

Investigating the level of risk imposed by different driver groups using different types of light-duty vehicles

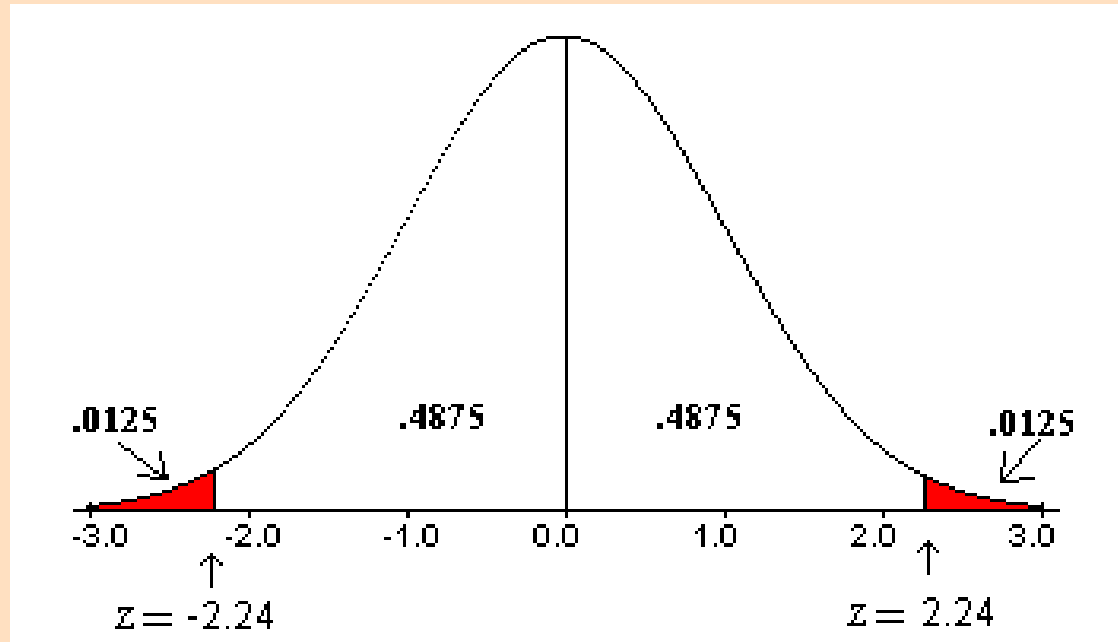
Essam Dabbour, Ph.D., P. Eng.
Advantage Forensics



Background

- Certain types of light-duty vehicles are more likely to be used by certain driver groups:
 - Minivans
 - Pickup trucks
 - Small sedan cars
 - ...
- there are variations among different types of light-duty vehicles in terms of their respective weight.
- Is there a correlation between the type of the light-duty vehicle and the level of risk imposed on other drivers?

Method



https://www.nku.edu/~statistics/Z_Test_of_Hypothesis_about_mu.htm

Statistical significance tests used to analyze all two-vehicle collisions that occurred in North Carolina in five years (2014 – 2018) based on:

