# IMPACT Evaluation of Severe Speed-Caused Crashes In the January 2019 through July 2021 Time Frame

David B. Brown, PhD, P.E. brown@cs.ua.edu September 14, 2021

# **Table of Contents**

Introduction	1
Findings and Recommendations Related to SCFSI Crashes	2
Brief Statement of Findings by Category for SCFSI Crashes	2
Recommendation to Reduce SCFSI Crashes Based on Findings	4
Speed Caused Fatal and Severe Injury (SCESI) Crashes	5
Formal Filter Definition for SCFSI Crashes	5
Sos OR Impact GT 70 AND Fatal with Serious Injury Formal Definition	5
C025 Crash Severity of the SCFSI Crashes	6
C002 Year Variation for SCFSI Crashes	7
C015 Primary Contributing Circumstances (with positive Max Gains)	8
C202 CU (Causal Unit) Contributing Circumstances (positive Max Gain)	9
C224 CU Estimated Speed at Impact for SCFSI Crashes	10
Characteristics of Speed Coursed Severe (SCESI) Creshes	11
Geographical Characteristics	11
C002 City	11
C010 Purel or Urban	11
C011 Highway Classification	12
C027 At Intersection	15
Time Considerations	15
C006 Day of the Week	15
C008 Time of Day	16
Driver Behavior	10
C017 First Harmful Event	17
C020 Distracted Driving [officer's] Opinion	18
C129 CU Vehicle Maneuvers	19
Roadway Conditions	20
C032 Weather	20
C403 CU Roadway Condition	21
C403 CU Roadway Condition	20

C404 CU Environmental Contributing Factors	22
Severity and Conditions Affecting Severity	23
C038 Adjusted EMS Arrival Delay	23
C323 CU Driver Safety Equipment	24
Cross-tabulation Estimated Speed at Impact vs Severity	25
Cross-tabulation Estimated Seatbelts vs Severity	26
Crash Type	27
C052 Number of Vehicles	27
C067 Number of Pedestrians	
C080 CMV Involvement	29
Driver and Vehicle Demographics	30
C101 Causal Unit Type	30
C107 CU Driver Age	31
C120 CU Driver Employment Status	32
C208 CU Model year	
Effects of Alcohol and Other Drugs	34
C121 CU Driver Condition	34
C122 CU Officer Opinion Alcohol	35
C123 CU Officer Opinion Drugs	36

# Introduction

This study is an analysis of speed-caused fatal and severe injury crashes in the time frame:

- Before the COVID pandemic was recognized (January 2019 through March 15, 2020),
- During the time the COVID pandemic was recognized (March 16, 2020 through December 31, 2020), and
- Seven months after it had run its course (January 1, 2020 through July 31, 2021).

This time frame was chosen because of the increased fatal crash rate during and after the COVID-19 effects on motor vehicle traffic. For a review of these effects during and after the recognition of the pandemic, please see: <u>http://www.safehomealabama.gov/caps-special-studies/</u>

The IMPACT comparisons of this report will be of (1) Speed Caused Fatal and Serious Injury (SCFSI) crashes against (2) all other crashes. In this case "all other crashes" will include some Fatal and Suspected Serious Injury where speed was not implicated as a causal factor. For example, many fatal pedestrian crashes do not involve speed as a cause. The goal of such comparisons for all potential attributes is to isolate those causes and characteristics that are different for the SCFSI crashes. To do this a filter was developed to be used to create a subset that had all of the following characteristics (simultaneously):

- The resulting crashes had severities of either fatal or "Suspected Serious Injury," which is the most severe non-fatal crash category. It was reasoned that the "Suspected Serious Injury" crashes were likely to have been fatal were it not for the use of restraints or some other chance factors.
- The crash occurrence, severity, or both, were caused by speed as indicated by the following:
  - Primary Contributing Circumstances or Causal Unit Contributing Circumstances either Speeding or Too Fast for Conditions, and/or
  - Impact speed in excess of 70 MPH.

This filter is further explained in the Formal Filter Definition for SCFSI Crashes section below.

# **Findings and Recommendations Related to SCFSI Crashes**

The findings of this study surface the who, what, where, when, how and driver/vehicle demographics of SCFSI crashes. The findings will be given first in this section followed by a second section that will present the recommendations for reducing these types of crashes. The SCFSI considered for the 2019-2021 time period resulted in 600 Fatal crashes and 2,068 Suspected Serious Injury Crashes, or a total of 2,668.

The rationale behind this approach for this study was that these 2,668 crashes are such that they would represent all potential fatal crashes that were caused by excessive speed. By using IMPACT to compare these crashes to all non-SCFSI crashes, the goal was to surface what makes the SCFSI crashes different, and thereby reduce their frequency by addressing these differences.

This section is a type of executive summary. A brief statement of findings for the various categories of crashes will be given first. To see the details for these findings, see the IMPACT displays and interpretations in the Characteristics of Speed Caused Fatal and Severe Injury (SCFSI) section. Recommendations are given in a the next section, and they are in the same categories after the findings.

## Brief Statement of Findings by Category for SCFSI Crashes

• Geographical Characteristics – Generally SCFSI crashes occur three times their expected proportion in the Rural as opposed to Urban areas. County roads also had three times their expected proportion. While the dramatically higher speeds often cannot be attained in the urban areas, the filter applied also allowed for "Over the Speed Limit" and "Too Fast for Conditions," so urban areas were not totally ruled out. The rural parts of most Counties showed over-representation, and Intersections were under-represented with less than half (0.359) of their expected proportion.

- Time Considerations Time of day (night-time) and day of the week (weekends) give strong evidence of Impaired Driving (DUI) caused crashes. This will be verified in the Alcohol and Other Drugs discussion below.
- Driver Behavior the First Harmful Event provides a prioritized list of roadside features that should be addressed, not just for SCFSI crashes, but for crashes in general. Trees lead the list with almost twice the Odds Ratio as the second item, Ditches. Most all roads have ditches, most of which cannot be eliminated. The indication from vehicle maneuvers is that drivers are not anticipating and slowing down for curves, and they are not in full cognition when overtaking and passing.
- Roadway Conditions Weather and roadway conditions are not in the control of the driver, but their reactions to adverse conditions are. One of the requirements of the SCFSI filter was "Too Fast for Conditions." However, the SCFSI filter also required crashes that were either fatal or in the highest injury severity classification. This would indicate that these drivers were effectively oblivious to these dangerous conditions. This is contrary to expectations since usually we find reduced severity during rain and other adverse conditions resulting from the normal drivers' reduction in speed.
- Severity, and Conditions Affecting Severity the SCFSI considered for the 2019-2021 time period resulted in 600 Fatal crashes and 2068 Suspected Serious Injury Crashes. Severity is increased by EMS delay, and for the SCFSI crashes all of Odds Ratios increased with the delay times. This was a consequence of most of them being both rural and nighttime crashes. The failure to wear seatbelts appears to be as much of a reason for a crash to be added to the SCFSI subset as the speed; the expected Non Used for the non-SCFSI subset was 2.97% (about 97% compliance with seatbelt laws), while the SCFSI None Used percent was 40.93%. Cross-tabulations of Severity by Estimated Speed at Impact and Restraint use that further confirm these relationships.
- Crash Type SCFSI crashes are dramatically over-represented in Single Vehicle crashes, with an Odds Ratio of 3.458. Pedestrian and CMV crashes are about as expected; i.e., their proportions are not significantly different from the non-SCFSI crashes.
- Driver and Vehicle Demographics The major over-represented SCFSI causal vehicle was the Motorcycle, with 14.633 times the expected proportion. The Youngest drivers (16-20) are not significantly over-represented, and those that are over-represented tend to be quite variable between the ages of 21 and 40. Drivers above the age of 40 were not found to be over-represented. Unemployed drivers are over-represented by over double their expected proportion (36.17% as opposed to 17.10% in the nonSCFSI subset. SCFSI causal vehicles were significantly over-represented in the early model year (2000 through 2006). Note that this display is a comparison of Model years independent of the year in which the crash occurred.
- Effects of Alcohol and Other Drugs We saw above with time of day and day of the week that there was a strong indication of Impaired Driving taking place in the SCFSI subset. The Driver Condition attribute shows the proportion of "Under the Influence" to be 5.192 times the proportion of its nonSCFSI counterpart. The specific Officer Opinion are quite comparable, with alcohol having 5.493 times, and (other) drugs being 6.522 times their expected proportions.

