Impaired Driving Study 2008-2012

The Who, What, When, Where and Why of Impaired Driving Crashes

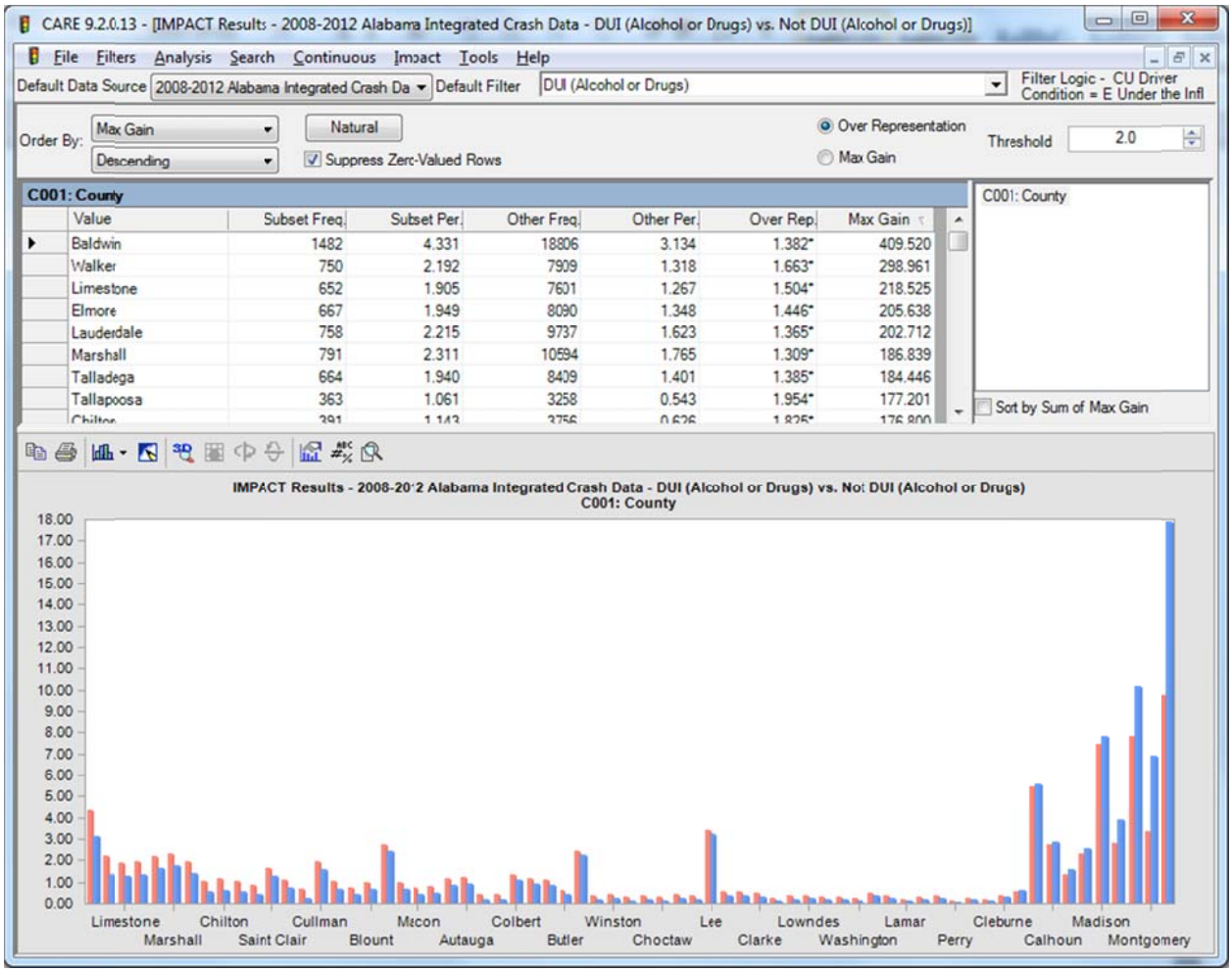
This report presents the results of a comparison of Impaired Driving (ID) crashes compared to non-ID crashes over the most recently five year period (CY2008-20120). ID includes all DUI regardless of the impairment source, e.g., alcohol or drugs (prescription or illegal). An *over-represented* value of an attribute is a situation found where that attribute has a greater share of ID crashes than would be expected if it were the same as non-ID crashes. That is, the non-ID crashes are serving as a control to which the ID crashes are being compared. In this way anything different about ID crashes surfaces and can be subjected to further analyses.

The analytical technique employed on most of the displays below are called Information Mining Performance Analysis Control Technique (IMPACT) outputs. For a detailed description of the meaning of each element of the outputs, see:

http://www.safehomealabama.gov/DataAnalysis/CAREeCrash.aspx

Geographical Factors

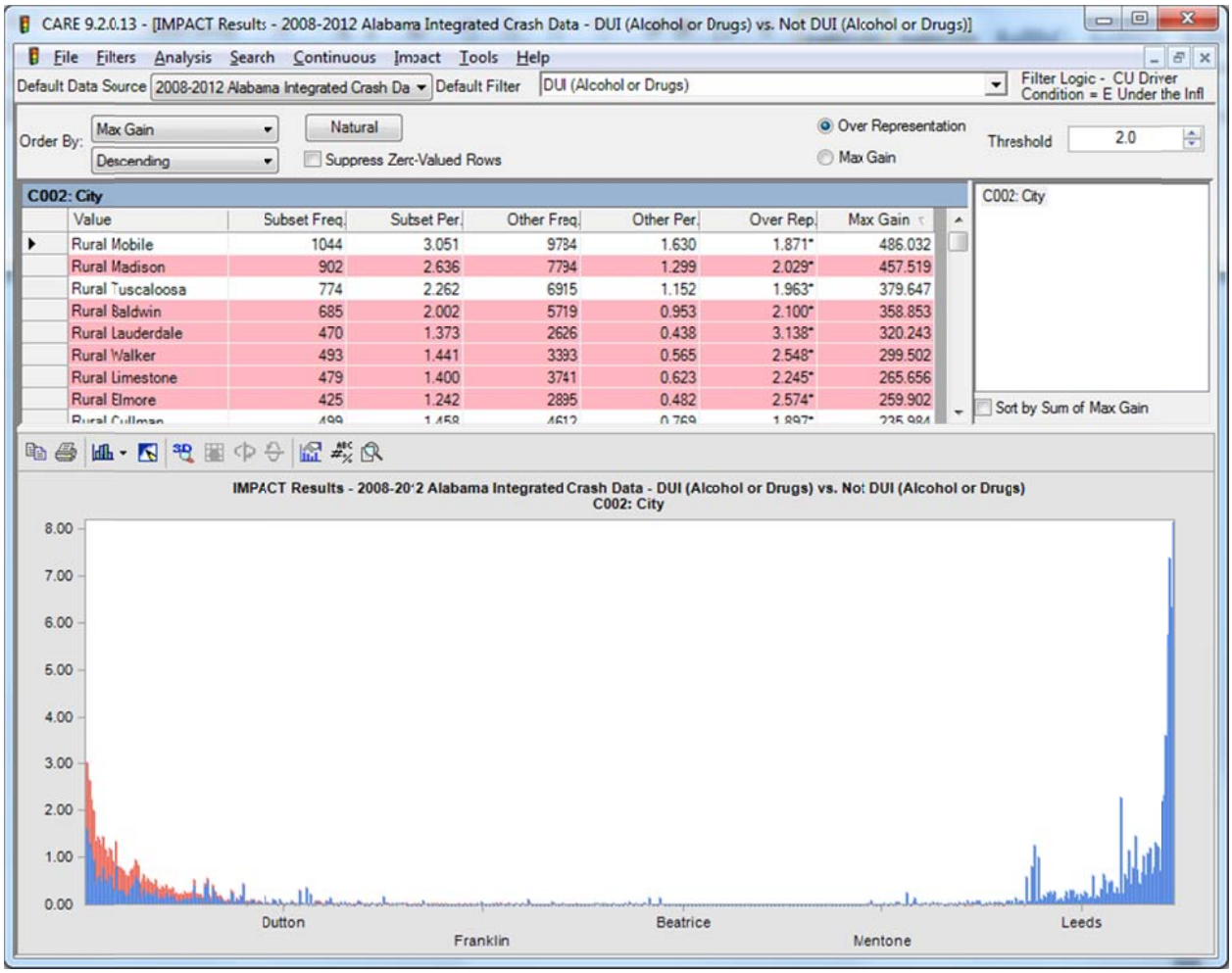
County



Value	Subset Freq.	Subset Per.	Other Freq.	Other Per.	Over Rep.	Max Gain
Baldwin	1482	4.331	18806	3.134	1.382*	409.520
Walker	750	2.192	7909	1.318	1.663*	298.961
Limestone	652	1.905	7601	1.267	1.504*	218.525
Elmore	667	1.949	8090	1.348	1.446*	205.638
Lauderdale	758	2.215	9737	1.623	1.365*	202.712
Marshall	791	2.311	10594	1.765	1.309*	186.839
Talladega	664	1.940	8409	1.401	1.385*	184.446
Tallapoosa	363	1.061	3258	0.543	1.954*	177.201

The analysis of impaired driving crashes by county indicates the greatest over-representations to be in Baldwin, Walker, Limestone, Elmore, and Lauderdale Counties. Montgomery, Jefferson, and Shelby counties were the most under-represented counties for impaired driving crashes. Generally, the over-represented counties contain larger rural areas. See the rural-urban comparison below.

City



Value	Subset Freq.	Subset Per.	Other Freq.	Other Per.	Over Rep.	Max Gain
Rural Mobile	1044	3.051	9734	1.630	1.871*	486.032
Rural Madison	902	2.636	7794	1.299	2.029*	457.519
Rural Tuscaloosa	774	2.262	6915	1.152	1.963*	379.647
Rural Baldwin	685	2.002	5719	0.953	2.100*	358.853
Rural Lauderdale	470	1.373	2626	0.438	3.138*	320.243
Rural Walker	493	1.441	3393	0.565	2.548*	299.502
Rural Limestone	479	1.400	3741	0.623	2.245*	265.656
Rural Elmore	425	1.242	2895	0.482	2.574*	259.902

For comparison purposes, the rural areas of counties are considered to be "virtual cities" in that crashes that occur there are listed as "Rural County" so that these crashes can be duly accounted for. Generally those rural areas that are adjacent to (or contain) significant urban areas, such as Mobile, Madison and Tuscaloosa, are over-represented. Contrasted with this finding, there was significant under-representation for impaired driving crashes in the largest cities themselves (e.g., Montgomery, Birmingham, and Mobile). This can be attributed to a number of possible factors in urban areas:

- Less need for motor vehicle travel to the drinking establishments;
- Larger police presence in the metropolitan areas; and
- Lower speeds in rural areas result in a lower severity of crashes, which may be less apt to be reported as caused by impaired driving. Urban crashes contain many described as fender-benders or lose speed rear-end bumper crashes.

Severity of Crash by Rural-Urban

CARE 9.2.0.13 - [Crosstab - 2008-2012 Alabama Integrated Crash Data - C024: Crash Severity vs. C010: Rural or Urban - Filter = D...

