Analysis of Vehicle Defective Brakes and Tires

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For more information on this subject from NHTSA and other sources, please see:
http://www.safehomealabama.gov/tag/defects-recalls/

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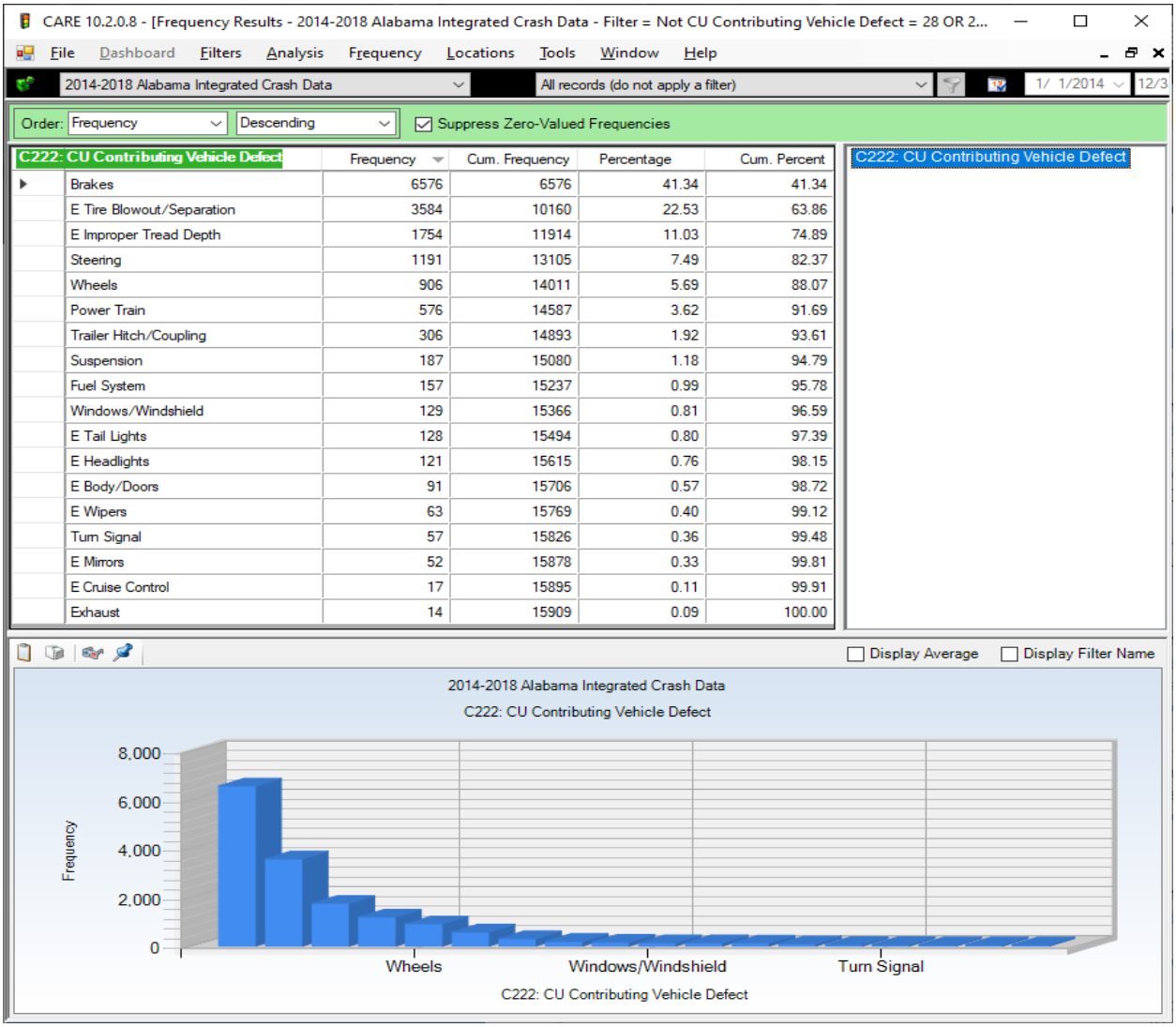
Introduction

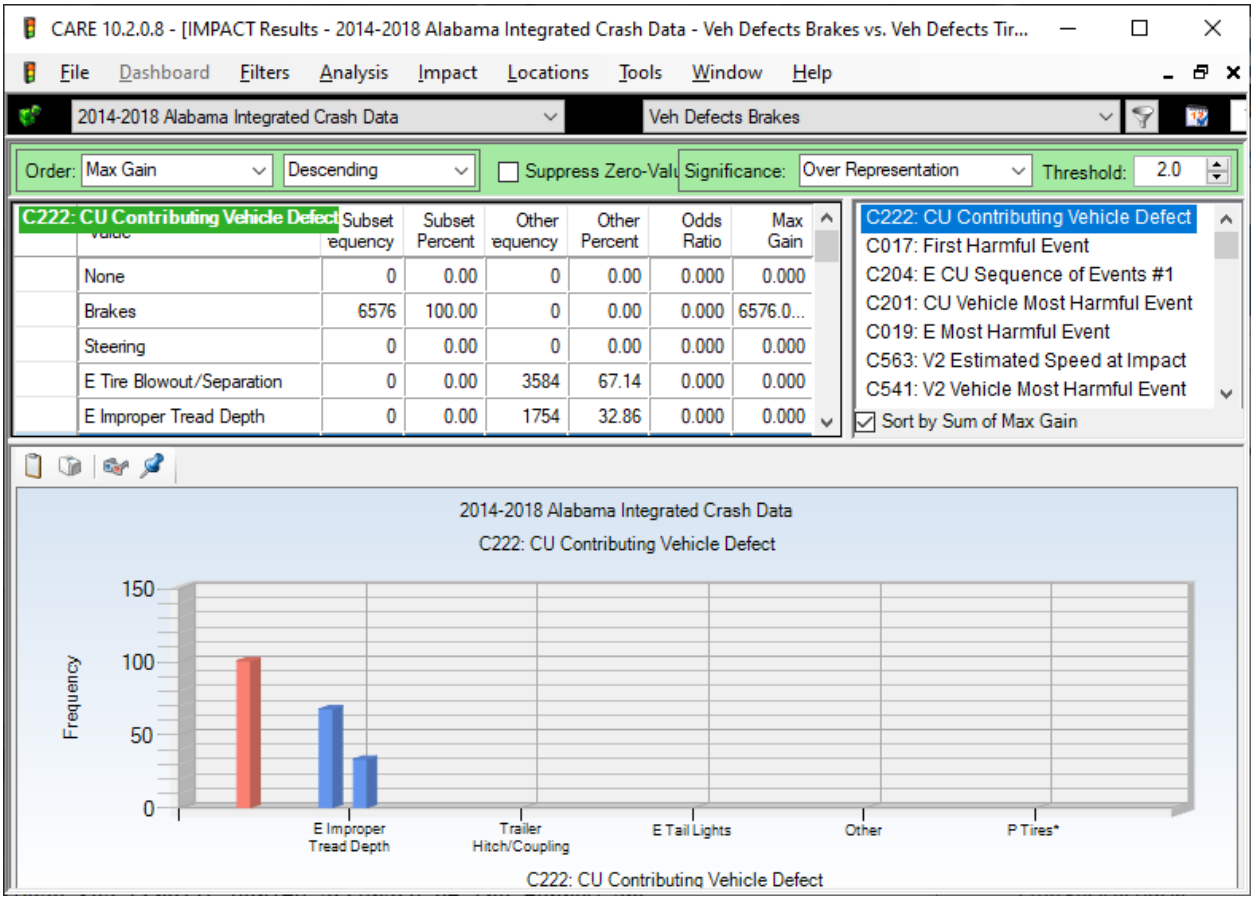
The frequency displays, below in this section, for C222 (CU Contributing Vehicle Defect Frequency) show that the most often crash-contributing defect is brakes, with 41.3% of the vehicle-defect crashes. Note that the listing omits those crashes where vehicle defects were not indicated to be contributing to the crash. The next two in frequency both relate to tires, and combined they account for 5338, which is 33.6% of the vehicle defect crashes. These will be considered together because they are not independent. Both Tire Blowout/Separation (3584 crashes) and Improper Tread Depth (1754 crashes) can be caused by tire wear, and thus many of them are the result of not performing timely tire maintenance. Together brakes and tires contributed to 11,914 crashes, which is about 75% of all contributing vehicle defect crashes.

C222 CU Contributing Vehicle Defect Frequency



The frequency distribution above indicates that the combined tire and brake defects account for about 75% of all crashes caused by vehicle defects. These are further subdivided by about 41% brake faults and 24% tire faults. Steering, wheels and power train occur rarely compared to these with 7.49%, 5.69%, and 3.62%, respectively. The items being compared are shown graphically in the display below.

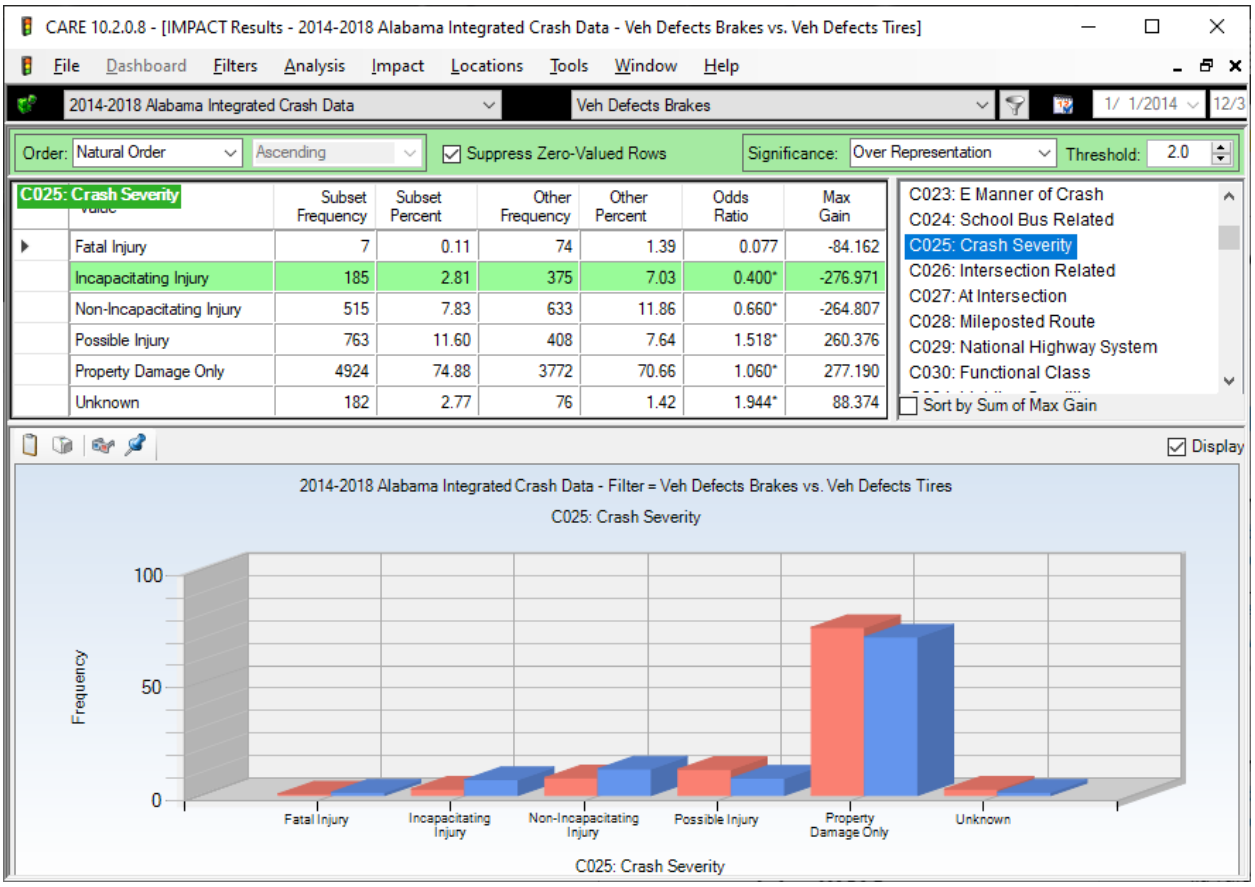
C222 Contributing Vehicle Defect Limited to Brakes and Tires



C025 Crash Severity

While considering these defect types as an overview, it is insightful to consider the severity of the crashes caused by each. The IMPACT display given below compares the two defect type by crash severity. From this it can be seen that the negative impact of these two defect types is not totally revealed by their frequencies. Tire defects resulted in 74 fatal crashes over the five years, while defective brakes were involved in only 7 fatal crashes. The under-representation of tire faults in the next two worse severity types indicates a very large over-representation of tire faults in these two categories as well. Compensating for this, the lowest severity types (Possible Injury and Property Damage Only) are over-represented in the brake-defect caused crashes. See a further discussion of severity beginning with C025 in the Recommendations section below.

Crash Severity of the Two Defect Types Being Compared



Recommendations

Recommendations will be presented here as a summary of the findings. They will be referenced by the CARE crash attribute numbers (Cnnn) for ease of reference to the IMPACT displays that will follow. Please read the *Introduction to the IMPACT Displays* section below to better understand the comparisons that are being made in the IMPACT displays.

The following present the recommendations by CARE crash attribute number:

- C001, C002 and C010: Geographical Area. City, County and Rural/Urban displays show clearly that defective brakes are far more prevalent in the urban areas, while tire defects are largely a rural issue. Inspections of trucks and cars should take into consideration where the predominance of the driving will take place for that vehicle and concentrate accordingly.
- C011 and C033: Highway Classifications and Locales. Reinforcing the results given above is the over-representation of brake problems on municipal streets, while tire problems are over-represented on Interstates. Similarly, Locales associated with urban areas reflect brake problems, while Open Country is significantly over-represented in tire defects.
- C028: Mileposted Routes. The high-level conclusion that we can come to in comparing mileposted routes (combined, Interstate, State and Federal) is that the State and Federal routes have far higher a proportion of brake problems as opposed to Interstates, which have the much higher proportion of tire-caused crashes. The increased proportion of tire problems on Interstates might be partially attributed to (1) higher speeds, (2) longer duration trips, and (3) less reliance on brakes for safe operation.
- C003: Year. Over the five-year period of the study, there was an increase of 214 (18.4%) for brakes, and an increase of 103 (10.8%) for tires. This provides some evidence that brake problems are increasing more than tire problems, with the increased traffic volume affecting both.
- C004, C006, C008 and C031: Enforcement Times. While Brake issues are over-represented in November and December, as opposed to tire issues that tend to be clustered in the warmer months of May-July. There is little reason to alter enforcement strategy on this account. The variability over the days of the week seem to be causes more by large differentials in brake defect crashes: Friday, Tuesday and Wednesday being over-represented, while Saturday and Sunday are significantly under-represented in brake-caused crashes (i.e., tire problems are over-represented). Correlated with this is the time of day: rush hours are over-represented with brake problems, whereas late night hours are more often attributed to tire defects. So if selective enforcement could differentiate between these two defect types, the concentration for brakes would be during the week, and especially rush hours, while the concentration for tires would be weekends and late-night.
- C006 and C008: see C004.

- C015: Primary Contributing Circumstance (PCC). As expected, urban types of crashes are related to bad brakes, from Misjudge Stopping Distance down to Various Failed to Yield Right of Way items. DUI and speed-related items are over-represented for tire faults.
- C017 and C023: First Harmful Event and Manner of Crash. Bad brakes clearly cause a major over-representation in Collision with Vehicle in Traffic and Collision with Parked Motor Vehicle. Bad tires tend to cause relatively more collisions with obstacles that are single-vehicle crashes off the roadway. Manner of Crash (C023) produces essentially identical results.
- C022: Type of Roadway Junction Feature. Four-Way Intersections and T-Intersections are significantly over-represented for bad brakes, while bad tires are more associated with junctions related to the Interstates.
- C023: see C017.
- C025, C038, C060 and C224: Crash Severity Factors. The severity results (C025) here are quite surprising and probably unexpected for most people. Notice just in the raw frequency that there are nearly ten times the fatal crashes cause by tires as that caused by defective brakes. (No statistical significance results are shown if any of the items being compared has less than 20 occurrences.) The next two most severe classifications are also quite significant. The least severe injury crashes are under-represented for faulty tires. Let us consider the causes of increased severity:
    - C038: Adjusted EMS Arrival Delay. A major problem with defective tire crashes is their distance from available EMS first responders. Being over-represented in rural crashes, the time it takes them to be reached is significantly higher than most brake-defect crashes, which occur in urban areas.
    - C060: Number of Injuries (including fatalities). All of the injury categories are over-represented in defective tires as opposed to defective brakes. This is consistent with the other severity metrics.
    - C224: Speed at Impact. This display makes it abundantly clear that the speed of impact of tire-defect caused crashes is much, much higher than the typical brake-defect crash. This reflects the proven fact that in Alabama above 40 MPH, an increase in the impact speed of 10 MPH doubles the probability (exponentially) that the crash will result in a fatality. The background coloring shows a very high significance for higher frequency of brake-defect crashes in the 1-35 MPH range. For tire defect caused crashes there is a similar exceedingly high over-representation in the 51-70 MPH range.
- C031: see C004.
- C032: Weather. As usual, weather changes things. The major finding in several previous studies is that wet pavement reduces fatalities by virtue of slowing the traffic speeds. In this case we find brakes being more of a problem in clear weather, and tires being a larger problem in the rain (about twice what is expected when compared to the proportion of brake-defect caused crashes.
- C033: see C011.
- C038: See C025.

- C052: Number of Vehicles. Single vehicle crashes are over-represented in defective tire-caused crashes. Defective brakes are more apt to cause two, three or higher multiple-vehicle crashes.
- C060: see C025.
- C101: Causal Unit (CU) Type. Passenger Cars and Mini-vans have the greatest brake problems, as opposed to SUVs and large trucks, which have a higher proportion of tire problems.
- C107: CU Driver Raw Age. Clearly the younger drivers have much more of a problem with brakes than they do with tires. This is about the only conclusion that can be obtained by studying these two distributions. The reason for this is probably that they are more apt to be involved in shorter trips, and in predominantly urban areas.
- C109: CU Driver Gender. The same thing probably explains the male-female disparity – males drive the longer trips; while females are more into urban driving.
- C110: Driver Residence Distance. This is also an expected result since shorter trips are correlated with brake defects, while longer trips are correlated with tire defects.
- C121, C122 and C123: CU Driver Condition and (Officer Opinion of) Sobriety. These attributes confirm what was found in the Primary Contributing Circumstances (C015) and the other alcohol and drug test results. ID/DUI is more correlated with defective tires than with defective brakes. This is probably because ID is correlated with rural driving.
- C125: CU Vehicle Maneuvers. Intuitively, brakes will be involved in maneuvers which require their use. On the other hand, tires can go out at any time, and so those which are most common to driving are thus over-represented.
- C204: Sequence of Events. Defective brakes are close to seven times more likely to result in collision with another vehicle in traffic, close to six times more likely to result in running off the road straight, and over 3 times more likely to result in a collision with a parked motor vehicle. The first of these is by far the most predominant, occurring over 30 times more than the second two.
- C208: Model Year. Brakes are problematic up through the 1998 model year. Neither defect type until model year 2008, and from that point forward, defective tires are over-represented.
- C224: see C025.
- C233: Point of Initial Impact. Head on Center is over-represented for brakes defects by over twice what would be expected, and no other attributes are over-represented. Defective tires, especially blow-outs, will tend to pull the vehicle one way or the other, and this accounts for most of the other point of initial impact over-representations.