## **Recommendations to Reduce SCFSI Crashes Based on Findings**

- Geographical Recommendations Center hotspot analysis procedures on high volume rural roadways where SCFSI crashes show over-representations; use the SCSFI filter.
- Time Recommendations Modify the times of selective enforcement to the over-represented times (weekends during the nighttime hours), recognizing that deterrence might be more effective if law enforcement presence is displayed in the earlier nighttime hours. Warn all drivers of the increased danger in late-night driving.
- Driver Behavior Recommendations To the extent feasible, establish programs for clear roadside (especially large trees) using the hotspot results with concentrations on county roads. Also, if possible, make ditches more crash friendly by eliminating steep side-slopes. Perform evaluations to determine the effectiveness of PI&E programs aimed at speed reduction before curves and caution when overtaking and passing in the rural areas.
- Roadway Condition Recommendations Create a PI&E program to inform drivers of all inclement weather hazards and perform some warning selective enforcement for drivers who are dramatically "Too Fast for Conditions." Develop hotspots for crashes in rainy conditions and water over-runs.
- Severity, and Conditions Affecting Severity Recommendations Repeated from findings above: "The failure to wear seatbelts appears to be as much a reason for a crash to be added to the SCFSI subset as speed" ... or any other factor. It is highly problematic that high-risk individuals involve themselves in unsafe speeds at the same time refuse to use restraints. Since this is no new problem, it is clear that new measures need to be developed to identify these individuals and apply some newly developed countermeasures. One possibility is the emphasis on the mandatory use of seatbelts to those who are in alcohol/drug programs.
- Crash Type Recommendations SCFSI crashes are dramatically over-represented in Single Vehicle crashes, with an Odds Ratio of 3.458. To some extent this reduces the threat to other drivers, although the publicized need for everyone to reduce their nighttime driving is an effective countermeasure.
- Driver and Vehicle Demographics Recommendations Motorcycle manufactures and club representatives need to be involved in developing effective countermeasures for motorcyclists in general, with special emphasis on those who are inclined to be risk takers. There is not any narrow age group that can be targeted for all SCFSI crashes, although some over-representations are distributed over ages 25-40. A study should be conducted to determine if there is a way to target unemployed drivers for PI&E information, perhaps distribution with their unemployment checks.
- Effects of Alcohol and Other Drugs Recommendations the large variety of efforts that are currently being made to reduce DUI should be expanded since considerable study has gone into them and their successes are well documented. Nevertheless, the over-representations in both drugs and alcohol argue for more emphasis. For a review of these countermeasures see Section one of <a href="http://www.safehomealabama.gov/wp-content/up-loads/2021/09/15100\_Countermeasures10th\_080621\_v5\_tag.pdf">http://www.safehomealabama.gov/wp-content/up-loads/2021/09/15100\_Countermeasures10th\_080621\_v5\_tag.pdf</a> . This document recommends other countermeasures for the items given above.

# Speed Caused Fatal and Severe Injury (SCFSI) Crashes

# **Formal Filter Definition for SCFSI Crashes**

The five IMPACT displays given in this section were set up to demonstrate the filter being applied, which is also described above.

# "Sos OR Impact GT 70 AND Fatal with Serious Injury" Formal Filter Definition

Filter Logic: Sos Or Impact GT 70 AND Fatal with Serious Injury -		×
Logic Tree Logic Text		
Cogie rice     C	itions s	
One or more of the following are true (OR)     One or more of the f		
2668 records selected by this filter.		

Filter name abbreviations:

- Sos speed over the speed limit or Driving Too Fast for Conditions as given either by the Primary Contributing Circumstances (C015) or the CU Contributing Circumstances (C202);
- Impact GT 70 CU Estimated Speed at Impact (as given by C224) is greater than 70 MPH. This will not get all such crashes into the subset, only those for which the severity was that of a Fatal or Suspected Serious Injury Crash.
- Fatal with ... Technically the Boolean logic for this would be an OR. This might confuse those who see this as a Boolean relation. We used the word "with" to indicate that all of the SCFSI crashes included both Fatal or Suspected Serious Injury.
- Serious Injury Suspected Serious Injury to be consistent with the MMUCC specifications for crash severity.

#### 🚦 CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with Serio... $\times$ \_ File Dashboard Filters Analysis Window в× Impact Tools <u>H</u>elp \_ **7**0 2019-2021 Alabama Integrated Crash Data Sos Or Impact GT 70 AND Fatal with Serious Injury 1/ 1/ Order: Max Gain Descending Suppress Zero-Valued R Significance: Over Representation ÷ $\sim$ $\sim$ Threshold: 2.0 C025: Crash Severity C022: E Type of Roadway Junction/Feature Subset Subset Other Other Odds Max Frequency Frequency Percent Percent Ratio Gain C023: E Manner of Crash Fatal Injury C024: School Bus Related 600 22.49 1607 0.43 52.736\* 588.622 C025: Crash Severity Suspected Serious Injury 2068 77.51 7678 2.04 38.043\* 2013.640 C026: Intersection Related Suspected Minor Injury 0 0.00 31234 8.29 0.000 0.000 C027: At Intersection Possible Injury 0 0.00 33211 8.81 0.000 0.000 C028: Mileposted Route Property Damage Only 0 293023 77.76 0.000 0.00 0.000 C029: National Highway System Ŷ 0 0.00 10084 2.68 0.000 0.000 Sort by Sum of Max Gain Unknown 📋 🕼 🚳 🖉 2019-2021 Alabama Integrated Crash Data C025: Crash Severity 100 -requency **50** · 0-Suspected Serious Injury Suspected Minor Injury Property Damage Only Fatal Injury Possible Injury Unknown C025: Crash Severity

## C025 Crash Severity of the SCFSI Crashes



## **C002 Year Variation for SCFSI Crashes**

Recent years were used to get more currently-applicable results. The 2021 year is lower in both the test and control sides because it contained less than 14% of August, and none of the months thereafter.



#### C015 Primary Contributing Circumstances (with positive Max Gains)

The top two high Odds Ratios were created by the filter; Aggressive Operation and DUI were not in the filter and so are just highly correlate with the crash causes that are. Only the positive Max Gains are relevant to illustrating the filter.



## C202 CU (Causal Unit) Contributing Circumstances (positive Max Gain)

Comparable to C015 above, the top two high Odds Ratios were created by the filter. In this case, the next three items were not in the filter, so this indicates that they are highly correlated with the crash causes that are determined by the filter. Only the positive Max Gains are shown since they are the only ones relevant to illustrating the filter.

