### Fatal Collision Highway Classifications IMPACT Special Study Fatal County Crashes (FCCs) vs Fatal Federal or State Crashes (FFSCs) By David B. Brown (brown@cs.ua.edu) University of Alabama Center for Advanced Public Safety (CAPS) and Alabama Transportation Institute (ATI) October 2023

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See <u>http://www.safehomealabama.gov/caps-special-studies/</u> for all CAPS Special Studies.

# 0.0 Introduction – review and revise

The analytical technique employed to generate most of the displays in Sections 4-8 is a component within the Critical Analysis Reporting Environment (CARE) called Information Mining Performance Analysis Control Technique (IMPACT). For a detailed description of the meaning of each element of the IMPACT outputs, please see: <a href="http://www.caps.ua.edu/software/care/">http://www.caps.ua.edu/software/care/</a>

Sections 4-8 present the results of a number of IMPACT evaluations of Fatal County Crashes (FCCs) compared to Fatal Federal or State Crashes (FFSCs) over a recent five-year period (CY2018-2022). The purpose of these comparisons is to determine the causes of fatal crashes that might distinguish those that occur on County roads from those that occur on Federal or State roads. This is different from most of the special IMPACT studies that have been performed, which have had the goal of reducing <u>all</u> of a particular type of crash regardless of severity, and not just those that were fatal.

IMPACT works by surfacing "over-representations." An *over-represented* attribute is found when that attribute has a greater share of Fatal County Crashes (FCCs) than would be expected if its proportion were the same as that for Fatal Federal or State Crashes (FFSCs). That is, the FFSC crashes are serving as a *control* to which the FCCs are being compared to determine over-representations that indicate causes. For this particular study, since the test and the control crash subsets are both fatal crashes, the FFSCs may be viewed as the test subset and the FCCs as the control. In other words, it is possible to find over-representations simultaneously in either of these subsets of crashes. This will become clear as we get into the IMPACT comparisons.

As a first example, over the five years of the crash data studied (CY2018-2022), we found that FCCs for the Day-of-the-Week attribute value of Sunday had a 37.6% higher proportion of crashes than did the Sunday FFSCs (details in Section 2.3). When such differences are statistically significant (as in this case), this surfaces characteristics that should be given additional attention, and in some cases, further analyses are performed for countermeasure development. For **example, additional selective enforcement for FCCs causes (e.g., excessive speed and Impaired Driving)** might be performed on Sunday and other days that have the highest over-representations. The Time of Day attribute (Section 5.5) is also used to focus optimal times for enforcement implementation.

Unless otherwise stated, the tables given above the charts in the IMPACT displays are ordered by *Max Gain*. *Max Gain* is the improvement in FDC reduction that could be obtained if a countermeasure could be applied to reduce the proportion of the Fatal County Crashes (FCCs) to the proportion of Fatal Federal or State Crashes (FFSCs) for the particular attribute under consideration (i.e., reduce the 17.28 to 12.55 in the Sunday example in Section 2.3). The Max Gain for each attribute value can be found in the extreme right column of the table. This report continues with three sections that provide a high-level summary of the IMPACT results and a more detailed explanation of their specifics. These are called: (1.0) Summary of Findings and Recommendations, (2.0) Filter and IMPACT Set-ups, and (3.0) Fatal Crash Comparison by Year. Section 3 is also introductory in that it provides another IMPACT example, a comparison for the Year attribute. After Section 3, the IMPACT comparisons between FCCs and FFSCs are presented under the following headings, given here with their section numbers:

- 4.0 Geographic Factors,
- 5.0 Time Factors,
- 6.0 Factors Affecting Severity,
- 7.0 Driver and Vehicle Demographics, and
- 8.0 Driver Behavior.

See the Table of Contents above for a guide to sections of interest.

## **1.0 Summary of Findings and Recommendations**

We present a summary of findings and recommendations here for two reasons (1) for those who do not have time to go through all of the IMPACT analyses, and/or (2) as an introduction to the more detailed IMPACT studies. These summaries are referenced to the more detailed analyses so that any questions regarding their sources can be accessed easily. Section numbers (1.1), (1.2), and (1.3) in this section have been omitted to maintain consistency with the analytical sections (Sections 4-8).

Findings and recommendations are organized into the areas of: (1.4) Geographical Factors, (1.5) Time Factors, (1.6) Severity Factors, (1.7) Driver and Vehicle Demographics, and (1.8) Driver Behavior. The ordering of these recommendations, either generally or within their respective categories, is not meant to imply priority. However, the more detailed information given should be quite useful in the further prioritization and allocation of traffic safety resources. This process of optimization should consider all of the recommendations, which should be validated against the information presented in the IMPACT Sections 4.0-8.0 (source section references for these summaries are given in parenthesis). Recommendations are given for the reduction of frequency and/or severity of Fatal Crashes (both FCCs and FFSCs) in Alabama. They are in the same ordering as the IMPACT displays to facilitate references to Sections 4.0-8.0.

<u>Terminology</u>: *Expected proportions* (AKA *expectations*) of either the FCCs or FFSCs below are obtained from the comparison of their proportions with the proportions for their corresponding control classifications. The IMPACT analyses in this study enabled the determination of over-representations in either the FCCs or the FFSCs.

*Note: subsection numbers 1.1, 1.2 and 1.3 have been omitted below in order to keep the numbering system in this Section consistent with that of the IMPACT displays that follow.* Findings are from the IMPACT analysis in Sections 4-8 that compare FCCs vs FFSCs over the

five years of the study (CY2018-2022). Recommendations will be given for each of the Findings. They are given in the bullet lists below:

### • 1.4 Geographical Factors (4.0)

- County (4.1, C001) Generally, the over-represented counties are rural with (or near) large population centers. The large population centers increase the traffic and thus the crashes, while rural generally make a larger proportion of these crashes fatal. Placed in Max Gain order, the FCC-over-represented counties with the highest potential for fatality reduction are (with their frequencies): Talladega 42, Mobile 87, Lee 33, Madison 56, Jefferson 60, and Baldwin 48. The FFSC-over-represented counties with the highest potential for fatality reduction with their frequencies are: Jackson 52, Russell 52, Tuscaloosa 79, Coffee 40, and Houston 50 (from the bottom of the entire table list). It is recommended that these and other over-represented counties be given special attention for fatality reduction. Generally, the countermeasures recommended to be applied to specific geographical areas, determined by hotspot analysis, are selective enforcement for Speed and Impaired Driving, since these two violations have the highest correlation with fatal crashes.
- City Comparisons of FCCs to FFSCs, viewing rural areas of counties as separate virtual cities (4.2, C002). There is little surprise in the number of rural areas in this output. City (and rural virtual city) comparisons are presented in the IMPACT tables for all areas that had Max Gains greater than 22. The top 5 FDC-over-represented Cities (with very high statistically significant Odds Ratios) are: Rural Mobile 81, Rural Madison 54, Rural Talladega 40, Rural Jefferson 47, and Rural Baldwin 38. The top 5 FFSC-over-represented Cities with their expected numbers are: Mobile 46, Huntsville, 33, Tuscaloosa 20, Rural Jackson 26, and Rural Dallas 36. Those cities with a high frequency of fatal crashes should be given special guidance, and perhaps additional funding. Many such large city areas have a considerable amount of Open Country that tends to increase their fatality count (see Locale, Section 4.6).
- Rural/Urban (4.3, C010) Fatal County Crash (FCC) Proportion FCCs occurred in 90.49% rural and 9.51% urban areas. For FFSCs, these proportions came out to be 62.34% Rural and 37.66% Urban. The rural areas for both were significantly higher than their urban area numbers. Concentration for fatality reduction is recommended in Rural areas where hotspot analyses determines that there are concentrations of fatal crashes. Recommendations to reduce fatalities within any of these areas include:
  - Whatever can be done to reduce the need for rural motor vehicle travel;
  - Promote shorter distances per trip;
  - Implement a larger police presence in the more critical areas; and
  - Lower the speed limits in frequent crash areas.

Anyone wishing analysis of additional cities, counties, or other areas, please contact CAPS – email <u>brown@cs.ua.edu</u>.

- Locale (4.4, C033) Open Country shows a high level of over-representation in both the FCCs (982) and the FFSCs (1319). Those countermeasures recommended to rural areas would be applicable to Open Country areas within city limits, which are effectively rural areas, as illustrated in the next display in Section 4.5.
- Cross-tabulation of Locale (4.5, C033) by Rural/Urban (C010) for FCCs. This illustrates that the Locale attribute is more definitive in specifying the surrounding areas of crashes that is the Rural/Urban attribute. Those recommendations for rural areas apply equally to Open Country Locales.
- Highway Classifications (4.6, C011) This attribute was used to determine the filters to be applied in this study (see Section 2.2).
- Most Harmful Event (4.7, C019) ordered by Max Gain. The following items had the largest number of fatality occurrences in the five years (listed with their frequencies):

nequeneres).	
COUNTY (FCC) OVER-REPRESENTED	
Collision with Tree	317
Overturned/Rollover	251
Fire/Explosion	34
Collision with Ditch	29
Collision with Utility Pole	23

FEDERAL/STATE (FFSC) OVER-REPRESENTED

Collision with Vehicle in Traffic	1032
Collision with Non-Motorist Pedestrian	133

Pedestrian training needs to be increased to include the advantages of walking against traffic, wearing of reflective clothing at night, and all the other rules for pedestrian safety, including a strong prohibition of walking while intoxicated with either alcohol or other drugs.

• Roadway Curvature and Grade (4.8, C407). The following items were the most over-represented (given with frequencies):

#### COUNTY OVER-REPRESENTED

Curve Left and Level	136
Curve Left and Down Grade	109
Curve Right and Level	98
Curve Right and Down Grad	e 90
Curve Left and Up Grade	52
FFSCS OVER-REPRESENTED	
Straight and Level	1016
Straight with Up Grade	185
Curve Right and Up Grade	216

Recommendations include selective enforcement and speed-limit-reduction (e.g., advisory speed and curve warning signs) concentrating first on left curves. The application of Advisory Speed Limits for Curves might be improved by considering the recent release of GDOT\_16-31 (trb.org) entitled: *An Enhanced Network-Level Curve Safety Assessment and Monitoring Using Mobile Devices*; GDOT\_16-31 (trb.org). This report appears on: <a href="http://www.safehomealbama.gov/tag/road-improvements">http://www.safehomealbama.gov/tag/road-improvements</a> Other engineering recommendations should evaluate all curves on county roads, especially left curves.

#### • 1.5 Time Factors (5.0)

- Year (3.1, C003) no recommendations are made to address any FDC or FNC annual variations since the differences found were not statistically significant.
- Month (5.2, C004) The number of FCCs and FFSCs correlated very closely in all months (no significant over-representations). July, September, and October, which had the highest Odds Ratios, might be given special selective enforcement concentration, with specific locations determined by hotspot analyses.
- Day of the Week (2.3, 5.7 C006) Friday, Saturday and Sunday were the only over-represented days of the week. Since the day of the week distribution is quite comparable to that of Impaired Driving (ID, DUI), the countermeasures for ID should be emphasized in the times and places indicated by hotspot analysis. Consideration might be given to using Fatal County Crashes (FCCs) as a proxy measure to improve ID countermeasure decisions. See Sections 8.3 and 8.4.
- Time of Day (5.5-5.6, C008) In *Natural Time Order*. In addition to Impaired Driving (ID). some of the late-night crashes will be due to drowsiness, causing among other things a diminished ability to see road edge lines. See Day of the Week (2.3, 5.7, C006) above for the similarity of this distribution with that of Impaired Driving (ID, DUI). The ID recommendations effectively apply to these over-represented times. For more ID information, See Sections 8.3 and 8.4.
- Time of Day by Day of the Week (5.7, C008 x C006) For all fatal crashes. This quantifies the extent of the fatal crash concentrations on Fridays, Saturday mornings and nights, and Sunday mornings and Sunday Evenings. This is a very useful summary for deploying selective enforcement details, especially during the weekend hours. Recommendations here are to adjust the selective enforcement times to the day of the week using this cross-tabulation.

#### 1.6 Factors Affecting Severity (6.0)

- Severity for All Highway Classifications (6.1, C025, C011) This Crosstabulation was performed for all records so that the various severities on the different Highway Classifications could be seen. Note the fatal overrepresentations on Federal, State and County roads.
- Speed at Impact (6.2, C224) Impact speeds from 26 MPH to 70 MPH are generally over-represented for FCCs. FFSCs are over-represented at speeds 71-75, 81-90 and over 100 MPH. So it is clear that speed is a larger problem in the FFSCs than in the FCCs. Several analyses have found the general rule of thumb that for every 10 MPH increase in impact speeds, the probability of the crash being fatal doubles. This was validated in the discussion below of the cross-tabulation of impact speeds by severity (6.4a and b). The recommendation here is to perform selective enforcement along with the various PI&E programs that go with it in other words, use whatever resources are available to bring about an overall speed reduction, and especially those speeds that are violating speed laws.
- Highway Classifications by Impact Speed (6.3, C224) for different Highway Classifications (C011). *For all fatal crashes.* This cross-tabulation gives an idea of the risks on the various highway classifications. The red backgrounds indicate those that had a relatively higher number of fatal crashes. If drivers have the option, this chart will be helpful in assisting them in choosing the safest routes for their trips.
- Severity by Impact Speed (6.4a and b. C025, C244). The speed to death relationship was further validated in the discussion of this cross-tabulation. This discussion was given elaboration in the Section 6.4b, which is a discussion of the Probability of Being Killed by Speed at Impact. The recommendation here is that the information of Section 6.4a and b be an essential part of the training in all traffic safety educational programs.
- Restraint Use by Drivers in Fatal Collisions (6.5, C323) Restraint use programs have been quite successful in Alabama. Consideration should be given to increasing financial support to these programs to assure that their effectiveness will continue. In particular, special concentration needs to be given to those drivers (identified in this report) who use County roads, since county road restraint use was found to be significantly less than that on Federal/State routes. See Section 6.6 for more information on the effectiveness of restraints.
- Cross tabulation: Crash Severity (6.6, C025) by Restraint Use (C323) for All Injury Crashes. A comparison of the probability of a fatal crash indicates that a fatality in an injury crash is on average 8.0 times more likely if the involved occupants are not using proper restraints (see text under the cross-tabulation in Section 6.6). This multiplier would increase as speeds of impact increase. Because current restraint-use programs are quite effective, consideration should

be given to increase their funding to make them even more universal and effective. Restraint effectiveness information should be part of all traffic safety educational programs, and consideration should be given to increasing the fines of being unrestrained.

- Number of Vehicles Involved (6.7, C052) the number of single vehicle fatal crashes is over-represented for FCCs by an Odds Ratio of 1.666, indicating that its proportion was two thirds more than expected. Over half (72.16%) of the FCCs were single vehicle crashes. This is consistent with the other findings of causality. It is recommended that PI&E efforts give top priority to single vehicle crashes. The following is potentially useful information from a list of the highest Primary Contributing Circumstances *for all single vehicle crashes* with more than five occurrences in 2018-2022: DUI (34); Aggressive Operation (23); Over the Speed Limit (37), Ran Off Road (24); Unseen Object/Person/Vehicle (12); and Improper Crossing (20 pedestrian crashes). This reflects the "unforced errors" of single vehicle crashes, and it provides additional reasons that they are over-represented in the FCC hours.
- Police Arrival Delay (6.8, C036) Generally, the police response times to FCCs were greater than expected, with delays greater than 10 minutes being over-represented, most of which were significant. There can be little doubt that this has to do with so many of the FCCs occurring in rural areas (see Section 4.3) and at night. The 0 to 10 minute delays were over-represented for the FFSCs by more than double that which was expected. Delays of 91 to 120 minutes and Over 180 minutes were highly statistically significant for FCCs.
- EMS Arrival Delay (6.9, C039) Probably because of (1) the severity of the crashes (all being fatal in this study), (2) the swiftness/urgency in getting called, and (3) the urgency in getting to the scene, much shorter delay times were recorded than that of the police delays. Generally, we can conclude that very few of the fatalities were caused by excessive EMS delays, since the frequencies drop off rapidly after 30 minutes. It is recognized that first responders are currently doing an excellent job in getting to the scene of the crash as quickly as possible without jeopardizing safety. Delays, if any, are usually caused be a failure to report the crash immediately, and encouraging quicker notification should be worked into the appropriate PI&E efforts.

#### • 1.7 Driver and Vehicle Demographics (7.0)

 Driver Age Range 2 (7.1, C106) –A comparison of FCC causal driver age with the FFSCs shows the most over-represented in the FCCs are in 16-25 years of age, while the most over-represented Federal/State are 61-85 years of age. Clearly, from the chart it can be seen that the FFSCs have higher age proportions than do those in the County in 61-70 and the 76-Over 95 pattern of overrepresentations for FFSCs. It is recommended that, to the extent possible, that PI&E efforts focus on these age concentrations.

- Crash Driver Gender (7.2, C109) the breakdown in FCC causal drivers is 73.39% male and 20.33% female. For FFSC cashes, the percentage is 65.87 male and 23.29 female. These gender differences certainly indicate that males are a greater cause of the fatal crashes, and the recommendation is that, if there are countermeasures that can be directed toward males, this would be much more cost-effective than those directed equally toward all drivers.
- Cross-tabulation of Driver Gender (7.2, C109) by Speed at Impact (7.3, C224) for <u>All Fatal Crashes</u>. To get better insight into the reason for male drivers causing more fatal crashes, this analysis shows that males had impact speeds in excess of the 70 MPH (speed limit on most Interstates) in 20.5% of their fatal crashes, while comparable speeds for females was only at 10.7%. Thus, all of the recommendations for speed reduction apply doubly to males over females.
- Causal Unit (Vehicle) Type (7.4, C101) This analysis was based on a comparison of FCC Causal Unit Type against the same for FFSCs. It is recommended that countermeasure programs that are currently in effect be continued and augmented so that part of it will emphasize the special issues during the nighttime hours. Pedestrian programs should include warnings against Impaired Walking (walking along the roadway after drinking), and the many other errors addressed in most pedestrian safety programs. Pedestrian fatalities are statistically significantly over-represented in the FFSCs, indicating that more emphasis might be warranted for divided and four-lane roadways. Additional pedestrian fatality study is warranted; see Section 7.5 below.
- Number of Pedestrians (7.5, C058) Fatal Federal and State pedestrian crashes occur about 61.5% times greater than their County counterparts. This is consistent with what has been found in most pedestrian studies. Both ID and Impaired Walking, contribute to this, as well as pedestrians not taking the maximum means for being seen at night. Wearing reflective clothing, and carrying (and using) a flashlight to be seen of vehicle drivers are two of the most important recommendations in that lack of visibility was cited for several fatal crashes. Pedestrian programs need to be emphasized in the lower school grades and continue to be emphasized through the young adult years.
- Driver License Status (7.6, C114) FCCs were slightly over-represented in their causal drivers having legitimate licenses. Expired, Revoked and Suspended licenses were also over-represented for FCCs to a greater degree. Essentially, this indicates that those who most often travel the county roads are less apt to have valid driver's licenses. This warrants more concern for enforcement at the County road level.

