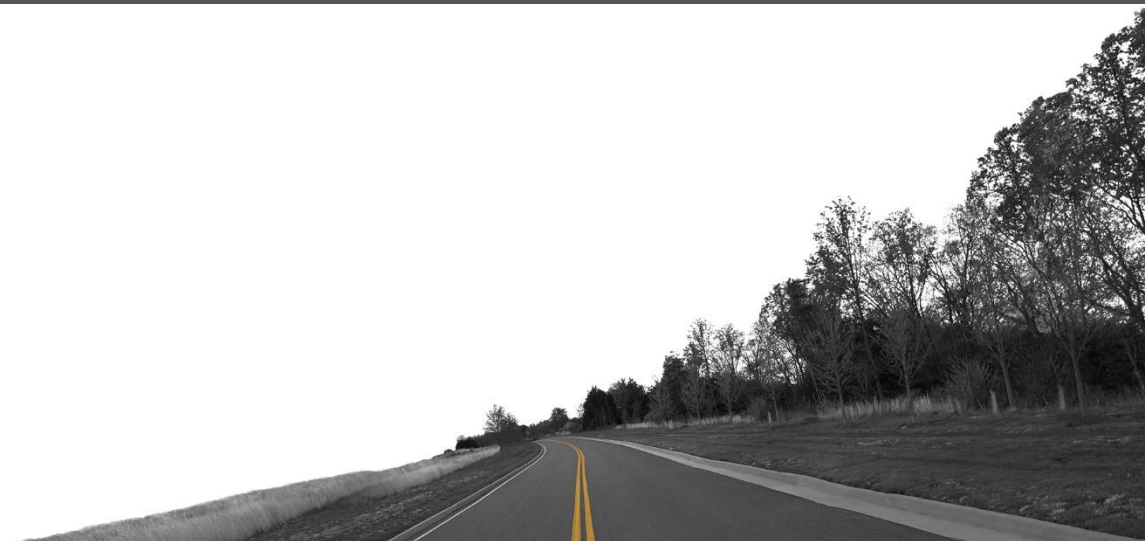
Vehicle technology & automation from a safety and insurance perspective

2025 Spring Symposium

April 16, 2025

Kay Wakeman
Director of Insurance Outreach



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Indiana Farm Bureau Insurance
Indiana Farmers Insurance
Just Insure
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Kentucky Farm Bureau Mutual Insurance Companies
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PEMCO Mutual Insurance Company
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Rider Insurance
Rockingham Insurance
Root Insurance Co
Rural Mutual Insurance Company
Safe Auto Insurance Company
Safeco Insurance®
Samsung Fire & Marine Insurance Company
SECURA Insurance
Selective Insurance
Sentry Insurance
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State Auto Insurance Companies
State Farm Insurance Companies
Stillwater Insurance Group
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United Insurance Group
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Virginia Farm Bureau Mutual Insurance
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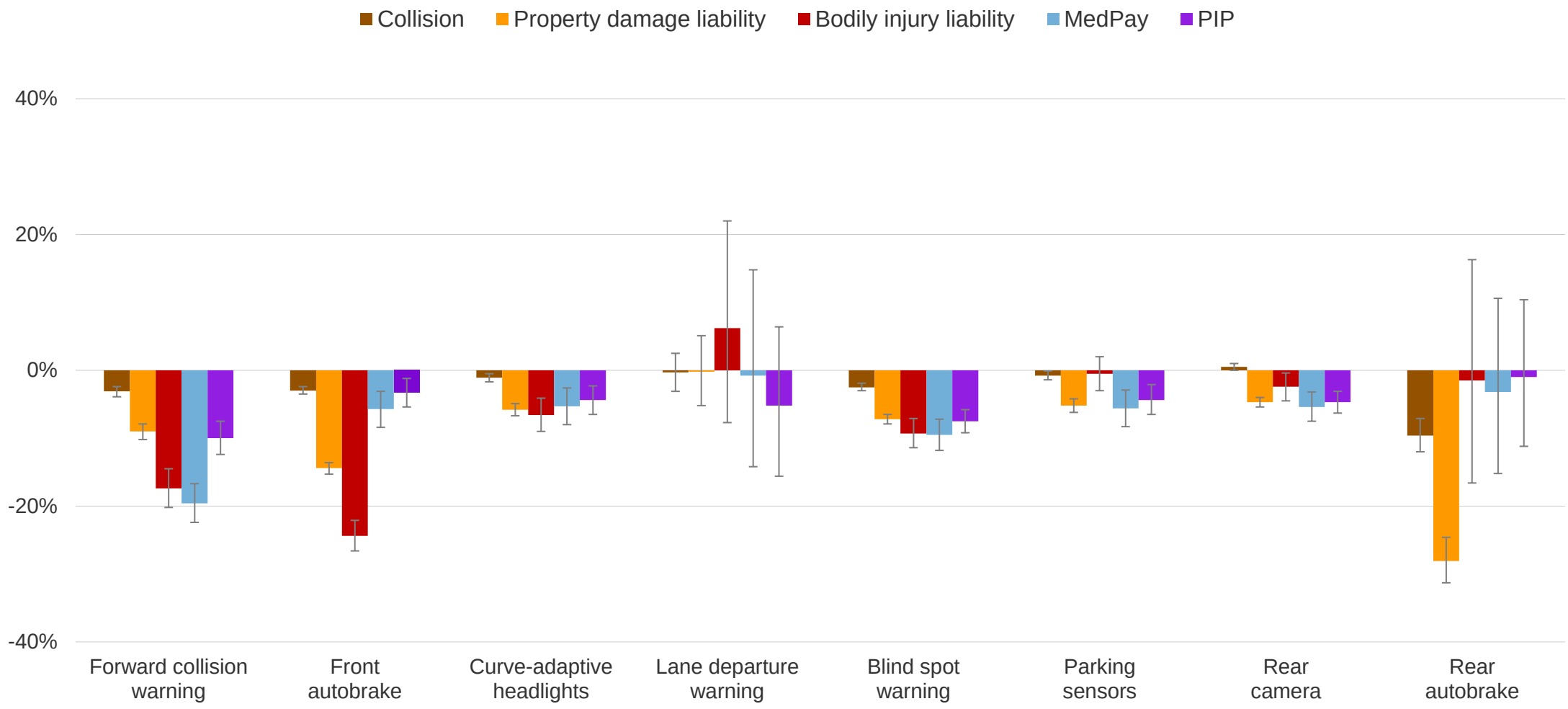
Advanced driver assistance systems

Summary of technology effects on insurance claim frequency

Results pooled across automakers



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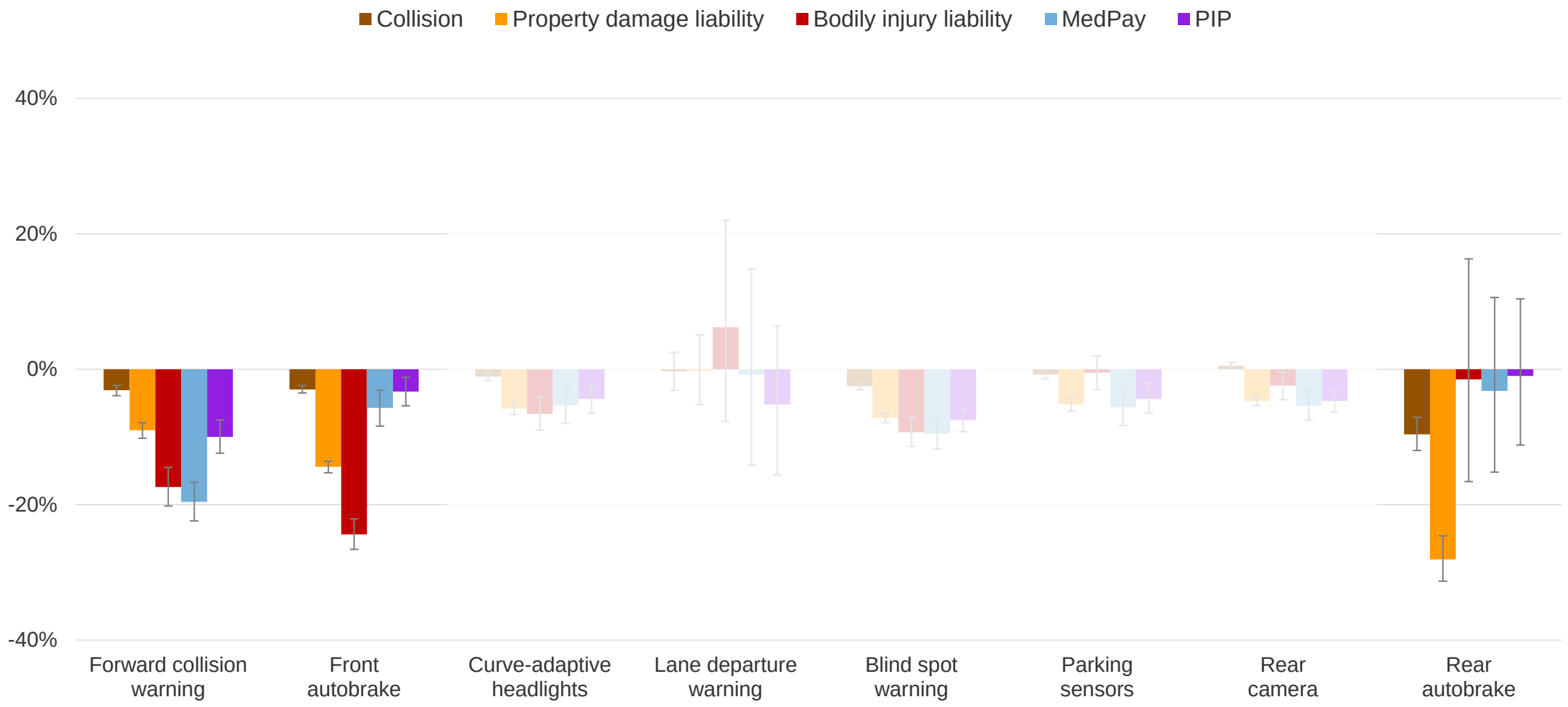

Summary of technology effects on insurance claim frequency

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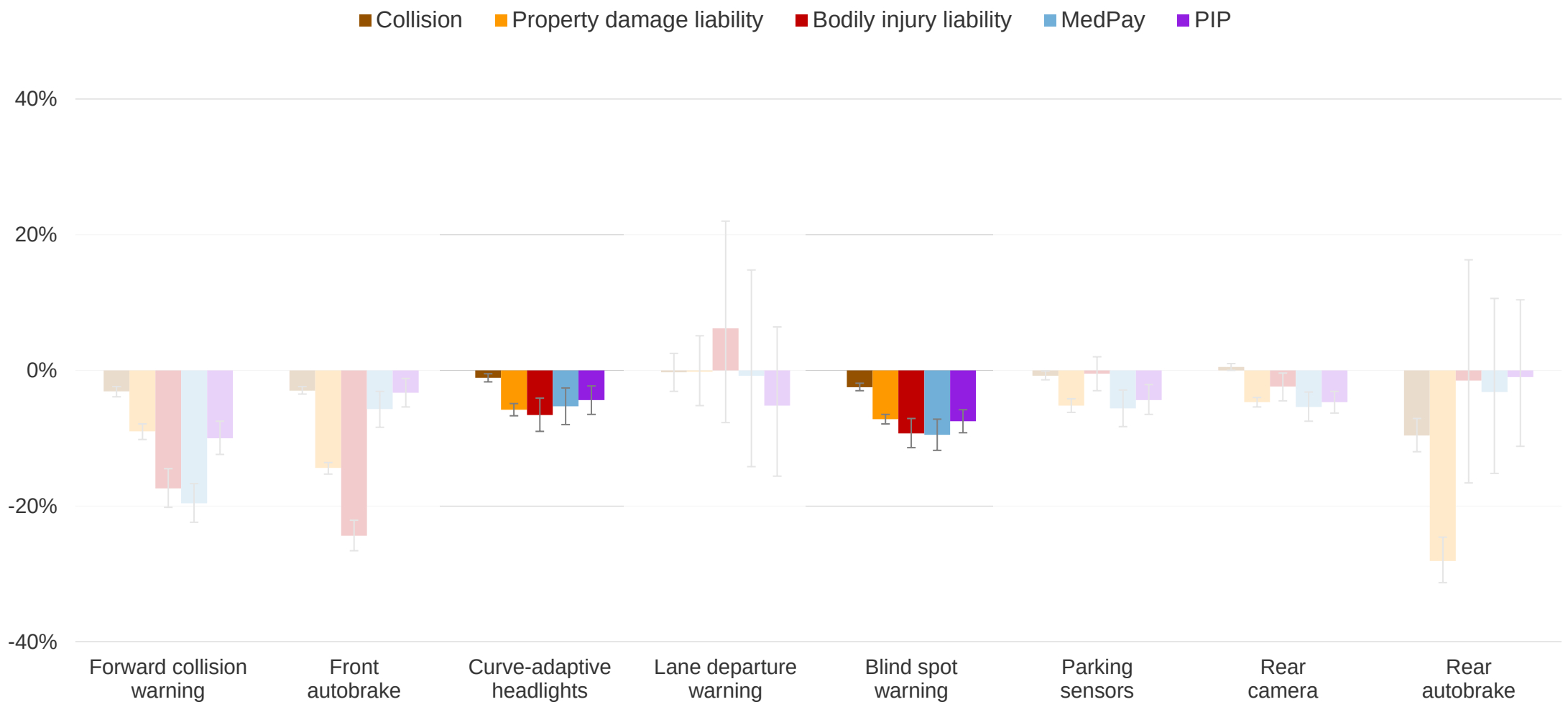

Summary of technology effects on insurance claim frequency

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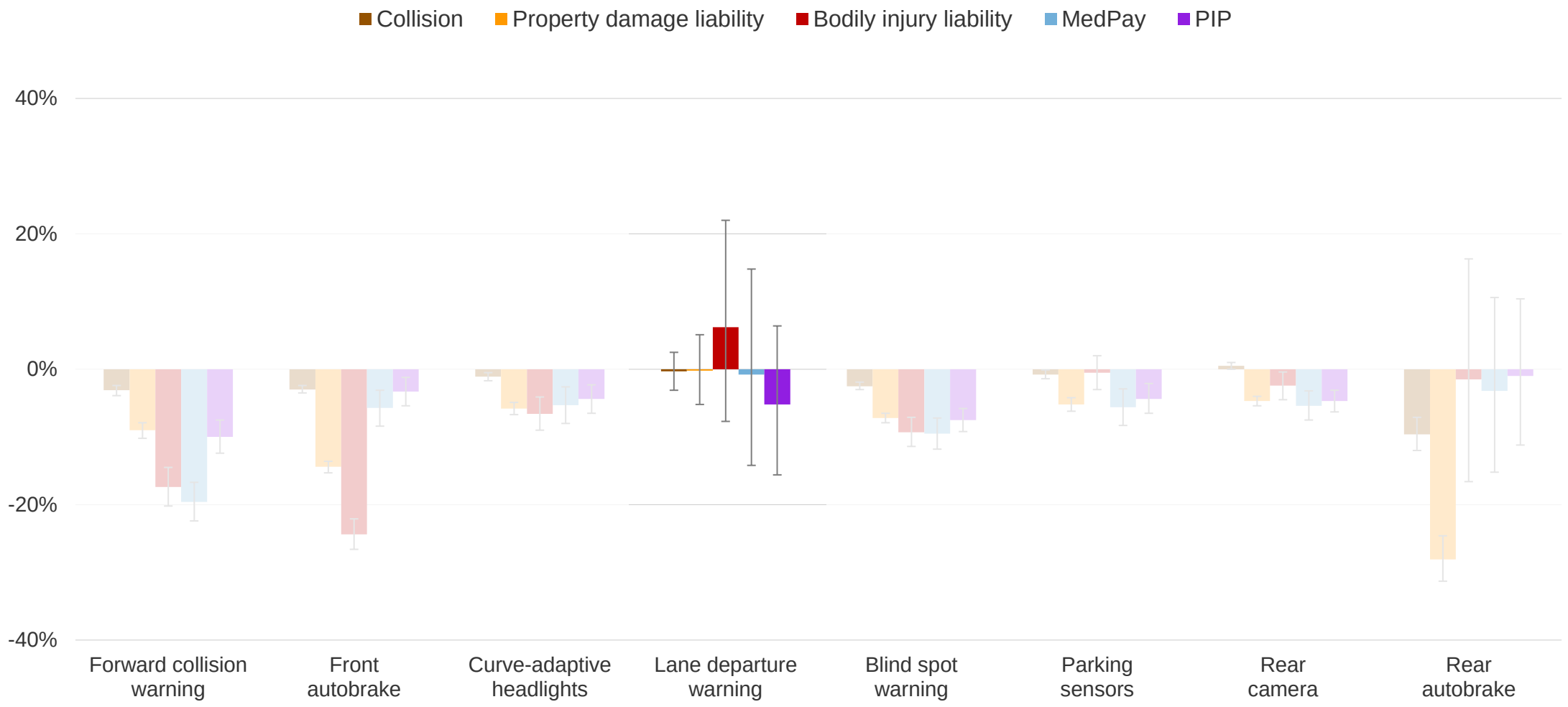

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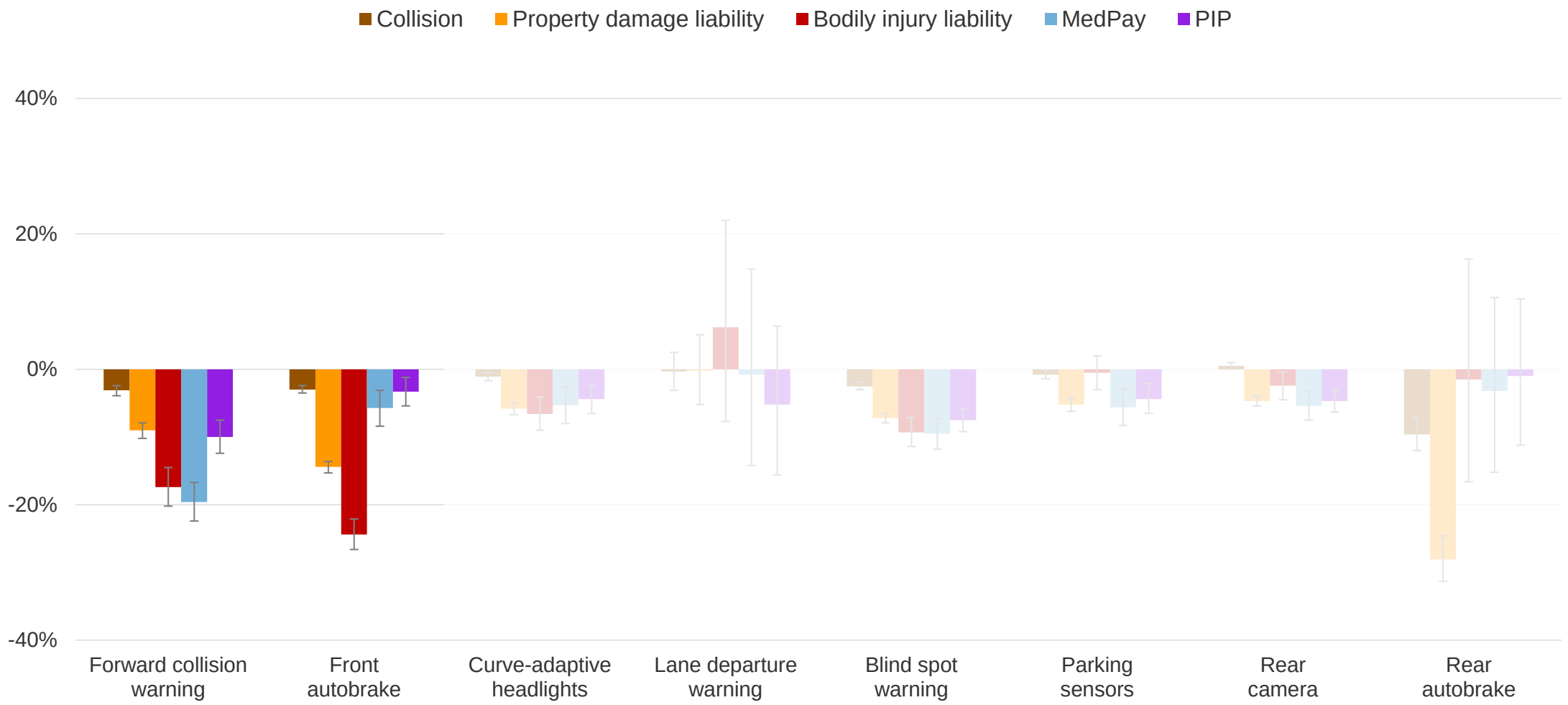