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Default Data Source 2008-2012 Alabama Integrated Crash Da | Default Filter DUI (Alcohol or Drugs) | Filter Logic -

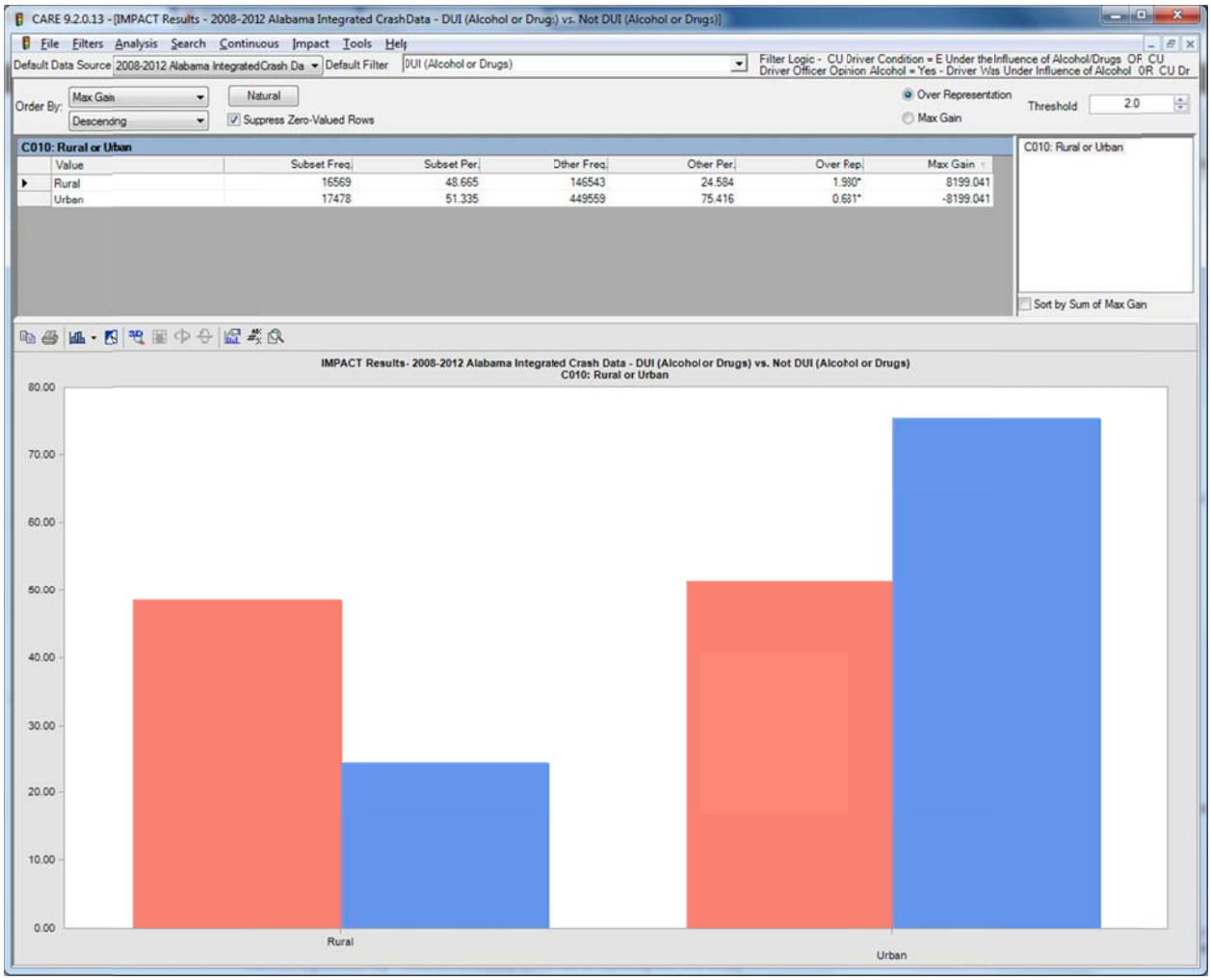
Select Cells: | Suppress Zero Values: None | Column: C024: Crash Severity ; Row: C010: Rural or Urban

	Fatal Injury	Incapacitatng Injury	Non-Incapacitating Inju	Possible Injury	Property Damage Only	Unknown	TOTAL
Rural	759 70.41%	3807 62.04%	2511 54.66%	679 28.26%	8687 44.77%	146 24.05%	16589 48.48%
Urban	319 29.59%	2329 37.96%	2083 45.34%	1724 71.74%	10716 55.23%	461 75.95%	17632 51.52%
TOTAL	1078 3.15%	6136 17.93%	4594 13.42%	2403 7.02%	19403 56.70%	607 1.77%	**34221** **100.00%**

The red cells in the cross-tabulation above indicate over-representation by more than 10%. For example, while 48.48% of crashes occur in rural areas, over 70% of the fatal crashes occur there. It is imperative to take into consideration crash severity when making geographical decisions regarding countermeasure implementation.

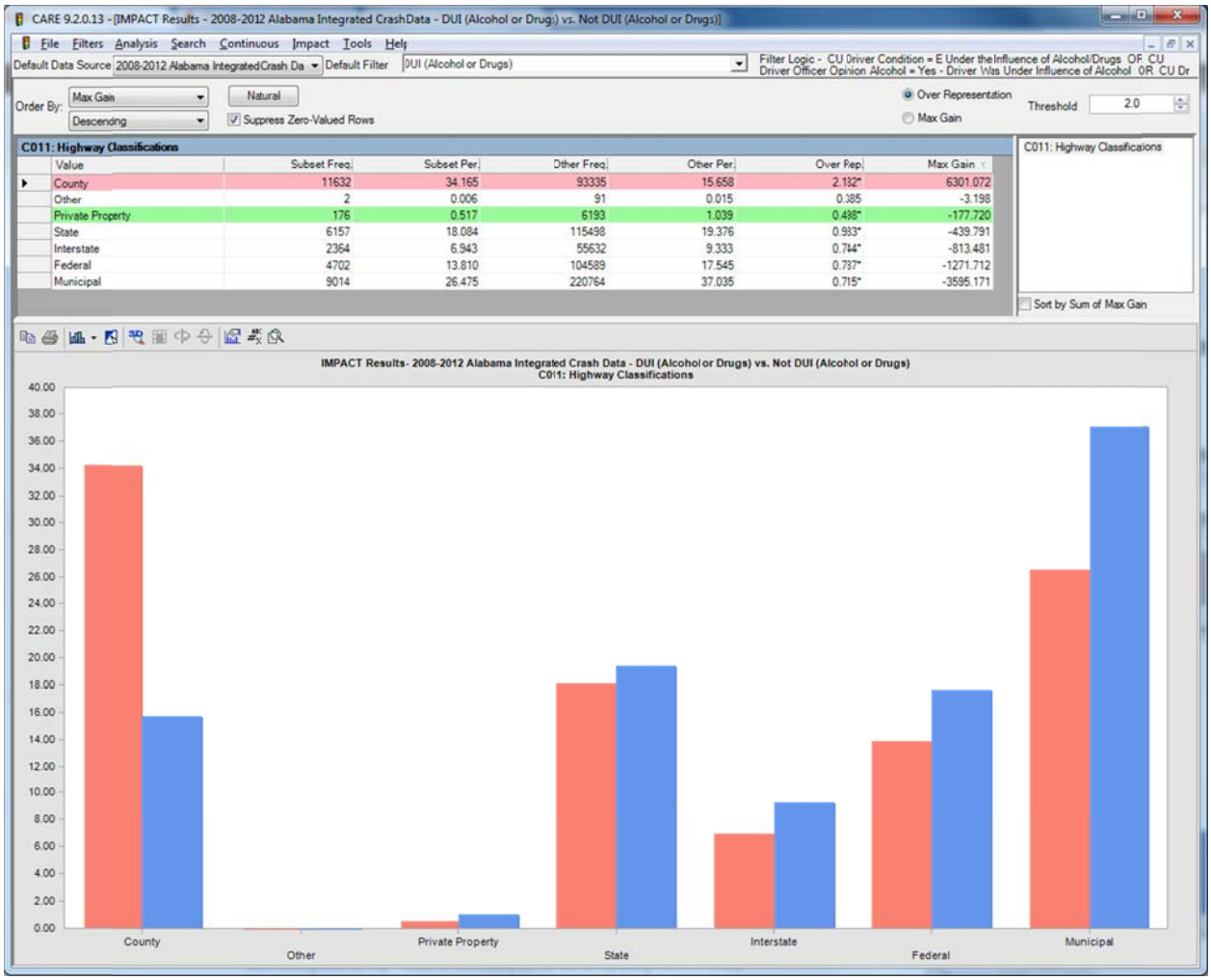
Some recent ads have stated that the urban areas contain the ID hotspots. This is only true if looking at the total frequency of the ID crashes as the criterion and ignoring severity.

Rural or Urban



Not only are impaired driving crashes more severe in rural areas, but the chart above shows that their frequency is about the same as in the urban area (compare the height of the red bars). Not only that, but the urban areas have a much higher ratio of ID crashes. While only about 25% of the crashes are expected in the rural areas, the red bar for rural shows it to be nearly 50%, or double its expected value.

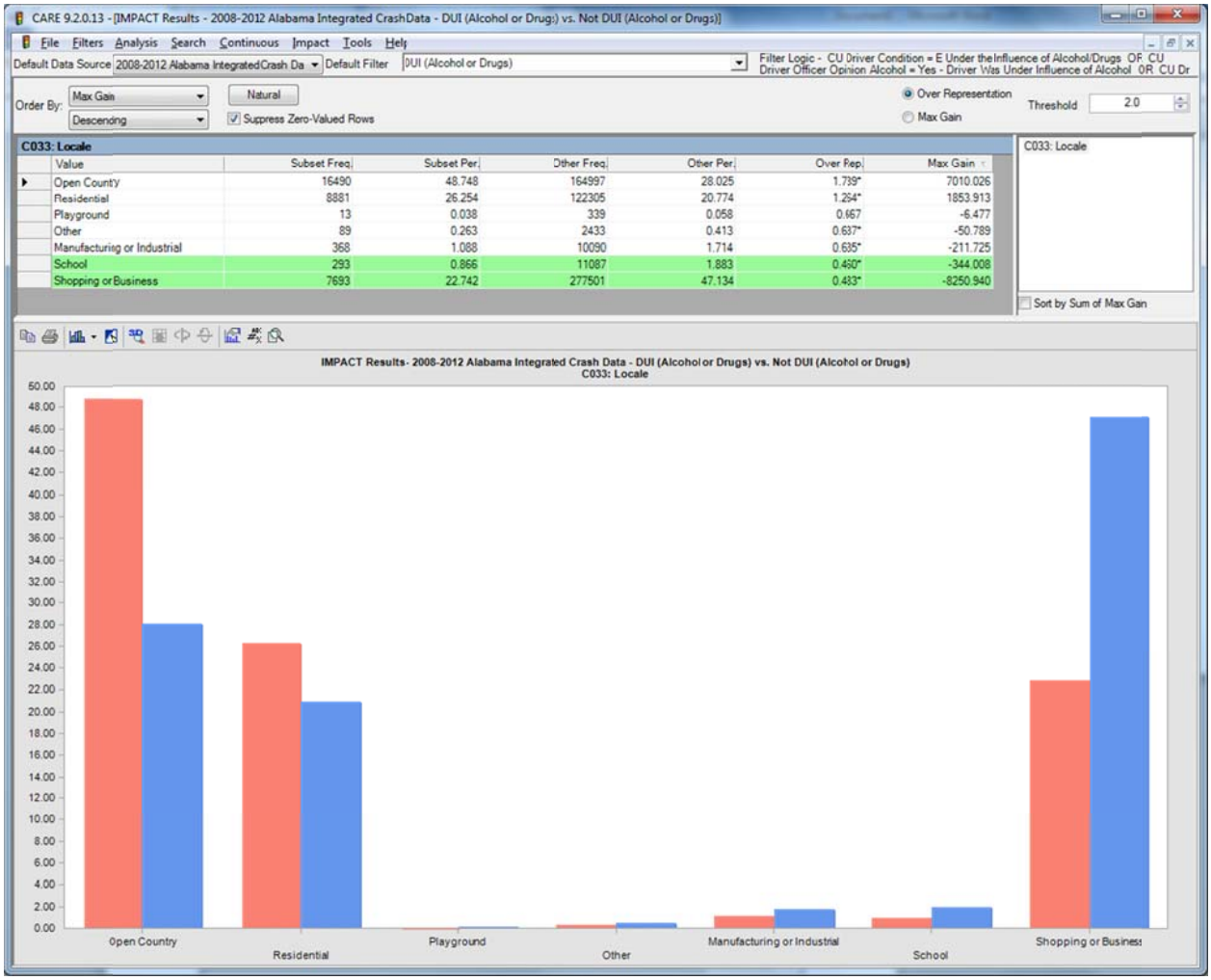
Highway Classifications



Value	Subset Freq	Subset Per	Other Freq	Other Per	Over Rep	Max Gain
County	11632	34.165	93335	15.658	2.182*	6301.072
Other	2	0.006	91	0.015	0.385	-3.198
Private Property	176	0.517	6193	1.039	0.498*	-177.720
State	6157	18.084	115498	19.376	0.933*	-439.791
Interstate	2364	6.943	55632	9.333	0.744*	-813.481
Federal	4702	13.810	104589	17.545	0.787*	-1271.712
Municipal	9014	26.475	220764	37.035	0.715*	-3595.171

Analysis of highway classifications indicates that ID crashes were over-represented on county roads. County roads had well over twice their expected proportion of crashes, while all other roadway classifications were under-represented, although they had very close to the same proportion as the non-ID crashes on those roadways. It is very possible that ID locals in the rural areas use the county road system to evade police. Their cunning in this regard does not seem to extend to making it home safely.