Driver Employment Status (7.7, C120) – This analysis indicated that the unemployment rate for the FCCs was about 21.20%, while that for FFSCs was 14.37%. Higher than average unemployment rates are not surprising because of the underlying drug/alcohol root cause of many fatal crashes (see Sections 8.3-8.4). The correlation between not having a job and being involved in a fatal crash should be watched carefully going forward in that it could affect the type and location of countermeasures. It is also recommended that research be performed to determine if there are some incentives that could be implemented in conjunction with unemployment payments.

#### • 1.8 Driver Behavior (8.0)

Primary Contributing Circumstances – PCC (8.1 and 8.2, C015) Driver behaviors that are correlated with Fatal County crashes might provide alternatives for countermeasure development. Those behaviors that involve pedestrians or had over 50 fatal crashes are:

		FCCs	FFSCs
• Ov	ver Speed Limit	233	168
■ DU	Л	194	176
<ul> <li>Ag</li> </ul>	gressive Operation	103	121
<ul> <li>Im</li> </ul>	proper Lane Change/Use	36	37
<ul> <li>Ra</li> </ul>	n off Road	72	99
<ul> <li>Ly</li> </ul>	ing or Sitting in Roadway (pedestrian)	10	6
<ul> <li>Dr</li> </ul>	iving too Fast for Conditions	50	75
<ul> <li>Ra</li> </ul>	n Stop Sign	28	40
• No	ot Visible (possible pedestrian)	14	28
■ Ur	seen Object/Person/Vehicle (possible pedestrian)	22	60
■ Fa	iled to Yield Right-of-Way Making Left or U-Turn	21	77
■ Tra	aveling Wrong Way/Wrong Side	21	88
<ul> <li>Im</li> </ul>	proper Crossing (probable pedestrians)	15	80
■ Cr	ossed Centerline	48	147
■ Fa	iled to Yield Right-of-Way from Stop Sign	31	131
Statistia	ally cignificant		

\* Statistically significant

No additional recommendations are given for these behaviors since most of them are covered by Speed, ID, Pedestrian and other countermeasures.

- CU Officer's Opinion Impaired Driving CU Officer's Opinion Impaired Driving Alcohol (8.3-8.4, C122-C123). We saw ample evidence for fatal crashes being caused by Impaired Driving (ID) in the time of day and day of the week attributes. The two ID attributes (C122 and C123) indicate the degree that ID was involved in fatal crashes. For alcohol, the proportion of ID fatal crashes was 1.724 times as many for FCCs as for FFSCs. For drugs this multiplier was 1.145. Recommended countermeasures to reduce ID are:
  - Additional ID enforcement is warranted on County roads.
  - Mandate breath-alcohol ignition interlock devices for all convicted of ID.

- Perform an in-depth study to determine if problems exist within the current programs, e.g., how the use of interlock devices can be expanded to be made more generally effective.
- Since the presence of drugs/alcohol often do not reach the reporting threshold, especially in cases involving prescription drugs, continued officer training to produce more complete reporting, especially for non-alcohol drugs.
- Drug/Alcohol Diversion Programs should continue (or new programs adopted) that concentrate on keeping the age 25 through 35 (typically *social users*) from becoming habitual to the point where they become part of the 36-55-year-old over-representation of predominantly *problem users* (see 7.1).
- Combinations of recreational or medical drugs and alcohol can be particularly lethal, and medical practitioners should warn against such problems and discourage all alcohol and additional drug use for their patients who have indicated either of these combinations, or who are taking other prescription drugs.
- Legalized recreational drugs are not a good alternative to alcohol use and the advertising as such should be outlawed. PI&E programs should take the opposite approach to warn drivers that legalization does not relax their responsibilities.

# 2.0 Filter and IMPACT Set-ups

Generally, the analyses performed in this study used IMPACT (See Section 2.1) to compare Fatal County Crashes (FCCs) against Fatal Federal or State Crashes (FFSCs) over the same 5year time period (FY2018-2022). The objective was to determine all significant differences between attributes within these two subsets of data in order to get an improved understanding as to the fatality crash causes (who, what, where, when, how, causal driver demographics, etc.). This is accomplished by pinpointing common factors to assess strategies that could be used to address any major inconsistencies between these two subsets of crash data. The findings that are presented should be taken into consideration when planning the large variety of countermeasures that exist to reduce both the crash frequency and severity.

Sections 2 and 3 of this report contain information that will be useful in obtaining an overall orientation toward the IMPACT results that will follow (in Sections 4-8). This introduction will consist of: (2.1) Introduction to IMPACT, (2.2) Definitions of Filters Used, (2.3) Example IMPACT: Day of the Week, and (2.4) Overall Fatal Crashes by Severity. Section 3 presents another IMPACT example (Fatal Crash Comparison by Year of FCCs vs FFSCs) for purposes of further orientation.

# **2.1 Introduction to IMPACT**

The findings of Sections 4.0-8.0 are in displays of comparisons for the various attributes that might have an influence on crash, and especially fatal crash, countermeasure development. The CARE analytical technique employed to generate these comparisons is called Information Mining Performance Analysis Control Technique (IMPACT). Unless otherwise indicated in the IMPACT "Order" box, the outputs will be listed in the order of highest *Max Gain* first. *Max Gain* is a term that CARE users have assigned to indicate the number of crashes that would be reduced if the respective attribute proportion was not over-represented (i.e., had an Odds Ratio of 1.000). An *over-represented* value of an attribute is a situation found where that attribute has a greater share (proportion) of crashes in the County (FCCs) than would be expected from that given in the FFSCs. Similarly, an *under-represented* value of an attribute is a situation found where that attribute has a smaller share of crashes than what would be expected. Significant under-representation for FFSCs, since they are the comparisons being performed in the IMPACT analyses.

IMPACT will display comparisons of FCCs against their FFSC counterparts. In summary, the FFSC Crashes are serving as a control to which the FCCs are being compared. In this way any inconsistencies related to the FCCs surfaces and can be subjected to further analyses. For a detailed description of the meaning of each element of the IMPACT outputs, see: http://www.caps.ua.edu/software/care/

The IMPACT analyses will be grouped by five general attribute categories as follow in Sections: 4. Geographical and Harmful Events, 5. Time, 6. Severity, 7. Demographics, and 8. Driver Behavior.

## **2.2 Filter Definitions for the IMPACT Analyses**

The IMPACT analyses will compare Fatal County Crashes (FCCs) vs Fatal Federal and State Crashes (FFSCs). The standard filter for all fatal crashes based on C025 Crash Severity was applied, and separate filters for the FCCs and FFSCs were obtained, as exemplified in the IMPACT displays in the next few pages. The formal definitions for these two filters are given below:

#### Formal Definition of Fatal County Crashes (FCCs)

Filter Logic: HW Class Fatal County Crshes (FCCs) —		$\times$
Logic Tree Logic Text		
One or more of the following are true (OR)     One or more of the following are true (AND)     One or more of the followi	-	
1146 records selected by this filter.		:

### Formal Definition of Fatal Federal and State Crashes (FFSCs)

Filter Logic: HW Class Fatal Fed-State Crshes (FFSCs)	_		×
Logic Tree Logic Text			
<ul> <li>One or more of the following are true (OR)</li> <li>All of the following are true (AND)</li> <li>2018-2022 Alabama Integrated eCrash Crash Data: Highway Classifications</li> <li>2018-2022 Alabama Integrated eCrash Crash Data: Crash Severity is equal t</li> <li>All of the following are true (AND)</li> <li>2018-2022 Alabama Integrated eCrash Crash Data: Highway Classifications</li> <li>2018-2022 Alabama Integrated eCrash Crash Data: Crash Severity is equal t</li> <li>2018-2022 Alabama Integrated eCrash Crash Data: Highway Classifications</li> <li>2018-2022 Alabama Integrated eCrash Crash Data: Crash Severity is equal t</li> </ul>	o Fatal Inju is equal to	ıry State	
1928 records selected by this filter.			:

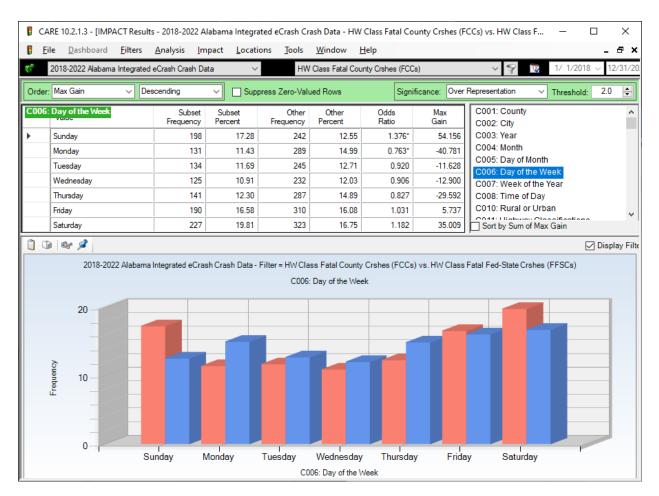
Why compare these two subsets of the five-year crash records? The following cross-tabulation provides the basis for the answer to this question:

CARE 10.2.1.3 -	[Crosstab Results	- 2018-2022 Alabar	na Integrated eCr	ash Crash Data]		_	- 🗆	×			
🖡 <u>F</u> ile <u>D</u> ashb	oard <u>F</u> ilters	<u>A</u> nalysis <u>C</u> rosstal	b <u>L</u> ocations	<u>T</u> ools <u>W</u> indow	<u>H</u> elp		-	8			
😵 2018-2022 Alabama Integrated eCrash Crash Data 🗸 HW Class Fatal Fed-State Crshes (FFSCs) V 💡 😨 1/ 1											
Suppress Zero Values: Rows and Columns 🗸 Select Cells: 🔳 🗸 🧭 Column: Highway Classifications ; Row: Crash Severity 🖓											
	Interstate	Federal	State	County	Municipal	Private Property	TOTAL				
Catal Jaiway	575	737	1191	1146	706	17	4372				
Fatal Injury	0.67%	0.78%	0.85%	1.09%	0.24%	0.07%	0.58%				
Suspected	2054	3099	5249	5438	4317	126	20283				
Serious Injury	2.39%	3.29%	3.74%	5.15%	1.44%	0.52%	2.70%				
Suspected Minor	6278	8582	13306	11399	20120	615	60300				
Injury	7.30%	9.12%	9.48%	10.80%	6.71%	2.53%	8.04%				
Descible Island	6087	9437	13274	7593	27032	749	64172				
Possible Injury	7.08%	10.03%	9.45%	7.19%	9.01%	3.08%	8.55%				
Property Damage	69817	70838	103634	76200	239389	21867	581745				
Önly	81.21%	75.26%	73.81%	72.18%	79.81%	90.04%	77.54%				
Unknown	1163	1426	3750	3792	8380	912	19423				
Unknown	1.35%	1.52%	2.67%	3.59%	2.79%	3.76%	2.59%				
TOTAL	85974	94119	140404	105568	299944	24286	750295				
TOTAL	11.46%	12.54%	18.71%	14.07%	39.98%	3.24%	100.00%	6			

The following provide reasons for selecting FCCs as the test subset and FFSCs as the control subset (called "Other" in the IMPACTs):

- Interstate highways were eliminated first because it is well established that on a per-mile basis, they are the State's safest roadways, and their use is to be encouraged without qualification.
- Second, in many attributes, Interstate highways will not be comparable to the other classifications that are being compared, and some of the differences found may be misleading.
- Similarly, Municipal and Private Property classifications were also eliminated from these comparisons.
- Fatal County [road] Crashes (FCCs) were chosen as the test subset in that they are known to have a per-mile fatal crash frequency that is generally larger than that of the other highway classifications. We will assume the word "[road]" can be excluded from the County acronym in the remainder of this report.
- Fatal Federal and State Crashes (FFSCs) were chosen to be the control dataset as follows: (1) they were considered to be the most comparable to the County roads, and (2) they were combined to form a larger dataset because of their similarity of Federal and State routes to each other, and (3) the increased sample size increased the statistical reliability of the results.
- Fatal crashes were chosen for the comparison in order to focus on this worst crash severity, recognizing that if it is reduced there will be a comparable reduction in other high severity crashes.

Note the filter of this IMPACT is FCCs and the comparative "Other" subset it FFSCs. These comparisons are different from most IMPACT analyses we have done in the past, because here both the Subset crashes and the "Other" crashes consist only of fatal crashes. Thus, they are comparable to each other. This is illustrated by the example in Section 2.3, immediately below.



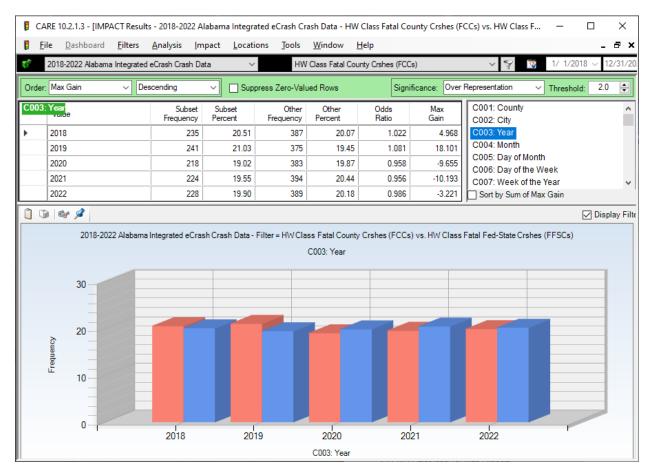
### 2.3 Day of the Week (C006); Comparison of FCCs and FFSCs

Quick reminder: FCCs=County=Red bars; FFSCs=Federal and State=Blue bars.

In this IMPACT display, as well of those in Sections 4-8, the Subset (given by the red bars) is the Fatal County Crashes (FCCs). The "Other" crashes are those that occurred on Federal and State routes (FFSCs). This IMPACT (and those below) will use both of the filters defined above to compare the FCCs directly with the FFSCs. The above shows that Saturday, Sunday, and to a lesser extent Friday, are over-represented in FCCs. Weekdays (with the exception of Friday) are over-represented in FFSCs. FCCs will be used to define the "Subset," while FFSCs will define the "Other."

# 3.0 Fatal Crash Comparison by Year

Fatal County Crashes (FCCs) vs Fatal Federal or State Crashes (FFSCs) by Year



Quick reminder: FCCs=County roads=Red bars; FFSCs=Federal and State routes=Blue bars.

This is an example that further demonstrate the IMPACT displays. As shown in the Fatal County Crashes (FCCs) were slightly over-represented in 2018 and 2019, but the statistical analysis did not find any of the years' differences to be significant in the proportion of either FCCs or FFSCs. Statistically significant results are indicated by an asterisk (\*) that will appear on the Odds Ratio for the attribute value under consideration.

# 4.0 Geographic and Harmful Event Factors

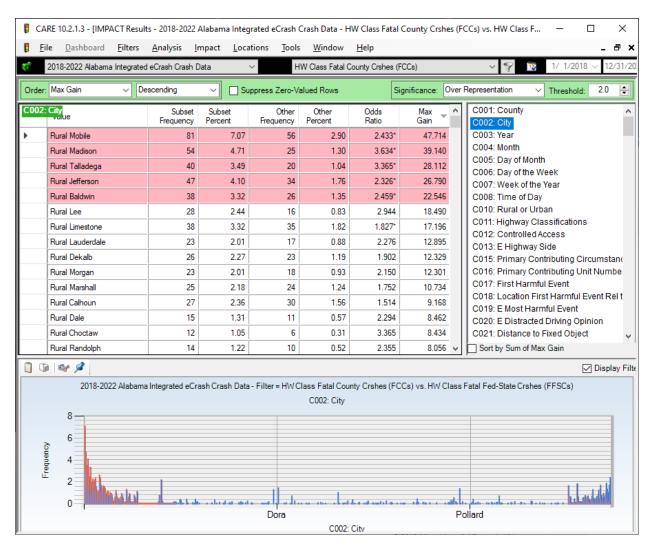
# 4.1 C001 County (top 11 counties) ordered by Max Gain; FCCs vs FFSCs

CA				_	grated eCrash ations Tools		HW Class Fat	al County Crs	nes (F	CCs) vs. HW Class F — 그 > _ 큔		
-	_		ed eCrash Crash [		_	W Class Fatal (		(FCCs)		✓ ♥ 〒 1/ 1/2018 ∨ 12/31		
Order:	Max Gain	~ [	Descending	~ 🗆 Si	uppress Zero-V	alued Rows		Significance:	Over	Representation V Threshold: 2.0		
C001:	County		Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	^	C001: County C002: City		
•	Talladega		42	3.66	37	1.92	1.910	* 20.00	7	C003: Year		
	Mobile		87	7.59	113	5.86	1.29	5 19.83	3	C004: Month		
	Lee		33	2.88	25	1.30	2.221	* 18.14	)	C005: Day of Month C006: Day of the Week		
	Madison		56	4.89	64	3.32	1.47	2 17.95	9	C007: Week of the Year		
	Jefferson		60	5.24	75	3.89	1.34	6 15.42	0	C008: Time of Day		
	Baldwin		48	4.19	56	2.90	1.44	2 14.71	4	C010: Rural or Urban		
	Lauderdale		27	2.36	28	1.45	1.62	2 10.35	7	C011: Highway Classifications		
	Limestone		39	3.40	52	2.70	1.26	2 8.09	1	C012: Controlled Access C013: E Highway Side		
	Dale		18	1.57	19	0.99	1.59	4 6.70	5	C015: Primary Contributing Circumstance		
	Choctaw		12	1.05	9	0.47	2.24	3 6.65	5	C016: Primary Contributing Unit Numbe		
	Dekalb		29	2.53	38	1.97	1.28	4 6.41	3 ~	Sort by Sum of Max Gain		
0	1 🞯 🖉									🗹 Display		
	2018-3	2022 Alabar	na Integrated eCr	ash Crash Data	a - Filter = HWC	County County	· ·	FCCs) vs. HW	Class	Fatal Fed-State Crshes (FFSCs)		
			hh	mila	din		Anda	anda		litter		
				Lam	ar		Mo	nroe		Marshall		
						C001: 0	County					

Again, recognize that each line of table above gives both FCC and FFSC fatal crashes. So, Talladega County at the top had 42 Fatal County Crashes and 37 Fatal Federal and State crashes. The respective proportions (3.66 and 1.92) are compared to obtain the Odds Ratio of 1.910. These proportions are calculated from the attribute (Talladega) frequency divided by the total number of fatal crashes (in either the Subset or the Other). The Max Gain (20.007) is the number of Fatal County Crashes (FCCs) that would be reduced if somehow the 3.66 was reduced to 1.92. The above display has been arranged in highest Max Gain order to indicate the counties that have the highest potential for gain in reducing their FCC proportions as opposed to their FFSC proportions. The display above contains all of the counties with Max Gains greater than 5.000.