Summary of technology effects on insurance claim frequency

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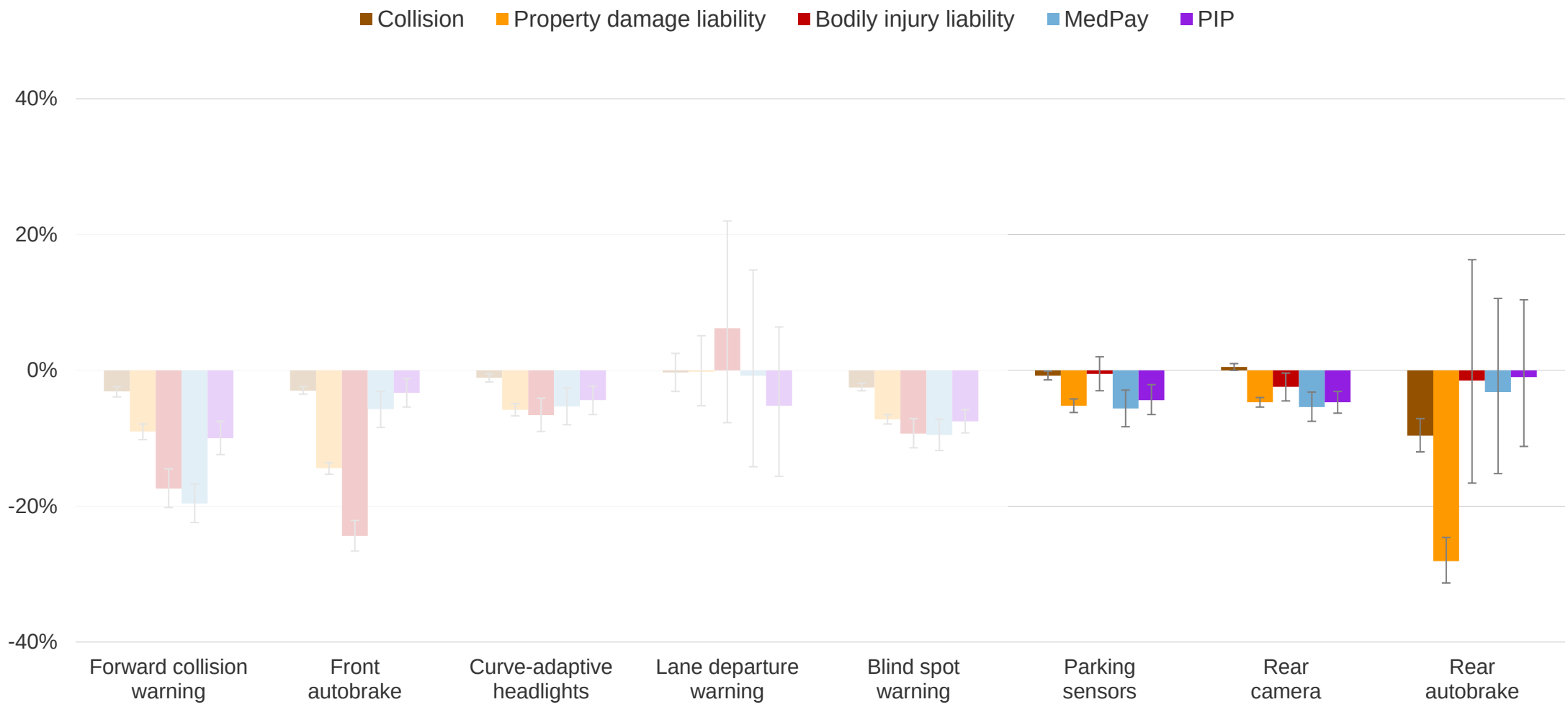
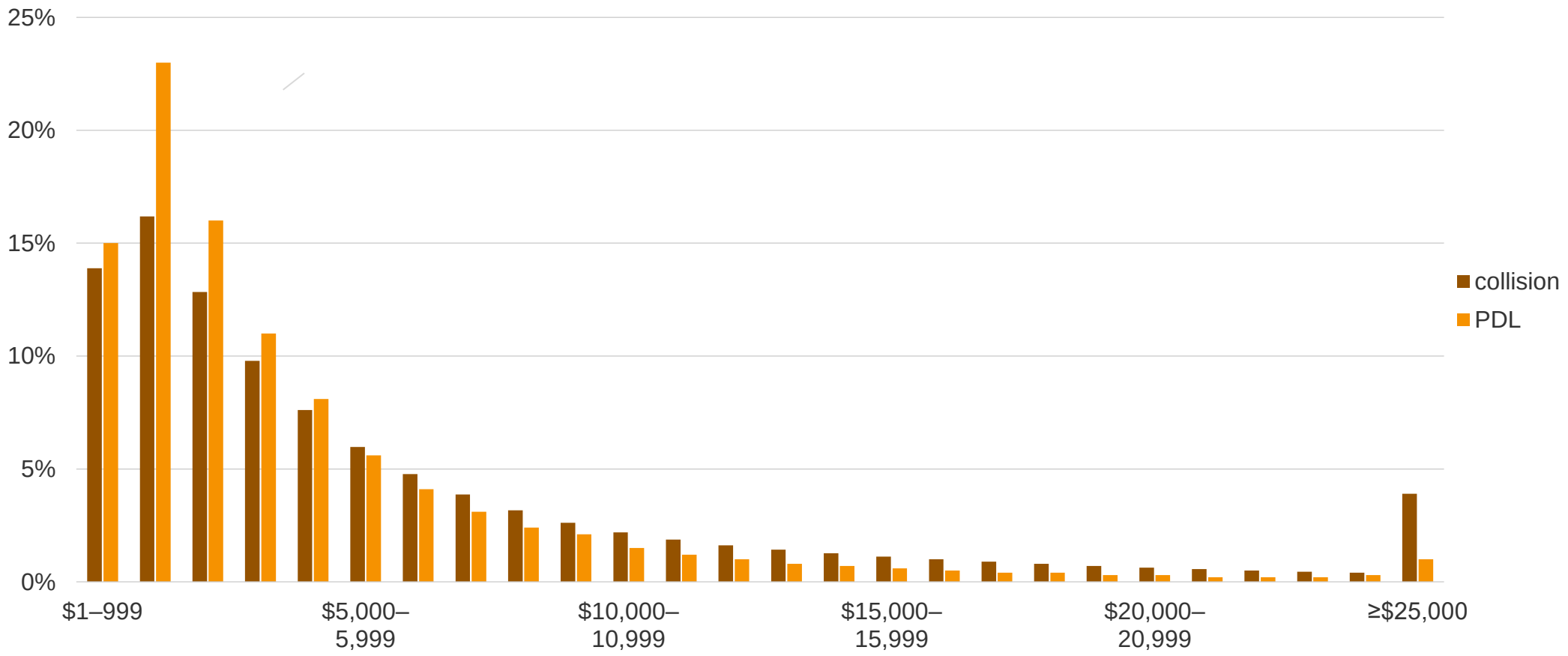


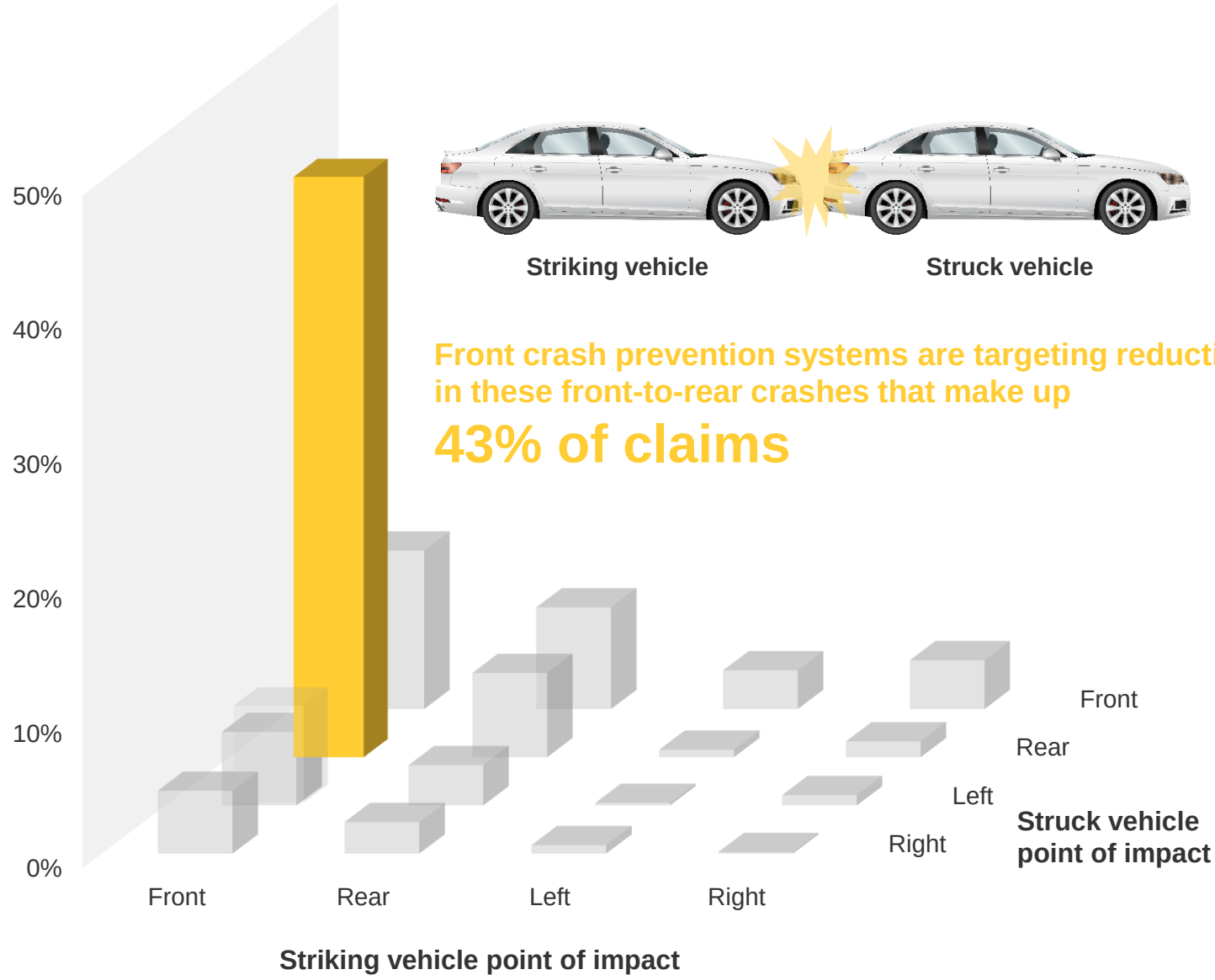
Distribution of collision & PDL claims, 2021 calendar year

By claim size, 1981-2022 models



Collision and PDL claims by point of impact

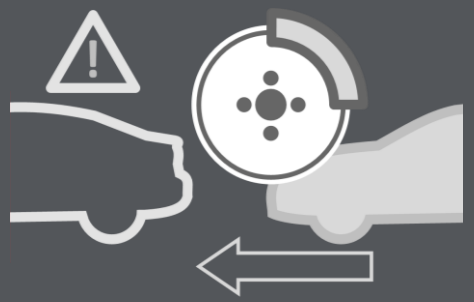
Vehicles of same size and weight, 1981-2022 models



Crash reductions with front, lane departure and blind spot technologies

50%

With AEB

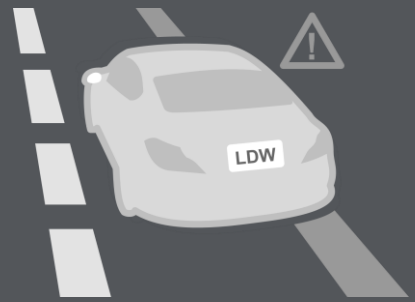


27%

With AEB
+ pedestrian detection

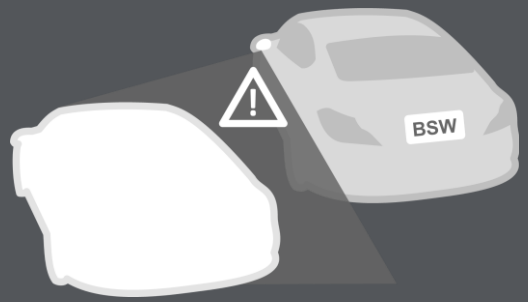
11%

With lane
departure warning



14%

With blind
spot warning



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Which ADAS feature is your favorite ?

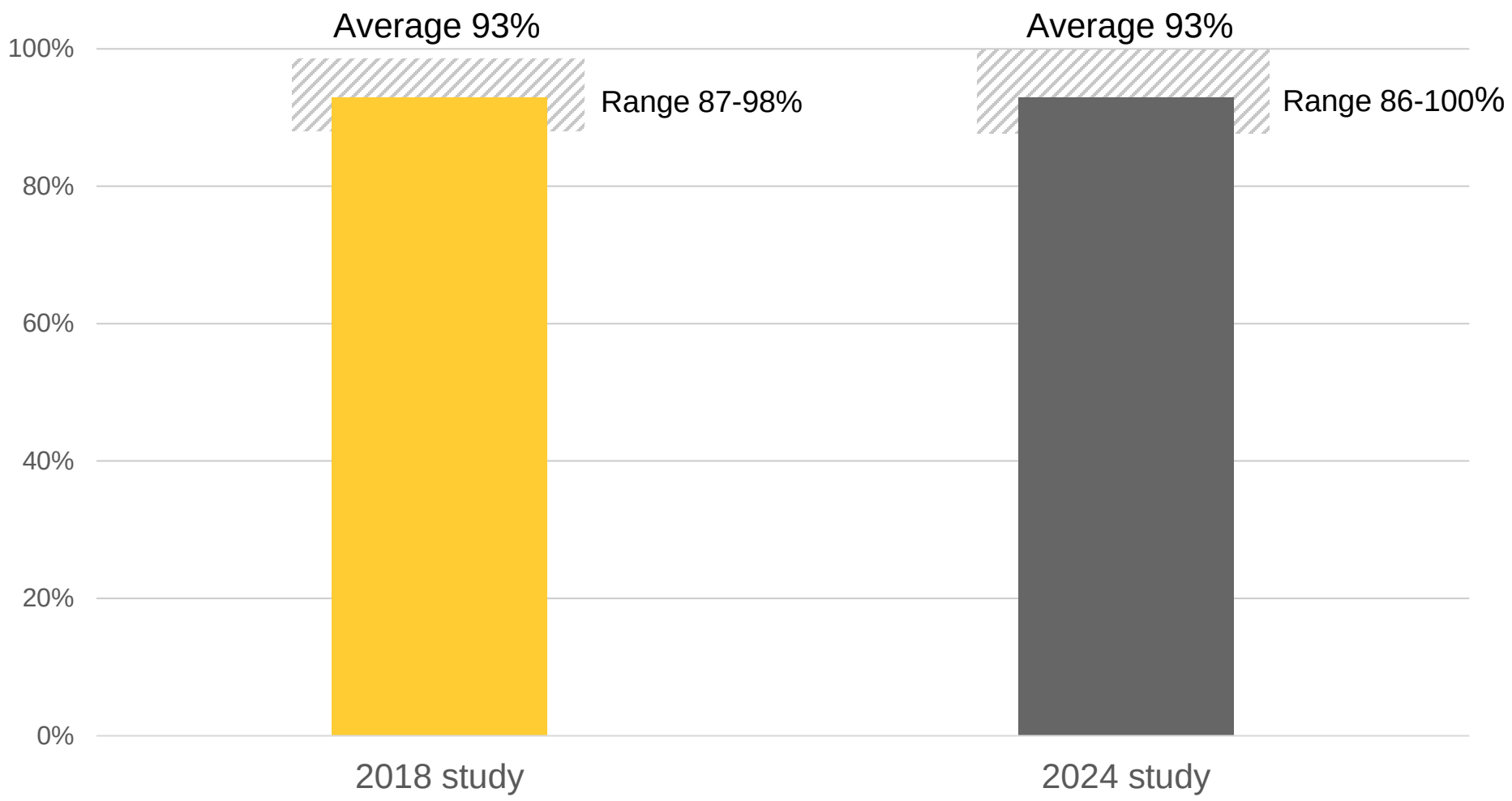
Which ADAS feature is your favorite?

- A. Automatic emergency braking
- B. Blind spot monitor
- C. Lane departure warning
- D. Parking sensors
- E. Rear camera
- F. I don’t have any.

Usage rates of ADAS systems by drivers

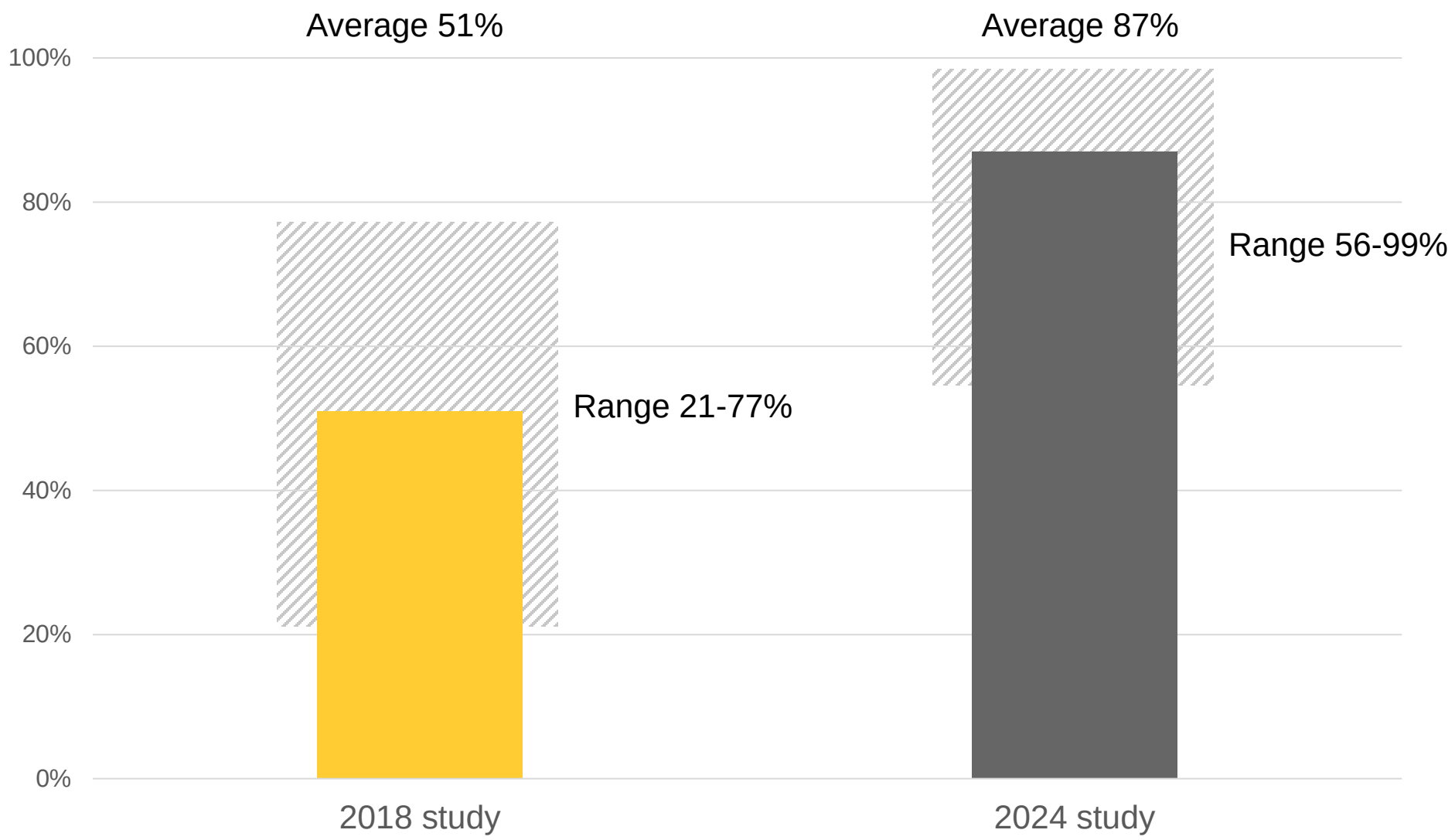
Dealership observations of front crash prevention system status

