Senior Driver Lighting Issues

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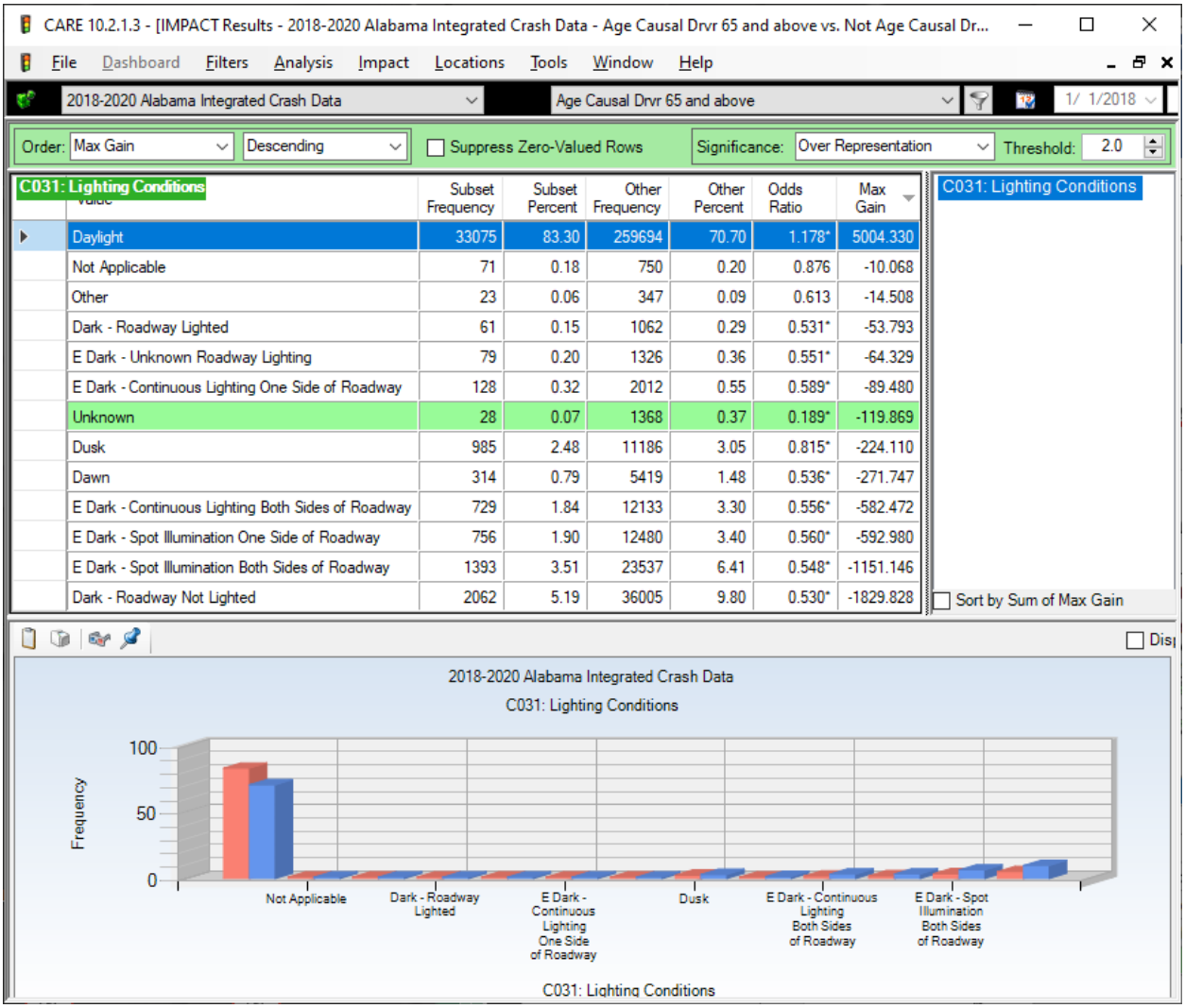
Introduction

Senior drivers are defined to be those 65 and older. The data used here are the most recent available; 2018-2020, through about 1/3 of September 2020. The following display is a comparison of 65 and older drivers against those who are younger than 65 for *all lighting conditions* during this time period. Drivers 65 and above have the column labels of *Subset* for their two columns, while those aged less than 65 have the column labels of *Other*.



Straight comparisons by time of day are skewed by the fact that older people choose to travel during the day and avoid the dark-time hours. To account for this, the further comparisons given below were limited to the nighttime darker conditions, i.e., dark, all dark artificial lighting conditions, and also including dusk and dawn. These were compared for various attributes between the 65 and older drivers and those aged less than 65 for their crashes that occurred during these lighting conditions only.

Older Driver Compared to Younger Drivers, Both for Night-Time Only

Summary of Findings

Then following findings are given in the order that they appear in the displays below, which was generally in the order of the sum of Max Gain (those with the largest significance in their departure from expectation:

- C031 Lighting Conditions. Daylight was excluded in the comparisons. Clearly, the most significant time period for the older driver is dusk. This is over-represented by an Odds Ratio of 1.385, i.e., the proportion is over 38% higher than expected. See the discussion after the display for this item.
- C015 Primary Contributing Circumstances (PCCs). All of the significantly over-represented PCCs could be linked to vision problems, as can most of the rest of the over-representations that are not statistically significant. See the discussion after the display.
- C023 Manner of Crash. Clearly there are major differences between the Manner of Crash of the older drivers at night and those of the younger drivers at night. The first 8 of these have significant over-representations. Their severity and chances of being caused by vision problems are discussed along with the display.
- C129 CU Vehicle Maneuvers. Older drivers are having major problems with Left Turns, followed by Changing Lanes and Turning Right. They are also significantly over-represented in being Stopped in Traffic. The "Changing Lanes" over-representation is potentially indicative of their not being able to see the lane division paint striping clearly.
- C017 First Harmful Event. Collisions with other vehicles in traffic (and parked) generally eclipses all other events. This is one of the few subsets that has an over-representation in the Collision with Vehicle in Traffic category. Clearly older drivers have most (over 65%) of their problems at night with other vehicles.
- C025 Number of Vehicles. As would be expected from C017, single vehicle crashes are significantly under-represented for senior drivers, while two-vehicle crashes are over-represented, occurring over twice as often as all other number of vehicle categories combined.
- C008 Time of Day. Senior drivers are significantly over-represented in the earlier dusk and night-time hours from 3 PM through 9 PM, after which they become significantly under-represented through 6 AM. These hours include the dusk times, which are the