Locale

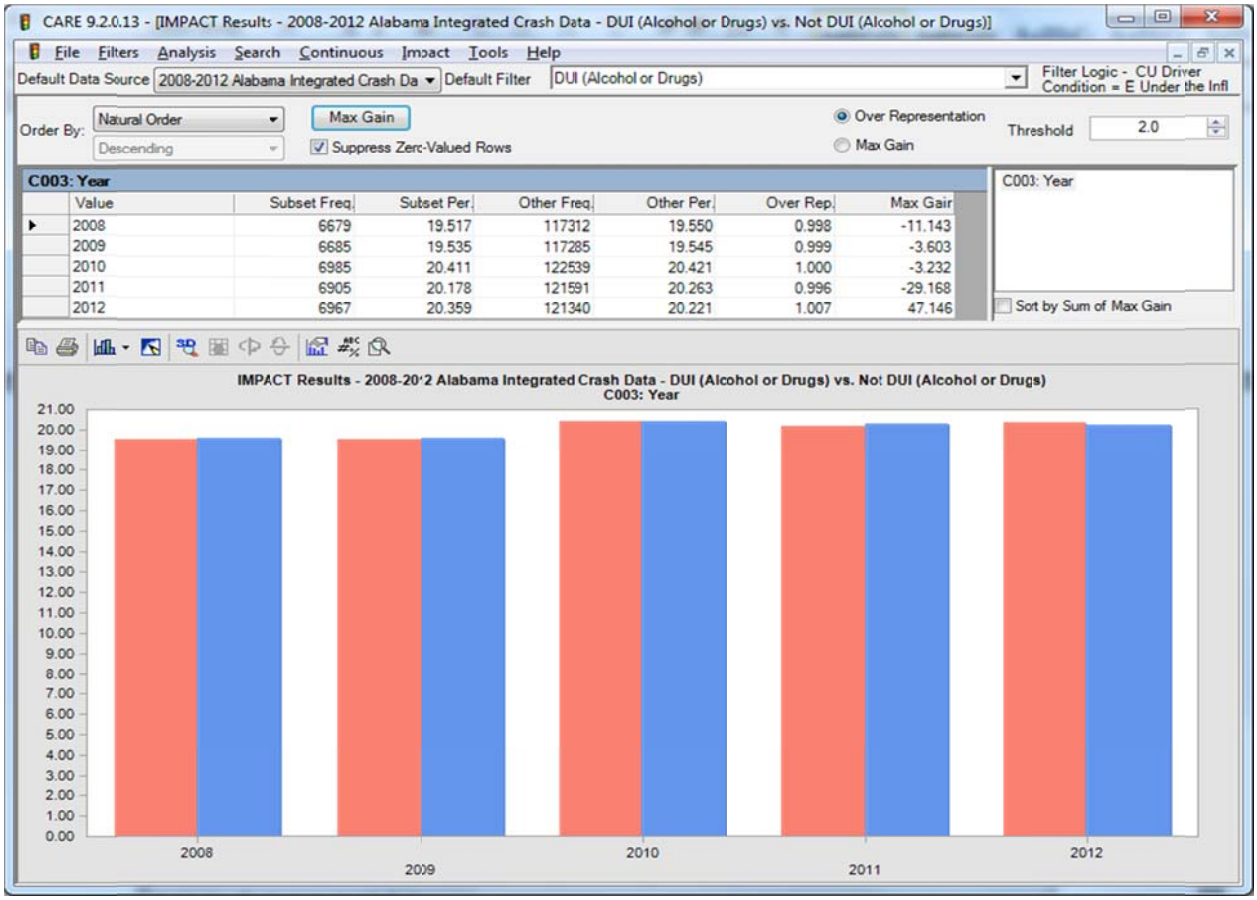


Value	Subset Freq	Subset Per	Other Freq	Other Per	Over Rep	Max Gain
Open Country	16490	48.748	164997	28.025	1.739*	7010.026
Residential	8881	26.254	122305	20.774	1.264*	1853.913
Playground	13	0.038	339	0.058	0.667	-6.477
Other	89	0.263	2433	0.413	0.637*	-50.789
Manufacturing or Industrial	368	1.088	10090	1.714	0.635*	-211.725
School	293	0.866	11087	1.883	0.460*	-344.008
Shopping or Business	7693	22.742	277501	47.134	0.483*	-8250.940

Reflecting the urban over-representation, open country and residential roadways show a high level of over-representation as compared with the more urbanized roadways.

Time Factors

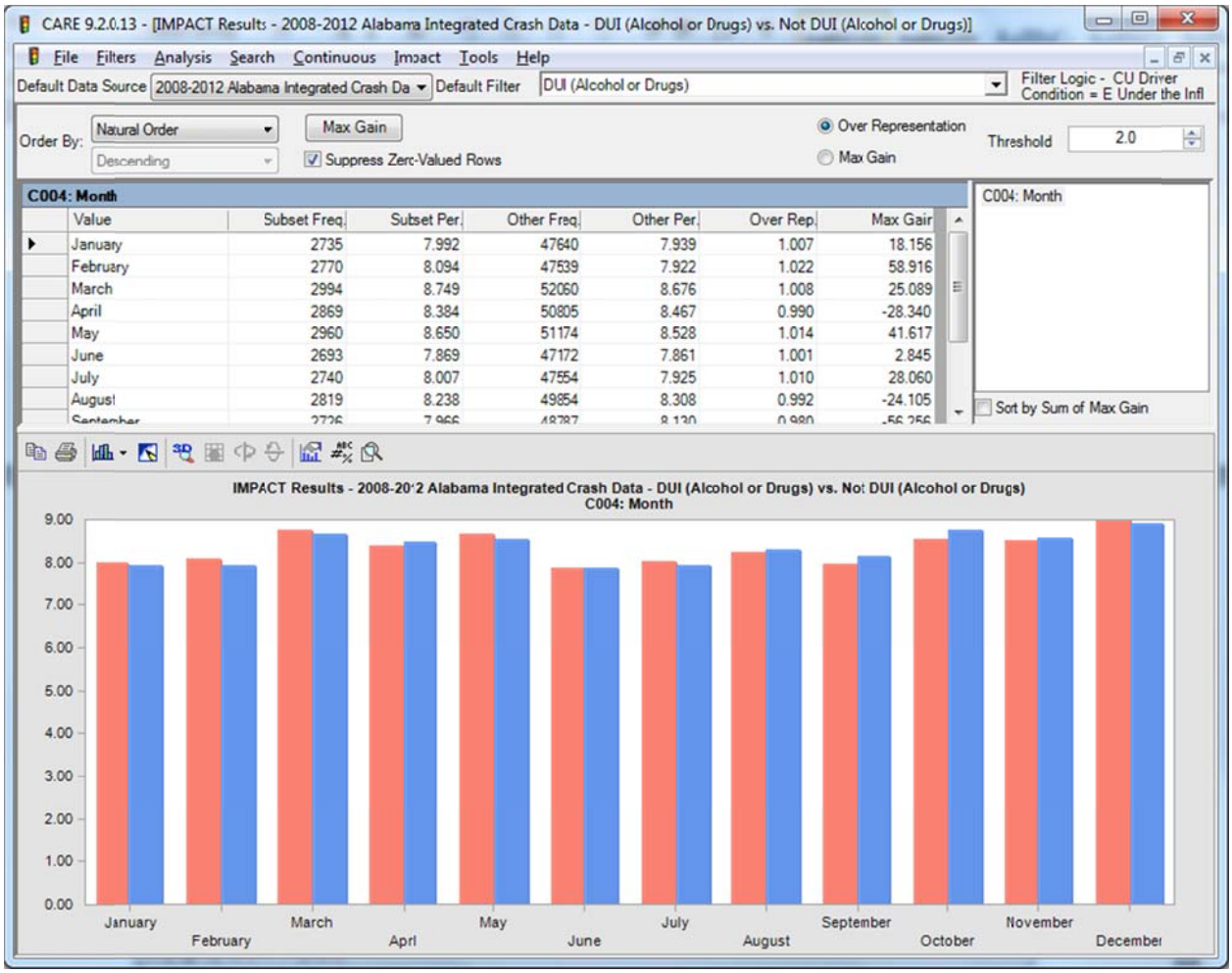
Year



Value	Subset Freq.	Subset Per.	Other Freq.	Other Per.	Over Rep.	Max Gain
2008	6679	19.517	117312	19.550	0.998	-11.143
2009	6685	19.535	117285	19.545	0.999	-3.603
2010	6985	20.411	122539	20.421	1.000	-3.232
2011	6905	20.178	121591	20.263	0.996	-29.168
2012	6967	20.359	121340	20.221	1.007	47.146

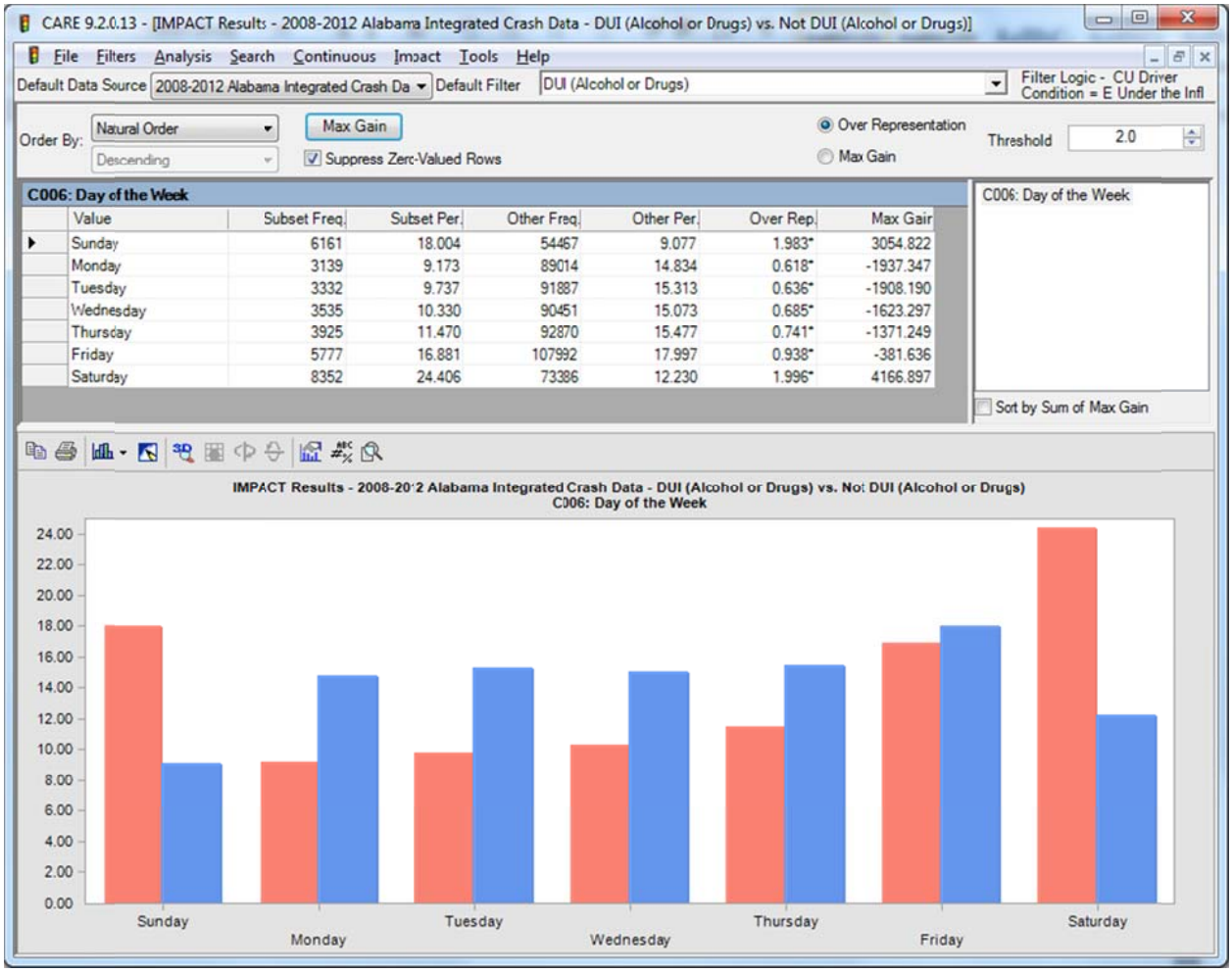
Analysis of crash data indicates that there has been little change in the total number of crashes reported from year to year, and the changes in the proportions are not significant. If there were no changes or over-representations all bars in the chart above would be at exactly 20%, the total number of ID crashes being evenly distributed over the years. This is a good time to emphasize that the total reports being considered here are those reported, which is about 6% of the total reported crashes. While this is an accurate statement of the number reported as such, no one claims that this is the actual number of ID crashes. Many ID caused crashes cannot be verified as such and they are therefore not reported as such. These reports over time provide excellent insight into the nature or ID crashes despite their not be a complete set of ID reports. As the severity of the crashes increases, the completeness of the reports in attributing them to ID also increased dramatically. For example, the amount of effort that goes into investigating a fatal crash is at least 10 to 20 times more effort than goes into reporting and obtaining all of the details of most property damage only crashes.