Percent with system on — mean values and range



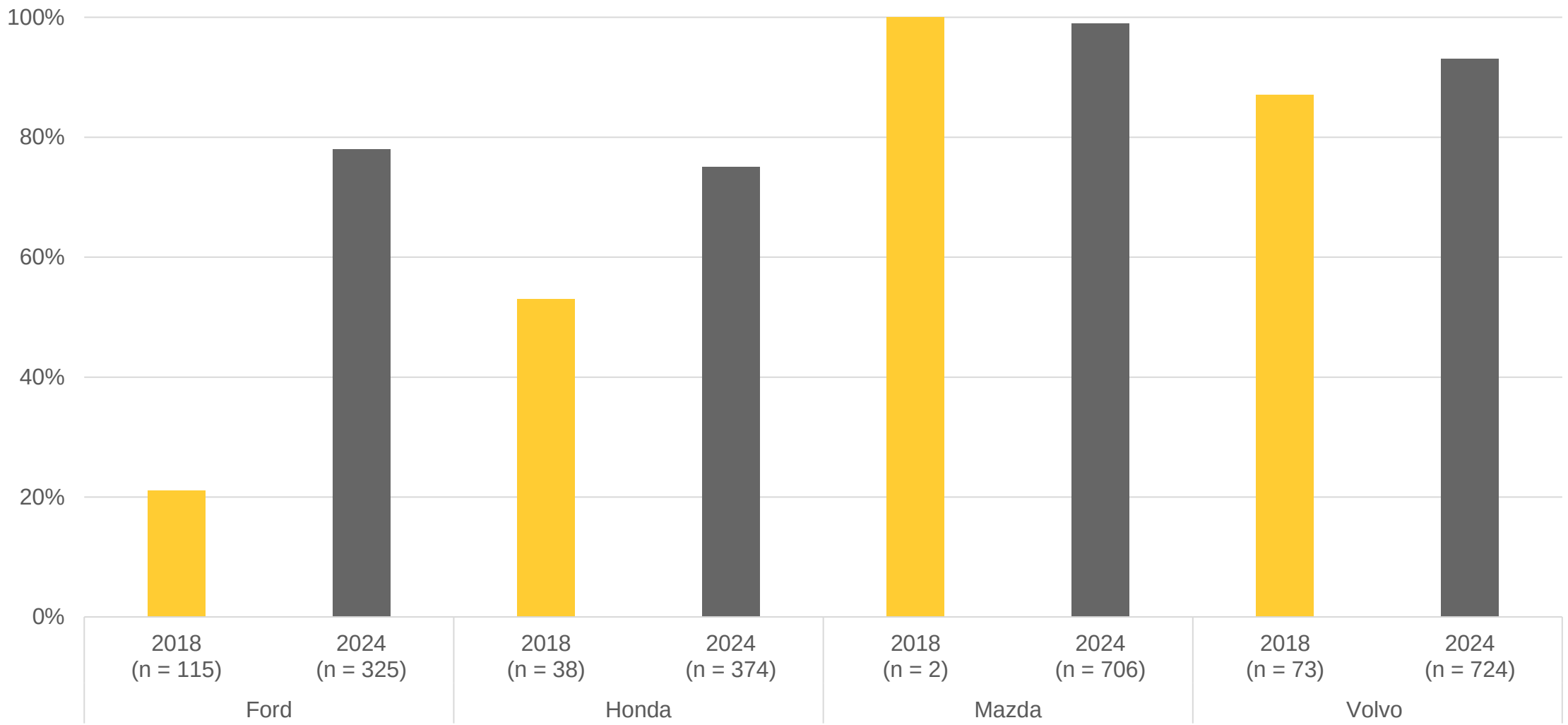
Dealership observations of lane departure mitigation system status

Percent with system on — mean values and range



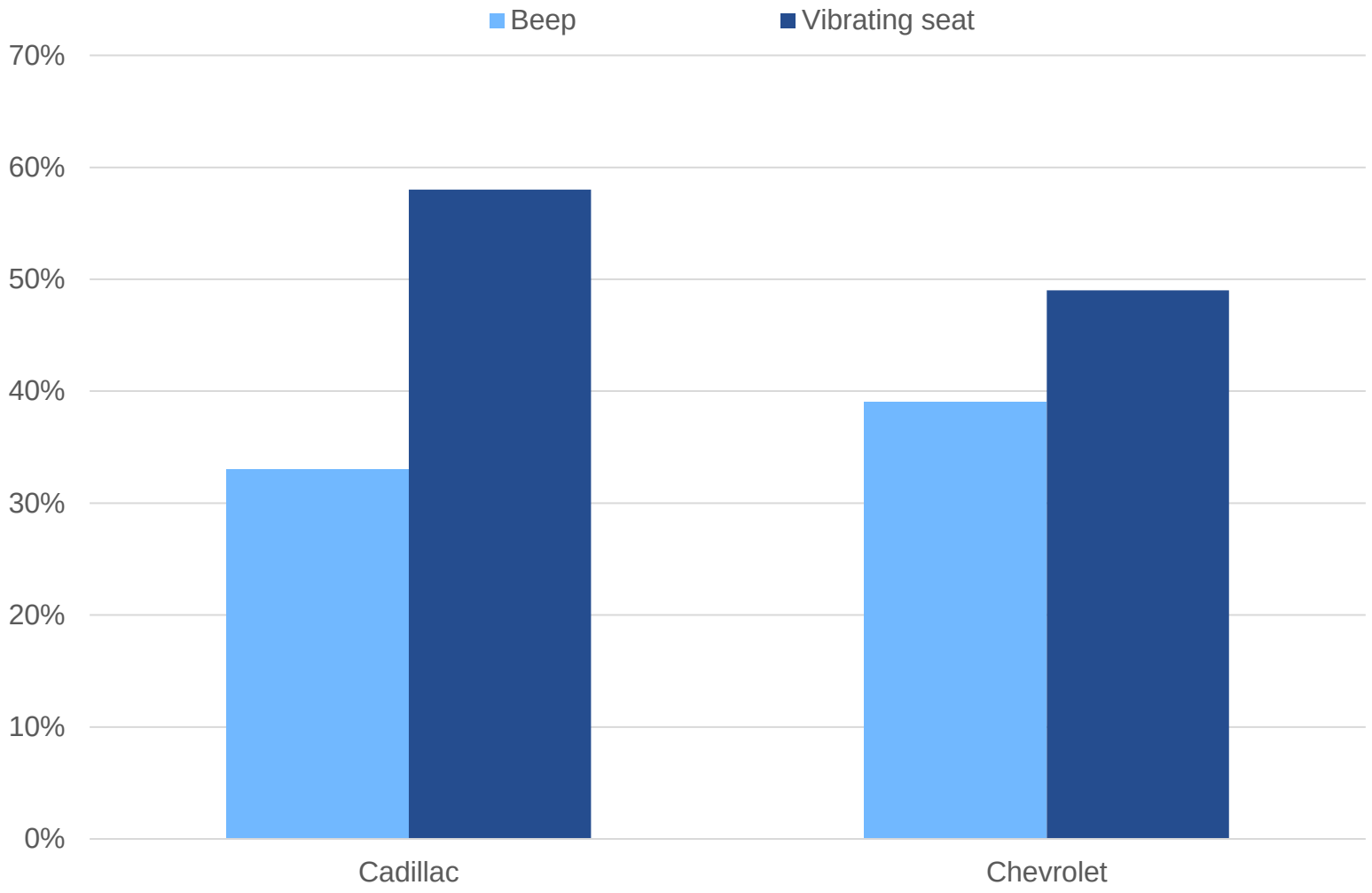
Lane departure prevention activation rates by manufacturer

For manufacturers observed in both 2018 and 2024 studies

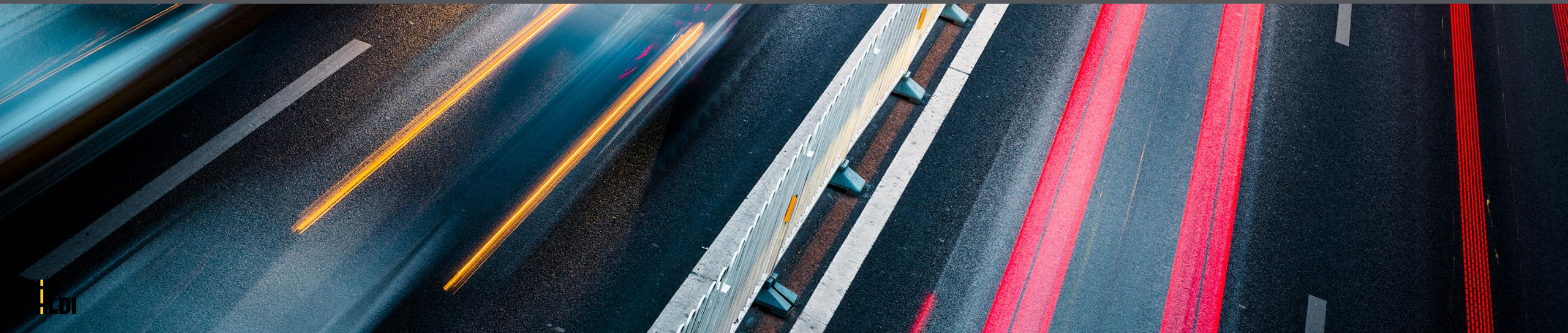


GM lane departure warning on-off status by warning type

2018 study

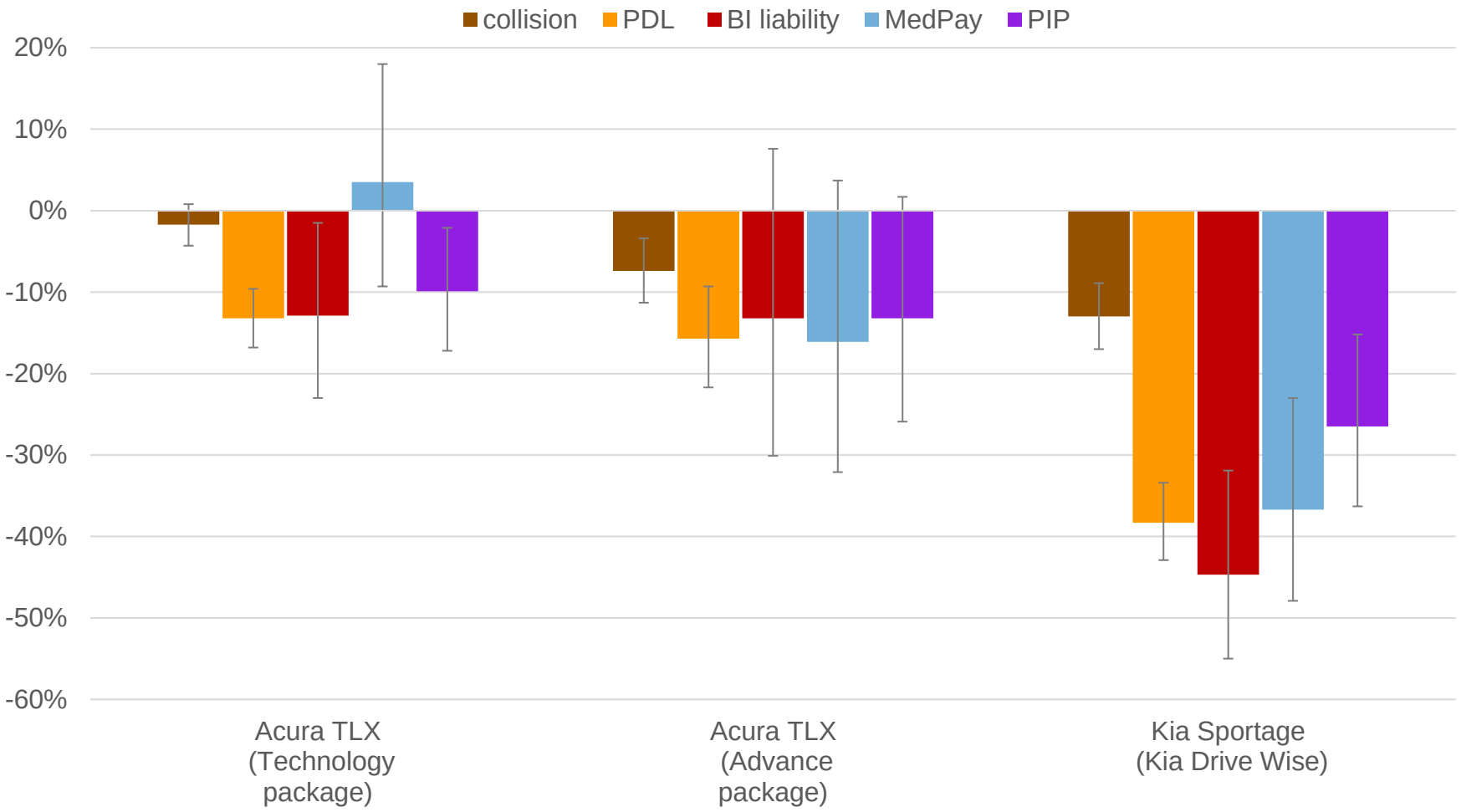


Analysis of ADAS bundles

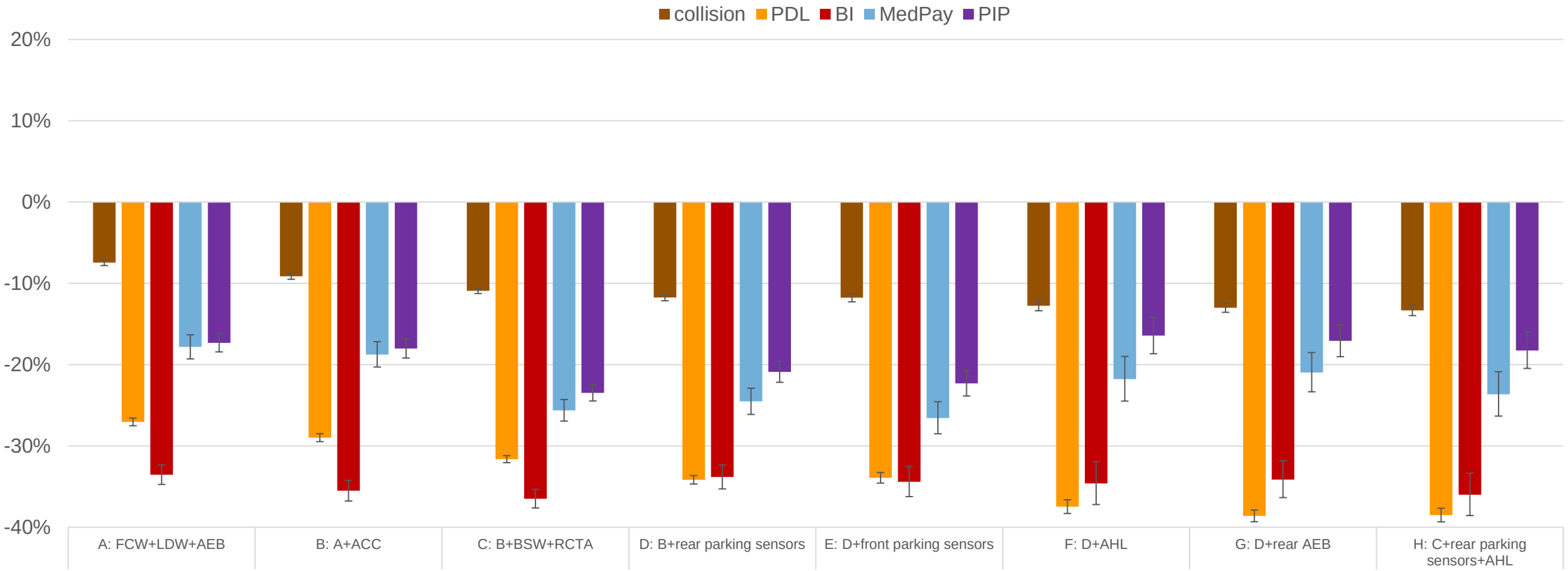


Summary of technology bundles

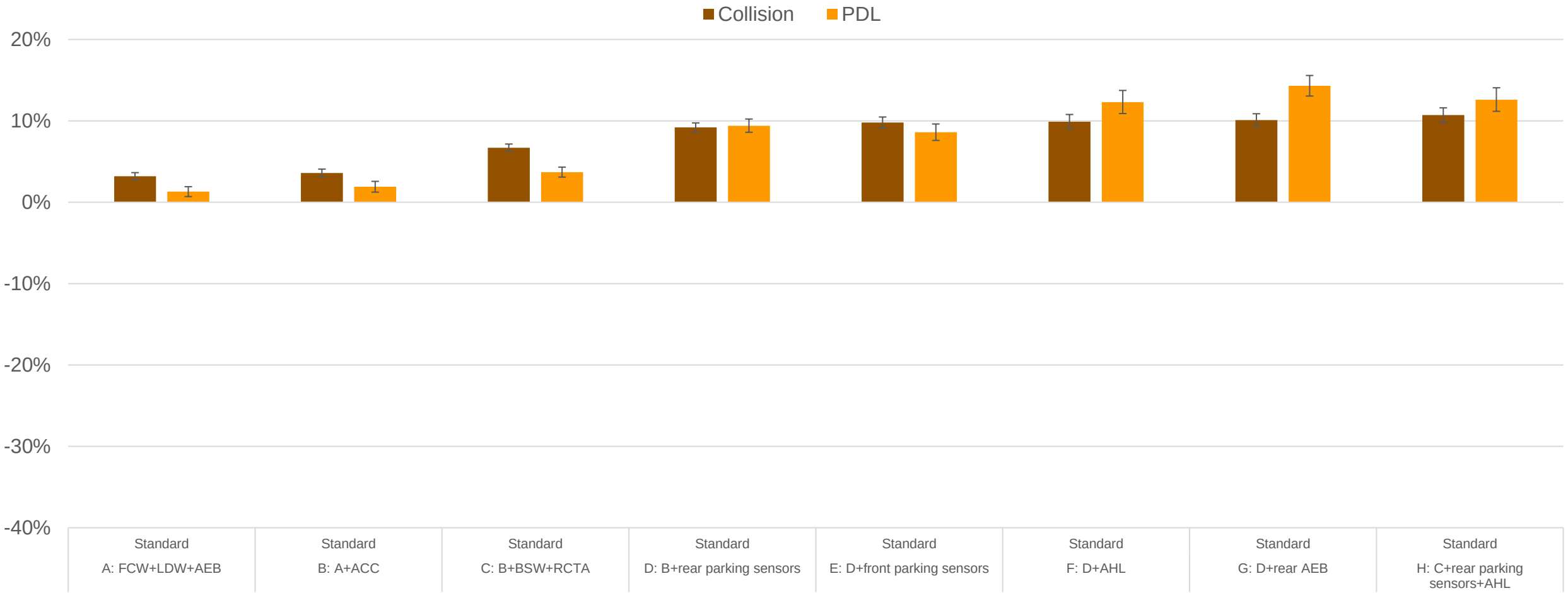
Change in claim frequency



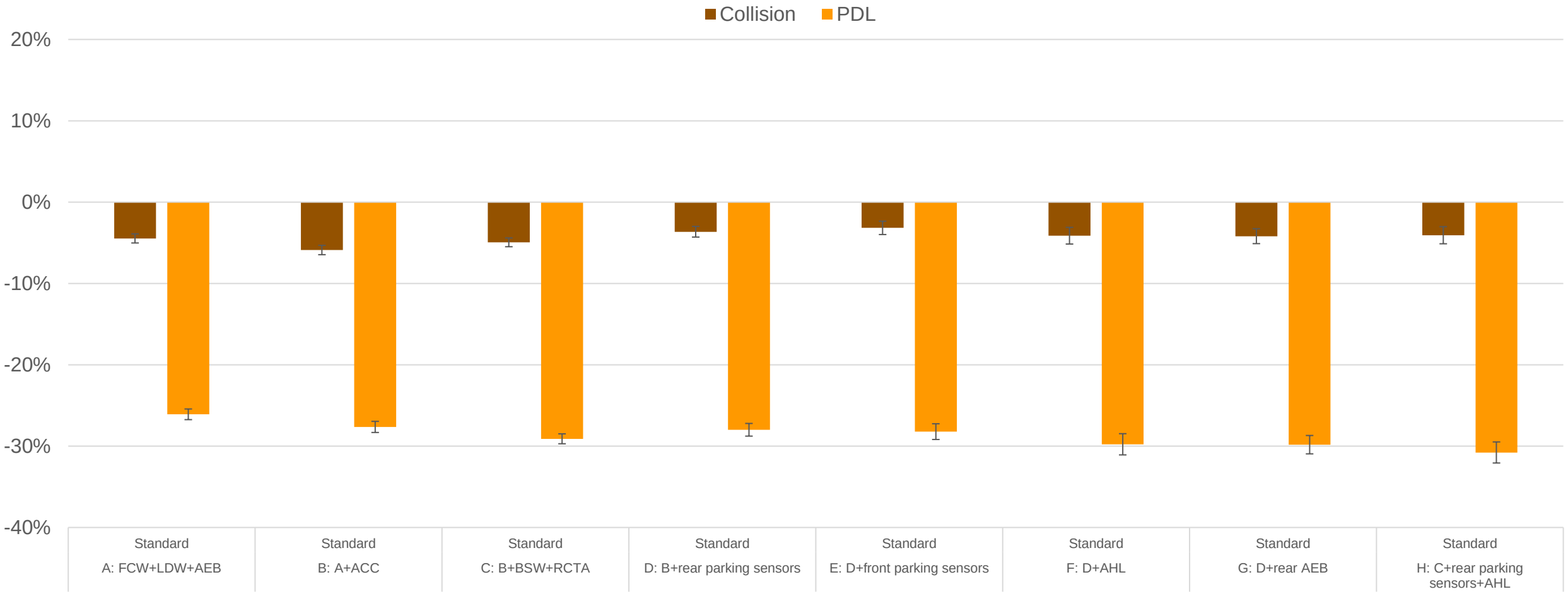
Estimated changes in injury-related claim frequency associated with ADAS bundles