## 4.2 C002 Cities (top 15) with Highest Max Gains (Rural Areas = Virtual Cities)

For comparison purposes, the rural area of a county is considered to be a "virtual city" and crashes that occur there are listed as "Rural [County Name] Crashes" so that these crashes can be effectively accounted for and compared. The high rural areas are generally adjacent to (or partially contain) significant urban areas that have a higher traffic density. This display is in Max Gain ordering to put those (possibly virtual) cities that have the highest potential for Fatal County [road] Crash (FCC) reduction at the top. The display below is for all Max Gains > 7.



# 4.3 C010 Rural or Urban

🖡 C	ARE 10.2.	1.3 - [IMP/	ACT Result	s - 2018-2022 A	labama Integra	ated eCrash Cr	ash Data - HW	Class Fatal Co	ounty Crshes (F	CCs) vs. HW Class F —	
1	<u>F</u> ile <u>D</u> a	shboard	<u>F</u> ilters	<u>A</u> nalysis <u>I</u> m	npact <u>L</u> ocati	ions <u>T</u> ools	<u>W</u> indow	<u>H</u> elp			- 8 ×
<b>6</b> 2	2018-20	22 Alabama	a Integrated	eCrash Crash Da	ata ~	HW	/ Class Fatal Cou	unty Crshes (FCC	Cs)	✓ ♥ 1/ 1/201	8 ~ 12/31/20
Orde	Order: Max Gain       V       Descending       V       Suppress Zero-Valued Rows       Significance: Over Representation       V       Threshold:       2.0       V										
C01	0: Rural o	r Urban		Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 👻	C007: Week of the Year C008: Time of Day	^
•	Rural Urban			1037 109	90.49 9.51	1202 726	62.34 37.66	1.451* 0.253*	322.533 -322.533	C010: Rural or Urban	~ ~
	)   🗞	<i>s</i>								,	🗹 Display Filte
	Display Filte										
						C010: F	Rural or Urban				

The County crashes had 90.49% of the FCCs in rural areas, while this percentage was 9.51% for Urban FCCs. The FFSCs were also predominately rural, with 62.34 in the rural areas. Both results illustrate how much more lethal rural crashes are then those on urban roadways. This is attributed to the comparative speed at impact on the rural roads, both in FCCs and FFSCs. Speed will be considered again in Section 6.2, C224 Speed at Impact. Speed not only can cause a crash, but it also dramatically increases its severity (see Section 4.4 below). Significant differences were found between the County and Fatal Federal and State Crashes in both the rural and urban differences.

# 4.4 C033 Locale

		2.1.3 - [IM Dashboard			labama Integra 1pact <u>L</u> ocati			Class Fatal Cou Help	unty Crshes (F	CCs) vs. HW Class F 디 ×	
¥ .	_	_	-	eCrash Crash Da	-			nty Crshes (FCCs	5)	✓ ♥ 〒 1/ 1/2018 ∨ 12/31/20	
Orde	Order: Max Gain V Descending V Suppress Zero-Valued Rows Significance: Over Representation V Threshold: 2.0										
C033	3: Local			Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 👻	C027: At Intersection C028: Mileposted Route	
•	Open	Country		982	85.69	1319	68.41	1.253*	197.989	C029: National Highway System	
	Resid	lential		138	12.04	157	8.14	1.479*	44.679	C030: Functional Class	
	Playg	round		0	0.00	1	0.05	0.000	0.000	C031: Lighting Conditions C032: Weather	
	Other	r -		4	0.35	15	0.78	0.449	-4.916	C032: Weather	
	Scho	ol		1	0.09	10	0.52	0.168	-4.944	C034: E Police Present at Time of Crash	
	Manu	facturing or	r Industrial	6	0.52	29	1.50	0.348	-11.238	C035: Police Notification Delay	
	Shop	ping or Busi	iness	15	1.31	397	20.59	0.064	-220.976	Sort by Sum of Max Gain	
	<u>)</u>	- 1	022 Alabama	Integrated eCra	sh Crash Data -		ss Fatal County C033: Locale	Crshes (FCCs)	vs. HW Class I	Display Filte	
		100									
	Frequency	50									
		0 -	Ope	en Country	Residential	Playground	Other C033: Locale	School	Manufactu or Indust		

Open Country and Residential Locales both showed significant differences between FCCs and FFSCs. The FCC proportion for Open Country was 85.69, and its Odds Ratio was 1.253. Residential had only 12.04 in the FCC category, but the Odds Ratio of Residential was 1.479 (both Odds Ratios were statistically significant. This demonstrates a significantly larger proportion of Open Country and Residential in the County roadway system, which may account for a proportionately larger number of fatal crashes.

# 4.5 C033 Locale by C010 Rural-Urban for FCCs

It is obvious in the above outputs that both FCCs and FFSCs are greatly over-represented in the rural areas. It is interesting to perform a cross-tabulation for Locale over the Rural and Urban areas to further define this relationship. The following, *which is only for <u>FCCs</u>*, gives one such analysis.

<u>F</u> ile <u>D</u> as	hboard <u>F</u> ilters <u>i</u>	<u>A</u> nalysis <u>C</u> rossta	b <u>L</u> ocations <u>1</u>	ools <u>W</u> indow	<u>H</u> elp			_ 5			
2018-2022 Alabama Integrated eCrash Crash Data V HW Class Fatal County Crshes (FCCs) V 💡 😨 1/ 1/2018 V 12/31/202											
Suppress Zero Values: None 🗸 Select Cells: 🔹 🔣 🌱 Column: Locale ; Row: Rural or Urban 👔											
	Open Country	Residential	Shopping or Business	Manufacturing or Industrial	School	Playground	Other	TOTAL			
Rural	909	113	7	3	1	0	4	1037			
Rurai	92.57%	81.88%	46.67%	50.00%	100.00%	0.00%	100.00%	90.49%			
Urban	73	25	8	3	0	0	0	109			
Orban	7.43%	18.12%	53.33%	50.00%	0.00%	0.00%	0.00%	9.51%			
TOTAL	982	138	15	6	1	0	4	1146			
TOTAL	85.69%	12.04%	1.31%	0.52%	0.09%	0.00%	0.35%	100.00%			

The red-backed cells in the cross-tabulation above indicate over-representation by more than 10%. Those that are over-represented, but by less than 10% have a yellow background. If under-represented, there will be a white background. For example, while 9.51% of all FCCs were Urban, 18.12% (25) occurred in Residential Locale. Since this is greater than a 10% difference, it has a red background.

This shows that the Rural/Urban attribute may not be as definitive as Locale in classifying crash locations.

🖡 CA	ARE 10	.2.1.3 - [IMP/	ACT Result	s - 2018-2022	Alabama Integra	ted eCrash Cras	sh Data - HW C	lass Fatal Cou	nty Crshes (FCC	s) vs. HW Class Fata — 🗆 🗙
E E	ile	<u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis <u>I</u>	mpact <u>L</u> ocatio	ons <u>T</u> ools	<u>W</u> indow <u>H</u>	elp		_ & ×
<b>e</b>	2018-	2022 Alabama	a Integrated	eCrash Crash I	Data 🗸 🗸	HW	Class Fatal Coun	ty Crshes (FCCs)	)	✓ ♥ 〒 1/ 1/2018 ∨ 12/31/2022
Order	r: Max	Gain	∼ De:	scending	- Supp	ress Zero-Value	ed Rows	Sign	ificance: Over	Representation V Threshold: 2.0
C011	: High	way Classific	cations	Subs Frequence		Other Frequency	Other Percent	Odds Ratio	Max Gain 🔻	C007: Week of the Year  C008: Time of Day
▶	Cour	ity		114	6 100.00	0	0.00	0.000	1146.000	C010: Rural or Urban
	Inters	state			0.00	0	0.00	0.000	0.000	C011: Highway Classifications C012: Controlled Access
	Fede	ral			0.00	737	38.23	0.000	0.000	C012: Controlled Access C013: E Highway Side
	State	•			0.00	1191	61.77	0.000	0.000	C015: Primary Contributing Circumstance
	Muni	cipal			0 0.00	0	0.00	0.000	0.000	C016: Primary Contributing Unit Number
	Priva	te Property			0 0.00	0	0.00	0.000	0.000	C017: First Harmful Event
	P Ot	ner*			0 0.00	0	0.00	0.000	0.000	Sort by Sum of Max Gain
00	0	r 🔎								Display Filter I
		2018-20	022 Alabam	a Integrated eC	òrash Crash Data -		ss Fatal County hway Classifica		) vs. HW Class F	atal Fed-State Crshes (FFSCs)
							,,			
		150								
			-							
	R	100								
	Frequency	_								
	Freq	50								
		0								
			(	County	Interstate	Federal	State	Municipal	Private Pro	perty P Other*
						C011:	Highway Classi	fications		

# 4.6 C011 Highway Classifications

Because highway classifications were used to define the filters of the two crash types being compared, this display shows that any given crash is classified as either County (FCC) or Federal and State (FFSC).

## 4.7 C019 Most Harmful Event (>7 in MaxGain order)

The following display is intended to show safety engineers obstacles that are being hit most often in Fatal Crashes, with a differential between Fatal County and Fatal Federal and State crashes. The most over-represented FDC is Collision with Tree (317 County as opposed to 223 Federal and State). The statistical algorithm does not consider items with frequencies less than 20, so there could be other significant differences in the list. At the bottom of the table it can be seen that for FFSCover-representations, Pedestrian collisions (60 FCCs; 133 FFSC s), and Collisions with Vehicle in Traffic (281 FCCs; 1,032 FFSCs) have the highest over-representations.

CA	RE 10.2.1.3 - [IMPACT Results - 2018-2022 Alat	oama Inte	egrated e	Crash Cr	ash Data	- HW Cla	iss Fatal C	County Crshes (FCCs — 🗆 🗙
🔋 Ei	le <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis <u>I</u> mpa	ict <u>L</u> o	cations	Tools	<u>W</u> indov	w <u>H</u> elp	p	_ & ×
<b>6</b>	2018-2022 Alabama Integrated eCrash Crash Data		$\sim$	HW	Class Fat	al County	Crshes (FC	CCs) ~ 💡 📆 1/ 1/20
Order:	Max Gain V Descending	7 0:	ouppress	Zero-Valu	ued Row S	Significan	ce: Over	Representation V Threshold: 2.0 🜩
C019:	E Most Harmful Event	Subset	Subset	Other	Other	Odds	Max	C019: E Most Harmful Event
	Value			quency	Percent	Ratio	Gain	
P	Collision with Tree	317	29.16	223	12.24	2.383*	183.9	
	Overtum/Rollover	251	23.09	243	13.34	1.731*	106.0	
	Fire/Explosion	34	3.13	30	1.65	1.900*	16.102	
	Collision with Ditch	29	2.67	24	1.32	2.025*	14.682	
	Collision with Utility Pole	33	3.04	33	1.81	1.676	13.312	
	Collision with Embankment	15	1.38	11	0.60	2.286	8.437	
	Collision with Fence	8	0.74	1	0.05	13.409	7.403	
	Fell/Jumped from Motor Vehicle	10	0.92	5	0.27	3.352	7.017	
	Collision with Culvert Headwall	20	1.84	22	1.21	1.524	6.875	
	Collision with Other Fixed Object	12	1.10	11	0.60	1.829	5.437	
	Collision with Other Non-Fixed Object	9	0.83	7	0.38	2.155	4.824	
l	Collision with Vehicle in (or from) Other Roadway	8	0.74	37	2.03	0.362	-14.074	
	Collision with Non-Motorist: Pedestrian	60	5.52	133	7.30	0.756	-19.347	
	Collision with Vehicle in Traffic	281	25.85	1032	56.64	0.456*	-334	Sort by Sum of Max Gain
0	i 🞯 🖉							
		2018-202	2 Alabam	a Integrat	ed eCras	h Crash D	Data	
				-	rmful Eve			
	60							
	40							
Fromon								
	20							
	0							
	Collis	ion with	Utility Po	ole	Coll	ision wit	h Other F	ixed Object
			C0	19: E Mos	t Harmful	Event		

<b>V</b>	2018-2022 Alabama Integrated eCr	ash Crash D	ata	~	HW C	lass Fatal C	County Crshe	s (FCCs) V 🌱 🛐 1/
Order:	Max Gain ~ Descer	nding	~ 2	] Suppress	Zero-Value	d Significa	nce: Over l	Representation V Threshold: 2.0 🗲
C407:	CU Roadway Curvature and Gr	ade <mark>Subset</mark> requency	Subset Percent	Other requency	Other Percent	Odds Ratio	Max Gain 👻	C401: E CU Involved Road/Bridge C402: E CU Road Surface Type
► _	E Curve Left and Level	136	11.87	100	5.19	2.288*	76.560	C403: CU Roadway Condition
	E Curve Left and Down Grade	109	9.51	81	4.20	2.264*	60.854	C404: E CU Environmental Contributing
	E Curve Right and Level	98	8.55	87	4.51	1.895*	46.287	C405: CU Contributing Material in Road C406: CU Contributing Material Source
	E Curve Right and Down Grade	90	7.85	78	4.05	1.941*	43.637	C407: CU Roadway Curvature and Grad
	E Curve Left and Up Grade	52	4.54	40	2.07	2.187*	28.224	C408: CU Vision Obscured By
	Straight at Hillcrest	22	1.92	25	1.30	1.480	7.140	C409: CU Traffic Control
	E Curve Right at Hillcrest	6	0.52	5	0.26	2.019	3.028	C410: CU Traffic Control Functioning
	E Sag (Bottom)	3	0.26	6	0.31	0.841	-0.566	C411: CU Opposing Lane Separation C412: CU Trafficway Lanes
	E Curve Right and Up Grade	28	2.44	50	2.59	0.942	-1.720	C413: E CU Turn Lanes
	Not Applicable	1	0.09	5	0.26	0.336	-1.972	C414: CU One-Way Street
	E Curve Left at Hillcrest	2	0.17	7	0.36	0.481	-2.161	C415: CU Workzone Related
	Straight with Down Grade	126	10.99	216	11.20	0.981	-2.390	C416: E CU Workzone Type
	CU is Unknown	10	0.87	27	1.40	0.623	-6.049	C417: E CU Workers Present C418: E CU Law Enforcement Present in
	Straight with Up Grade	74	6.46	185	9.60	0.673*	-35.964	C450: CU CMV Indicator
	Straight and Level	389	33.94	1016	52.70	0.644*	-214.909	Sort by Sum of Max Gain
0	i 😪 🖉							
Frommerce		ash Crash E	C407	: CU Roadv		ire and Gra	ide	HW Class Fatal Fed-State Crshes (FFSCs)
	EC	Jurve Left al		1e P.0 C407·CU F				Irve Lett at HillCrest

# 4.8 C407 CU Roadway Curvature and Grade

FCCs are over-represented about half of the curve types. Their difference from FFSCs were seen to be significant higher (see the top five in the table).

OVER-REPRESENTED FCCs: Curve Left and Level 136, Curve Left and Down Grade 109, Curve Right and Level 98. Curve Right and Down Grade 90, and Curve Left and Up Grade 52.

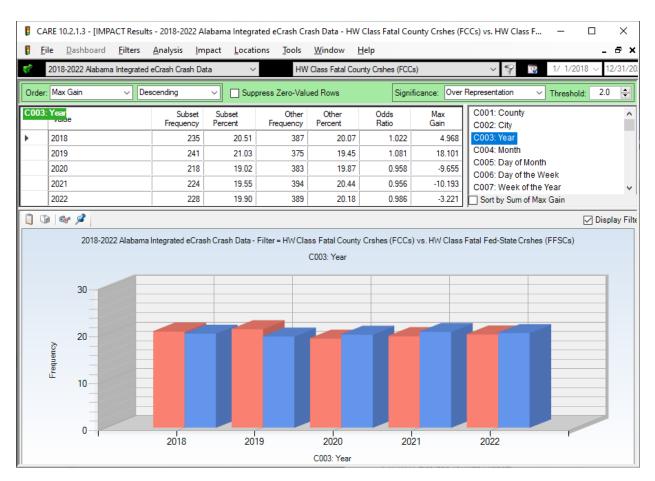
OVER-REPRESENTED FFSCs:, Straight and Level 1,016, Straight with Up Grade 185, and Straight with Down Grade 216.

Curves, especially left curves seem t be a much larger problem on County Roads then on Federal and State Roads.

# **5.0 Time Factors**

## 5.1 C003 Year – copied from Section 3.0 for ease of reference

Fatal County Crashes (FCCs) vs Fatal Federal or State Crashes (FFSCs) by Year



Variations from year to year were not determined to be significant. With the possible exception of 2019, the yearly variation of the FCCs are quite comparable to those of the FFSCs. No year was determined to have a statistically significant difference between the FCCs and FFSCs.