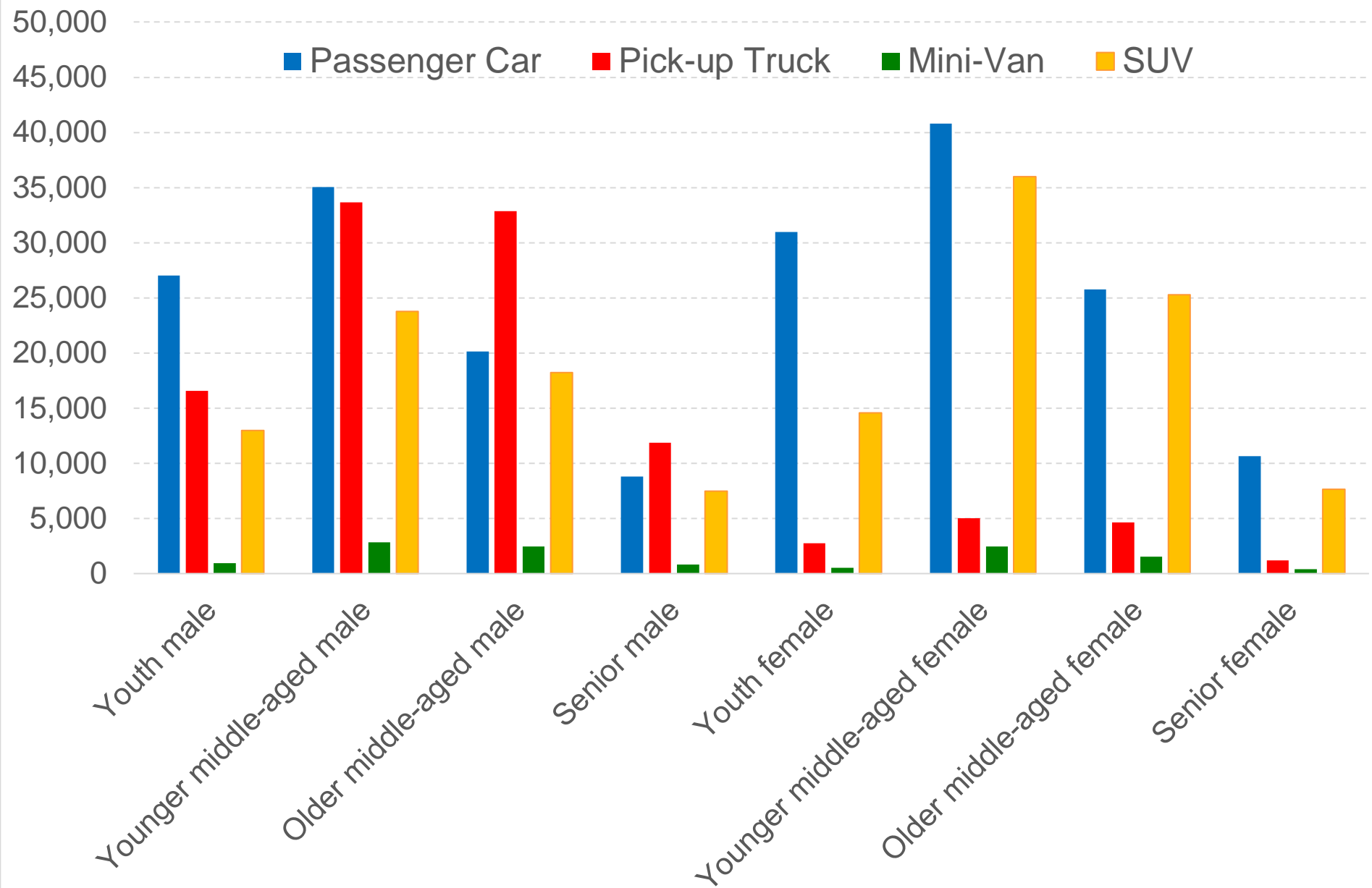
- Type of the light-duty vehicle.
- Driver's age.
- Driver's gender.

