Vehicle Design and Pedestrian Safety

February 5, 2025
2:00pm Eastern / 11:00am Pacific

Hosted by:

CPBS
Center for Pedestrian and Bicyclist Safety

Outline

1. Introduction (1 min.)
2. UNM - Texas (9 min.)
3. UTK - Tennessee (40 min.)
4. Q&A (10 min.)

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CPBS Project # 23UTK03

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Justification

⚙ CPBS 🚶

When a crash does occur, larger vehicles are less safe.
(Hu et al., 2024; Tyndall, 2024)

Credit: Angie Schmitt
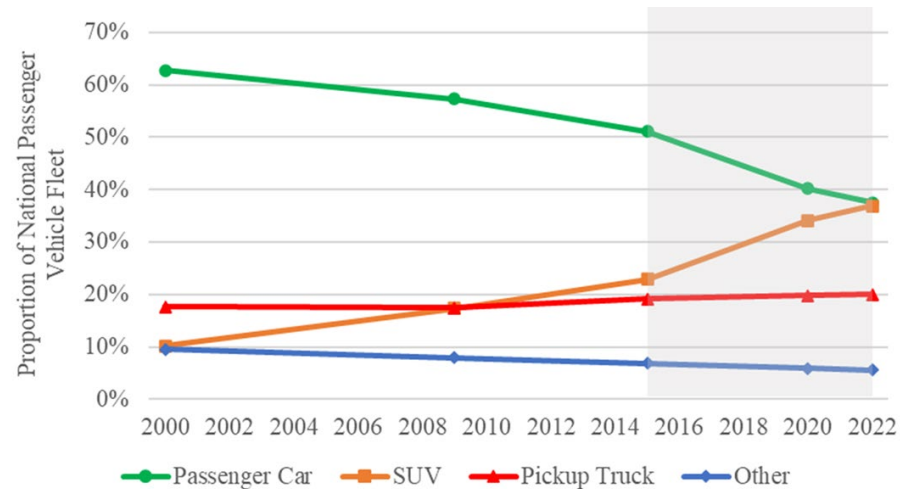
Data Source: NHTSA

Are these vehicles more likely to collide with a pedestrian in the first place?