🖡 CA	RE 10.2.1.3 - [IMPAC	CT Re	sults - 2019-2	2021 Alabar	na Integrate	d Crash Data	a - Sos Or Im	pact GT 70 A	ND Fatal with Serio — 🗆 🗙
Eil	e <u>D</u> ashboard	<u>F</u> ilter	rs <u>A</u> nalysis	<u>I</u> mpact	Tools	Window	<u>H</u> elp		_ @ ×
5	2019-2021 Alabama li	ntegra	ated Crash Dat	a	~	Sos	Or Impact GT	70 AND Fata	I with Serious Injury V 👽 😨 1/ 1/
Order	Max Gain	~	Descending	~		ess Zero-Valu	ed B Signific	ance: Over	Representation × Threshold: 2.0
0.004	Cliffetimeted See				0.1	01			
6224.	voice	eu al	Frequency	Percent	Frequency	Percent	Ratio	Gain	C212: CU License Tag State
•	0 MPH		0	0.00	0	0.00	0.000	0.000	C213: CU Vehicle Usage
	1 to 5 MPH		1	0.04	28580	7.58	0.005	-201.346	C214: E CU Emergency Status
	6 to 10 MPH		0	0.00	20811	5.52	0.000	0.000	C215: E CU Placard Required
	11 to 15 MPH		2	0.07	14508	3.85	0.019	-100.716	C210. E CO Placard Status C217: CU Hazardous Cargo
	16 to 20 MPH		1	0.04	10111	2.68	0.014	-70.586	C218: E CU Hazardous Released
	21 to 25 MPH		6	0.22	8884	2.36	0.095	-56.899	C219: CU Attachment
	26 to 30 MPH		10	0.37	9196	2.44	0.154	-55.108	C220: CU Oversized Load Requiring Pe
	31 to 35 MPH		22	0.82	11018	2.92	0.282*	-56.007	C221: CU Had Oversized Load Permit
	36 to 40 MPH		49	1.84	10583	2.81	0.654*	-25.927	C223: CU Speed Limit
	41 to 45 MPH		133	4.99	17699	4.70	1.061	7.691	C224: CU Estimated Speed at Impact
	46 to 50 MPH		111	4.16	8544	2.27	1.835*	50.509	C225: CU Citation Issued
	51 to 55 MPH		205	7.68	14011	3.72	2.067*	105.802	C226: CU Vehicle Damage
	56 to 60 MPH		297	11.13	6653	1.77	6.305*	249.897	C227: CU Vehicle Towed
	61 to 65 MPH		311	11.66	7942	2.11	5.531*	254,771	C231: E CU Areas Damaged #2
	66 to 70 MPH		295	11.06	9379	2.49	4.443*	228.597	C232: E CU Areas Damaged #3
	71 to 75 MPH		267	10.01	2073	0.55	18 192*	252 323	C233: CU Point of Initial Impact
	76 to 80 MPH		261	9.78	1214	0.32	30.366*	252 405	C301: CU Non-Motorist Prior Action
	81 to 85 MPH		108	4 05	354	0.09	43.091*	105 494	C303: E CU K-12 Child W/C To/From Sc
	86 to 90 MPH		119	4.05	256	0.03	65,656*	117 188	C304: E CU Non-Motorist Action at Time
	91 to 95 MPH		37	1 29	42	0.07	121 525*	36,696	C306: CU Non-Motorist Location at Time
	91 to 55 MPH		07	1.00	43	0.01	104 107*	00.105	C307: E Vehicle Unit That Struck CU Nor
	Ourse 100 MPH		0/ 50	3.20	70	0.03	104.137	40.441	C308: CU Non-Motorist Condition
	Over 100 MPH		1	1.87	/9	0.02	69.394	49.441	C309: CU Non-Motorist Officer Opinion A
	E Stationary		205	10.04	2888	12.00	0.049	-19.447	C310: CU Non-Motorist Officer Opinion L C311: CU Non-Motorist Most Harmful Ev
	Unknown		285	10.68	164517	43.66	0.245	-8/9.//8	C321: CU Driver/Non-Motorist Seating P
	Not Applicable		5	0.19	11602	3.08	0.061	-//.142	C322: CU Driver/Non-Motorist Victim/Oc
	CU is Not a Vehicle		0	0.00	1035	0.27	0.000	0.000	C323: CU Driver/Non-Motorist Safety Eq. 🗸
	CU is Unknown		5	0.19	14/39	3.91	0.048	-99.352	Sort by Sum of Max Gain
00	1 🗇 🖉 📃								
					2019-2021 A	labama Integ	rated Crash E	Data	
					C224: CU	Estimated Sp	peed at Impac	et	
	60								
5	, 40								
<u> </u>	20								
		-						1	
	0								
			16 to 20 M	PH ·	41 to 45 Mi	PH 66	5 to 70 MPH	l 91 t	o 95 MPH Not Applicable
II					C22	4: CU Estima	ted Speed at	Impact	

## C224 CU Estimated Speed at Impact for SCFSI Crashes

Impact speeds above 70 MPH were forced into the subset by the filter for all severe crashes under the rationale that this necessary implied speeding. It can be seen that other relatively high-speed impacts resulted without their being part of the filter.

The next section contains the IMPACTs that are the basis for the findings and recommendations.

# **Characteristics of Speed-Caused Severe (SCFSI) Crashes**

# **Geographical Characteristics**

# C002 City

🔋 CA	🔋 CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with										
E E	ile <u>D</u> ashboard <u>F</u> ilt	ters <u>A</u> nal	lysis <u>I</u> mp	pact <u>T</u> oo	ls <u>W</u> indo	ow <u>H</u> elp			_ & ×		
<b>6</b>	2019-2021 Alabama Inte	grated Crash	Data		$\sim$	Sos Or Im	pact GT 70	AND	Fatal with Serious Injury 🛛 🗸 🏆		
Order	Max Gain 🗸 🗸	Descend	ing	✓ Ø S	uppress Zer	o-Valı Signi	ficance: C	)ver	Representation V Threshold: 2.0		
C002	City v.ue	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain	^	C001: County		
•	Rural Walker	76	2.85	1683	0.45	6.378*	64.084	r i i	C003: Year		
	Rural Baldwin	89	3.34	3664	0.97	3.431*	63.059		C004: Month		
	Rural Talladega	78	2.92	2158	0.57	5.105*	62.721		C005: Day of Month C006: Day of the Week		
	Rural Etowah	72	2.70	1327	0.35	7.664*	62.605		C007: Week of the Year		
	Rural Madison	94	3.52	4844	1.29	2.741*	59.705		C008: Time of Day		
	Rural Limestone	71	2.66	2715	0.72	3.694*	51.778		C010: Rural or Urban		
	Rural Dekalb	52	1.95	1196	0.32	6.141*	43.532		C011: Highway Classifications		
	Rural Lauderdale	48	1.80	1326	0.35	5.113*	38.612		C012: Controlled Access C013: E Highway Side		
	Rural St. Clair	53	1.99	2051	0.54	3.650*	38.479		C015: Primary Contributing Circumstance		
	Rural Calhoun	56	2.10	2541	0.67	3.113*	38.010		C016: Primary Contributing Unit Numbe		
	Rural Cullman	55	2.06	2743	0.73	2.832*	35.580		C017: First Harmful Event		
	Rural Marshall	42	1.57	1342	0.36	4.420*	32.499		C018: Location First Harmful Event Rel t		
	Rural Jackson	38	1.42	858	0.23	6.256*	31.925		C019. E Most Harmful Event		
	Rural Tuscaloosa	62	2.32	4414	1.17	1.984*	30.749		C021: Distance to Fixed Object		
	Rural Chilton	37	1.39	1511	0.40	3.459*	26.302		C022: E Type of Roadway Junction/Featu		
	Rural Lawrence	33	1.24	971	0.26	4.800*	26.125		C023: E Manner of Crash		
	Rural Cherokee	31	1.16	776	0.21	5.642*	25.506		C024: School Bus Related		
	Rural Winston	28	1.05	420	0.11	9.416*	25.026		C025: Crash Seventy C026: Intersection Related		
	Rural Escambia	32	1.20	1082	0.29	4.177*	24.339		C027: At Intersection		
	Rural Chambers	27	1.01	429	0.11	8.889*	23.963		C028: Mileposted Route		
	Rural Marengo	26	0.97	454	0.12	8.089*	22,786		C029: National Highway System		
	Bural Shelby	46	1.72	3336	0.89	1.948*	22.381		C030: Functional Class		
	Rural Colbert	29	1.09	982	0.26	4.171*	22.047		C031: Lighting Conditions C032: Weather		
	Rural Randolph	24	0.90	353	0.09	9.603*	21.501		C022: Locala Y		
								~			
				2019-2021	Alabama Ir	ntegrated Cr	ash Data				
					C002:	City					
	15										
<u>s</u>	10										
									1		
L L	5										
		ninianananini 	Binni						In Hutter in the second s		
		Rural I	Macon	S	ilas 🧹	Go	od Hope		Hueytown Birmingham		
					C(	002: City					

The vast majority of the high MaxGain areas fell into the Rural areas of the counties.