Estimated changes in physical damage claim severity associated with ADAS bundles



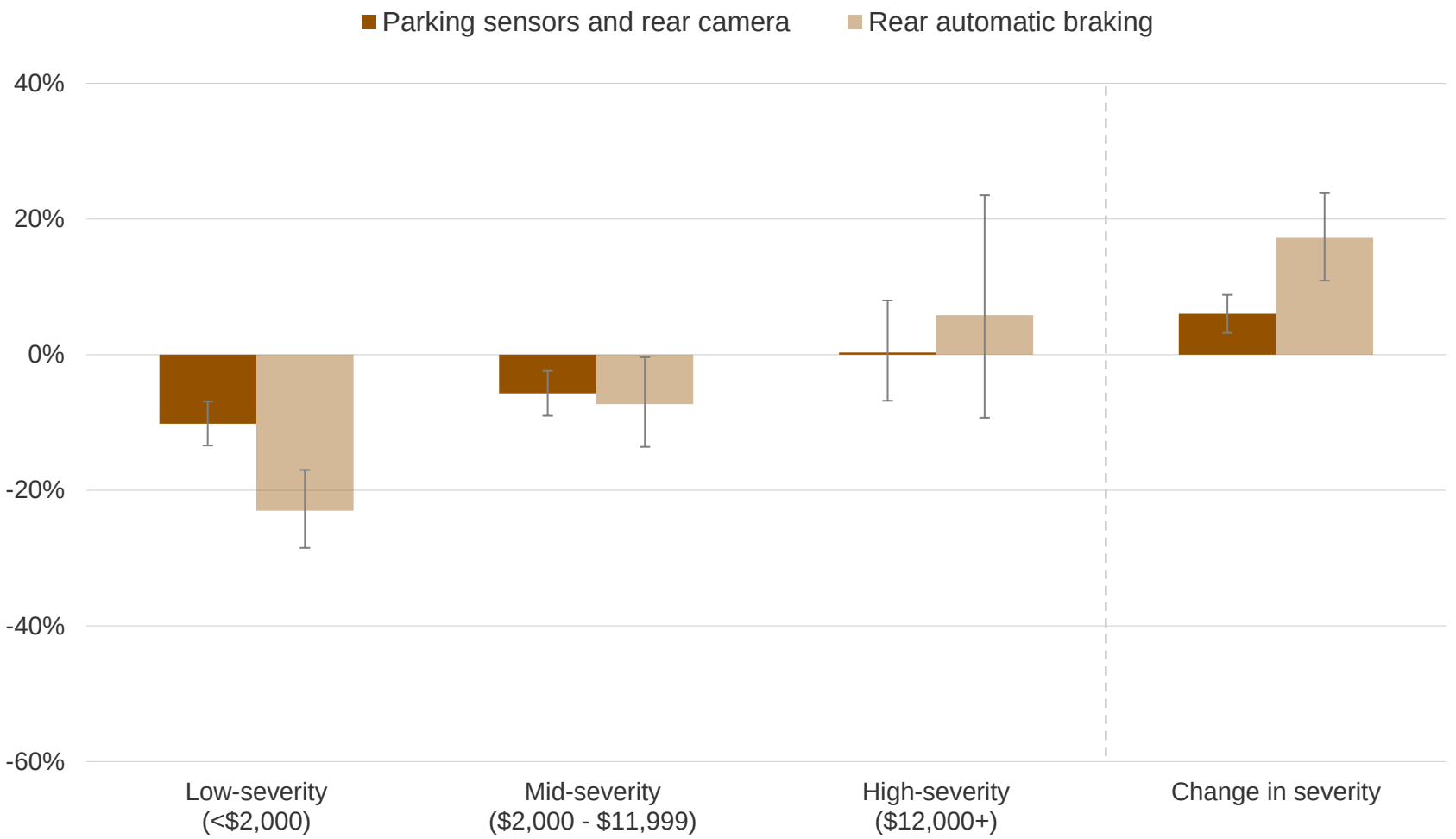
Estimated changes in physical damage overall losses associated with ADAS bundles



ADAS and claim severity for collision and PDL

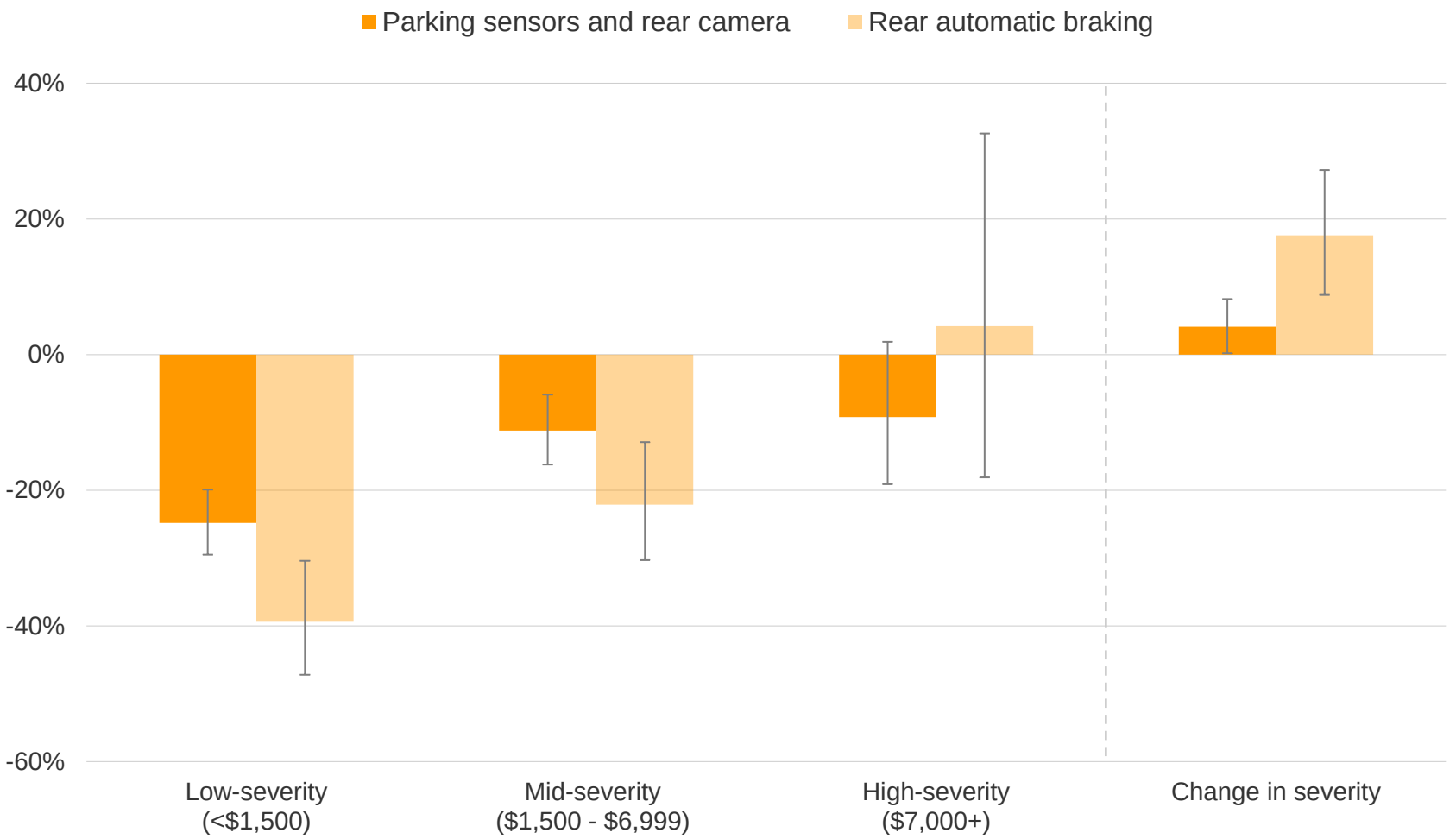
Changes in collision claim frequency by claim size

General Motors parking assist systems



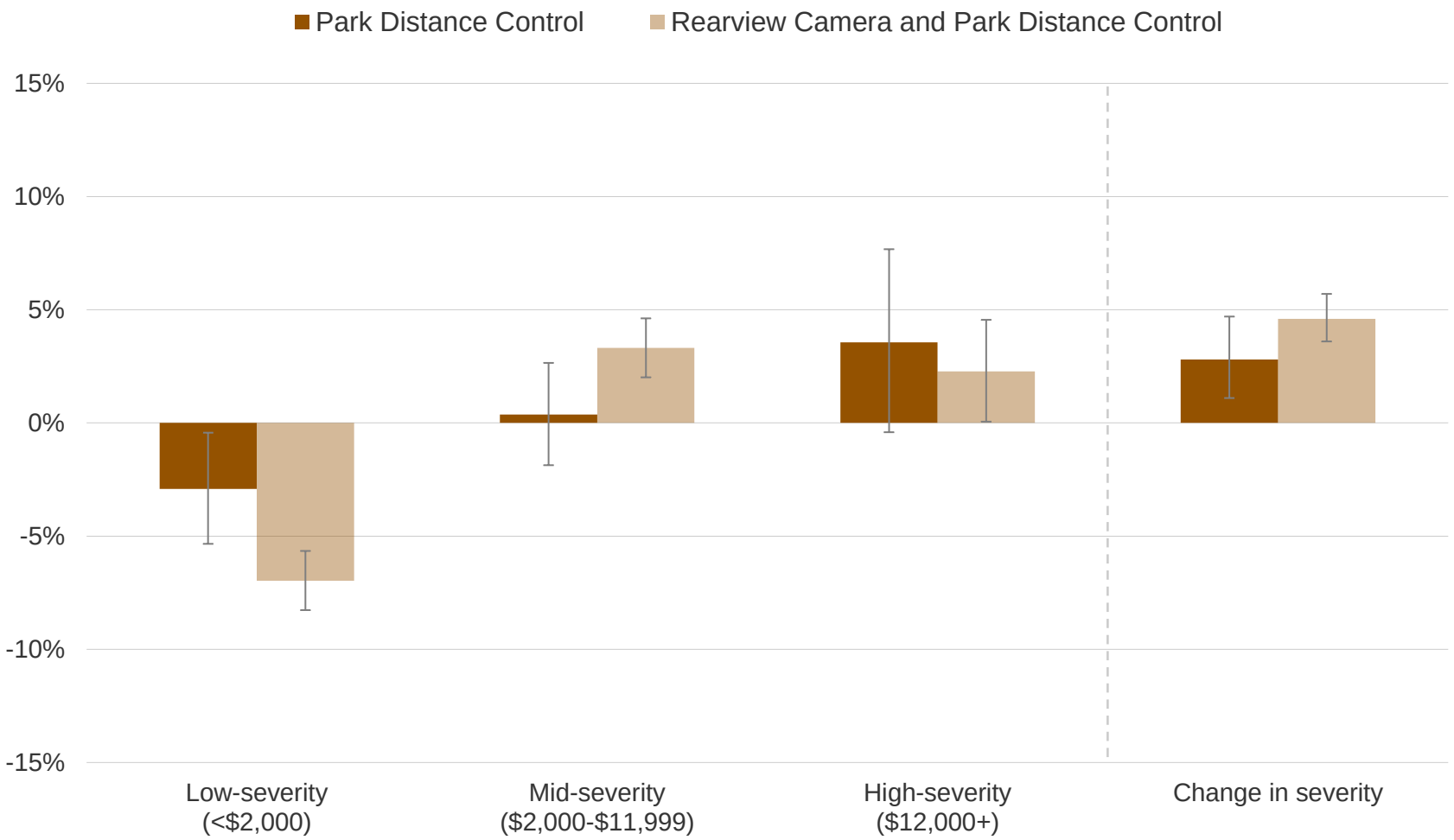
Changes in PDL claim frequency by claim size

General Motors parking assist systems



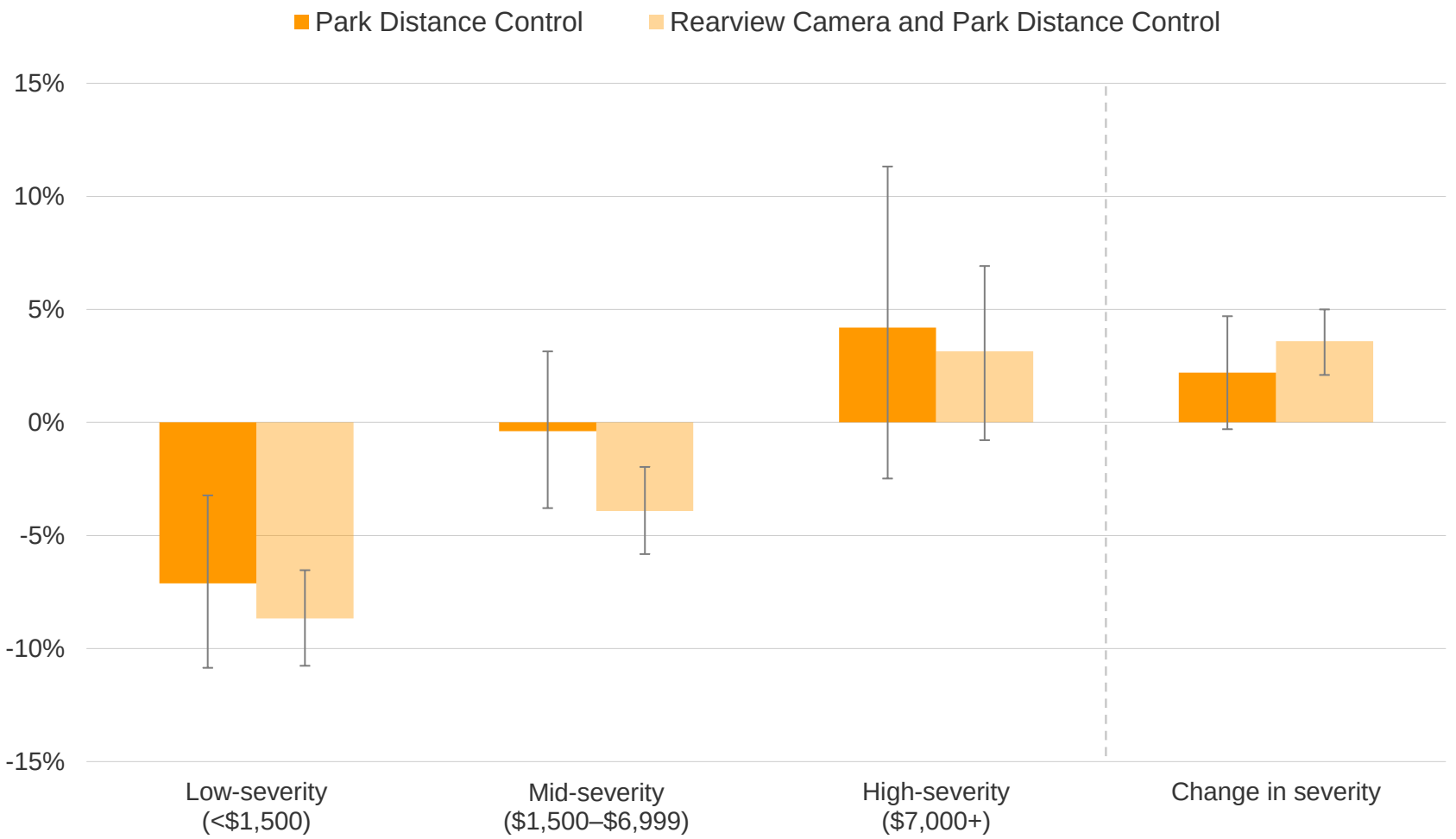
Changes in collision claim frequency by claim size

BMW parking assist systems



Changes in PDL claim frequency by claim size

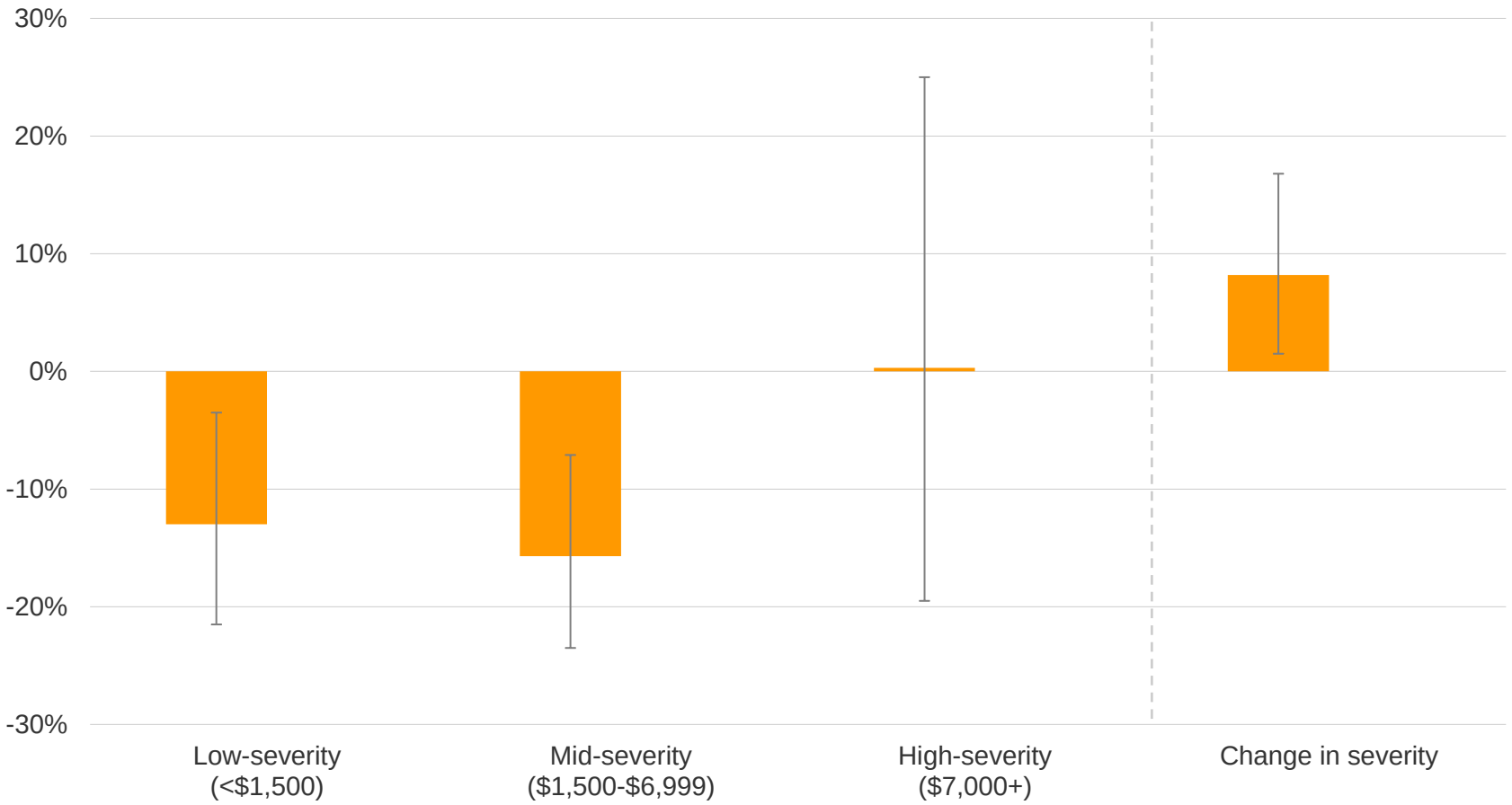
BMW parking assist systems



Do operational speed ranges of front crash prevention systems affect PDL severity?