Data

We derived pedestrian crash rates:
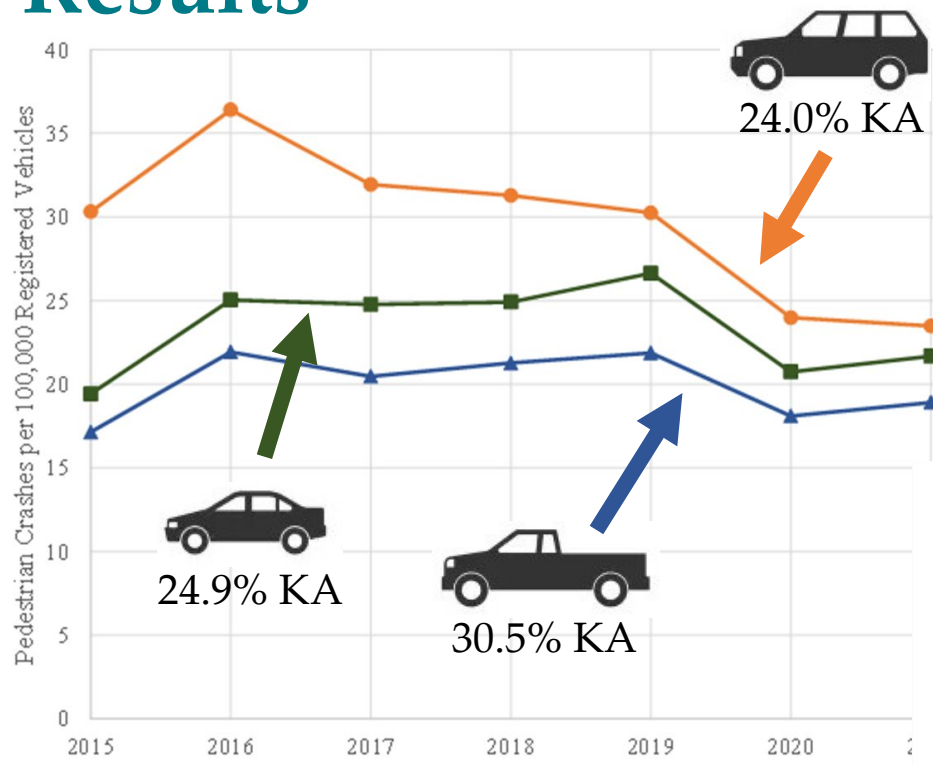
Pedestrian Crashes
(total and KA)
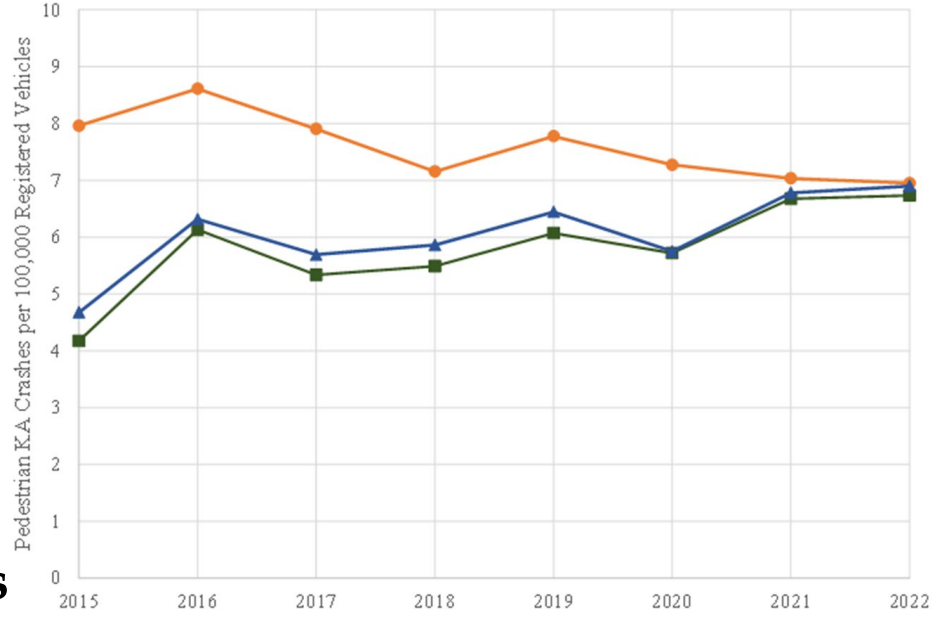

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Exposure
(registered vehicles)

- Years of available data: 2015-2022
- Single-vehicle, single-pedestrian crashes
- Two approaches: 1) Vehicle Type and 2) Make/Model
- Next steps: VMT for exposure

Results

$$\frac{\text{Pedestrian Crashes}}{\text{100k Registered Vehicles}}$$

24.0% KA

24.9% KA

30.5% KA

$$\frac{\text{Pedestrian KA Crashes}}{\text{100k Registered Vehicles}}$$

Vehicle Relationship	p-value			
	Crash Rates *(Figure 1)*	KA Rates *(Figure 2)*	%KA	
Pickup truck to passenger car	0.121	0.747	30.5% to 24.9%	**0.007**
SUV to passenger car	**0.006**	**<0.001**	24.0% to 24.9%	0.776
SUV to pickup truck	**<0.001**	**0.001**	24.0% to 30.5%	**0.001**

