Fea	ature _{ibset} equency	Subset Percent	Other equency	Other Percent	Odds Ratio	Max Gain	C022: E	Type of F	Roadway	Junctio	on/F
►	No Special Feature	17203	73.12	512950	69.99	1.045*	735.814					
	Bridge/Overpass/Underpass	817	3.47	13140	1.79	1.937*	395.168					
	Entrance or Exit Ramp	458	1.95	9743	1.33	1.464*	145.221					
	Railroad Crossing	105	0.45	1203	0.16	2.719*	66.380					
	Off Ramp	131	0.56	3089	0.42	1.321*	31.834					
	On Ramp Merge Area	70	0.30	1539	0.21	1.417*	20.594					
	Other (than 1-12) Non-Intersection	80	0.34	1870	0.26	1.333*	19.968					
	Intersection with Ramp	90	0.38	2275	0.31	1.232	16.966					
	Other Intersection	76	0.32	2586	0.35	0.915	-7.018					
	Y-Intersection	71	0.30	2797	0.38	0.791	-18.792					
	At Intersection, Intersection Related	82	0.35	3189	0.44	0.801	-20.376					
	Business Drive	140	0.60	5059	0.69	0.862	-22.409					
	Crossover in Median	72	0.31	3305	0.45	0.679*	-34.100					
	Driveway Access Intersection	169	0.72	7771	1.06	0.677*	-80.472					
	On Segment but Intersection Related	288	1.22	11704	1.60	0.767*	-87.732					
	T-Intersection	1335	5.67	50920	6.95	0.817*	-299.680					
	Four-Way Intersection	2340	9.95	99722	13.61	0.731*	-861.366	Sort by	Sum of M	lax Gain		
Ì	🕼 🚳 🖉											
			2016-2020) Alabama	Integrated	Crash Da	ta					
		(C022: E T)	/pe of Roa	dway Junc	tion/Featu	ire					
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		Off F	l Ramp		Y-Int	ersection			egment but ction Relate	ed		
			C022	F Type of	f Roadway	Junction/	Feature					

3.10 Type of Junction/Intersection CMVs vs Non-CMVs (Items > 50 Crashes in 5 Years)

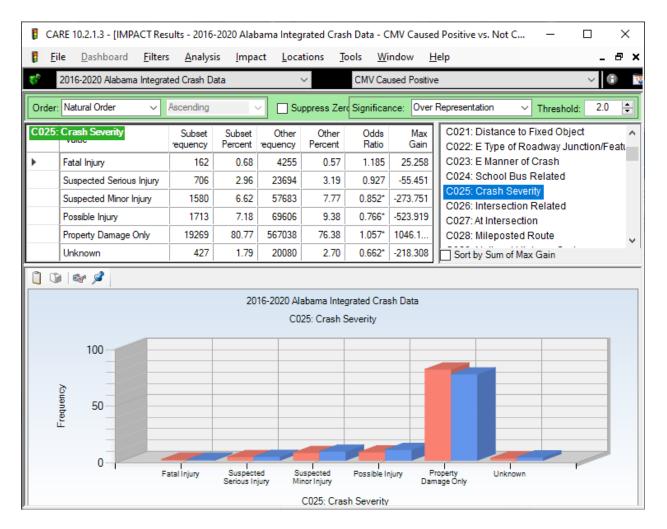
The over-representation of CMVs at Railroad Crossings is the most surprising finding for this attribute. While these are less than a half of a percent of CMV crashes, they are of concern because of the severity of such crashes. The general "Intersection Related" attributes (C026 and C027) indicated that CMVs were involved in fewer than expected crashes at intersections. CMVs are also significantly over-represented on the following Roadway Junctions: Bridge/Overpass/Underpass, Entrance or Exit Ramp, Railroad Crossing, Off Ramp, Tunnel, and On Ramp Merge Area.



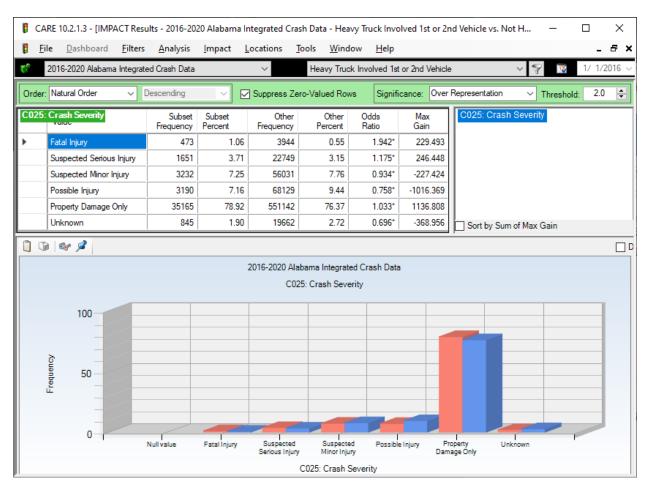
3.11 Manner of Crash; CMVs vs All Non-CMVs

The following crash types were the only that were over-represented (crash frequencies): Sideswipe - Same Direction (5,413), Single Vehicle Crash - all types (5,410), Non-Collision (666), and Sideswipe - Opposite Direction (806). The largest non-collision crash PCCs that had any meaning were: Defective Equipment (237), Cargo Fell or Load Shift (125), and Ran off Road (25).

3.12a Crash Severity CMVs vs Non-CMVs



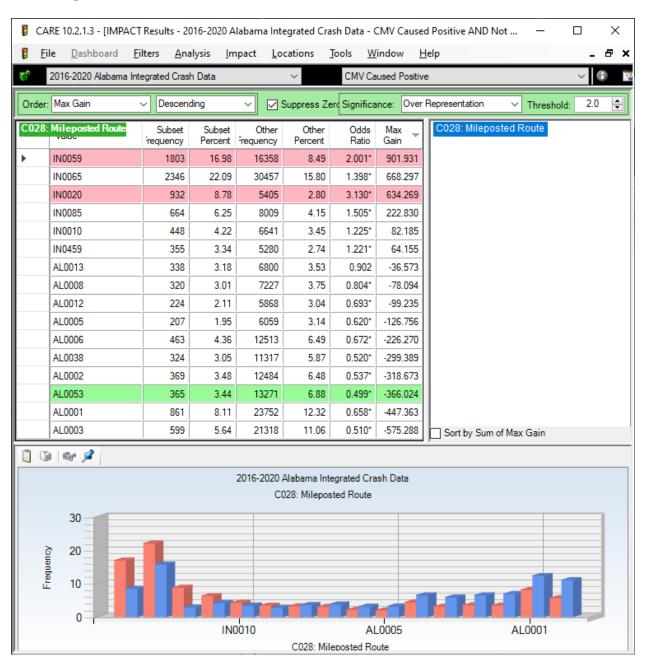
The only over-represented injury category is Fatal Injury and even that is not statistically significant. Other studies on vehicle type causes indicated that large trucks, while generally causing more than 50% of 2-vehicle crashes, are under-represented (significantly less than 50%) for fatal crashes. In other words, in the majority of cases it is the other vehicle (usually a much smaller vehicle) that causes a fatal crash with the CMV.



3.12b Crash Severity All Large Truck Involved (1st or 2nd Veh) vs Smaller Vehicles

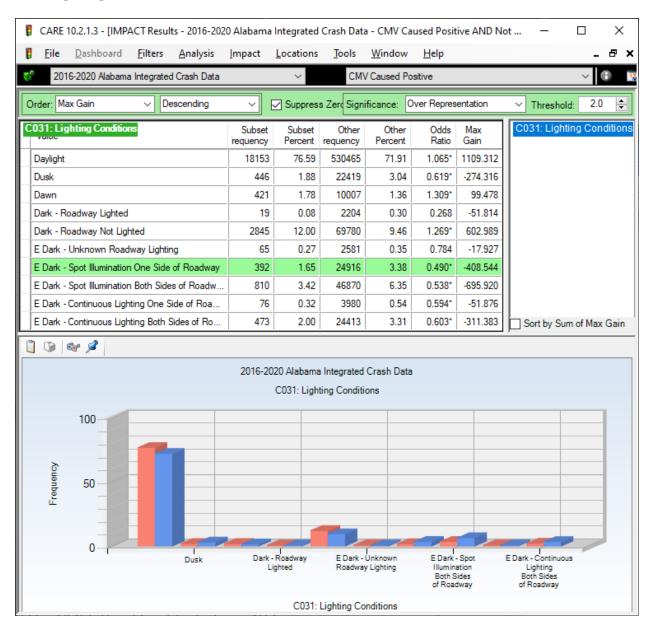
This comparison was for all large trucks, not just CMVs. It included large trucks as either the first (usually causal) or the second vehicle.

The above shows that crashes involving large trucks generally result in more fatal crashes. However, past research has shown that most of the fatal crashes are not caused by the large trucks.



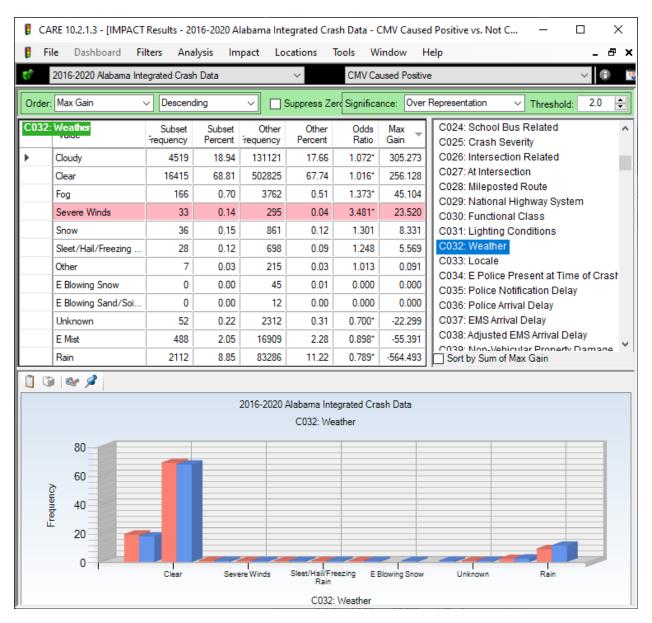
3.13 Mileposted Routes CMVs vs Non-CMV (Crashes > 200)

I-59 and I-20 each had over-representations greater than twice the expected from non-CMV vehicles, even though I-65 had more crashes than the sum of both of them. This analysis does not take into account miles driven except in comparison to vehicles that are not CMVs. It has been well demonstrated, however, that the crash rate on a given road is proportional to the miles driven on that road.