Month



There were no significant over-representations by month, indicating that the number of ID crashes correlated well with the other crashes during each of the months. The chart above, however, is useful in seeing the spring months of March through May, and the last three months of the year having slightly above average ID crashes. This chart is significant if, for no other reason, than to demonstrate that no single month should be ignored, and that ID problems are sustained and should be addressed throughout the year.

Day of the week



Value	Subset Freq.	Subset Per.	Other Freq.	Other Per.	Over Rep.	Max Gain
Sunday	6161	18.004	54467	9.077	1.983*	3054.822
Monday	3139	9.173	89014	14.834	0.618*	-1937.347
Tuesday	3332	9.737	91887	15.313	0.636*	-1908.190
Wednesday	3535	10.330	90451	15.073	0.685*	-1623.297
Thursday	3925	11.470	92870	15.477	0.741*	-1371.249
Friday	5777	16.881	107992	17.997	0.938*	-381.636
Saturday	8352	24.406	73386	12.230	1.996*	4166.897

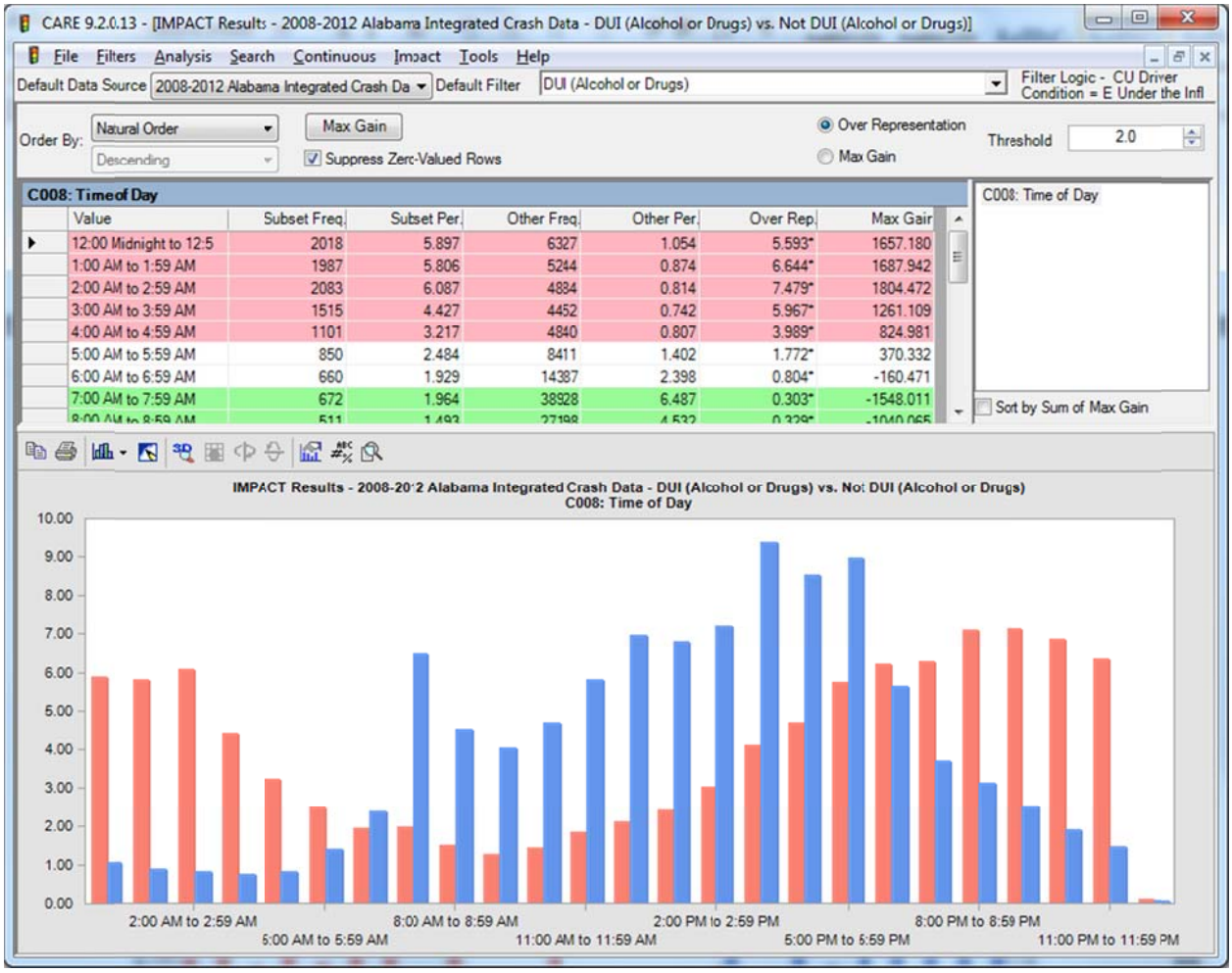
The chart above shows the typical non-holiday week pattern. The days can be classified as follows:

- Weekday (Monday through Thursday) – these days are under-represented in ID crashes we would surmise due to the need to go to work the following day.
- Friday – this pattern is the day before a weekend (or holiday). i.e., before a day off. The Friday pattern is slightly under-represented in ID crashes, not because they do not occur more frequently than weekdays, but because non-ID crashes occur even more. This is due to the increased traffic of combined commuters and vacationers (including short week-end vacations) – a bad traffic mix. It may be only slightly denser than a typical rush hour, but it is not homogeneous and restricted to commuters as is the case during most weekday rush hours.
- Saturday – the "Saturday" pattern is the worse for ID crashes in that it has both an early morning component (like Sunday) and a late night component (like Friday). So, it could be viewed as a combination of the typical Friday and Sunday, with one exception. It does not have the complexity of the Friday afternoon commuters.

- Sunday – this is the last day of a holiday sequence or as given above, the weekend. It's over-representation come strictly from those who start on Saturday night and do not complete their use of alcohol/drugs until after midnight.

A holiday "weekend," such as Thanksgiving, can be viewed as a sequence of a Friday-, Saturdays- and Sunday-pattern sequence. The Wednesday before Thanksgiving would follow the Friday pattern assuming that most are at work on Wednesday. The Thursday, Friday and Saturday would follow the Saturday pattern, and the Sunday would follow the Sunday pattern. Holidays that fall mid week could also be so mapped. This is the reason that long holiday events (i.e., several days off) can be much more prone to ID crashes than the normal weekend.

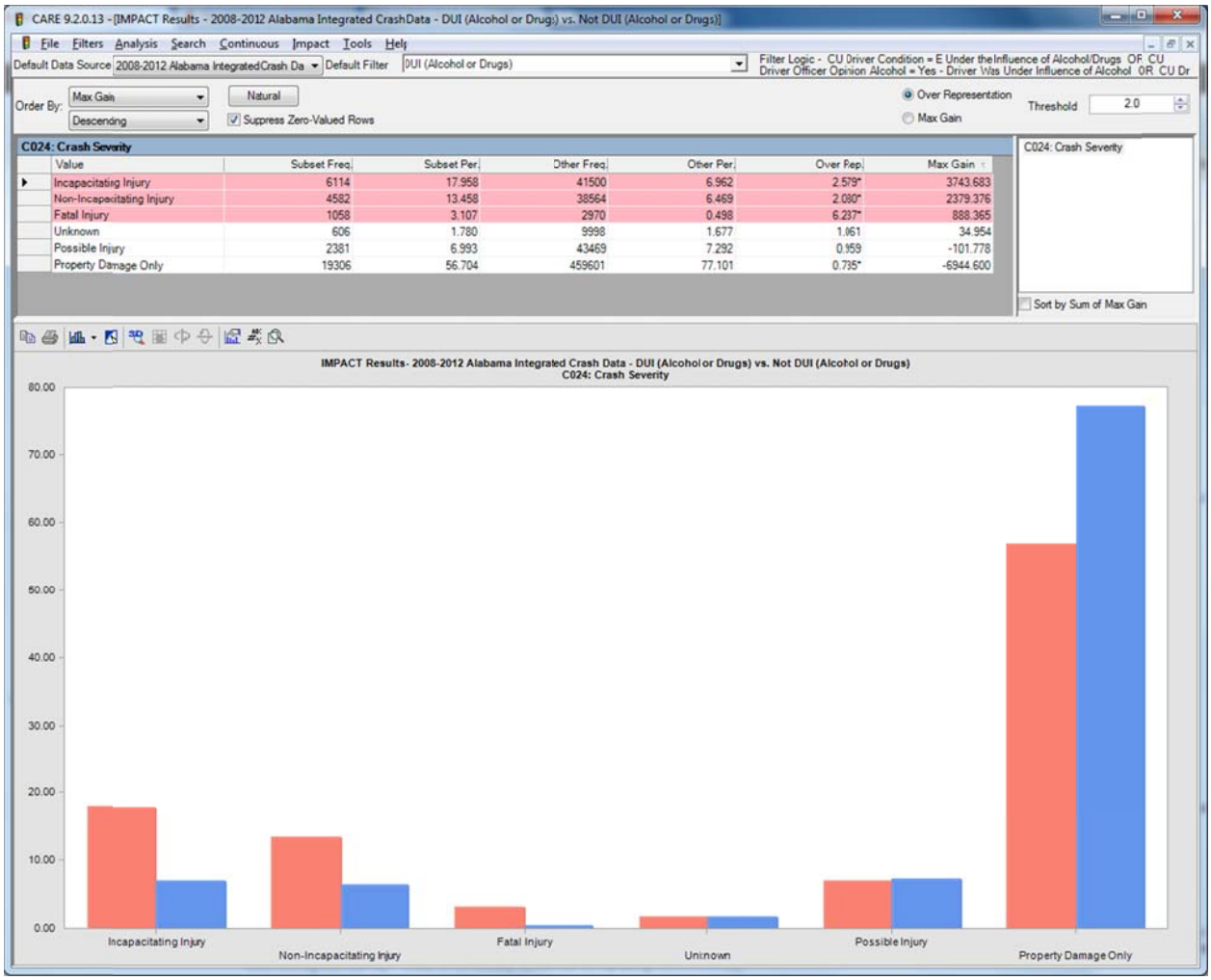
Time of Day



It is no surprise to find ID crashes over-represented during the late night/early morning hours. The extent of these over-representations, however, is quite amazing. The blue bars above follow the typical traffic patterns of high traffic in the morning and afternoon rush hours. ID crashes are just getting started in the afternoon rush hours and they continue to grow through midnight and the early morning hours, not tapering off until about 5 AM. It is clear that if selective enforcement is going to have an effect on ID crashes, it would have to be conducted when these crashes are occurring. Optimal times for enforcement would start immediately following any rush hour details, and would continue through at least 3 AM.