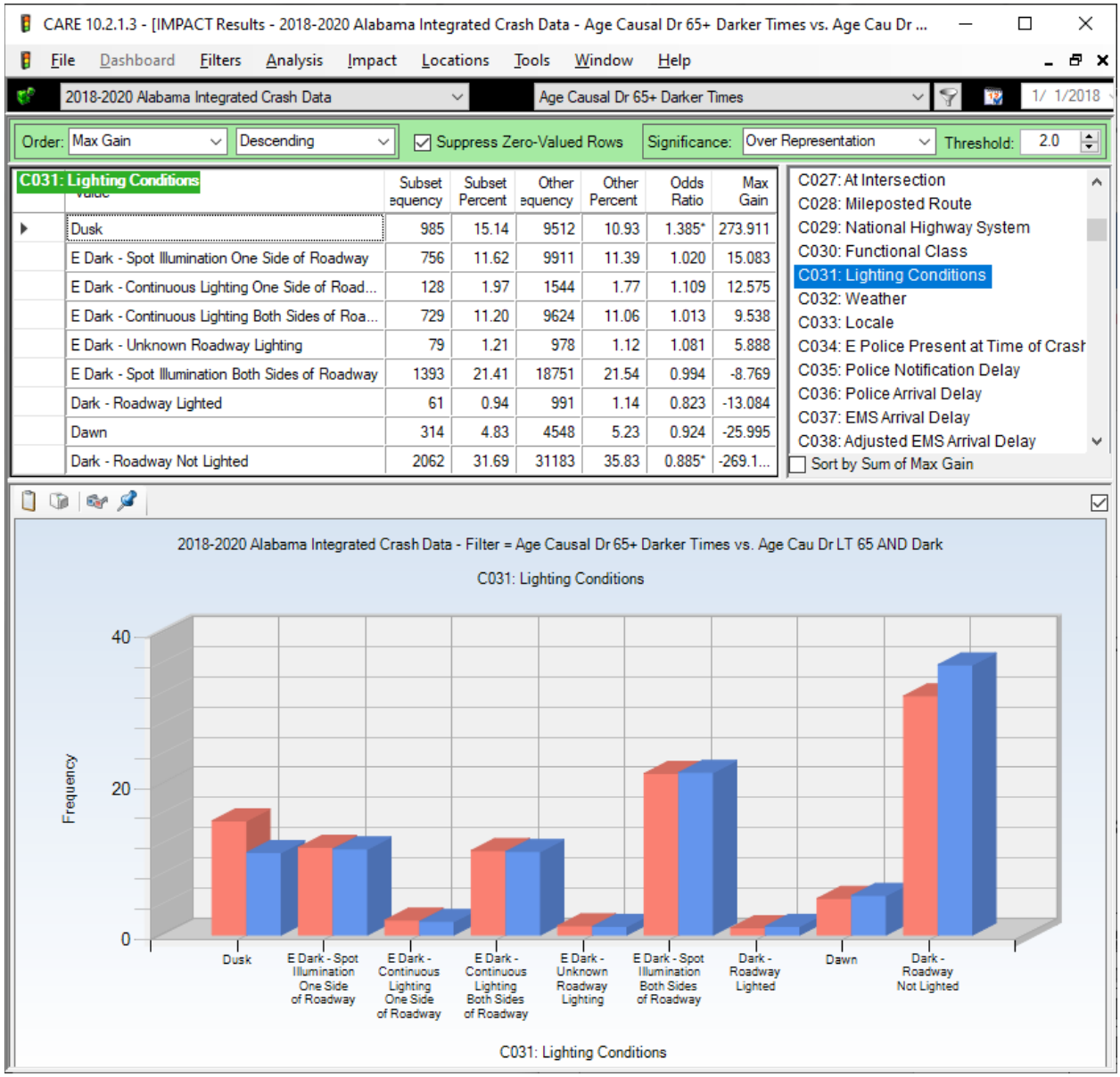
lighting conditions that have the highest over-representation. Lighting problems tend to be magnified in these "in-between" conditions.

- C004 Month. Consistent with the above findings, those months that have earlier dusk hours (e.g., November, December and January) are over-represented. The combination of time of day, month and the effects of daylight savings time all work together to create the problems that senior drivers have with dusk, which accounts for over 15% of senior driver nighttime crashes, and which is over-represented by nearly 40%.
- C011 Highway Classification. Interstates and county roads tend to be the most under-represented for senior drivers, although the numbers on these roads are still significant, collectively accounting for 24.27% if their crashes in the darker hours. Their most over-represented highway classifications are State, Federal and Municipal highways. As we have seen above, Municipal Highways may be over-represented because of the preference of Senior Drivers to drive near the large cities. The State and Federal over-representations are probably those that can only be addressed by ALDOT.

See the IMPACT displays below for more details on these findings.

IMPACT Displays

C031 Lighting Conditions (defined identically for both of the subsets)

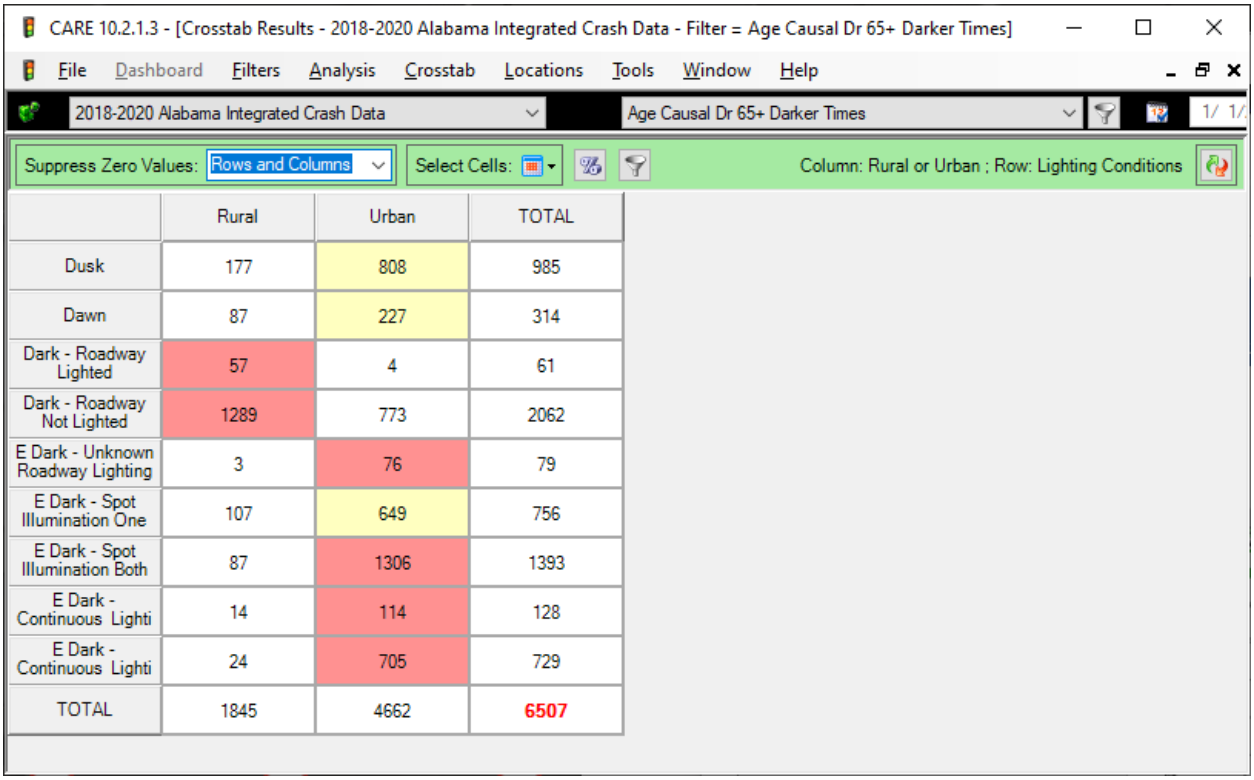


The difference between this comparison and the one in the Introduction section is that this comparison is restricted to just the dark (including dusk and dawn) times for both age subsets. This serves also to define the comparisons for the remaining IMPACT displays in this section. The comparisons will be for all lighting conditions *except daylight*.