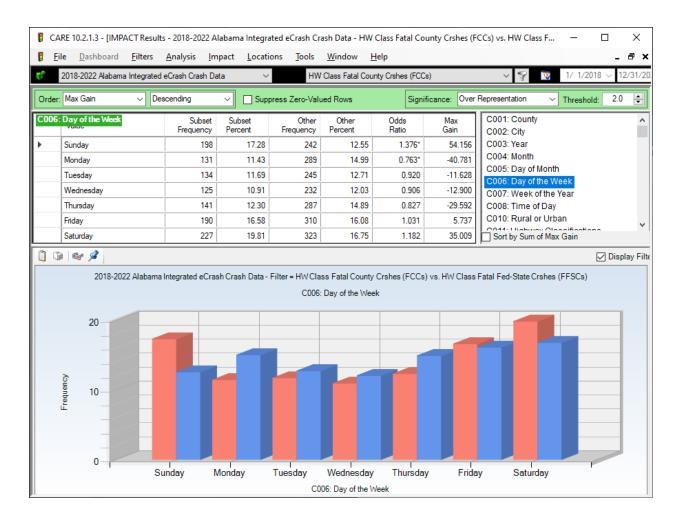
# 5.2 C004 Month

ļ	CARE	10.2.1.3 - [IMP/	ACT Result	s - 2018-2022	Alabama Inte	grated eCrash	Crash Data - H	HW Class Fatal	County Crsh	es (FCCs) vs. HW Cla — 🗆 🗙
ľ	<u>F</u> ile	<u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis <u>I</u>	mpact <u>L</u> oc	ations <u>T</u> ool	s <u>W</u> indow	<u>H</u> elp		- 8
¢?	201	8-2022 Alabama	a Integrated	eCrash Crash [	Data	~ H	W Class Fatal	County Crshes (I	FCCs)	✓ ♥ 1/ 1/2018 ∨ 12
Orc	der: Ma	ax Gain	∼ De	scending	~ 🗆 Si	uppress Zero-V	alued Rows	Signifi	icance: Over	Representation V Threshold: 2.0
C0(	04: Mo	nth		Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C001: County C002: City
•	Jar	nuary		92	8.03	145	7.52	1.067	5.812	C003: Year
	Fel	bruary		70	6.11	141	7.31	0.835	-13.810	C004: Month
	Ma	ırch		90	7.85	163	8.45	0.929	-6.887	C005: Day of Month C006: Day of the Week
	Ар	ril		80	6.98	161	8.35	0.836	-15.698	C007: Week of the Year
	Ma	y		116	10.12	176	9.13	1.109	11.386	C008: Time of Day
	Jur	ne		92	8.03	171	8.87	0.905	-9.642	C010: Rural or Urban
	July	у		110	9.60	162	8.40	1.142	13.707	C011: Highway Classifications C012: Controlled Access
	Au	gust		87	7.59	166	8.61	0.882	-11.670	C012: Controlled Access C013: E Highway Side
	Se	ptember		104	9.08	157	8.14	1.114	10.679	C015: Primary Contributing Circumstance
	Oc	tober		124	10.82	173	8.97	1.206	21.169	C016: Primary Contributing Unit Numbe
	No	vember		96	8.38	154	7.99	1.049	4.463	C017: First Harmful Event
	De	cember		85	7.42	159	8.25	0.899	-9.509	Sort by Sum of Max Gain
1		sy 🖉								🖂 Displ
		2018-2022	Alabama In	tegrated eCras	h Crash Data -	Filter = HW Cla	ess Fatal Count	y Crshes (FCC	s) vs. HW Clas	ss Fatal Fed-State Crshes (FFSCs)
							C004: Month			
		15								
		13								
	~	10								
	Frequency									
	Freq	5								
		0		February	Apr	il	June	Augus	st	October December
							C004: Mor	th		

The ordering of the displays above is according to the natural ordering of months. No months had any statistically significant over-representations. FCC months generally fell in line with their FFSC counterparts. The following presents the Odds Ratios for all months with more than 10% over-representations.

<b>Over-represented County</b>	<b>Over-represented Federal and State</b>						
May 1.109	February 0.835						
July 1.142	April 0.836						
September 1.114	August 0.882						
October 1.206	December 0.899						

# 5.3 C006 Day of the Week Comparison FCCs and FFSCs (same as Section 2.3)



The following presents Days of the Week with over-representations displayed.

<b>Over-represented County</b>	<b>Over-represented Federal and State</b>
Sunday 1.376*	Monday 0.763*
Friday 1.031	Tuesday 0.920
Saturday 1.182	Wednesday 0.906
	Thursday 0.827
*Statistically Significant	

**5.4 Day of the Week Discussion [Omitted to Maintain IMPACT Ordering]** Also, all relevant Day of the Week information is given above.

## 5.5 C008 Time of Day

E E			Alabama mice	grated eCrash	Crash Data - F	IW Class Fatal	County Crshe	es (FCCs) vs. HW Cla — 🛛 🛛 🛛
	ile <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis <u>I</u>	mpact <u>L</u> oca	ations <u>T</u> ool	s <u>W</u> indow	<u>H</u> elp		_ & ×
¢?	2018-2022 Alabama Integrated	eCrash Crash [	Data	~ H	-IW Class Fatal (	County Crshes (I	FCCs)	✓ ♥ 〒 1/ 1/2018 ∨ 12/3
Order	: Max Gain 🗸 De	scending	~ 🗆 Si	uppress Zero-\	/alued Rows	Signifi	icance: Over	Representation V Threshold: 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 12:59 AM	51	4.45	72	3.73	1.192	8.203	C003: Year
	1:00 AM to 1:59 AM	42	3.66	51	2.65	1.385	11.686	C004: Month
	2:00 AM to 2:59 AM	34	2.97	47	2.44	1.217	6.063	C005: Day of Month C006: Day of the Week
	3:00 AM to 3:59 AM	30	2.62	42	2.18	1.202	5.035	C007: Week of the Year
	4:00 AM to 4:59 AM	30	2.62	47	2.44	1.074	2.063	C008: Time of Day
	5:00 AM to 5:59 AM	28	2.44	73	3.79	0.645	-15.391	C010: Rural or Urban
	6:00 AM to 6:59 AM	37	3.23	85	4.41	0.732	-13.524	C011: Highway Classifications
	7:00 AM to 7:59 AM	46	4.01	75	3.89	1.032	1.420	C012: Controlled Access C013: E Highway Side
	8:00 AM to 8:59 AM	27	2.36	53	2.75	0.857	-4.503	C015: Primary Contributing Circumstance
	9:00 AM to 9:59 AM	19	1.66	47	2.44	0.680	-8.937	C016: Primary Contributing Unit Numbe
	10:00 AM to 10:59 AM	28	2.44	73	3.79	0.645	-15.391	C017: First Harmful Event
	11:00 AM to 11:59 AM	35	3.05	66	3.42	0.892	-4.230	C018: Location First Harmful Event Rel t
	12:00 Noon to 12:59 PM	46	4.01	96	4.98	0.806	-11.062	C019: E Most Harmful Event C020: E Distracted Driving Opinion
	1:00 PM to 1:59 PM	41	3.58	103	5.34	0.670	-20.223	C021: Distance to Fixed Object
	2:00 PM to 2:59 PM	72	6.28	109	5.65	1,111	7,211	C022: E Type of Roadway Junction/Featu
	3:00 PM to 3:59 PM	66	5.76	111	5.76	1.000	0.022	C023: E Manner of Crash
	4:00 PM to 4:59 PM	65	5.67	110	5.71	0.994	-0.384	C024: School Bus Related
	5:00 PM to 5:59 PM	74	6.46	116	6.02	1.073	5.050	C025: Crash Severity C026: Intersection Related
	6:00 PM to 6:59 PM	73	6.37	110	5.71	1.116	7.616	C027: At Intersection
	7:00 PM to 7:59 PM	69	6.02	90	4.67	1.290	15.504	C028: Mileposted Route
	8:00 PM to 8:59 PM	78	6.81	96	4.98	1.367	20.938	C029: National Highway System
	9:00 PM to 9:59 PM	61	5.32	108	5.60	0.950	-3.195	C030: Functional Class
	10:00 PM to 10:59 PM	48	4.19	82	4.25	0.985	-0.741	C031: Lighting Conditions C032: Weather
	11:00 PM to 11:59 PM	40	4.15	62	4.25	1.167	6.147	C032: weather C033: Locale
	Unknown	43	0.26	4	0.21	1.167	0.622	C024: E Police Present at Time of Crack
ិព		3	0.20	4	0.21	1.202	0.022	Sort by Sum of Max Gain
0		tegrated eCras	h Crash Data -		ass Fatal Count 08: Time of Day		s) vs. HW Clas	ss Fatal Fed-State Crshes (FFSCs)
	8—							
								hala
			T	114				
	0 4	:00 AM to 4:5	59 AM 9 (	00 AM to 9:5	9 AM 2.00	) PM to 2:59	PM 7.00	PM to 7:59 PM Unknown
					C008: Time o			

The relatively low sample sizes for this attribute has kept any of the hours from being statistically significant (technically). There is a high correlation in the times of the FCCs and the FFSCs. See the next section for more information on Time of Day and Day of the Week.

## 5.6 C008 Discussion on Time of Day

Refer to the Day of the Week by Time of Day cross-tabulation *for all fatal crashes* given immediately below in Section 5.7.

It is no surprise to find Fatal Crashes over-represented during the late night/early morning hours, since their other correlations with aspects of Impaired Driving (ID) are clear. The following narrative was developed with regard to a special study that was done for ID. We include it here because of its relevance to the comparison of FCCs to FFSCs.

Typical traffic patterns of high traffic results on more crashes in the morning and afternoon rush hours. However, IDs, and especially the IDs that occur at night, are just getting started in the afternoon rush hours, and they continue to grow through midnight and the early morning hours, often not tapering off until about 7:00 AM the next day. It is clear that if selective enforcement is going to have an effect on Fatal Crashes, it would have to be conducted at the times when these crashes are most occurring. Optimal times that start with Friday enforcement would continue immediately following any rush hour details, and would continue through at least 8:00 AM the following Saturday or Sunday.

The *Time of Day by Day of the Week* cross-tabulation (given in the next section *for all fatal crashes* (not subdivided by FCCs and FFSCs) shows the optimal times for selective enforcement on all roadways. <u>Generally</u>, the highest proportion of times in any day are given in red for that day. Notice that this works well for Friday Nights, Saturday mornings, Saturday nights, and Sunday mornings.

The expected proportion for all cells in a given row is given at the extreme right in the total row percentage column for each row. If there were absolutely no over-representations across the columns (days), then all of the proportions for those cells would be identical to the one for the total. Notice for example, the 2 AM to 2:59 AM row has a total percentage value of 2.86% for these fatal crashes. The red cells to the left have percentages of 4.86% and 5.07%. The one yellow cell has a percentage of 2.93%, only slightly higher than the average. All the rest of the cells have white background indicating that their percentages are less than 2.86%.

Cells that are lower than the average value (given in the TOTAL column) have a neutral (white) background. Those that are higher, but not more than 10% of the proportion are yellow; and those above 10% more than that expected from the TOTAL (right column) are red.

CARE 10.2.1.3 -	[Crosstab Results	s - 2018-2022 Alabar	ma Integrated eCra	sh Crash Data - Fil	ter = Fatal Crashes]			- 🗆
<u>F</u> ile <u>D</u> ashbo	ard <u>F</u> ilters	<u>A</u> nalysis <u>C</u> rosstal	b <u>L</u> ocations ]	<u>T</u> ools <u>W</u> indow	<u>H</u> elp			- 1
2018-2022 Ala	abama Integrated e	Crash Crash Data	$\sim$	Fatal Crashes		~	9 😵 1/ 1	/2018 ~ 12/31/20
uppress Zero Valu	es: None	<ul> <li>✓ Select</li> </ul>	Cells: 🔳 🗸 🔣	9		Colun	nn: Day of the Week ;	Row: Time of Day
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	TOTAL
2:00 Midnight to 12:59 AM	44	20	14	15	13	20	50	176
	6.68%	3.37%	2.64%	2.85%	2.13%	2.93%	6.50% 34	4.03% 147
:00 AM to 1:59 AM	46 6.98%	15 2.53%	15	1.90%	1.48%	18 2.64%	4.42%	3.36%
00 AM to 2:59	32	10	6	10	8	20	39	125
AM	4.86%	1.68%	1.13%	1.90%	1.31%	2.93%	5.07%	2.86%
00 AM to 3:59	37	14	8	13	15	15	32	134
AM	5.61%	2.36%	1.51%	2.47%	2.46%	2.20%	4.16%	3.06%
:00 AM to 4:59 AM	23	15	14	18	14	12	17	113
	3.49%	2.53%	2.64%	3.42%	2.30%	1.76%	2.21%	2.58%
00 AM to 5:59 AM	22 3.34%	18	23	20	21	33	22	159
:00 AM to 6:59	21	3.03%	4.33%	3.80%	3.45%	4.83%	2.86%	3.64%
AM to 6:59	3.19%	4.04%	4.33%	3.04%	5.09%	3.81%	4.03%	3.93%
00 AM to 7:59	25	21	21	24	36	22	15	164
AM 67.55	3.79%	3.54%	3.95%	4.55%	5.91%	3.22%	1.95%	3.75%
00 AM to 8:59	11	16	20	15	19	18	19	118
AM	1.67%	2.69%	3.77%	2.85%	3.12%	2.64%	2.47%	2.70%
00 AM to 9:59	8	16	15	17	15	16	8	95
AM	1.21%	2.69%	2.82%	3.23%	2.46%	2.34%	1.04%	2.17%
:00 AM to 10:59	9	28	20	18	18	22	21	136
AM	1.37%	4.71%	3.77%	3.42%	2.96%	3.22%	2.73%	3.11%
:00 AM to 11:59	14	27	15	17	21	13	22	129
AM	2.12%	4.55%	2.82%	3.23%	3.45%	1.90%	2.86%	2.95%
12:00 Noon to 12:59 PM	24	33	29	24 4.55%	27	32	30	199
:00 PM to 1:59	3.64% 24	5.56% 31	5.46% 22	4.55%	4.43%	4.69%	3.90%	4.55%
PM 10 1:59	3.64%	5.22%	4.14%	5.69%	4.76%	4.54%	2.60%	4.28%
:00 PM to 2:59	26	35	37	27	43	35	38	241
PM	3.95%	5.89%	6.97%	5.12%	7.06%	5.12%	4.94%	5.51%
:00 PM to 3:59	19	36	33	25	36	39	38	226
PM	2.88%	6.06%	6.21%	4.74%	5.91%	5.71%	4.94%	5.17%
:00 PM to 4:59	30	40	29	39	23	40	31	232
PM	4.55%	6.73%	5.46%	7.40%	3.78%	5.86%	4.03%	5.31%
00 PM to 5:59	32	31	43	41	42	38	35	262
PM	4.86%	5.22%	8.10%	7.78%	6.90%	5.56%	4.55%	5.99%
:00 PM to 6:59 PM	57	35	41	33	33	25	41	265
	8.65%	5.89%	7.72%	6.26%	5.42%	3.66%	5.33%	6.06%
00 PM to 7:59 PM	46 6.98%	21 3.54%	27 5.08%	20 3.80%	44 7.22%	36 5.27%	33 4.29%	227 5.19%
00 PM to 8:59	34	3.54%	34	3.80%	33	40	4.25%	250
PM PM to 8:55	5.16%	5.22%	6.40%	6.07%	5.42%	5.86%	5.98%	5.72%
00 PM to 9:59	31	29	15	28	33	54	51	241
PM	4.70%	4.88%	2.82%	5.31%	5.42%	7.91%	6.63%	5.51%
:00 PM to 10:59	21	24	16	17	22	43	53	196
PM	3.19%	4.04%	3.01%	3.23%	3.61%	6.30%	6.89%	4.48%
:00 PM to 11:59	22	22	10	17	23	34	40	168
PM	3.34%	3.70%	1.88%	3.23%	3.78%	4.98%	5.20%	3.84%
Unknown	1	2	1	1	1	1	3	10
Chichowh	0.15%	0.34%	0.19%	0.19%	0.16%	0.15%	0.39%	0.23%
TOTAL	659	594	531	527	609	683	769	4372
	15.07%	13.59%	12.15%	12.05%	13.93%	15.62%	17.59%	100.00%

# 5.7 C008 Time of Day x C005 Day of the Week (all fatal crashes)

# **6.0 Factors Affecting Severity**

6.1	Severity	for County	. Federal.	and State	Routes (a)	ll crashes)
<b>U</b> •1	Devenuy	IOI County	, <b>I</b> cuci ui	and State	Louice (u	n ci abiicoj

CARE 10.2.1.3 -	[Crosstab Resu	lts - 2018-2022 Alaba	ima Integrated eC	rash Crash Data]			- 🗆	Х
File Dashb	oard <u>F</u> ilters	<u>A</u> nalysis <u>C</u> rossta	ab <u>L</u> ocations	<u>T</u> ools <u>W</u> indow	<u>H</u> elp		-	. 8 :
2018-2022 A	labama Integrated	l eCrash Crash Data	$\sim$	All records (do not	apply a filter)	~	Se 1/ 1	1/2018
Suppress Zero Val	ues: Rows and C	hway Classifications ;	Row: Crash Severit	y 🙋				
	Interstate	Federal	State	County	Municipal	Private Property	TOTAL	
Fatal Injury	575	737	1191	1146	706	17	4372	1
Fatarinjury	0.67%	0.78%	0.85%	1.09%	0.24%	0.07%	0.58%	
Suspected	2054	3099	5249	5438	4317	126	20283	1
Serious Injury	2.39%	3.29%	3.74%	5.15%	1.44%	0.52%	2.70%	
Suspected Minor	6278	8582	13306	11399	20120	615	60300	1
Injury	7.30%	9.12%	9.48%	10.80%	6.71%	2.53%	8.04%	
Descible lainer	6087	9437	13274	7593	27032	749	64172	1
Possible Injury	7.08%	10.03%	9.45%	7.19%	9.01%	3.08%	8.55%	
Property Damage	69817	70838	103634	76200	239389	21867	581745	1
Önly	81.21%	75.26%	73.81%	72.18%	79.81%	90.04%	77.54%	
Halanson	1163	1426	3750	3792	8380	912	19423	1
Unknown	1.35%	1.52%	2.67%	3.59%	2.79%	3.76%	2.59%	
TOTAL	85974	94119	140404	105568	299944	24286	750295	1
TOTAL	11.46%	12.54%	18.71%	14.07%	39.98%	3.24%	100.00%	

This cross-tabulation was introduced in Section 2.2 to illustrate the reason for selecting the comparison of County fatal crashes with those that occur on Federal and State routes. It is repeated here to assist in understanding the subsections remaining in this section. Notice that the basis for this cross-tabulation is <u>all crashes</u> and not just fatal crashes.