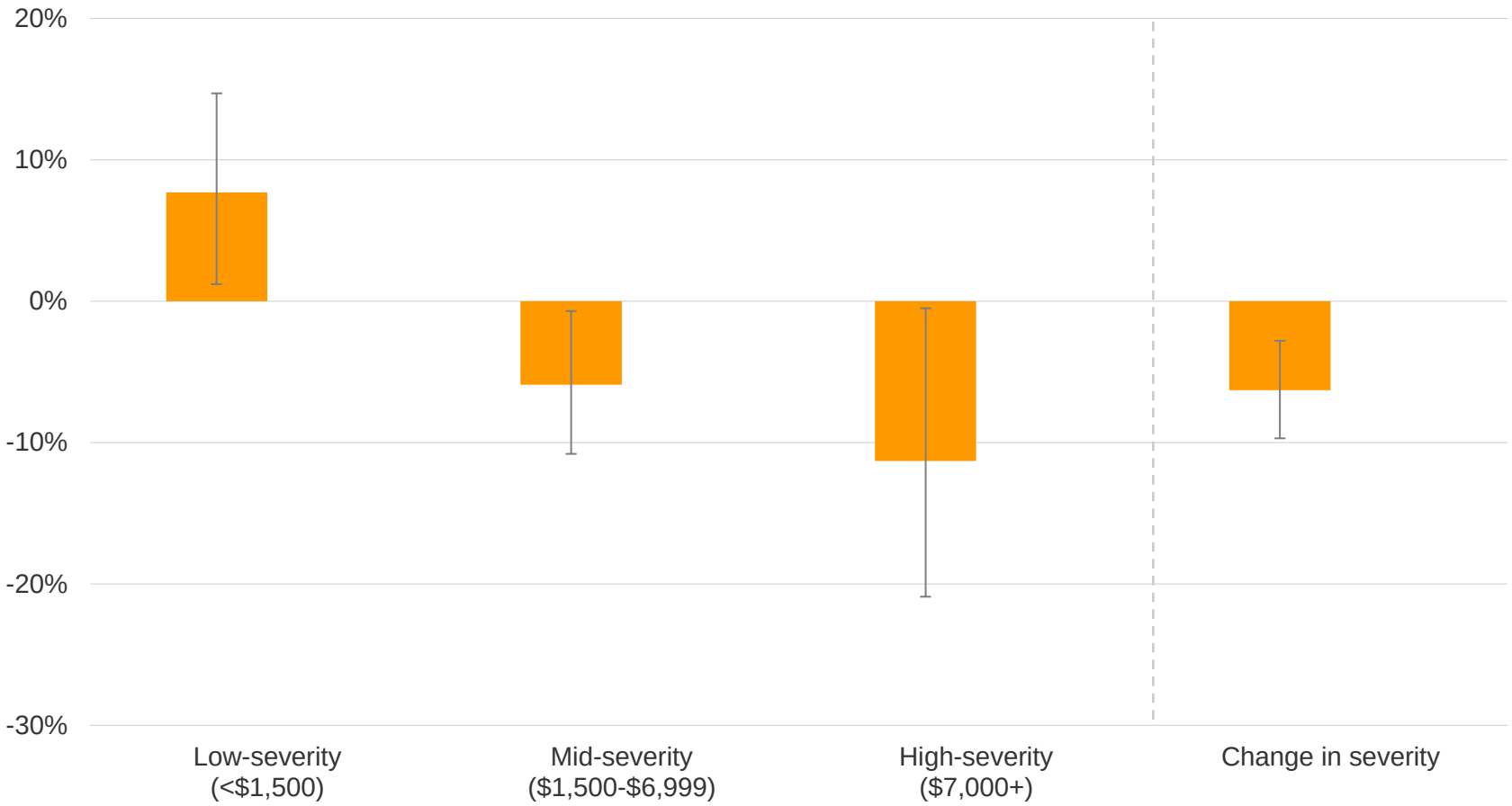
Changes in PDL claim frequency by claim size

Mazda's Smart City Brake Support (speeds 2-18 mph)



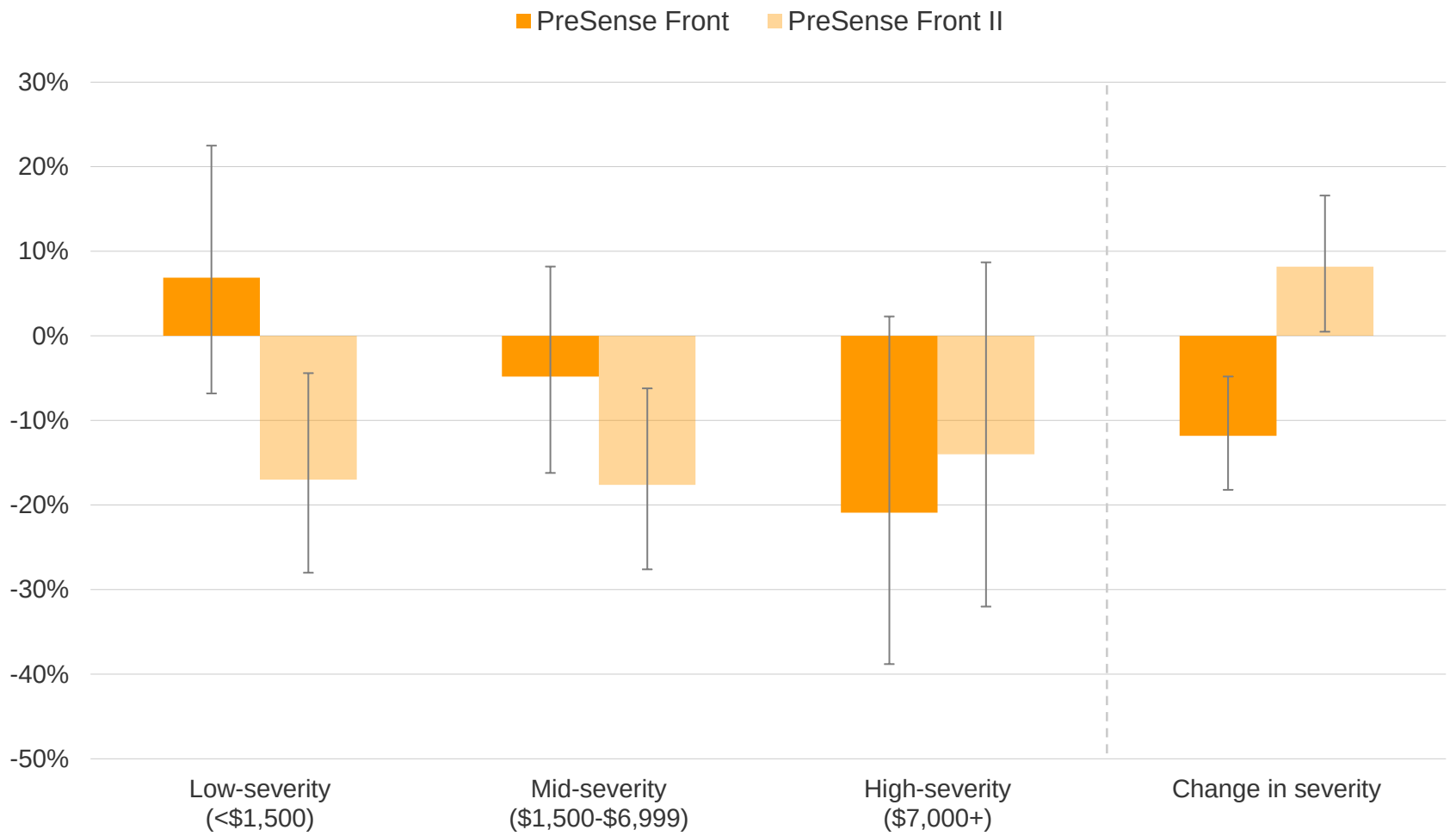
Change in PDL claim frequency by claim size

General Motors Forward Collision Alert with Lane Departure warning (speeds >25 mph)



Changes in PDL claim frequency by claim size

Audi's PreSense Front (speeds >19 mph) and PreSense Front II (all speeds)



Evolution of AEB Testing

Original vehicle-to-vehicle front crash prevention tests

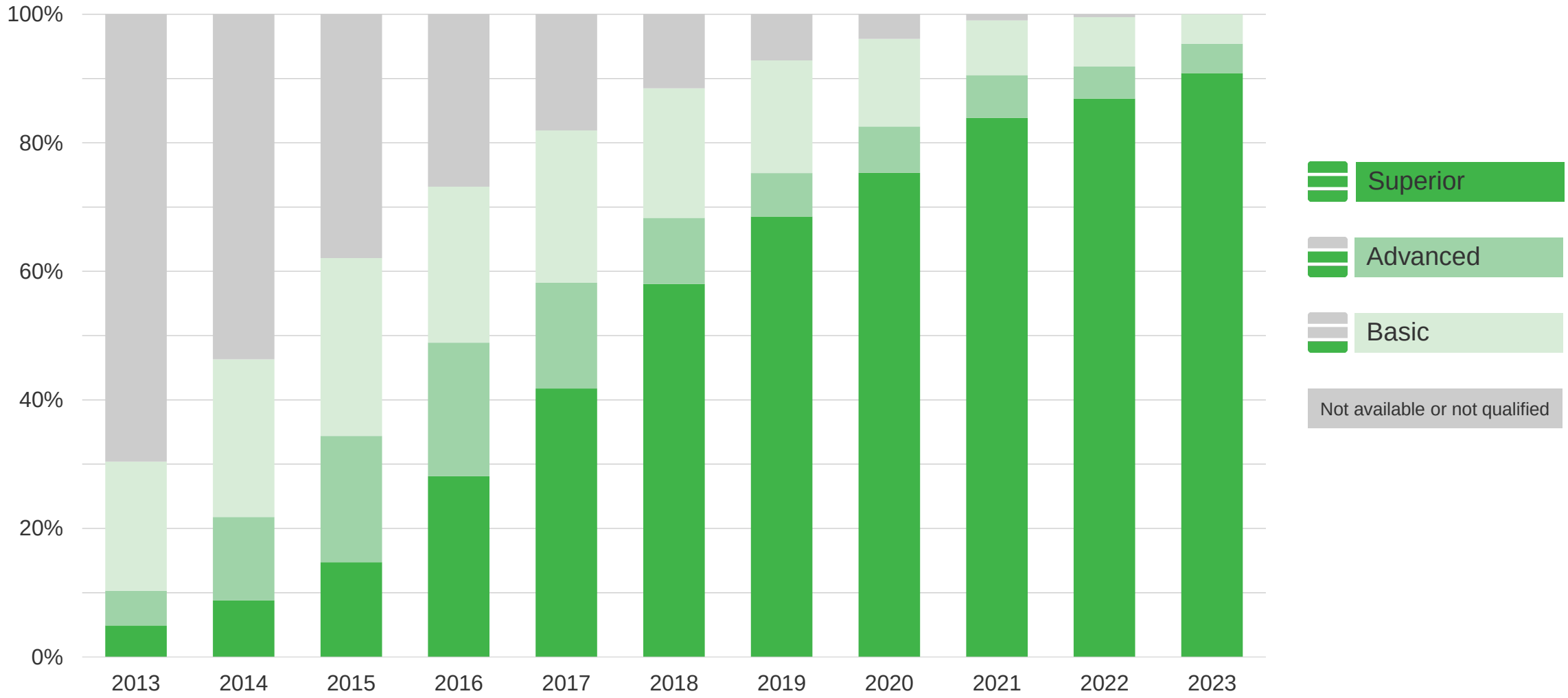
12 mph and **25 mph**

Superior Advanced Basic

Front AEB testing

Front crash prevention ratings

2013-23 models



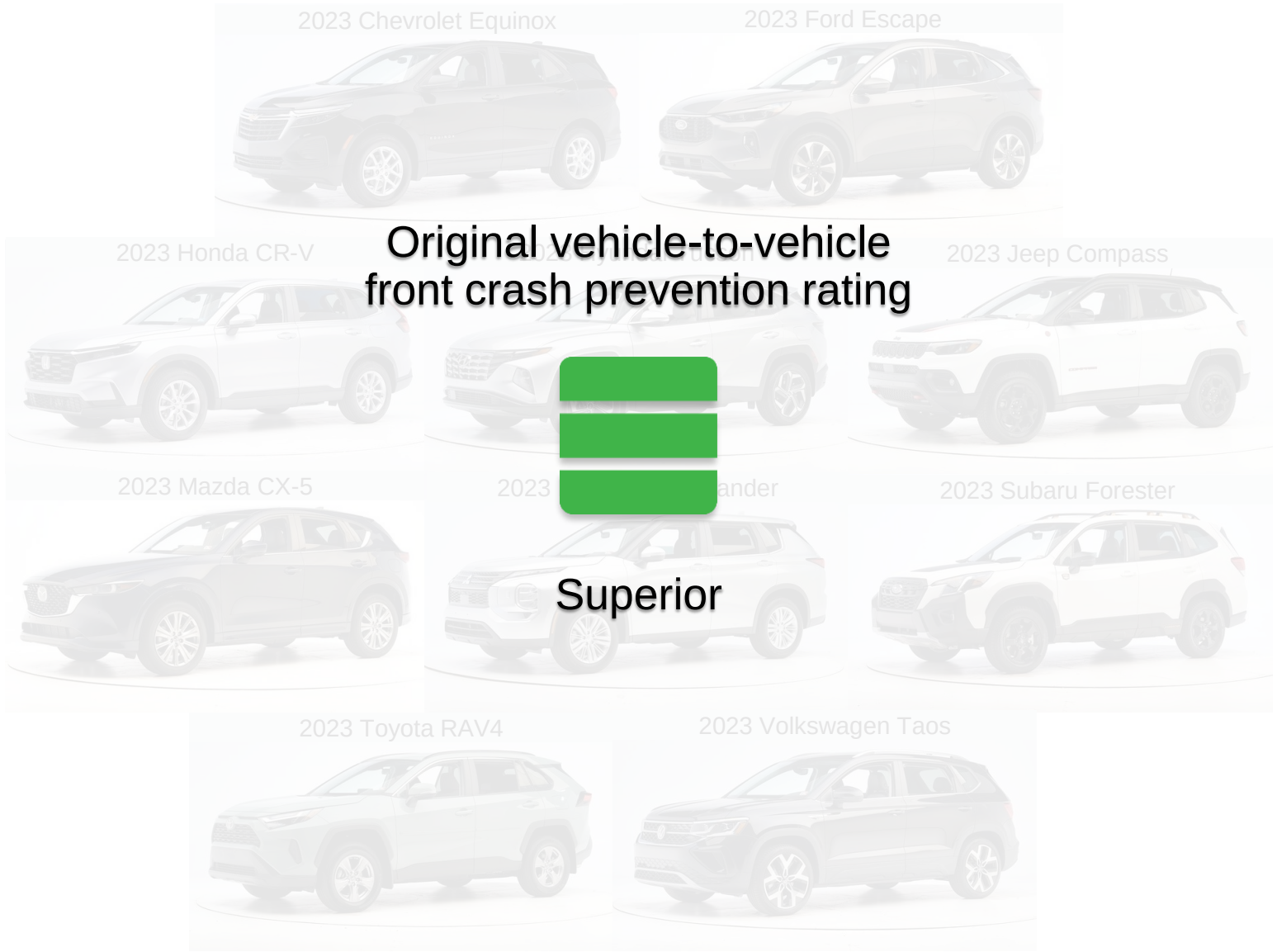
Police-reported rear-end crashes

59% occur on **30-45** mph roads

Medium or heavy trucks struck in 32% of fatal rear-end crashes

Motorcycles struck in 11% of fatal rear-end crashes

Small SUVs

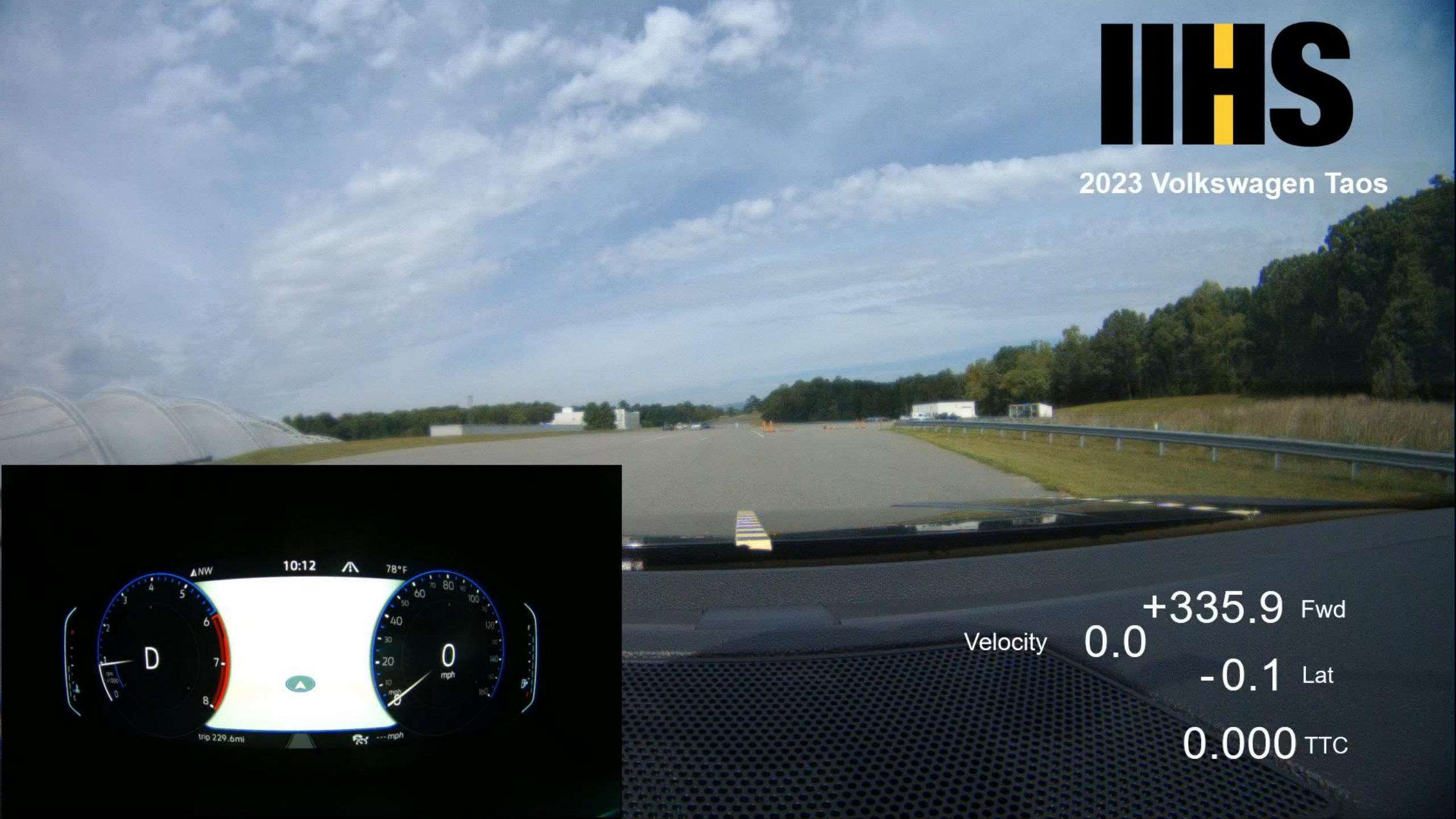


Original vehicle-to-vehicle front crash prevention rating

Superior


IIHS
2022 Subaru Forester
MPG
32
MPH
422.0
431 mi
Velocity 50.5
+147.2 Fwd
-0.0 Lat
10.513 TTC


IIHS
2023 Subaru Forester
Velocity
0.0
+363.9
Fwd
-0.7
Lat
0.000
TTC


IIHS
2023 Volkswagen Taos
NW
10:12
78°F
D
0
mph
trip 229.6mi
--- mph
Velocity
0.0
+335.9 Fwd
-0.1 Lat
0.000 TTC


IIHS
2023 Hyundai Tucson
Velocity 0.0
+284.3 Fwd
-0.2 Lat
0.000 TTC


IIHS
2023 Chevrolet Equinox
+289.8 Fwd
Velocity 0.0
+0.0 Lat
0.000 TTC
E F
C H
0
MPH