## C010 Rural or Urban



Rural highways are most apt to have SCFSI crashes due to the incrased speed that can be attained on these roadways. The over-representation is over three times that expected as given by the Odds Ratio.

## **C011 Highway Classification**

F	CARE	10.2.1.3 - [IMPA	CT Resu	lts - 2019-2	2021 Alab	ama Integr	ated Crash	Data - Sos C	)r Impact GT	70 AND Fatal with $ \Box$ $ imes$			
ľ	<u>F</u> ile	<u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis	s <u>I</u> mpa	ct <u>T</u> ools	<u>W</u> indow	<u>H</u> elp		_ & ×			
¢?	201	9-2021 Alabama	Integrate	d Crash Da	ta	~	·	Sos Or Impac	t GT 70 AND	) Fatal with Serious Injury 🛛 🗸 🏆			
Ore	der: Ma	ax Gain	~ D	escending		Sup	press Zero-	Valı Significa	ance: Over	Representation V Threshold: 2.0			
C0	11: Hig	ghway Classific	ations Fre	Subset quency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C007: Week of the Year C008: Time of Day			
►	Co	unty		1135	42.54	52650	13.97	3.045*	762.239	C010: Rural or Urban			
	Inte	erstate		402	15.07	42303	11.23	1.342*	102.495	C011: Highway Classifications			
	Sta	ate		573	21.48	71152	18.88	1.137*	69.245	C012: Controlled Access C013: E Highway Side			
	Fe	deral		303	11.36	48023	12.74	0.891	-37.002	C015: Primary Contributing Circumstance			
	Pri	vate Property		3	0.11	12176	3.23	0.035	-83.206	C016: Primary Contributing Unit Number 🗸			
	Mu	inicipal		252	9.45	150533	39.95	0.236*	-813.771	Sort by Sum of Max Gain			
Ũ													
	2019-2021 Alabama Integrated Crash Data C011: Highway Classifications												
	Frequency	60 40 20							1				
			Co	unty	Intersta	te C01	State 1: Highway (	Federal Classificatio	Private i ns	Property Municipal			

County roads are the clear losers here with over three times their expected proportion. Speed is feasible on most county roads, but the roadway configurations and roadsides are not designed for any type of crash, much less high speed. The speed limit maximum on virtually all country roads is 45 MPH for a reason.

### **C027** At Intersection



As expected in primarily rural crashes, intersections are under-represented.

## **Time Considerations**

### C006 Day of the Week



Severe Crashes are significantly over-represented on weekends, which is indicative or DUI (Drugs and Alcohol) – see C121, C122 and C123 below. Friday is higher than the other weekdays, but it is not higher than the control. Friday is typically quite busy with the combination of commuters and those traveling for recreational purposes.

# C008 Time of Day

🖡 CA	🔋 CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with 🗕 🗆 🗙										
🔋 <u>F</u> il	le <u>D</u> ashboard <u>F</u> ilte	ers <u>A</u> nalys	sis <u>I</u> mpa	ct <u>T</u> ools	<u>W</u> indow	<u>H</u> elp		_ & ×			
<b>6</b> 2	2019-2021 Alabama Integ	rated Crash D	)ata	~		Sos Or Impac	t GT 70 AND	Fatal with Serious Injury 🗸 💡 🏆			
Order:	Natural Order 🗸 🗸 🗸	Descending		Sup	press Zero-'	Valı Significa	ance: Over l	Representation V Threshold: 2.0			
C008:	Time of Day	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C001: County			
•	12:00 Midnight to 12:	112	4.20	4772	1.27	3.315*	78.214	C003: Year			
	1:00 AM to 1:59 AM	88	3.30	3955	1.05	3.143*	59.999	C004: Month			
	2:00 AM to 2:59 AM	69	2.59	3514	0.93	2.773*	44.121	C005: Day of Month			
	3:00 AM to 3:59 AM	76	2.85	3156	0.84	3.401*	53.656	C000. Day of the Week			
	4:00 AM to 4:59 AM	60	2.25	3537	0.94	2.396*	34.958	C008: Time of Day			
	5:00 AM to 5:59 AM	78	2.92	6446	1.71	1.709*	32.362	C010: Rural or Urban			
	6:00 AM to 6:59 AM	95	3.56	10437	2.77	1.286*	21.106	C011: Highway Classifications			
	7:00 AM to 7:59 AM	102	3.82	20072	5.33	0.718*	-40.109	C012: Controlled Access			
	8:00 AM to 8:59 AM	73	2.74	15303	4.06	0.674*	-35.345	C015: Primary Contributing Circumstance			
	9:00 AM to 9:59 AM	58	2.17	14161	3.76	0.578*	-42.260	C016: Primary Contributing Unit Numbe			
	10:00 AM to 10:59 AM	86	3.22	16589	4.40	0.732*	-31.450	C017: First Harmful Event			
	11:00 AM to 11:59 AM	82	3.07	20971	5.57	0.552*	-66.474	C018: Location First Harmful Event Rel t			
	12:00 Noon to 12:59	114	4.27	25305	6.72	0.636*	-65.159	C019: E Most Harmful Event			
	1:00 PM to 1:59 PM	112	4.20	25000	6.63	0.633*	-65.000	C021: Distance to Fixed Object			
	2:00 PM to 2:59 PM	143	5.36	27304	7.25	0.740*	-50.312	C022: E Type of Roadway Junction/Featu			
	3:00 PM to 3:59 PM	160	6.00	32822	8.71	0.689*	-72.379	C023: E Manner of Crash			
	4:00 PM to 4:59 PM	150	5.62	32113	8.52	0.660*	-77,360	C024: School Bus Related			
	5:00 PM to 5:59 PM	174	6.52	33661	8.93	0.730*	-64,319	C025: Crash Severity C026: Intersection Related			
	6:00 PM to 6:59 PM	163	6 11	22562	5.99	1 020	3 261	C027: At Intersection			
	7:00 PM to 7:59 PM	147	5.51	15788	4 19	1.315*	35 221	C028: Mileposted Route			
	8:00 PM to 8:59 PM	145	5.43	13209	3.51	1.550*	51 480	C029: National Highway System			
	9:00 PM to 9:59 PM	139	5.10	10752	2.85	1.826*	62 876	C030: Functional Class			
	10:00 PM to 10:59 PM	134	5.02	8389	2.00	2 256*	74 606	C031: Lighting Conditions			
	11:00 PM to 11:59 PM	108	4 05	6303	1.67	2.200	63.375	Sort by Sum of Max Gain			
					1.07	2.120	00.070				
			1	2019-2021 A	labama Inte	grated Crash	i Data				
					2008: Time	of Day					
	10										
<u> </u>   ≧						_					
enpe	5										
<u> </u>											
	0	4:00 AM to	4-59 AM	9-00.444	to 9:59 AM	2.00 PM	to 2:59 DM	7:00 PM to 7:59 PM			
		4.00 AM TO	4.05 AM	5.00 AM	C008-1	Z:00 PN Time of Dav	4 10 2.05 FM	7.00 FM to 7.05 FM			
_											

Very clearly, SCSFI crashes are highly over-represented in the nighttime hours.

