Vehicle and Driver At-Fault Comparisons

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Recommendations

Because fault varies widely by severity, the report sections should be consulted if readers are interested in non-fatal crashes. We concentrate on fatal crashes since this is the primary goal of Alabama's traffic safety efforts. The following table presents the results and the recommendations with regard to fatal crashes only. Generally, these recommendations would also hold for the more severe injury categories.

Comparison	Most At Fault	Recommendation
Car vs Large Truck*	Passenger Car	Instruct passenger car drivers of the need to keep distance between themselves and trucks. Train law enforcement to detect passenger vehicle hazardous operations involving trucks.
Pedestrian* vs Vehicle	Pedestrian	Develop stricter laws that deal with pedestrian distraction and impairment, as well as law enforcement awareness.
Motorcycle* vs Other	Motorcycle	Make motorcyclists more aware of the various ways that they are causing crashes so they can take preventive actions.
Bicycle vs Other	Bicycle	Develop bicycle countermeasures and work with bicycle clubs to communicate defensive bicycle riding at youngest ages.
Age 16-20* vs Older	Age 16-20	Develop risk-taking aversion countermeasures for younger ages and make it part of their license testing.
Age Over 64* vs Younger	Age 65+	Develop information on perception loss for older drivers and assure that this information reaches as many as possible.
Age Over 74 vs Younger	Age 75+	Same as for 65+ as well as formalized methods of preventing people with severe driving disabilities from obtaining licenses.
Male vs Female	Male	The differences here are so small that no male-directed countermeasures are seen to be warranted.
School Bus vs Other	Other Vehicles	Greater emphasis in PI&E and other efforts are recommended to make drivers more cognizant of school bus issues.
LT 25 Miles vs Further	Local Drivers	Drivers need to be made aware of their tendency to be less safe when near home (e.g., cell phones and other distractions).
In State vs Out of State	In-State Drivers	Same as the local vs further away comparison and recommendations.
Making Lane Change vs Not	Lane Change	Inform drivers that (1) lane change is one of the most dangerous things they do, and (2) effective countermeasures for it.

*Special studies have been performed for these types of crashes; click on cell to go to the subject page then click the study at the top of the left panel.

Introduction

This document reports the results of a study to determine on average over a large number of cases, which driver is more apt to be at fault in two-vehicle crashes that involve two types of drivers (e.g., large truck and car; car and pedestrian, car and bicycle, car and motorcycle, etc.). This information is essential to effective countermeasure development with regard to changing driver behavior since ignoring who it typically at fault could lead to a miss-allocation of resources (e.g., targeting truck drivers, when cars are most often at fault).

For this study, traffic crash data were obtained from data that included the 2009-2013 calendar years. The officer's opinion as to which driver was at-fault (also referenced as the *causal* driver) is a data element in the crash record. Records without an officers' indications of the unit that caused the crash were omitted. In order to make a fair comparison it was necessary to create subsets of the data that did not bias the data in either direction. For example, all single-vehicle crashes were omitted from consideration. For the comparison to be valid one of the units had to be of one type (e.g., truck) and the other of the second type (e.g., passenger cars and other non-truck vehicles). This led to a fair comparison and a clean estimate of the relative frequency (i.e., the probability) of a given unit or driver type causing the category of crash under consideration.

The following give a brief explanation of the various vehicles that were compared:

- Truck Involved – this compared heavy trucks, generally large commercial motor vehicles with passenger vehicles of all types. "Trucks" in this case would include all tractor trailer trucks and all vehicles larger than normal pick-up trucks.
- Pedestrians – this covered all crashes that involved pedestrians, answering the question of whether the pedestrian or the motor vehicle was typically at fault.
- Motorcycles – this considered all motorcycle crashes with other types of motor vehicles.
- Bicycles – comparable to the motorcycle analysis, but involving bicycles as opposed to motorcycles.
- Age 16-20 – all crashes where one of the drivers was in this age range.
- Age 65+ – all crashes in which one of the drivers was of an age greater than 64.
- Age 75+ – all crashes in which one of the drivers was of an age greater than 74.
- Male-Female – crashes that involved two vehicles, one driven by a male and the other by a female.
- School Bus – all crashes in which one of the vehicles was a school bus.
- Local or 25+ Miles – local drivers were considered to be within 25 miles of their homes, and these were compared with those more than 25 miles from home.
- Out of State Drivers – similar to the "local" comparison above, but in this case one driver had an Alabama driver's license while the other had a license that was out of state.
- Changing Lanes – one driver was reported to be changing lanes while the other was not.
- Pickup vs Passenger Car – this was for all vehicles reported to be pickup trucks in a wreck with a passenger car.

As you survey the list above ask yourself which vehicle or driver type you think would be most apt to be at fault in a crash with a car. In the sections below a question is posed for each category and we urge readers to take a moment and try to answer the question *before* reading the blurb that follows it.