It is important to distinguish between what is causing crashes and what is just the results of the older driver preference. The IMPACT display immediately above tends to "readjust" the previous similar analyses to account for driver preference caused differences. For example, we do not see the over-representation at dusk to be caused by senior driver preference. Rather, we tend to believe it is the result of being "caught out after dark" as opposed to intentionally wanting to drive at that time.

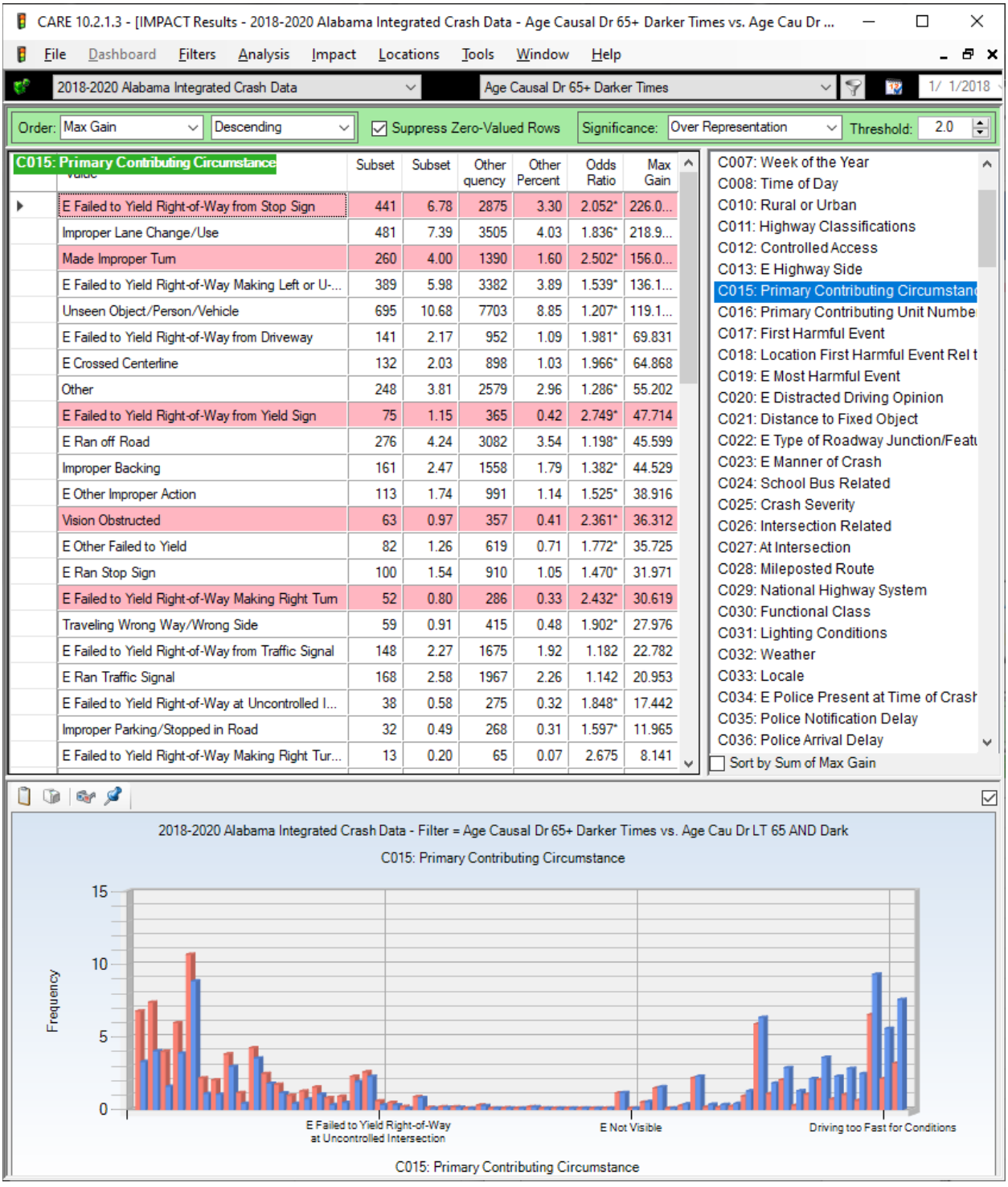
The next four over-represented items, where the roadways are lit, could be the result of Senior Driver preference, especially the Continuous Lighting categories, which would generally be in the urban areas. Note that these differences are not statistically significant, so they should not be give too much emphasis in the problem identification process. The last four all have negative Max Gains, which is an indication that the number of crashes are less than expected. This is not something that would be caused by these four Lighting Conditions, so we can expect that at least some portion of the lower than expected values were caused by Senior Driver avoidance.

The Dark-Roadway Not Lighted is significantly under-represented, and thus quite interesting. The inference would be that senior drivers could be safer in areas where there is no lighting at all than in some of the areas that have lighting. However, the following cross-tabulation shows that the both the "Dark – Roadway Not Lighted" and the "Dark – Roadway Lighted" categories are predominantly rural categories. For those who live in the rural areas and know their roads well, it would be expected that the lighting might not have much of an effect on crash causation.