3.14 Lighting Conditions CMVs vs Non-CMVs

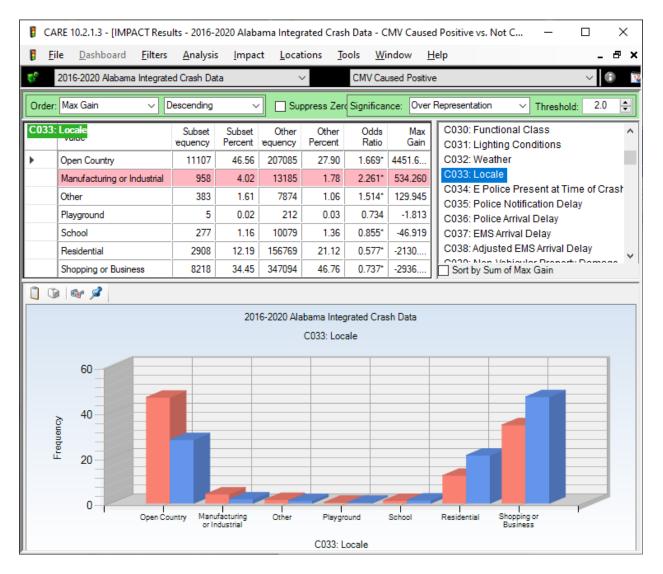
These results correspond closely to the time of day results in Section 3.5.



3.15 Weather CMVs vs Non-CMVs

Severe winds appear to be the only Weather feature that is dramatically over-represented. The other over-representations are probably due to CMVs being required to be out in those weather conditions.

3.16 Locale CMVs vs Non-CMVs

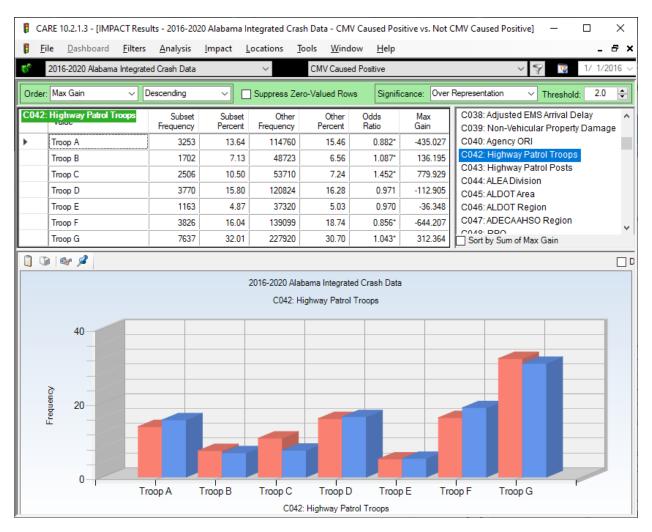


Open Country corresponds to Rural in Section 3.6; however, there are some technically Urban areas (i.e., within city limits) that are also open country. In all of the IMPACTs we have done, CMVs are the only vehicles that we have found that have more than a double over-representation in Manufacturing or Industrial areas.



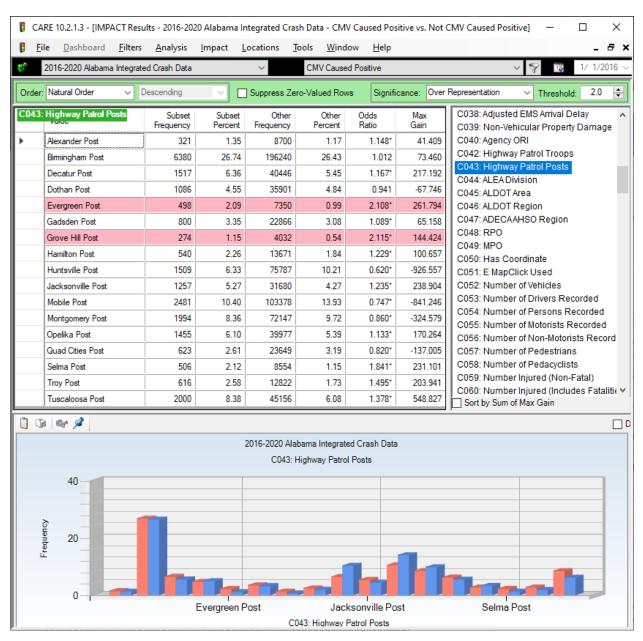
3.17 Adjusted EMS Arrival Delay CMVs vs Non-CMVs

The degree of over-representation (Odds Ratio) generally increases with the increase in arrival time. This shows that the pattern is for crashes that involve CMVs to be in the more remote areas for which EMS access is delayed.



3.18 Highway Patrol Troops CMVs vs Non-CMVs

Troop C is the most over-represented in CMV-Caused Crashes. This may be of importance to assist in planning the tactics of each troop.



3.19 Highway Patrol Posts CMVs vs Non-CMVs

The Evergreen and Grove Hill posts have nearly the same over-representations. The Selma post comes in next.

3.20 ALEA Divisions CMVs vs Non-CMS

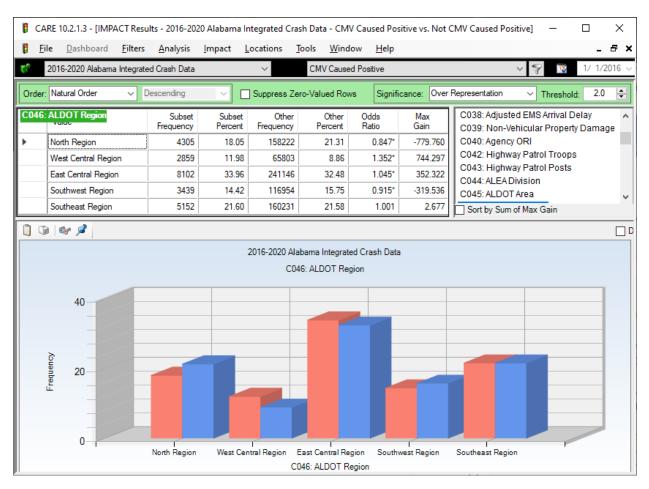
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S.	2016	6-2020 Alabam	a Integrated	Crash Data		\sim	CMV Cau	sed Positive		✓ ♥ 1/ 1/2016 ∨
Ord	ler: Nat	ural Order	∽ Des	cending	C] Suppress Ze	ero-Valued R	ows Sign	ificance: Over	Representation V Threshold: 2.0
C0 4	4: ALE	A Division		Subset Frequency	Subset Percent	Other Frequency	Other Percent		Max Gain	C038: Adjusted EMS Arrival Delay C039: Non-Vehicular Property Damage
	Stat	te HQ		7	0.08	136	0.09	0.84	7 -1.263	C040: Agency ORI
	Divi	sion A		1108	11.87	20775	13.53	0.878	-154.194	C042: Highway Patrol Troops
	Divi	sion B		610	6.54	13726	8.94	0.731	-223.929	C043: Highway Patrol Posts C044: ALEA Division
	Divi	sion C		1505	16.13	15770	10.27	7 1.571	• 546.887	C045: ALDOT Area
	Divi	ision D		1457	15.61	25163	16.38	0.95	3 -71.789	C046: ALDOT Region
	Divi	sion E		727	7.79	13906	9.05	5 0.860	• -117.865	C047: ADECAAHSO Region
	Divi	sion F		1750	18.75	36390	23.69	0.792	-460.890	C048: RPO C049: MPO
	Divi	ision G		2167	23.22	27717	18.05	5 1.287	483.042	Sort by Sum of Max Gain
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						2010 2020 44		ated Crash Da		
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							C044: ALEA	DIVISION		

Division C has the highest over-representation followed by Division G.

3.21 ALDOT Areas CMVs vs Non-CMVs

-	-				-			sitive vs. Not (CMV Caused Positive] — 🗆 🗙	
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S.	2016-2020 Alabam	a Integrate	d Crash Data		~	CMV Cause	ed Positive		~ 🖓 🛐 1/ 1/2016 🕥	
Order: Natural Order V Descending V Suppress Zero-Valued Rows Significance: Over Representation V Threshold: 2.0										
C04	5: ALDOT Area		Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C038: Adjusted EMS Arrival Delay C039: Non-Vehicular Property Damage	
	Area 1		3477	14.57	124176	16.73	0.871*	-513.628	C040: Agency ORI	
	Area 2		1722	7.22	52208	7.03	1.026	44.198	C042: Highway Patrol Troops C043: Highway Patrol Posts	
	Area 3		6084	25.50	194114	26.15	0.975	-154.217	C044: ALEA Division	
	Area 4		2707	11.35	76008	10.24	1.108*	264.341	C045: ALDOT Area	
	Area 5		2216	9.29	53169	7.16	1.297*	507.315	C046: ALDOT Region	
	Area 6		2554	10.71	79151	10.66	1.004	10.334	C047: ADECAAHSO Region	
	Area 7		1469	6.16	45452	6.12	1.006	8.315	C048: RPO C049: MPO	
	Area 8		757	3.17	8973	1.21	2.625*	468.636	C050: Has Coordinate	
	Area 9		2871	12.03	109105	14.70	0.819*	-635.293	Sort by Sum of Max Gain	
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	2016-2020 Alabama Integrated Crash Data									
	C045: ALDOT Area									
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	0	Area	1 Area	2 Area	3 Area	4 Area 5	5 Area 6	Area 7	Area 8 Area 9	
						C045: ALDO	T Area			

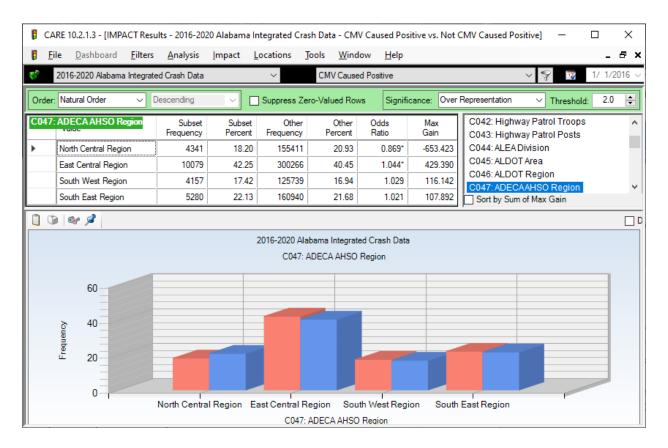
While Area 8 has the highest over-representation, it is also apparently the area with the least traffic. It also has the second highest Max Gain, with Area 5 having the largest.