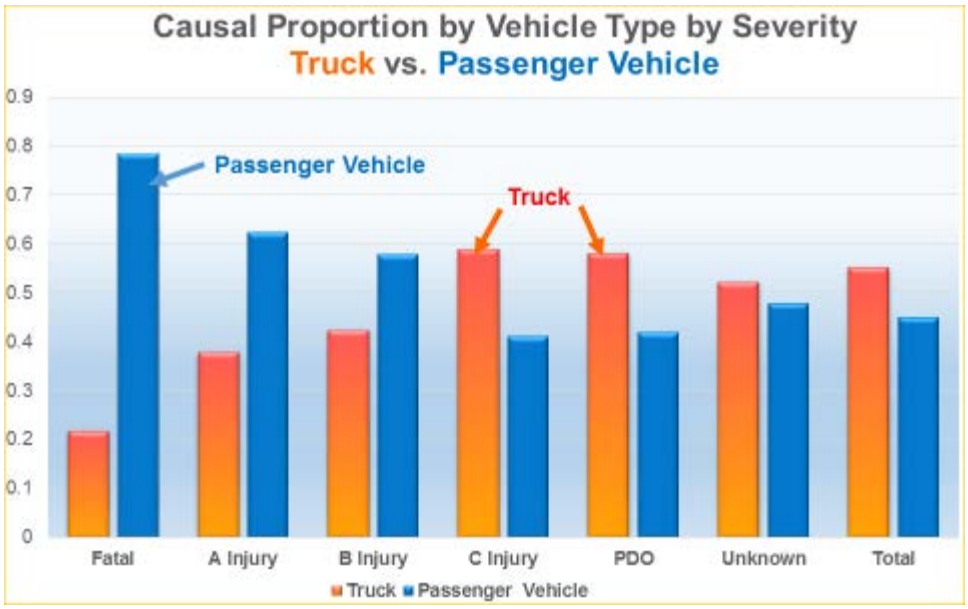
The charts given only indicate causation, not crash frequency, so they are not useful for comparing between or among the various crash types. See the final section of this report (Frequency of Crashes by Severity) for a comparison between crash types.

Please note the norm. *All other things being equal we should expect half of the crashes to be caused by one type of vehicle/driver and 50% to be caused by the other. This is only reasonable, since this assumes equal skill and integrity on both classes of drivers, so that the cause becomes a matter of chance. Obviously, it is not expected that any vehicle/driver type will cause all of the crashes.*

With the large sample sizes that are under consideration, any deviation from 50% by more than about 5% is highly statistically significant, and this would warrant addition analysis to determine the most effective countermeasures that should be applied. This guidance as to who caused the majority of the crashes is a first step toward more effective countermeasure development. It is not just the binary result that is important, but the degree of causation and how this causation varies with crash severity.

Cars or Trucks?

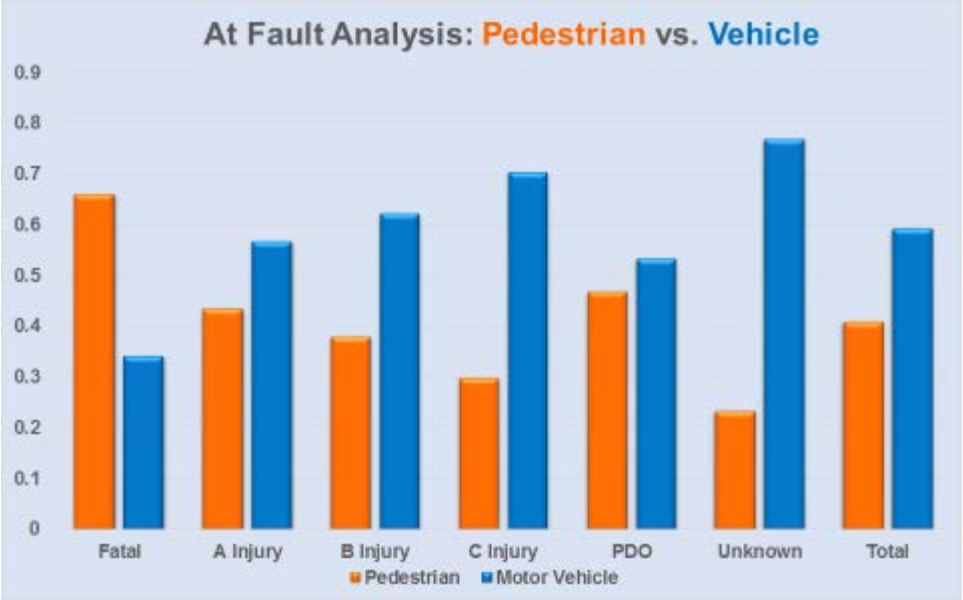
True or False? *In fatal crashes between cars and trucks, it is the truck that is most often at fault?* The chart below shows that this is false. Heavy trucks only caused about 22% of the fatal crashes in which they were involved. The general driving public has a sense that the truck causes the crash because of its size. No doubt the disparity in size between trucks and cars accounts for a higher fatality rate than what occurs in crashes between two vehicles of equivalent weight. However, this analysis was of who caused the crash in terms of driver errors (not what caused the severity to be so high). It is reasonable that professional drivers would have a higher driving skill level due to their experience. However, in the lower severity classification the heavy truck drivers are over-represented in causation. Perhaps this is due to their skill in mitigating the crash so that it will not cause a fatality. Clearly heavy trucks are much more difficult to control, and so there might be the natural expectation that they cause more two-vehicle crashes.