Grouping

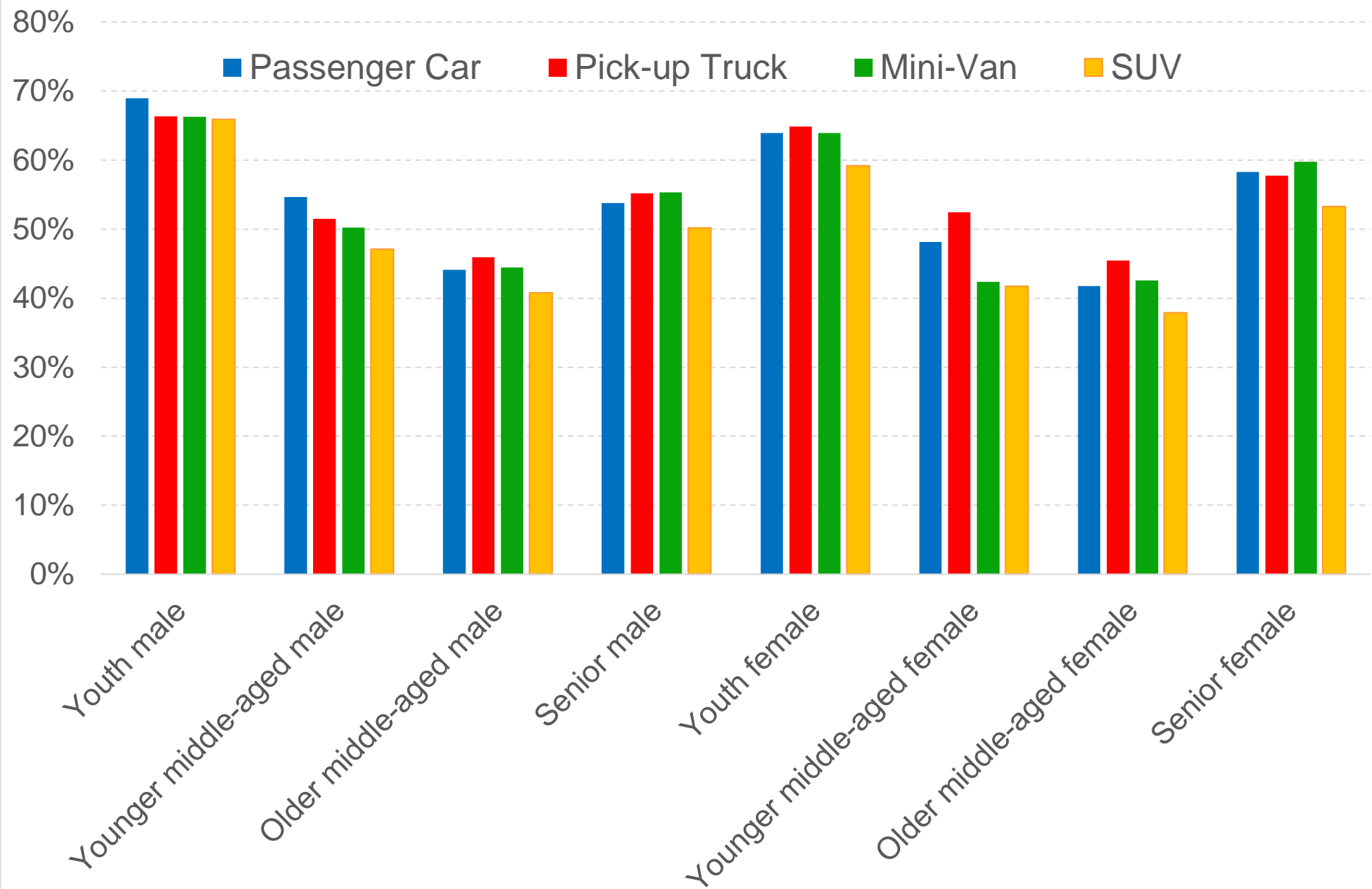
- Type of the light-duty vehicle:
 - Passenger car (PC)
 - Pickup truck (PU)
 - Minivan (MV)
 - SUV (SU)
- Driver's age:
 - Youth (16 – 24 years)
 - Young adults (25 – 44 years)
 - Older adults (45 – 64 years)
 - Seniors (65 +)
- Driver's gender:
 - Male (M)
 - Female (F)