3.22 ALDOT Regions CMVs vs Non-CMVs

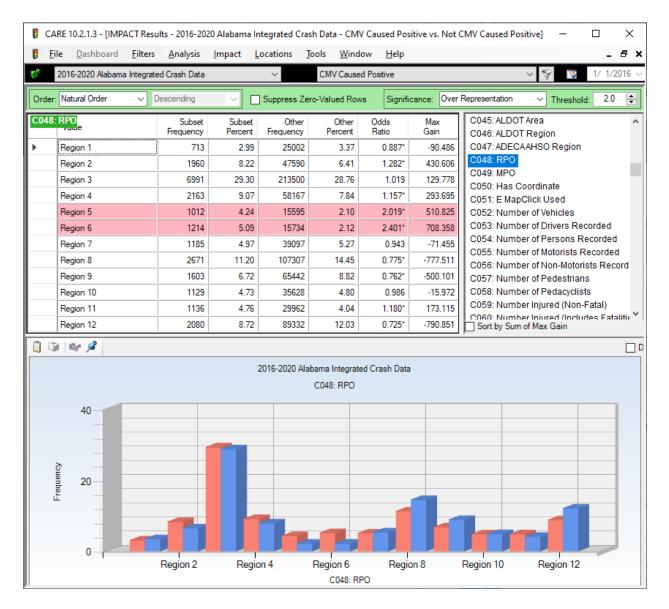
The ALDOT West Central Region is the only one with a large over-representation.

3.23 ADECA-AHSO Regions CMVs vs Non-CMVs



None of these regions shows an extraordinarily high level of over-representation of CMV caused crashes.

3.24 RPO Regions CMVs vs Non-CMVs



Regions 5 and 6 have over twice their expected proportion of CMV caused crashes when compared to the non-CMV crashes that are occurring in the regions.

3.25 MPO Areas CMVs vs Non-CMVs

-	RE 10.2.1.3 - [IMPACT Resu			-			itive vs. Not (
🔋 Ei		- /	<u>I</u> mpact <u>L</u>	_	ools <u>W</u> indo			_ & ×					
6	2016-2020 Alabama Integrat	ed Crash Data		~	CMV Caused	l Positive		✓ ♥ 1/ 1/2016 ∨					
Order:	Natural Order 🗸 [Descending	Y	Suppress Ze	ro-Valued Row	s Signific	ance: Over	Representation V Threshold: 2.0 🚖					
C049:	MPO	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C045: ALDOT Area					
•	Anniston	368	1.69	13552	2.05	0.823*	-79.242	C047: ADECAAHSO Region					
	Aubum-Opelika	500	2.29	16544	2.50	0.916	-45.983	C048: RPO					
	Bimingham	4534	20.77	141945	21.46	0.968*	-150.454	C049: MPO C050: Has Coordinate					
	Decatur	379	1.74	12622	1.91	0.910	-37.550	C051: E MapClick Used					
	Dothan	416	1.91	16578	2.51	0.760*	-131.105	C052: Number of Vehicles					
	Eastern Shore	211	0.97	9177	1.39	0.697*	-91.858	C053: Number of Drivers Recorded					
	Gadsden	288	1.32	10927	1.65	0.799*	-72.612	C054: Number of Persons Recorded C055: Number of Motorists Recorded					
	Huntsville	837	3.83	53432	8.08	0.475*	-926.357	C056: Number of Non-Motorists Record					
	Mobile	1367	6.26	60452	9.14	0.685*	-628.030	C057: Number of Pedestrians					
	Montgomery	1182	5.42	53994	8.16	0.663*	-599.904	C058: Number of Pedacyclists					
	Muscle Shoals	187	0.86	11760	1.78	0.482*	-201.102	C059: Number Injured (Non-Fatal)					
	Pensacola	12	0.05	969	0.15	0.375	-19.979	C060: Number Injured (Includes Fatalitie C061: Number Killed					
	Phenix City	328	1.50	10429	1.58	0.953	-16.177	C062: Number of Railroad Trains					
	Tuscaloosa	968	4.44	32304	4.88	0.908*	-98.093	C063: Has Railroad Crossing Number					
	None	10249	46.96	216671	32.76	1.433*	3098.447	Sort by Sum of Max Gain					
00) 🞯 🖉												
			1	2016-2020 Ala	bama Integrate	d Crash Data							
					C049: MPO								
	60												
	10												
	40 <u>-</u>												
L L	20												
	0												
			Dot	nan		Montg	jomery	None					
					C049: MF	°0							

Of those assigned an MPO name, none show any over-representations.

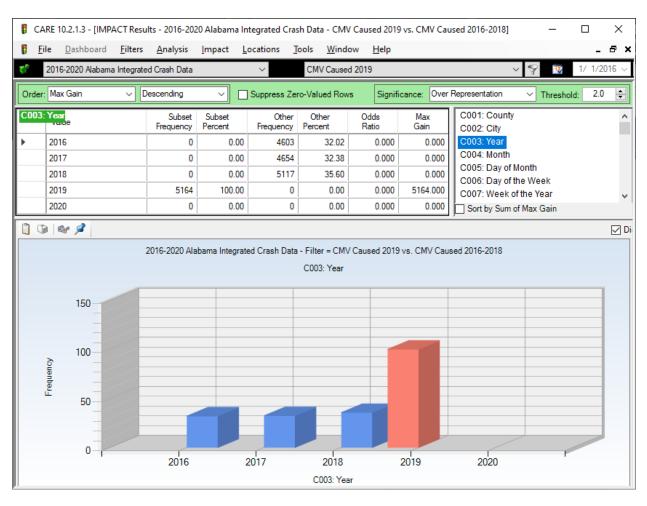
3.26 Vehicle Maneuver

-	RE 10.2.1.3 - [IMPACT Results		-				D Not CU Vehi		×
Ei	le <u>D</u> ashboard <u>Filters</u> 2016-2020 Alabama Integrated	- , ,	pact <u>L</u> ocati		<u>W</u> indow <u>I</u> IV Caused Positiv	<u>H</u> elp			₽ > 2/31/
<u>6</u>	-			CM	IV Caused Fositi				
Order	Max Gain 🗸 Des	scending	V V Sup	press Zero-Val	ued Rows	Signif	icance: Over	Representation V Threshold: 2.0	÷
C129:	CU Vehicle Maneuvers	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C129: CU Vehicle Maneuvers	
•	E Changing Lanes	2759	11.88	40804	5.66	2.097*	1443.223		
	Turning Right	1896	8.16	36120	5.01	1.628*	731.264		
	Backing	1765	7.60	33122	4.60	1.653*	696.938		
	E Negotiating a Curve	1249	5.38	33662	4.67	1.151*	163.525		
	E Overtaking/Passing	325	1.40	8076	1.12	1.248*	64.579		
	Stopped in Traffic	123	0.53	2656	0.37	1.436*	37.354		
	Making U-Tum	153	0.66	4077	0.57	1.164	21.532		
	Legally Parked	37	0.16	507	0.07	2.263*	20.651		
	E Stopped for Sign/Signal	107	0.46	2843	0.39	1.167	15.324		
	Illegally Parked	47	0.20	1007	0.14	1.447*	14.528		
	E Leaving Main Road	83	0.36	2593	0.36	0.993	-0.615		
	E Entering Main Road	335	1.44	18931	2.63	0.549*	-275.454		
	Turning Left	2374	10.22	83653	11.61	0.880*	-323.499		
	Slowing/Stopping	1005	4.33	42377	5.88	0.735*	-361.501		
	Movement Essentially Strai	10970	47.23	378811	52.59	0.898*	-1245.248	Sort by Sum of Max Gain	
] [1 🐼 🖉							Disp	lay
			2	2016-2020 Alab	ama Integrated	Crash Data			
				C129: Cl	J Vehicle Maneu	uvers			
	60								
	_장 40								
	20								
	0		Questekir = //	Dessing		Illegelly Deriv	d	Maxament Essentially Statisty	
		E	Overtaking/F			Illegally Parke	ea	Movement Essentially Straight	
				C129: C	U Vehicle Mane	euvers			

The following had Max Gains in excess of 50 crashes: Changing Lanes, Turning Right, Backing, Negotiating a Curve, and Overtaking/Passing. Changing Lanes was almost double the next highest Max Gain.

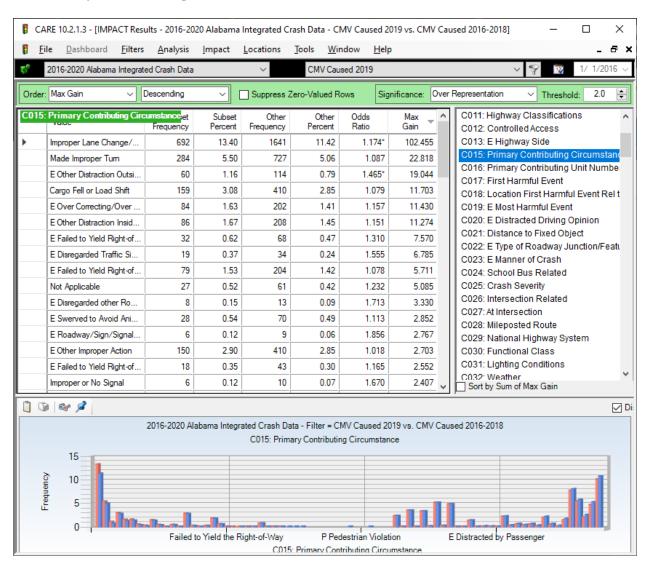
4.0 Year 2019 against the three previous years (2016-2018)

See the five year comparison in Section 3.3. The results there indicate that 2019 had a significant increase over 2016-2018. It was determined to eliminate 2020 from this analysis because the effects of COVID would make it non-typical. This section compares CMV-Caused crashes in 2019 (test; red bars) against CMV-Caused crashes in 2016-2018 (control; blue bars) in an attempt to surface any significant differences that may have caused the increase in 2019.



4.1 Year CMV-Caused 2019 vs CMV-Caused 2016-2018 (filter definitions)

The above shows the test (Subset) and the control (Other) produced by the filters that are forming the basis for the comparison of the CMV-caused crashes over the 2016-2019 years. These filters will be in effect for the rest of this section in order to attempt to establish the reason that 2019 had a higher than expected proportion of crashes.



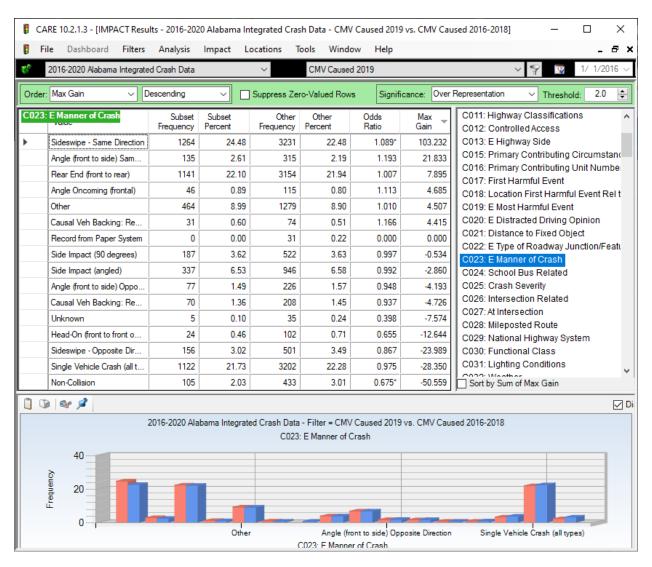
4.2 Primary Contributing Circumstances CMV-Caused 2019 vs 2016-2018

Improper Lane Change definitely became more of a problem in 2019 than it had been in the prior three years. The Max Gain indicates that the difference was about 102 crashes. Improper turns and other distractions outside the vehicle would account for a few more, although the numbers drop off quickly. Primary emphasis here should be on <u>Improper Lane Change</u>.