The above analysis indicates strongly how fault can vary significantly by severity. This is the main reason that we have subdivide the results by severity. Typically the vehicle that is "of concern" will have the bar to the left (orange bar), which the one on the right will apply to all other vehicles or drivers. Note that the total for all severity classifications (and those of Unknown severity is given at the right. *Important: no inference should be made about the relative severity of the different types of crashes below by the heights of the bars in the graph.* The orange and the blue bars within every severity classification sum to 1.00 (100%). Thus it is impossible to derive any conclusions with regard to how many truck related fatalities (either absolutely or relatively) from these charts. See the final section of this report (Frequency of Crashes by Severity) for this information.

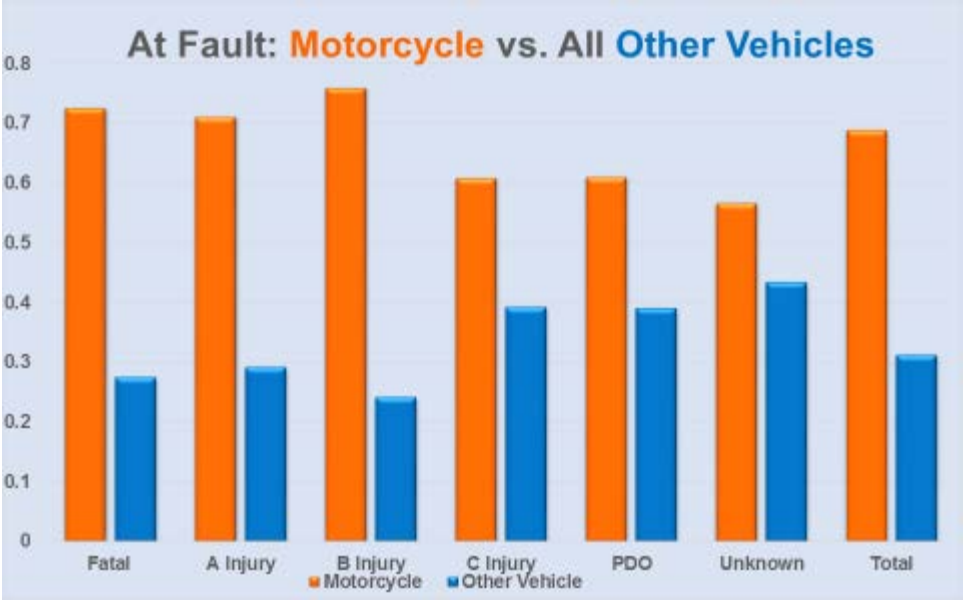
Pedestrians or Vehicles?

True or False? *Pedestrians cause most pedestrian fatalities?* This is true – the chart below shows that they are responsible for twice as many as are the vehicles that strike them. However, this is only true for fatalities. For all other severities, and for pedestrian crashes in general, it is the vehicle that is the cause. Whether a pedestrian crash is fatal or not depends heavily on other causes, such as pedestrian age, health, and the response time of EMS. Thus countermeasures might best be addressed toward all vehicle drivers. On the other hand, while the pedestrian might not be technically at fault, there are few pedestrian involvements that could not be avoided by pedestrian precautions. Most assuredly pedestrian use of alcohol/drugs and distractions of cell phone use and texting should be totally avoided near busy highways while walking.



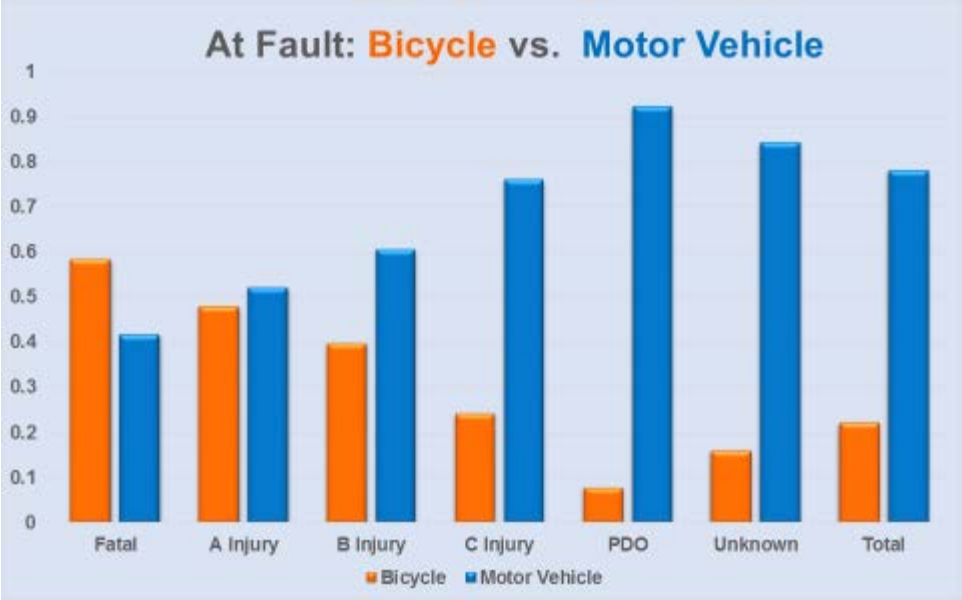
Motorcycles of Other Vehicles?