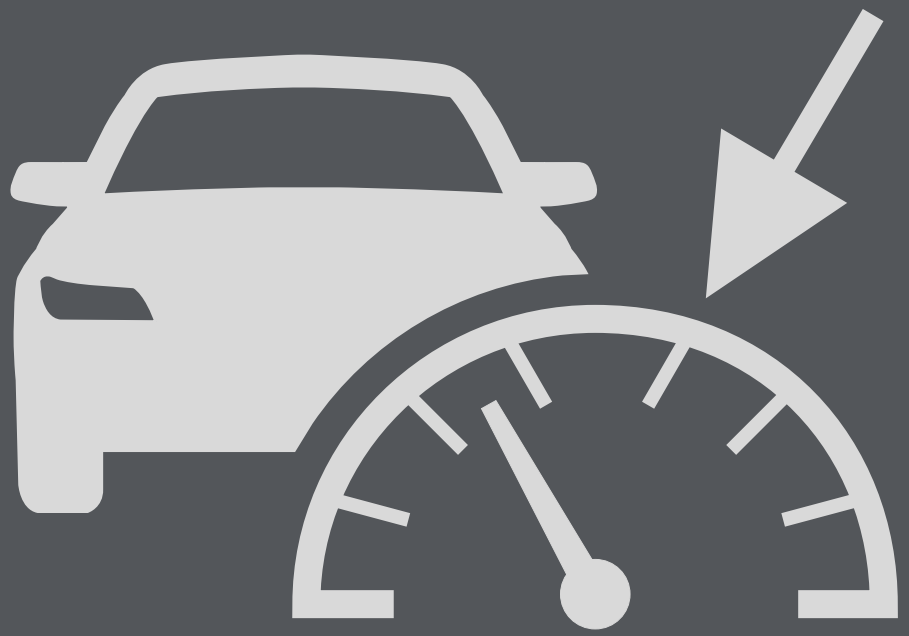
Ratings for small SUVs

G Good A Acceptable M Marginal P Poor

Partial driving automation

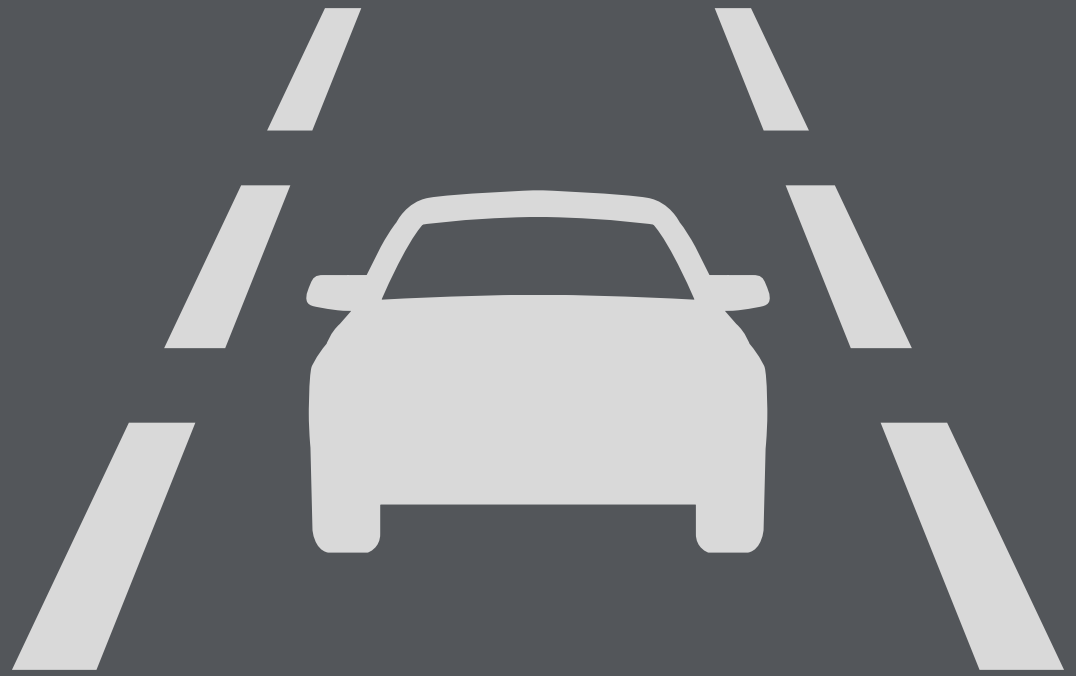

RES/+
SET/-
[S]
[ ]

Adaptive Cruise Control



- Typically will not slow or stop for traffic lights or signs
- May not respond quickly enough if your vehicle is cut off
- May have trouble sensing certain types of vehicles
- Driver must pay attention and be ready to brake or accelerate

Lane following

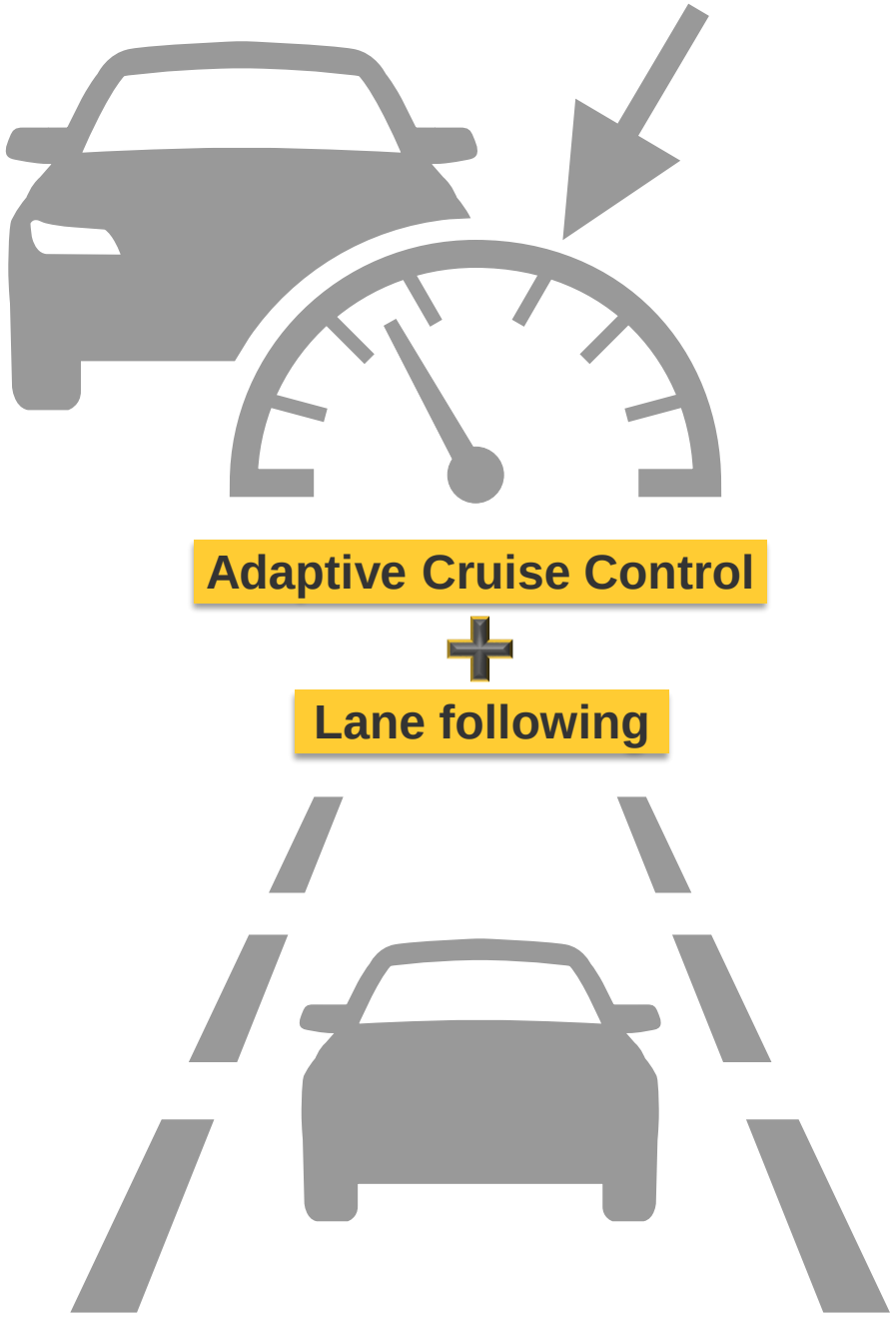


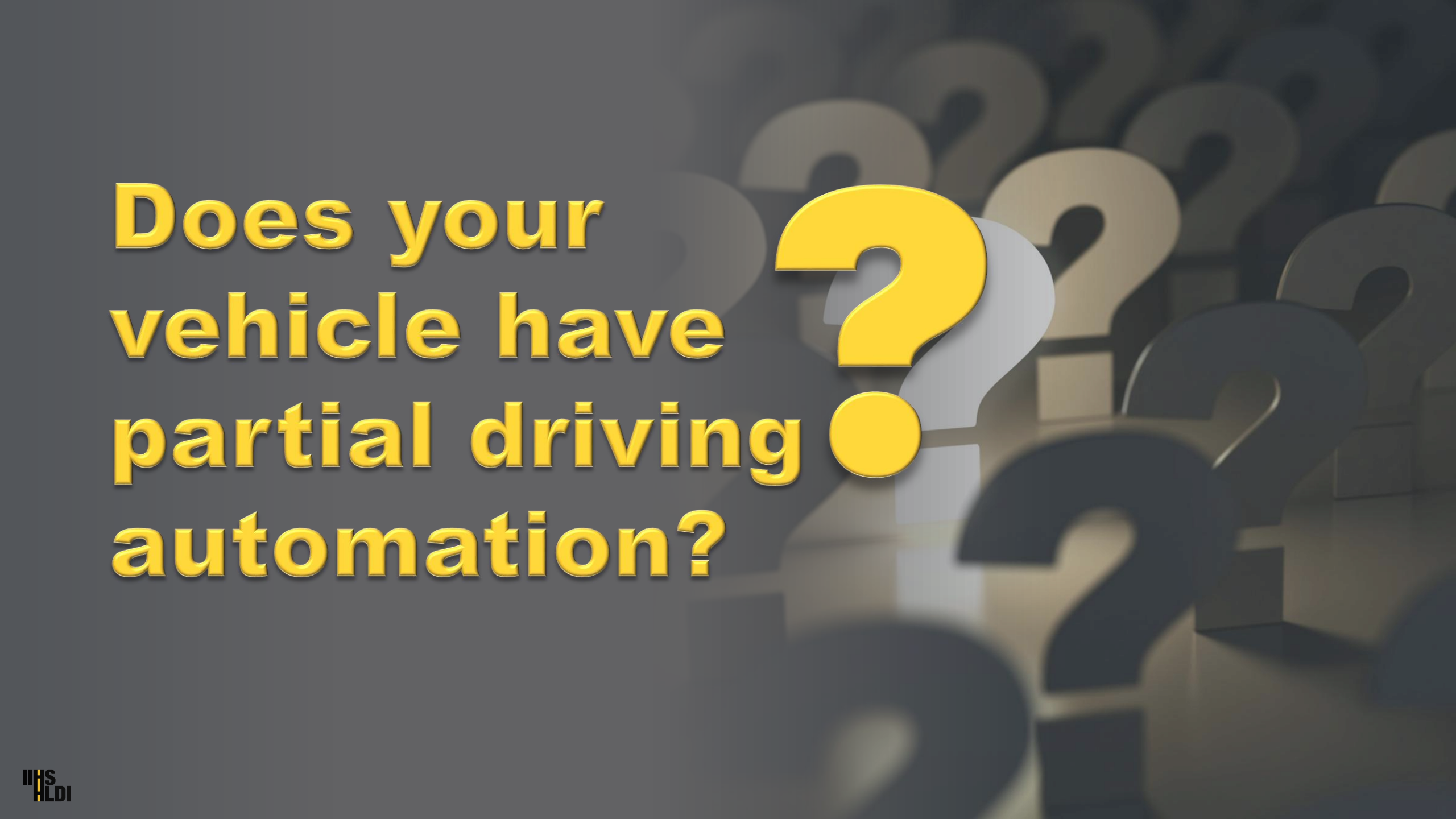
- Light conditions and road topography may limit system
- System does not work when lane markers are absent (e.g. across intersections)
- Some systems may not be able to steer through sharp curves
- Driver needs to be ready to take control without warning

Partial driving automation

is a

convenience feature




Does your vehicle have partial driving automation?

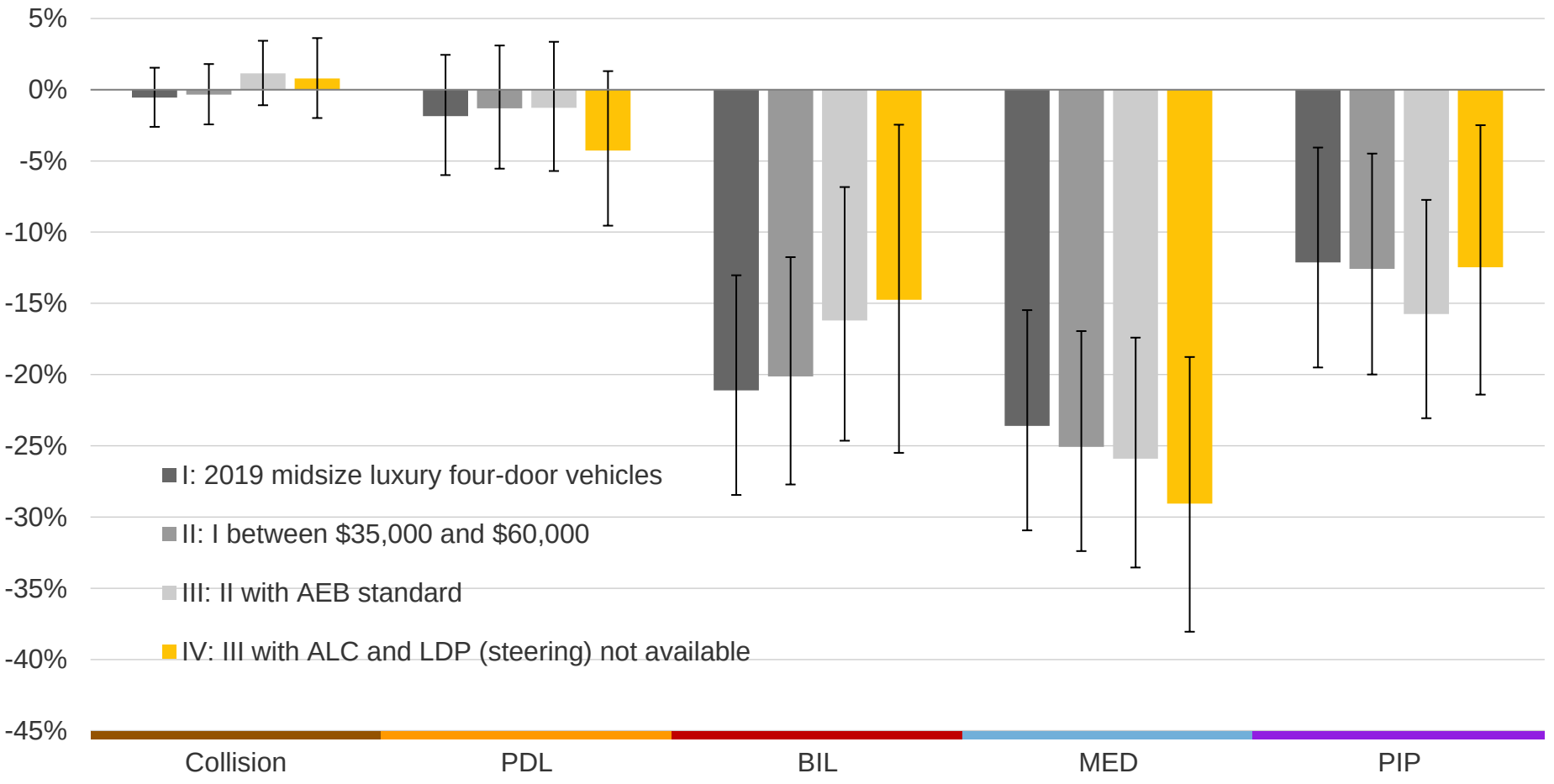
Does your vehicle have partial driving automation?

- A. Yes, and I use it regularly
- B. Yes, but I don’t use it
- C. No
- D. I don’t know

Partial automation loss results

Estimated differences in claim frequency

2019 Tesla Model 3 vs. different control groups, data since 4/11/2019



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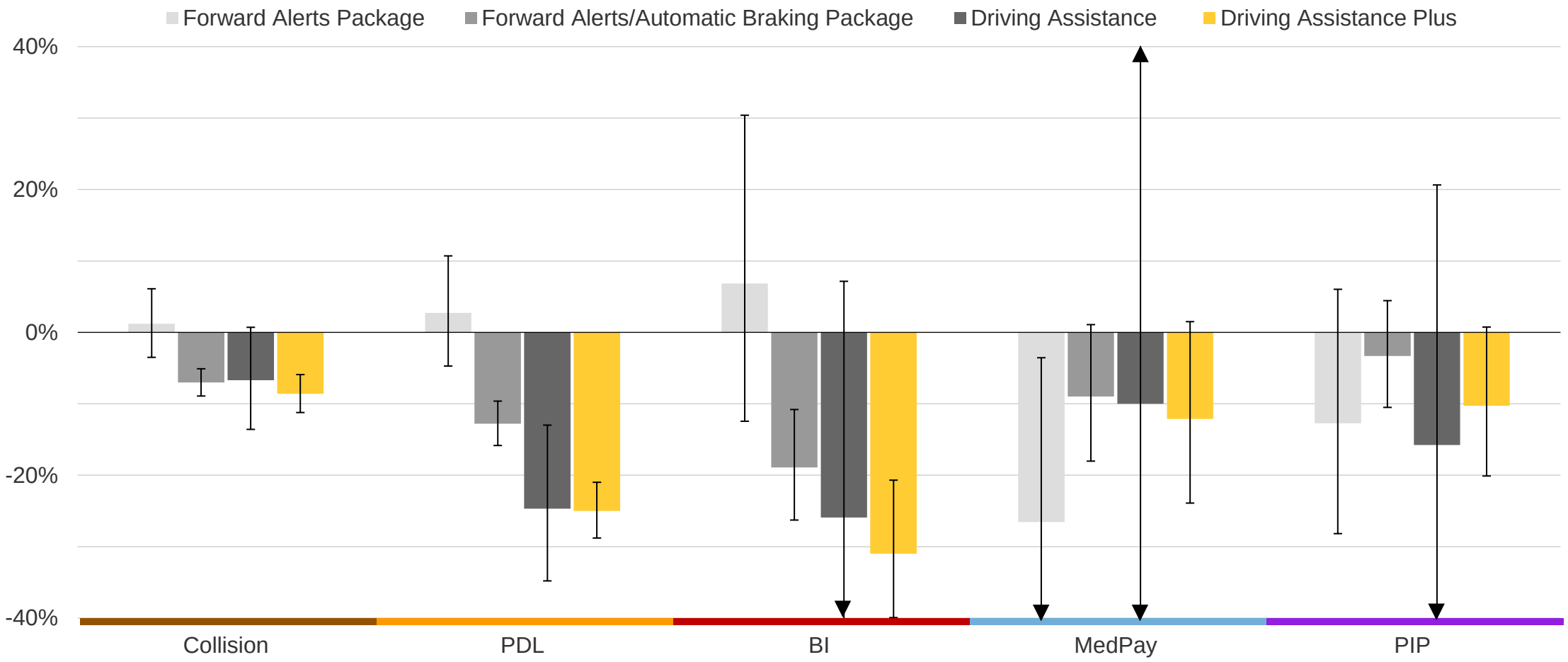
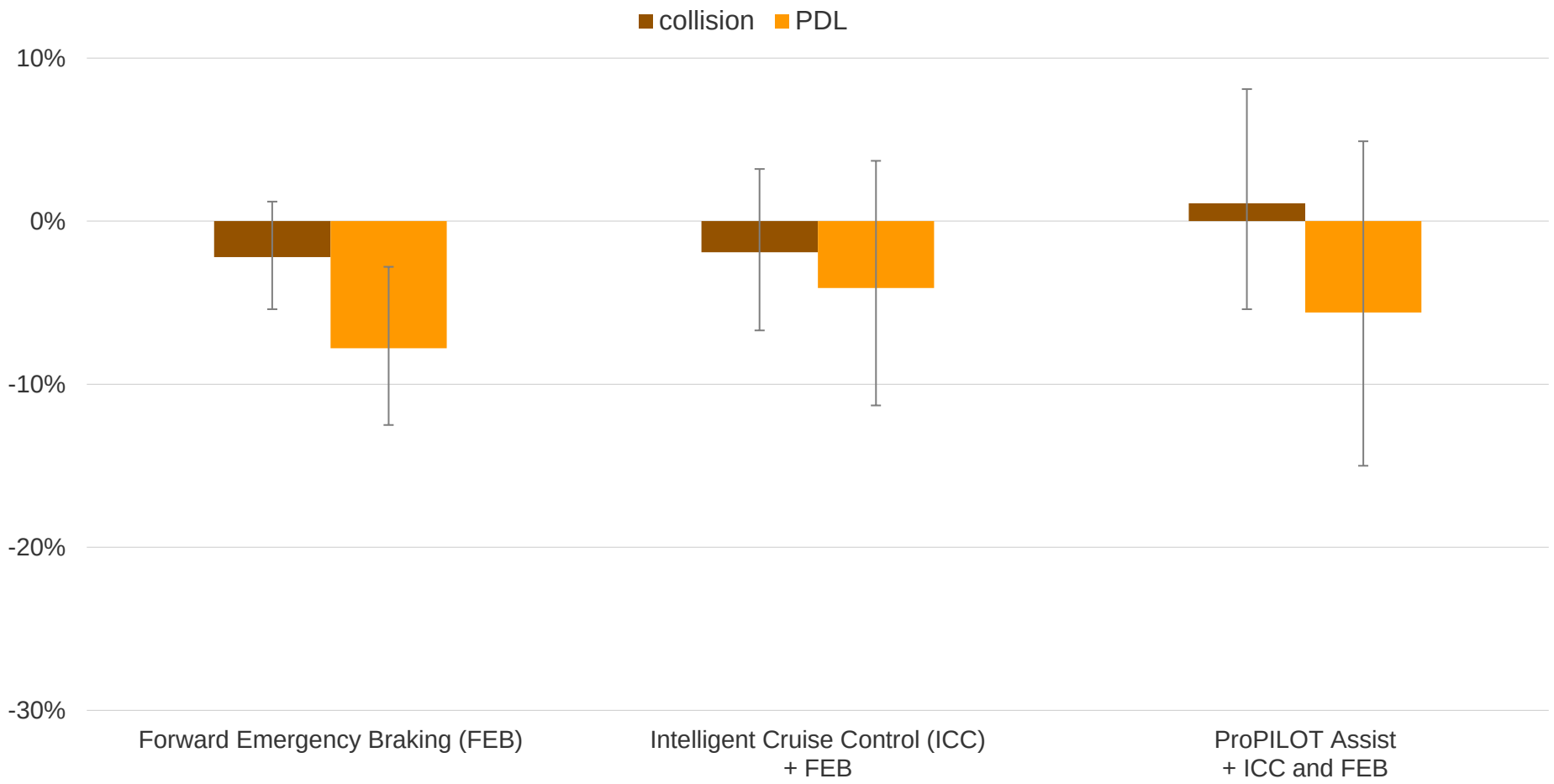
Changes in claim frequency with BMW front crash prevention