<u>e</u>	2016-2020 Alabama Integrat	ed Crash Data		\sim	CMV Cau	sed 2019		✓ ♥ 1/ 1/2016
		Descending	~ [Suppress Z	ero-Valued Ro		nificance: Over I	Representation V Threshold: 2.0
:017:	First Harmful Event	Subset	Subset	Other	Other	Odds Batio	Max _ ^	C011: Highway Classifications
	Collision with Vehicle in	Frequency 3112	Percent 60.26	Frequency 8418	Percent 58.57	Hatio 1.029	Gain	C012: Controlled Access C013: E Highway Side
	Cargo/Equipment Loss	119	2.30	263	1.83	1.029	24.508	C015: Primary Contributing Circumstand
	E Collision with Cable Ba	35	0.68	58	0.40	1.680*	14.161	C016: Primary Contributing Unit Numbe
	Collision with Sign Post	45	0.87	92	0.40	1.361	11.946	C017: First Harmful Event
	E Collision with Animal:	39	0.76	76	0.53	1.428	11.694	C018: Location First Harmful Event Rel t C019: E Most Harmful Event
	E Collision with Embank	22	0.43	41	0.29	1.493	7,269	C020: E Distracted Driving Opinion
	Collision with Light Pole (15	0.29	23	0.16	1.815	6.736	C021: Distance to Fixed Object
	Collision with Railway Ve	14	0.27	22	0.15	1.771	6.096	C022: E Type of Roadway Junction/Featu C023: E Manner of Crash
	Collision with Utility Pole	58	1.12	146	1.02	1.106	5.544	C024: School Bus Related
	Collision with Tree	66	1.28	169	1.18	1.087	5.281	C025: Crash Severity
	Collision with Mailbox	17	0.33	33	0.23	1.434	5.144	C026: Intersection Related
	E Collision with Other No	96	1.86	255	1.77	1.048	4.382	C027: At Intersection C028: Mileposted Route
	E Collision with Animal: F	27	0.52	64	0.45	1.174	4.006	C029: National Highway System
	E Downhill Runaway	5	0.10	3	0.02	4.639	3.922	C030: Functional Class
	Collision with Bridge Abu	31	0.60	76	0.53	1.135	3.694	C031: Lighting Conditions
	Collision with Bridge Sup	5	0.10	6	0.04	2.319	2.844 🗸	C032: Weather Sort by Sum of Max Gain
] ()	i 😪 🖉							
		2016-2020 Ala	ibama Integra		ta - Filter = Cl 7: First Harm)19 vs. CMV Caus	ed 2016-2018
Frequency	80 60 40 20							

4.3 First Harmful Event CMV-Caused 2019 vs 2016-2018

The only item with a significant difference is Collision with a Cable Barrier, and we would expect the large truck would be attempting to avoid a pedestrian, animal or other vehicle. The Max gain is only a little over 14. So there is little of significance here.



4.4 Manner of Crash CMV-Caused 2019 vs 2016-2018

Sideswipe in the same direction further reinforces the findings of Section 4.2 – Improper Lane Change/Use. This would be the manner of crash that would result from an encroachment into the lane of another vehicle. It is interesting that, while these two crash causes/results (Improper Lane Change and Sideswipe – Same Direction) have major differences in frequencies, their Max Gains are practically the same. If only 100 crashes were reduced by some countermeasure to these two items, it would be a significant reduction in the total crashes for 2019.

5.0 Improper Lane Change Analysis

The following table indicates how "Improper Lane Change" is recorded in its various attributes.

#	Attribute	Value	Number
C015	Primary Contributing Circumstance (PCC)	Improper Lane Change	2846
C023	Manner of Crash	Sideswipe Same Direction	5413
C129	CU Vehicle Maneuver	Changing Lanes	2759
C202	CU Contributing Circumstance	Improper Lane Change	2091

For simplicity, we will refer to all of these as "Improper Lane Change" or ILC. These are not intended to be mutually exclusive. Recording officers may select any combination of these for a given crash.

The nominal Causal Unit (CU) will be the CMV in all crashes in the ILC subset because the intent of this analysis is to uncover information to reduce CMV crashes. This was determined by C450 CU CMV Indicator = Yes – CU is a CMV.

IMPACTS showing significance and/or difference from general CMV Caused: C008 C010 C011 C015* C022 C023* C028 C031 C033 C040-049 6.12 C052 6.13 C101 6.14 C104 6.15 C105 6.16 C106 6.17 C107 6.18 C108 6.19 C129* 6.20 C202* 6.21 C208 6.22 C224 6.23 C412 6.24 C413 6.25 C415 C451-465

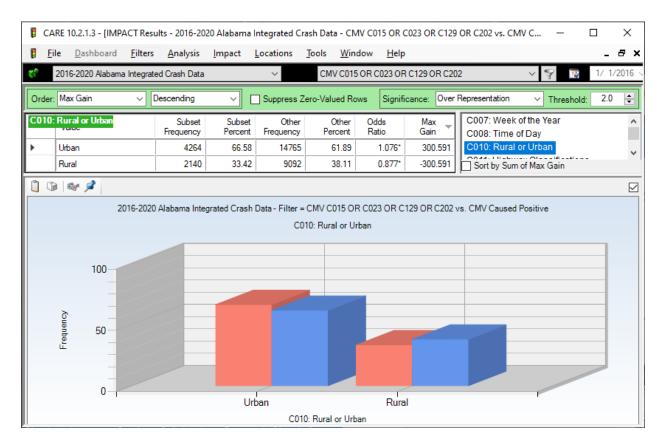
The following IMPACT displays will compare a crash subset of all of the 4 ILCs above ORed together against the CMV Caused subset. This control subset (CMV Caused) was used to determine how ILC crashes were different from CMV-caused crashes in general.

5.1 Time of Day; ILC vs All CMV Caused

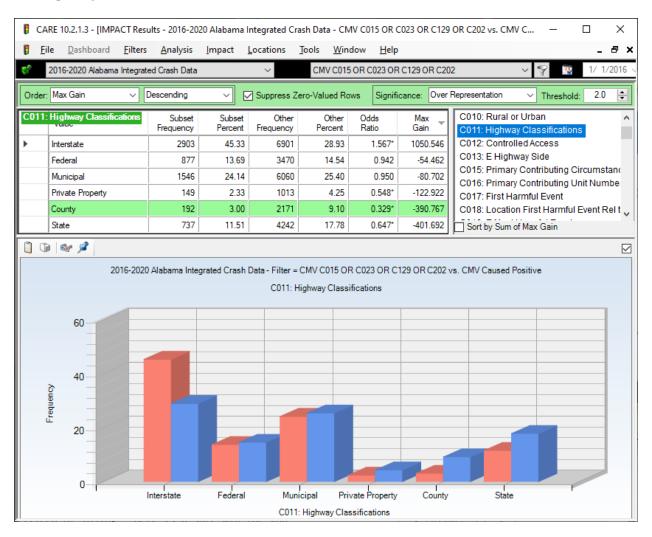
2016-2020 Alabar	ma Integrated	d Crash Data	I	~	CMV	C015 OR C0	DR C129 OR C202	~ 💡
Order: Natural Order	∼ De	escending	~	Suppress	s Zero-Valı	Significance	ver Representation V	nreshold: 2.0 🚔
C008: Time of Day	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C001: County C002: City	^
12:00 Midnight to 12:	55	0.86	264	1.11	0.776	-15.866	C003: Year	
1:00 AM to 1:59 AM	55	0.86	266	1.11	0.770	-16.403	C004: Month	
2:00 AM to 2:59 AM	47	0.73	255	1.07	0.687*	-21.450	C005: Day of Month	
3:00 AM to 3:59 AM	57	0.89	326	1.37	0.651*	-30.509	C006: Day of the Week C007: Week of the Year	
4:00 AM to 4:59 AM	77	1.20	402	1.69	0.714*	-30.910	C008: Time of Day	
5:00 AM to 5:59 AM	168	2.62	666	2.79	0.940	-10.776	C010: Rural or Urban	
6:00 AM to 6:59 AM	237	3.70	955	4.00	0.925	-19.353	C011: Highway Classifica	tions
7:00 AM to 7:59 AM	364	5.68	1486	6.23	0.913	-34.891	C012: Controlled Access	
8:00 AM to 8:59 AM	418	6.53	1498	6.28	1.040	15.888	C013: E Highway Side C015: Primary Contributin	a Circumstance
9:00 AM to 9:59 AM	384	6.00	1400	5.87	1.021	7.926	C015: Primary Contributin	-
10:00 AM to 10:59 AM	395	6.17	1548	6.49	0.951	-20.534	C017: First Harmful Event	-
11:00 AM to 11:59 AM	459	7.17	1682	7.05	1.017	7 496	C018: Location First Harm	
12:00 Noon to 12:59	449	7.01	1730	7.05	0.967	-15.389	C019: E Most Harmful Eve	
1:00 PM to 1:59 PM	444	6.93	1688	7.08	0.980	-9.114	C020: E Distracted Driving C021: Distance to Fixed O	
2:00 PM to 2:59 PM	460	7.18	1743	7.00	0.983	-7.878	C021: Distance to Fixed O C022: E Type of Roadway	-
3:00 PM to 3:59 PM	480	7.18	1743	7.31	0.950	-25.533	C023: E Manner of Crash	oundation outdate
1							C024: School Bus Related	t
4:00 PM to 4:59 PM	388	6.06	1483	6.22	0.975	-10.086	C025: Crash Severity	
5:00 PM to 5:59 PM	412	6.43	1327	5.56	1.157*	55.790	C026: Intersection Relate	d
6:00 PM to 6:59 PM	292	4.56	903	3.79	1.205*	49.605	C027: At Intersection C028: Mileposted Route	
7:00 PM to 7:59 PM	216	3.37	651	2.73	1.236*	41.250	C029: National Highway S	vstem
8:00 PM to 8:59 PM	197	3.08	557	2.33	1.318*	47.483	C030: Functional Class	,
9:00 PM to 9:59 PM	164	2.56	462	1.94	1.322*	39.984	C031: Lighting Conditions	a
10:00 PM to 10:59 PM	102	1.59	360	1.51	1.056	5.364	C032: Weather	
11:00 PM to 11:59 PM	78	1.22	305	1.28	0.953	-3.872	C033: Locale	
Unknown	5	0.08	12	0.05	1.552	1.779	Sort by Sum of Max Gain	
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			2010	6-2020 Alaba	ma Integrate	ed Crash Dat		
				C008	Time of Da	зу		
10								
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5	4:0	0 AM to 4:59	9 AM 9:	00 AM to 9:59	AM 2:	00 PM to 2:59	1 7:00 PM to 7:59 PM	Unknown
					C008: Time	of Dav		

The time of day distribution for ILCs is generally not significantly different from CMV Caused crashes in general. However, there are several hours that are significantly over-represented in the late afternoon, 5:00 PM through 9:59 PM.