True or False? *Motorcycles cause the majority of crashes regardless of severity classification.* This is true in general and especially for the higher severity classifications. It seems quite clear that the major motorcycle countermeasures must be directed toward the motorcycle operators themselves. There is no doubt that other vehicle drivers are often not looking for motorcycles, but this can be mitigated by motorcyclists keeping their lights on at all times. The need for defensive driving on the part of motorcyclists is quite clear.



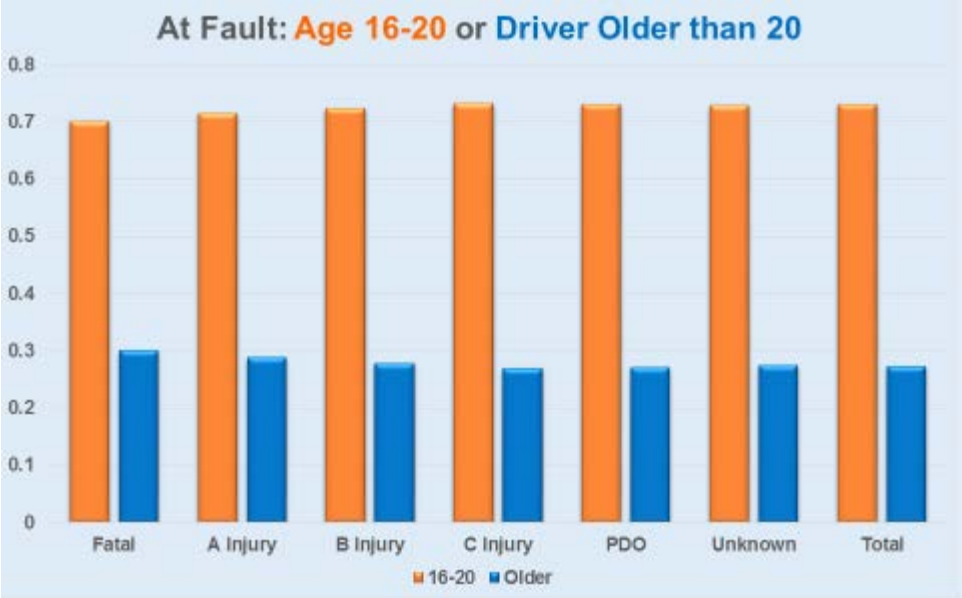
Bicycles or Motor Vehicles?

True or False? *Bicycle riders are rarely at fault.* While "rarely" is a subjective word, it is hard to apply it given the chart below. It is true that for the lessor injury types they seem to be dramatically less than their expected 50%. However, notice the nearly linear increase with increased severity to the point where they are causing 60% of their fatality crashes. It is clear that they share the blame here and countermeasures need to be applied to both drivers and bicyclists probably in about the same proportion. Drivers do not look for bicyclists – they are looking for motor vehicles. Often the excuse is given: "I never saw the bicyclist." They were looking in that direction but because they did not see a car or truck, they proceeded as if there was nothing there. This is a problem with motorcycles as well; however, it is far more pronounced with bicycles, which typically do not have a significant headlight capability. All motor vehicle drivers need to look well ahead for the presence of bicyclists, and slow down appropriately since they know that bicyclists rarely approach 20 MPH. It should not be taken for granted that there will be room to pass the bicyclists. On the other hand, bicyclists should stay as far to the right as possible and in single file.



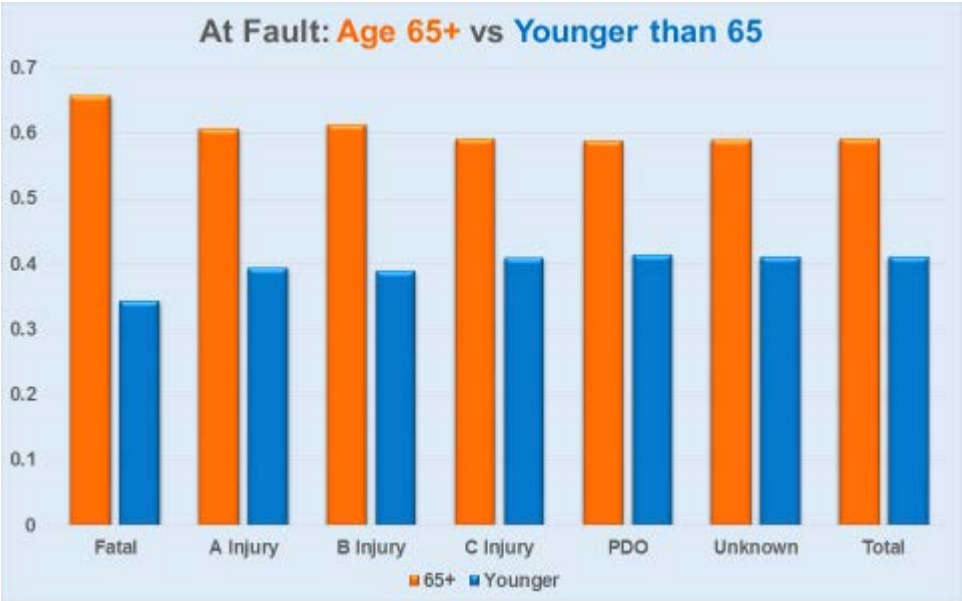
Young (16-20) or Older (20+) Drivers?