Introduction to the IMPACT Displays

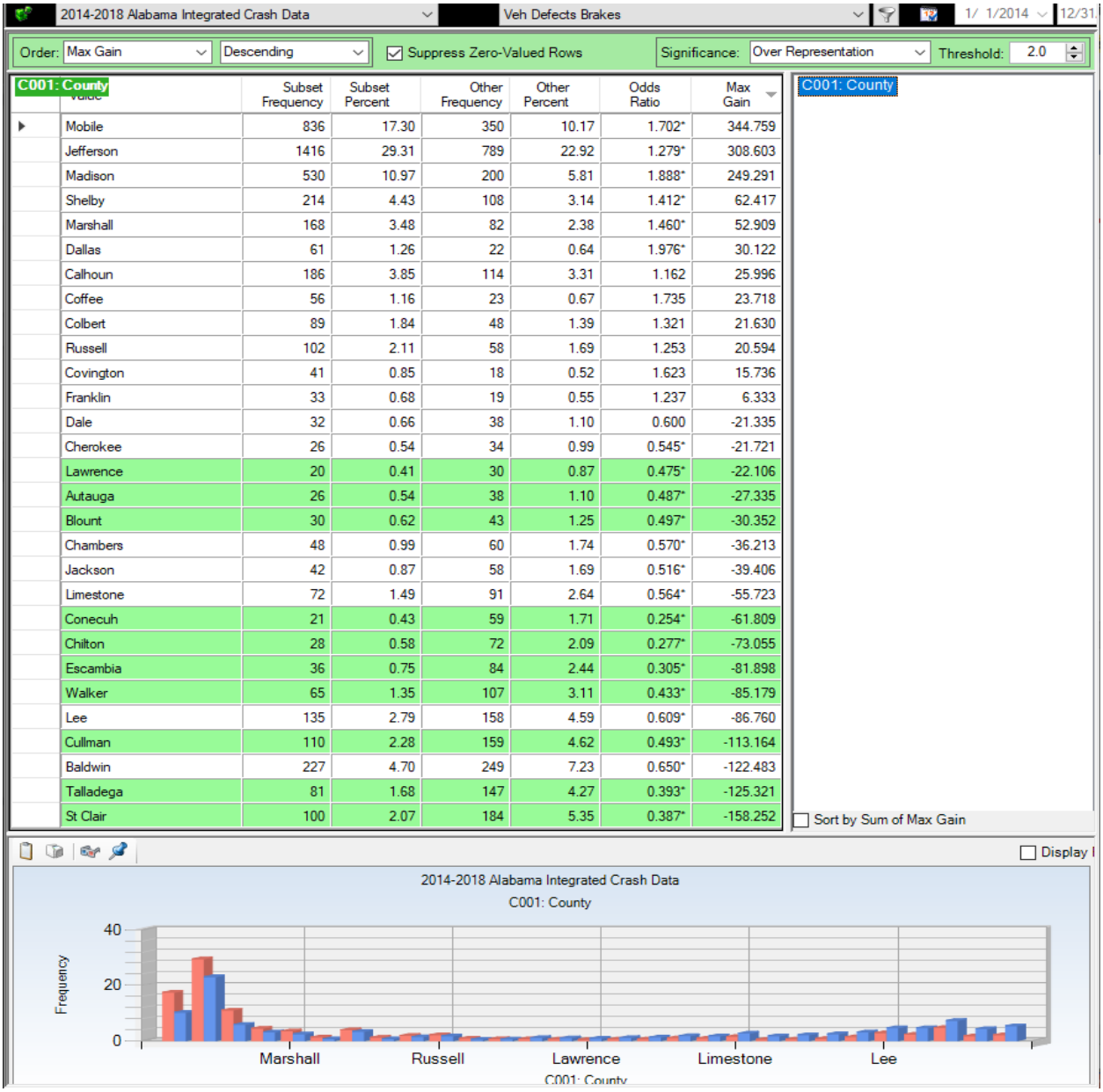
In order to get insight into these two vehicle defect types, an IMPACT analysis was performed that compared them against each other. This showed the similarities and differences between the two types of defects. Experimentally, each of them can be viewed as the other's control group. When one of them is over-represented, this could indicate an even larger issue than if the comparison were against no defects at all. To facilitate future reference, the comparisons are generally ordered in the way that they appear in the data. Use the navigation bar of Word or the PDF search to get to specific comparisons. In the results, the "Subset" is the proportion of brake defect caused crashes (represented by the red bars in the charts). The "Other" (blue bars) is not the complement, which is often the case in IMPACT comparisons, but it is the proportion of tire-defect caused crashes.

To summarize, in the displays that follow the *red bars* represent the proportion of the attributes of the 6576 crashes that had Brakes as the Contributing Vehicle Defect. These are compared against comparable attributes of the combined Tire defect types: (1) Tire Blowout/Separation and (2) Improper Tread Depth, which had 3,584 and 1,754 crashes, respectively (5,338 total). These tire defect proportions are given by the *blue bars* in the charts. Several of the displays are "pruned" to remove irrelevant items of low frequency that had very low relative impact on crashes in general.

Please do not confuse the color of the bars with the background colors in the table. In the tables, red background indicates that defective brakes are over-represented by over twice what would be expected from the defective tires proportion; conversely, green background indicates that tires are over-represented by over twice what would be expected from the defective brakes proportion. This will be represented by an Odds Ratio of 0.5 or less.

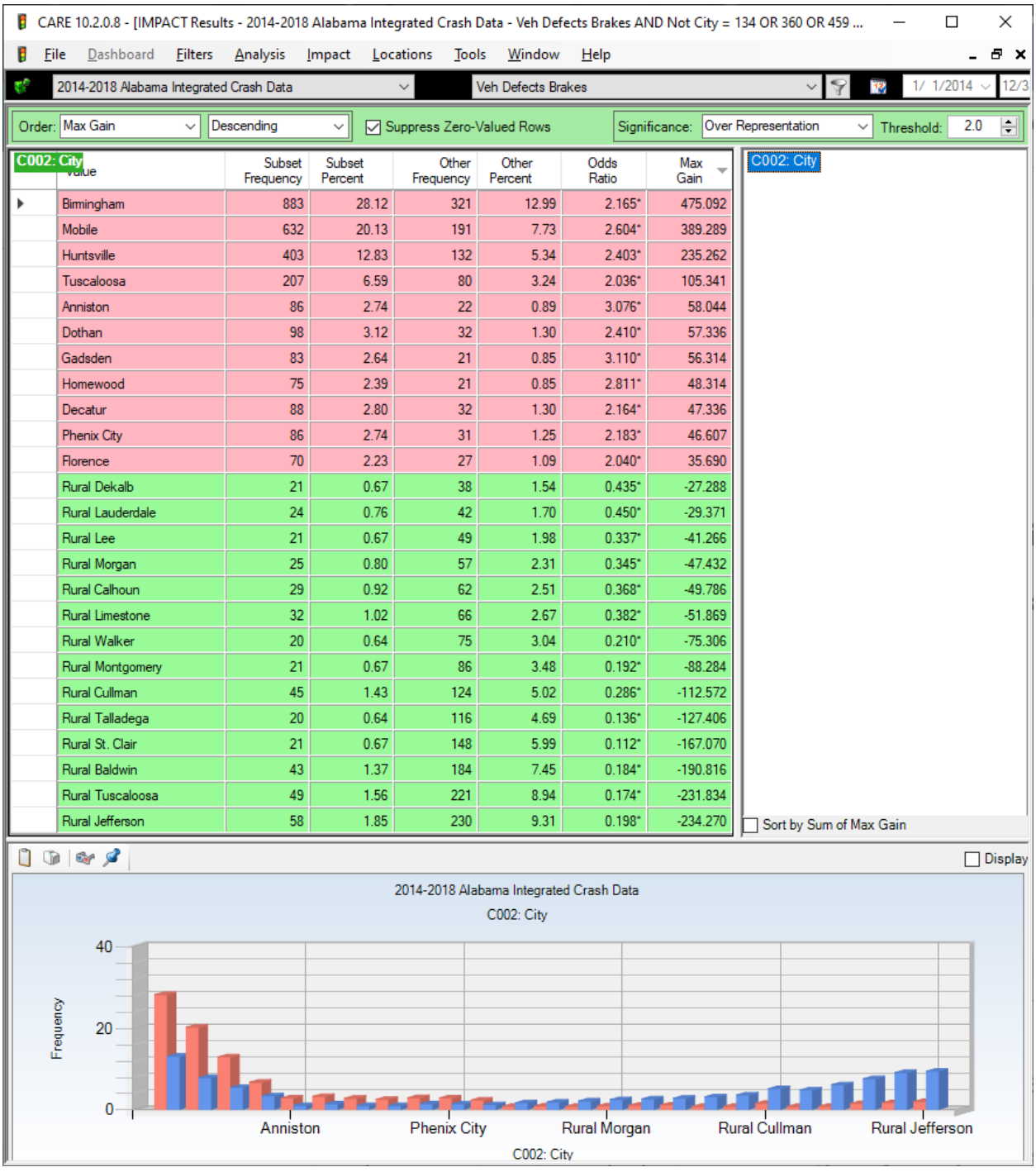
IMPACT Comparison of Brakes (Red Bars) with Tires (Blue Bars)

C001 County (Counties that had significant differences before pruning)



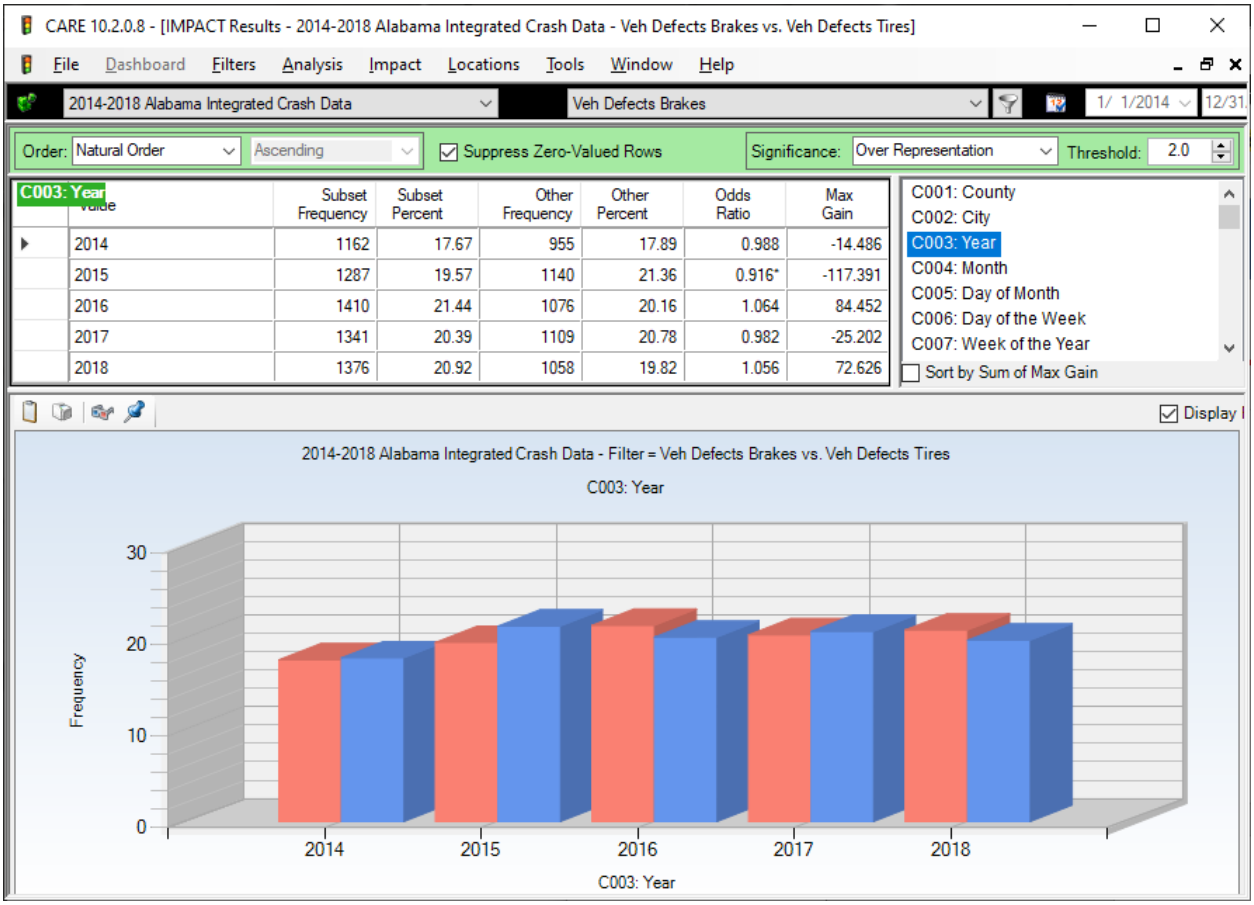
Counties that had less than 20 defective brakes crashes as well as others that did not significant differences in the proportion of brakes compared to tires crashes. Prior to pruning, all of the above showed significant difference in their proportions. The counties that are over-represented in brakes defects are at the top, while those with more tire defects are toward the bottom.

C002 City (Cities that had significant differences before pruning)



See C010; clearly brakes are the larger problem in the urban areas.

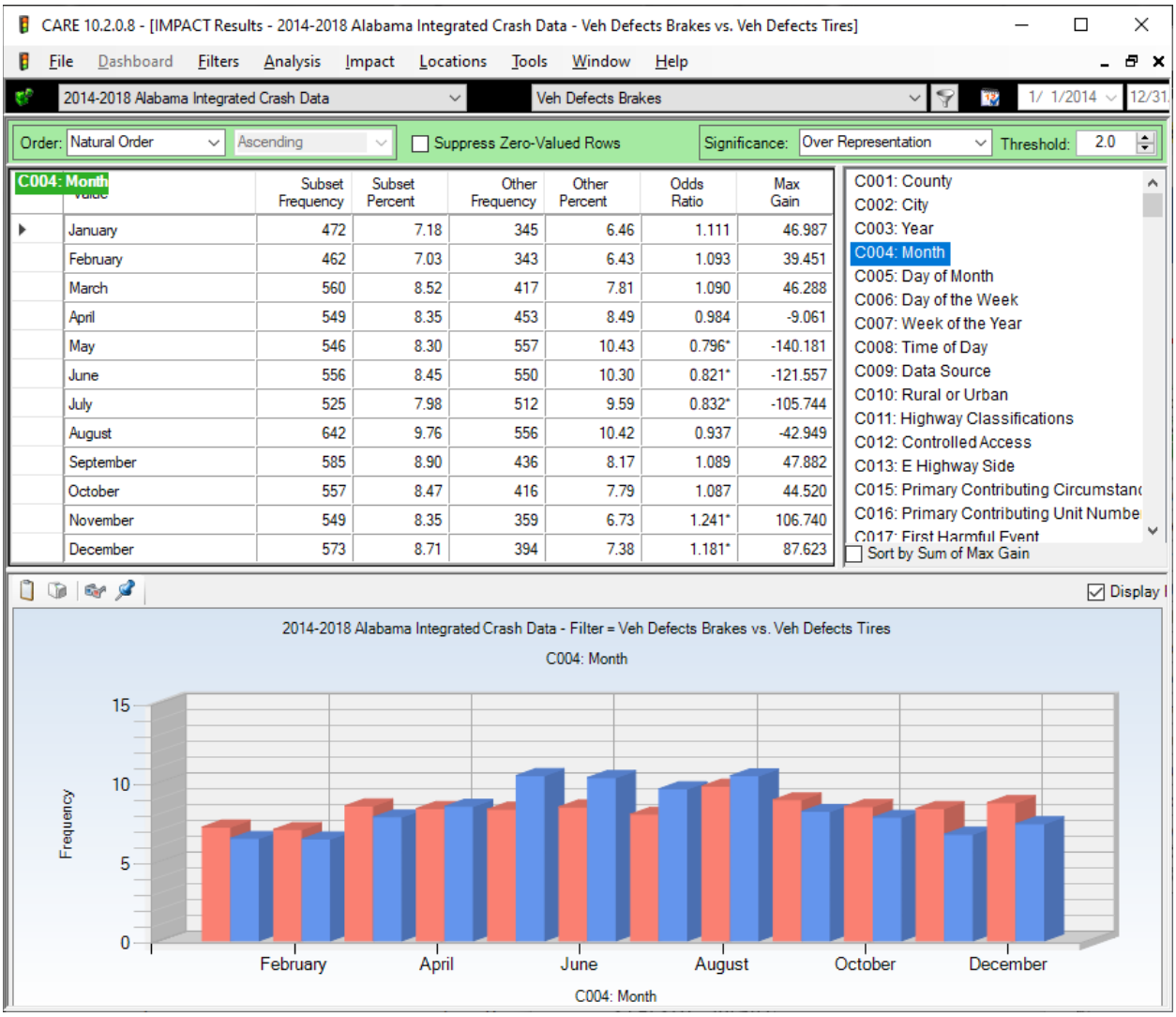
C003 Year



There is a general trend up that reflects the increase in the number of vehicle-miles traveled. The only significant difference between the two defect types was in 2015, where tire defects had a large increase. Overall, between 2014 and 2018, there was an increase of 214 (18.4%) for brakes and an increase of 103 (10.8%) for tires. The 2016 year was an outlier in most respects, and that has been studied in other analyses, e.g.,:

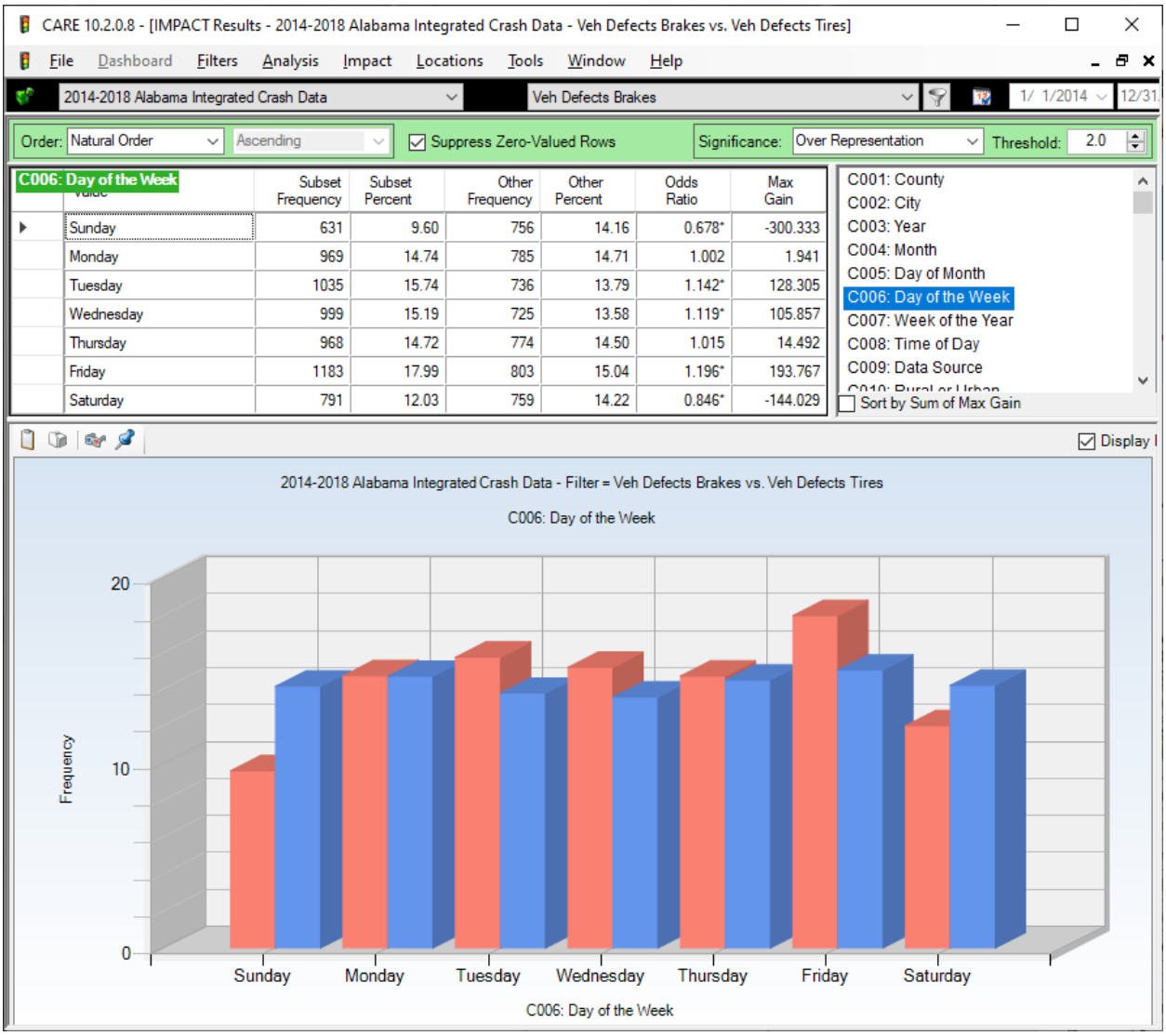
http://www.safehomealabama.gov/wp-content/uploads/2018/12/AL-Fatality-PPT-Comp-CY2016-w-2014-v08.pdf

C004 Month



Brake issues are over-represented in November and December, while tire issues tend to be clustered in the warmer months of May-July.