5.2 Rural/Urban; ILC vs All CMV Caused



Unlike CMV Caused in general, ILC crashes occur significantly more in the Urban than the Rural roadways. About twice as many crashes occur in the Urban as in the Rural areas. Please see the discussion in this regard in Section 5.10, Locale.



5.3 Highway Classification; ILC vs All CMV Caused

CMVs are have a little over 45% of their ILC crashes on Interstates, which is over-represented in comparison to all CMV Caused crashes by 56.7%. See Section 5.10, which indicates that a large proportion of these Interstate crashes are close to urban areas as opposed to open country. Although slightly under-represented, the proportion of crashes on Municipal Roadways is second only to Interstates, further reflecting the tendency of ILC crashes to be in or near urban areas.

5.4 Primary Contributing Circumstances (PCCs); ILC vs All CMV Caused; C015 = part of ILC filter (see Section 5.0)

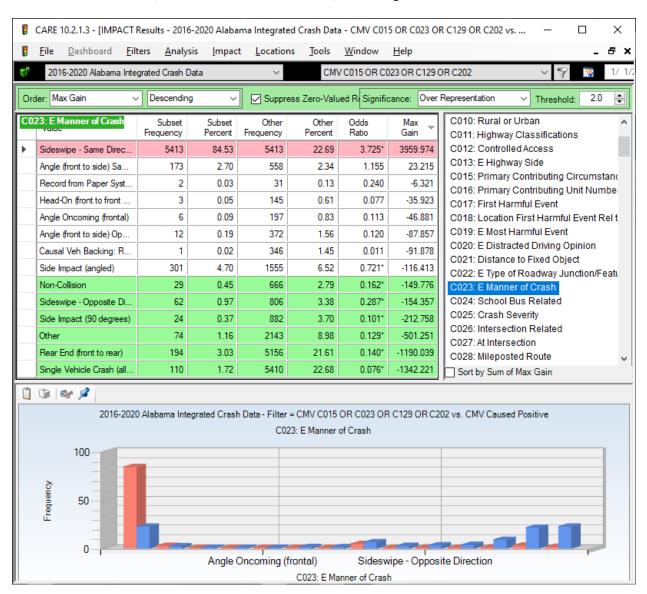
CARE 10.2.1.3 - [IMPACT Results - 2016-2020 Alabama In	tegrated C	rash Data	- CMV C0	15 OR C02	3 OR C129	OR C202 v	/s. C	MV Cause − □ ×
Eile Dashboard Eilters Analysis Impact	ocations	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp				_ 8 ×
2016-2020 Alabama Integrated Crash Data	\sim	CMV	C015 OR C	023 OR C1	29 OR C2(02		✓ ♥ 1/ 1/2016 ∨ 12
Order: Max Gain V Descending V	Suppress	Zero-Value	ed Rows	Sign	ificance:	Over Repre	sent	ation V Threshold: 2.0 🛓
C015: Primary Contributing Circumstance	Subset requency	Subset Percent	Other requency	Other Percent	Odds Ratio	Max Gain	^	C001: County A C002: City
Improper Lane Change/Use	2846	44.44	2846	11.93	3.725*	2082.0		C003: Year
Unseen Object/Person/Vehicle	849	13.26	2535	10.63	1.248*	168.523		C004: Month
E Crossed Centerline	266	4.15	567	2.38	1.748*	113.799		C005: Day of Month C006: Day of the Week
Unknown	321	5.01	788	3.30	1.518*	109.475		C007: Week of the Year
Improper Passing	127	1.98	195	0.82	2.426*	74.656		C008: Time of Day
Made Improper Turn	394	6.15	1214	5.09	1.209*	68.123		C010: Rural or Urban
E Other Failed to Yield	104	1.62	192	0.80	2.018*	52.461		C011: Highway Classifications
Improper or No Signal	13	0.20	24	0.10	2.018	6.558		C012: Controlled Access C013: E Highway Side
E Aggressive Operation	51	0.80	168	0.70	1.131	5.903		C015: Primary Contributing Circ
E Failed to Yield Right-of-Way Making Right Turn	26	0.41	77	0.32	1.258	5.331		C016: Primary Contributing Unit
E Swerved to Avoid Object	17	0.27	48	0.20	1.319	4.115		C017: First Harmful Event
E Failed to Yield Right-of-Way from Yield Sign	17	0.27	56	0.23	1.131	1.968		C018: Location First Harmful Ev
E Over Correcting/Over Steering	101	1.58	369	1.55	1.020	1.948		C019: E Most Harmful Event C020: E Distracted Driving Opin
E Failed to Yield Right-of-Way from Parked Position	10	0.16	30	0.13	1.242	1.947		C021: Distance to Fixed Object
Under Minimum Speed	3	0.05	6	0.03	1.863	1.389		C022: E Type of Roadway Juncti
E Failed to Yield Right-of-Way Making Right Turn on Red Signal	2	0.03	7	0.03	1.064	0.121	~	Sort by Sum of Max Gain
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2016-2020 Alabama Integrated Crash			C015 OR C ributing Cir			02 vs. CMV	Саι	ised Positive
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EC	rossed Me		v Contributi		Districtions	on Outside	the	Vehicle

The 2846 ILC crashes in this attribute were used as part of the ILC definition process, along with three other attributes that indicated ILC (see Section 5.0 for the detailed definition). Thus, the remaining items listed for this attribute cannot be considered to be a reflection of anything except the residual crashes that were not filtered out by the other three attribute values. This does provide some important subjective information even if it cannot be quantified. For example, 849 crashes were recorded to be "Unseen Object/Person/Vehicle." It is reasonable to expect that a large number of crashes occurred when one of the drivers failed to see the other vehicle. This, and the other values as well, provide valuable insights into potential ILC crash causes.

🚦 CA	RE 10.2.1.3 - [IMPACT Results - 2016	-2020 Alab	ama Integr	ated Crash	Data - CM	V C015 OR (C023 OR C1	29 OR C202 AN − □ ×
🔋 Ei	le <u>D</u> ashboard <u>F</u> ilters <u>A</u> naly:	sis <u>I</u> mpa	t <u>L</u> ocat	ions <u>T</u> oo	ols <u>W</u> ind	ow <u>H</u> elp		_ 8 ×
¢?	2016-2020 Alabama Integrated Crash D)ata	`	1	CMV C015	OR C023 OF	R C 129 OR C	C202 V 💡 📆 1/ 1/
Order:	Max Gain V Descending	g ~	🛛 🖂 Sup	press Zero	-Valued R	Significance:	Over Repr	resentation V Threshold: 2.0
C022:	E Type of Roadway Junction/Featu	e Subset requency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain	C022: E Type of Roadway Junction/Fea
▶	No Special Feature	4901	77.05	17203	73.03	1.055*	255.350	
	Entrance or Exit Ramp	156	2.45	458	1.94	1.261*	32.318	
	Bridge/Overpass/Underpass	248	3.90	817	3.47	1.124	27.370	
	On Ramp Merge Area	44	0.69	70	0.30	2.328*	25.097	
	Other (than 1-12) Non-Intersection	34	0.53	80	0.34	1.574	12.396	
	Off Ramp Diverge Area	20	0.31	42	0.18	1.763	8.658	
	Off Ramp	44	0.69	131	0.56	1.244	8.624	
	Other Part of Interchange	18	0.28	40	0.17	1.666	7.198	
	Intersection with Ramp	28	0.44	90	0.38	1.152	3.696	
	Tunnel	11	0.17	48	0.20	0.849	-1.962	
	Other Intersection	18	0.28	76	0.32	0.877	-2.524	
	At Intersection, Intersection Related	16	0.25	82	0.35	0.723	-6.144	
	Y-Intersection	13	0.20	71	0.30	0.678	-6.173	
	Crossover in Median	11	0.17	72	0.31	0.566	-8.444	
	On Segment but Intersection Related	63	0.99	288	1.22	0.810	-14.774	
	Business Drive	19	0.30	140	0.59	0.503	-18.807	
	Driveway Access Intersection	25	0.39	169	0.72	0.548*	-20.638	
	Four-Way Intersection	521	8.19	2340	9.93	0.824*	-110.914	
	T-Intersection	171	2.69	1335	5.67	0.474*	-189.515	Sort by Sum of Max Gain
	i €# ∮				Integrated C			
	100		C022: E 1	ype of Roa	dway Juncti	on/Feature		
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	0-1	Other (than 1 Non-Interse	ction	2) E Tues	Tunnel	Junction/Fea	Interse	Segment but ection Related
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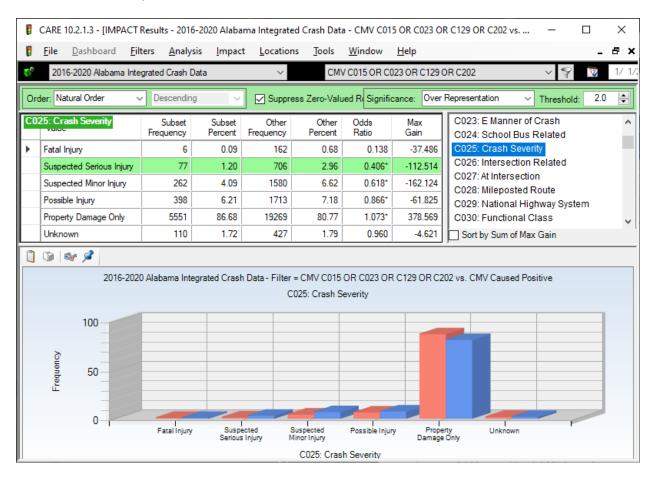
5.5 Type of Junction/Intersection; ILC vs All CMV Caused (Items > 50 Crashes in 5 Years)

The general "Intersection Related" attributes (C026 and C027) indicated that CMV Caused crashes were involved in fewer than expected crashes at intersections. These two attributes showed even proportionately fewer ILC crashes at intersections. The two intersection types that were significantly over-represented were "Entrance or Exit Ramp" and "On Ramp Merge Area."