True or False? *Age 16-20 (what we are calling "young") drivers cause over twice the proportion of crashes than what over-20 aged drivers cause?* The chart below shows that this is true for all severity classifications. "Older drivers" in our section heading question refers to those who are older than 20. It is a well-established fact that the young driver age group is over-represented in crashes in general, and the inference that they are causing a large proportion of the crashes in which they are involved is unavoidable. The chart below is one of the few charts in this report that is severity independent. The major issue with young drivers is their inexperience coupled with their inability to comprehend risk, a brain development issue that is only resolved by maturity to the age of about 25 years. Clearly countermeasures for this age group are one of the greatest challenges within the field of traffic safety. Those who are inclined to want to take risks are hardly dissuaded by stating that a given action is risky – in fact they could be encouraged to take it. This makes no sense at all to older drivers; in fact we see the older drivers to be just the opposite, extremely risk averse by any metric (e.g., speed, weather, time of day, etc.). We will consider these older categories next.



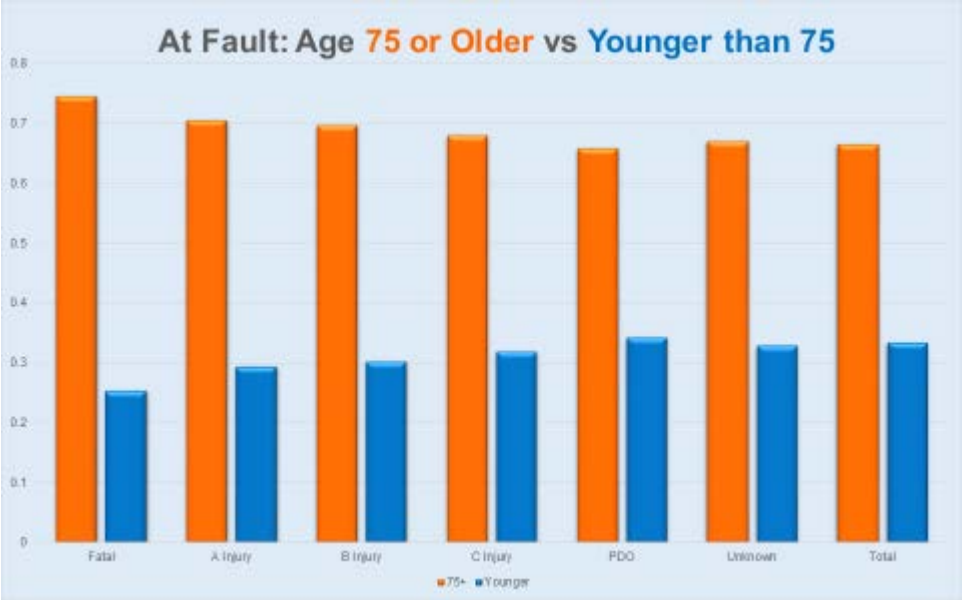
Older (65+) or Younger (Under 65)

True or False? *Age 65+ drivers cause well over half of the two vehicle fatality crashes in which they are involved?* True. The chart below is very comparable to the one above, showing that the extreme ends of the driver age range account for much more than their share of causing the crashes in which they are involved in crashes involving others not in their age subset. The conclusion would be that the safest drivers are from the center age groups, which have both experience and normal capabilities when it comes to both physical (e.g., sight and hearing) and risk perceptions.