	Rural	Urban	TOTAL
Dusk	177	808	985
Dawn	87	227	314
Dark - Roadway Lighted	57	4	61
Dark - Roadway Not Lighted	1289	773	2062
E Dark - Unknown Roadway Lighting	3	76	79
E Dark - Spot Illumination One	107	649	756
E Dark - Spot Illumination Both	87	1306	1393
E Dark - Continuous Lighti	14	114	128
E Dark - Continuous Lighti	24	705	729
TOTAL	1845	4662	6507

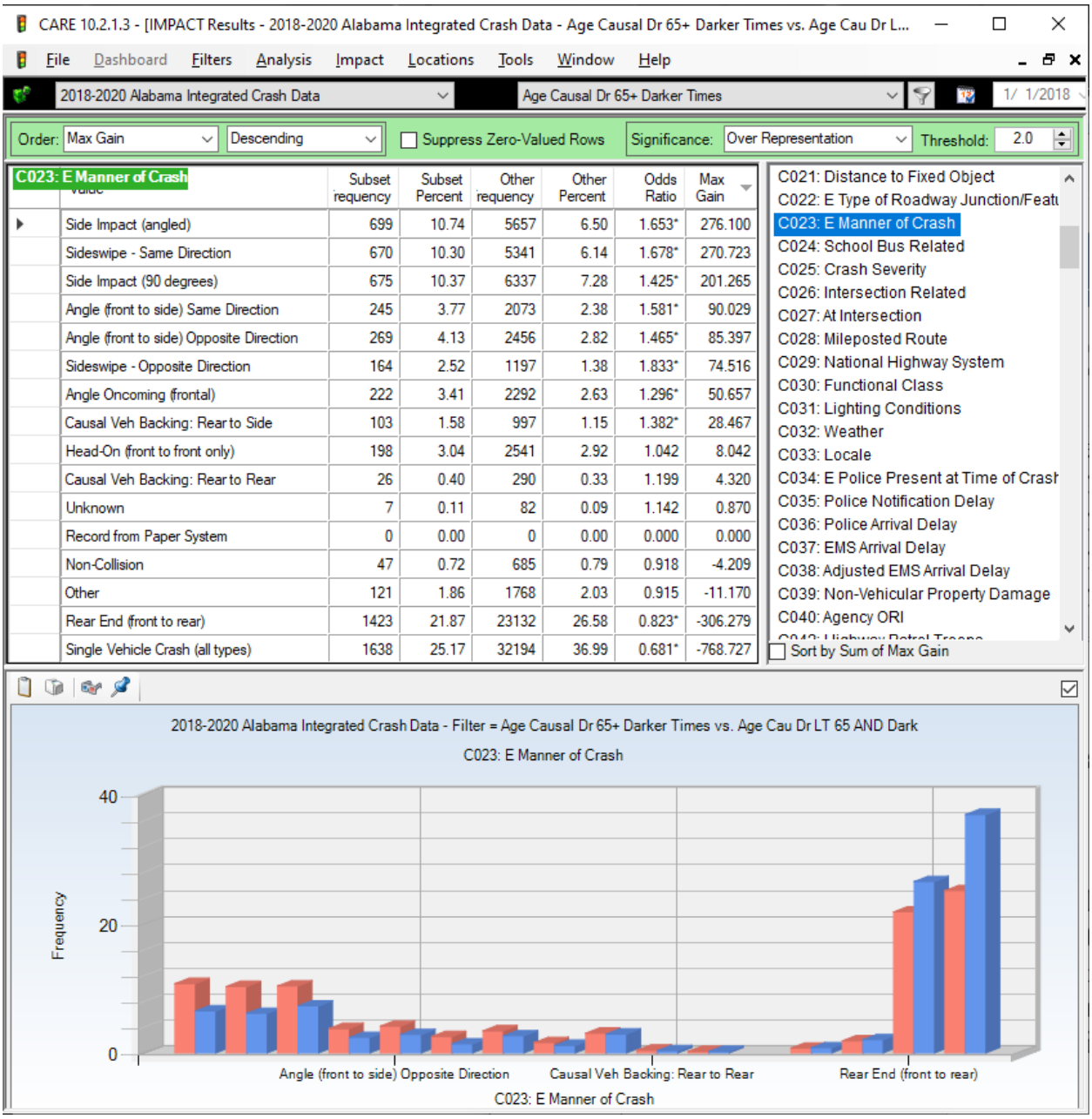
C015 Primary Contributing Circumstances



The above presents all of the over-represented categories (asterisk on the Odds Ratio). Those with a red background had more than twice their expected proportion of crashes. The table is in Max Gain order so those that had fewer crashes will fall lower on the list even though they may have a higher Odds Ratio than those above. The reason for this is the number of crashes that are under consideration – those with a large number will tend toward a higher Max Gain.

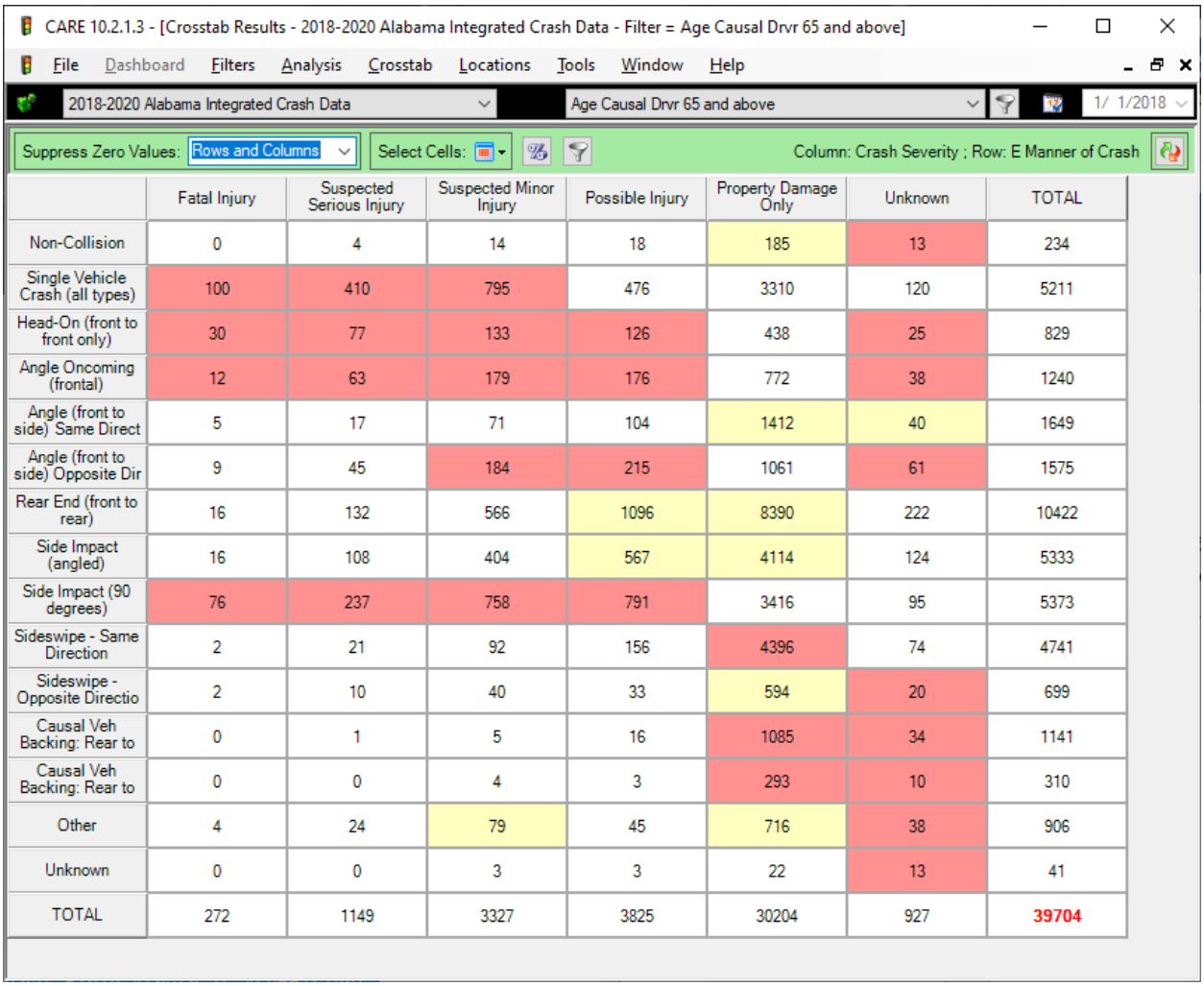
The top 7 of these, which are the ones that have significant over-representations, could easily have been caused by vision deficiencies. Looking down the list, many of the others could also be caused by vision problems.