## **Driver Behavior**

## **C017 First Harmful Event**

<b>6</b> °	2019-2021 Alabama Integ	grated Crash D	)ata	~		Sos Or Impact GT 70 AND Fatal with Serious Injury V 💡 🏆						
Order:	Max Gain 🗸 🗸	Descending	g `	Sup	press Zero-'	Val Significa	nce: Over l	Repre	esentation V Threshold: 2.0 🖨			
C017:	First Harmful Event	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	^	C015: Primary Contributing Circums A C016: Primary Contributing Unit Nun			
•	Collision with Tree	497	18.63	7427	1.97	9.452*	444.417		C017: First Harmful Event			
	Collision with Ditch	333	12.48	9183	2.44	5.122*	267.985		C018: Location First Harmful Event F			
	Overtum/Rollover	212	7.95	3177	0.84	9.425*	189.507		C019: E Most Harmful Event			
	E Collision with Emba	121	4.54	1813	0.48	9.427*	108.164	-11	C021: Distance to Fixed Object			
	Collision with Culvert	96	3.60	1440	0.38	9.416*	85.805		C022: E Type of Roadway Junction/F			
	E Ran Off Road Right	156	5.85	11270	2.99	1.955*	76.209		C023: E Manner of Crash			
	Collision with Utility P	65	2.44	3098	0.82	2.963*	43.066		C024: School Bus Related			
	E Collision with Guar	58	2.17	2414	0.64	3.394*	40.909		C026: Intersection Related			
	E Ran Off Road Left	84	3.15	6331	1.68	1.874*	39.177		C027: At Intersection			
	Collision with Sign Post	53	1.99	2152	0.57	3.479*	37.764		C028: Mileposted Route			
	Collision with Fence	40	1.50	1714	0.45	3.296*	27.865		C029: National Highway System			
	Collision with Mailbox	41	1.54	2017	0.54	2.871*	26.720		C031: Lighting Conditions			
	E Collision with Guar	32	1.20	792	0.21	5.707*	26.393		C032: Weather			
	Collision with Other Fi	41	1.54	2644	0.70	2.190*	22.281		C033: Locale			
	E Collision with Concr	35	1.31	2494	0.66	1.982*	17.343		C034: E Police Present at Time of Ci			
	Collision with Bridge	20	0.75	937	0.25	3.015*	13.366		C035: Police Arrival Delay			
	E Fell/Jumped from	12	0.45	178	0.05	9.522	10.740		C037: EMS Arrival Delay			
	E Collision with Other	14	0.52	627	0.17	3.154	9.561		C038: Adjusted EMS Arrival Delay 🗸 🤘			
	E Collision with Curb/	20	0.75	1691	0.45	1.671	8.028	~	Sort by Sum of Max Gain			
00	) 🗇 🖉											
			:	2019-2021 A	labama Integ	grated Crash	Data					
				C01	7: First Harn	nful Event						
	80											
	60								1			
∧												
	40											
[] <sup>[]</sup>	20											
	0 Illumber							-	, Iberraria			
		E Other	Non-Collision	n E	Thrown or Fall	ing Object	P Collision	n with	Sideslope E Collision with Vehicle in (or from) Other Roadway			
				с	017: First H	armful Event						

These results answer the question: What is being hit first? All items with a Max Gain in excess of 8 crashes are given. The high blue bar at right is Vehicle in Traffic, which is dramatically under-represented.



## C020 Distracted Driving [officer's] Opinion

This is only included because we anticipated with the great attention given to Distracted Driving many might be wondering if it is significant here. The answer is: only in a relatively few crashes. It is good that those given to speeding are not as prone to distractions.

# C129 CU Vehicle Maneuvers

🚦 CA	🔋 CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with												
🖡 Ei	le <u>D</u> ashboard <u>F</u> ilters <u>A</u>	nalysis	<u>l</u> mpact	<u>T</u> ools <u>\</u>	<u>V</u> indow	<u>H</u> elp		_ & ×					
<b>6</b> °	2019-2021 Alabama Integrated Cr	ash Data		~	Sos	Or Impact	GT 70 AND	) Fatal with Serious Injury 🛛 🗸 🏆					
Order:	Order: Max Gain V Descending V Suppress Zero-Valu Significance: Over Representation V Threshold: 2.0												
C129:	CU Vehicle Maneuvers	Subset	Subset	Other	Other	Odds	Max	C118: CU Endorsement Violations #1					
		requency	Percent	requency	Percent	Ratio	Gain	C119: E CU Endorsement Violations #2					
*	E Negotiating a Curve	0101	37.86	16/16	4.45	8.511	891.328	C120. E CO Driver Employment Status C121: CU Driver Condition					
	Movement Essentially Straight	1409	52.91	191/10	50.93	1.027	50 117	C122: CU Driver Officer Opinion Alcohol					
	E Leaving Main Road	1403	0.45	1384	0.33	1 221	2 175	C123: CU Driver Officer Opinion Drugs					
	Illegally Parked	1	0.04	570	0.15	0.247	-3.047	C124: CU Driver Alconol Test Type Given					
	Other	10	0.37	3433	0.91	0.410	-14.372	C126: CU Driver Alcohol Test Results					
	Unknown	6	0.22	6468	1.72	0.131	-39.918	C127: E CU Driver Drug Test Results					
	E Entering Main Road	4	0.15	9115	2.43	0.062	-60.710	C128: CU Vehicle Initial Travel Direction					
	CU is Unknown	5	0.19	14739	3.92	0.048	-99.637	C130: E CU Non-Motorist Maneuvers					
	E Changing Lanes	47	1.76	22133	5.89	0.299*	-110.130	C201: CU Vehicle Most Harmful Event					
	Turning Right	29	1.09	19776	5.26	0.207*	-111.396	C202: CU Contributing Circumstance					
	Slowing/Stopping	18	0.67	19245	5.12	0.132	-118.627	C203: CO First Harmidi Event Eucation					
	Turning Left	23	0.86	43950 11.69 0.074* -289.016 Sort by Sum of Max Gain									
00	) 🕼 🖉												
			2019	-2021 Alaba	ama Integra	ted Crash	Data						
				C129: CU	Vehicle Ma	aneuvers							
	60												
	ठे 40 <b></b>												
	due due												
	<u>දී</u> 20												
							-						
	ging		peop	-		peo		- See lind					
	g/Pas		Aain R	<pre></pre>	>	Aain R		al print 1/2 to 2/2 to					
	fakin		Ming 1			ering 1		Chang					
	E Ove		E Lø			EED		ш оо					
				C129	CU Vehicl	e Maneuve	ers						

Both Negotiating a Curve and Overtaking to Pass are extremely significantly over-represented, with Odds Ratios of 8.511 and 3.066, respectively.

# **Roadway Conditions**

## C032 Weather

File       Dashboard       Eilters       Analysis       Impact       Tools       Window       Help         2019-2021 Alabama Integrated Crash Data       Sos Or Impact GT 70 AND Fatal with Serious Injury       Impact       Sos Or Impact GT 70 AND Fatal with Serious Injury       Impact       2.0         Order:       Max Gain       Descending       Subset       Other       Other       Other       Odds       Max       Impact       2.0         C0322:       Weather       Subset       Subset       Other       Other       Odds       Max       Impact       2.0         C032:       Weather       Subset       Subset       Other       Other       Odds       Max       Impact       Co28: Mileposted Route       Co29: National Highway System       Co30: Functional Class       Co30: Functional Class       Co31: Lighting Conditions       Co32: Weather       Co33: Locale       Co32: Weather       Co33: Locale       Co33: Locale       Co33: Locale       Co33: Eolice Notification Delay       Co33: Eolice Arrival Delay       Co33: Police Arrival Delay       Co33: Police Arrival Delay       Co38: Adjusted EMS Arrival Delay       Co38: Adjusted EMS Arrival Delay       Co38: Adjusted EMS Arrival Delay       Co39: Non-Vehicular Property Dar         Seet/Hail/Freezing R       2       0.07       363       0.10       0.778<	CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with — 🛛 🗙										
Corder:         Max Gain         Descending         Suppress Zero-Val         Significance:         Over Representation         Threshold:         2.0           C032:         Weather         Subset         Subset         Other         Other         Odds         Max	₽ ×										
Order:         Max Gain         Descending         Suppress Zero-Val         Significance:         Over Representation         Threshold:         2.0           C032:         Weather value         Subset Frequency         Subset Percent         Other Frequency         Other Percent         Odds Ratio         Max Gain         C028:         Mileposted Route C029:         National Highway System C030:         Functional Class           Cloudy         539         20.20         64366         17.08         1.183*         83.290         C031:         Lighting Conditions           Cloudy         539         20.20         64366         17.08         1.333*         20.981         C032:         Weather           Fog         31         1.16         1781         0.47         2.458*         18.391         C033:         Locale         C031:	12										
C032: Weather         Subset         Subset         Other         Other         Other         Odds         Max         Gain         C028: Mileposted Route           Value         Rain         444         16.64         44010         11.68         1.425*         132.410         C029: National Highway System           Cloudy         539         20.20         64366         17.08         1.183*         83.290         C031: Lighting Conditions           E Mist         84         3.15         8901         2.36         1.333*         20.981         C032: Weather         C033: Locale         C033: Locale           Fog         31         1.16         1781         0.47         2.458*         18.391         C035: Police Present at Time of           Snow         2         0.07         186         0.05         1.519         0.683         C037: EMS Arrival Delay           Other         1         0.04         91         0.02         1.552         0.356         C037: EMS Arrival Delay           C038: Adjusted EMS Arrival Delay         C037: EMS Arrival Delay         C038: Adjusted EMS Arrival Delay         C039: Non-Vehicular Property Dan           Other         1         0.04         91         0.02         1.552         0.366	÷										
Sleet/Hail/Freezing R         2         0.07         363         0.10         0.778         -0.570         C038. Adjusted Entra Annual Deray C039: Non-Vehicular Property Dan C040: Agency ORI           Unknown         5         0.19         1184         0.31         0.596         -3.383         C040: Agency ORI           Clear         1558         58.40         255752         67.87         0.860*         -252.720         Sort by Sum of Max Gain	fCi										
	ma V										
C032: Weather											
Rain CO22. Watthers											