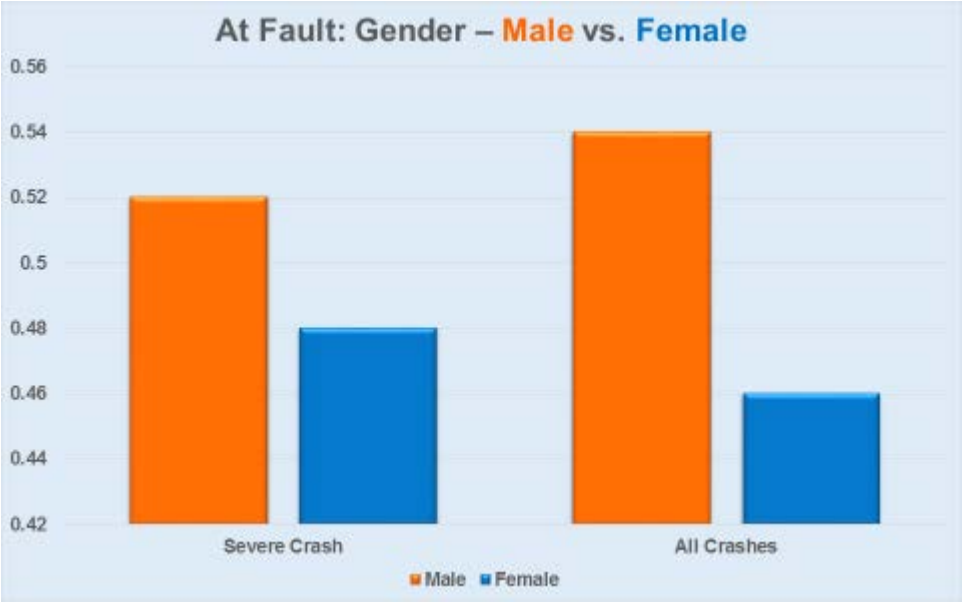
Oldest Drivers (75+) or Younger (Under 75)

True or False? *Age 75+ drivers cause about three times the fatalities than those younger drivers (under 75) involved in these crashes.* The chart below shows how causation increases with age. Certainly we would expect that any factor caused by age (e.g., visual impairments) would be further exacerbated by further age increases.



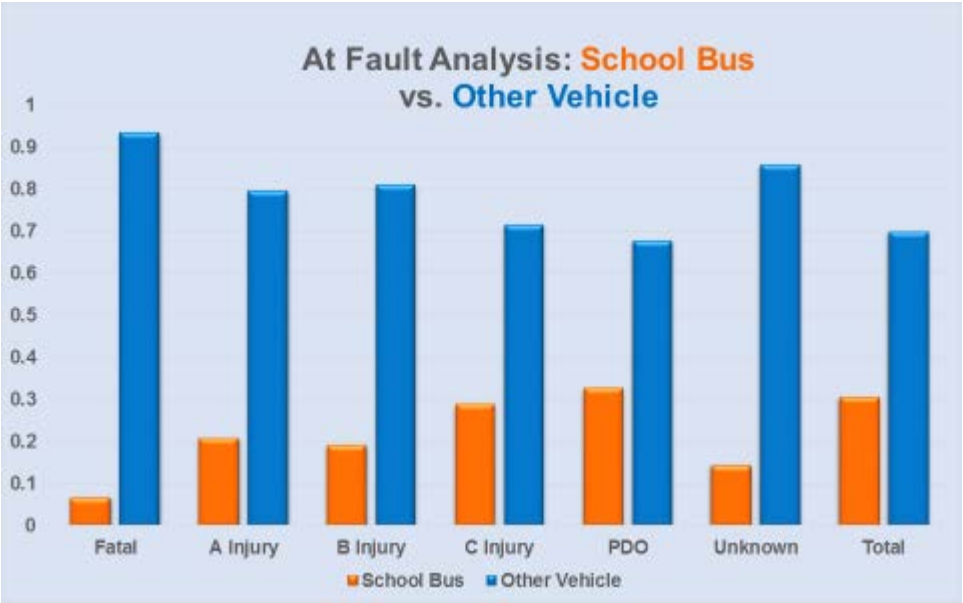
Male of Female?

True or False? *In two vehicle crashes in which one driver is a man and the other a woman, the male driver caused over 50% of the crashes.* Most studies of this subject look at overall causation of all crashes. This is not at all a fair comparison since it is not clear that men drive far more miles in a given year than do women. The comparison given in the (*not to scale*) chart below is a fair one in that only two vehicle crashes in which one of the drivers was a man and the other was a woman were considered. Note first of all for the more severe classification, which contained fatalities and severe injuries, the difference is only 2% from the expected. While this is statistically significant because of the huge sample size, practically speaking when applying this to any given male or any given female, no definitive conclusions can be drawn. It could be reasoned from these proportions, for example, that in a sample of 50 men and 50 women, only two of the men would be more apt to cause a crash that their female counterparts and all the rest of the sample would be equally as likely. The gap is slightly larger when it comes to all crashes 54% to 46%, but even these results cannot lead to inferences concerning anything other than that of a very large sample, as opposed to any given individual.