# 6.2 IMPACT: FCCs vs FFSCs for C224 Speed at Impact (fatal crashes only)

: ا	2018-2022 Alabama Integrate	ed eCrash Crasł	n Data	$\sim$	HW Class	Fatal County C	rshes (FCCs)	✓  ✓  ✓  Ĩ 1/ 1/2018 ∨
Order:	Max Gain 🗸 🗸	Descending	~ [	Suppress Z	ero-Valued Ro	ws Signifi	cance: Over	Representation V Threshold: 2.0
C224:	CU Estimated Speed at In	npact Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C214: E CU Emergency Status
	0 MPH	0	0.00	0	0.00	0.000	0.000	C216: E CU Placard Status
	1 to 5 MPH	15	1.31	43	2.23	0.587	-10.559	C217: CU Hazardous Cargo
	6 to 10 MPH	26	2.27	67	3.48	0.653	-13.825	C218: E CU Hazardous Released C219: CU Attachment
	11 to 15 MPH	20	1.75	49	2.54	0.687	-9.126	C220: CU Oversized Load Requiring Pe
	16 to 20 MPH	11	0.96	38	1.97	0.487	-11.587	C221: CU Had Oversized Load Permit
	21 to 25 MPH	13	1.13	32	1.66	0.683	-6.021	C222: CU Contributing Vehicle Defect
	26 to 30 MPH	23	2.01	17	0.88	2.276	12.895	C223: CU Speed Limit
	31 to 35 MPH	25	2.18	14	0.73	3.004	16.678	C224: CU Estimated Speed at Impact C225: CU Citation Issued
	36 to 40 MPH	33	2.88	23	1.19	2.414*	19.329	C226: CU Vehicle Damage
	41 to 45 MPH	124	10.82	52	2.70	4.012*	93.091	C227: CU Vehicle Towed
	46 to 50 MPH	47	4.10	69	3.58	1.146	5.987	C230: CU Areas Damaged #1
	51 to 55 MPH	96	8.38	272	14.11	0.594*	-65.676	C231: E CU Areas Damaged #2
	56 to 60 MPH	118	10.30	95	4.93	2.090*	61.532	C232: E CU Areas Damaged #3 C233: CU Point of Initial Impact
	61 to 65 MPH	105	9.16	149	7.73	1.186	16.435	C301: CU Non-Motorist Prior Action
	66 to 70 MPH	93	8.12	92	4.77	1.701*	38.315	C303: E CU K-12 Child W/C To/From Sc
	71 to 75 MPH	38	3.32	74	3.84	0.864	-5.985	C304: E CU Non-Motorist Action at Time
	76 to 80 MPH	50	4.36	76	3.94	1.107	4.826	C305: E CU Non-Motorist Action at Time C306: CU Non-Motorist Location at Time
•	81 to 85 MPH	14	1.22	35	1.82	0.673	-6.804	C306. CO Non-Motorist Eocation at Time C307: E Vehicle Unit That Struck CU Nor
	86 to 90 MPH	16	1.40	40	2.07	0.673	-7.776	C308: CU Non-Motorist Condition
	91 to 95 MPH	5	0.44	7	0.36	1.202	0.839	C309: CU Non-Motorist Officer Opinion A
	96 to 100 MPH	24	2.09	34	1.76	1.188	3.790	C310: CU Non-Motorist Officer Opinion [
	Over 100 MPH	11	0.96	27	1.40	0.685	-5.049	C311: CU Non-Motorist Most Harmful Ev C321: CU Driver/Non-Motorist Seating P
	E Stationary	4	0.35	13	0.67	0.518	-3.727	C322: CU Driver/Non-Motorist Victim/Oci
	Unknown	165	14.40	414	21.47	0.671*	-81.081	C323: CU Driver/Non-Motorist Safety Equ
!	Not Applicable	4	0.35	9	0.47	0.748	-1.350	C324: CU Driver Airbag Status
!	CU is Not a Vehicle	56	4.89	160	8.30	0.589*	-39.104	C325: CU Driver/Non-Motorist Age
	CU is Unknown	10	0.87	27	1.40	0.623	-6.049	C326: CU Driver/Non-Motorist Gender V Sort by Sum of Max Gain
1	Ser 9							
		arated eCrash	Crash Data -	Filter = HW/C	lass Fatal Cou	ntv Crahes (F	CCs) vs. HW/	Class Fatal Fed-State Crshes (FFSCs)
	2010 2022 Alabama inte	igi aloa oordan	oraon bala		Estimated Spee		000) 10.1111	
	30							
	50							
2	20							
Frequency					-			
1	10				110			
		100		e ha			Lan	
	0	16 to 20 MF	РН 4	1 to 45 MPI	H 66 t	o 70 MPH	91 to 9	5 MPH Not Applicable
				C224	CU Estimated	Speed at Imr	act	

Generally, the County road speeds of 26-70 MPH are significantly over-represented. The FFSCs are over-represented at speeds of 71-75, 81-90 and over 100 MPH. The speed limit on County roads is generally 45 MPH, so slower speeds should be expected to accommodate the adverse safety conditions.

uppress Zero Value:	: Rows and Col	umns 🗸 Sel	ect Cells: 🔳 🗸 🚿	9	Column: H	lighway Classification	s ; Row: CU Esti
	Interstate	Federal	State	County	Municipal	Private Property	TOTAL
1 to 5 MPH	3	16	27	15	3	1	65
TOSMPH	0.52%	2.17%	2.27%	1.31%	0.42%	5.88%	1.49%
S to 10 MPH	1	28	39	26	7	1	102
	0.17%	3.80%	3.27%	2.27%	0.99%	5.88%	2.33%
11 to 15 MPH	2	22	27	20	5	0	76
	0.35%	2.99%	2.27%	1.75%	0.71%	0.00%	1.74%
16 to 20 MPH	1	17	21	11	3	0	53
	0.17%	2.31% 10	1.76%	0.96%	0.42%	0.00%	1.21%
21 to 25 MPH	0.00%	1.36%	22	1.13%	0.71%	0.00%	1.14%
	1	5	12	23	8	0.00%	49
26 to 30 MPH	0.17%	0.68%	1.01%	2.01%	1.13%	0.00%	1.12%
	1	5	9	25	8	0	48
31 to 35 MPH	0.17%	0.68%	0.76%	2.18%	1.13%	0.00%	1.10%
	1	10	13	33	8	1	66
36 to 40 MPH	0.17%	1.36%	1.09%	2.88%	1.13%	5.88%	1.51%
41 to 45 MPH	2	14	38	124	11	0	189
+110 40 MEH	0.35%	1.90%	3.19%	10.82%	1.56%	0.00%	4.32%
46 to 50 MPH	5	23	46	47	14	0	135
	0.87%	3.12%	3.86%	4.10%	1.98%	0.00%	3.09%
51 to 55 MPH	4	86	186	96	7	0	379
	0.70%	11.67%	15.62%	8.38%	0.99%	0.00%	8.67%
56 to 60 MPH	16	34	61	118	11	0	240
	2.78%	4.61%	5.12%	10.30%	1.56%	0.00%	5.49% 291
S1 to 65 MPH	33 5.74%	66 8.96%	83 6.97%	105 9.16%	4	0	6.66%
	114	29	63	93	13	0.00%	312
56 to 70 MPH	19.83%	3.93%	5.29%	8.12%	1.84%	0.00%	7.14%
	20	30	44	38	10	0.00%	142
71 to 75 MPH	3.48%	4.07%	3.69%	3.32%	1.42%	0.00%	3.25%
	44	23	53	50	5	0	175
76 to 80 MPH	7.65%	3.12%	4.45%	4.36%	0.71%	0.00%	4.00%
81 to 85 MPH	18	13	22	14	4	0	71
T tO 65 MPH	3.13%	1.76%	1.85%	1.22%	0.57%	0.00%	1.62%
36 to 90 MPH	21	11	29	16	3	0	80
	3.65%	1.49%	2.43%	1.40%	0.42%	0.00%	1.83%
91 to 95 MPH	14	6	1	5	3	0	29
	2.43%	0.81%	0.08%	0.44%	0.42%	0.00%	0.66%
96 to 100 MPH	15	13	21	24	4	0	77
	2.61%	1.76%	1.76%	2.09%	0.57%	0.00%	1.76%
Over 100 MPH	12 2.09%	11 1.49%	16	0.96%	5 0.71%	0	1.26%
	2.09%	1.49%	1.34%	0.96%	5	0.00%	49
E Stationary	4.52%	1.09%	0.42%	0.35%	0.71%	5.88%	1.12%
	136	157	257	165	389	10	1114
Unknown	23.65%	21.30%	21.58%	14.40%	55.10%	58.82%	25.48%
lot Applicable	3	4	5	4	30	1	47
	0.52%	0.54%	0.42%	0.35%	4.25%	5.88%	1.08%
CU is Not a	60	83	77	56	86	0	362
Vehicle	10.43%	11.26%	6.47%	4.89%	12.18%	0.00%	8.28%
CU is Unknown	22	13	14	10	55	2	116
	3.83%	1.76%	1.18%	0.87%	7.79%	11.76%	2.65%
TOTAL	575	737	1191	1146	706	17	4372
	13.15%	16.86%	27.24%	26.21%	16.15%	0.39%	100.00%

# 6.3 Highway Classification (C011) by Speed at Impact (C224) All Fatal Crashes

*All Fatal Crashes.* This shows how fatal crashes are caused by combinations of higher speeds, Impaired Driving (ID), and causal vehicles pulling out on the roadway at slow speeds.

2018-2022 A	abama Integrated e	Crash Crash [	Data 🗸 🗸		All records (do not a	pply a filter)		✓ ♥ 1/ 1/2	
Suppress Zero Valu	Jes:	~	Select Cells: 🔳 🕇	36	9	Column: Crash Severity ; Row: CU		J Estimated Speed at Impact	
	Fatal Injury	Suspect Serious Ir			Possible Injury	Property Damage Only	Unknown	TOTAL	
1 to 5 MPH	65	524	224		3645	49446	836	56757	
TIO S MITT	1.49%	2.58%	3.72	%	5.68%	8.50%	4.30%	7.56%	
6 to 10 MPH	102	729	294	3	3498	33991	518	41781	
	2.33%	3.59%	4.88	%	5.45%	5.84%	2.67%	5.57%	
11 to 15 MPH	76	636	229	4	2651	22655	351	28663	
	1.74%	3.14%	\$ 3.80	%	4.13%	3.89%	1.81%	3.82%	
16 to 20 MPH	53	398	158	1	1839	16005	263	20139	
10 to 20 Mil 11	1.21%	1.96%	2.62	%	2.87%	2.75%	1.35%	2.68%	
21 to 25 MPH	50	371	142	2	1667	13901	296	17707	
	1.14%	1.83%	2.36	%	2.60%	2.39%	1.52%	2.36%	
26 to 30 MPH	49	340	157	7	1825	14131	252	18174	
2010/30/01/11	1.12%	1.68%	2.62	%	2.84%	2.43%	1.30%	2.42%	
21 to 25 MDU	48	564	215	1	2172	16511	378	21824	
31 to 35 MPH	1.10%	2.78%			3.38%	2.84%	1.95%	2.91%	
201-001001	66	660	228	4	2161	15169	307	20647	
36 to 40 MPH	1.51%	3.25%			3.37%	2.61%	1.58%	2.75%	
	189	1710			3181	24518	459	34604	
41 to 45 MPH	4.32%	8.43%			4.96%	4.21%	2.36%	4.61%	
	135	934	235		1639	11883	220	17161	
46 to 50 MPH	3.09%	4.60%			2.55%	2.04%	1.13%	2.29%	
	379	2111			2333	18413	291	27588	
51 to 55 MPH	8.67%	10.413			3.64%	3.17%	1.50%	3.68%	
	240	1168			1127	8707	173	13409	
56 to 60 MPH	5.49%	5.76%			1.76%	1.50%	0.89%	1.79%	
	291	1259			1123	10958	154	15854	
61 to 65 MPH	6.66%	6.21%			1.75%	1.88%	0.79%	2.11%	
	312	1208			1217	13973	108	18786	
66 to 70 MPH	7.14%	5.96%			1.90%	2.40%	0.56%	2.50%	
71 to 75 MPH	142 3.25%	375 1.85%	563 0.93		304 0.47%	3147 0.54%	31 0.16%	4562	
76 to 80 MPH	175	343	42		231	1645	31	2851	
	4.00%	1.69%			0.36%	0.28%	0.16%	0.38%	
81 to 85 MPH	71	138	15		86	455	3	904	
	1.62%	0.68%			0.13%	0.08%	0.02%	0.12%	
86 to 90 MPH	80	148	11		58	289	7	700	
	1.83%	0.73%			0.09%	0.05%	0.04%	0.09%	
91 to 95 MPH	29	38	22		10	51	4	154	
	0.66%	0.19%			0.02%	0.01%	0.02%	0.02%	
96 to 100 MPH	77	93	58		30	148	12	418	
	1.76%	0.46%			0.05%	0.03%	0.06%	0.06%	
Over 100 MPH	55	45	35		24	83	4	246	
	1.26%	0.22%			0.04%	0.01%	0.02%	0.03%	
E Stationary	49	146	42		392	4533	157	5702	
	1.12%	0.72%			0.61%	0.78%	0.81%	0.76%	
Unknown	1114	5095			28798	257736	11824	325629	
	25.48%	25.12	% 34.93	%	44.88%	44.30%	60.88%	43.40%	
Not Applicable CU is Not a Vehicle	47	273	134	0	1302	19553	1486	24001	
	1.08%	1.35%	. 2.22	%	2.03%	3.36%	7.65%	3.20%	
	362	540	67	)	305	175	60	2112	
	8.28%	2.66%			0.48%	0.03%	0.31%	0.28%	
CU is Unknown	116	437			2554	23669	1198	29922	
	2.65%	2.15%			3.98%	4.07%	6.17%	3.99%	
TOTAL	4372	20283			64172	581745	19423	750295	
TOTAL	0.58%	2.70%			8.55%	77.54%	2.59%	100.00%	

### 6.4b Dicussion: C025 Probability of being killed x C224 Speed at Impact

The display above presents information on the effect of increased impact speed on the severity of <u>all crashes</u>. Notice the red in the Fatality and Serious Injury cells as speeds increase. What is more interesting is the probability that an injury crash results in a fatality as a function of impact speed. This is given in the following table using 31-35 MPH as the base speed for the third column, which is the fatality probability multiplier from this base as the speeds increase.

Speed at Impact	Fatality Odds (1 in)	Increase Probability above 31-35
31 to 35 MPH	102.8	1
36 to 40 MPH	78.3	1.3
41 to 45 MPH	50.9	2.0
46 to 50 MPH	37.5	2.7
51 to 55 MPH	23.4	4.4
56 to 60 MPH	18.9	5.4
61 to 65 MPH	16.3	6.3
66 to 70 MPH	15.1	6.8
71 to 75 MPH	9.7	10.5
76 to 80 MPH	6.7	15.3
81 to 85 MPH	6.3	16.4
86 to 90 MPH	5.1	20.4
91 to 95 MPH	3.4	30.1
96 to 100 MPH	3.4	30.7
Over 100 MPH	2.9	35.6

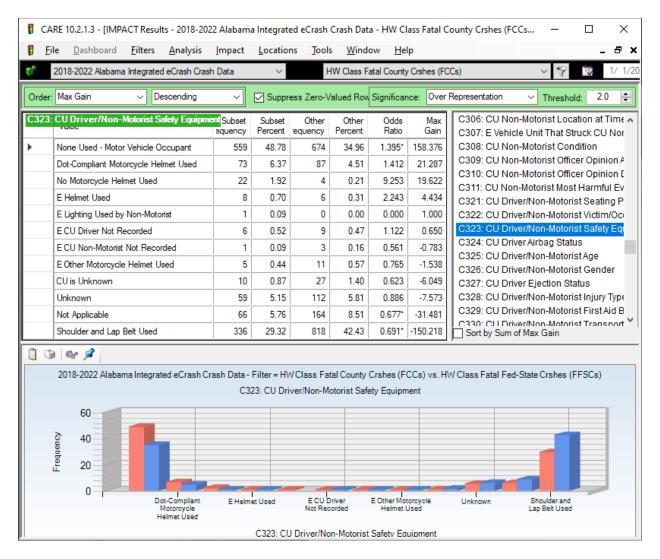
The last column of the above table gives the fatality probability multiplier based on the lowest probability (31-35 MPH), to which was assigned a <u>relative value</u> of 1.0 (not a probability). The probabilities in the form of "**1 in X**" are given in the middle column. For example, the probability of a crash at 46-55 MPH being fatal is one in 37.5. This is 2.7 times that probability if the impact speed were in the 31 to 35 range.

Obviously, speed kills, and a reduction in speed at impact by as little as 5 MPH can have a major effect on whether or not that crash is fatal. On average, the reduction in impact speeds by 10 MPH cut the number of fatal crashes in half. This is one reason that selective enforcement is effective – even officer presence generally causes some speed reduction.

However, there is another major factor in effect here as well – the failure of FDC and FNC drivers to be properly restrained, which will be covered in the next separate attribute below (6.5; Restraint Use by Causal Drivers in Fatal Collisions). This is also correlated with Impaired Driving because Impaired Drivers have been found to have a much lower restraint use than those not impaired.