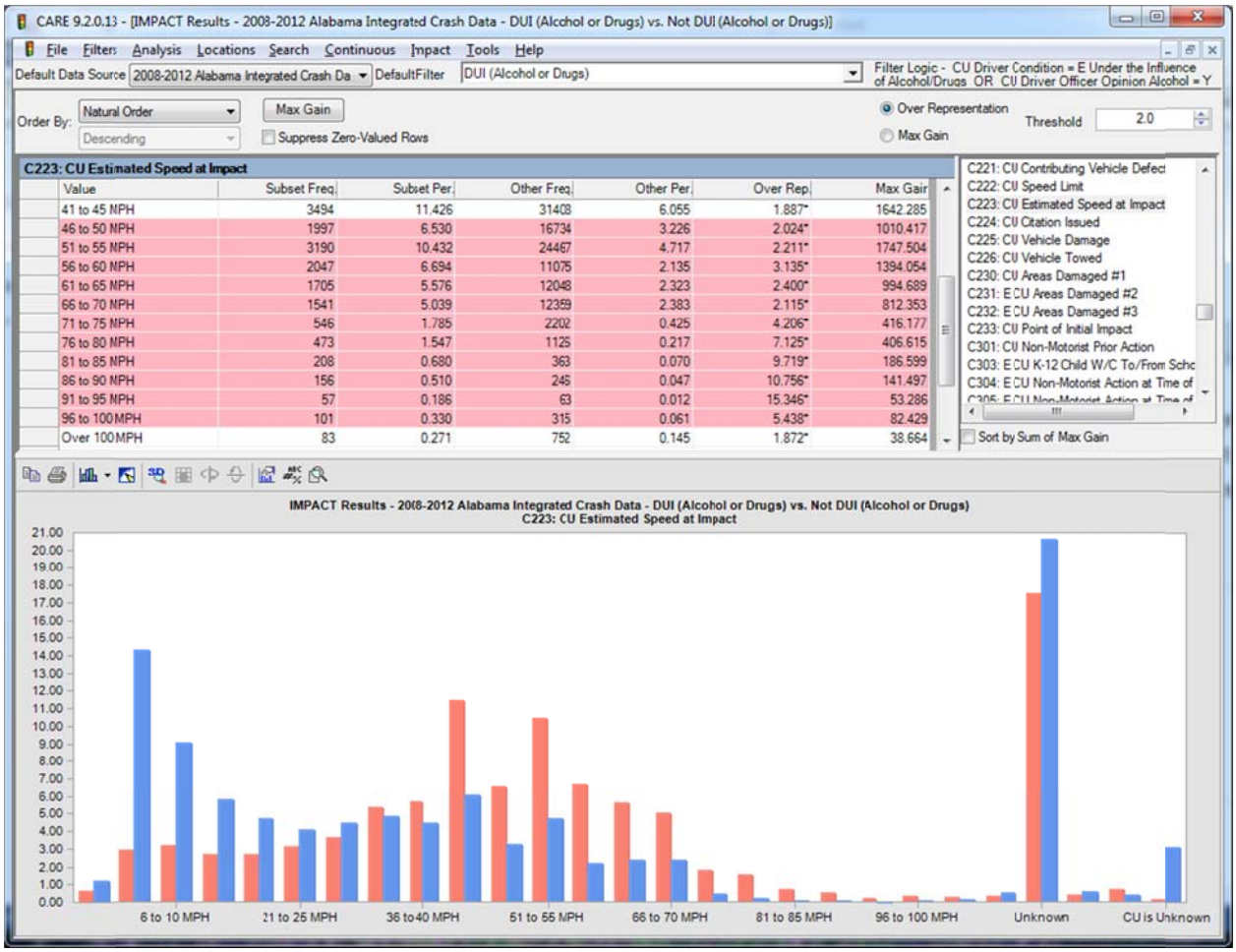
Factors Affecting Severity

ID Crash Severity



The rate of injuries and fatalities are consistently higher in ID crashes than that of non-ID crashes. Fatality crashes were over six times their expected proportion, while the two highest no-fatal injury classifications had over twice their expected values when compared with non-impaired driving crashes. The next variable indicates one of the reasons for this.

Speed at Impact



Value	Subset Freq	Subset Per	Other Freq	Other Per	Over Rep	Max Gain
41 to 45 MPH	3494	11.426	31408	6.055	1.887*	1642.285
46 to 50 MPH	1997	6.530	16734	3.226	2.024*	1010.417
51 to 55 MPH	3190	10.432	24467	4.717	2.211*	1747.504
56 to 60 MPH	2047	6.694	11075	2.135	3.135*	1394.054
61 to 65 MPH	1705	5.576	12048	2.323	2.400*	994.689
66 to 70 MPH	1541	5.039	12359	2.383	2.115*	812.353
71 to 75 MPH	546	1.785	2202	0.425	4.206*	416.177
76 to 80 MPH	473	1.547	1125	0.217	7.125*	406.615
81 to 85 MPH	208	0.680	363	0.070	9.719*	186.599
86 to 90 MPH	156	0.510	245	0.047	10.756*	141.497
91 to 95 MPH	57	0.186	63	0.012	15.346*	53.286
96 to 100 MPH	101	0.330	315	0.061	5.438*	82.429
Over 100 MPH	83	0.271	752	0.145	1.872*	38.664

It might be noticed that the speed limits on country roads is generally 45 MPH. All speeds about 45 MPH are dramatically over-represented. The next cross-tabulations indicates how this impacts the severity of the crash for ID crashes.

Severity of Impact Speed

CARE 9.2.0.13 - [Crosstab - 2008-2012 Alabama Integrated Crash Data - C024: Crash Severity vs. C223: CU Estimated Speed at Impact - Filter = DUI (Alcohol or D]

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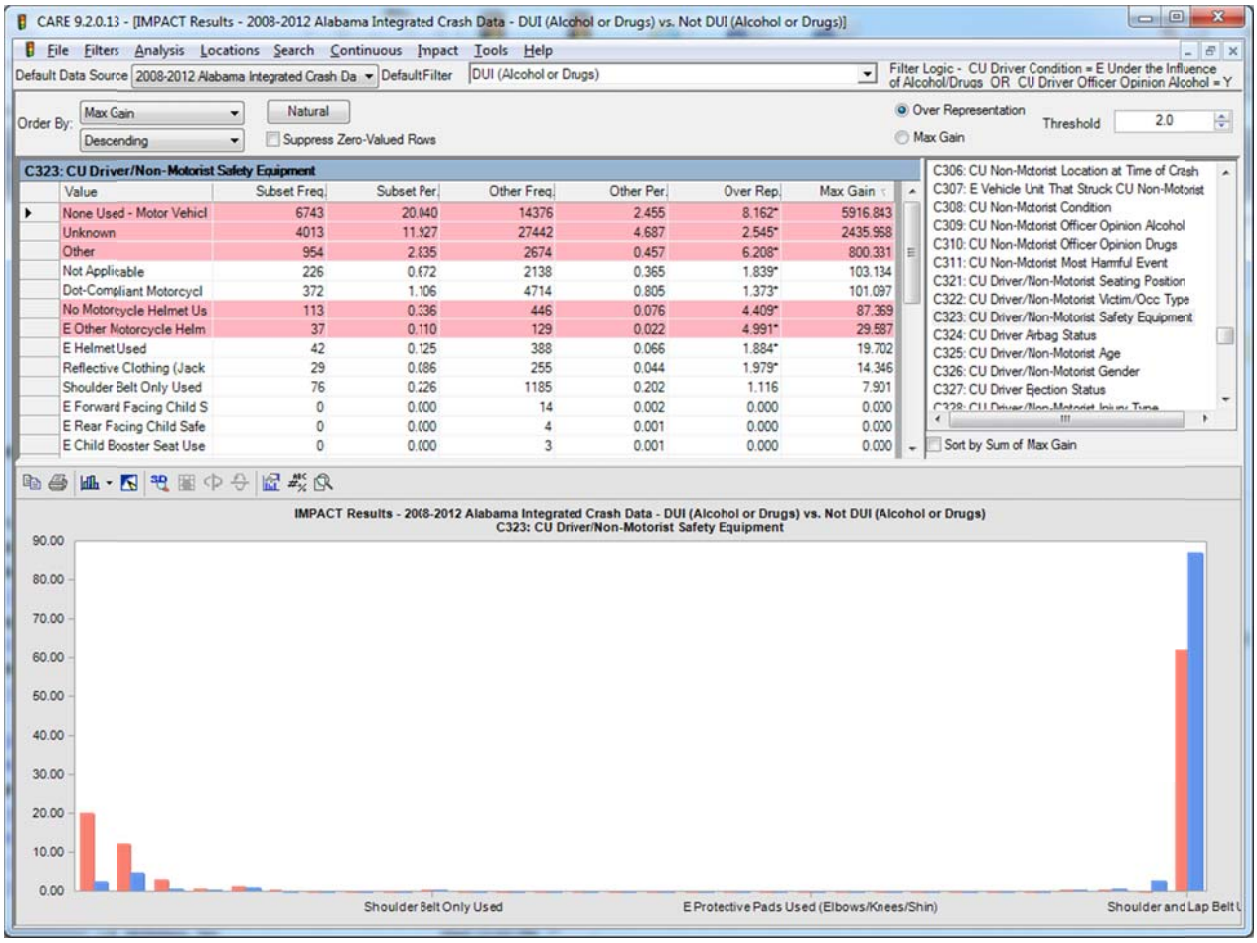
Default Data Source 2008-2012 Alabama Integrated Crash Da DefaultFilter DUI (Alcohol or Drugs) Filter Logic - CU Driver Condition = E Under the Influence of Alcohol/Drugs OR CU Driver Officer Opinion Alcohol = Y

Select Cells: Suppress Zero Values: None Column: C024: Crash Severity ; Row: C223: CU Estimated Speed at Impact

	Fatal Injury	Incapacitating Injury	Non-Incapacitating Inju	Possible Injury	Property Damage Only	Unknown	TOTAL
1 to 5 MPH	8 0.80%	54 0.99%	43 0.97%	61 2.91%	709 4.17%	13 2.14%	888 2.90%
6 to 10 MPH	9 0.90%	95 1.74%	88 1.99%	78 3.72%	702 4.13%	8 1.32%	980 3.20%
11 to 15 MPH	4 0.40%	67 1.23%	74 1.67%	61 2.91%	594 3.50%	16 2.64%	816 2.67%
16 to 20 MPH	6 0.60%	82 1.50%	78 1.76%	76 3.62%	568 3.34%	17 2.80%	827 2.70%
21 to 25 MPH	4 0.40%	79 1.45%	102 2.30%	74 3.53%	687 4.04%	14 2.31%	960 3.14%
26 to 30 MPH	6 0.60%	151 2.76%	107 2.42%	88 4.20%	746 4.39%	10 1.65%	1108 3.62%
31 to 35 MPH	12 1.20%	220 4.03%	184 4.15%	110 5.25%	1079 6.35%	21 3.46%	1626 5.32%
36 to 40 MPH	20 2.00%	284 5.20%	258 5.82%	107 5.10%	1047 6.16%	19 3.13%	1735 5.67%
41 to 45 MPH	58 5.81%	684 12.52%	528 11.92%	202 9.63%	1973 11.62%	49 8.07%	3494 11.43%
46 to 50 MPH	39 3.91%	424 7.76%	352 7.95%	151 7.20%	1001 5.89%	30 4.94%	1997 6.53%
51 to 55 MPH	97 9.72%	743 13.60%	510 11.51%	165 7.87%	1650 9.71%	25 4.12%	3190 10.43%
56 to 60 MPH	109 10.92%	536 9.81%	336 7.58%	112 5.34%	926 5.45%	29 4.78%	2047 6.69%
61 to 65 MPH	109 10.92%	492 9.01%	275 6.21%	90 4.29%	722 4.25%	17 2.80%	1705 5.58%
66 to 70 MPH	109 10.92%	416 7.61%	233 5.26%	70 3.34%	696 4.10%	17 2.80%	1541 5.04%
71 to 75 MPH	54 5.41%	143 2.62%	104 2.35%	23 1.10%	215 1.27%	7 1.15%	546 1.79%
76 to 80 MPH	56 5.61%	153 2.80%	77 1.74%	33 1.57%	152 0.89%	2 0.33%	473 1.55%
81 to 85 MPH	30 3.01%	66 1.21%	36 0.81%	12 0.57%	62 0.37%	2 0.33%	208 0.68%
86 to 90 MPH	20 2.00%	53 0.97%	23 0.52%	8 0.38%	50 0.29%	2 0.33%	156 0.51%
91 to 95 MPH	13 1.30%	17 0.31%	10 0.23%	1 0.05%	16 0.09%	0 0.00%	57 0.19%
96 to 100 MPH	15 1.50%	39 0.71%	19 0.43%	0 0.00%	25 0.15%	3 0.49%	101 0.33%
Over 100 MPH	15 1.50%	22 0.40%	14 0.32%	2 0.10%	28 0.16%	2 0.33%	83 0.27%