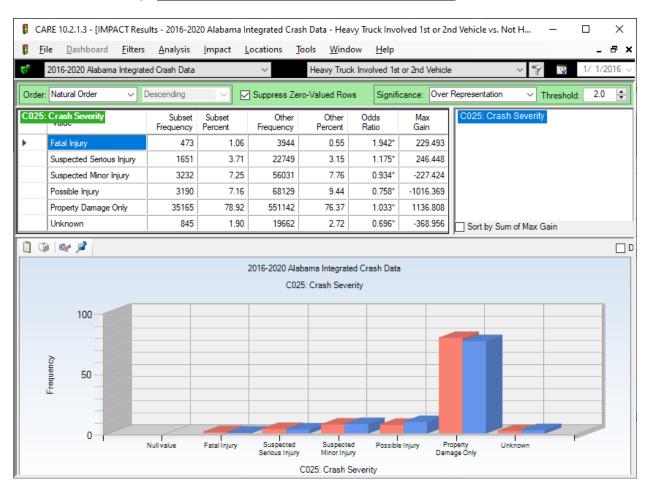
5.6 Manner of Crash; ILC vs All CMV Caused; C023 = part of ILC

This attribute was also used to define the ILC filter; in this case Sideswipe – Same Direction was considered to be in indicator of ILC. A comparison with the results for CMV Caused vs all other crashes indicate the following frequencies in the C023 attribute that were filtered out: Single Vehicle Crash - all types (was 5,410; now 110), Non-Collision (was 666; now 29), and Sideswipe - Opposite Direction (was 806; now 62).



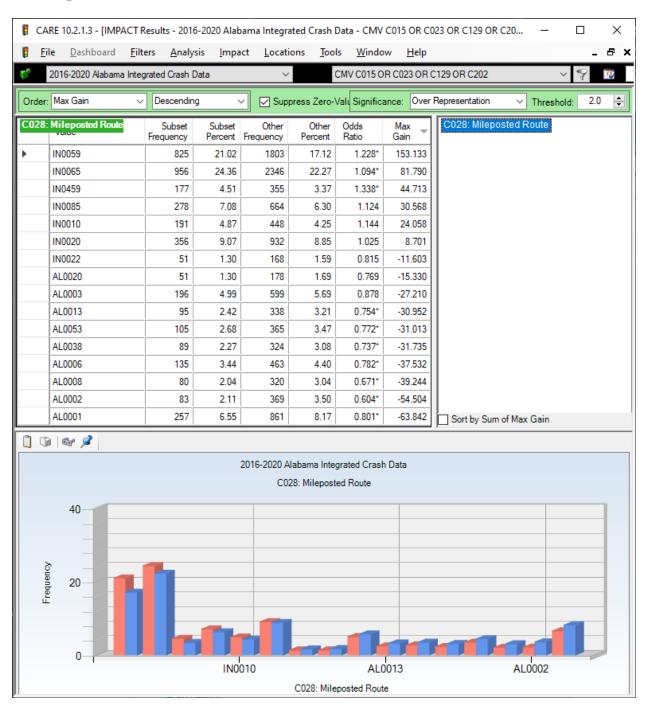
5.7a Crash Severity; ILC vs All CMV Caused

The above indicates that the severity of the defined ILC is considerably lower than that of CMV Caused crashes in general. The cause of the lower severity is probably the urban nature of the crashes coupled with their slower impact speeds (see Section 5.15). The analysis giving next shows the extent to which crashes involving large trucks result in higher severities.



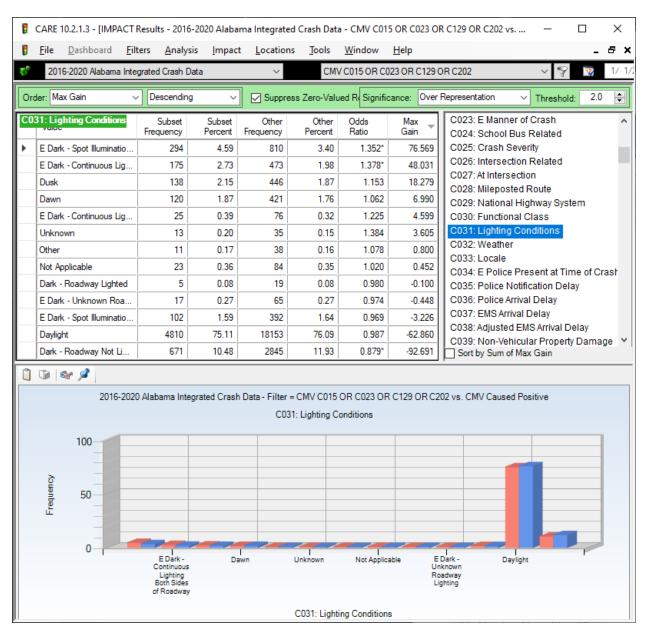
5.7b Crash Severity; All Large Truck Involved (1st or 2nd Vehicle) vs Non-CMVs

The above shows that crashes involving large trucks generally result in more fatal crashes. However, past research has shown that most of the fatal crashes are not caused by the large trucks but by the lighter vehicle. Obviously, any crash of a large heavy vehicle and one that is considerably lighter has the potential to cause serious harm.



5.8 Mileposted Routes; ILC vs All CMV Caused (Crashes > 50)

I-59, I65 and I-459 significant over-representations. Those at the bottom of the list were generally significantly under-represented, although some had well over 50 ILC crashes.



5.9 Lighting Conditions; ILC vs All CMV Caused

These results correspond closely to the time of day results in Section 5.1. This would especially be true in the time-change months of November and December, which were found to be over-represented, although not significantly.

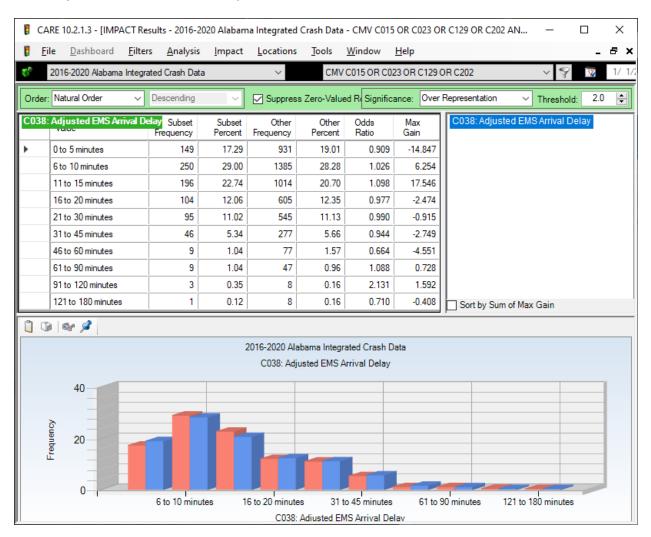
\times 🚦 CARE 10.2.1.3 - [IMPACT Results - 2016-2020 Alabama Integrated Crash Data - CMV C015 OR C023 OR C129 OR C202 vs. ... <u>F</u>ile Dashboard Filters Analysis đΧ <u>I</u>mpact Locations Tools <u>W</u>indow <u>H</u>elp CMV C015 OR C023 OR C129 OR C202 2016-2020 Alabama Integrated Crash Data 12 1/ 1/ Order: Max Gain Descending Suppress Zero-Valued R Significance: Over Representation 2.0 ÷ Threshold: C033: Locale C029: National Highway System Subset Subset Other Other Odds Max ٨ Frequency Percent Frequency Percent Ratio Gain C030: Functional Class C031: Lighting Conditions 2507 34.45 300.927 Shopping or Business 39.15 8218 1.136* ٠ C032: Weather 1.410* 145 2.26 1.61 42.186 Other 383 C033: Locale Playground 1 0.02 5 0.02 0.745 -0.342 C034: E Police Present at Time of Crash Manufacturing or Indust. 245 3.83 958 4.02 0.953 -12.169 C035: Police Notification Delay -14.359 School 60 0.94 277 1.16 0.807 C036: Police Arrival Delay C037: EMS Arrival Delay Open Country 2897 45.24 11107 46.56 0.972 -84.607 C029: Adjusted EMS Arrival Dalay 8.57 12.19 0.703* -231.635 Residential 549 2908 Sort by Sum of Max Gain 📋 🕼 🕼 💋 2016-2020 Alabama Integrated Crash Data - Filter = CMV C015 OR C023 OR C129 OR C202 vs. CMV Caused Positive C033⁻ Locale 60 40 Frequency 20 0 Shopping or Business Manufacturing Other Playground School Open Country Residential or Industrial C033: Locale

5.10 Locale; ILC vs All CMV Caused

Open Country, which was the top of the over-representation list for all CMV Caused, is now shown to be under-represented for ILC crashes. The following attributes further support this outcome (over-representations in parentheses):

<u>Section</u>	<u>Attribute</u>	
5.2	Rural or Urban	(Urban)
5.3	Highway Classification	(I)
5.16	Trafficway Lanes	(Three or more lanes)
5.17	Turn Lanes	(Both right- and left-turn lanes)
5.10	Locale (shown above)	(Shopping or business)

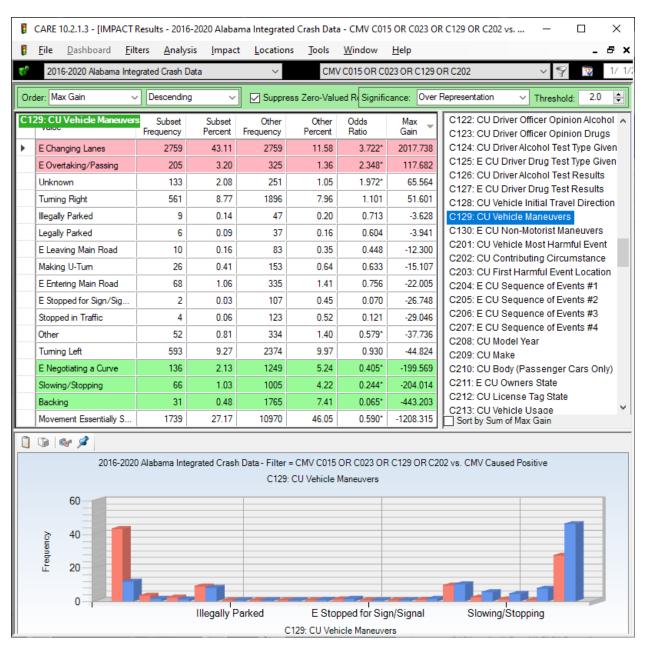
Before drawing any conclusion on the general concentration of ILC crashes, all of these attributes should be examined and compared.



5.11 Adjusted EMS Arrival Delay; ILC vs All CMV Caused

There are no significant differences in the ambulance arrival time between the ILC and the CMV Caused crashes in general. See Section 3.17 for the contrast between CMVs and all other vehicles.