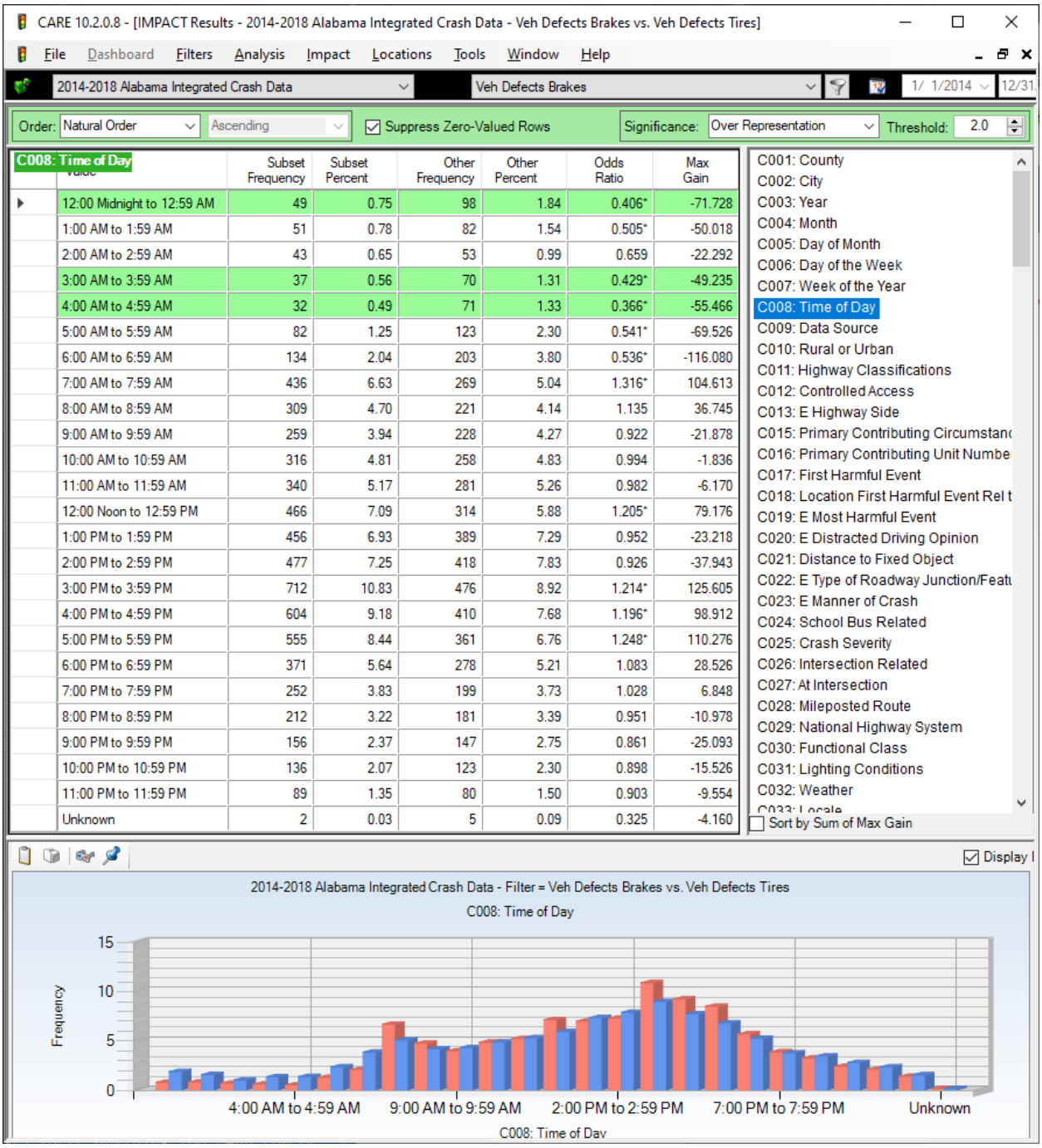
C006 Day of the Week



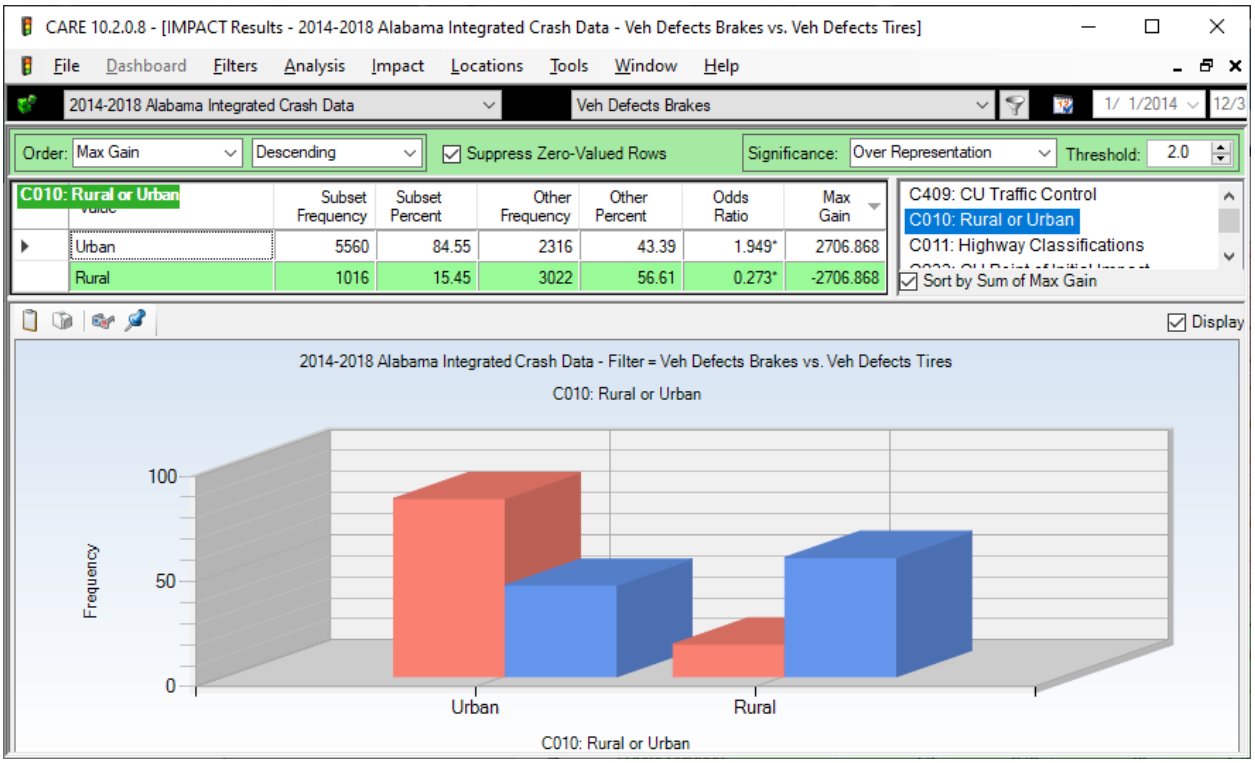
Weekends are over-represented in tire issues, while Friday, Tuesday and Wednesday (in that order) are over-represented in brake contributing defects.

Correlated with this is the time of day given next. Rush hours are over-represented with brake problems, whereas late night are most often attributed to tire defects.

C008 Time of Day

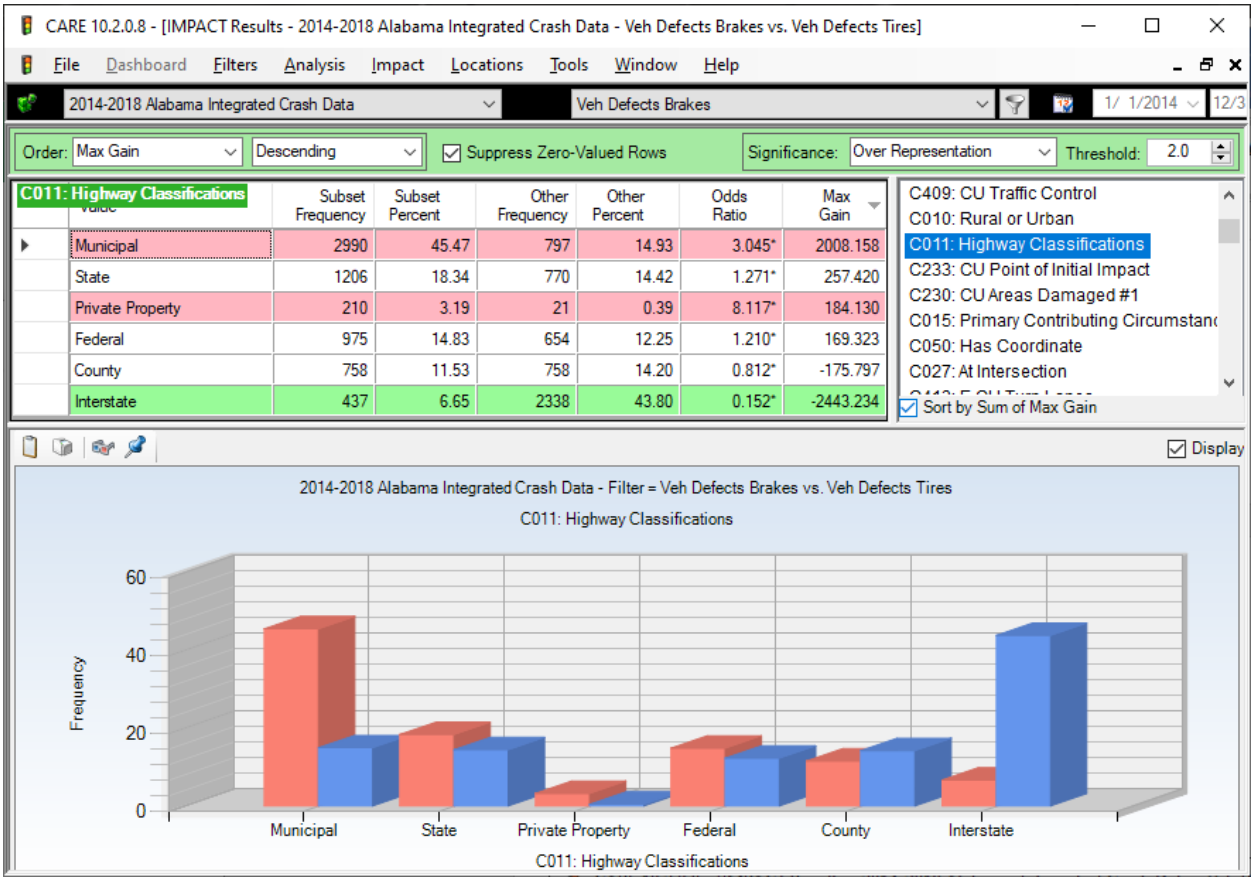


C010 Rural or Urban

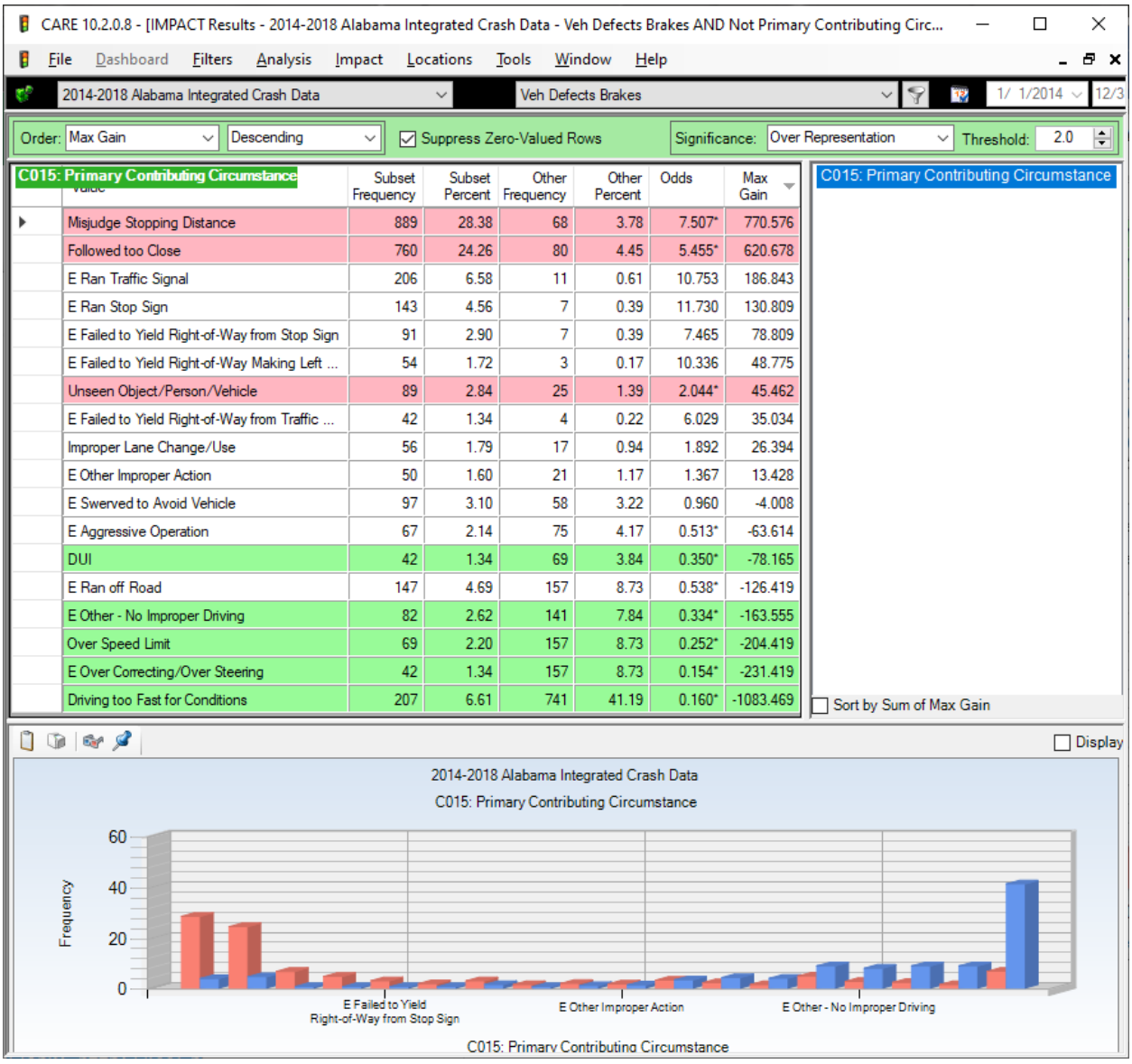


The county and city results basically reflect the rural-urban over-representations. Clearly urban areas are over-represented in brakes issues, while rural areas have proportionately far more problems with tires.