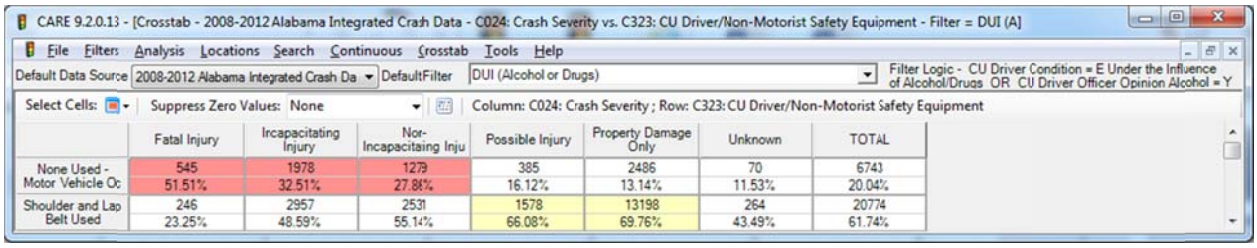
Notice the red in the fatality and severe injury cells as speeds increase. What is more enlightening is the probability that the crash results in a fatality as a function of impact speed. In the 41-45 MPH impact speed the probability is only a little over one in every one hundred crashes. As impact speeds climb to the 51-55 MPH, this probability almost doubles to two per hundred. And if the speed is 90 MPH or above, it is about ten times the probability to one in every ten crashes. The rule of thumb is that for every 10 MPH increase in speeds, the probability of the crash being fatal doubles. Conversely, a reduction in impact speeds by 10 MPH would cut the number of fatal crashes in half. This is the reason that selective enforcement is effective. However, there is another major factor in effect as well – the failure of ID drivers to be properly restrained.

Restraint Use by Impaired Drivers



Risk-taking involved in ID does not stop with excess speed; it extends to not being properly restrained. The above analysis demonstrates that the impaired driver is over 8 times more likely to be unrestrained as is the non-ID. The next analysis demonstrates how this contributes to fatality crashes. The table able shows that the ID motorcyclist is over four times as likely not to be wearing a helmet.

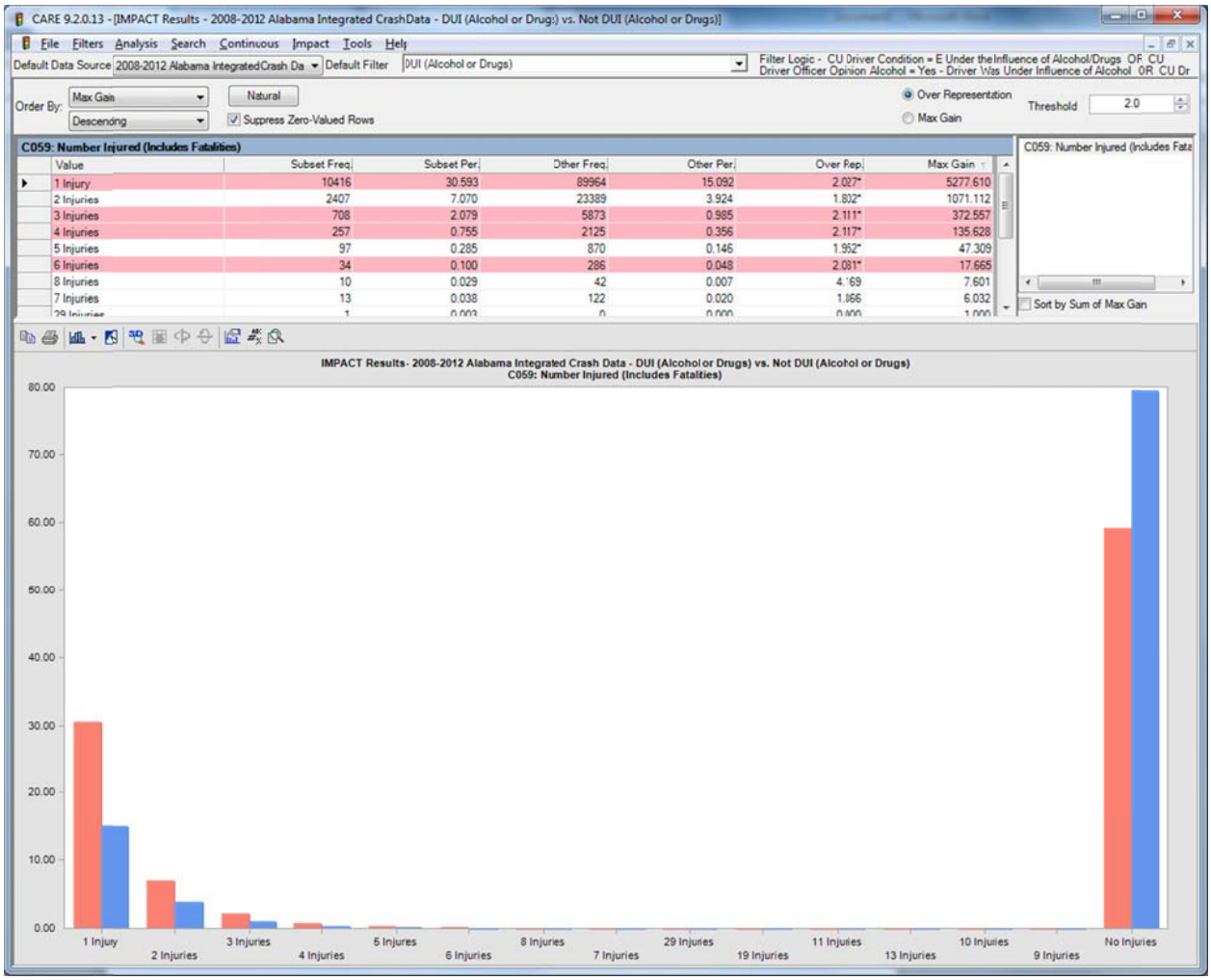
Fatality Crashes by Restraint Use for Impaired Drivers



	Fatal Injury	Incapacitating Injury	Non-Incapacitating Inju	Possible Injury	Property Damage Only	Unknown	TOTAL
None Used - Motor Vehicle Oc	545 51.51%	1978 32.51%	1279 27.86%	385 16.12%	2486 13.14%	70 11.53%	6743 20.04%
Shoulder and Lap Belt Used	246 23.25%	2957 48.59%	2531 55.14%	1578 66.08%	13198 69.76%	264 43.49%	20774 61.74%

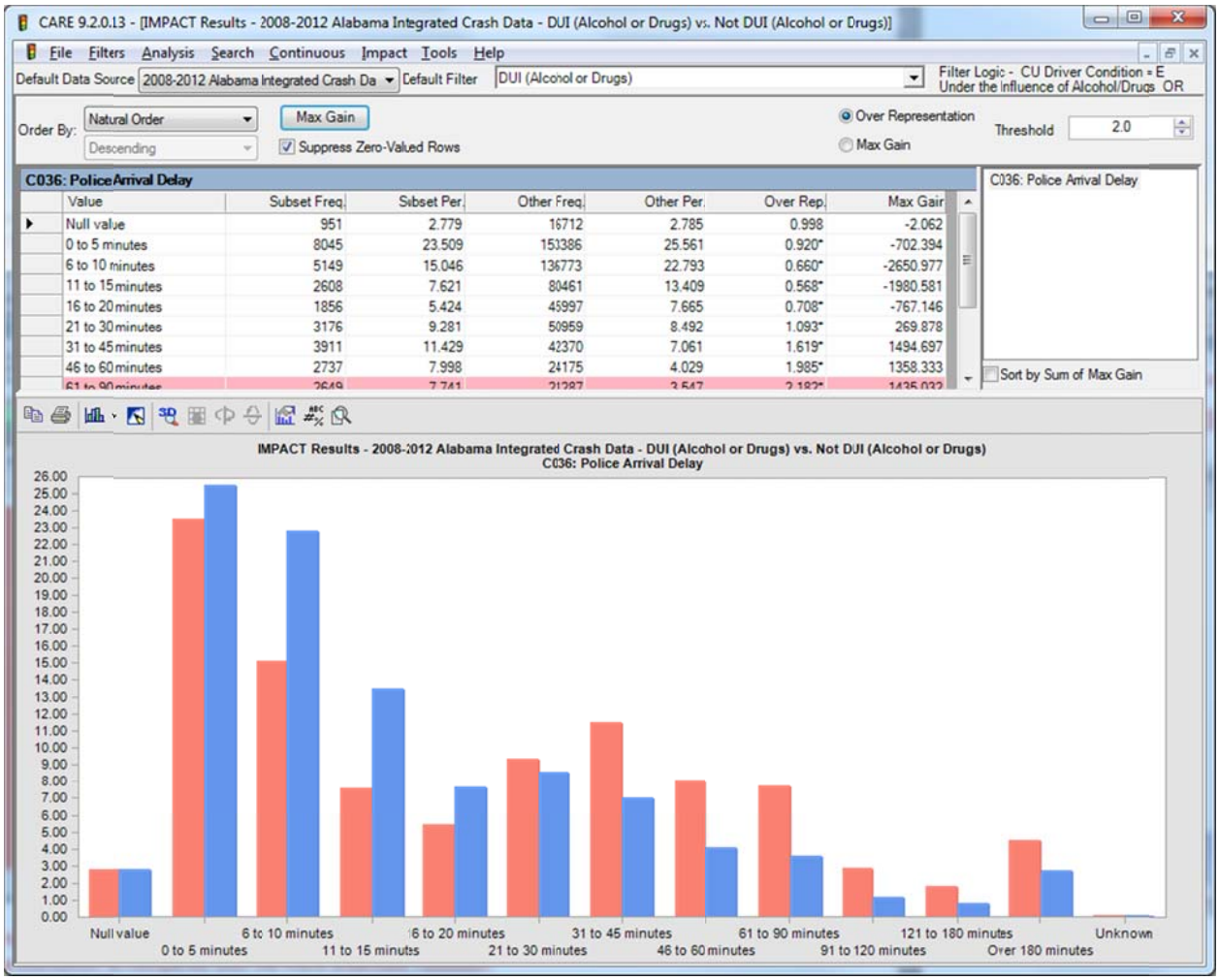
A comparison of the probability of a fatal crash indicates that a fatality is about seven times more likely if the impaired driver is not using proper restraints. The probability is estimated by 545 fatality crashes out of 6,743 when restraints were not used, as opposed to only 246 fatal crashes out of 20,774 crashes when restraints were used. So the combined effect of lower restraint use and higher speed is a devastating combination that accounts for the high lethality of ID crashes. But that is not all; see the following three items.

Number Injured (Including Fatalities)



The above shows that not only are ID crashes more severe to the driver, but also the number of multiple injuries in these ID crashes is over-represented as well. Some might suspect that an ID crash might involve just a driver returning home from a night of indulgence. However, rarely is the impaired driver alone, and, of course, if another vehicle is involved, then that would also generally increase the number of injuries.