December 2021 analysis of model years 2013-17



Changes in frequency with Nissan front crash prevention system

April 2021 analysis of 2017-19 Nissan Rogue



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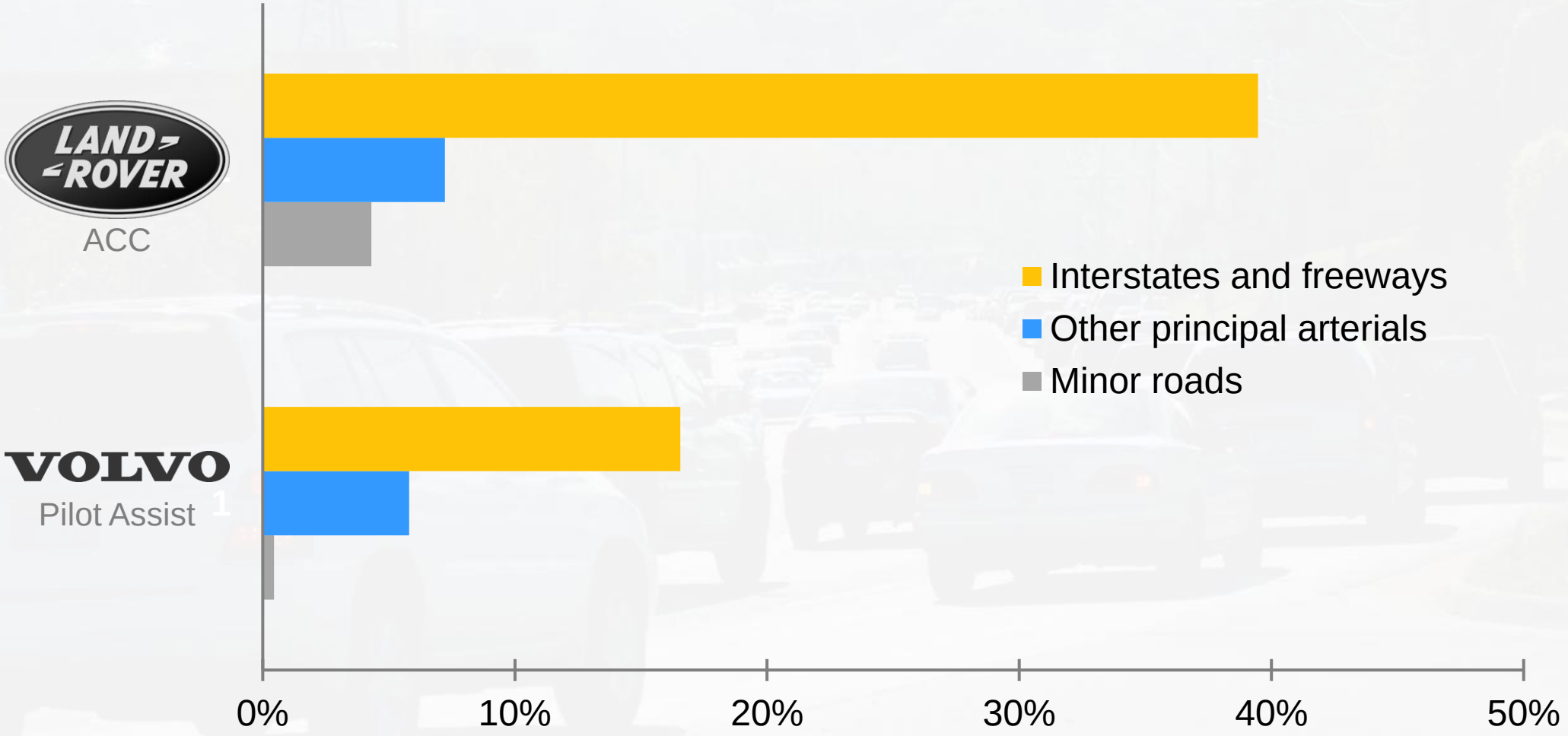
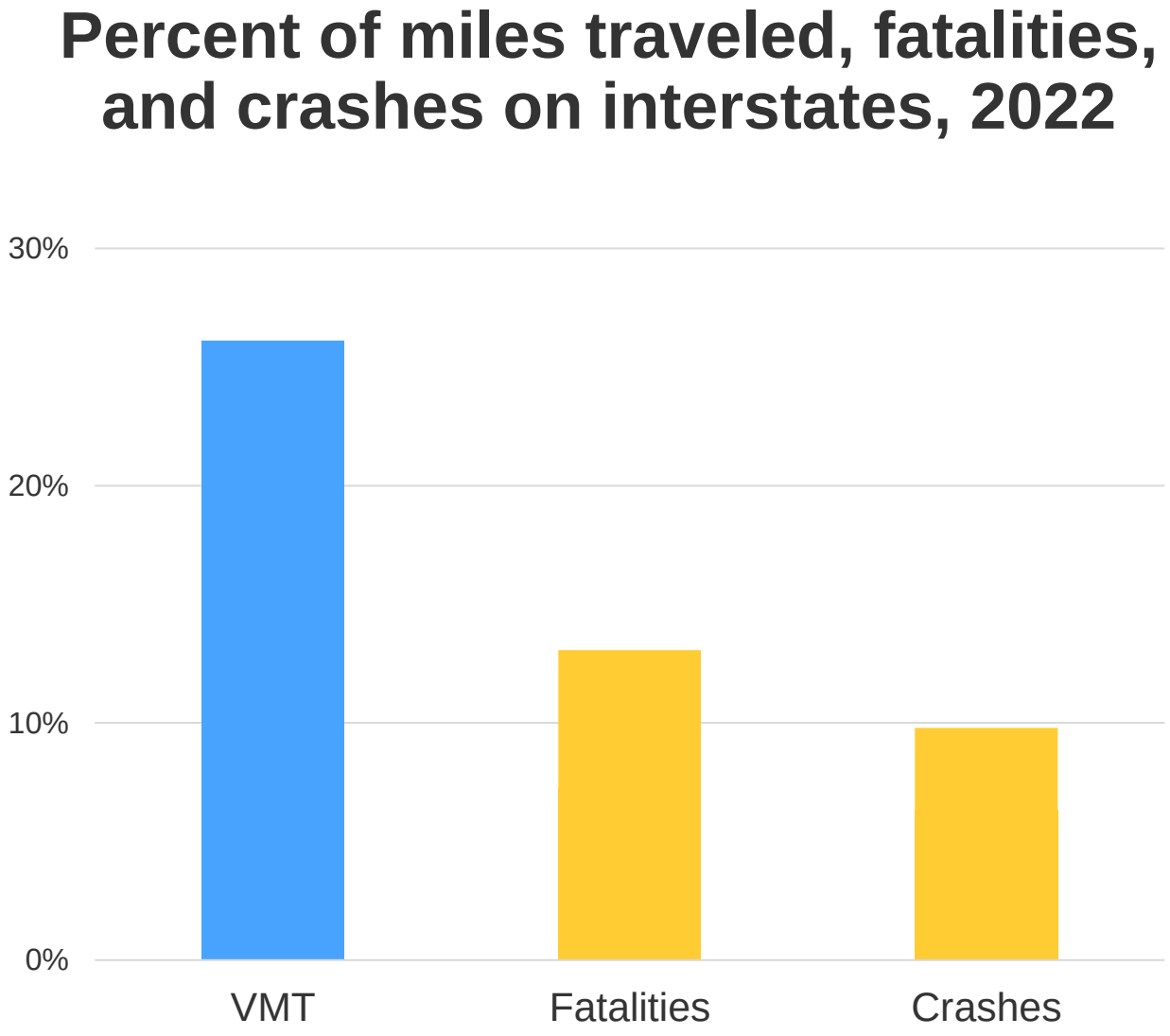
Partial automation effects in police-reported crashes

Use of driving automation by system and road type

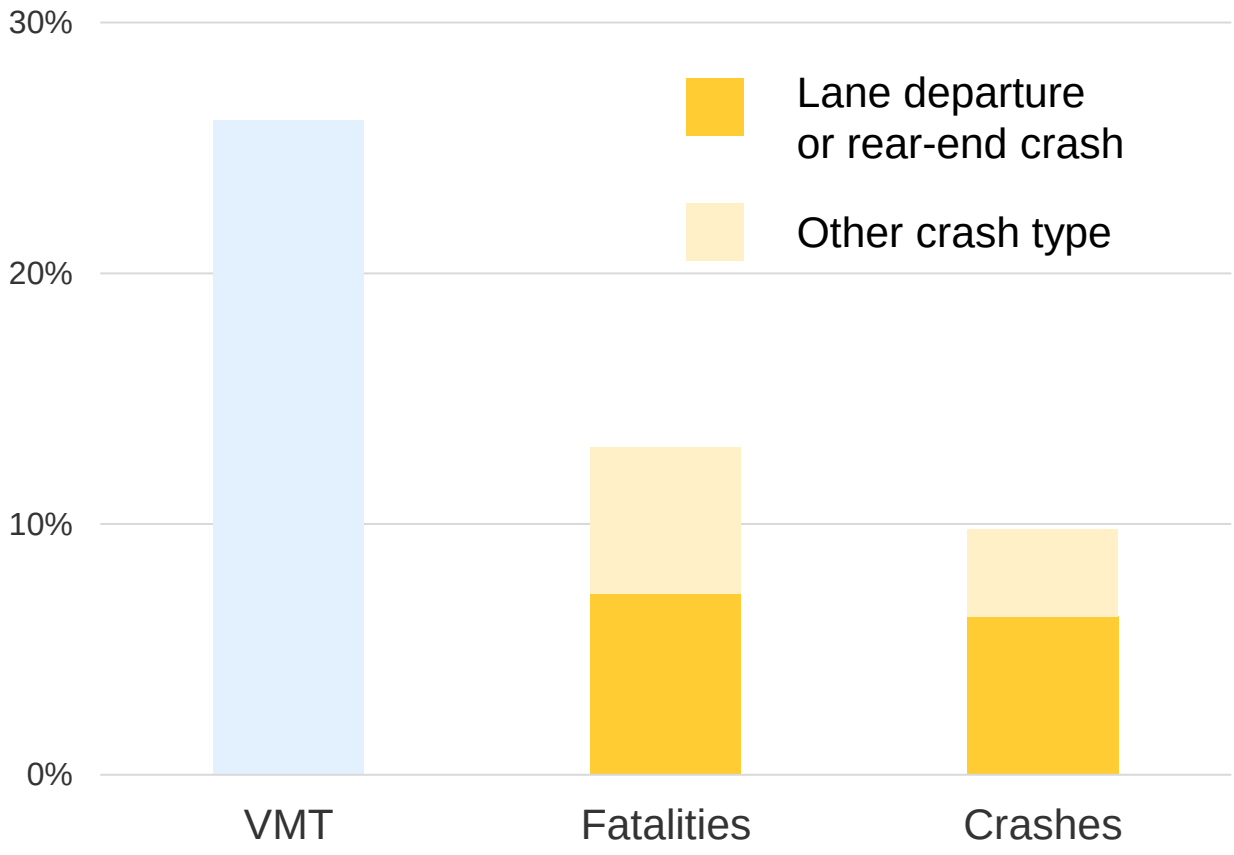


Interstate highways are among the safest roads



Only 7% of fatalities and 6% of crashes were addressable by partial driving automation systems limited to interstates

Percent of miles traveled, fatalities, and crashes on interstates, 2022



Examined crash effects on limited-access highways

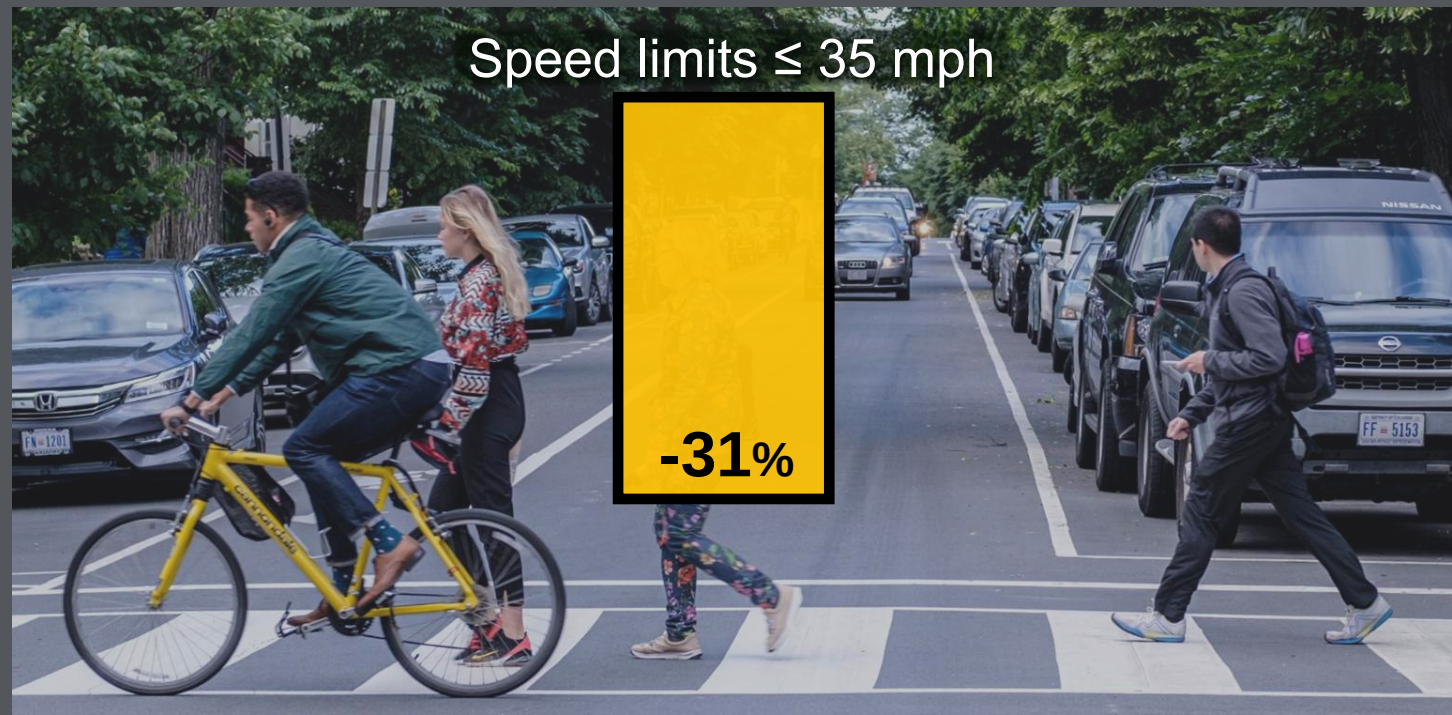
Examined crash effects on limited-access highways

and roads with speed limits ≤ 35 mph

Examined
lane departure crashes

and rear-end crashes

Lane departure crash rate reductions for Nissan vehicles with partial driving automation

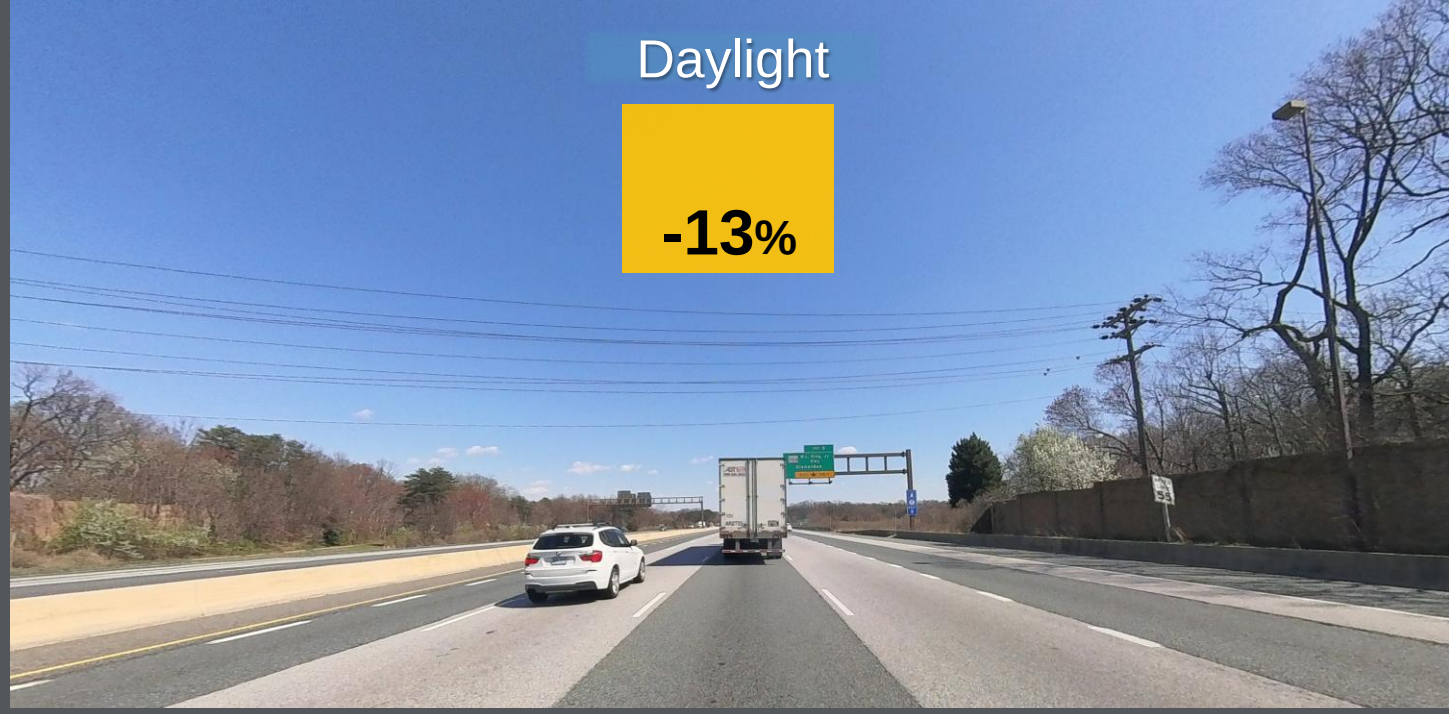


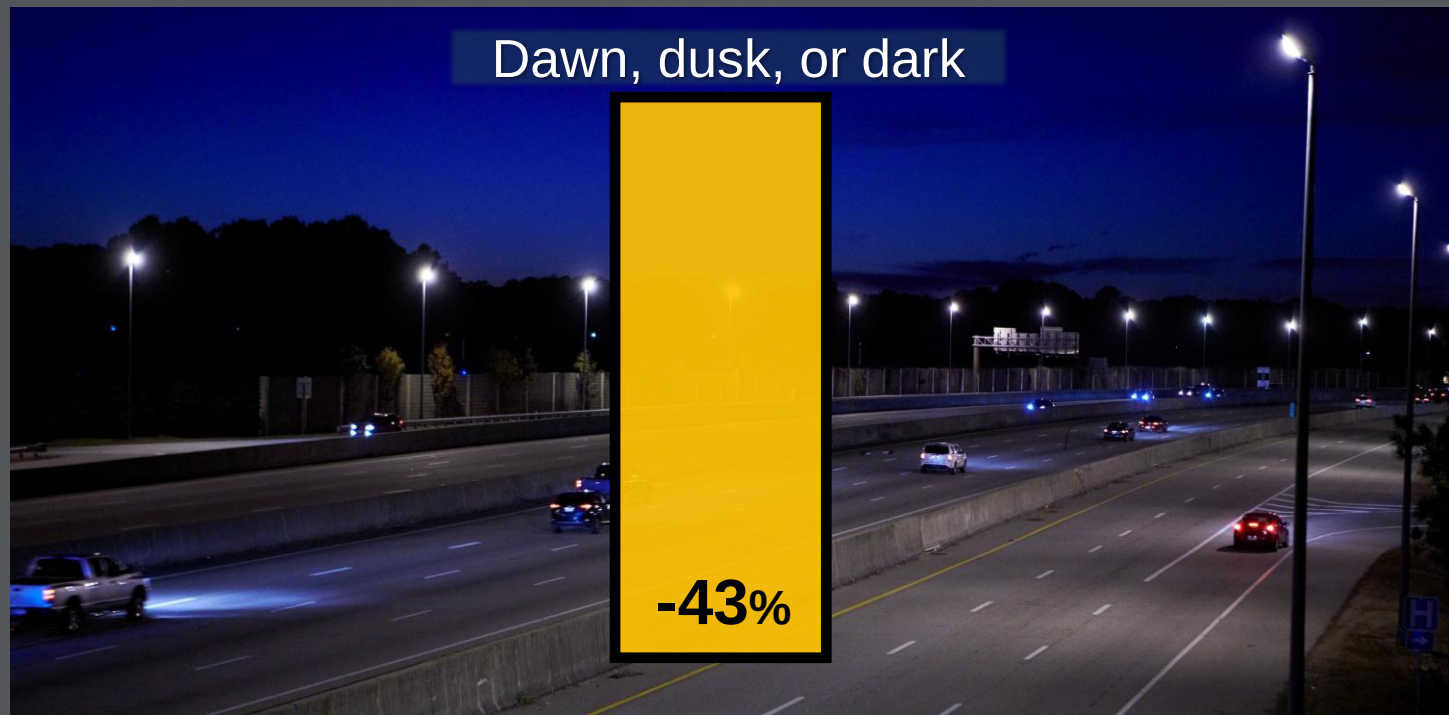
☐ Statistically significant

IIHS HLDI


GOOD
POOR
Deer targets at 200 feet
Headlights on the Rogue were rated
A
Acceptable or
P
Poor