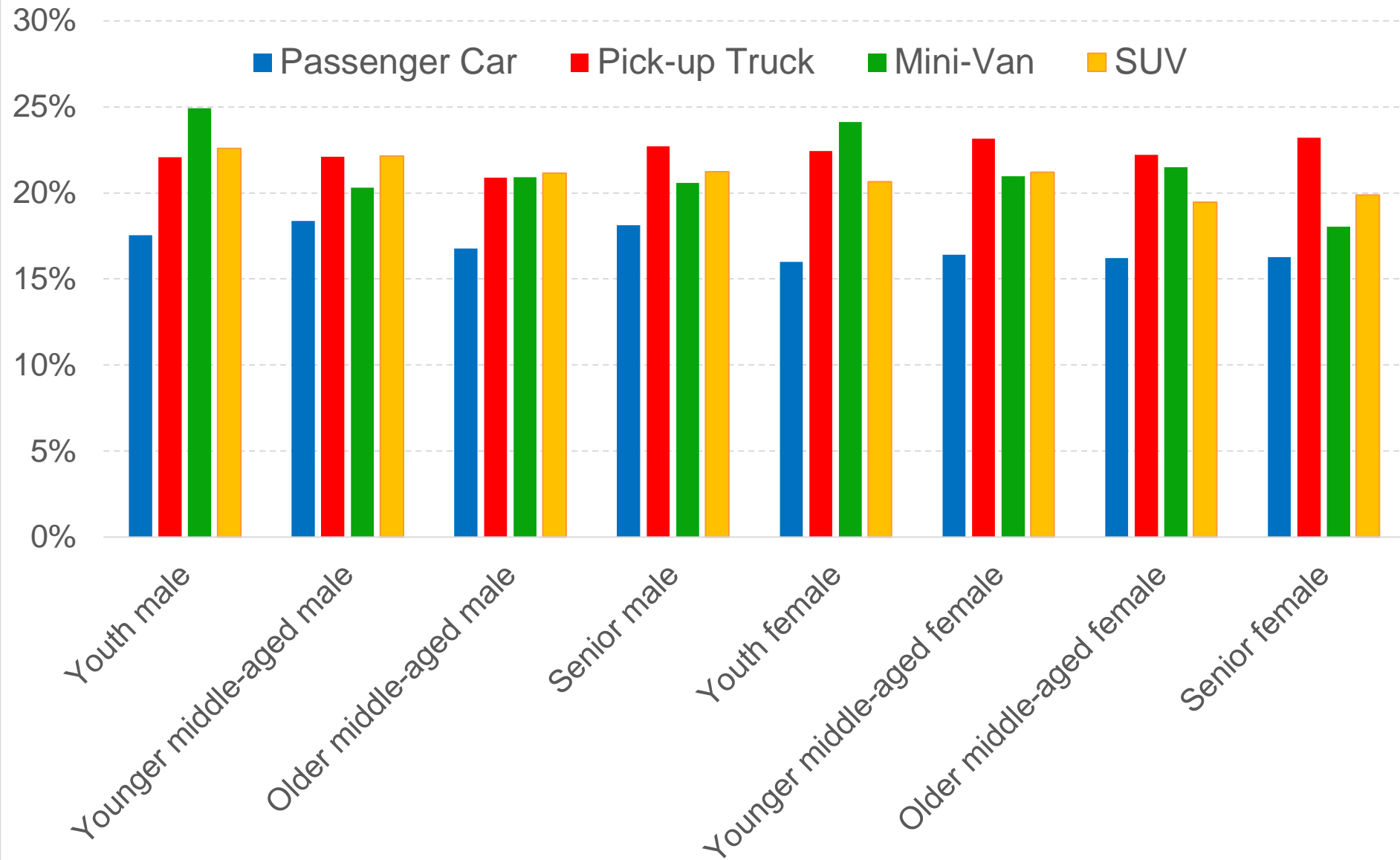
Involved vehicles



Percentage of at-fault drivers



Percentage of collisions when at-fault drivers injured other drivers



At-fault Drivers

Significantly over-represented groups

M / Youth / PC	M / 25-44 / PC	M / Youth / PU	M / Senior / PU
F / Youth / PC	M / Youth / SU	F / Senior / SU	M / Senior / PC
F / Youth / PU	M / Youth / MV	F / Youth / MV	F / Senior / PC
F / Senior / PU	M / Senior / MV	F / Senior / MV	F / Youth / SU

Groups not significantly different from population

F / 25-44 / PU	M / 25-44 / MV	M / 25-44 / PU
----------------	----------------	----------------

Significantly under-represented groups

M / 45-64 / PC	F / 25-44 / PC	F / 45-64 / PC	M / 45-64 / PU
M / 45-64 / MV	F / 25-44 / MV	F / 45-64 / MV	M / 45-64 / SU
F / 45-64 / PU	M / Senior / SU	F / 25-44 / SU	F / 45-64 / SU
M / 25-44 / SU			