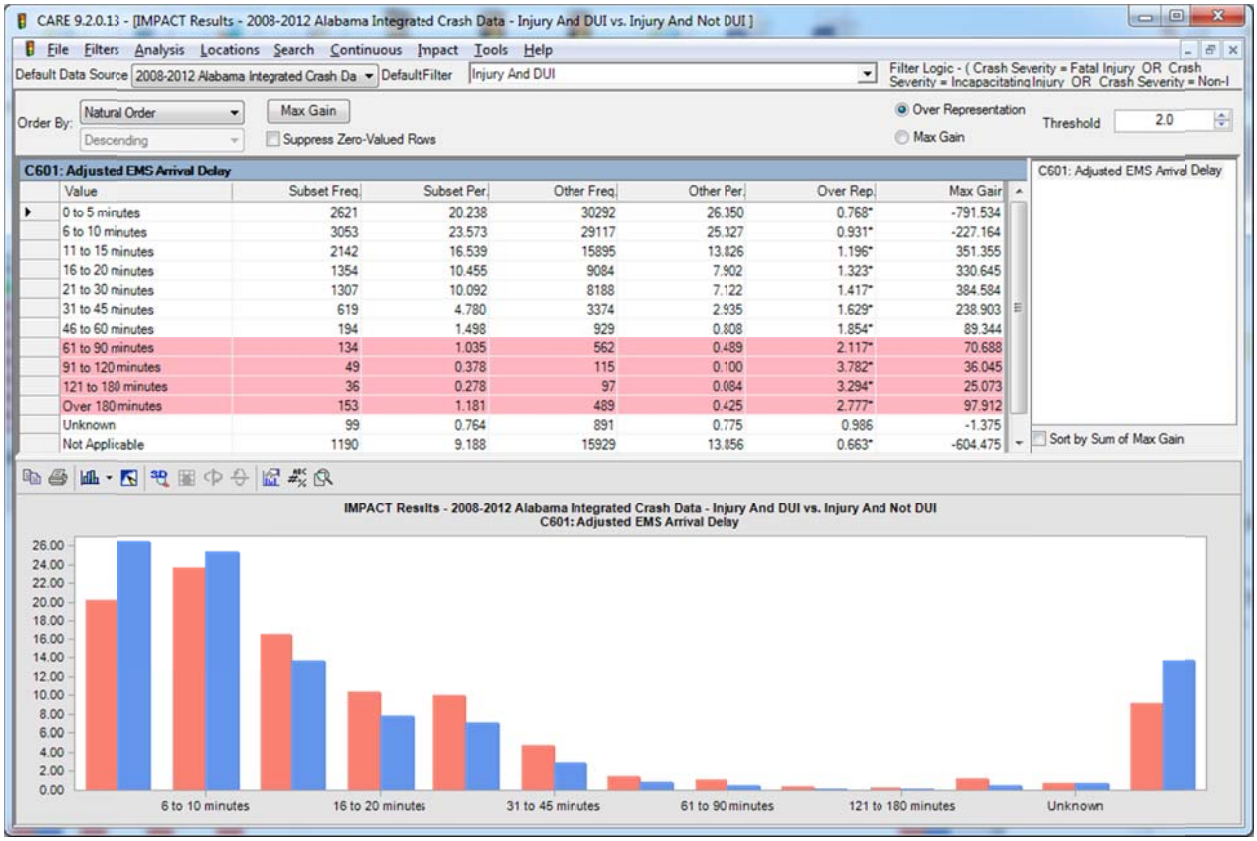
Police Arrival Delay



Value	Subset Freq.	Subset Per.	Other Freq.	Other Per.	Over Rep.	Max Gain
Null value	951	2.779	16712	2.785	0.998	-2.062
0 to 5 minutes	8045	23.509	153386	25.561	0.920*	-702.394
6 to 10 minutes	5149	15.046	136773	22.793	0.660*	-2650.977
11 to 15 minutes	2608	7.621	80461	13.409	0.568*	-1980.581
16 to 20 minutes	1856	5.424	45997	7.665	0.708*	-767.146
21 to 30 minutes	3176	9.281	50959	8.492	1.093*	269.878
31 to 45 minutes	3911	11.429	42370	7.061	1.619*	1494.697
46 to 60 minutes	2737	7.998	24175	4.029	1.985*	1358.333

ID crashes generally had longer police arrival delays; in this case all arrival delays over 21 minutes were over-represented. There can be little doubt that this has to do with the rural nature of these crashes and the potential that at night they would not be discovered for some time. The analysis below shows how this impacts EMS arrival time, which is a comparison of ID vs. non-ID crashes both of which were reported to include injuries, and thus would generally call for EMS.

EMS Arrival Delay

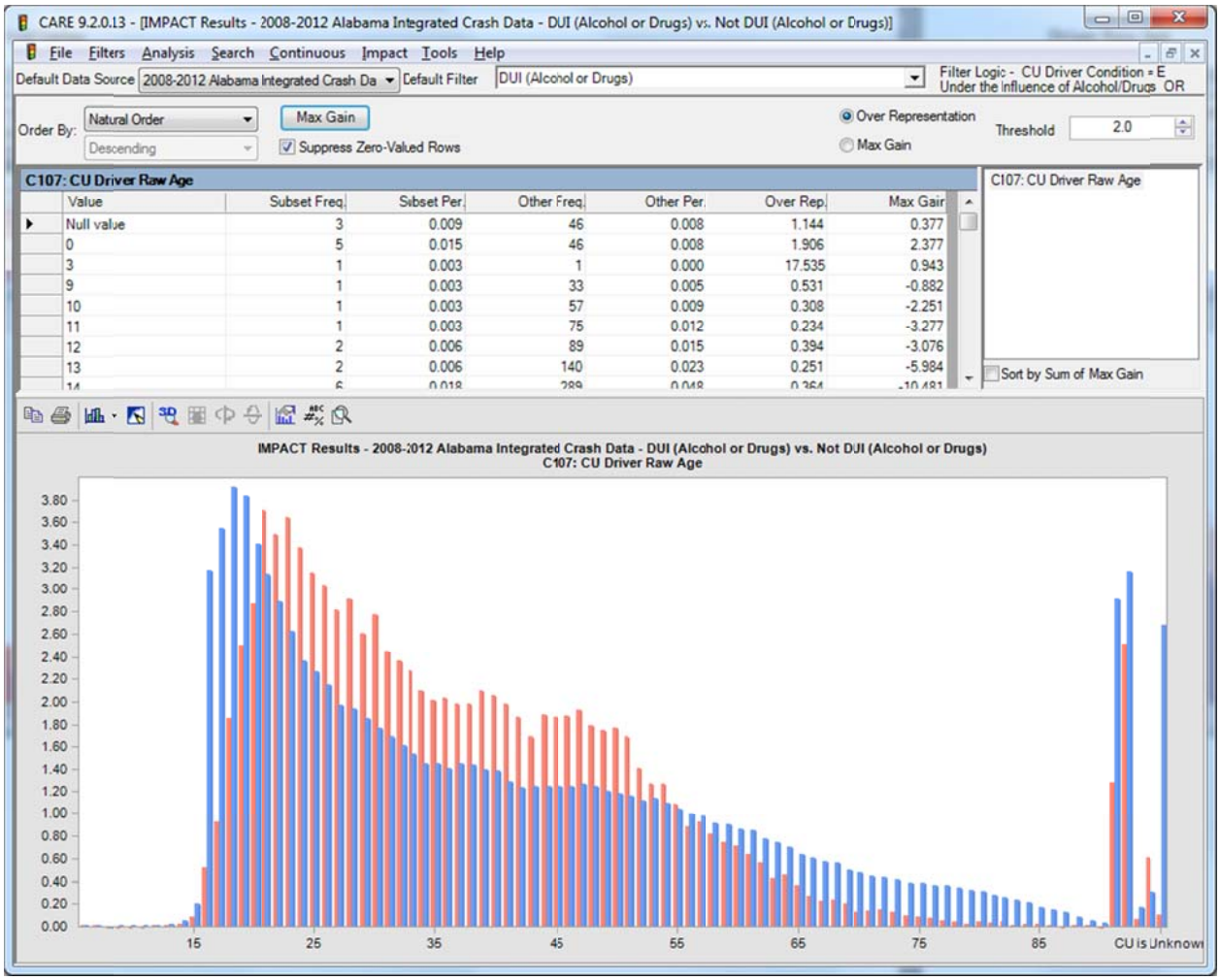


Value	Subset Freq	Subset Per	Other Freq	Other Per	Over Rep	Max Gain
0 to 5 minutes	2621	20.238	30292	26.150	0.768*	-791.534
6 to 10 minutes	3053	23.573	29117	25.127	0.931*	-227.164
11 to 15 minutes	2142	16.539	15895	13.826	1.196*	351.355
16 to 20 minutes	1354	10.455	9084	7.902	1.323*	330.645
21 to 30 minutes	1307	10.092	8188	7.122	1.417*	384.584
31 to 45 minutes	619	4.780	3374	2.935	1.629*	238.903
46 to 60 minutes	194	1.498	929	0.808	1.854*	89.344
61 to 90 minutes	134	1.035	562	0.489	2.117*	70.688
91 to 120 minutes	49	0.378	115	0.100	3.782*	36.045
121 to 180 minutes	36	0.278	97	0.084	3.294*	25.073
Over 180 minutes	153	1.181	489	0.425	2.777*	97.912
Unknown	99	0.764	891	0.775	0.986	-1.375
Not Applicable	1190	9.188	15929	13.856	0.663*	-604.475

For much the same as the longer police arrival delays, EMS delays were over-represented for impaired driving crashes in all categories above ten minutes, and dramatically for the very longer times of 60 minutes and above. This obviously contributes to the severity of crashes and the chances that the crash results in one or more fatalities. As for the very long times, these might be due to the delay in discovering the crash as much as their generally over-represented rural locations.

Driver and Vehicle Demographics

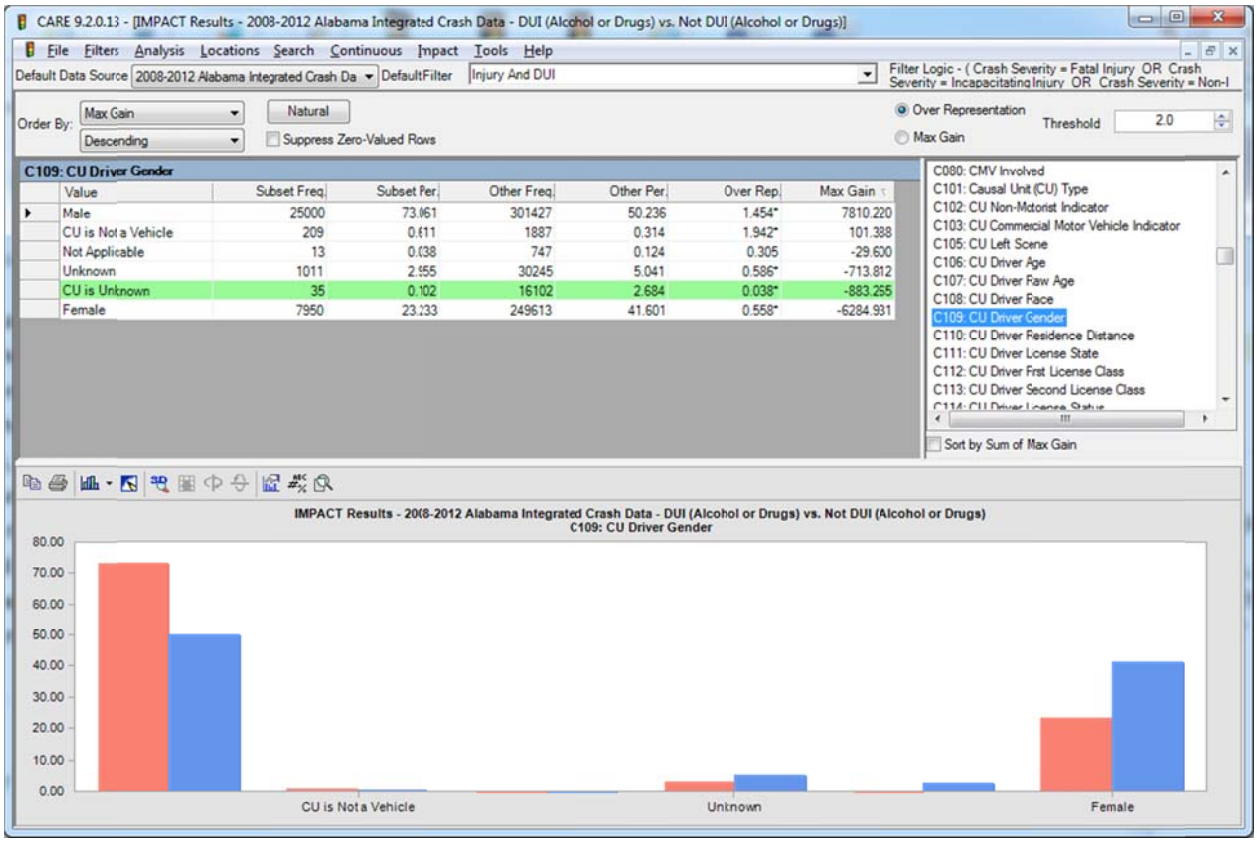
Driver Age



Value	Subset Freq.	Subset Per.	Other Freq.	Other Per.	Over Rep.	Max Gain
Null value	3	0.009	46	0.008	1.144	0.377
0	5	0.015	46	0.008	1.906	2.377
3	1	0.003	1	0.000	17.535	0.943
9	1	0.003	33	0.005	0.531	-0.882
10	1	0.003	57	0.009	0.308	-2.251
11	1	0.003	75	0.012	0.234	-3.277
12	2	0.006	89	0.015	0.394	-3.076
13	2	0.006	140	0.023	0.251	-5.984