C023 Manner of Crash



Clearly there are major differences between the Manner of Crash of the older drivers at night and those of the younger drivers at night. The first 8 of these have significant over-representations. These tend to be more sever crashes as well as shown by the Severity by Manner of Crash cross-tab given below. Note the red in the first three columns, which indicates a percentage for that cell that is greater than 10% higher than that of the corresponding Total column value.

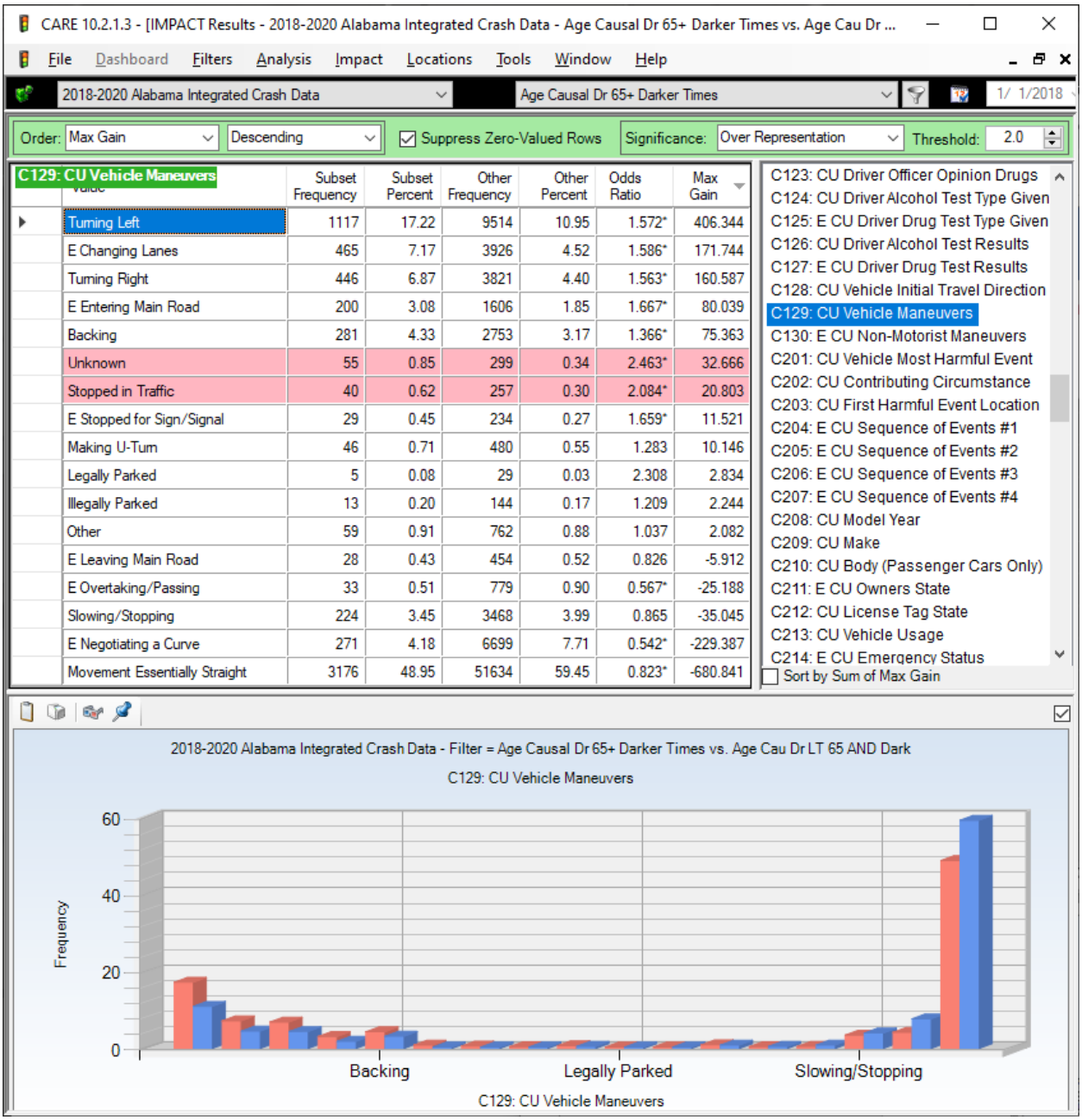
Crosstab: Crash Severity by Manner of Crash



	Fatal Injury	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	Property Damage Only	Unknown	TOTAL
Non-Collision	0	4	14	18	185	13	234
Single Vehicle Crash (all types)	100	410	795	476	3310	120	5211
Head-On (front to front only)	30	77	133	126	438	25	829
Angle Oncoming (frontal)	12	63	179	176	772	38	1240
Angle (front to side) Same Direct	5	17	71	104	1412	40	1649
Angle (front to side) Opposite Dir	9	45	184	215	1061	61	1575
Rear End (front to rear)	16	132	566	1096	8390	222	10422
Side Impact (angled)	16	108	404	567	4114	124	5333
Side Impact (90 degrees)	76	237	758	791	3416	95	5373
Sideswipe - Same Direction	2	21	92	156	4396	74	4741
Sideswipe - Opposite Directio	2	10	40	33	594	20	699
Causal Veh Backing: Rear to	0	1	5	16	1085	34	1141
Causal Veh Backing: Rear to	0	0	4	3	293	10	310
Other	4	24	79	45	716	38	906
Unknown	0	0	3	3	22	13	41
TOTAL	272	1149	3327	3825	30204	927	39704