C011 Highway Classification



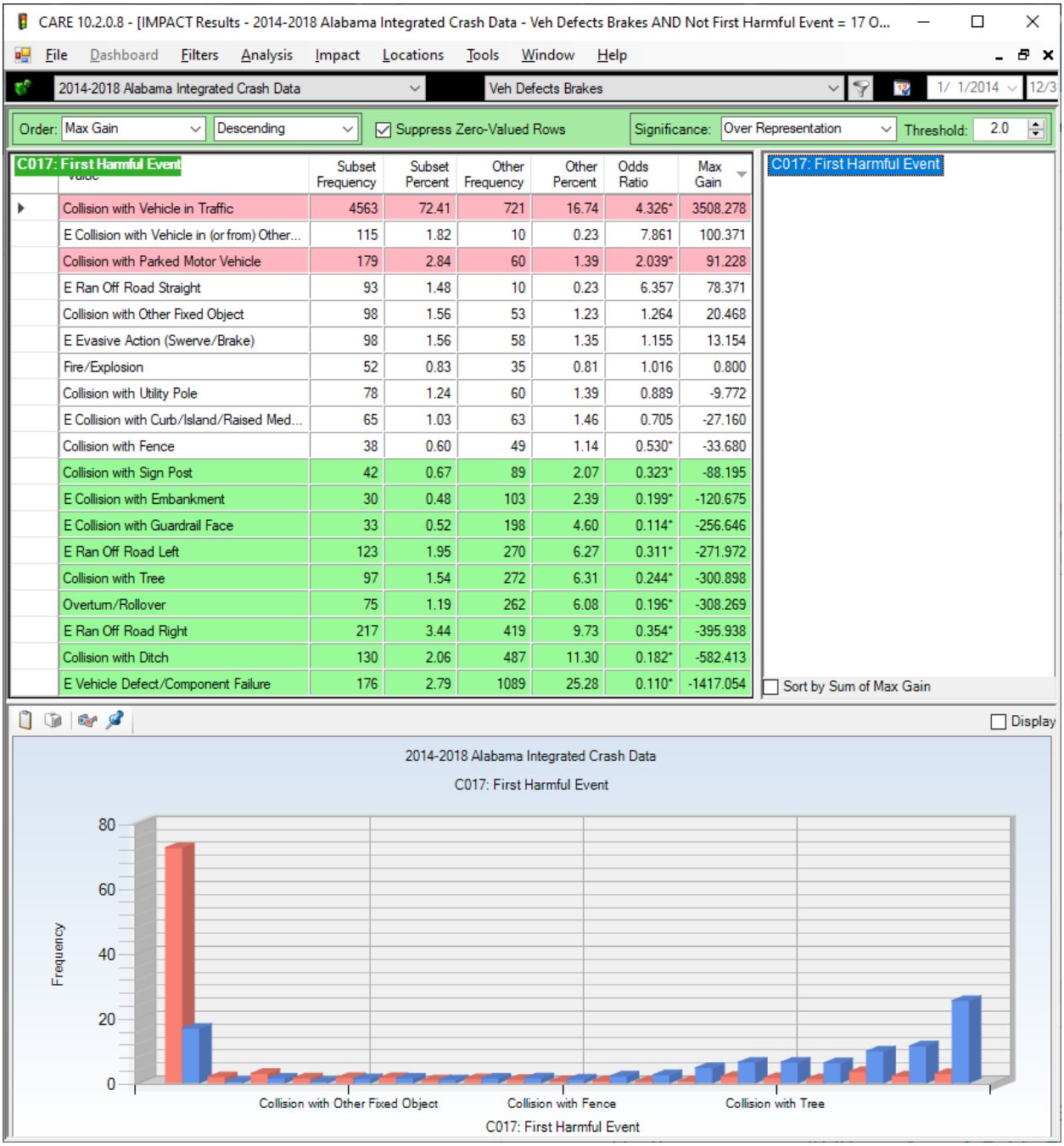
C015 Primary Contributing Circumstances



C015: Primary Contributing Circumstance	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain
Misjudge Stopping Distance	889	28.38	68	3.78	7.507*	770.576
Followed too Close	760	24.26	80	4.45	5.455*	620.678
E Ran Traffic Signal	206	6.58	11	0.61	10.753	186.843
E Ran Stop Sign	143	4.56	7	0.39	11.730	130.809
E Failed to Yield Right-of-Way from Stop Sign	91	2.90	7	0.39	7.465	78.809
E Failed to Yield Right-of-Way Making Left ...	54	1.72	3	0.17	10.336	48.775
Unseen Object/Person/Vehicle	89	2.84	25	1.39	2.044*	45.462
E Failed to Yield Right-of-Way from Traffic ...	42	1.34	4	0.22	6.029	35.034
Improper Lane Change/Use	56	1.79	17	0.94	1.892	26.394
E Other Improper Action	50	1.60	21	1.17	1.367	13.428
E Swerved to Avoid Vehicle	97	3.10	58	3.22	0.960	-4.008
E Aggressive Operation	67	2.14	75	4.17	0.513*	-63.614
DUI	42	1.34	69	3.84	0.350*	-78.165
E Ran off Road	147	4.69	157	8.73	0.538*	-126.419
E Other - No Improper Driving	82	2.62	141	7.84	0.334*	-163.555
Over Speed Limit	69	2.20	157	8.73	0.252*	-204.419
E Over Correcting/Over Steering	42	1.34	157	8.73	0.154*	-231.419
Driving too Fast for Conditions	207	6.61	741	41.19	0.160*	-1083.469

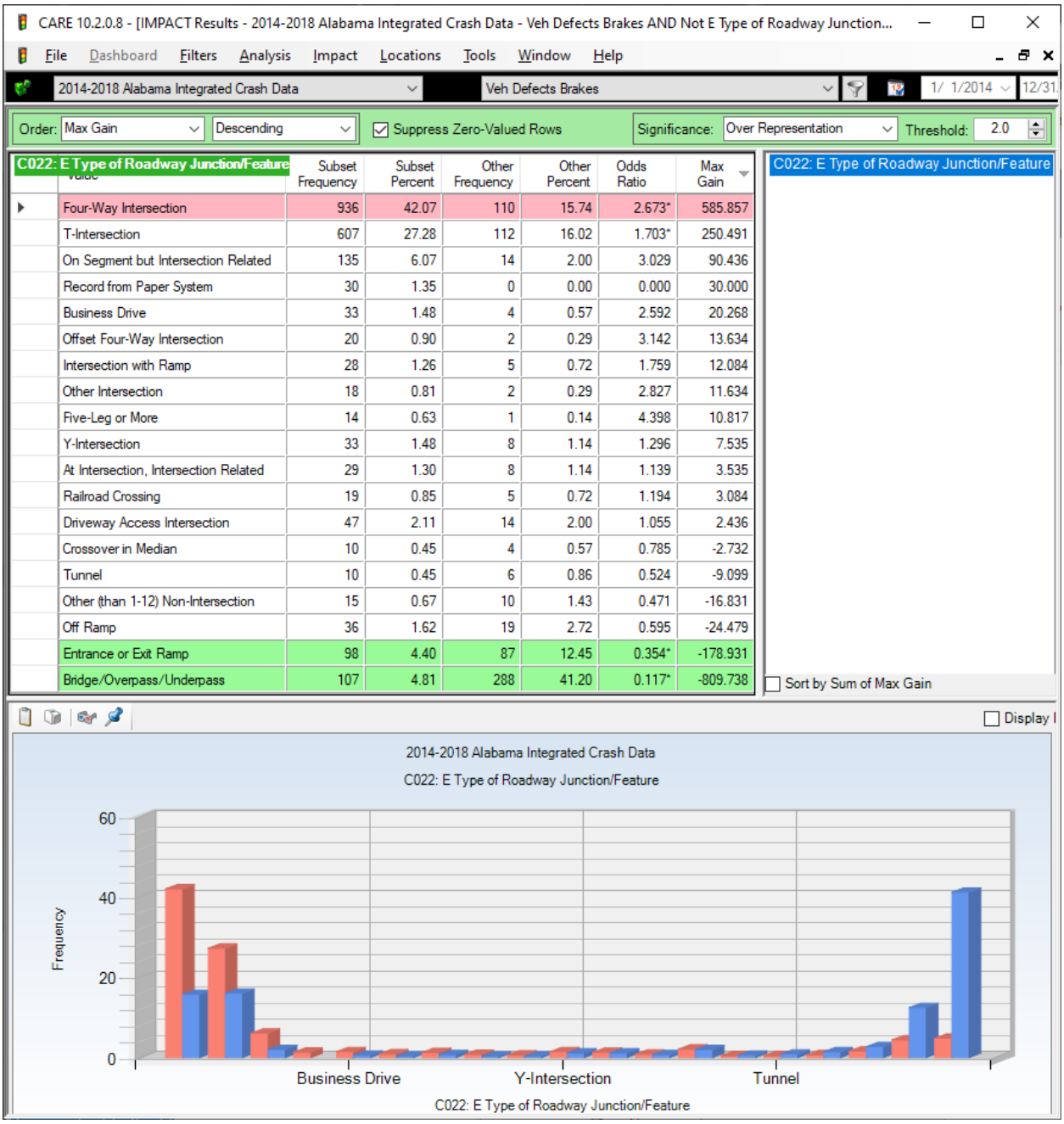
All attributes with less than 40 cases were removed. DUI and Speed are correlated with faulty tires as opposed to bad brakes.

C017 First Harmful Event (30 or less removed)



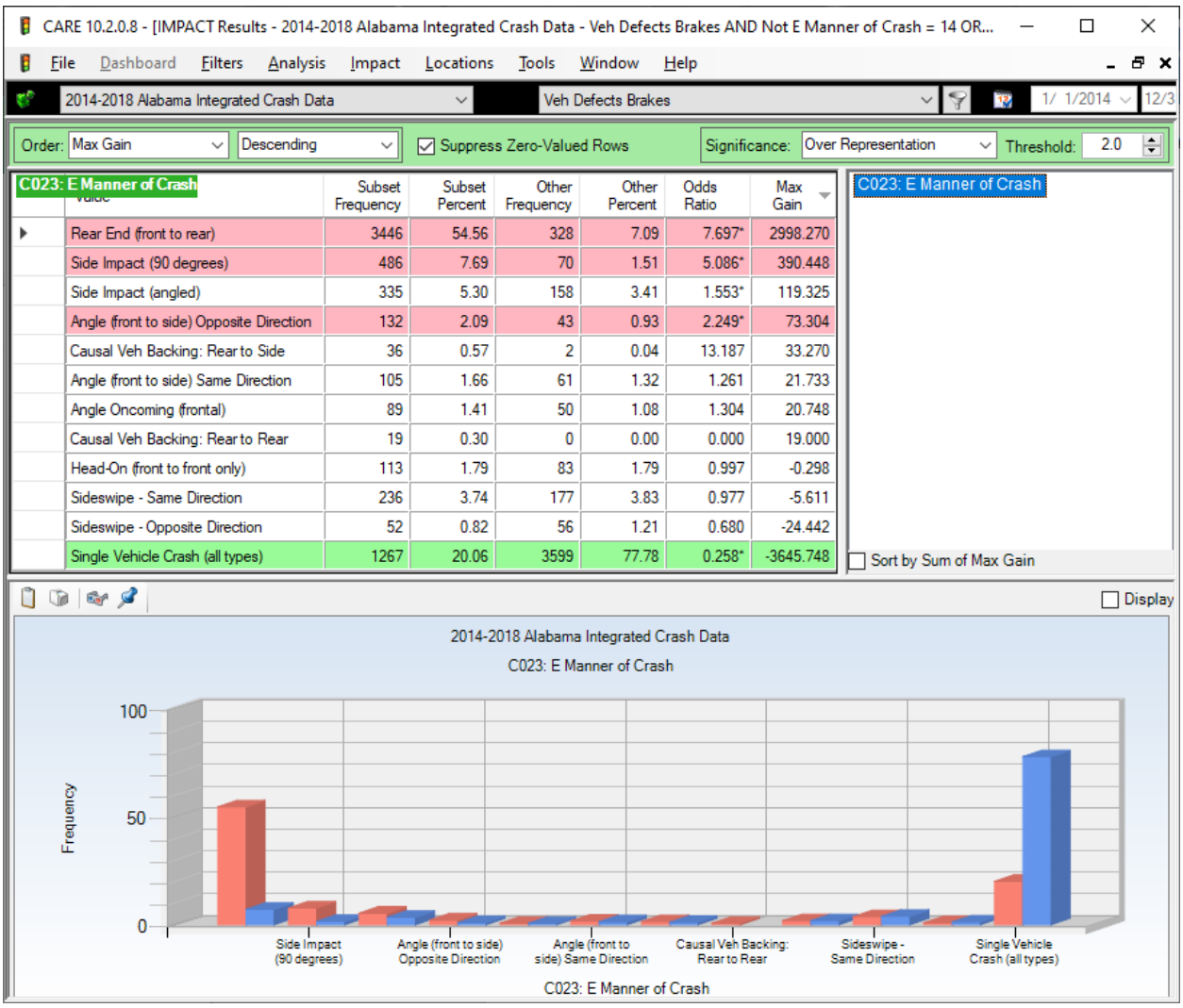
This attribute had the highest total maximum gain.

C022 Type of Roadway Junction/Feature



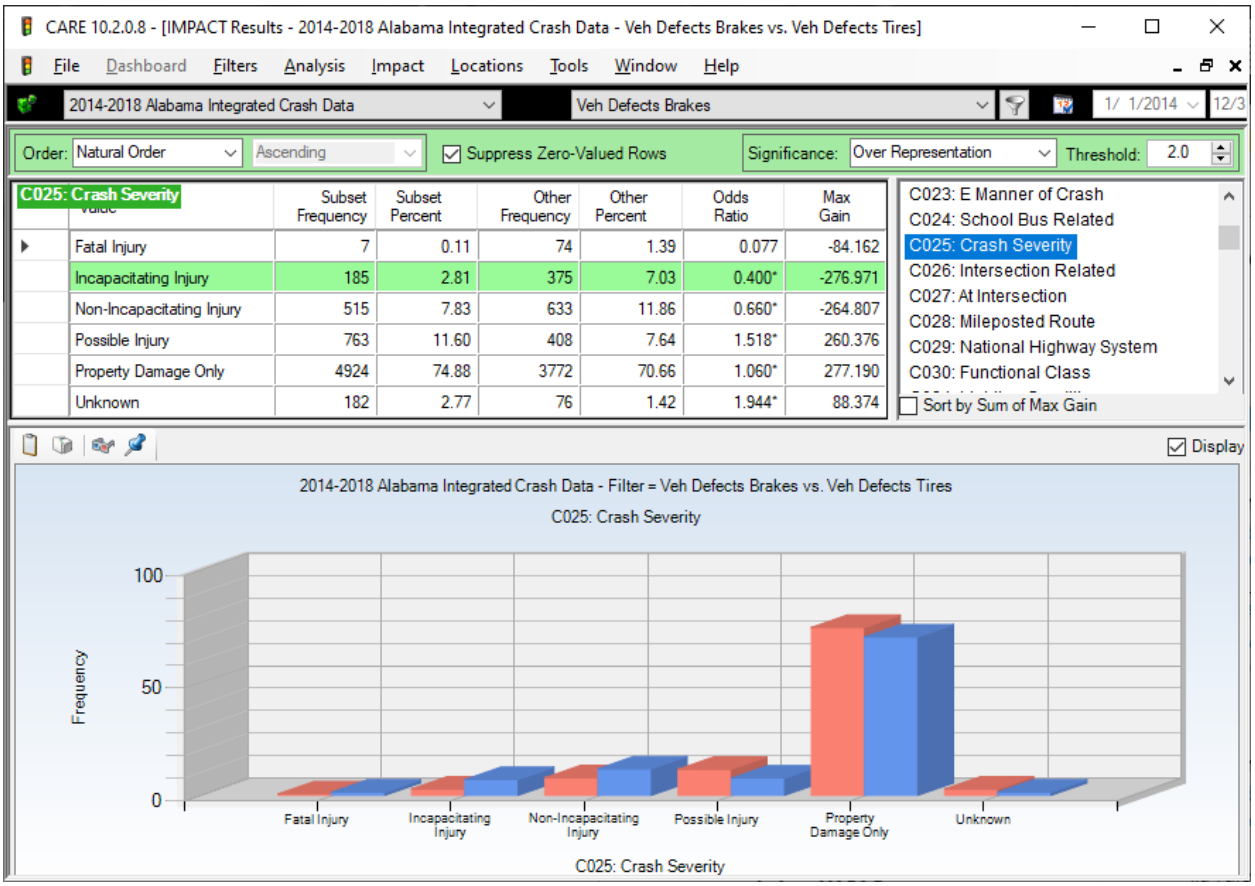
Brakes contribute to more crashes at intersections, while tire defects are more on locations described by Bridge/Overpass/Underpass, Entrance or Exit Ramp, and Off Ramp. This was further confirmed by C026 (not shown), which had an odds ratio for brake-related crashes at intersections to be close to 6 times that of defective tires.

C023 Manner of Crash

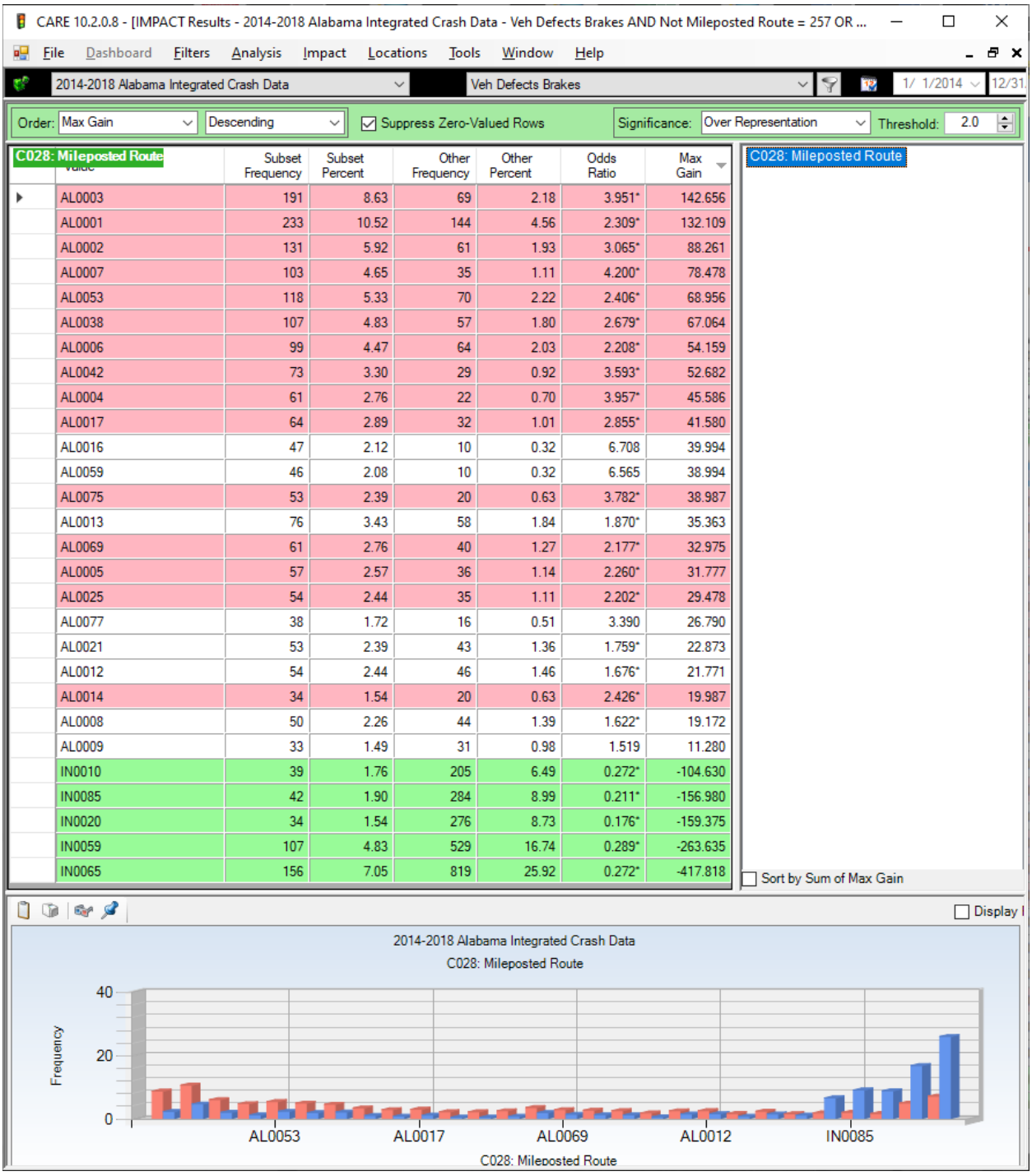


This attribute had the fifth highest total Max Gain.