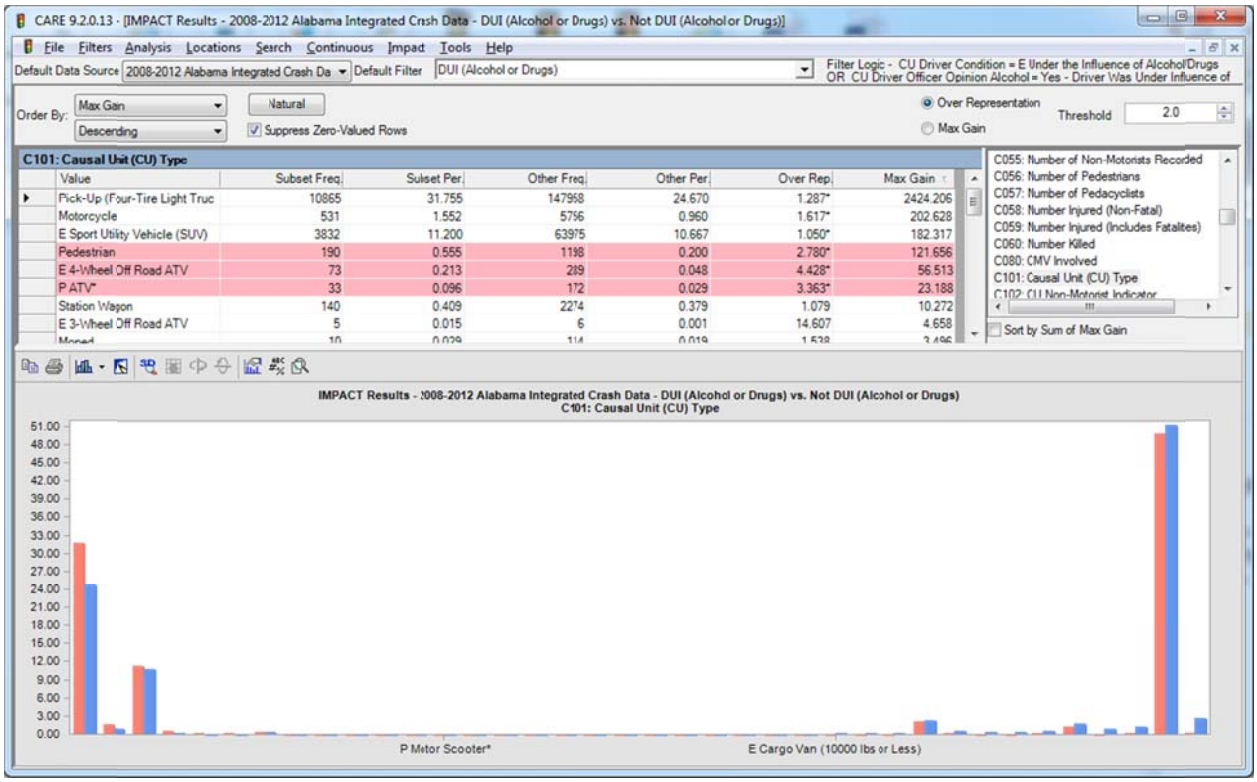
The blue (non-ID) bars illustrate the problems that 16-20 year old drivers have in general. On the bright side, these issues are not generally caused by ID up until ages 19 and 20, and even at these ages they are under-represented. At 21 the first age over-representation takes place and continues on to age 54. It is clear that the legal drinking age is having an effect on keeping the numbers down for the 16-20 year old drivers, and any attempt to decrease this legal age should be fought strenuously by the traffic safety community despite the fact that it might be promoted by some college presidents (although that effort seems now to have waned). There is a bi-modal distribution in the 21-54 year olds; 21 through about 35, and a second group from 36 to 54. Generally the first of these might be classified as social drinkers. However, it is hard to escape the fact that those who are in their late 30s up through their middle ages would not be largely problem drinkers. These two groups must be dealt with in different ways.

Impaired Driver Gender



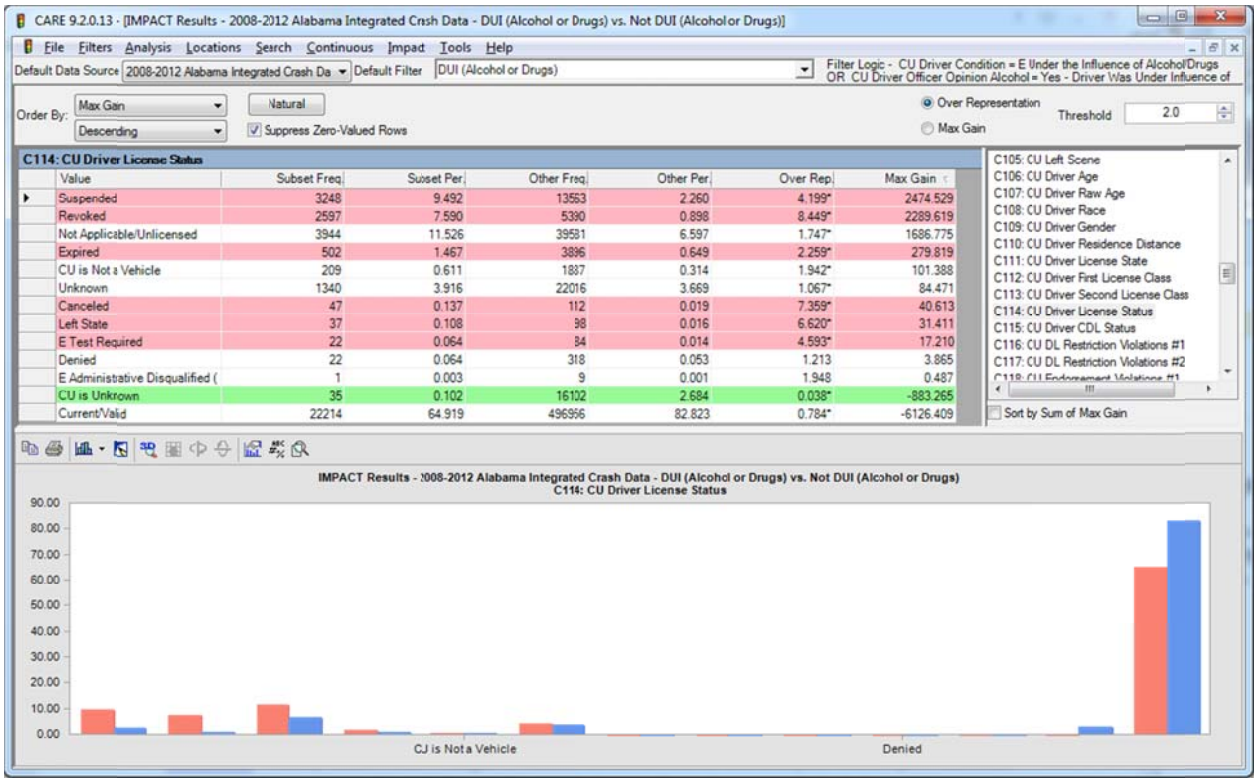
The middle cells in the above chart can be ignored, since they are not relevant to the causal driver in the crash. Looking at the male bars on the left and the female to the very right, the blue bars represent non-ID crshes. There is about a 50% male and 40% female comparison of the blue bars. However, the red bars show about 73% male and 23% female. This would certainly indicate that males are a far greater issue, and if there are countermeasures that can be directed toward them, doing so would be much more cost-effective, all other things being equal.

Causal Vehicle Type



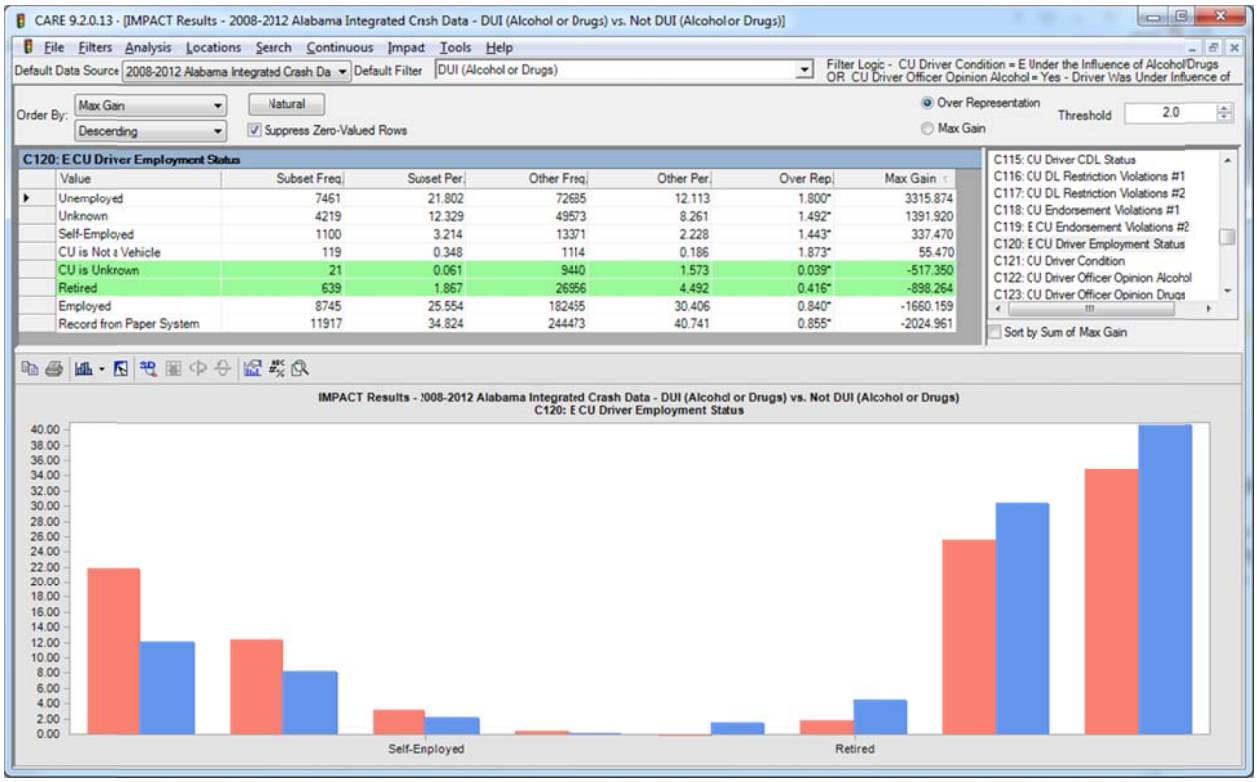
While clearly the pick-up is the vehicle of choice in the rural areas, there was no distinction between this category and SUVs prior to eCrash coding, which began in 2009, but did not become predominant until some time in 2010, so these two categories should be combined for this analysis. Motorcycles are over-represented more than either of these, although their overall numbers are relatively low. Of interest are the proportion of pedestrians that involve ID, which is close to three times their expected number. So the new major information generated by this analysis is that motorcycle and pedestrian crashes have far more than their share of ID causation. The ATV issues caused by ID are also significantly over-represented, although for the most part they are off road and relatively un-regulated.

Driver License Status



Clearly ID crashes are so over-represented in causal drivers without legitimate licenses that the question might be asked: does suspending or revoking their licenses even make a difference? Some states have gone so far as to make it a mandatory arrest if a driver is found to not have a current license. The results of this analysis need to be given serious consideration by those determining the direction of the legislative process regarding ID.

Driver Employment Status



In our current era when the economy is playing such a big role in traffic safety, the quantification and tracking of the employment proportion of drivers involved in ID crashes will be important. This indicates that their unemployment rate is about 80% higher than expected. This is probably not unexpected, and the correlation between not having a job and being involved in an ID crash should be watched carefully going forward.