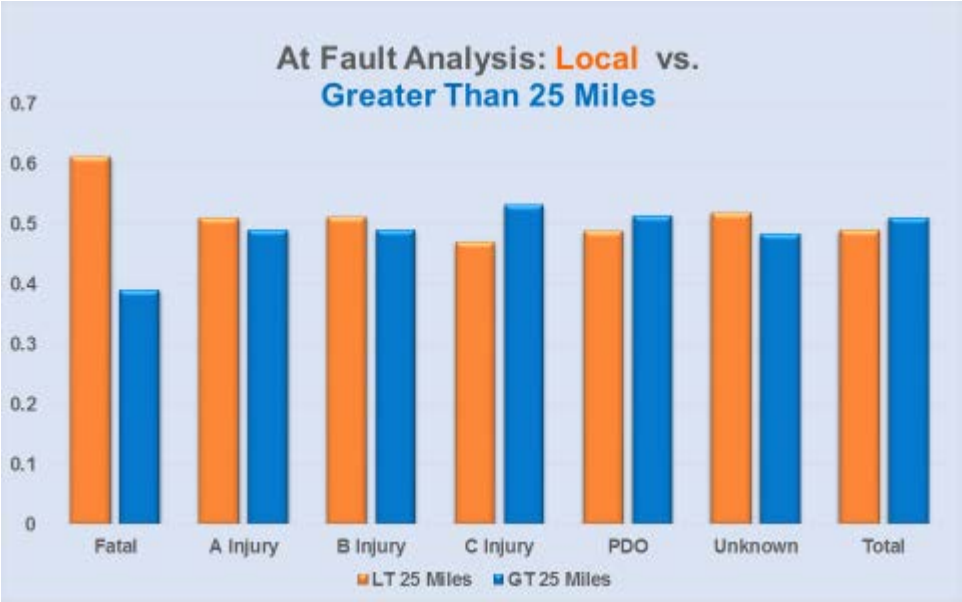
School Bus or Other Vehicle?

True or False? *School bus drivers are very seldom responsible when involved in a two-vehicle crash.* The following chart shows that this is true. This is a tribute to our school bus drivers in that the equipment that they are driving is certainly much more difficult to control than the ordinary car. We would look toward countermeasures involving the other vehicles in attacking the problem of school bus crashes.



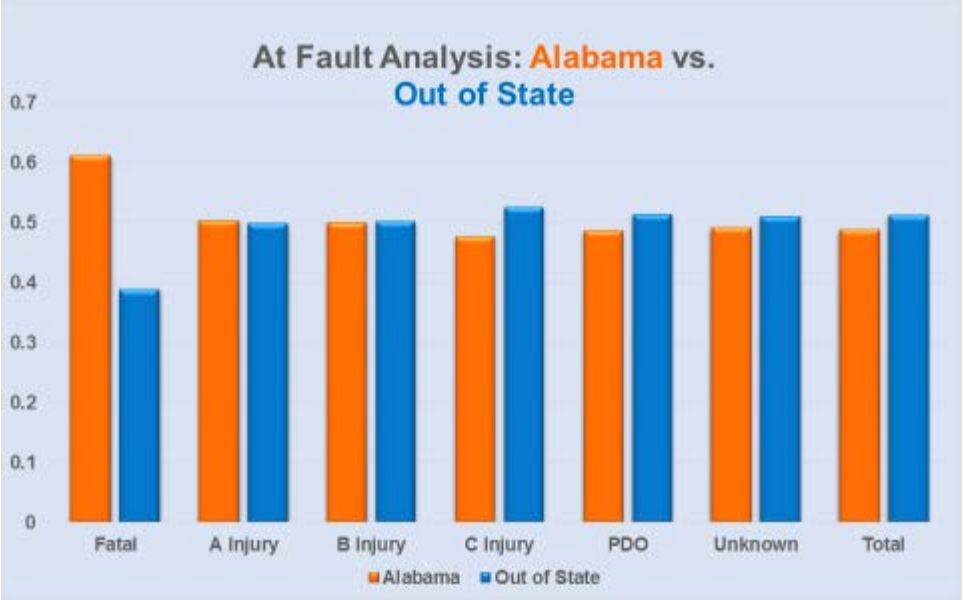
Local (<25 Miles) or Away From Home?

True or False? *Fatality crashes are most often caused by the driver furthest away from home? This is clearly false from the chart below.* Recent issues with distractions (e.g., cell phones and texting) could be the cause in that they are more apt to be used close to home. The comparison is on a proportional basis, so the fact that more driving is done close to home is not a factor.



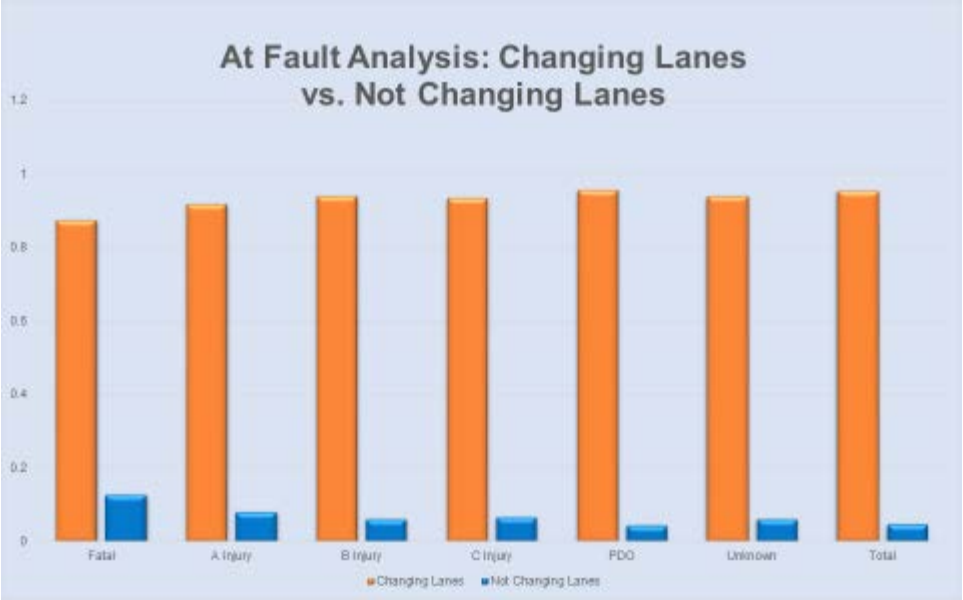
In State or Out of State?