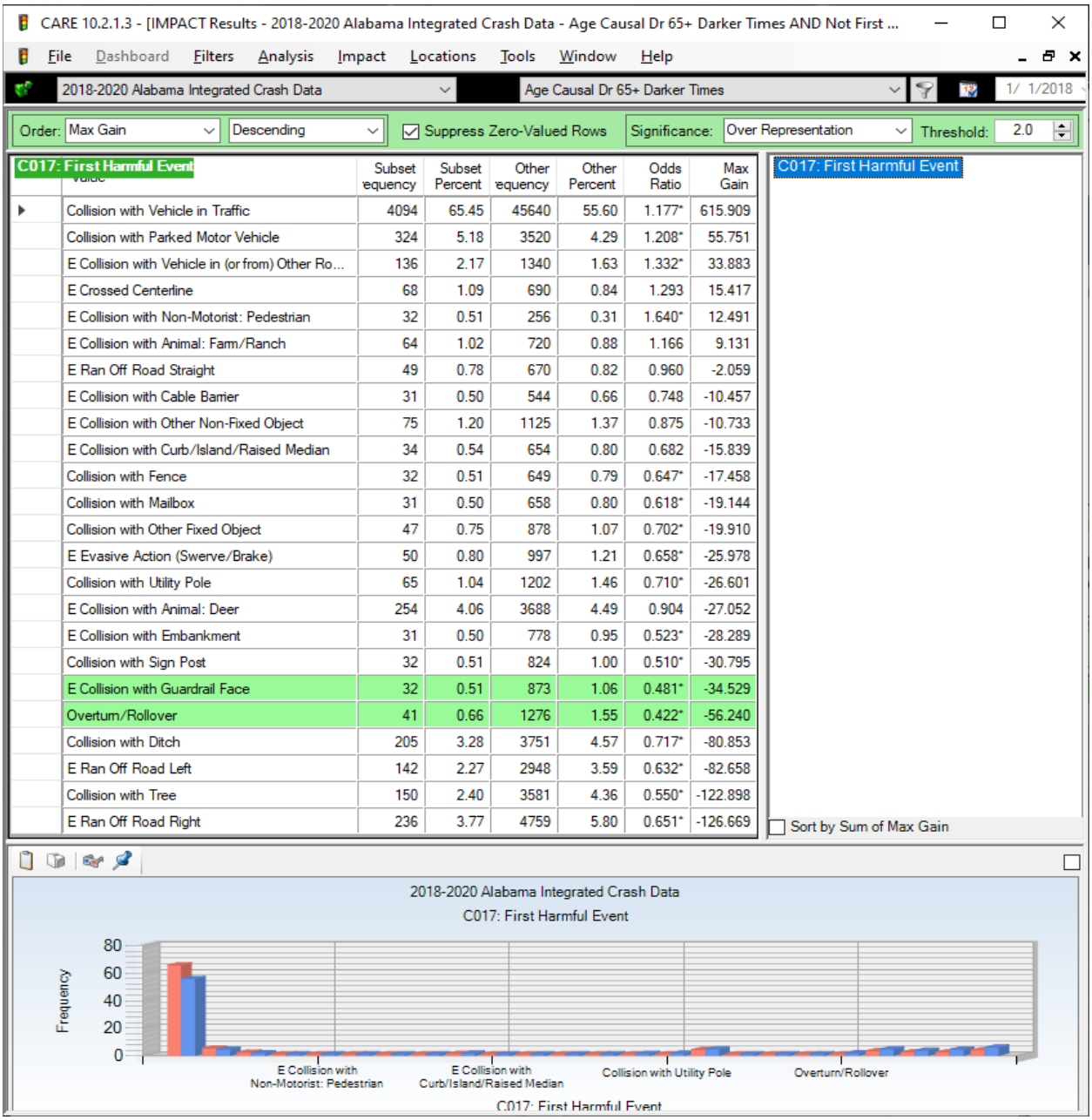
Manner of Crash	Number of Crashes	Potential Vision Cause
Side Impact (angled)	699	Medium
Sideswipe - Same Direction	670	High
Side Impact (90 degrees)	675	High
Angle (front to side) Same Direction	245	High
Angle (front to side) Opposite Direction	269	Medium
Sideswipe - Opposite Direction	164	Medium
Angle Oncoming (frontal)	222	Medium
Causal Veh Backing: Rear to Side	103	High

C129 CU Vehicle Maneuvers



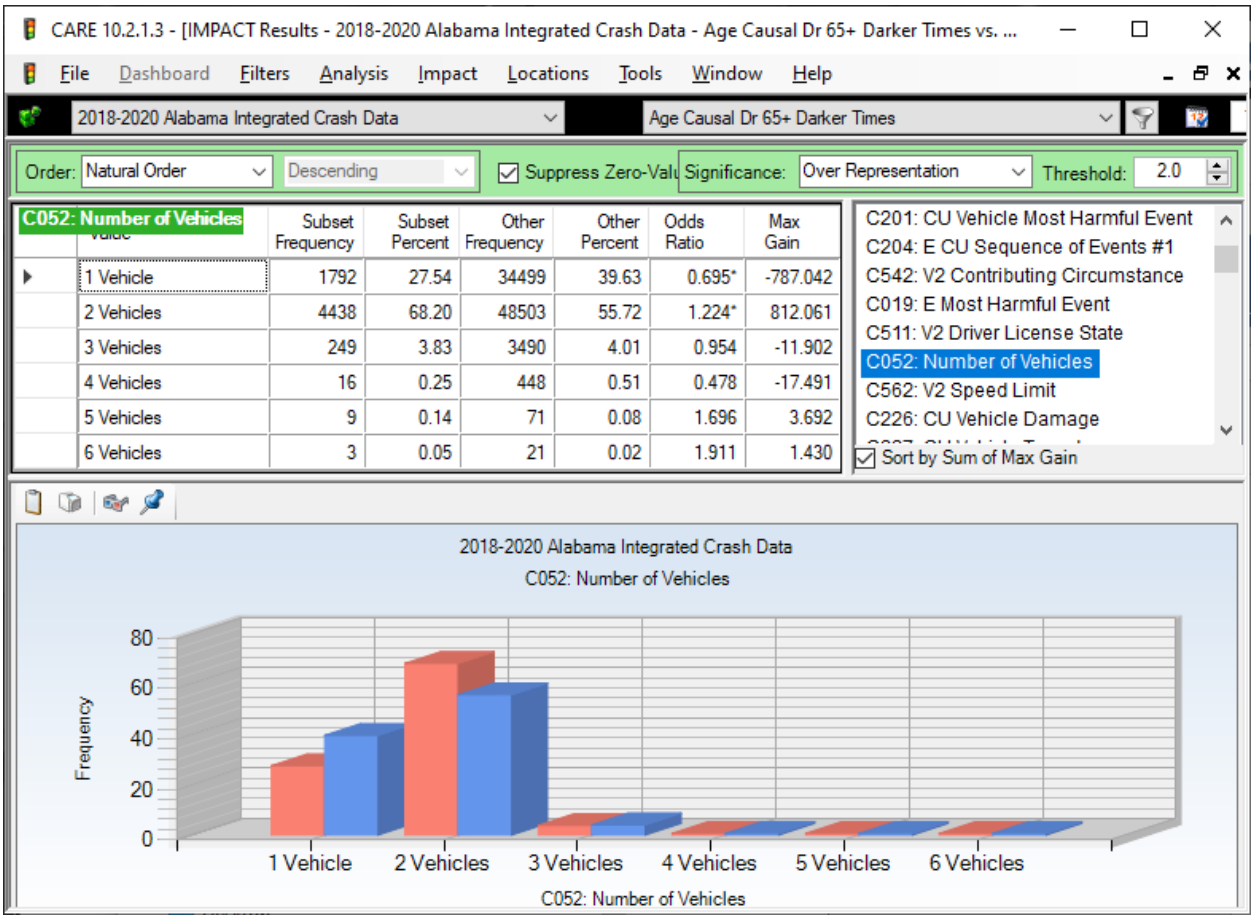
Older drivers are having major problems with Left Turns, followed by Changing Lanes and Turning Right. They are also significantly over-represented in being Stopped in Traffic.