We have found that fatalities go down in rainy weather, mainly because of the normal reduction in speeds. Crash frequencies generally increase. Those who do not slow down in limited visibility and slippery situations will pay the price, which is what is shown here, since the subset filter included "Too Fast for Conditions."

# C403 CU Roadway Condition

CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with											
🔋 Ei	ile <u>D</u> ashboard <u>F</u> i	lters <u>A</u> nalysi	s <u>I</u> mpa	act <u>T</u> oo	ols <u>W</u> in	ndow	<u>H</u> elp		_ & ×		
<b>6</b>	😵 2019-2021 Alabama Integrated Crash Data 🗸 Sos Or Impact GT 70 AND Fatal with Serious Injury 🗸 💱 📆										
Order	: Max Gain	<ul> <li>Descending</li> </ul>		v 🗆	Suppress 2	Zero-Valu	Significan	ce: Over	Representation V Threshold: 2.0 🚖		
C403:	CU Roadway Conditio	on	Subset	Subset	Other equency	Other Percent	Odds Ratio	Max Gain	C326: CU Driver/Non-Motorist Gender		
•	Wet		727	27.25	67215	17.84	1.528*	251.119	C328: CU Driver/Non-Motorist Injury Type		
	Muddy Sand/Dirt/Grav	el	7	0.26	192	0.05	5.149	5.641	C329: CU Driver/Non-Motorist First Aid B		
	E Water Buildup		7	0.26	387	0.10	2.555	4.260	C330: CU Driver/Non-Motorist Transport		
	Ice		5	0.19	589	0.16	1.199	0.830	C401: E CU Involved Road/Bridge		
	Other		1	0.04	78	0.02	1.811	0.448	C402: E CU Road Surface Type		
	E Snow		1	0.04	89	0.02	1.587	0.370	C403: CU Roadway Condition		
	E Slush		0	0.00	69	0.02	0.000	0.000	C404: E CU Environmental Contributing		
	P Snow or Slush*		0	0.00	0	0.00	0.000	0.000	C405: CU Contributing Material In Road		
	Unknown		2	0.07	435	0.12	0.649	-1.080	C407: CU Roadway Curvature and Grad		
	Not Applicable		5	0.19	11601	3.08	0.061	-77.135	C408: CU Vision Obscured By		
	Dry		1908	71.51	281443	74.69	0.958*	-84.612	C409: CU Traffic Control		
	CU is Unknown		5	0.19	14739	3.91	0.048	-99.352	Sort by Sum of Max Gain		
0	i 🗞 🖉										
				2019-202	1 Alabama	a Integrate	ed Crash E	Data			
				C4	03: CU Ro	adway C	ondition				
	100										
	100										
	è –										
	50										
8											
	0						-				
	5	Muddy Sand/Dirt/Grave	a -	lce	E	Snow	P Snov	w or Slush*	Not Applicable CU is Unknown		
					C403: C	U Roadw	ay Conditi	on			



#### C404 CU Environmental Contributing Factors

# Severity and Conditions Affecting Severity

# C038 Adjusted EMS Arrival Delay

🔋 CA	🖡 CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with 🗕 🗆 🗙											
E E	ile <u>D</u> ashboard <u>F</u> ilt	ers <u>A</u> nalys	is <u>I</u> mpa	ct <u>T</u> ools	<u>W</u> indow	<u>H</u> elp				- 1	8 ×	
<b>6</b>	2019-2021 Alabama Integ	rated Crash D	ata	~	S	ios Or Impact	GT 70 AND	) Fatal with Serious I	Injury V	9	2	
Order	May Gain	Descending				Significa	ooo: Over	Representation	Threehold	2.0		
Order		Descending			iress Zero-v	an Significal	nce. Over	Representation	✓ Threshold:	2.0		
C038	: Adjusted EMS Arrival [	DelaySubset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max	C038: Adjusted	d EMS Arrival De	lay		
•	0 to 5 minutes	314	12.98	23405	26.59	0.488*	-329.313					
	6 to 10 minutes	600	24.80	28965	32.91	0.754*	-196.136					
	11 to 15 minutes	527	21.79	16042	18.23	1.195*	86.067					
	16 to 20 minutes	407	16.83	8289	9.42	1.786*	179.167					
	21 to 30 minutes	350	14.47	7049	8.01	1.806*	156.250					
	31 to 45 minutes	139	5.75	2903	3.30	1.742*	59.208					
	46 to 60 minutes	38	1.57	763	0.87	1.812*	17.028					
	61 to 90 minutes	22	0.91	393	0.45	2.037*	11.198					
	91 to 120 minutes	10	0.41	70	0.08	5.197	8.076					
	121 to 180 minutes	4	0.17	80	0.09	1.819	1.801					
	Over 180 minutes	8	0.33	49	0.06	5.940	6.653	Sort by Sum of	f Max Gain			
1	) 🗞 🖉											
				2019-2021 AI	abama Integ	rated Crash	Data					
				C038: Ad	iusted EMS	Arrival Delay	,					
	40											
	-											
	<sup>™</sup> 20											
ů												
	0	6 to 10 minute	s 16 tr	20 minutes	31 to 45	minutes	61 to 90 mi	nutes 121 to 180	minutes			
		e to no minute		C038	Adjusted E	MS Arrival D	elav					
J					-,		.,					

No doubt, the higher than normal EMS arrival delays accounts for the greater proportion of the crashes being fatal. The cause of this is mainly the time of day, and in some cases the inability to see a crashed single vehicle at night.



## C323 CU Driver Safety Equipment

Perhaps more than any other, this attribute shows how crashes become part of the SCFSI. The rate of no restraints used is 40.93%, which accounts for the highest crash severities. This is 13.795 times the corresponding non-SCFSI proportion. Even with the recommended safety equipment used, motorcycles have a greater multiplier of their proportion (16.854). Safety equipment is extremely important, but it cannot compensate for excessive speed.