C040-C049 have been omitted since they were determined not to provide any information in addition to the results given in Sections 3.18-3.25.



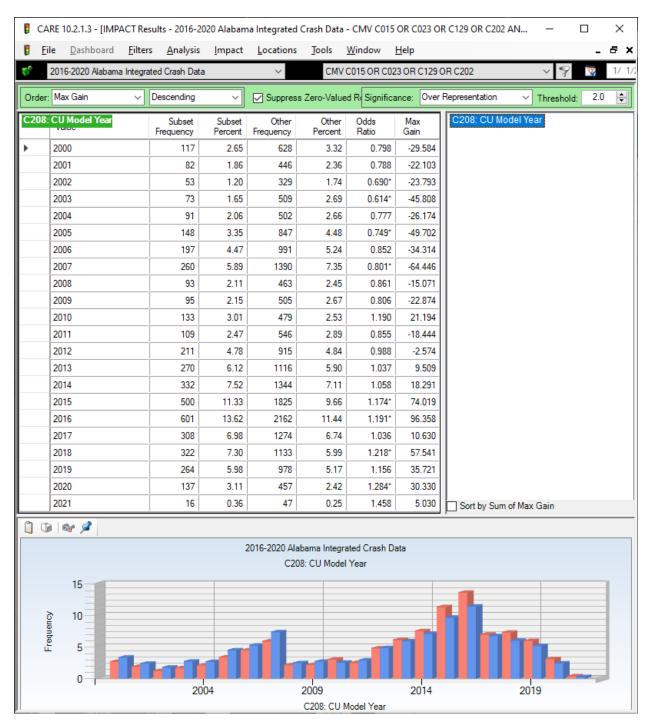
5.12 C129 Vehicle Maneuvers; ILC vs All CMV Caused; C129 = part of ILC filter

The following had Max Gains in excess of 50 crashes: Changing Lanes, Overtaking/Passing, and Turning Right. These are shown for their subjective use, since the numbers given above are not indicative of their absolute frequency due to this attribute being part of the ILC filter.

CARE 10.2.1.3 - [IMPACT Results - 2016-2020 Alabama II	-				C129 OR C2	02 vs. CMV Ca	
 Eile Dashboard Eilters Analysis Impact I 2016-2020 Alabama Integrated Crash Data 	ocations ~		(indow <u>H</u>)15 OR C023	elp OR C129 O	R C202	~	_ ₽ >
Order: Max Gain V Descending V] Suppress Z	ero-Valued	Rows		Significance:	Over Represe	entation V Threshold: 2.0 🚖
C202: CU Contributing Circumstance	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max 🚽 ^	C123: CU Driver Officer Opinion C124: CU Driver Alcohol Test Ty
Improper Lane Change/Use	2091	32.65	2091	8.76	3.725*	1529.707	C125: E CU Driver Drug Test Typ
Unseen Object/Person/Vehicle	949	14.82	2525	10.58	1.400*	271.207	C126: CU Driver Alcohol Test Re
Unknown	632	9.87	1435	6.02	1.641*	246.799	C127: E CU Driver Drug Test Re C128: CU Vehicle Initial Travel D
E Crossed Centerline	240	3.75	498	2.09	1.795*	106.320	C129: CU Vehicle Maneuvers
Improper Passing	104	1.62	158	0.66	2.452*	61.588	C130: E CU Non-Motorist Maneu
Made Improper Turn	321	5.01	1022	4.28	1.170*	46.662	C201: CU Vehicle Most Harmful
E Other Failed to Yield	88	1.37	174	0.73	1.884*	41.293	C202: CU Contributing Circums
Improper or No Signal	14	0.22	21	0.09	2.484	8.363	C203: CU First Harmful Event L C204: E CU Sequence of Events
E Swerved to Avoid Object	14	0.22	35	0.15	1.490	4.605	C205: E CU Sequence of Events
E Not Applicable Because Unit is Railroad Train	2	0.03	2	0.01	3.725	1.463	C206: E CU Sequence of Events
E Not Visible	2	0.03	3	0.01	2.484	1.195	C207: E CU Sequence of Events
E Failed to Yield Right-of-Way Making Right Turn on Red Sig	2	0.03	7	0.03	1.064	0.121	C208: CU Model Year C209: CU Make
E Disregarded other Road Markings	6	0.09	22	0.09	1.016	0.094	C210: CU Body (Passenger Car v
Under Minimum Speed	1	0.02	4	0.02	0.931	-0.074 🗸	Sort by Sum of Max Gain
📋 🕼 🕼 🖋							🗹 Display Filte
2016-2020 Alabama Integrated			/ C015 OR C ributing Circu		29 OR C202 v	vs. CMV Cause	d Positive
	E Crossed N		J. Contributin		-	of-Way from Dr	riveway

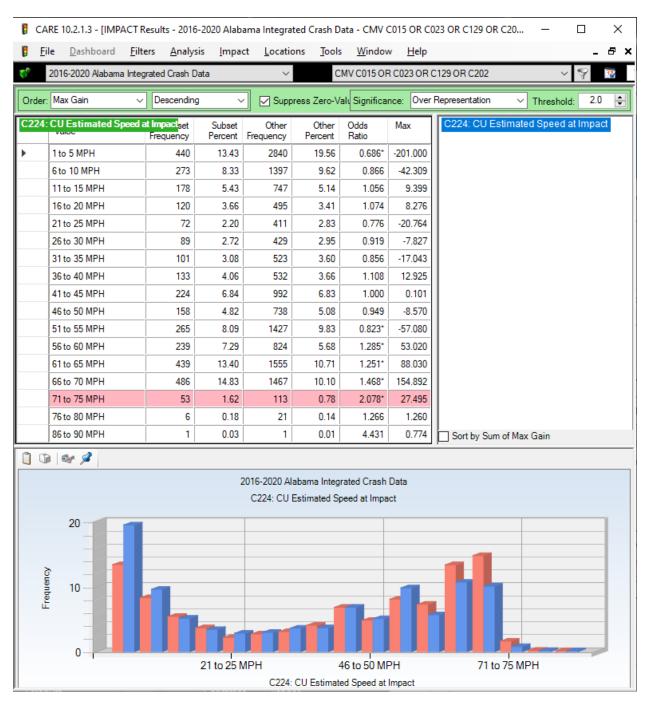
5.13 C202 CU Contributing Circ ILC vs All CMV Caused; C202 part of ILC filter

Like C129 (discussed immediately above this one), the results here are only good for obtaining an indication of other factors that might have influenced the crashes, since C202 Improper Lane Change/Use was used in creating the ILC filter. The other factors that rose to the top are quite interesting, and it can be seen how they would affect the ILC crashes. They are: Unseen Object/Person/Vehicle, Crossed Centerline, Improper Passing, Made Improper Turn, Other Failed to Yield. These are all significantly over-represented in their comparison with the CMV Caused crash subset.



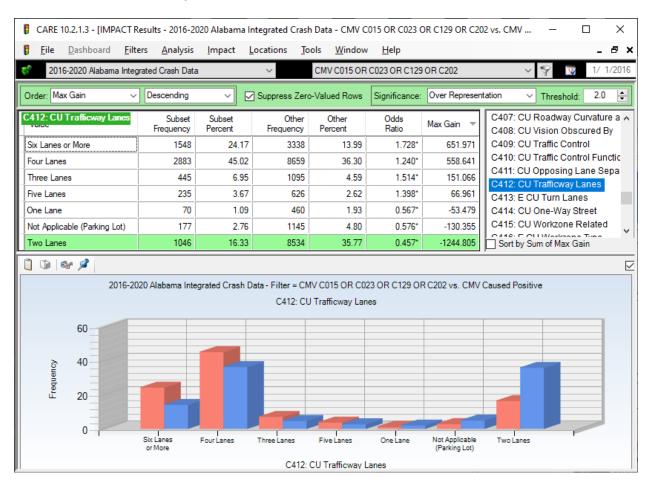
5.14 C208 CU Model Year ILC vs All CMV Caused

The more recent truck model years are over-represented along with other years after 2013, and especially 2015 and 2016. To a large extent, these reflect ages of vehicles on the road.



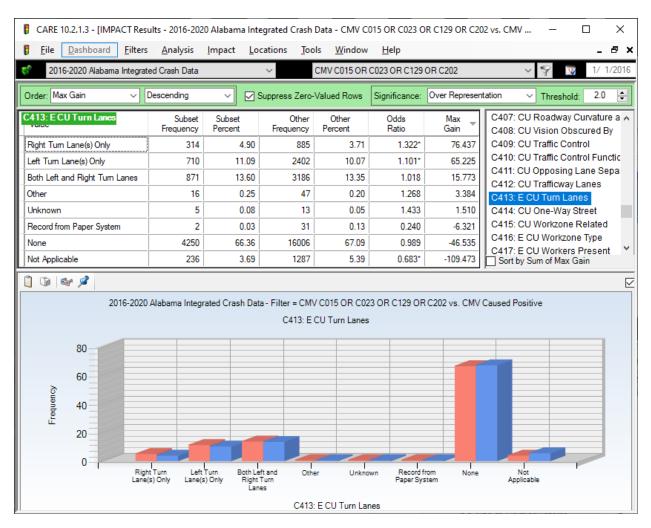
5.15 C224 CU Estimated Speed at Impact ILC vs All CMV Caused

The high impact speeds abouve 56 MPH indicate that these crashes were more likely to have occurred on Interstate highways, some possibly going through relatively urbanized areas.



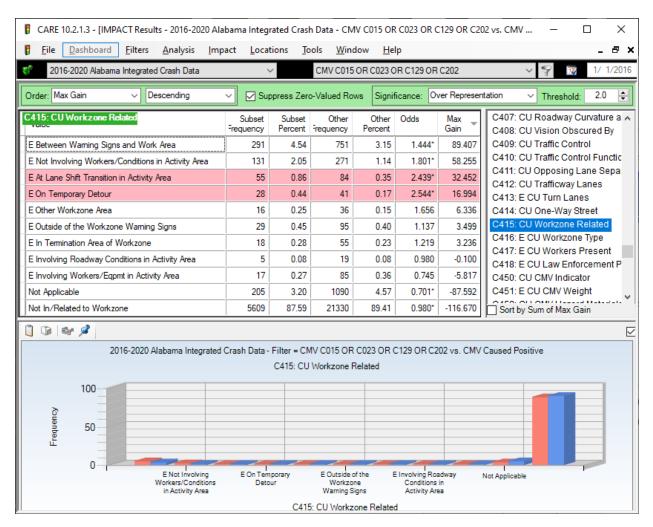
5.16 C412 CU Trafficway Lanes ILC vs All CMV Caused

All of the number of lanes of three lanes or more are over-represented. This indicates that the more lanes that are active, the greater the chance of an ILC crash, which is reasonable.