# 6.5 C323 Restraint Use by Drivers in Fatal Collisions (FCCs vs FFSCs)

The following display presents a restraint-use comparison of FDCs driver safety belt use compared that for all FFSCs, over the same five-year time period.



The proportion of failure to use proper restraints is 39.5% (Odds Ratio = 1.395) higher for County roads than for Federal and State routes according the comparable fatal crash statistics. Shoulder and Lap Belt used is over-represented in FFSCs by about 45% (Odds Ratio 1/0.691 = 1.45 times the expected use in comparison to County seatbelt usage).

File Dashbo	ard <u>F</u> ilters	<u>A</u> nalysis <u>C</u> rossta	b <u>L</u> ocations ]	<u>F</u> ools <u>W</u> indow	<u>H</u> elp			- 6
2018-2022 Al	abama Integrated e	Crash Crash Data	~	Injury Crashes (inclue	ding Fatalities)	~ <	9	1/ 1/2018
Suppress Zero Valu	es: Rows and Col	umns 🗸 Select	:Cells: 🔳 🕶 %	Second Column:	Crash Severity ; Ro	w: CU Driver/Non-Moto	rist Safety Eo	quipment
	Fatal Injury	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	TOTAL			
None Used - Motor Vehicle Oc	1596	4412	5240	2510	13758			
Shoulder and Lap	36.51% 1581	21.75%	8.69% 44825	3.91% 51783	9.23%			
Belt Used	36.16%	57.32%	74.34%	80.69%	73.64%			
Lap Belt Only	7	42	123	154	326			
Used	0.16%	0.21%	0.20%	0.24%	0.22%			
Shoulder Belt	7	32	156	188	383			
Only Used	0.16%	0.16%	0.26%	0.29%	0.26%			
E Forward Facing	0	1	3	0	4			
Child Safety Seat	0.00%	0.00%	0.00%	0.00%	0.00%			
E Rear Facing Child Safety Seat	0	0	0	3	3			
	0.00%	0.00%	0.00%	0.00%	0.00%			
E Rear Facing Child Safety Seat	0.00%	0.00%	2 0.00%	0	2			
E Child in Arms of	0.00%	0.00%	2	0.00%	2			
Restrained Adult	0.00%	0.00%	0.00%	0.00%	0.00%			
Dot-Compliant	201	955	1118	351	2625			
Aotorcycle Helme	4.60%	4.71%	1.85%	0.55%	1.76%			
E Helmet Used	18	102	177	51	348	1		
E Heimet Used	0.41%	0.50%	0.29%	0.08%	0.23%			
E Protective Pads	0	1	0	0	1			
Used (Elbows/Kn	0.00%	0.00%	0.00%	0.00%	0.00%			
Reflective	1	6	7	0	14			
Clothing (Jacket/B	0.02%	0.03%	0.01%	0.00%	0.01%			
E Lighting Used by Non-Motorist	1	3	3	2	9			
E Other Safety	0.02%	0.01% 5	0.00%	0.00%	0.01%			
Equipment Used	0.02%	0.02%	0.02%	0.01%	0.02%			
E Other	24	69	62	13	168			
Motorcycle Helme	0.55%	0.34%	0.10%	0.02%	0.11%			
No Motorcycle	32	111	94	26	263			
Helmet Used	0.73%	0.55%	0.16%	0.04%	0.18%			
Other	9	23	56	38	126			
Ould	0.21%	0.11%	0.09%	0.06%	0.08%			
Unknown	351	1581	4982	5459	12373			
	8.03%	7.79%	8.26%	8.51%	8.30%			
Not Applicable	385	716	1066	546	2713			
	8.81%	3.53%	1.77% 1948	0.85%	1.82%			
CU is Unknown	116 2.65%	437 2.15%	3.23%	2554	3.39%			
E CU Driver Not	32	110	340	414	896			
Recorded	0.73%	0.54%	0.56%	0.65%	0.60%			
E CU Non-	10	51	86	72	219			
Motorist Not Reco	0.23%	0.25%	0.14%	0.11%	0.15%			
TOTAL	4372	20283	60300	64172	149127			
TOTAL	2.93%	13.60%	40.44%	43.03%	100.00%			

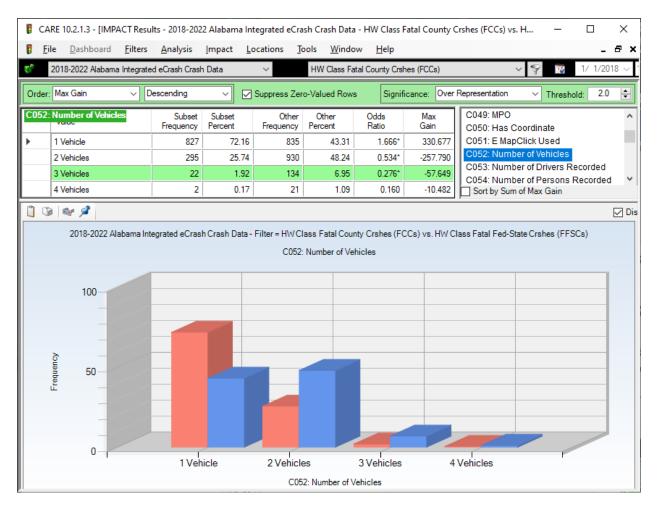
#### 6.6 Crosstabulation: C025 Crash Severity x C323 Restraint Use (all injury)

Calculations are based on <u>all injury</u> (including fatal) crashes.

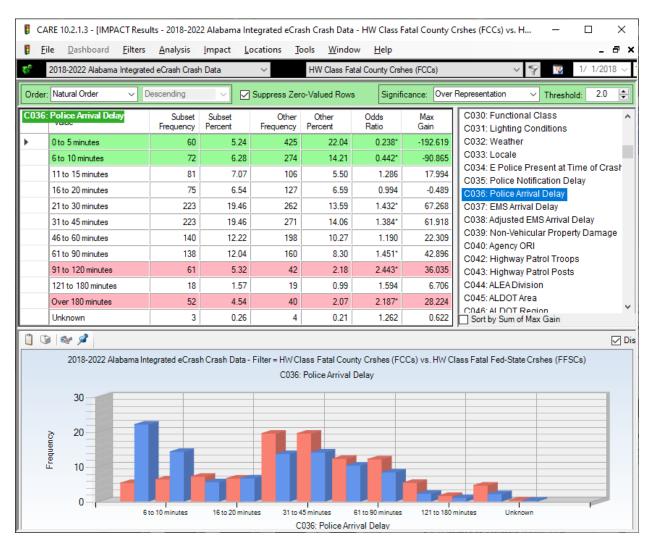
Odds of death <u>not using</u> restraints = 13,758 fatal crashes/1,596 deaths = one in 8.6 injury crashes. Odds of death <u>using</u> restraints = 109,815 fatal crashes/1,581 deaths = one in 68.8 injury crashes. Risk of death is increased by an average factor of 8.0 when not using proper restraints.

# 6.7 C052 Number of Vehicles Involved (FCCs vs FFSCs)

The following display presents a comparison of the number of vehicles in FCCs against number of vehicles FFSCs over the five-year time period of the study.

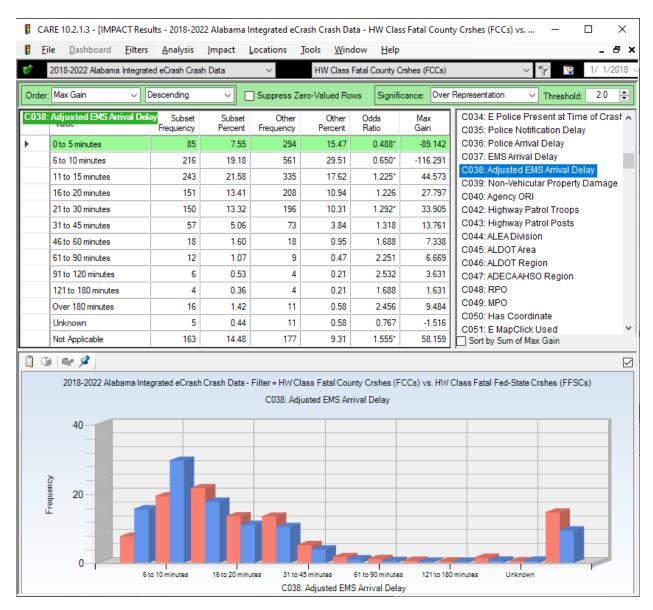


Single vehicle FCCs are over-represented by a factor of 1.666, or about two/thirds higher than expected. The two- and three-vehicle crashes are significantly over-represented in FFSCs by factors of 0.540 and 0.276, respectively (= 85.2% and 362.3% respectively, increases above expectation from County roads). This illustrates that unforced errors (i.e., single vehicle crashes) are much more prevalent in causing FCCs than FFSCs, while the denser traffic on the Federal and State routes leads to more two- and three-vehicle crashes.



# 6.8 C036 Police Arrival Delay (FCCs vs FFSCs)

FNC police arrival delays reflect the issues in finding out about the crash and getting to the scene at night. All delay times above 21 minutes were over-represented for FCCs with high Odds Ratios. Four of the high seven times were statistically significant. The analysis below shows how this correlates with EMS arrival times.



## 6.9 C038 Adjusted EMS Arrival Delay

Federal and State roads are significantly over-represented in the 0 to 10-minute response. County roads are significantly over-represented in the 11 to 15, and 21 to 30 categories. All the times above 30 minutes are over-represented for County roads.

#### 7.0 Driver and Vehicle Demographics

#### 7.1 C106 Driver Age Range 2

	2018-2022 Alabama Integrat	<u> </u>	<u> </u>	$\sim$	HW Class F	atal County C	irshes (FCCs)	✓ ♥ 1/ 1/2018
Order:	Max Gain 🗸	Descending	~ 2	Suppress Ze	ro-Valued Row	/s Signifi	cance: Over	Representation V Threshold: 2.0
C106:	CU Driver Age Range 2	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C103: CU Commercial Motor Vehicle Inc A C104: CU Left Scene
•	6 to 10 Years	1	0.09	0	0.00	0.000	1.000	C105: CU Driver Age Range 1
	11 to 15 Years	8	0.70	2	0.10	6.729	6.811	C106: CU Driver Age Range 2
	16 to 20 Years	136	11.87	168	8.71	1.362*	36.141	C107: CU Driver Raw Age C108: CU Driver Race
	21 to 25 Years	128	11.17	163	8.45	1.321*	31.113	C109: CU Driver Gender
	26 to 30 Years	101	8.81	179	9.28	0.949	-5.397	C110: CU Driver Residence Distance
	31 to 35 Years	105	9.16	197	10.22	0.897	-12.096	C111: CU Driver License State
	36 to 40 Years	96	8.38	147	7.62	1.099	8.623	C112: CU Driver First License Class
	41 to 45 Years	88	7.68	132	6.85	1.122	9.539	C113: CU Driver Second License Class C114: CU Driver License Status
	46 to 50 Years	73	6.37	112	5.81	1.097	6.427	C115: CU Driver CDL Status
	51 to 55 Years	90	7.85	122	6.33	1.241	17.483	C116: CU DL Restriction Violations #1
	56 to 60 Years	76	6.63	124	6.43	1.031	2.295	C117: CU DL Restriction Violations #2
	61 to 65 Years	45	3.93	103	5.34	0.735	-16.223	C118: CU Endorsement Violations #1
	66 to 70 Years	40	3.49	77	3.99	0.874	-5.769	C119: E CU Endorsement Violations #2 C120: E CU Driver Employment Status
	71 to 75 Years	35	3.05	56	2.90	1.051	1.714	C121: CU Driver Condition
	76 to 80 Years	25	2.18	49	2.54	0.858	-4.126	C122: CU Driver Officer Opinion Alcohol
	81 to 85 Years	16	1.40	46	2.39	0.585	-11.342	C123: CU Driver Officer Opinion Drugs
	86 to 90 Years	8	0.70	31	1.61	0.434	-10.426	C124: CU Driver Alcohol Test Type Given C125: E CU Driver Drug Test Type Given
	More than 95 Years	1	0.09	2	0.10	0.841	-0.189	C126: CU Driver Alcohol Test Results
	Not Applicable	4	0.35	4	0.21	1.682	1.622	C127: E CU Driver Drug Test Results
	Unknown	4	0.35	20	1.04	0.336	-7.888	C128: CU Vehicle Initial Travel Direction
	CU is Not a Vehicle	56	4.89	160	8.30	0.589*	-39.104	C129: CU Vehicle Maneuvers
	CU is Unknown	10	0.87	27	1.40	0.623	-6.049	C130: E CU Non-Motorist Maneuvers   Sort by Sum of Max Gain
0	) 😪 🖉			· · ·				
	2018-2022 Alabama Inte	grated eCrash	Crash Data -				CCs) vs. HW (	Class Fatal Fed-State Crshes (FFSCs)
				C106: CI	U Driver Age F	lange 2		
	15							
	≩ 10 <sup>-</sup>	11						
	2010 10 10 10 10 10 10 10 10 10 10 10 10			The second	l'an			
Ľ								
	0	26 to 3	V Vears	51 to	55 Years	76	to 80 Years	Unknown
		20103	o reals		05 rears 06 CU Driver			OTKTOWT

The table display above presents FCCs compared to FFSCs given in 5-year age increments. The blue (FFSC) bars illustrate the problems that 16- to 25-year-old drivers have on County roads, at least partially due to ID (see Sections 8.3 and 8.4). The widest age interval is in ages from 56-90 (blue bars), for the Federal and State routes. Older drivers tend to drive more on the well-established roads for safety reasons.

# 7.2 C109 Driver Gender FCCs vs FFSCs

_	RE 10.2.1.3 - [IMPACT Res						s Fatal County	/ Crshes (FCCs) vs	-	
🚦 Eil	le <u>D</u> ashboard <u>F</u> ilters 2018-2022 Alabama Integra	- /		ocations	<u>T</u> ools <u>W</u> ind	low <u>H</u> elp Fatal County C	rshes (FCCs)	~	<b>9</b>	_ ₽ : 1/ 1/2018
	-	Descending		] Suppress Ze	ero-Valued Ro			Representation ~	Threshold:	2.0 🜩
C109:	CU Driver Gender	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C106: CU Driver Ag C107: CU Driver R	-	-
•	Male	841	73.39	1270	65.87	1.114*	86.114	C108: CU Driver R	ace	
	Female	233	20.33	449	23.29	0.873	-33.885	C109: CU Driver G		
	Unknown	2	0.17	16	0.83	0.210	-7.510	C110: CU Driver R C111: CU Driver Li		
	Not Applicable	4	0.35	6	0.31	1.122	0.434	C112: CU Driver Fi		
	CU is Not a Vehicle	56	4.89	160	8.30	0.589*	-39.104	C113: CU Driver S		
	CU is Unknown	10	0.87	27	1.40	0.623	-6.049	Sort by Sum of Ma:	c Gain	
	2018-2022 Alabama Int				): CU Driver G	· ·	,			-,
	100									
I	Source So		L							
	0	I Male	Female	Un	known M	I Not Applicable	CU is Not a Vehicle	CU is Unknown		

The male and female red and blue bars each individually sum to 100%. So the breakdown in FCCs causal drivers is 73.39% male and 20.333% female. For "Other," FFSCs, the percentage is 65.87% male and 23.29% female. These differences in proportions certainly indicate that males are a greater cause of fatal crashes both County and Federal/State. If there are countermeasures that can be directed toward males, doing so would be much more cost-effective than those directed toward all drivers.

The significant over-representation in "CU is Not a Vehicle" is largely due to pedestrians being coded in this category. For more definitive specifications, see Sections 7.4 and 7.5.

What makes women drivers so much safer in fatal crash comparisons? No doubt it has something to do with speed. See Section 7.3 immediately below.