2019-2021	Alabama Integrated C	rash Data	Sos Or Impact GT 70 AND Fatal with Serious Injury 🕕 🔘		
Suppress Zero Va	lues: Rows and Col	umns 🗸 S	elect	Cells: 🔳 🕶 🔣	Column: Crash Severity ; Row: CU Estimated Speed at Impact
	Fatal Injury	Suspected Serious Injury		TOTAL	
1 to 5 MPH	0	1		1	
11 to 15 MPH	0	2		2	
16 to 20 MPH	0	1		1	
21 to 25 MPH	0	6		6	
26 to 30 MPH	0	10		10	
31 to 35 MPH	1	21		22	
36 to 40 MPH	3	46		49	
41 to 45 MPH	11	122		133	
46 to 50 MPH	8	103		111	
51 to 55 MPH	26	179		205	
56 to 60 MPH	40	257		297	
61 to 65 MPH	50	261		311	
66 to 70 MPH	73	222		295	
71 to 75 MPH	69	198		267	
76 to 80 MPH	90	171		261	
81 to 85 MPH	30	78		108	
86 to 90 MPH	45	74		119	
91 to 95 MPH	19	18		37	
96 to 100 MPH	41	46		87	
Over 100 MPH	31	19		50	
E Stationary	0	1		1	
Unknown	62	223		285	
Not Applicable	1	4		5	
CU is Unknown	0	5		5	
TOTAL	600	2068		2668	

# **Cross-tabulation Estimated Speed at Impact vs Severity**

The following indicates the probability of the SCFSI crash being fatal for the impact speeds: 36 to 40 MPH: 1 in 16 fatal; 51 to 55 MPH: 1 in 8 fatal; 66 to 70 MPH: 1 in 4 fatal; 91 to 95 MPH or above: 1 in 2 fatal.

CARE 10.2.1.3 - [Crosstab Results - 2019-2021 Alabama Integrated Crash Data - Filter = Sos Or Impact											
File Dasht	board <u>F</u> ilters <u>/</u>	<u>A</u> nalysis <u>C</u> rosstal	b <u>T</u> ools <u>W</u> ind	ow <u>H</u> elp _ 🗗 🗙							
2019-2021	😵 2019-2021 Alabama Integrated Crash Data 🗸 Sos Or Impact GT 70 AND Fatal with Serious Injury 🕜 🔘										
Suppress Zero Va	Ilues: Rows and Col	umns 🗸 Select	Cells: 🔳 🔻 %	Column: Crash Severity ; Row: CU Driver/Non -Motorist Safety Equipment							
	Fatal Injury	Suspected Serious Injury	TOTAL								
None Used - Motor Vehicle Oc	327	765	1092								
Shoulder and Lap Belt Used	171	984	1155								
Lap Belt Only Used	1	2	3								
Shoulder Belt Only Used	2	2	4								
Dot-Compliant Motorcycle Helme	53	139	192								
E Helmet Used	1	13	14								
E Other Motorcycle Helme	6	7	13								
No Motorcycle Helmet Used	3	12	15								
Other	2	1	3								
Unknown	27	109	136								
Not Applicable	6	23	29								
CU is Unknown	0	5	5								
E CU Driver Not Recorded	1	6	7								
TOTAL	600	2068	2668								
				_							

## **Cross-tabulation Estimated Seatbelts vs Severity**

The numbers are clear: even at the high speeds specified by the SCFSI filter, seatbelts save lives. The probability of a SCFSI crash being fatal is more than cut in half by the proper use of seatbelts. This is from 0.299 (about one in three) to 0.148 (about one in seven).

# **Crash Type**

## **C052** Number of Vehicles



Single vehicle crashes of the SCFSI type are almost 3.5 times those of non-SCFSI crashes.

### **C067** Number of Pedestrians



There were 15 pedestrian crashes in the SCFSI subset and their proportions were about the same as the number in the non-SCFSI subset.

### **C080 CMV Involvement**



CMV = Commercial Motor Vehicles = primarily large trucks. Large truck crashes generally create considerable publicity, and no doubt, with the disparity of the vehicle weights, a larger proportion are deadly than with collisions between cars. However, this shows that they cannot be blamed for the recent increase in fatal crashes. The Odds Ratios close to one indicate there is nothing abnormal for them in the subset.

## **Driver and Vehicle Demographics**

## C101 Causal Unit Type

🔋 CA	RE 10.2.1.3 - [IMPACT Results - 2019-2021 /	Alabama I	ntegrated	d Crash D	ata - Sos	Or Impac	t GT 70 Al	ND Fatal wi — 🗆 🗙		
E E	ile <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis <u>I</u> r	npact	Tools	<u>W</u> indow	<u>H</u> elp			_ & ×		
<b>6</b>	2019-2021 Alabama Integrated Crash Data		$\sim$	S	os Or Impa	ct GT 70	AND Fatal	with Serious Injury 🛛 🗸 🕤 🎇		
Order	Max Gain V Descending	~ 5	Suppres	ss Zero-	Significan	ce: Over	Represent	ation V Threshold: 2.0		
C101:	Causal Unit (CU) Type	Subset	Subset	Other ;quency	Other Percent	Odds Ratio	Max Gain	C063: Has Railroad Crossing 1 A C080: CMV Involved		
▶	Motorcycle	256	9.60	2471	0.66	14.633*	238.505	C081: E Has Truck Bus Supple		
	Pick-Up (Four-Tire Light Truck)	485	18.18	65268	17.32	1.050	22.904	C101: Causal Unit (CU) Type		
	Passenger Car	1284	48.13	178764	47.44	1.015	18.354	C102: CU Non-Motorist Indicate		
	E 4-Wheel Off Road ATV	20	0.75	323	0.09	8.746*	17.713	C104: CU Left Scene		
	Moped	2	0.07	89	0.02	3.174	1.370	C105: CU Driver Age Range 1		
	E Other Motorized Cycle/Low Speed Vehicle	2	0.07	104	0.03	2.716	1.264	C106: CU Driver Age Range 2		
	E Passenger Van	9	0.34	1096	0.29	1.160	1.240	C107: CU Driver Raw Age		
	E 3-Wheel Off Road ATV	1	0.04	8	0.00	17.655	0.943	C108: CU Driver Race		
	E Truck Tractor Only (Bobtail)	1	0.04	202	0.05	0.699	-0.430	C109. CU Driver Gender		
	Motor Home/Recreational Vehicle	1	0.04	213	0.06	0.663	-0.508	C111: CU Driver License State		
	Station Wagon	5	0 19	870	0.23	0.812	-1 160	C112: CU Driver First License C		
	F Other Passenger Vehicle	1	0.04	491	0.13	0.288	-2 476	C113: CU Driver Second Licens		
	E Truck (6 or 7) with Trailer	5	0.04	1122	0.15	0.629	-2.944	C114: CU Driver License Status		
	E Single Linit Truck (2 Ayles or Less)	6	0.13	1600	0.30	0.527	5 205	C115: CU Driver CDL Status		
		12	0.22	2124	0.43	0.527	-0.000	C117: CU DL Restriction Violati		
	E Cargo Van (10000 lbs of Less)	12	0.45	3134	0.83	0.541	-10.189	C118: CU Endorsement Violatic		
	E Single-Unit Truck (2-Axle/6-Tire)	16	0.60	3997	1.06	0.565	-12.299	C119: E CU Endorsement Viola		
I	E Mini-van	39	1.46	/513	1.99	0.733	-14.192	C120: E CU Driver Employment		
	E Tractor/Semi-Trailer	33	1.24	7475	1.98	0.624*	-19.923	C121: CU Driver Condition		
	E Unknown Type of Motorized Vehicle	2	0.07	4403	1.17	0.064	-29.173	C122: CU Driver Officer Opinior		
	E Sport Utility Vehicle (SUV)	483	18.10	80207	21.28	0.851*	-84.864	C123. CO Driver Olicer Opinior		
	CU is Unknown	5	0.19	14739	3.91	0.048	-99.352	Sort by Sum of Max Gain		
1	) 🚳 🖉									
		2019-20	21 Alabar	na Integra	ted Crash	Data				
		C	101: Cau	sal Unit (C	CU) Type					
	60									
5	40 40									
- L	20									
	0 - F Other Sand	Bus (Same	15		P.C		-	E Sport Ukity Vehicle (SUB)		
C101: Causal Unit (CU) Type										

So what types of vehicles ARE causing these Severe Crashes? It should not be surprising to see Motorcycles at the top of this list, with an Odds Ratio indicating close to 15 times the proportion of motorcycles in the SCFSI subset as opposed to the non-SCFSI. Pick-Ups and Passenger Cars follow. Although the number is small, Off-Road ATVs have a high proportion (Odds Ratio).