C025 Crash Severity



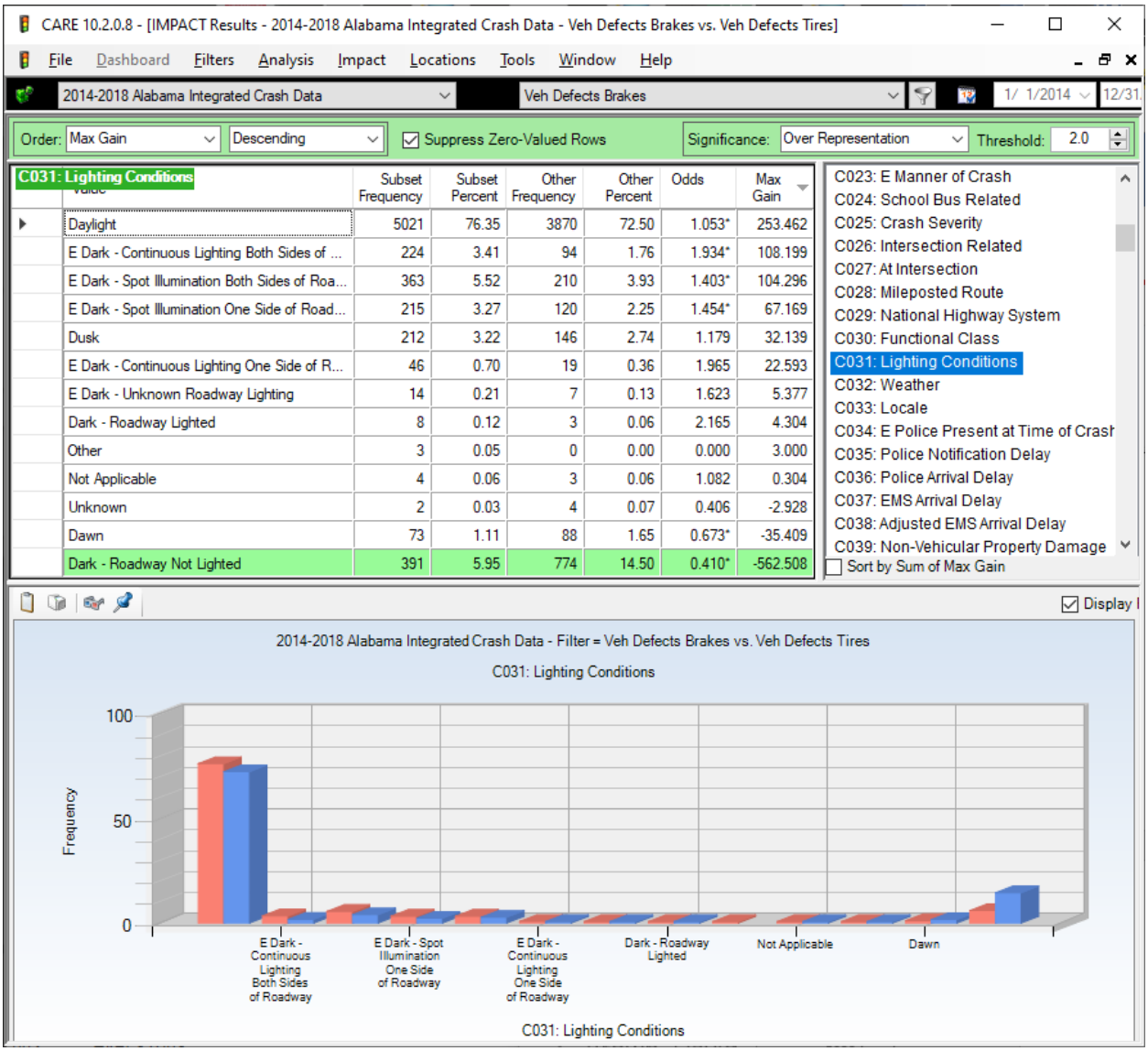
C028 Mileposted Routes



C028: Mileposted Route	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain
AL0003	191	8.63	69	2.18	3.951*	142.656
AL0001	233	10.52	144	4.56	2.309*	132.109
AL0002	131	5.92	61	1.93	3.065*	88.261
AL0007	103	4.65	35	1.11	4.200*	78.478
AL0053	118	5.33	70	2.22	2.406*	68.956
AL0038	107	4.83	57	1.80	2.679*	67.064
AL0006	99	4.47	64	2.03	2.208*	54.159
AL0042	73	3.30	29	0.92	3.593*	52.682
AL0004	61	2.76	22	0.70	3.957*	45.586
AL0017	64	2.89	32	1.01	2.855*	41.580
AL0016	47	2.12	10	0.32	6.708	39.994
AL0059	46	2.08	10	0.32	6.565	38.994
AL0075	53	2.39	20	0.63	3.782*	38.987
AL0013	76	3.43	58	1.84	1.870*	35.363
AL0069	61	2.76	40	1.27	2.177*	32.975
AL0005	57	2.57	36	1.14	2.260*	31.777
AL0025	54	2.44	35	1.11	2.202*	29.478
AL0077	38	1.72	16	0.51	3.390	26.790
AL0021	53	2.39	43	1.36	1.759*	22.873
AL0012	54	2.44	46	1.46	1.676*	21.771
AL0014	34	1.54	20	0.63	2.426*	19.987
AL0008	50	2.26	44	1.39	1.622*	19.172
AL0009	33	1.49	31	0.98	1.519	11.280
IN0010	39	1.76	205	6.49	0.272*	-104.630
IN0085	42	1.90	284	8.99	0.211*	-156.980
IN0020	34	1.54	276	8.73	0.176*	-159.375
IN0059	107	4.83	529	16.74	0.289*	-263.635
IN0065	156	7.05	819	25.92	0.272*	-417.818

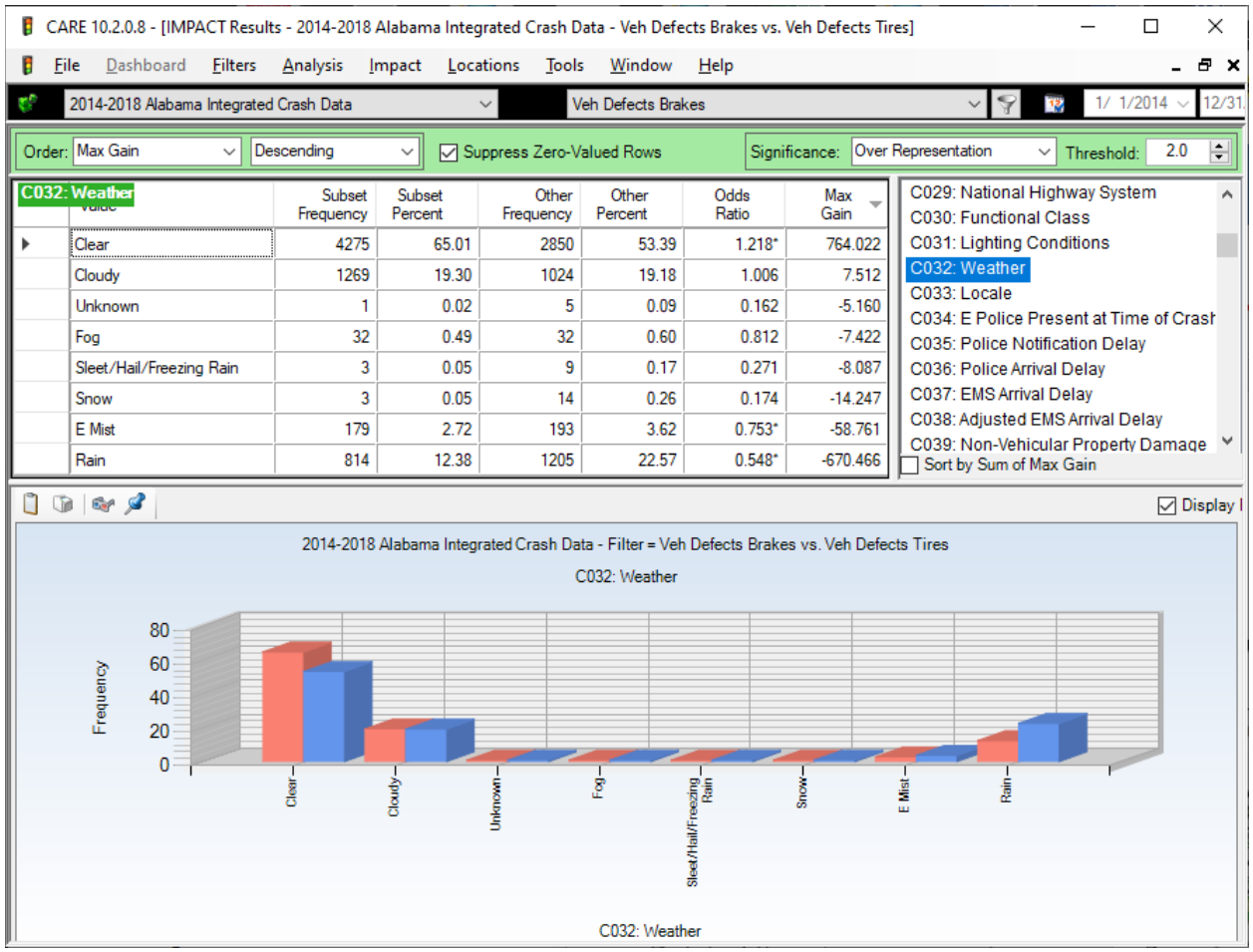
Routes with 30 or less brake-related crashes were removed.

C031 Lighting Conditions



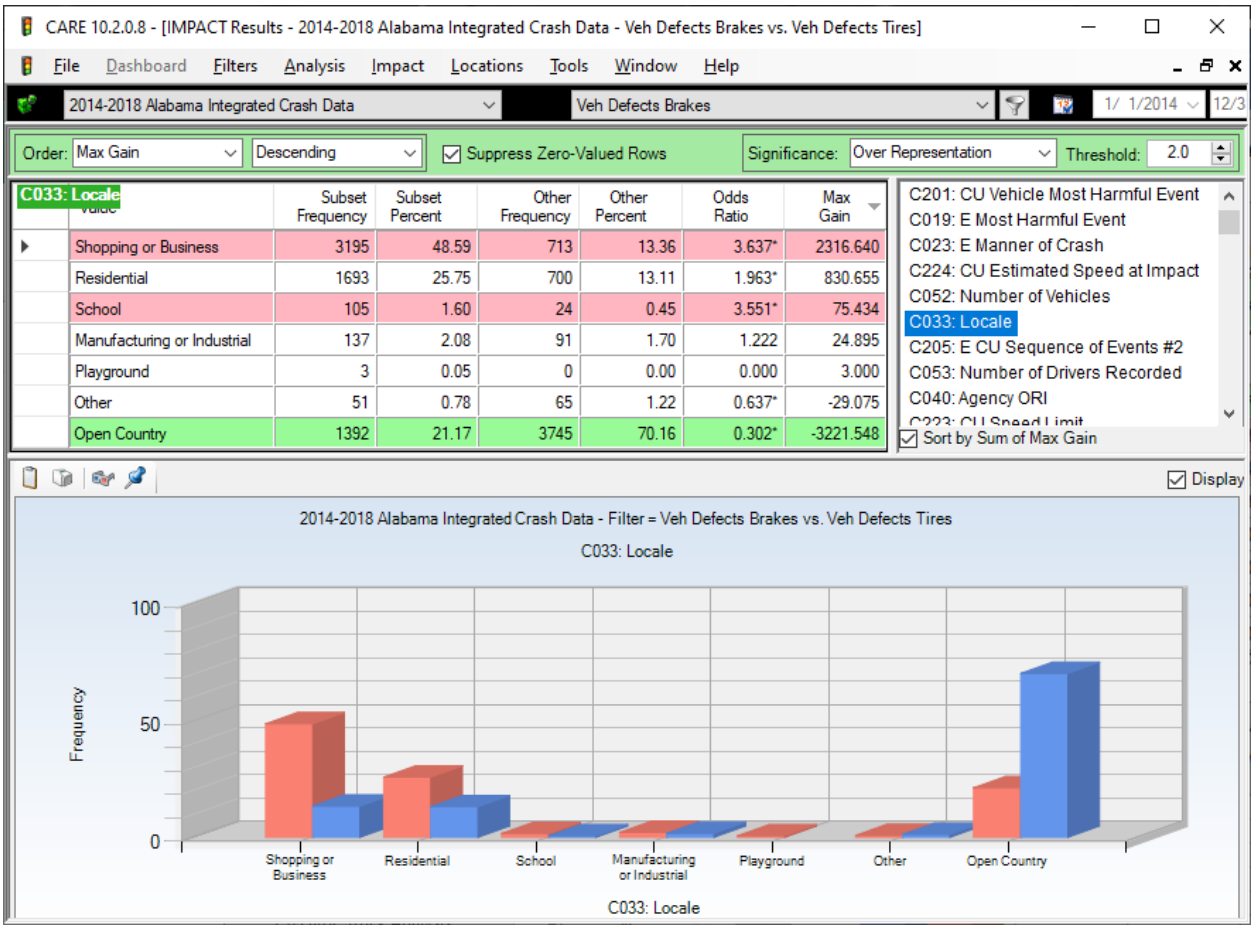
These results can be correlated with the urban-rural and other geographic results, but this could be a root cause for those other results.

C032 Weather

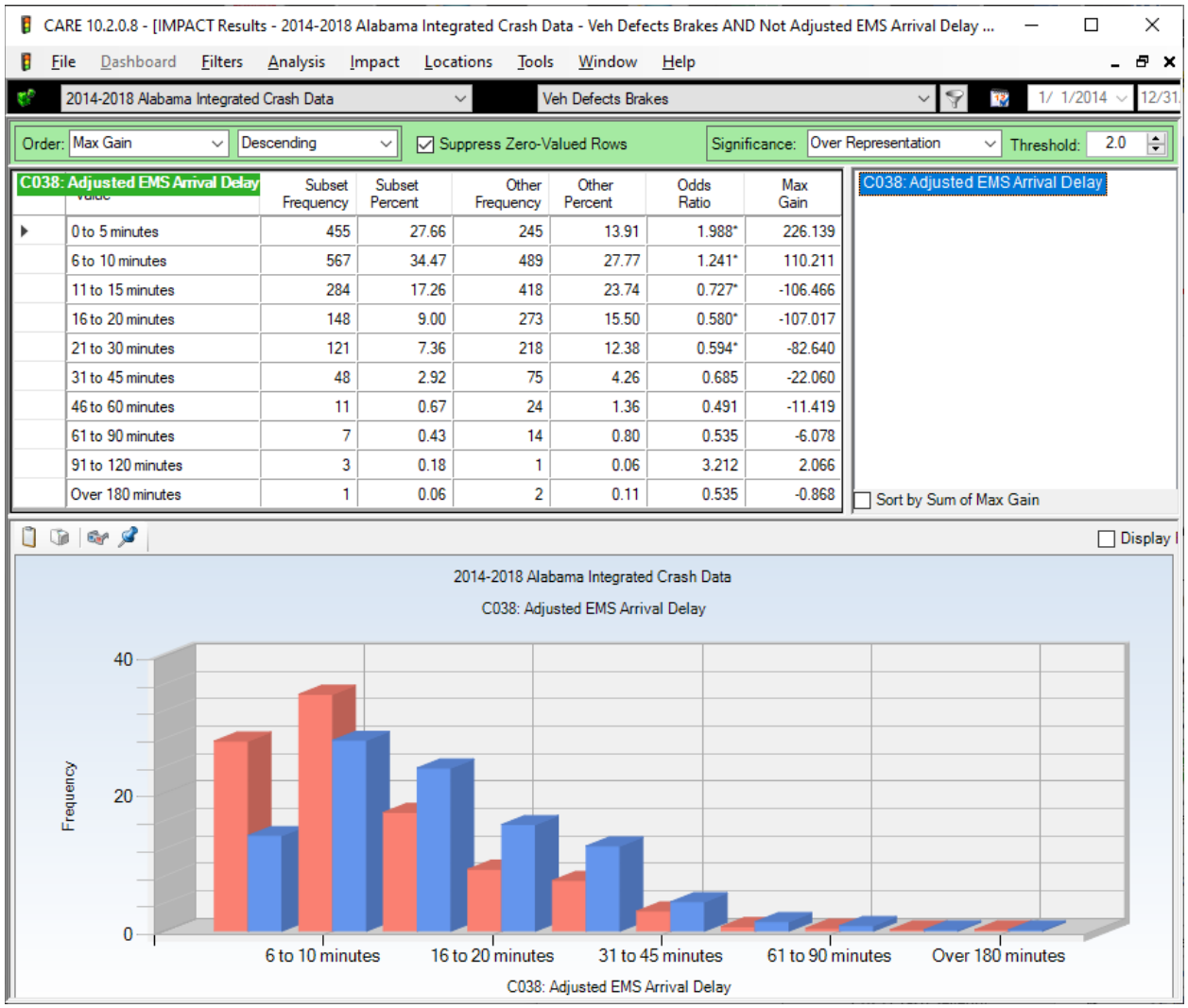


Clear weather leads to significantly more brake-related crashes, while rain is over-represented in tire-defect related crashes.

C033 Locale


CARE 10.2.0.8 - [IMPACT Results - 2014-2018 Alabama Integrated Crash Data - Veh Defects Brakes vs. Veh Defects Tires]
File Dashboard Filters Analysis Impact Locations Tools Window Help
2014-2018 Alabama Integrated Crash Data
Veh Defects Brakes
Order: Max Gain
Descending
Suppress Zero-Valued Rows
Significance: Over Representation
Threshold: 2.0
C033: Locale
Subset Frequency
Subset Percent
Other Frequency
Other Percent
Odds Ratio
Max Gain
Shopping or Business 3195 48.59 713 13.36 3.637* 2316.640
Residential 1693 25.75 700 13.11 1.963* 830.655
School 105 1.60 24 0.45 3.551* 75.434
Manufacturing or Industrial 137 2.08 91 1.70 1.222 24.895
Playground 3 0.05 0 0.00 0.000 3.000
Other 51 0.78 65 1.22 0.637* -29.075
Open Country 1392 21.17 3745 70.16 0.302* -3221.548
C201: CU Vehicle Most Harmful Event
C019: E Most Harmful Event
C023: E Manner of Crash
C224: CU Estimated Speed at Impact
C052: Number of Vehicles
C033: Locale
C205: E CU Sequence of Events #2
C053: Number of Drivers Recorded
C040: Agency ORI
Sort by Sum of Max Gain
Display
2014-2018 Alabama Integrated Crash Data - Filter = Veh Defects Brakes vs. Veh Defects Tires
C033: Locale
Frequency
100
50
0
Shopping or Business
Residential
School
Manufacturing or Industrial
Playground
Other
Open Country
C033: Locale

C038 Adjusted EMS Arrival Delay



This result seems consistent to the facts that tire-defect related crashes (blue bars) are more severe and the also occur more in rural areas. Perhaps the more severe crashes lead to a greater sense of urgency, but this is just speculation. See C224 for speed severity metrics. The more general cross-tabulation below shows the overall relationship between ambulance delay times and severity.