C017 First Harmful Event



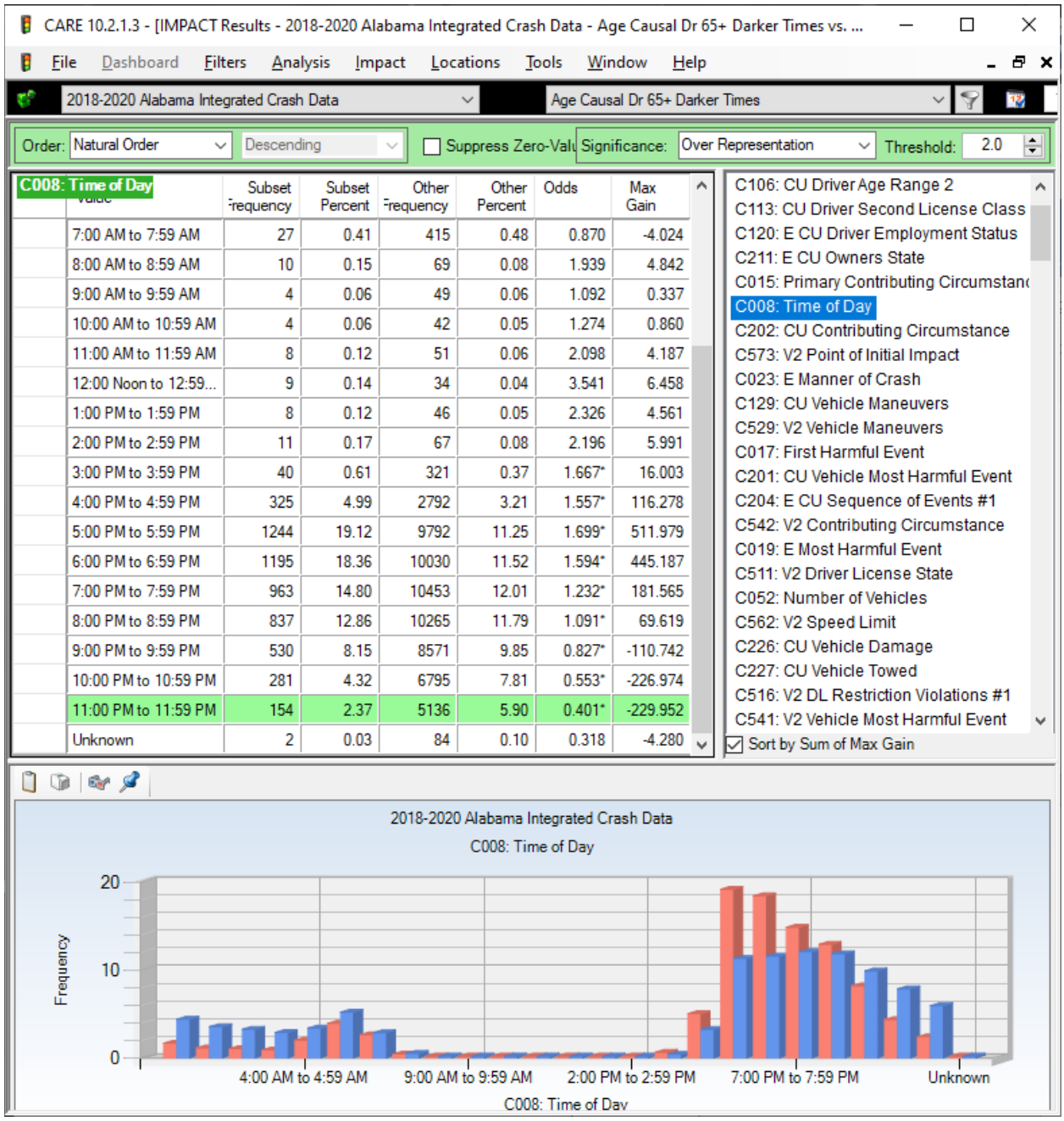
All items with less than 30 crash occurrences have been eliminated from the above display. Collisions with other vehicles in traffic (and parked) generally eclipses all other events. This is one of the few subsets that has an over-representation in the Collision with Vehicle in Traffic category. While the number of such crashes is generally high, it is most often under-represented for most crash types.