True or False? *These results are practically identical to those for greater than or less than 25 miles from home.* Clearly true in that the chart below appears to be a mirror image of the one above.



Making Lane Change or Not?

True or False? *If you are involved in a crash while changing lanes, your chance of being the at-fault driver is over 95%.* If the chart below does not make us wary of making lane changes, nothing will. Officers assign fault to the driver changing lanes in a little over 95% of all such crashes. It seems clear that the old adage "if you are behind you are automatically at fault" no longer applies. We are not questioning the officers' opinions, since this conclusion seems to be quite intuitive. If there is any doubt at all about someone in your blind spot or the vehicle coming up on you from behind, just do not make the lane change. Also, on three lanes, don't just look for clearance in the middle lane. Look for someone two lanes over trying to occupy the same space as you are moving into. Let's not try to defy basic physics, which tells us that two objects cannot occupy the same area of space at the same time.



Frequency of Crashes by Severity

The table below shows most the crash types considered above and how they compare with regard to overall crash frequency and severity. It is sorted so that the crash type category with the highest number of fatal crashes is listed first, descending to the crash type category with the lowest number of fatal crashes listed last. Categories were defined by a group of traffic safety professionals within Alabama who developed the State's Strategic Highway Safety Plan (SHSP). Each crash type category lists the crashes that happened for that particular category during calendar year 2012. *The categories given in this table are not mutually exclusive (e.g., you could have an impaired driving crash that also involved speeding). However, they still tend to demonstrate the relative criticality of that particular category.*

The severity classifications in the table are quite significant, and the arrangement is generally by fatal crashes. The percentages given are for the respective severity classification only; thus, these percentages represent the relative severity of the crash category, and this can be used to compare the crash categories by severity. For example, it might be noticed that the severities of pedestrian, motorcycle and railroad crashes are significantly higher than most other categories, as is also true for those crashes in which the driver was not properly restrained.

Summary of Crash Severity by Crash Type –Alabama CY2012 Data

Crash Type (Causal Driver)	Fatals	Fatal %	Injury Number	Injury %	PDO No.	PDO %	Total
1. Restraint Deficient*	366	3.53%	4,075	39.35%	5,916	57.12%	10,357
2. Impaired Driving	186	2.67%	2,661	38.19%	4,120	59.14%	6,967
3. Speeding	176	4.60%	1,779	46.49%	1,872	48.92%	3,827
4. Obstacle Removal	123	2.03%	2,102	34.75%	3,824	63.22%	6,049
5. Mature – Age > 64	103	0.90%	2,477	21.60%	8,887	77.50%	11,467
6. License Status Deficiency	97	1.53%	2,048	32.36%	4,183	66.10%	6,324
7. Youth – Age 16-20	91	0.43%	4,790	22.51%	16,400	77.06%	21,281
8. Motorcycle	89	4.65%	1,289	67.42%	534	27.93%	1,912
9. Ped., Bicycle, School Bus	88	4.36%	1,004	49.70%	928	45.94%	2,020
10. Pedestrian	78	9.01%	647	74.71%	141	16.28%	866
11. Fail to Obey S/Y Sign	32	0.52%	1,663	26.80%	4,510	72.68%	6,205
12. Utility Pole	30	1.32%	831	36.53%	1,414	62.15%	2,275
13. Non-pickup Truck Involved	30	0.68%	712	16.20%	3,653	83.12%	4,395
14. Construction Zone	23	1.03%	477	21.37%	1,732	77.60%	2,232
15. Roadway Defects – All	21	0.61%	807	23.56%	2,598	75.83%	3,426
16. Vehicle Defects – All	17	1.14%	350	23.46%	1,125	75.40%	1,492
17. Vision Obscured	13	1.21%	271	25.28%	788	73.51%	1,072
18. Fail to Obey Signal	12	0.27%	1,306	29.49%	3,110	70.23%	4,428
19. Bicycle	9	1.46%	270	43.76%	338	54.78%	617
20. Child Restraint Deficient*	4	0.18%	347	15.22%	1,929	84.61%	2,280
21. Railroad Trains	1	0.83%	35	28.93%	85	70.25%	121
22. School Bus	1	0.18%	103	18.39%	456	81.43%	560

* The Fatal, Injury and PDO numbers for the “Restraint Deficient” and “Child Restraint Deficient” are the total number of persons killed, injured and uninjured, respectively. This is different from the other categories in that they list the number of crashes in which such an injury severity was incurred.