Cross-tabulation Severity by Ambulance Arrival Time for <u>All Crashes</u>

CARE 10.2.1.0 - [Crosstab Results - 2014-2018 Alabama Integrated Crash Data - Filter = Severity EMS Called]

File Dashboard Filters Analysis Crosstab Locations Tools Window Help

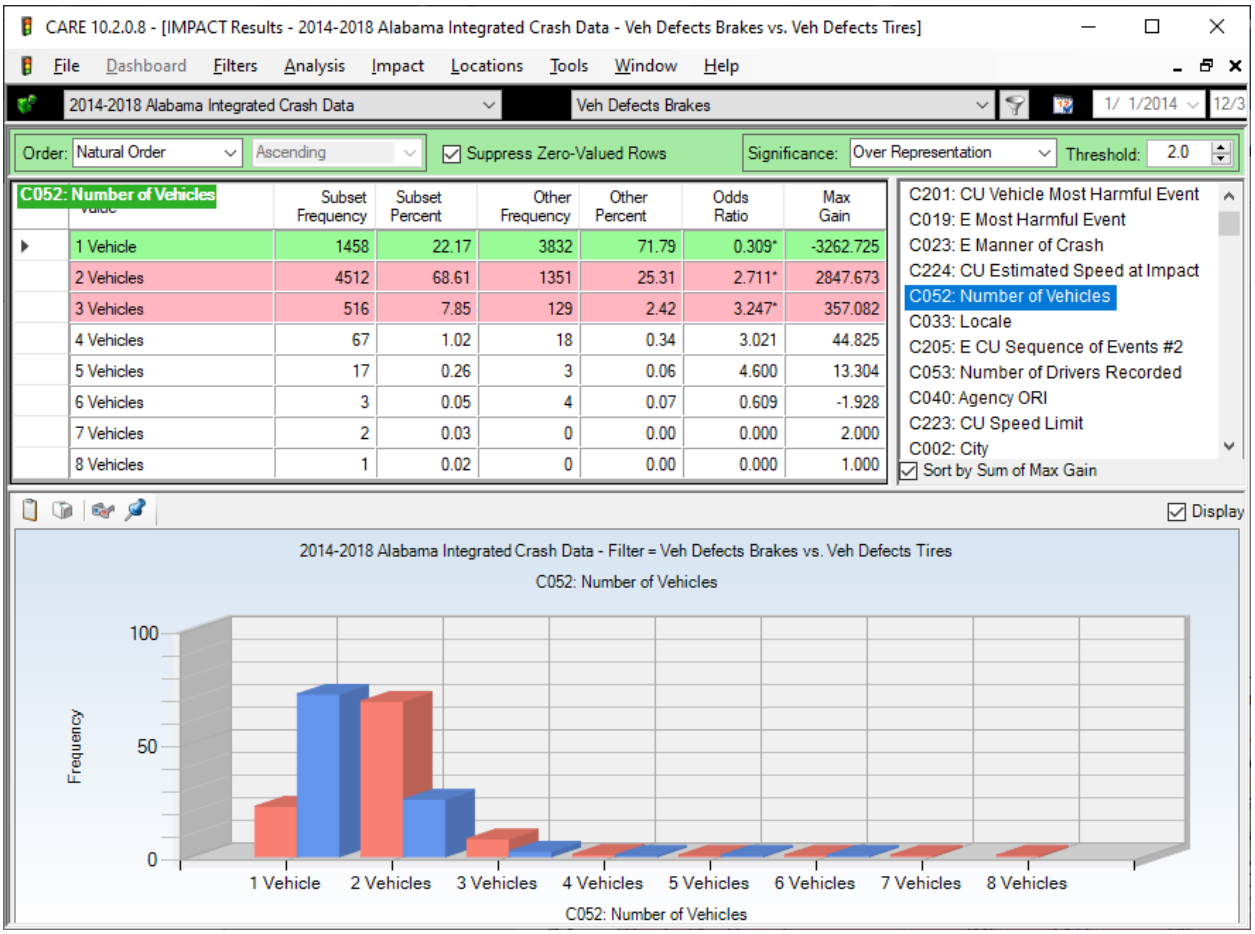
2014-2018 Alabama Integrated Crash Data | Severity EMS Called | 1/ 1/2014

Suppress Zero Values: Rows and Columns | Select Cells: | Column: Crash Severity ; Row: EMS Arrival Delay

	Fatal Injury	Incapacitating Injury	Non-Incapacitating Inju	Possible Injury	Property Damage Only	TOTAL
0 to 5 minutes	617 16.27%	5193 18.98%	11197 23.67%	14535 27.15%	13415 31.41%	44957 25.73%
6 to 10 minutes	1120 29.54%	7954 29.06%	14681 31.03%	17578 32.83%	13892 32.52%	55225 31.61%
11 to 15 minutes	850 22.42%	5863 21.42%	8673 18.33%	8797 16.43%	7111 16.65%	31294 17.91%
16 to 20 minutes	469 12.37%	3353 12.25%	5055 10.68%	4874 9.10%	3500 8.19%	17251 9.87%
21 to 30 minutes	442 11.66%	3187 11.65%	4669 9.87%	4440 8.29%	2880 6.74%	15618 8.94%
31 to 45 minutes	156 4.11%	1210 4.42%	1879 3.97%	2147 4.01%	1174 2.75%	6566 3.76%
46 to 60 minutes	42 1.11%	261 0.95%	577 1.22%	640 1.20%	358 0.84%	1878 1.07%
61 to 90 minutes	30 0.79%	203 0.74%	376 0.79%	363 0.68%	228 0.53%	1200 0.69%
91 to 120 minutes	13 0.34%	57 0.21%	83 0.18%	66 0.12%	47 0.11%	266 0.15%
121 to 180 minutes	12 0.32%	47 0.17%	80 0.17%	60 0.11%	56 0.13%	255 0.15%
Over 180 minutes	41 1.08%	39 0.14%	40 0.08%	38 0.07%	55 0.13%	213 0.12%
TOTAL	3792 2.17%	27367 15.66%	47310 27.08%	53538 30.64%	42716 24.45%	**174723** **100.00%**

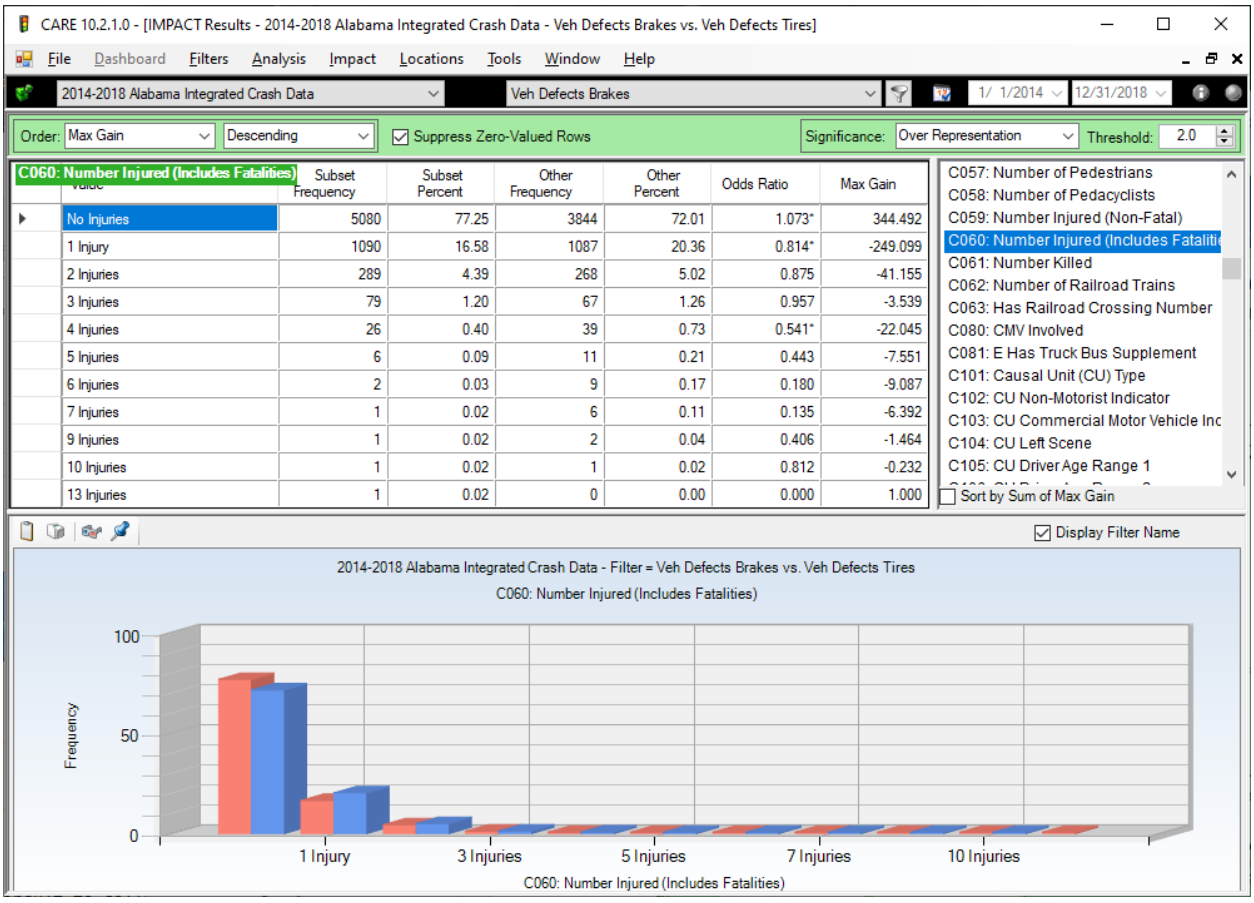
This cross-tabulation considers all crashes for which an EMS unit was called. For these crashes, "Property Damage Only" represents the number of crashes in which EMS were called but no one was found to have any injury; so this could be renamed: no injury. Note how the numbers and proportions in this column go down with increases in the arrival times above 10 minutes. The probability of a crash being fatal increases by 50% with an arrival of 6-10 minutes. For arrivals from 11 to 90 minutes, the probability doubles. For 91-180 minutes it goes up by a factor of 3.5; and this factor increases to 14 for arrival times over 180 minutes.

C052 Number of Vehicles



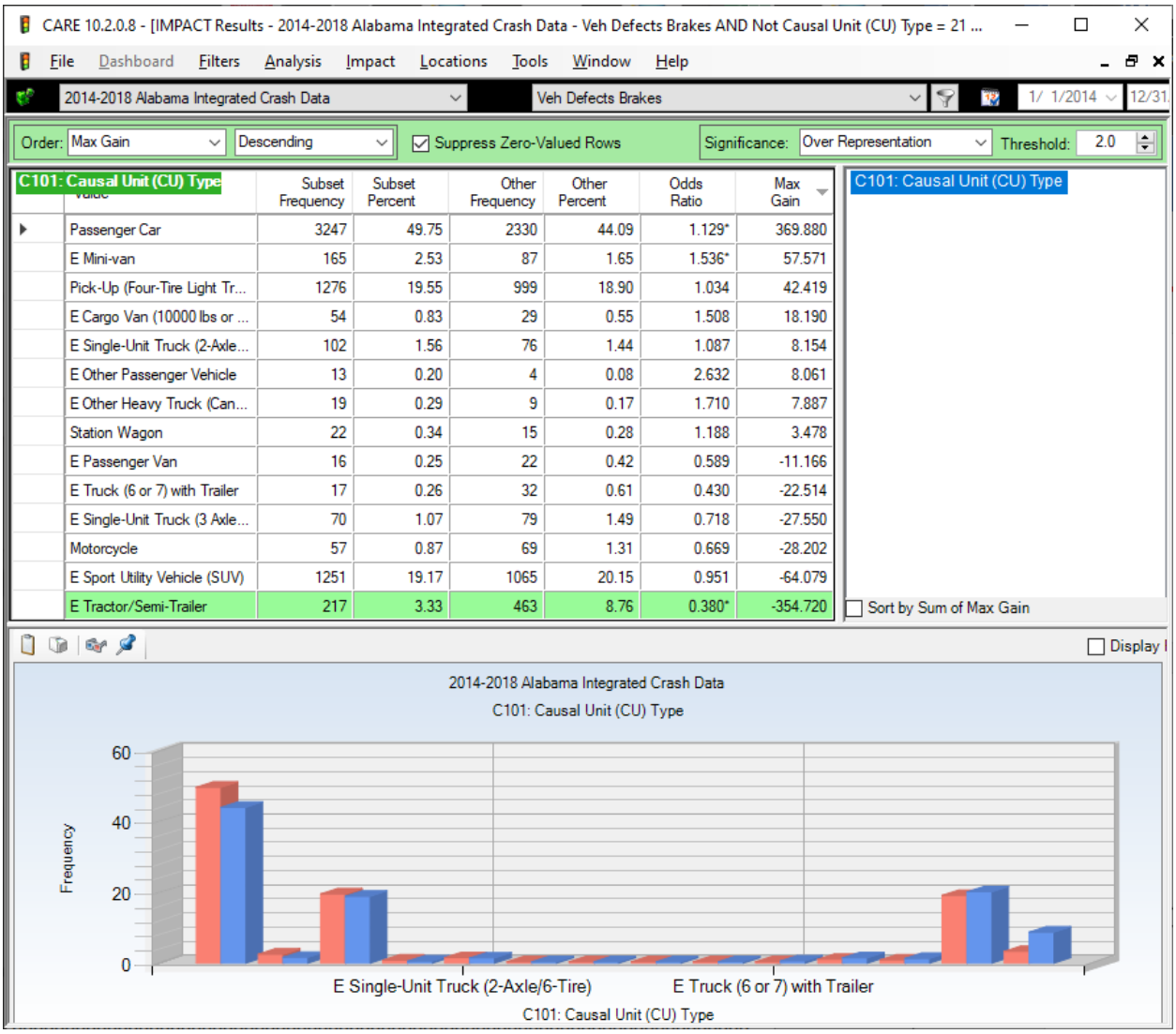
This attribute had the 7th largest total Max Gain.

C060 Number Injured (Includes Fatalities)



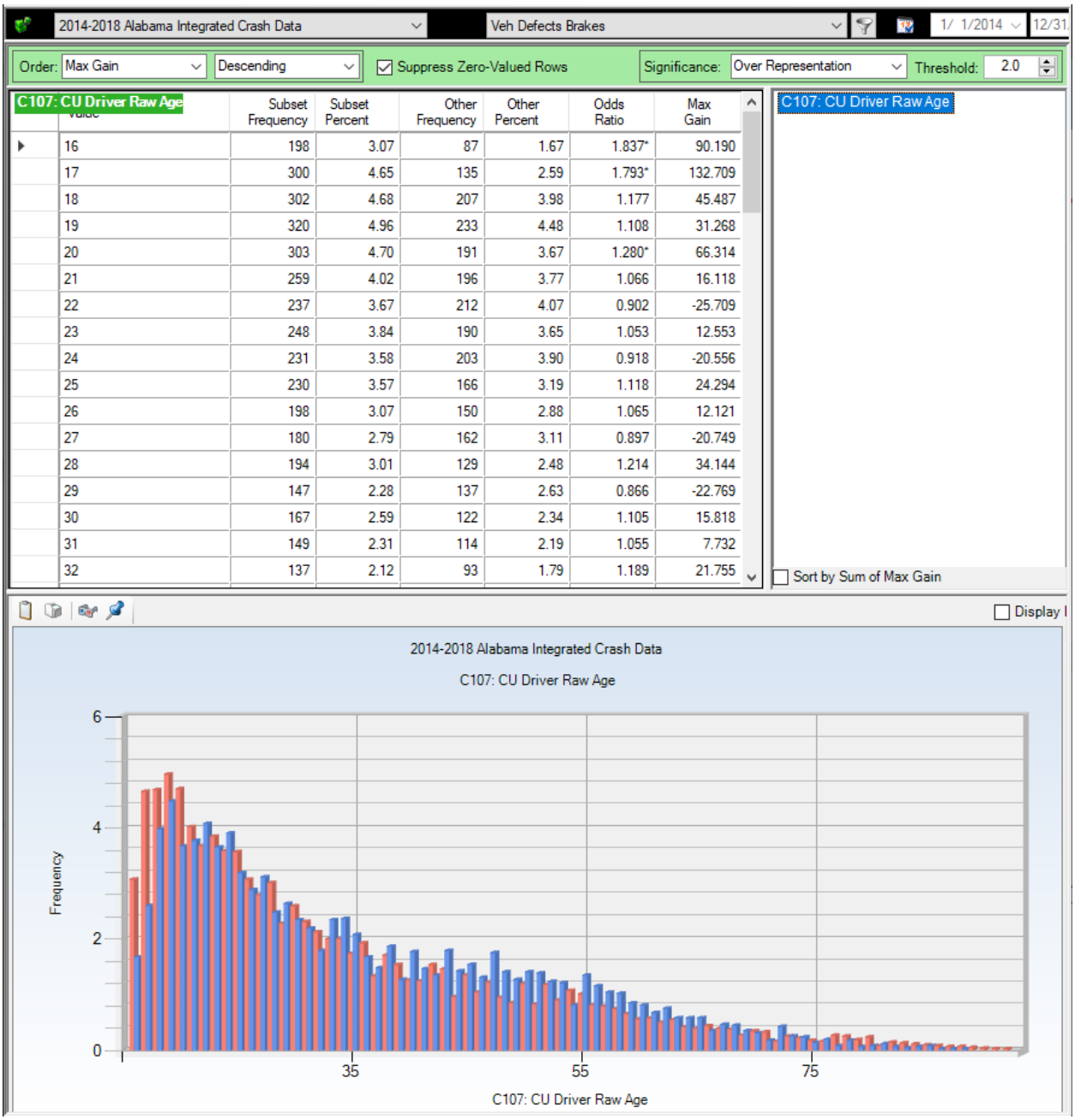
Tire-defect related crashes are over-represented in the one-injury and most of the multiple-injury categories as well. There is little doubt that these crashes are more severe, and one reason is the increased speeds of impact (see C224).

C101 Causal Unit (CU) Type



The unit types at the top (e.g., Passenger Car, Mini-van and Pick-Up) are more inclined to brake problems. Those with Odds Ratios less than 1.000 are over-represented in tire problems (e.g., Tractor/Semi-Trailers and SUVs).

C107 CU Driver Raw Age



Collectively, the age group from 16-20 is significantly over-represented in brake faults. We suspect this is because they are driving cars of model year much older than other ages. This is confirmed by the cross-tabulation of two age ranges (16-20 and 21-25) by model year given below. It is obvious that they are driving significantly older vehicles.