# 7.3 Cross-tabulation of C109 Driver Gender x C224 Speed at Impact (all fatals)

CARE 10.2.1.3	- [Crosstab Results	- 2018-2022 Alabar	ma Integrated eCra	ish Crash Data - Filt	ter = Fatal Crashes]		- 0	I X
<u>File D</u> ashk	ooard <u>F</u> ilters <u>/</u>	<u>A</u> nalysis <u>C</u> rosstal	<u>L</u> ocations	<u>T</u> ools <u>W</u> indow	<u>H</u> elp			- 8
2018-2022	Alabama Integrated e	Crash Crash Data	~	Fatal Crashes		~	9 1/	1/2018
Suppress Zero Va	lues: Rows and Col	umns 🗸 Select	Cells: 🔳 🛛 🔀	ବ	olumn: CU Driver Ge	ender ; Row: CU Estin	nated Speed at Im	pact 🖪
	Male	Female	Unknown	Not Applicable	CU is Not a Vehicle	CU is Unknown	TOTAL	
1 to 5 MPH	38 1.31%	27 2.91%	0	0.00%	0	0	65 1.49%	
6 to 10 MPH	59 2.03%	43 4.64%	0	0	0	0	102 2.33%	_
11 to 15 MPH	48 1.65%	28 3.02%	0	0	0	0	76 1.74%	_
16 to 20 MPH	27 0.93%	26 2.80%	0.00%	0.00%	0.00%	0.00%	53	_
21 to 25 MPH	33 1.13%	16 1.73%	1	0.00%	0.00%	0.00%	50	-
26 to 30 MPH	35	1.73% 14 1.51%	0	0	0	0	49	-
31 to 35 MPH	1.20%	7	0.00%	0.00%	0.00%	0.00%	1.12% 48	-
36 to 40 MPH	1.41% 50	0.76%	0.00%	0.00%	0.00%	0.00%	1.10%	-
41 to 45 MPH	1.72% 141	1.73% 47	0.00%	0.00%	0.00%	0.00%	1.51% 189	-
46 to 50 MPH	4.85% 108	5.07% 27	2.78% 0	0.00%	0.00%	0.00%	4.32% 135	-
51 to 55 MPH	3.71% 278	2.91% 100	0.00%	0.00%	0.00%	0.00%	3.09% 379	-
	9.55% 182	10.79% 57	2.78%	0.00%	0.00%	0.00%	8.67% 240	_
56 to 60 MPH	6.25% 230	6.15% 60	2.78%	0.00%	0.00%	0.00%	5.49% 291	_
61 to 65 MPH	7.90%	6.47% 62	2.78%	0.00%	0.00%	0.00%	6.66% 312	_
66 to 70 MPH	8.56% 106	6.69% 36	0.00%	4.76%	0.00%	0.00%	7.14%	_
71 to 75 MPH	3.64%	3.88%	0.00%	0.00%	0.00%	0.00%	3.25%	
76 to 80 MPH	147 5.05%	28 3.02%	0	0	0	0	175 4.00%	
81 to 85 MPH	57 1.96%	14 1.51%	0	0	0	0	71 1.62%	_
86 to 90 MPH	68 2.34%	12 1.29%	0 0.00%	0	0	0 0.00%	80 1.83%	_
91 to 95 MPH	29 1.00%	0	0	0	0	0	29 0.66%	_
96 to 100 MPH	68 2.34%	9 0.97%	0	0	0	0	77 1.76%	
Over 100 MPH	50 1.72%	5	0.00%	0.00%	0.00%	0.00%	55	_
	1.72%	0.04%	0.00%	0.00%	0.00%	0.00%	1.20%	

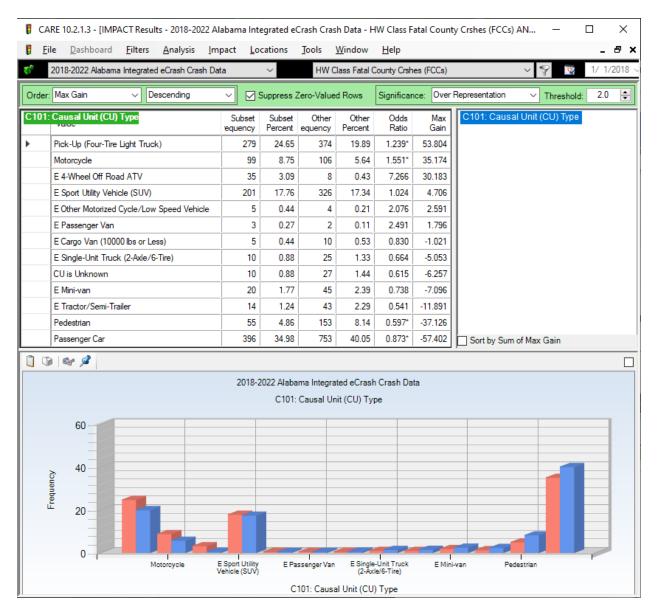
Number and Percent males and females involved in fatal crashes over 75 MPH:

 $419 \text{ Male} = 419/2044 \quad 20.5\%$ 

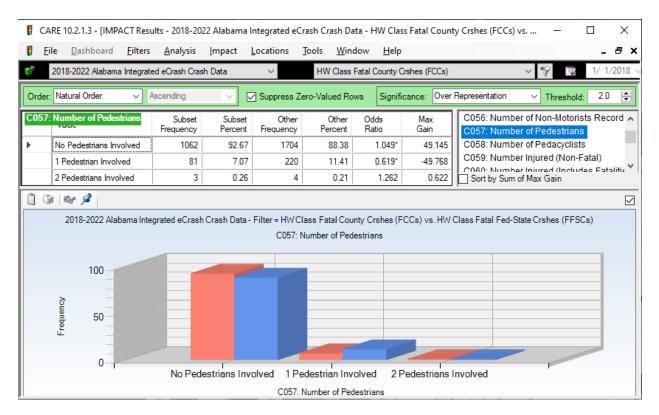
 $68 \text{ Female} = 68/633 \quad 10.7\%.$ 

The proportion of male fatal crashes over 75 MPH is practically double that of the female.

# 7.4 C101 Causal Vehicle Type (> 2 or more crashes) FCCs vs FFSCs



Pickups 279 and Motorcycles 99 were significantly over-represented on County roads. The proportion of Sport Utility Vehicles was approximately equal on both roadway classifications, with the third largest frequencies (201 for FCCs, and 326 for on FFSCs). Pedestrians (55 and 153) and Passenger Cars (396 and 753) were significantly over-represented on Federal/State routes. See Section 7.5 for more information on Pedestrians.



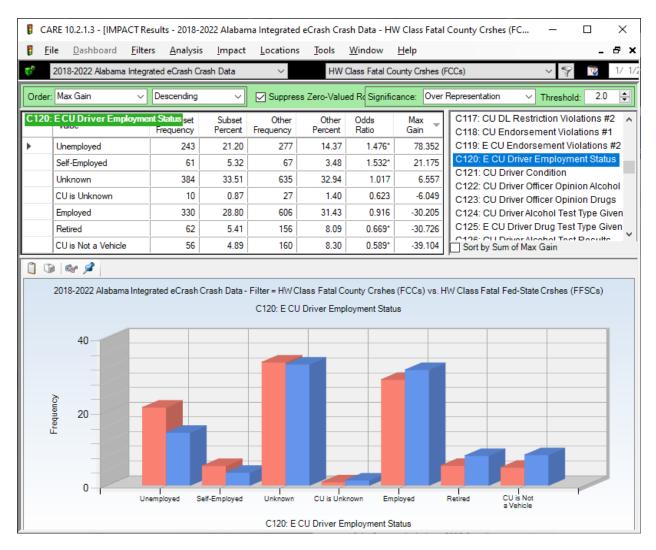
#### 7.5 C058 Number of Pedestrians

Single Fatal Federal and State Pedestrian crashes occur in about 61.9% greater proportion than their County counterparts. This is consistent with what has been found in most pedestrian studies. Both ID and Impaired Walking, contribute to this, as well as pedestrians not taking the maximum provisions for being seen at night.

# 7.6 C114 Driver License Status

CA	RE 10.2.1.3 - [IMPACT Resul	ts - 2018-2022	Alabama Int	egrated eCras	h Crash Data ·	HW Class Fa	tal County Cr	rshes (FCCs) vs. HW 🗕 🗌 🗙
🖡 Ei	le Dashboard Filters	<u>A</u> nalysis	<u>I</u> mpact <u>L</u> o	cations <u>T</u> o	ols <u>W</u> indov	v <u>H</u> elp		_ 8 >
¢°	2018-2022 Alabama Integrate	d eCrash Crash	Data	$\sim$	HW Class Fata	al County Crshe	s (FCCs)	✓ Y 1/ 1/2018 ∨
Order	Max Gain 🗸 D	escending	~ 🖂	Suppress Zero	-Valued Rows	Signific	cance: Over	Representation V Threshold: 2.0
C114:	CU Driver License Status	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C114: CU Driver License Status C115: CU Driver CDL Status
•	Current/Valid	831	72.51	1368	70.95	1.022	17.863	C116: CU DL Restriction Violations #1
	Expired	18	1.57	28	1.45	1.082	1.357	C117: CU DL Restriction Violations #2
	Left State	5	0.44	3	0.16	2.804	3.217	C118: CU Endorsement Violations #1 C119: E CU Endorsement Violations #2
	Revoked	59	5.15	86	4.46	1.154	7.882	C120: E CU Driver Employment Status
	Suspended	82	7.16	100	5.19	1.380	22.560	C121: CU Driver Condition
	E Test Required	1	0.09	1	0.05	1.682	0.406	C122: CU Driver Officer Opinion Alcohol
	Canceled	1	0.09	2	0.10	0.841	-0.189	C123: CU Driver Officer Opinion Drugs C124: CU Driver Alcohol Test Type Given
	Unknown	8	0.70	33	1.71	0.408	-11.615	C125: E CU Driver Drug Test Type Given
	Not Applicable/Unlicensed	75	6.54	120	6.22	1.051	3.672	C126: CU Driver Alcohol Test Results
	CU is Not a Vehicle	56	4.89	160	8.30	0.589*	-39.104	C127: E CU Driver Drug Test Results
	CU is Unknown	10	0.87	27	1.40	0.623	-6.049	Sort by Sum of Max Gain
0	) 🗞 🖉							Die
	2018-2022 Alabama Int	egrated eCrasl	n Crash Data -		ass Fatal Coun J Driver Licens	· ·	Cs) vs. HW Cl	ass Fatal Fed-State Crshes (FFSCs)
	100							
ı	රිස 50							
	0							
		Expired	F	Revoked	E Test Req 4: CU Driver Li	uired	Unknown	CU is Not a Vehicle

FCCs were over-represented in their causal drivers having legitimate licenses. Expired, Revoked and Suspended were also over-represented for FCCs. This indicates that a greater degree of enforcement may be warranted on County roads



## 7.7 C120 Driver Employment Status

This analysis indicated that the unemployment rate for the FCCs was about 21.20%, while that for FFSCs was 14.37%. Higher than average unemployment rates are not surprising because of the underlying drug/alcohol root cause of many fatal crashes (see Sections 8.3-8.4). The following givens the frequency comparisons for FCCs and FFSCs, with an over-representation indication (\*):

Status	FCCs	<b>FFSCs</b>
Retired	62	156*
Unemployed	243*	277
Self-Employed	61*	67
Employed	330	606

\* Statistically significant higher proportion.