5.17 C413 CU Turn Lanes ILC vs All CMV Caused

While right turn lanes have a higher over-representation (Odds Ratio = 1.322), the number of ILC crashes occurring was about double in the left turn lanes. Both of these would seem to be hazardous, resulting in more ILC crashes than what would be expected in CMV crashes in general.



5.18 C415 CU Workzone Related ILC vs All CMV Caused

The areas of the workzone that seem to have the greatest vulnerability to ILC crashes are: (1) Between Warning Signs and Work Area; (2) At Lane Shift Transition in Activity Area; and (3) On Temporary Detour.

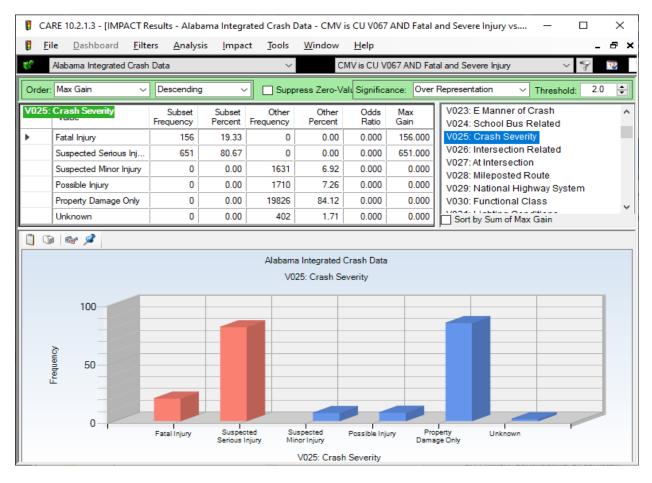
5.19 CMV Items C451 to 465

All of these attributes indicated that for the most part (usually above 90%), the "crashes were not qualified." We interpret this to mean that they were not qualified to use these attributes that, for the most part, are reserved for CMV use.

6.0 CMV Crash Analyses for the Selective Enforcement Assistant (SEA)

The purpose of this section is to determine for CMV-caused crashes the specific causes for (1) all crashes and (2) fatal and severe injury crashes. The IMPACT comparison for the first is between all CMV caused crashes against all other crashes (i.e., that were not caused by CMVs). For the second (fatal and severe) the IMPACT comparison was between the combined CMV caused fatal and severe injury crashes and *all other CMV-caused crashes*.

This information will be useful in further developing the Selective Enforcement Assistant (SEA), software that will highlight locations that had (1) higher numbers of CMV crashes than expected, and (2) higher numbers of CMV fatal crashes than expected.



6.1 V025 Crash Severity; CMV Fatal and Severe Crash vs All Other CMV Caused

The purpose of this display is to show the number of fatal and Suspected Serious Injury crashes that are under consideration in the remainder of this section.

6.2 V015 Primary Contrib Circ; CMV Fatal and Severe Crash vs All Other CMV Caused

🚦 CA	RE 10.2.1.3 - [IMPACT Results - Alabam	a Integra	ated Cras	h Data -	CMV is (CU V067	AND Fata	al and	l Severe Injury vs 🗕 🗆 🗙
Ei Ei	le <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis	<u>I</u> mpac	t <u>T</u> ool	ls <u>W</u> in	dow <u>I</u>	<u>H</u> elp			_ & ×
6 2	Alabama Integrated Crash Data			\sim	CMV	is CU VO	67 AND F	atal a	nd Severe Injury 🗸 💡 🏆 1/
Order	Max Gain V Descending	~	S	uppress 2	Zero-Valu	e Signific	ance: 0	ver R	epresentation V Threshold: 2.0 🐳
V015:	Primary Contributing Circumstance	Subset	Subset	Other	Other Percent	Odds Batio	Max Gain		V011: Rural or Urban V012: Highway Classifications
	E Fatigued/Asleep	64	7.93	365	1.55	5.121*	51.502		V012: Controlled Access
	E Ran off Road	52	6.44	540	2.29	2.812*	33.510		V014: E Highway Side
	Over Speed Limit	37	4.58	152	0.64	7.109*	31.796		V015: Primary Contributing Circumstanc
	E Failed to Yield Right-of-Way from Sto	37	4.58	452	1.92	2.391*	21.524		V016: Primary Contributing Unit Number V017: First Harmful Event
	E Ran Traffic Signal	32	3.97	329	1.40	2.841*	20.735		V018: Location First Harmful Event Rel to
	Driving too Fast for Conditions	36	4.46	531	2.25	1.980*	17.819		V019: E Most Harmful Event
	E Failed to Yield Right-of-Way Making	27	3.35	325	1.38	2.426*	15.872		V020: E Distracted Driving Opinion
	E Other Distraction Inside the Vehicle	26	3.22	317	1.34	2.395*	15.146		V021: Distance to Fixed Object V022: E Type of Roadway Junction/Featu
	E Ran Stop Sign	14	1.73	80	0.34	5.111	11.261		V023: E Manner of Crash
	E Swerved to Avoid Vehicle	40	4.96	846	3.59	1.381	11.033		V024: School Bus Related
	Improper Parking/Stopped in Road	10	1.24	86	0.36	3.396	7.055		V025: Crash Severity
	E Other - No Improper Driving	25	3.10	550	2.33	1.328	6.168		V026: Intersection Related V027: At Intersection
	E Swerved to Avoid Animal	8	0.99	131	0.56	1.784	3.515		V028: Mileposted Route
	Misjudge Stopping Distance	42	5.20	1126	4.78	1.089	3.446		V029: National Highway System
	E Over Correcting/Over Steering	16	1.98	368	1.56	1.270	3.400		V030: Functional Class
•	Improper Passing	10	1.24	204	0.87	1.432	3.015	~	V031: Lighting Conditions
	🛙 🎯 🔎 Alabama Integrated Crash Data - Filter = I	CMV/in C	111/067 /		and Sour	ara Iniuny	wa CMV	in Cl	I VAR7 AND NOT Estal and Savora Injuny
					ntributing			IS CO	1007 AND NOT Patarana Severe injury
Frequency		racted by l	ation Device	e	ailed to Yie	-	-		E Distracted by Use of Other Electronic Device

See the summaries in Section 6.4.

6.3 V015 Primary Contrib Circ; All CMV Caused Crashes vs All Other Crashes

🔋 CA	RE 10.2.1.3 - [IMPACT Results - Alabama	Integrated (Crash Data	- CMV is C	U V067 vs. I	Not CMV is	CU V067]	- 🗆 X
🖡 Ei	le <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis	<u>I</u> mpact	<u>T</u> ools <u>W</u>	indow <u>H</u>	lelp			_ @ ×
6	Alabama Integrated Crash Data		~	CMVi	s CU V067			✓ ♥ 〒 1/ 1/2017 ∨ 1/.
Order:	Max Gain ~ Descending	~ [Suppress	Zero-Value	d Rows	Signi	ificance: Over	r Representation V Threshold: 2.0
V015:	Primary Contributing Circumstance	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max 🚽 ^	V015: Primary Contributing Circumstance
•	Improper Lane Change/Use	3121	12.80	41850	5.62	2.277*	1750.541	
	Defective Equipment	1413	5.80	10834	1.46	3.983*	1058.220	
	Unseen Object/Person/Vehicle	2518	10.33	45705	6.14	1.682*	1021.301	
	Made Improper Turn	1241	5.09	14026	1.88	2.702*	781.691	
	Improper Backing	1246	5.11	17638	2.37	2.157*	668.410	
	Cargo Fell or Load Shift	726	2.98	1832	0.25	12.102*	666.008	
	Other	1229	5.04	24625	3.31	1.524*	422.607	
	E Other - No Improper Driving	575	2.36	8039	1.08	2.184*	311.747	
	E Other Improper Action	675	2.77	11295	1.52	1.825*	305.123	
	E Swerved to Avoid Vehicle	886	3.63	17968	2.41	1.506*	297.603	
	E Crossed Centerline	580	2.38	9772	1.31	1.812*	259.997	
	E Over Correcting/Over Steering	384	1.58	7507	1.01	1.562*	138.169	
	Improper Load/Size	94	0.39	202	0.03	14.210*	87.385	
	E Ran off Road	592	2.43	16576	2.23	1.091	49.187	
	E Disregarded Traffic Sign other than St	66	0.27	916	0.12	2.200*	36.004	
	Improper Parking/Stopped in Road	96	0.39	2011	0.27	1.458*	30.146	
	E Fatigued/Asleep	429	1.76	12542	1.68	1.045	18.288	
	E Disregarded other Road Markings	25	0.10	314	0.04	2.431*	14.717	
	Improper Attachment	21	0.09	240	0.03	2.672*	13.141	
	Improper or No Signal	25	0.10	522	0.07	1.463	7.906 🗸	Sort by Sum of Max Gain
0) @ Ø							🗸 Displa
	Alab	ama Integrat		ata - Filter = rimary Cont			ot CMV is CU	V067
France							11.000 11 1.000	libitempe
	Imp	proper or No		/015: Primar	E Crosse		tance	E Ran Stop Sign

See the summaries in Section 6.4.

6.4 Preliminary Requirement for SE Assistant (SEA) Prototype

The crash types and numbers given below are to illustrate how the SEA will work – they do not map to any actual locations. The crash types given are for example causes determined by actual Primary Contributing Circumstances that would be run for the particular area for which the analysis is being conducted. Similarly, the numbers are for small areas in which the selective enforcement is being considered.

Set area: area will default to that last set (from a map) by the user. It will remain the area summarized until the area covered is changed.

Severity/Cause	Recent	Past	Past	Past
All Crashes	(Set Time/Area)	3 mo	6 mo	9 mo
Improper Lane Change	62	16	31	47
Unseen Object/Vehicle	50	13	25	38
Defective Equipment	28	7	14	21
Made Improper Turn	25	6	12	18
Swerved: Veh or Animal	21*	5	10	15
Fatal Crashes	Statewide 2021			
Failed to Yield ROW	21*	5	10	16
Excessive Speed	15*	4	7	11
Fatigued/Asleep	13	3	7	10
Ran Off Road	10	3	5	8
Swerved: Veh or Animal	10**	3	5	8

Set Time – Set by the user (default one year, for area assumed to be 0.1 of state). This will be a dropdown of times of crashes for the current SE area, which can also default to statewide. Time in this column is currently set for this example as the most recent year.

*Indicates that the number is a sum of two or more other items.

**Swerved: Veh or Animal = Swerved to Avoid Vehicle + Swerved to Avoid Animal

For fatal crashes:

*Excessive Speed = Over the Speed Limit + Driving Too Fast for Conditions

*Failure to Yield ROW = ... from Stop Sign + Ran Traffic Signal + Making Left/U + driveway