Results

Pedestrian KA Crashes / 100k Registered Vehicles
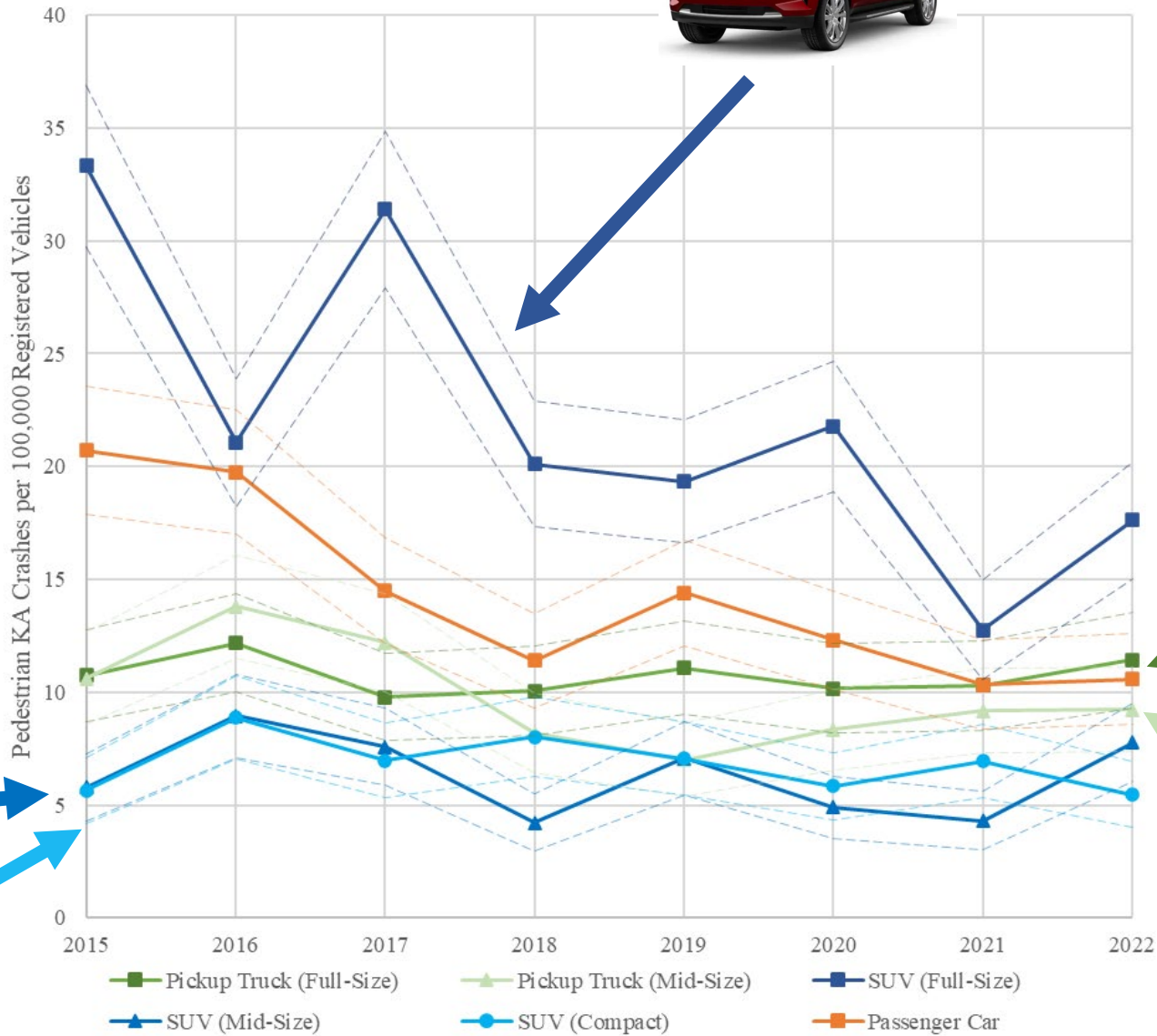
Results

Dependent variable = Injury severity

	p=0.003 R^2=0.005		
	Est.	S.E.	p
Height-grille	**0.053**	**0.019**	**0.005**
Height-overall	-	-	-
Weight-curb	-	-	-
Year-vehicle	**-0.036**	**0.022**	**0.096**
Vehicle Color	0.001	0.002	0.681
Out of State	-0.024	0.103	0.814
Insured	0.116	0.077	0.132
Year-crash	**0.064**	**0.021**	**0.003**
Intercept	**2.813**	**0.120**	**<0.001**