C025 Number of Vehicles



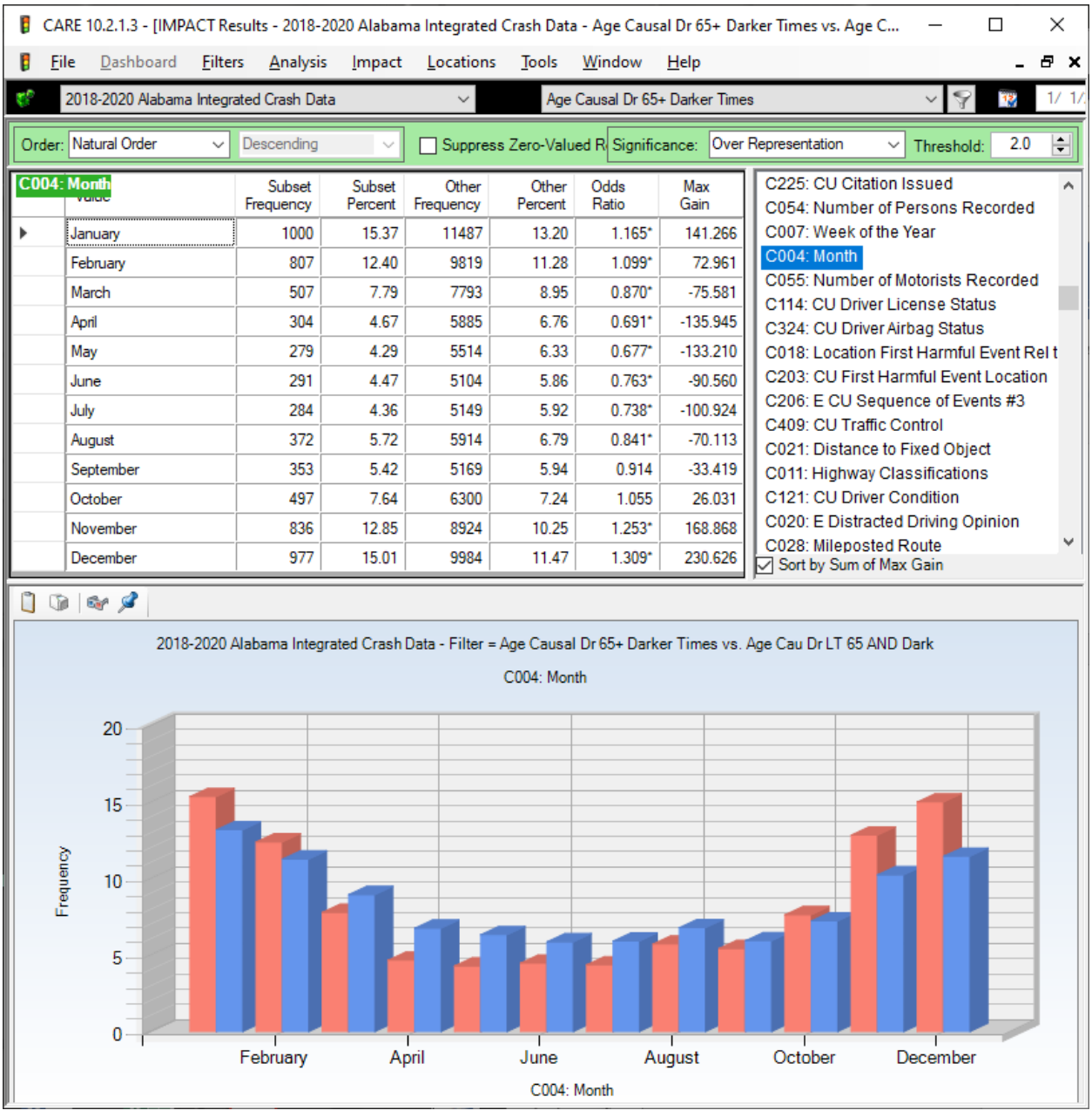
As would be expected from C017, single vehicle crashes are significantly under-represented for senior drivers, while two-vehicle crashes are over-represented, occurring over twice as often as all other number of vehicle categories combined.

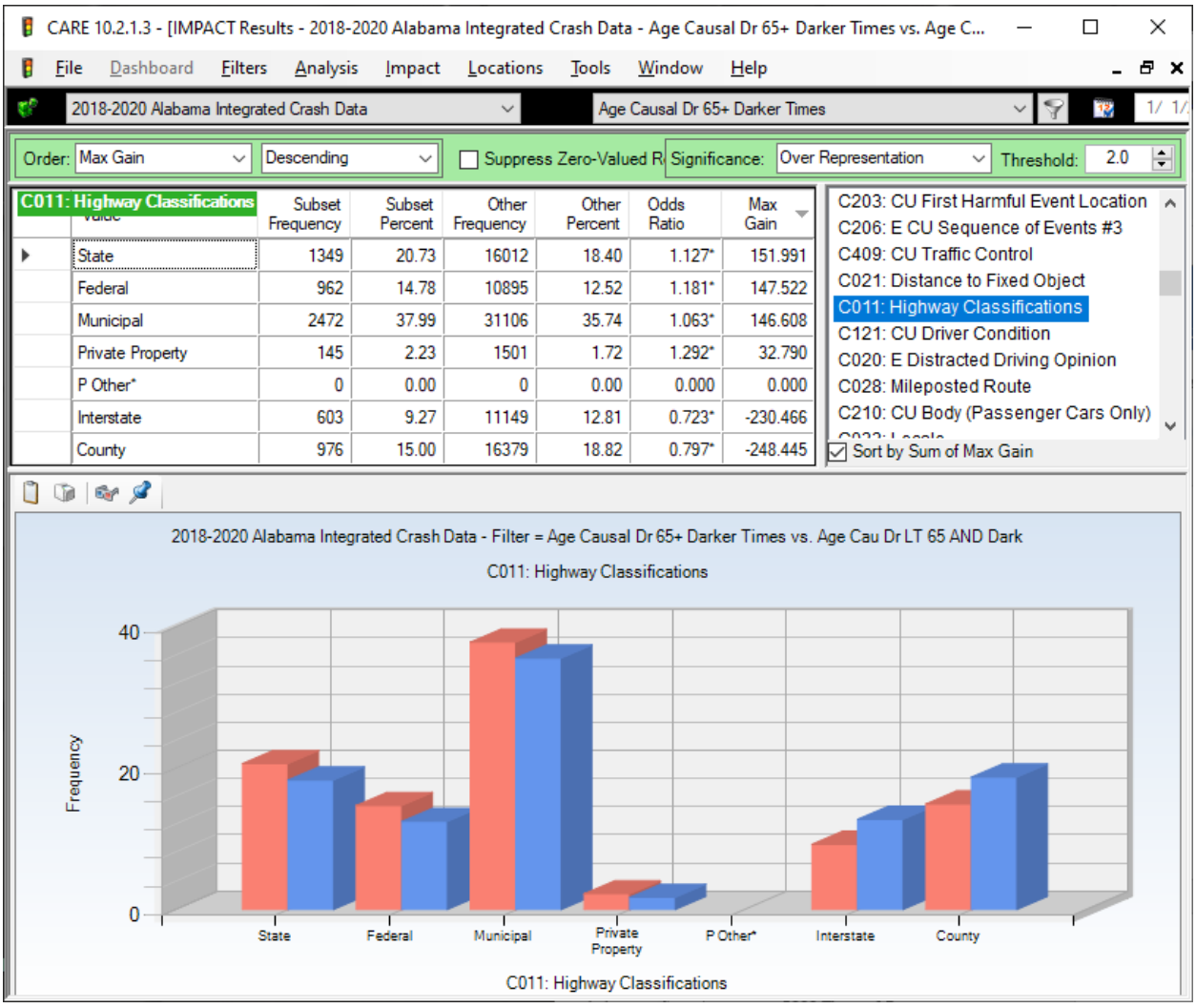
C008 Time of Day



Senior drivers are significantly over-represented in the earlier dusk and night-time hours from 3 PM through 9 PM, after which they become significantly under-represented through 6 AM.

C004 Month



The combined effects of the shorter days during the autumn months and daylight savings time work together to create the problem time that we see at dusk. Dusk is just a short half hour compared to the other lighting conditions, but it is accounts for over 15% of the nighttime crashes, which is close to 40% more than are expected.

C011 Highway Classification