# C107 CU Driver Age

C/	ARE 10.2.1.3 - [IMPACT	Results - 201	9-2021 Ala	bama Integ	rated Crash	Data - Sos	Or Impac	t GT	70 AND Fatal v	with	_		$\times$						
E E	ile <u>D</u> ashboard <u>F</u> i	lters <u>A</u> naly	ysis <u>I</u> mp	act <u>T</u> ool	s <u>W</u> indo	w <u>H</u> elp						-	в×						
<b>6</b> 8	2019-2021 Alabama Inte	egrated Crash	Data		~	Sos Or Imp	act GT 70	AND	Fatal with Serior	us Injury	~	$\mathbb{P}$	12						
Order	: Max Gain	- Descendi	ng	✓ ☑ Su	ppress Zero	-Valı Signifi	cance: 0	)ver F	Representation	~	Threshold	d: 2.0	÷						
C107	: CU Driver Raw Age	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain	^	C107: CU D	river Ra	w Age								
•	16	87	3.31	9392	2.87	1.156	11.762	ŕ											
	17	76	2.90	10009	3.05	0.948	-4.181												
	18	98	3.73	11735	3.58	1.042	3.993												
	19	94	3.58	12051	3.68	0.974	-2.539												
	20	87	3.31	11285	3.44	0.962	-3.403												
	21	113	4.30	10759	3.28	1.311*	26.811												
	22	91	3.47	10184	3.11	1.115	9.417												
	23	101	3.85	9229	2.82	1.366*	27.068												
	24	72	2.74	8742	2.67	1.028	1.969												
	25	67	2.55	8329	2.54	1.004	0.278												
	26	94	3.58	8169	2.49	1.436*	28.559												
	27	82	3.12	7970	2.43	1.284	18.153												
	28	81	3.09	7735	2.36	1.307*	19.036												
	29	87	3.31	7528	2.30	1.443*	26.694												
	30	72	2.74	7229	2.21	1.243	14.089												
	31	65	2.48	6666	2.03	1.217	11.600												
	32	50	1.90	6375	1.95	0.979	-1.069												
	33	53	2.02	6049	1.85	1.094	4.542												
	34	64	2.44	5885	1.80	1.358*	16.856												
	35	55	2.10	5681	1.73	1.209	9.490												
	36	52	1.98	5574	1.70	1.165	7.347												
	37	54	2.06	5520	1.68	1.221	9.780												
	38	44	1.68	5336	1.63	1.029	1.254												
	39	45	1.71	5318	1.62	1.056	2.398												
	40	61	2.32	5011	1.53	1.520*	20.858	~	Sort by Sun	n of Max	Gain								
11 ព								_	,										
				2019-2021	Alabama Int	egrated Cra	ah Data												
				C1	07: CU Driv	er Raw Age	on Data												
	6—					er nam nge													
	Č																		
	4	1 .																	
		had to be	la a																
ů	- 2			<u>Olmobi</u>	himber			1	1110000										
	0									1111	<b>KUNA</b>	Lilan,							
			35	5		5	55			7	5								
					C107- CU	Driver Raw	Ane		C107: CLI Driver Pay Age										

The Youngest drivers (16-20) are not significantly over-represented. Those that are over-represented tend to be quite variable between the ages of 21 and 40. None are significant above the age of 40.

#### 🚦 CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with ... $\times$ \_ ٢ 8× <u>File</u> Dashboard Filters Analysis <u>Impact</u> Tools Window <u>H</u>elp 2019-2021 Alabama Integrated Crash Data Sos Or Impact GT 70 AND Fatal with Serious Injury 12 Order: Max Gain Descending Suppress Zero-Valu Significance: Over Representation ÷ $\sim$ $\sim$ Threshold: 2.0 $\sim$ nt Status <sub>et</sub> C120: ECU Driver En C120: E CU Driver Employment Status Other Other Odds Max Subset Frequency Percent Frequency Percent Ratio 17.10 667 36.17 42884 2.115\* 351.703 Unemployed Self-Employed 102 5.53 13660 5.45 1.016 1.567 Retired -79.281 77 4.18 21256 8.48 0.493\* Employed 998 54.12 171970 68.57 0.789\* -266.379 Sort by Sum of Max Gain 📋 🕼 🚳 💋 2019-2021 Alabama Integrated Crash Data C120: E CU Driver Employment Status 100 Frequency 50 0 Unemployed Self-Employed Retired Employed C120: E CU Driver Employment Status

## C120 CU Driver Employment Status

The "unemployment rate" in the Severe Crash subset is over 36%, and it is shown to be over-represented by over two (2.115). This would indicate that the increase in Severe Crashes has an economic cause, with unemployed drivers over twice the proportion for SCFSI crashes as for non-SCFSI crashes.

#### 🚦 CARE 10.2.1.3 - [IMPACT Results - 2019-2021 Alabama Integrated Crash Data - Sos Or Impact GT 70 AND Fatal with ... $\times$ F <u>F</u>ile <u>D</u>ashboard **Filters** Tools Window 8 × <u>Analysis</u> Impact <u>H</u>elp 2019-2021 Alabama Integrated Crash Data Sos Or Impact GT 70 AND Fatal with Serious Injury Order: Max Gain Descending Suppress Zero-Valu Significance: Over Representation 2.0 + Threshold: $\sim$ $\sim$ $\sim$ C208: CU Model Year C208: CU Model Year Subset Subset Other Other Odds Max Frequency Percent Frequency Percent Ratio 2000 111 4.79 7873 2.53 1.894\* 52.401 37.124 2001 101 4.36 2.76 1.581\* 8582 47.409 2002 123 5.31 10156 3.26 1.627\* 2003 153 6.60 12319 3.96 1.669\* 61.310 2004 163 7.03 14410 4.63 1.520\* 55.746 2005 166 7.16 15538 4.99 1.435\* 50.351 2006 160 6.91 17162 5.51 1.253\* 32.263 14.846 2007 157 6 78 19099 6.14 1.104 2008 134 5.78 16949 5.44 1.062 7.849 2009 82 3.54 11180 3.59 0.985 -1.213 -15.900 2010 84 3.63 13422 4.31 0.841 2011 89 3.84 15021 4.83 0.796 -22.801 97 4.19 5.44 0.770\* -28.973 2012 16925 99 4.27 2013 18190 5.84 0.731\* -36.388 2014 103 4.45 18585 5.97 0.745\* -35.328 4.66 -46.219 2015 108 20720 6.66 0.700\* 2016 86 3.71 19408 6.23 0.595\* -58.454 2017 91 3.93 0.674\* -43.994 18137 5.83 85 0.741\* 2018 3.67 15408 4.95 -29.682 2019 69 2.98 12839 4.12 0.722\* -26.561 2020 42 1.81 2.07 0.877 -5.903 6436 2021 14 0.60 1537 0.49 1.224 2.560 Sort by Sum of Max Gain 📋 🕼 🚳 🖉 2019-2021 Alabama Integrated Crash Data C208: CU Model Year 8 6 Frequency 4 2 0 2004 2009 2014 2019 C208: CU Model Year

C208 CU Model year

This is a very interesting distribution showing that the major problems occur in older model vehicles.

## **Effects of Alcohol and Other Drugs**

## **C121 CU Driver Condition**



This provides considerable insight into what might be "wrong" with drivers who cause Severe Crashes. It is quite understandable why those who are inebriated would have increased crash frequency. However, why would they be speeding coupled with what they must know to be a limited reaction capability? The following two variables will examine DUI more closely.

## C122 CU Officer Opinion Alcohol



The proportion of drivers who are impaired in SCFSI crashes is well over five times that of the control group (non-SCFSI crashes). DUI/ID was not one of the factors included in the subset filter (see the filter definition section above). Thus, it can clearly be seen as a causal factor in SCFSI type of crashes.

## C123 CU Officer Opinion Drugs



The proportion of drivers who are impaired is 6.5 times that of the control group, which is greater than the comparable metric for alcohol. We recognize that alcohol IS A DRUG, but are using the common accommodative language in making this distinction. Both alcohol and other drugs are comparable in their effect in causing SCFSI crashes.