All were significant

Older vehicles

Irrespective of other variables

Results

#	Make/Model	Vehicle Type
1	Toyota Camry	PC
2	Nissan Altima	PC
3	Chevrolet Tahoe	SUV (FS)
4	Ford Explorer	SUV (MS)
5	Ford Expedition	SUV (FS)
6	Honda CR-V	SUV (C)
7	Toyota Tacoma	PT (MS)
8	Chevrolet Silverado	PT (FS)
9	Ford Escape	SUV (C)
10	Jeep Grand Cherokee	SUV (MS)
11	Ford F-150	PT (FS)
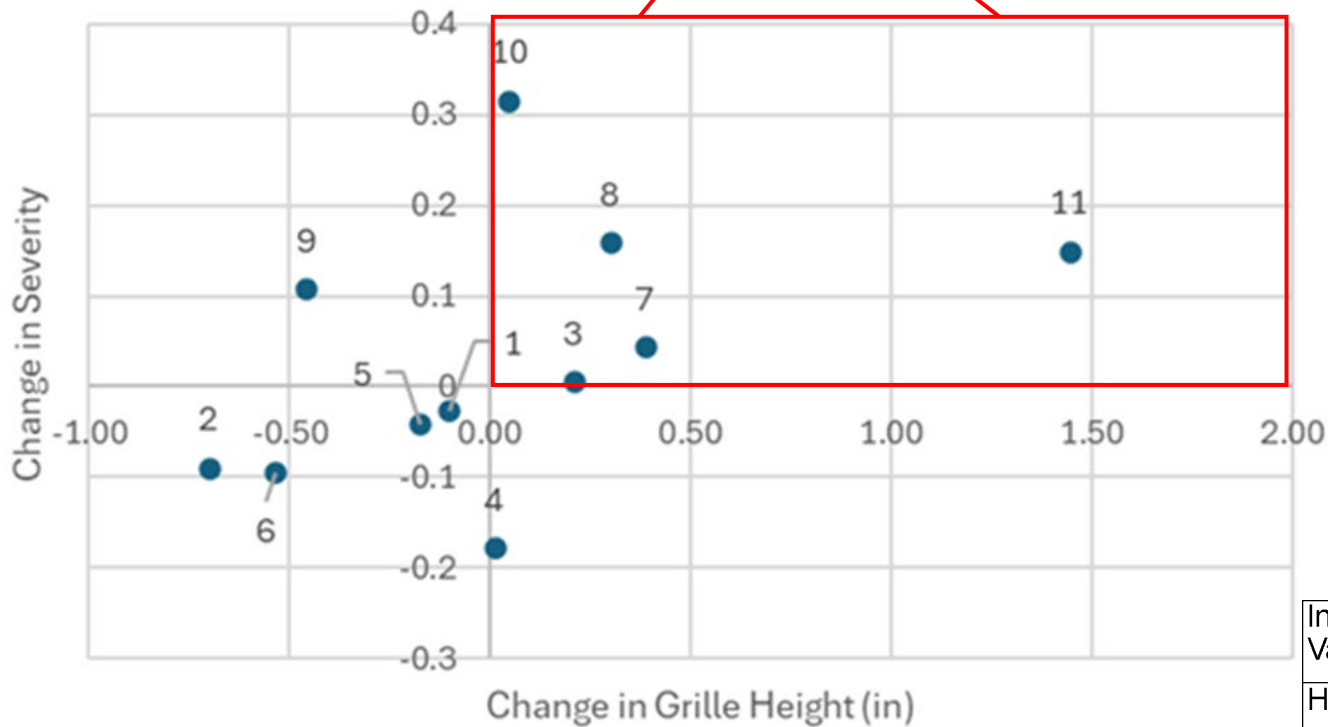
Independent Variable	Spearman's rho	p-value
Height-grille	**0.600**	**0.056**
Height-overall	0.436	0.182
Weight-curb	-0.027	0.946

Thank You!

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