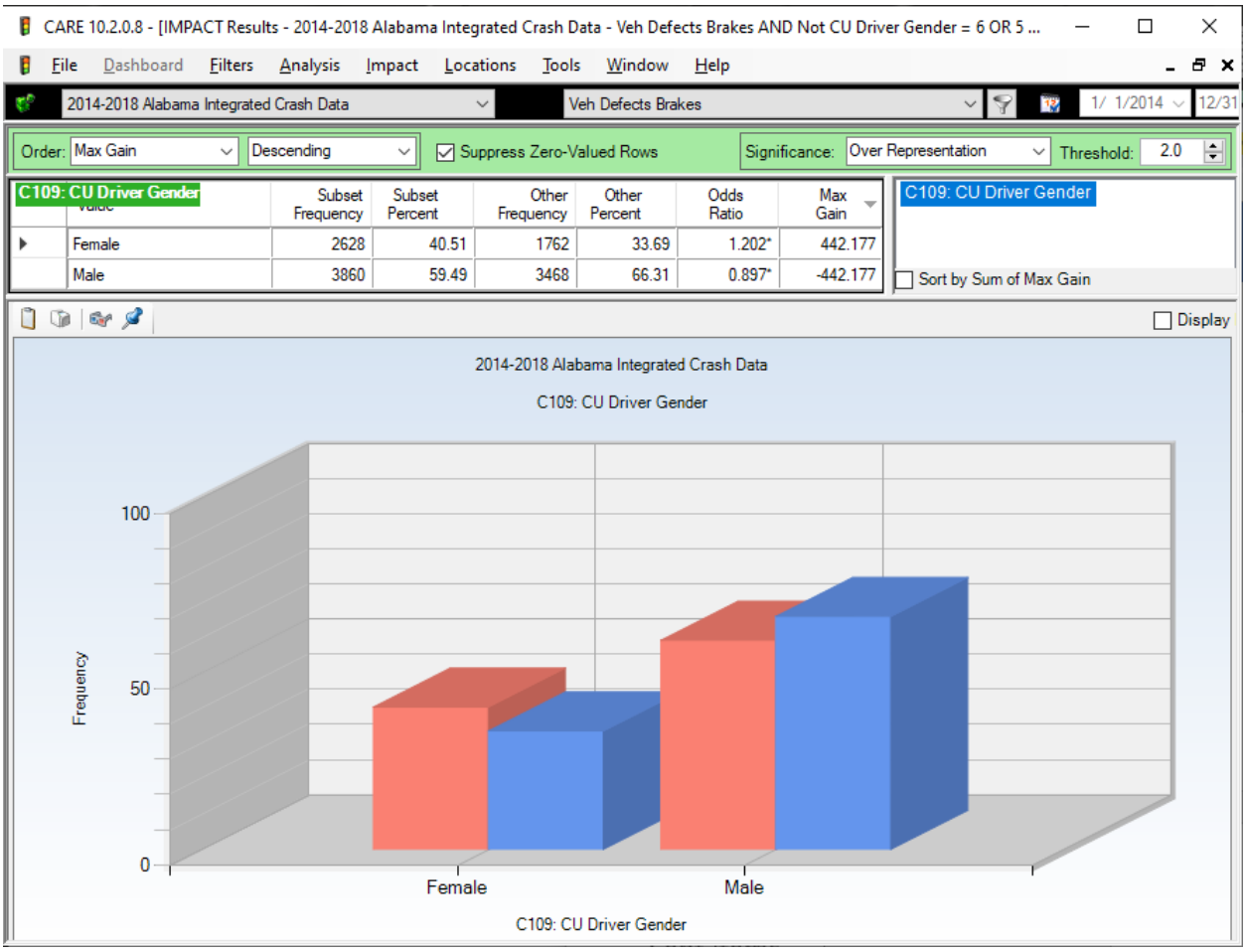
Cross-tabulations of driver age (for 16-20 and 21-25) by Model year

2014-2018 Alabama Integrated Crash Data | Veh Def Age by Model Yr

Suppress Zero Values: Rows and Columns | Select Cells: | Column: CU Driver Age Range 2 ; Row: CU Model Year

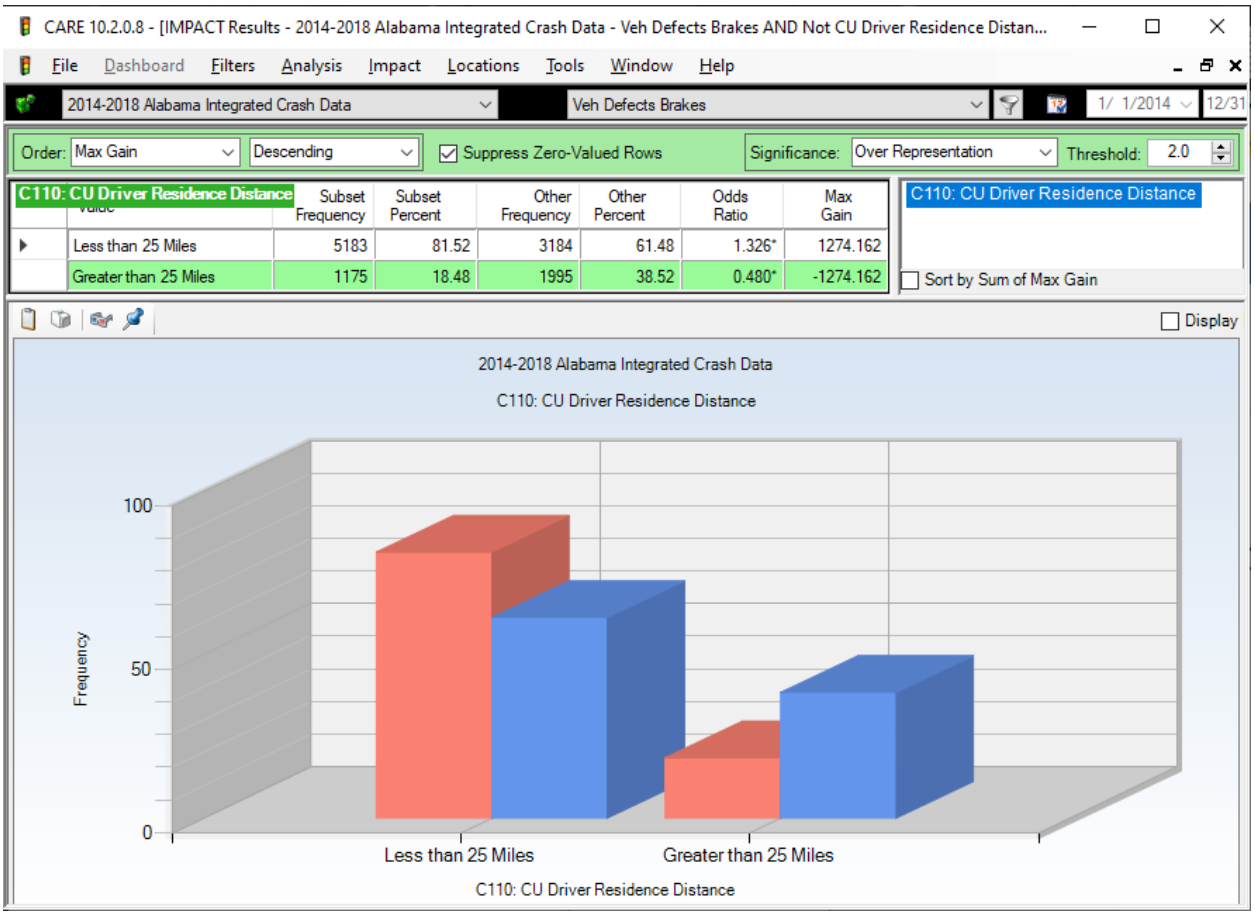
	16 to 20 Years	21 to 25 Years	TOTAL
1996	1870 1.64%	1503 1.50%	3373 1.57%
1997	2797 2.45%	2009 2.00%	4806 2.24%
1998	3256 2.85%	2510 2.50%	5766 2.69%
1999	4288 3.76%	3147 3.13%	7435 3.46%
2000	5441 4.77%	4064 4.04%	9505 4.43%
2001	5795 5.08%	4180 4.16%	9975 4.65%
2002	6698 5.87%	5029 5.00%	11727 5.46%
2003	7488 6.56%	5602 5.57%	13090 6.10%
2004	7922 6.94%	6095 6.06%	14017 6.53%
2005	8224 7.20%	6585 6.55%	14809 6.90%
2006	8129 7.12%	7000 6.96%	15129 7.05%
2007	8136 7.13%	7252 7.21%	15388 7.17%
2008	6722 5.89%	6231 6.20%	12953 6.03%
2009	4045 3.54%	4048 4.03%	8093 3.77%
2010	4457 3.90%	4520 4.50%	8977 4.18%
2011	4278 3.75%	4359 4.34%	8637 4.02%
2012	4886 4.28%	5026 5.00%	9912 4.62%
2013	4675 4.09%	5100 5.07%	9775 4.55%
2014	4021 3.52%	4540 4.52%	8561 3.99%
2015	3138 2.75%	3805 3.79%	6943 3.23%
2016	2113 1.85%	2668 2.65%	4781 2.23%
2017	1183 1.04%	1533 1.53%	2716 1.26%
2018	356 0.31%	518 0.52%	874 0.41%
2019	11 0.01%	34 0.03%	45 0.02%
TOTAL	114185 53.18%	100523 46.82%	**214708** **100.00%**

C109 CU Driver Gender



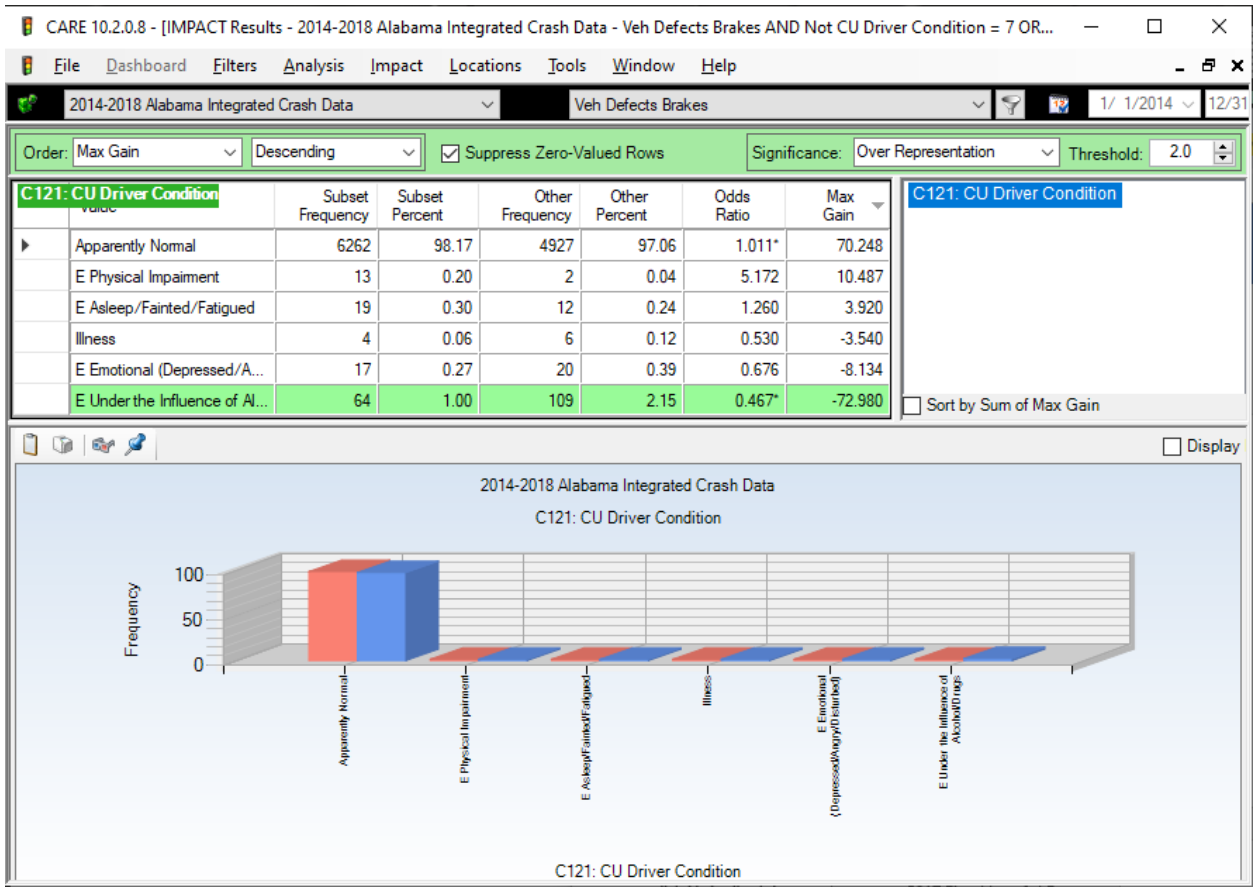
Females are more prone to brake faults, while Males are over-represented in tire faults.

C110 Driver Residence Distance



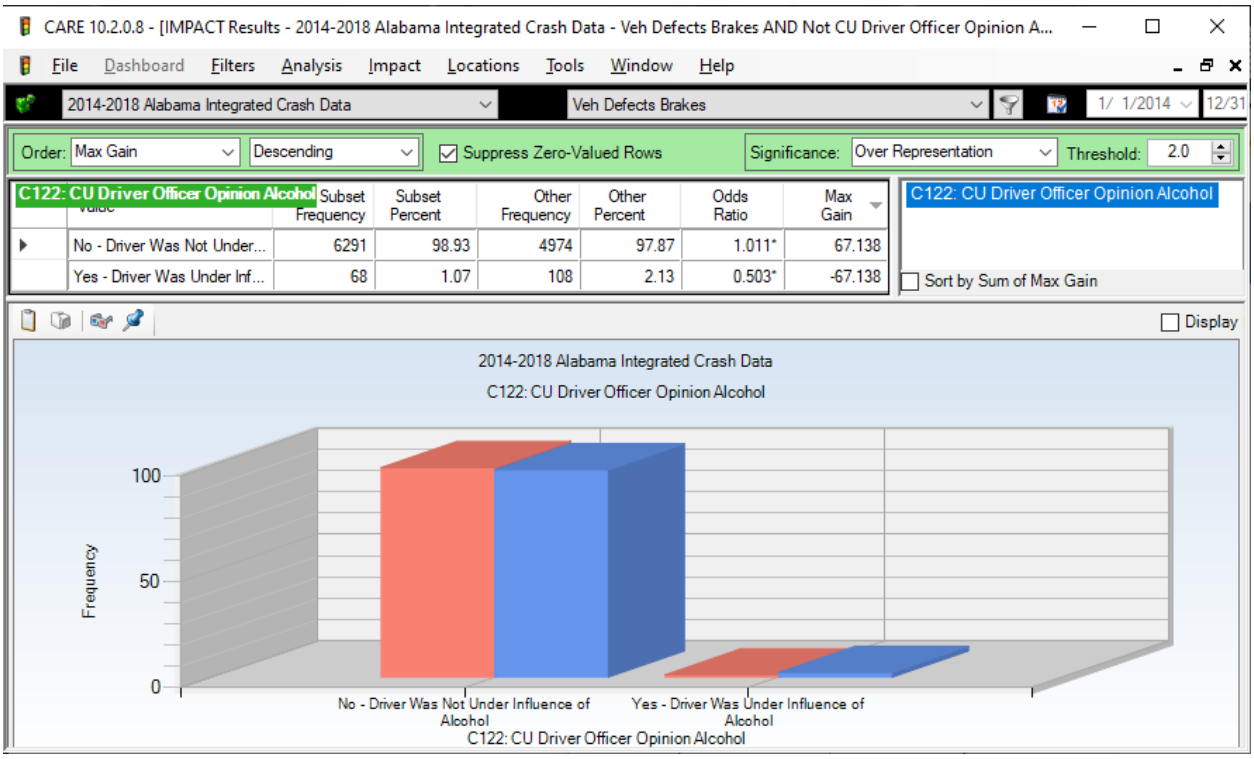
Shorter trips are correlated with brake defects, while longer trips are correlated with tire defects.

C121 CU Driver Condition



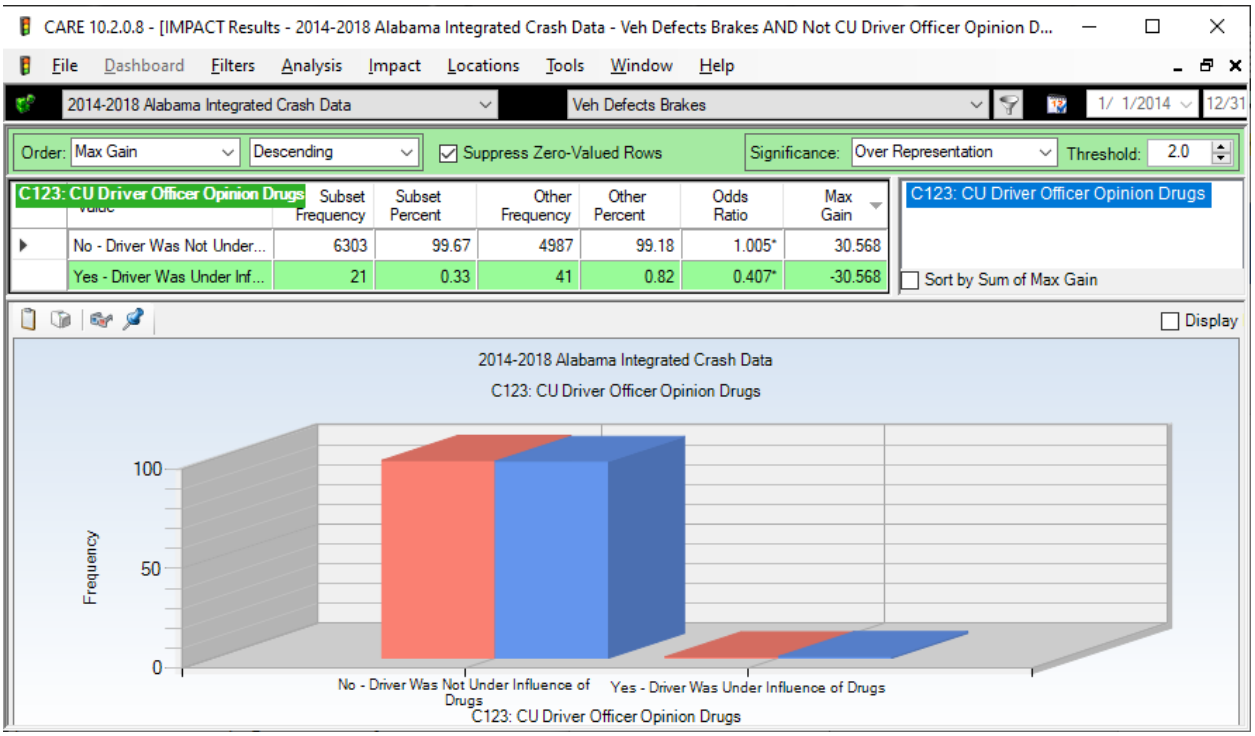
This confirms the findings of C015 and the other alcohol and drug test results given below. ID/DUI is more correlated with defective tires than with defective brakes. This is probably because ID is correlated with rural driving.

C122 CU Drivers Officer Opinion Alcohol



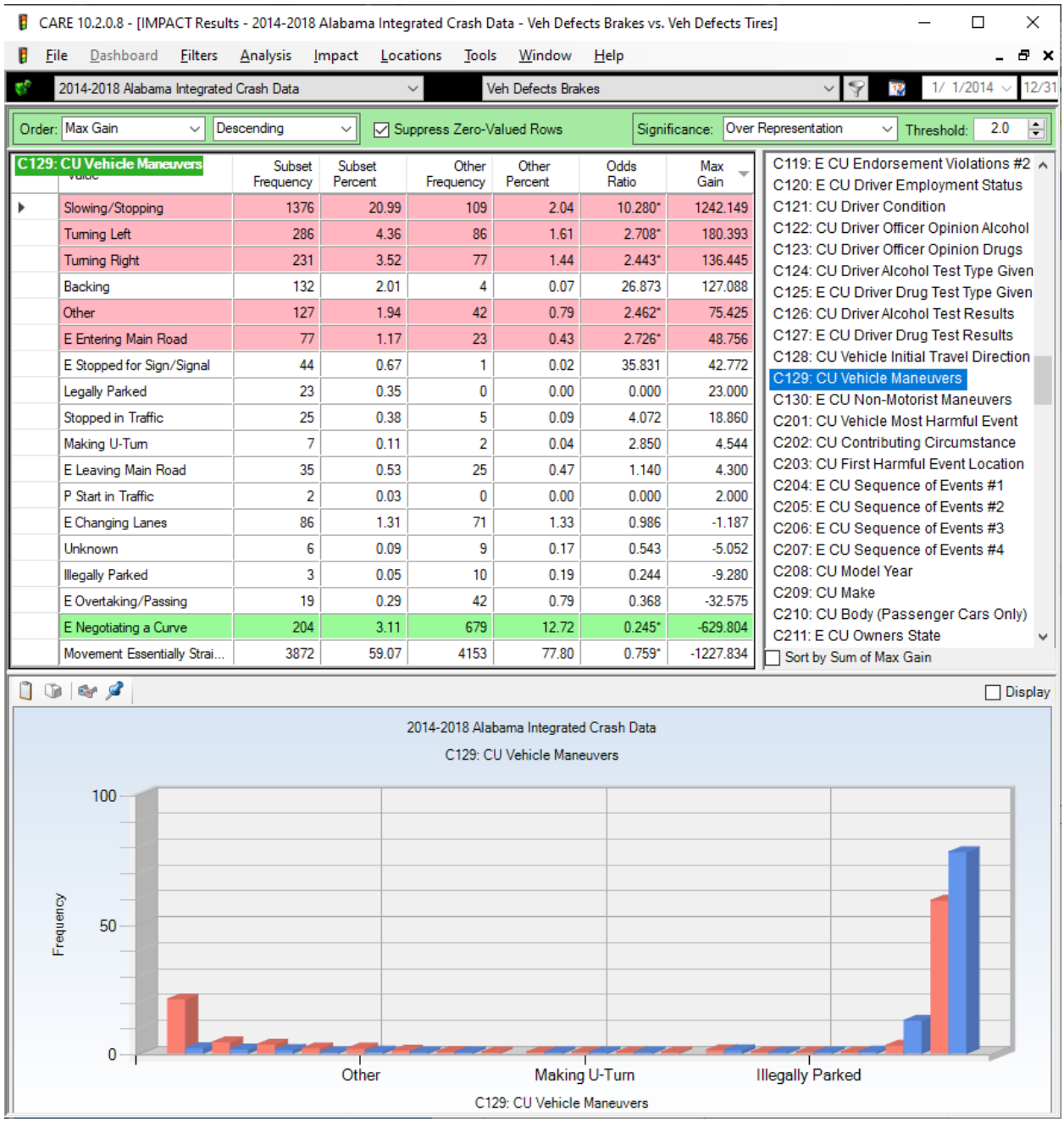
Further confirming C121 above.