Speeding Drivers

Significantly over-represented groups

M / Youth / PC

M / 25-44 / PC

M / Youth / PU

M / 25-44 / PU

F / Youth / PC

M / Youth / SU

Groups not significantly different from population

F / Youth / PU

F / Senior / PU

M / 25-44 / MV

M / 45-64 / PC

M / 25-44 / SU

F / 25-44 / PU

M / Youth / MV

F / Youth / MV

F / Youth / SU

Significantly under-represented groups

M / Senior / PC

F / 25-44 / PC

F / 45-64 / PC

M / 45-64 / PU

M / 45-64 / MV

M / Senior / PU

F / Senior / MV

F / Senior / PC

F / 45-64 / PU

M / Senior / MV

F / 25-44 / MV

F / 45-64 / MV

F / 25-44 / SU

M / Senior / SU

M / 45-64 / SU

F / Senior / SU

F / 45-65 / SU

Impaired Drivers

Significantly
over-represented groups

M / Youth / PC

M / 25-44 / PC

M / 45-64 / PC

M / 25-44 / PU

M / 45-64 / PU

M / 45-64 / SU

M / 25-44 / SU

Groups not significantly different
from population

F / 25-44 / PC

M / Youth / PU

M / 25-44 / MV

M / 45-64 / MV

M / Youth / SU

F / 25-44 / PU

F / Senior / MV

F / Youth / MV

Significantly under-represented
groups

M / Senior / PC

F / Youth / PC

F / 45-64 / PC

F / Youth / PU

M / Youth / MV

M / Senior / PU

F / Senior / PU

F / Senior / PC

F / 45-64 / PU

M / Senior / MV

F / 25-44 / MV

F / 45-64 / MV

F / 25-44 / SU

M / Senior / SU

F / Youth / SU

F / Senior / SU

F / 45-64 / SU

Drivers caused injuries to others

Significantly over-represented groups

M / Youth / PU	M / 25-44 / PU	M / 45-64 / PU	M / Senior / PU
F / Youth / PU	F / 25-44 / PU	F / 45-64 / PU	F / Senior / PU
M / Youth / MV	F / Youth / MV	M / Youth / SU	M / 25-44 / SU
M / 45-64 / SU	M / Senior / SU	F / Youth / SU	F / 25-44 / SU

Groups not significantly different from population

M / 25-44 / MV	M / 45-64 / MV	M / Senior / MV	F / 25-44 / MV
F / Senior / SU	F / 45-64 / MV	F / Senior / MV	F / 45-64 / SU

Significantly under-represented groups

M / 45-64 / PC	M / Youth / PC	M / 25-44 / PC	F / Youth / PC
M / Senior / PC	F / Senior / PC	F / 45-64 / PC	F / 25-44 / PC

Drivers caused injuries to themselves

Significantly over-represented groups

M / Senior / PC

M / 25-44 / PC

F / Youth / PC

F / 45-64 / PC

F / Senior / PC

F / 25-44 / PC

F / Senior / SU

Groups not significantly different from population

F / Youth / PU

M / Youth / PC

M / Senior / MV

F / 25-44 / MV

F / 45-64 / PU

F / 25-44 / PU

F / Senior / MV

F / Youth / MV

F / 45-64 / MV

F / Youth / SU

F / 25-44 / SU

F / Senior / PU

F / 45-64 / SU

Significantly under-represented groups

M / 45-64 / PC

M / Youth / PU

M / 25-44 / PU

M / 25-44 / MV

M / Youth / MV

M / Senior / PU

M / 45-64 / MV

M / 45-64 / PU

M / Youth / SU

M / 25-44 / SU

M / 45-64 / SU

M / Senior / SU

Conclusions

- Young male drivers (below 45) are more likely to be speeding and cause injuries to other drivers.
- Youth female drivers driving passenger cars are also likely to be speeding.
- Male drivers (below 65) are also likely to be impaired.
- Drivers driving pickup trucks and SUVs are more likely to cause injuries to other drivers.
- Drivers driving passenger cars are more likely to be injured.
- Senior drivers (above 65) are more likely to be at fault (but not speeding or impaired).

THANK YOU ALL