# **8.0 Driver Behavior**

# 8.1 C015 Primary Contributing Circumstances (Items < 10 Crashes Removed)

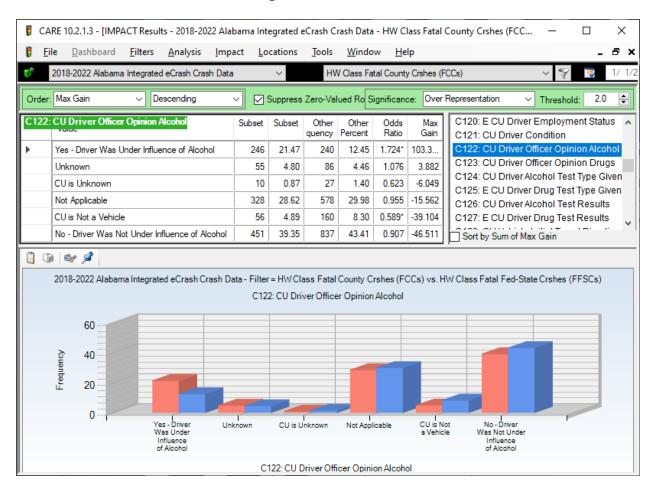
2018-2022 Alabama Integrated eCrash Crash Data       V       HW Class Fatal County Crshes (FCCs)       V       V       1/ 1/20         Order: Max Gain       V       Descending       V       Suppress Zero-Valued Rows       Significance: Over Representation       V       Threshold:       2.0	🚦 CA	RE 10.2.1.3 - [IMPACT Results - 2018-2022 Alaba	ma Integr	ated eCra	ash Crash	Data - H	W Class Fa	atal Count	ty Crshes (FCCs) AN — 🔲 🗙
Order:         Max Gain Descending          Suppress Zero-Valued Rows          Significance:         Over Representation          Threshold         2.0           C0151         Attinuery Gent Librarge Grace Librarge          Subset          Subset          Over Representation          Threshold         2.0           C0151         Attinuery Gent Librarge Grace Librarge          Subset          Subse	🖡 <u>E</u> i	le <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis <u>I</u> mpact	<u>L</u> ocat	ions <u>T</u>	ools <u>W</u>	<u>/</u> indow	<u>H</u> elp		_ @ ;
Coll         Control         Subset squency         Subset squency         Other Percent         Other Ratio         Odda Gan Gan Environment Percent         Matrix Ratio         Matrix Ratio         Matrix Gan Gan Gan Environment Percent         Other Ratio         Odda Gan Gan Environment Percent         Matrix Ratio         Matrix Gan Gan Gan Environment Percent         Other Ratio         Other Ratio         Matrix Ratio         Matrix Gan Gan Gan Gan Environment Percent         Other Ratio         Other Ratio         Matrix Ratio         Matrix Gan Gan Gan Gan Gan Gan Gan Gan Gan Gan	<b>6</b> 8	2018-2022 Alabama Integrated eCrash Crash Data	~	·	HW Cla	iss Fatal C	ounty Crsh	es (FCCs)	✓ ♥ 1/ 1/2018
Note:         pagency         Normality         pagency         Percent         Ratio         Gain           Over Speed Lint         233         23.95         168         10.80         22.18         127.36           DUI         194         19.94         176         11.31         1.763         83.943           E Aggressive Operation         103         10.95         121         7.78         1.361         27.35           E Fan off Road         7.2         7.40         99         6.56         1.161         10.033           E Lying or Stiting in Roadway         10         10.31         6         0.39         2.665         6.248           Diving to Fat for Conditions         50         5.14         7.5         1.19         2.987           E Not Visible         14         1.44         2.8         1.80         0.800         3.503           E Other Distraction inside the Vehicle         12         12.2         2.57         16         2.56         6.286         -3.765           Improper Passing         11         1.13         2.77         4.74         0.551         5.284           E Other- No Improper Driving         10         10.33         2.66         0.386	Order:	Max Gain V Descending V	🛛 🖂 Sup	press Zei	ro-Valued	Rows	Significan	ce: Over	Representation V Threshold: 2.0
DUI       194       194       176       11.31       1.763       83.943         E Aggressive Operation       103       10.59       121       7.78       1.361       27.36         Improper Lane Change/Use       36       3.70       37       2.38       1.556       12.863         E Han off Road       72       7.40       99       6.36       1.163       10.093         E Lying of Stiting in Roadway       100       103       6       0.33       2.665       6.248         Driving too Fast for Conditions       50       5.14       75       4.82       1.066       3.101         E Ront Stop Sign       2.88       400       2.57       1.119       2.997         E Not Visible       14       1.44       2.8       1.80       0.800       3.533         E Over Correcting/Over Steering       2.5       2.57       4.6       2.96       0.88       3.765         Improper Passing       11       1.13       2.7       1.74       0.652       5.884         E Other - No Improper Driving       10       1.03       26       1.67       0.615       6.258         E Fatuged/Aleop       17       1.75       4.82       0.386       0	C015:	Primary Contributing Circumstance		Subset					C015: Primary Contributing Circumstance
E Aggressive Operation       103       1059       121       7.78       1.361       27.336         Improper Lane Change/Use       36       3.70       37       2.38       1.556       12.863         E Ran off Road       72       7.40       99       6.36       1.163       10.093         E Lying or Sitting in Roadway       10       103       6       0.39       2.66       6.248         Driving too Fast for Conditions       50       5.14       75       4.82       1066       3.011         E Ran off Road       22       7.74       6.99       6.36       1.113       2.997         E Not Viable       14       1.44       28       1.80       0.800       3.509         E Other Oltartaction Inside the Vehicle       12       1.23       25       1.61       0.768       3.533         E Other - No Improper Driving       10       1.03       26       1.67       0.615       6.258         E Fategud/Alaleep       17       1.75       44       2.83       0.618       1.0514         Unseen Object/Person/Vehicle       22       2.26       60       3.86       0.586       1.952       1.939         E Fated to Yield Right-of-Way Making Left or U		Over Speed Limit	233	23.95	168	10.80	2.218*	127.946	
Immorper Lane Change/Use         36         3.70         37         2.38         1.556         12.863           E Ran off Road         72         7.40         99         6.36         1.163         10.033           E Lying or Sitting in Roadway         10         1.03         6         0.39         2.655         6.248           Driving too Fast for Conditions         50         5.14         75         4.82         1.066         3.031           E Ran off Road         22         2.88         40         2.57         1.119         2.987           E Not Viable         14         1.44         2.8         1.80         0.800         3.509           E Other Distraction Inside the Vehicle         12         1.23         2.55         1.61         0.768         3.633           E Over Correcting/Over Steering         2.5         2.57         4.6         2.96         0.899         3.765           Improper Passing         11         1.03         2.6         1.67         1.65         6.288           E Fatigued /Aaleep         1.7         1.75         4.4         2.80         0.518         1.0514           Unseen Object/Person/Vehicle         2.2         2.2         6.00         3.86 <td>•</td> <td>DUI</td> <td>194</td> <td>19.94</td> <td>176</td> <td>11.31</td> <td>1.763*</td> <td>83.943</td> <td></td>	•	DUI	194	19.94	176	11.31	1.763*	83.943	
E Ran off Road       72       740       9       6.36       1.163       10.031         E Lying or Sitting in Roadway       10       1.03       6       0.38       2.665       6.248         Diving too Fast for Conditions       50       5.14       75       4.82       1.066       3.101         E Ran Stop Sign       28       2.88       40       2.57       1.19       2.997         E Not Mable       14       1.44       28       1.80       0.800       3.533         E Over Correcting/Over Steering       22       2.57       4.6       2.96       0.869       3.765         Improper Passing       11       1.13       27       7.74       0.652       5.884         E Other - No Improper Driving       10       1.03       26       1.67       0.615       6.258         E Fatigued/Aleep       17       1.75       4.4       2.80       0.618       1.0514         Unseen Object/Person/Vehicle       22       2.26       60       3.82       34.028         E Inproper Crossing       15       1.54       80       5.14       0.300       35.026         E Crossed CerterIne       4.84       4.93       1.47       9.45 <t< td=""><td></td><td>E Aggressive Operation</td><td>103</td><td>10.59</td><td>121</td><td>7.78</td><td>1.361*</td><td>27.336</td><td></td></t<>		E Aggressive Operation	103	10.59	121	7.78	1.361*	27.336	
E Lying or Sitting in Roadway       10       100       6       0.33       2.65       6.244         Driving too Fast for Conditions       50       5.14       75       4.82       1.066       3.101         E Ran Stop Sign       2.8       2.88       40       2.57       1.119       2.987         E Not Viable       14       1.44       2.8       1.80       0.800       3.509         E Other Distraction Inside the Vehicle       12       1.23       2.5       1.61       0.768       3.633         E Over Correcting/Over Steering       2.5       2.57       4.6       2.96       0.893       3.765         Improper Passing       10       1.03       2.6       1.67       0.515       6.258         E Other - No Improper Driving       10       10.30       2.6       1.67       0.515       6.258         E Faileyed / Nelege P       17       1.75       4.4       2.83       0.618       10.514         Unseen Object/ Person/Vehicle       2.2       2.2.6       60       3.86       0.586       1.5519         E Failed to Yield Right-of Way Making Left or U       2.1       2.16       88       5.66       0.382       -34.028         E Failed to Yield		Improper Lane Change/Use	36	3.70	37	2.38	1.556	12.863	
Driving too Fast for Conditions       50       5.14       75       4.82       1.066       3.101         E Ran Stop Sign       28       2.88       40       2.57       1.119       2.987         E Not Visible       14       1.44       28       1.80       0.800       3.509         E Other Distraction Inside the Vehicle       12       1.23       25       1.61       0.768       3.633         E Other Distraction Inside the Vehicle       12       1.23       25       1.61       0.768       3.633         E Other No Improper Passing       11       1.13       27       1.74       0.652       5.884         E Other No Improper Driving       10       10.3       26       1.67       0.515       6.256         E Faileyed/Asleep       117       1.75       44       2.83       0.518       10.514         Unseen Object/Person/Vehicle       22       2.26       60       3.86       0.586       1.519         E Onseed Controline       21       2.16       88       5.66       0.382       -34.028         E Improper Crossing       15       1.54       80       5.14       0.527       -43.922         E Failed to Yield Right-of-Way from Stop Sign		E Ran off Road	72	7.40	99	6.36	1.163	10.093	
E Ran Stop Sign       22       2.88       40       2.57       1.119       2.987         E Not Visble       14       1.44       2.8       1.80       0.800       3.509         E Other Distraction Inside the Vehicle       12       1.23       2.5       1.61       0.768       3.633         E Other Distraction Inside the Vehicle       12       1.23       2.5       1.61       0.768       3.633         E Other Correcting/Over Steering       2.5       2.57       4.6       2.96       0.869       3.765         Improper Passing       11       1.13       2.7       1.74       0.652       5.884         E Other - No Improper Driving       10       1.03       2.6       1.67       0.615       6.259         E Failed to Yield Right-of-Way Making Left or U       22       2.2.6       60       3.86       0.586       1.514         Unseen Object/Person/Vehicle       22       2.16       77       4.95       0.522       43.922         E Improper Crossing       15       1.54       80       5.14       0.300       35.026         E Traveling Wong Way/Wong Side       21       2.16       88       5.66       0.382       -5.027       43.922		E Lying or Sitting in Roadway	10	1.03	6	0.39	2.665	6.248	
E Not Visible       14       14       14       14       180       0.800       3.509         E Not Visible       12       123       25       1.61       0.768       3.633         E Over Correcting/Over Steering       25       2.57       46       2.96       0.869       3.765         Improper Passing       11       1.13       27       1.74       0.652       5.884         E Other - No Improper Driving       10       1.03       26       1.57       0.615       6.258         E Fatigued/Aleep       17       1.75       44       2.83       0.618       1.0514         Unseen Object/Person/Vehicle       22       2.26       60       3.86       0.382       7.34.028         E Failed to Yield Right-of-Way Making Left or U       21       2.16       88       5.66       0.382       7.34.028         E Improper Crossing       15       1.54       80       5.14       0.30       35.026         E Failed to Yield Right-of-Way from Stop Sign       31       3.19       131       8.42       0.378       50.917         Image: E Failed to Yield Right-of-Way from Stop Sign       31       3.19       131       8.42       0.378       50.917		Driving too Fast for Conditions	50	5.14	75	4.82	1.066	3.101	
E Other Distraction Inside the Vehicle       12       123       25       1.61       0.768       3.633         E Over Correcting/Over Steering       25       2.57       46       2.96       0.869       3.765         Improper Passing       11       1.13       27       1.74       0.652       5.884         E Other - No Improper Driving       10       1.03       26       1.67       0.615       6.258         E Fatigued/Asleep       17       1.75       44       2.83       0.618       10.514         Unseen Object/Person/Vehicle       22       2.26       60       3.86       0.586       15.519         E Failed to Yield Right-of-Way Making Left or U       21       2.16       88       5.66       0.382       34.028         E Improper Crossing       15       1.54       80       5.14       0.300       35.026         E Failed to Yield Right-of-Way from Stop Sign       31       3.19       131       8.42       0.378       5.0917         Cother / Neid Right-of-Way from Stop Sign       31       3.19       131       8.42       0.378       5.0917         Cother / Neid Right-of-Way from Stop Sign       31       3.19       131       8.42       0.378		E Ran Stop Sign	28	2.88	40	2.57	1.119	2.987	
E Over Correcting/Over Steering       25       257       46       296       0.869       3.765         Improper Passing       11       1.13       27       1.74       0.652       5.884         E Other - No Improper Driving       10       1.03       26       1.67       0.615       6.256         E Fatigued/Asleep       17       1.75       44       2.83       0.618       10.514         Unseen Object/Person/Vehicle       22       2.26       60       3.86       0.586       15.519         E Failed to Yield Right-of-Way Making Left or U       21       2.16       77       4.95       0.436*       27.150         Traveling Wrong Way/Wrong Side       21       2.16       88       5.66       0.322*       3.4028         E Improper Crossing       15       1.54       80       5.14       0.300       35.026         E Crossed Certerline       4.8       4.33       147       9.45       0.522*       43.921         Improper Crossing       15       1.54       80       5.14       0.300       35.026         E Tauled to Yield Right-of-Way from Stop Sign       31       3.19       131       8.42       0.378*       50.917         Image Consel Cont		E Not Visible	14	1.44	28	1.80	0.800	-3.509	
Improper Passing       11       1.13       27       1.74       0.652       5.884         E Other - No Improper Driving       10       1.03       26       1.67       0.615       6.258         E Fatigued/Asleep       17       1.75       44       2.83       0.618       1.0514         Unseen Object/Person/Vehicle       22       2.26       60       3.86       0.586       1.5519         E Failed to Yield Right-of-Way Making Left or U       21       2.16       77       4.95       0.436*       27.150         Traveling Wrong Way/Wrong Side       21       2.16       88       5.66       0.382       -34.028         E Improper Crossing       15       1.54       80       5.14       0.300       -35.026         E Crossed Centerline       48       4.93       147       9.45       0.522       -43.922         E Failed to Yield Right-of-Way from Stop Sign       31       3.19       131       8.42       0.378*       -50.917         Colls-2022 Alabama Integrated eCrash Crash Data       Colls: Primary Contributing Circumstance       2018-2022 Alabama Integrated eCrash Crash Data       Colls: Primary Contributing Circumstance         Of Ung       Graph Bad       Externol       Externol       Externol		E Other Distraction Inside the Vehicle	12	1.23	25	1.61	0.768	-3.633	
E Other - No Improper Driving 10 1.03 26 1.67 0.615 6.258 E Fatgued/Asleep 117 1.75 44 2.83 0.618 10.514 Unseen Object/Person/Vehicle 22 2.26 60 3.86 0.586 15.519 E Failed to Yield Right-of-Way Making Left or U 21 2.16 77 4.95 0.436 27.150 Traveling Wrong Way/Wrong Side 21 2.16 88 5.66 0.382 34.028 E Improper Crossing 15 1.54 80 5.14 0.300 35.026 E Crossed Centerline 48 4.93 147 9.45 0.522 4.3.922 E Failed to Yield Right-of-Way from Stop Sign 31 3.19 131 8.42 0.378 5.0.917 Sort by Sum of Max Gain 2018-2022 Alabama Integrated eCrash Crash Data C015: Primary Contributing Circumstance		E Over Correcting/Over Steering	25	2.57	46	2.96	0.869	-3.765	
E Fatigued/Asleep 17 1.75 44 2.83 0.618 10.514 Unseen Object/Person/Vehicle 22 2.26 60 3.86 0.586 15.519 E Failed to Yield Right-of-Way Making Left or U 21 2.16 77 4.95 0.436' 27.150 Traveling Wrong Way/Wrong Side 21 2.16 88 5.66 0.382' 34.028 E Improper Crossing 15 1.54 80 5.14 0.300 -35.026 E Crossed Centerline 48 4.93 147 9.45 0.522' 43.922 E Failed to Yield Right-of-Way from Stop Sign 31 3.19 131 8.42 0.378' -50.917 Sort by Sum of Max Gain 2018-2022 Alabama Integrated eCrash Crash Data C015: Primary Contributing Circumstance		Improper Passing	11	1.13	27	1.74	0.652	-5.884	
Unseen Object/Person/Vehicle 22 2.26 60 3.86 0.586 -15.519 E Failed to Yield Right-of-Way Making Left or U 21 2.16 77 4.95 0.436 27.150 Traveling Wrong Way/Wrong Side 21 2.16 88 5.66 0.382 34.028 E Improper Crossing 15 1.54 80 5.14 0.300 35 0.26 E Crossed Centerline 48 4.93 147 9.45 0.522 43.922 E Failed to Yield Right-of-Way from Stop Sign 31 3.19 131 8.42 0.378 -50.917 Construction of Max Gain Construction of Ma		E Other - No Improper Driving	10	1.03	26	1.67	0.615	-6.258	
E Failed to Yield Right-of-Way Making Left or U 21 2.16 77 4.95 0.436 27.150 Traveling Wrong Way/Wrong Side 21 2.16 88 5.66 0.382 34.028 E Improper Crossing 15 1.54 80 5.14 0.300 35.026 E Crossed Centerline 48 4.93 147 9.45 0.522 43.922 E Failed to Yield Right-of-Way from Stop Sign 31 3.19 131 8.42 0.378 50.917 Sort by Sum of Max Gain C C 2018-2022 Alabama Integrated eCrash Crash Data C C 2018-2022 Alabama Integrated eCrash Crash Data C C 2018-2022 Alabama Integrated eCrash Crash Data C 15: Primary Contributing Circumstance		E Fatigued/Asleep	17	1.75	44	2.83	0.618	-10.514	
Traveling Wrong Way/Wrong Side 21 2.16 88 5.66 0.382* 34.028 E Improper Crossing 15 1.54 80 5.14 0.300 35.026 E Crossed Centerline 48 4.93 147 9.45 0.522* 43.922 E Failed to Yield Right-of-Way from Stop Sign 31 3.19 131 8.42 0.378* 50.917 Control Stop Sign 2012 2012 Alabama Integrated eCrash Crash Data C015: Primary Contributing Circumstance		Unseen Object/Person/Vehicle	22	2.26	60	3.86	0.586	-15.519	
E Improper Crossing 15 1.54 80 5.14 0.300 -35.026 E Crossed Centerline 48 4.93 147 9.45 0.522 43.922 E Failed to Yield Right-of-Way from Stop Sign 31 3.19 131 8.42 0.378 -50.917 Sort by Sum of Max Gain		E Failed to Yield Right-of-Way Making Left or U	21	2.16	77	4.95	0.436*	-27.150	
E Crossed Centerline 48 4.93 147 9.45 0.522* 43.922 E Failed to Yield Right-of-Way from Stop Sign 31 3.19 131 8.42 0.378* -50.917 Sort by Sum of Max Gain Control Structure Control Structure Co		Traveling Wrong Way/Wrong Side	21	2.16	88	5.66	0.382*	-34.028	
E Failed to Yield Right-of-Way from Stop Sign 31 3.19 131 8.42 0.378* -50.917 Sort by Sum of Max Gain Sort by Sum of Max Gain 2018-2022 Alabama Integrated eCrash Crash Data C015: Primary Contributing Circumstance 0 0 0 0 0 0 0 0 0 0 0 0 0		E Improper Crossing	15	1.54	80	5.14	0.300	-35.026	
2018-2022 Alabama Integrated eCrash Crash Data C015: Primary Contributing Circumstance		E Crossed Centerline	48	4.93	147	9.45	0.522*	-43.922	
2018-2022 Alabama Integrated eCrash Crash Data C015: Primary Contributing Circumstance		E Failed to Yield Right-of-Way from Stop Sign	31	3.19	131	8.42	0.378*	-50.917	Sort by Sum of Max Gain
C015: Primary Contributing Circumstance	0	) 🕼 🖉							Ε
A Construction of the cons			2018-202	2 Alabama	a Integrate	ed eCrash	Crash Dat	а	
Participandi and a second and a			C015	: Primary	Contributi	ng Circur	nstance		
10 E Ranoff Road E Other Distraction Unseen Object/Person/Vehicle E Failed to Yield		30							
10 E Ranoff Road E Other Distraction Unseen Object/Person/Vehicle E Failed to Yield									
10 E Ranoff Road E Other Distraction Unseen Object/Person/Vehicle E Failed to Yield		20							
ERanoff Road E Other Distraction Unseen Object/Person/Vehicle E Failed to Yield	5								
ERanoff Road E Other Distraction Unseen Object/Person/Vehicle E Failed to Yield	Louis								
	4			_					
					-				
Inside the Venicle Right-of-Way from Stop Stop		0 E Ran off Road					Unsee	n Object/Per	
C015: Primary Contributing Circumstance			C				umstance		Right-of-Way from Stop Sign

#### 8.2 Discussion of Primary Contributing Circumstances (PCC) Results Above

These results demonstrate the driver behaviors as they were defined by the C015, Primary Contributing Circumstances (PCCs), which accompanied FCCs and FFSCs. Items over-represented in their expected proportion (when compared to their controls) are as follows, with frequencies:

	FCCs PCC Overrepresented	FCCs	<b>FFSCs</b>		
0	Over Speed Limit	233*	168		
0	ID/DUI (Impaired Driving)	194*	176		
0	Aggressive Operation	103*	121		
0	Improper Lane Change/Use	36	37		
0	Ran Off Road	72	99		
0	Lying or Sitting in Roadway (pedestrian)	10	6		
0	Driving too Fast for Conditions	50	75		
0	Ran STOP Sign	28	40		
	Federal/State Overrepresented			FCCs	<b>FFSCs</b>
0	Federal/State Overrepresented Failed to Yield ROW at STOP Sign			<b>FCCs</b> 31	<b>FFSCs</b> 131*
0	-				
-	Failed to Yield ROW at STOP Sign			31	131*
0	Failed to Yield ROW at STOP Sign Crossed Centerline			31 48	131* 147*
0	Failed to Yield ROW at STOP Sign Crossed Centerline Improper Crossing (pedestrian)			31 48 15	131* 147* 80
0 0 0	Failed to Yield ROW at STOP Sign Crossed Centerline Improper Crossing (pedestrian) Traveling Wrong Way/Wrong Side	pedestria	n)	31 48 15 21	131* 147* 80 88*
	Failed to Yield ROW at STOP Sign Crossed Centerline Improper Crossing (pedestrian) Traveling Wrong Way/Wrong Side Failed to Yield ROW Left or U Turn	pedestria	n)	31 48 15 21 21	131* 147* 80 88* 77*
	Failed to Yield ROW at STOP Sign Crossed Centerline Improper Crossing (pedestrian) Traveling Wrong Way/Wrong Side Failed to Yield ROW Left or U Turn Unseen Object/Persons/Vehicle (probable p	pedestria	n)	31 48 15 21 21 22	131* 147* 80 88* 77* 60

None of the items listed here or in the IMPACT table are necessarily mutually exclusive from the others. Each should be viewed in terms of their relative positions in the table as opposed to any one of them being the absolute cause.



# 8.3 C122 CU Driver Officer's Opinion Alcohol

Impaired Driving/Alcohol was indicated as one cause of the crash for 21.47% of the FCCs, and 12.45% of the FFSCs. This gives an ID Odds Ratio of 1.724. ID/DUI tends to be underreported, and there is no doubt that its reduction would have a major impact on reducing the number of fatal crashes, both day and night.

# 8.4 C123 CU Driver Officer's Opinion Drugs (other than alcohol)

CA	RE 10.	2.1.3 - [IMP/	ACT Res	ults - 2018-20	022 Alab	ama Inte	egrated e	Crash Cr	ash Data	- HW CI	ass Fatal	County Crshes (FCC	_		×
E E	ile 🛛	<u>)</u> ashboard	<u>F</u> ilter:	s <u>A</u> nalysis	<u>I</u> mpa	ct <u>L</u> o	cations	<u>T</u> ools	<u>W</u> indo	w <u>H</u> e	p			-	₽×
¢°	2018-2	2022 Alabama	a Integra	ted eCrash Cra	ish Data		$\sim$	HW	/ Class Fa	tal County	r Crshes (F	CCs)	~ 9	12	1/ 1/2
Order	Max (	Gain	~	Descending	``		Suppress	Zero-Val	ued Ro S	ignificand	e: Over	Representation 🗸 🏹	Threshold:	2.0	-
C123:		river Officer	r Opinio	n Drugs		Subset	Subset	Other quency	Other Percent	Odds Ratio	Max Gain	C120: E CU Driver Er C121: CU Driver Con		nt Statu	5 ^
•	No - E	Driver Was N	ot Under	r Influence of D	)rugs	506	44.15	816	42.32	1.043	20.971	C122: CU Driver Offic			_
l	Not A	pplicable				418	36.47	680	35.27	1.034	13.809		C123: CU Driver Officer Opinio C124: CU Driver Alcohol Test T		
<b></b>	Yes -	Driver Was U	Jnder Inf	luence of Drug	s	96	8.38	141	7.31	1.145	12.190	C125: E CU Driver Dr			
l	Unknown						5.24	104	5.39	0.971	-1.817	C126: CU Driver Alco	C126: CU Driver Alcohol Test R		
	CU is	Unknown				10	0.87	27	1.40	0.623	-6.049	C127: E CU Driver Dr	rug Test F	tesults 🗸	~
	CU is	Not a Vehicle	e			56	4.89	160	8.30	0.589*	-39.104	Sort by Sum of Max G	iain	<b>D</b> . 1	
	<ul> <li>Image: Control of the second se</li></ul>														
	Frequency	60 40 20 0		No - Driver Was Not nder Influence of Drugs	Not Ap	I	Yes - Was L Influence	Under	L Unkno	Dwn	CU is Unkr	nown CU is Not a Vehicle			
						С	123: CU I	Driver Off	ficer Opin	iion Druge	8				

The reported non-alcohol drug use in FCCs is about 39% (8.38/21.47) of that for alcohol. In both cases (FCCs and FFSCs), drug use is difficult to detect compared to alcohol, which has well-established tests for the blood-alcohol level that are much easier to administer. Our conclusion is that both alcohol and non-alcohol drug use are major contributors to increasing the frequency of fatal crashes, and their use is further compounded if they choose to avoid detection by using county roads, or they choose to speed or fail to use proper restraints.