C123 CU Drivers Officer Opinion Drugs



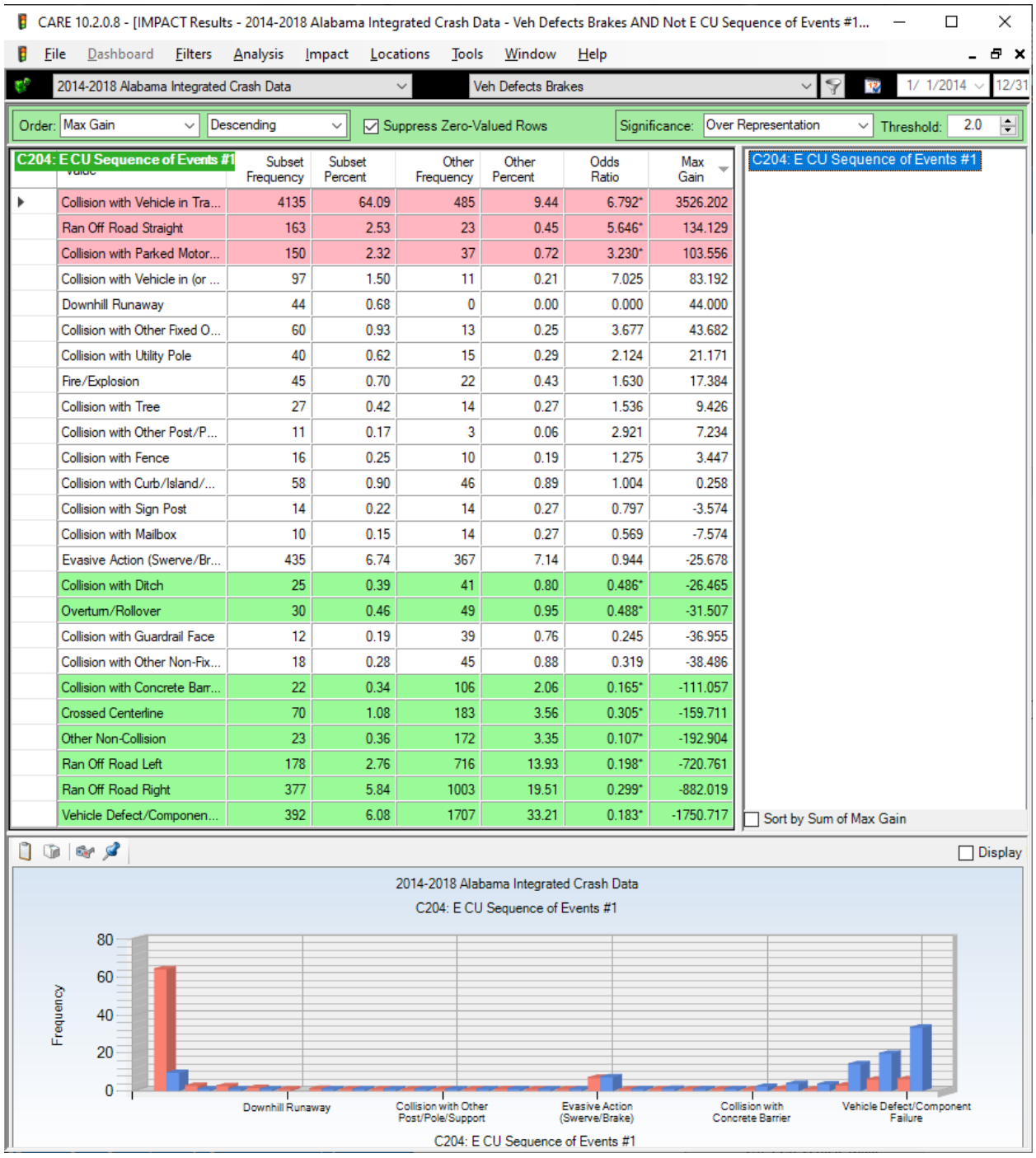
Further confirmation for drugs. Recall that an under-representation in the lower lines indicates an over-representation for tire defects.

C125 CU Vehicle Maneuvers



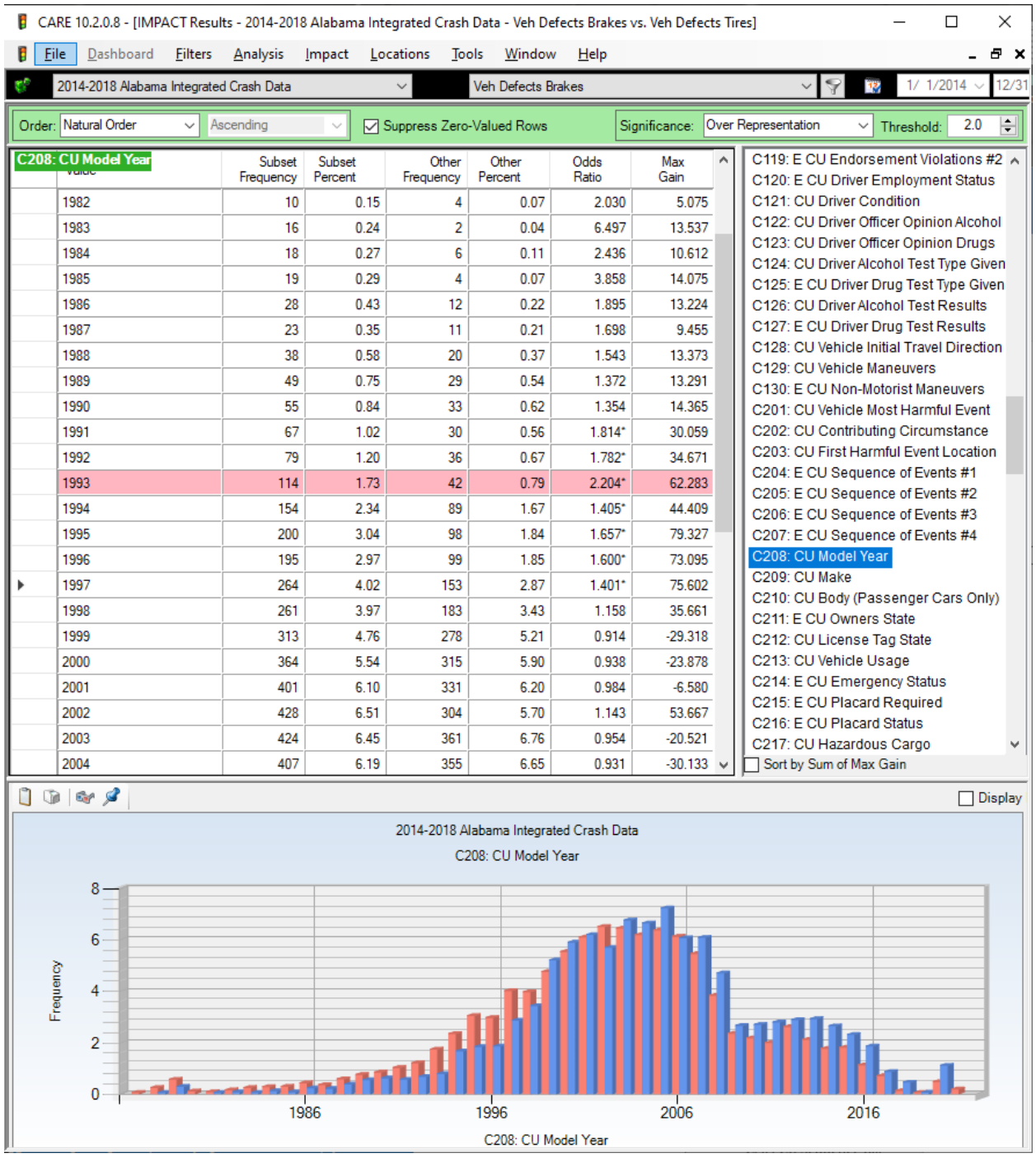
Several maneuvers at the top correlate with bad brakes. Bad tires show significant over-representation when negotiating a curve, and also Movement Essentially Straight.

C204 CU Sequence of Events #1



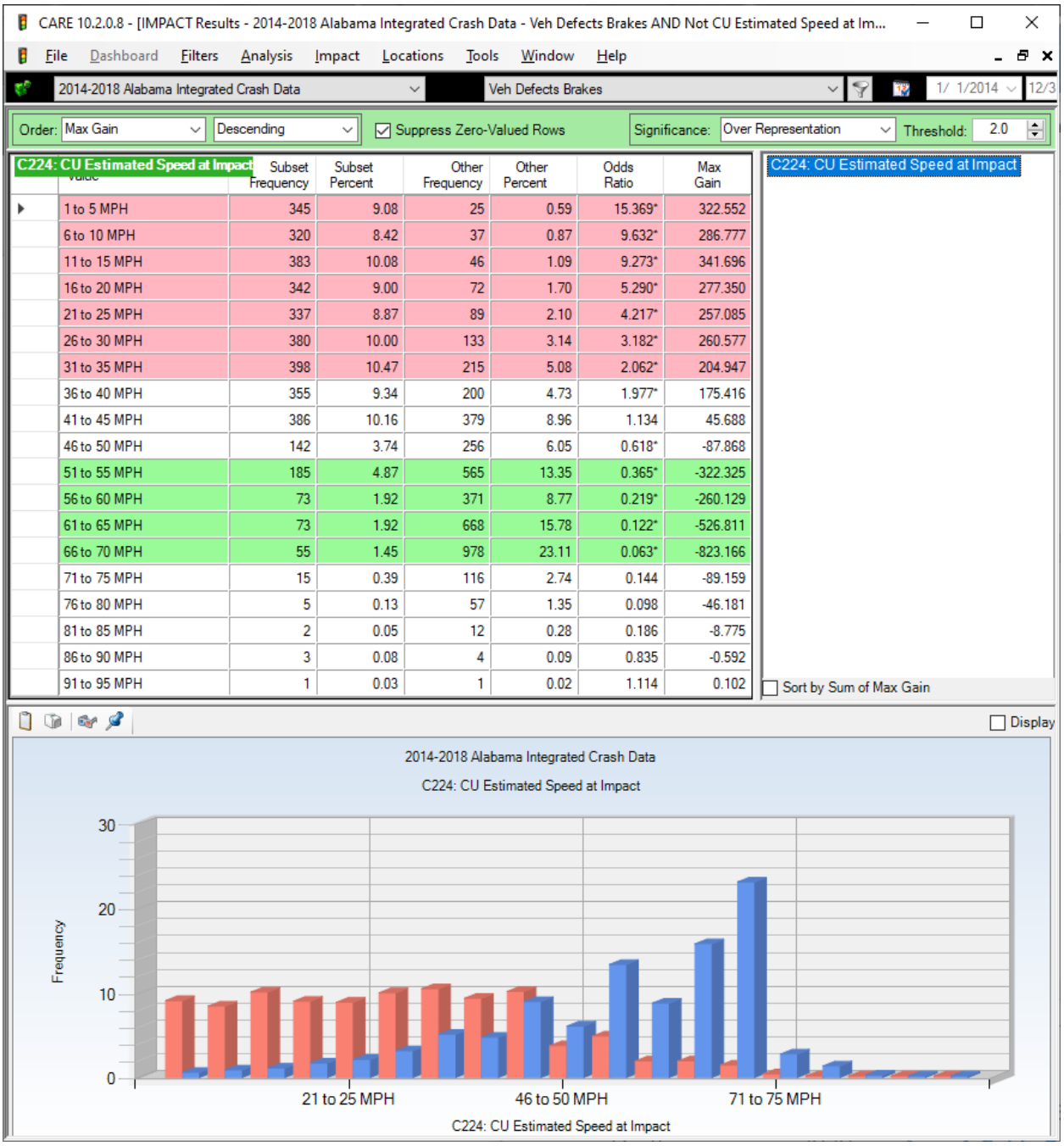
Items with less than 10 occurrences were removed. This attribute had the second highest total Max Gain.

C208 CU Model Year



Brakes are problematic up through the 1998 model year. Neither defect type until model year 2008, and from that point forward, defective tires are over-represented.

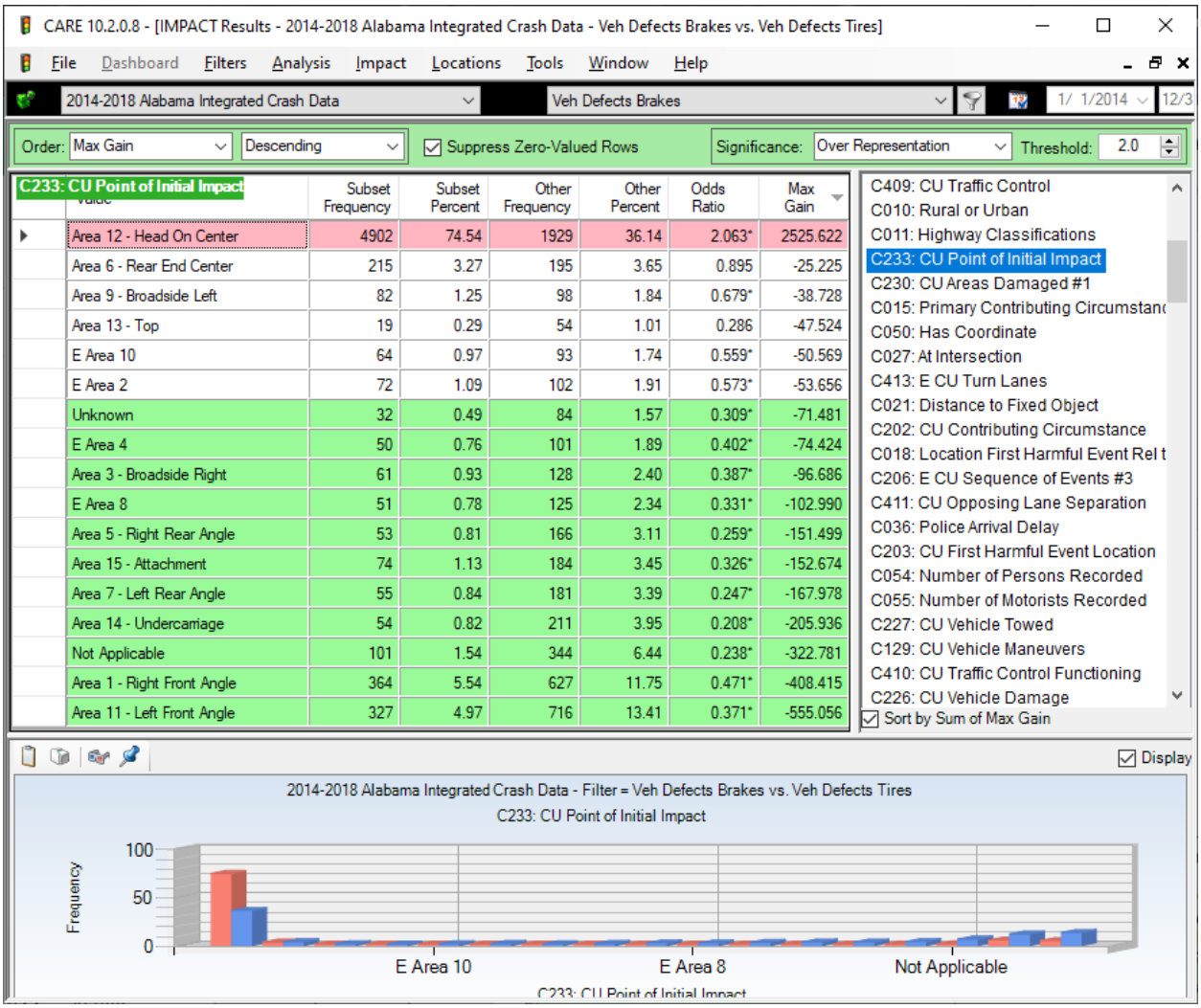
C224 CU Estimated Speed at Impact



C224: CU Estimated Speed at Impact	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain
1 to 5 MPH	345	9.08	25	0.59	15.369*	322.552
6 to 10 MPH	320	8.42	37	0.87	9.632*	286.777
11 to 15 MPH	383	10.08	46	1.09	9.273*	341.696
16 to 20 MPH	342	9.00	72	1.70	5.290*	277.350
21 to 25 MPH	337	8.87	89	2.10	4.217*	257.085
26 to 30 MPH	380	10.00	133	3.14	3.182*	260.577
31 to 35 MPH	398	10.47	215	5.08	2.062*	204.947
36 to 40 MPH	355	9.34	200	4.73	1.977*	175.416
41 to 45 MPH	386	10.16	379	8.96	1.134	45.688
46 to 50 MPH	142	3.74	256	6.05	0.618*	-87.868
51 to 55 MPH	185	4.87	565	13.35	0.365*	-322.325
56 to 60 MPH	73	1.92	371	8.77	0.219*	-260.129
61 to 65 MPH	73	1.92	668	15.78	0.122*	-526.811
66 to 70 MPH	55	1.45	978	23.11	0.063*	-823.166
71 to 75 MPH	15	0.39	116	2.74	0.144	-89.159
76 to 80 MPH	5	0.13	57	1.35	0.098	-46.181
81 to 85 MPH	2	0.05	12	0.28	0.186	-8.775
86 to 90 MPH	3	0.08	4	0.09	0.835	-0.592
91 to 95 MPH	1	0.03	1	0.02	1.114	0.102

This attribute had the 6th highest total Max Gain.

C233 CU Point of Initial Impact



For more information on this subject from NHTSA and other sources, please see:
http://www.safehomealabama.gov/tag/defects-recalls/