Lane departure crash rate reductions for Nissan vehicles with partial driving automation on limited-access highways





☐ Statistically significant

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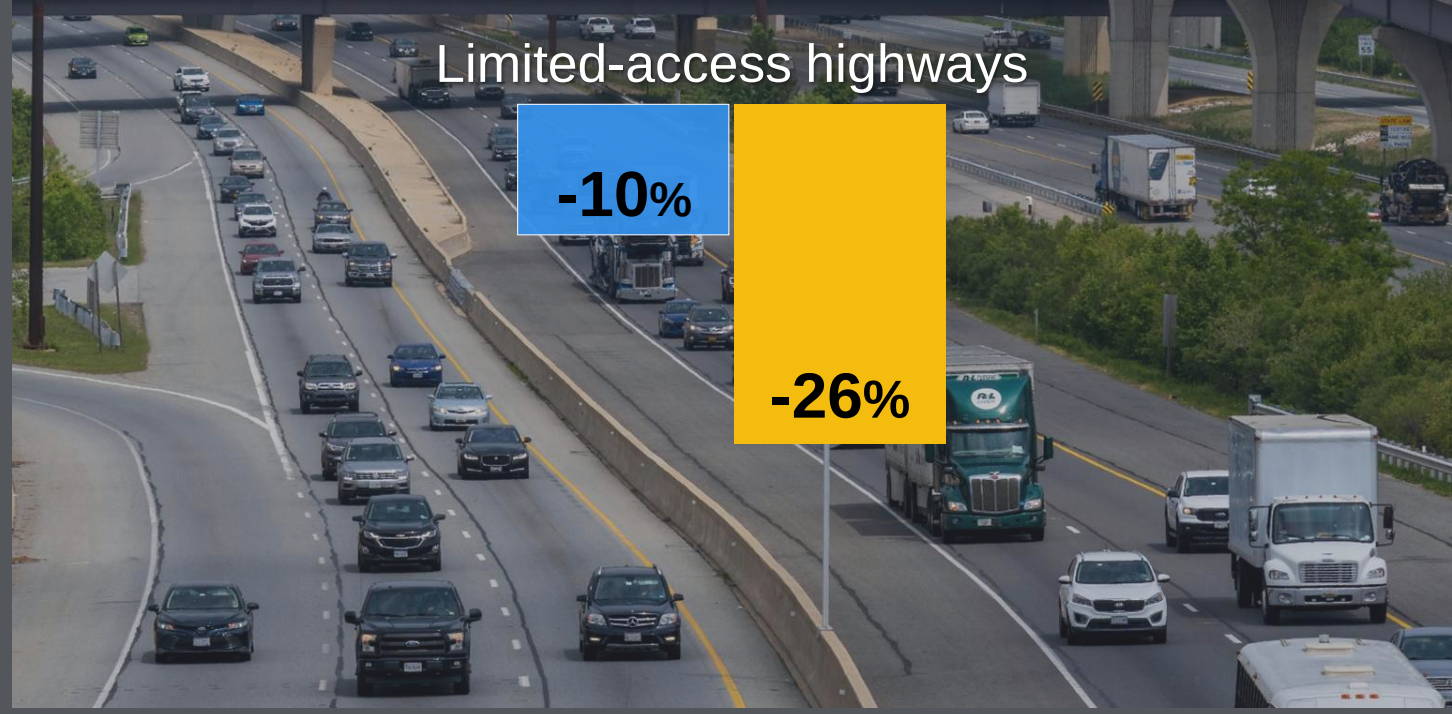
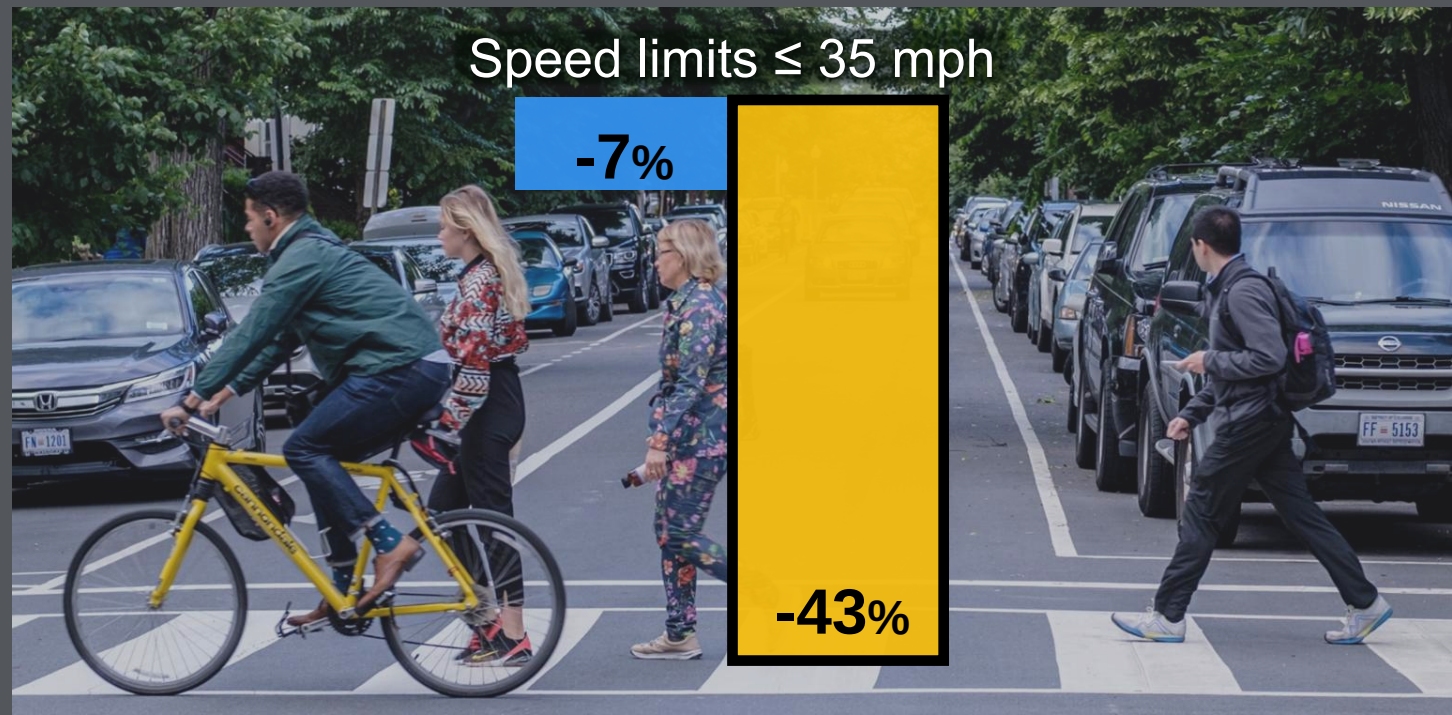
Rear-end crash rate reductions for Nissan vehicles with adaptive cruise control and partial driving automation





☐ Statistically significant

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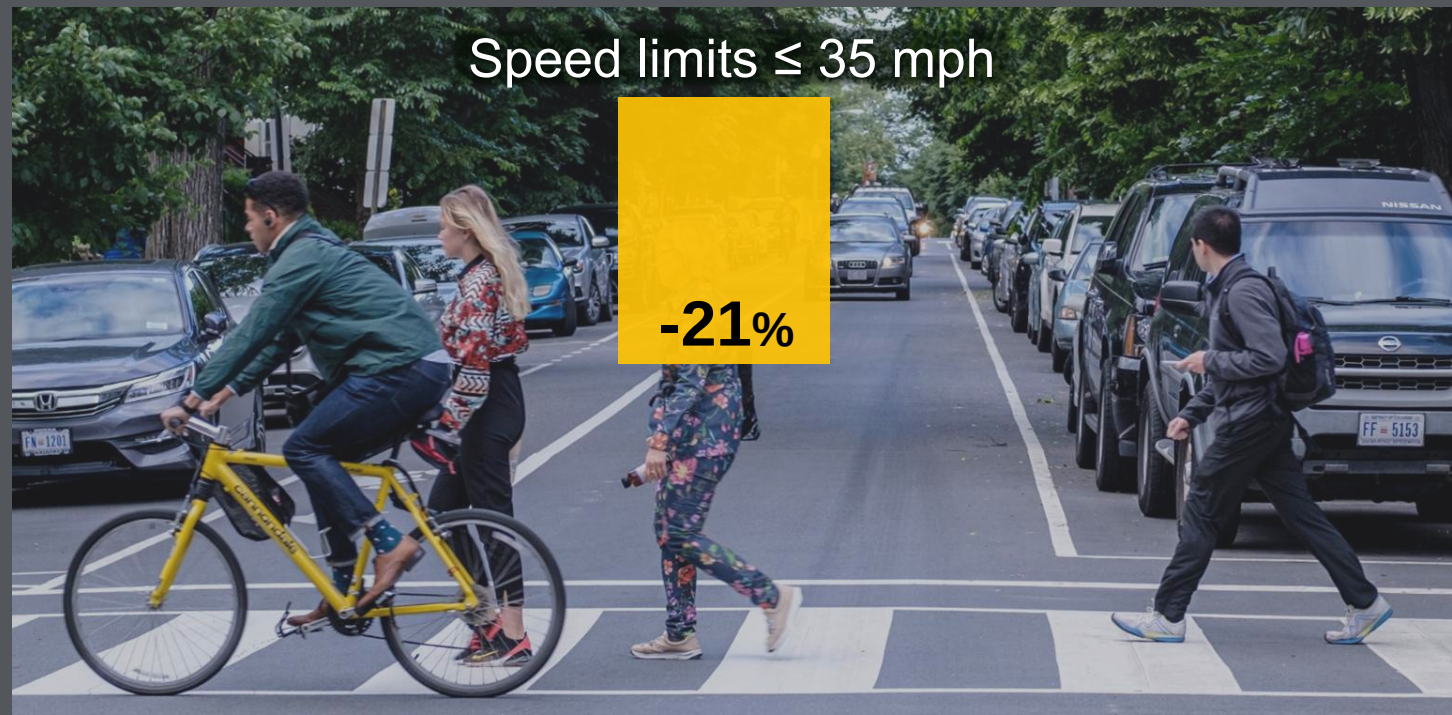
Lane departure crash rate reductions for BMW vehicles with partial driving automation



☐ Statistically significant

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AEB was more capable on BMW models when paired with ACC

Without ACC
Radar system
Operated up to 35 mph

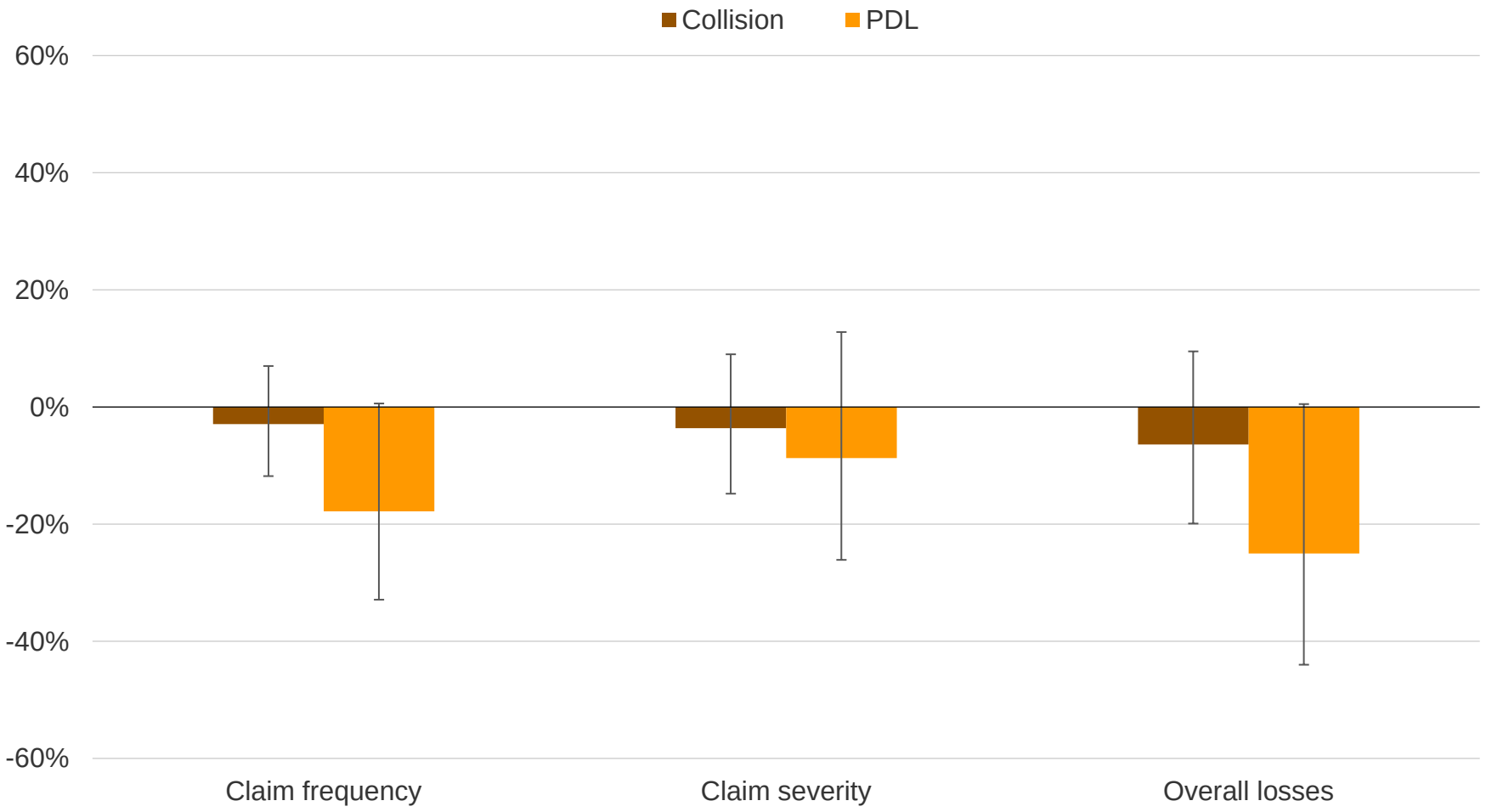
Advanced

With ACC
Fusion system
Operated at full speed range

Superior

2018-20 Cadillac CT6 Super Cruise bundle changes in loss results

Through calendar year 2021




iSpot.tv
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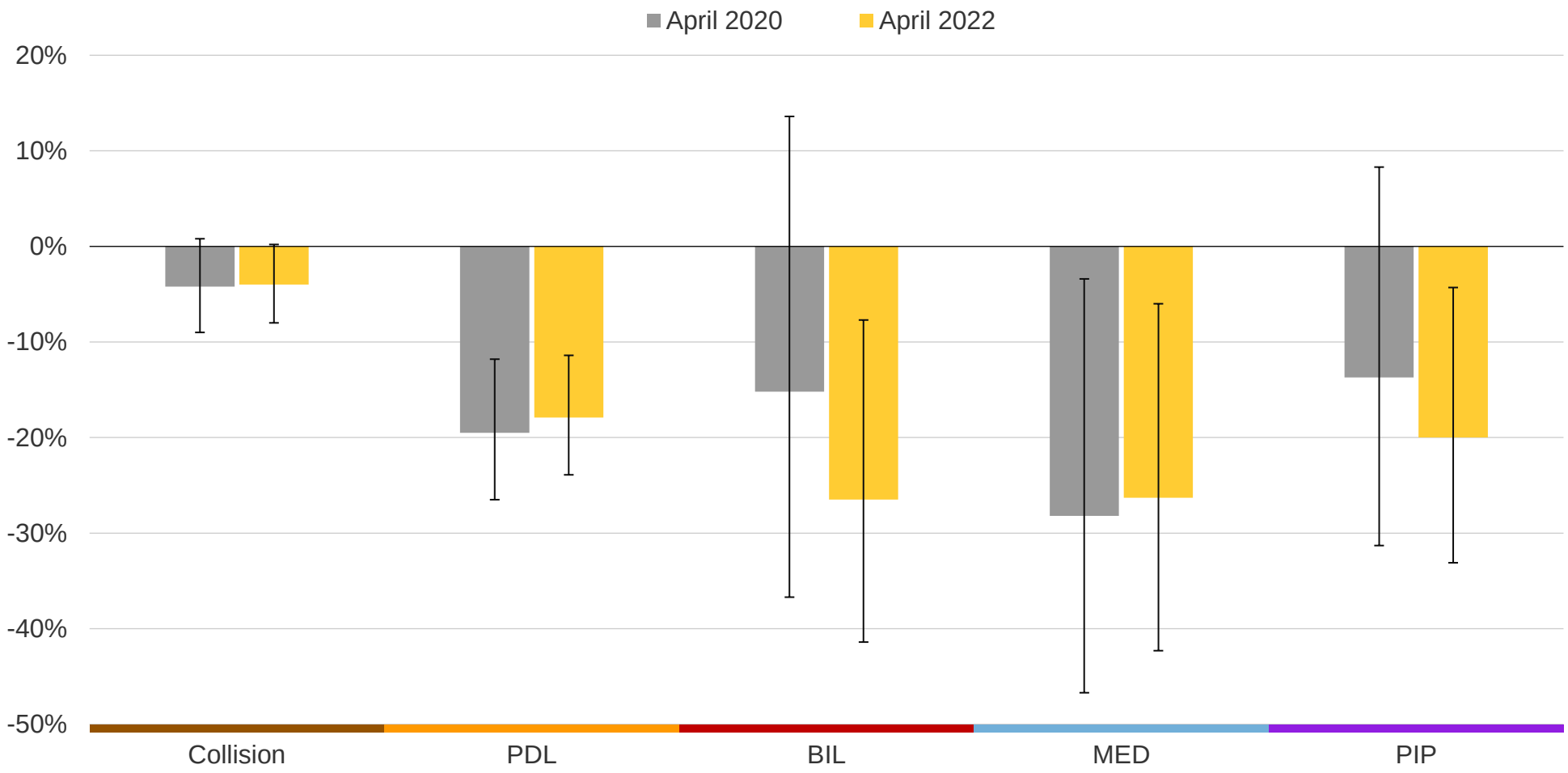
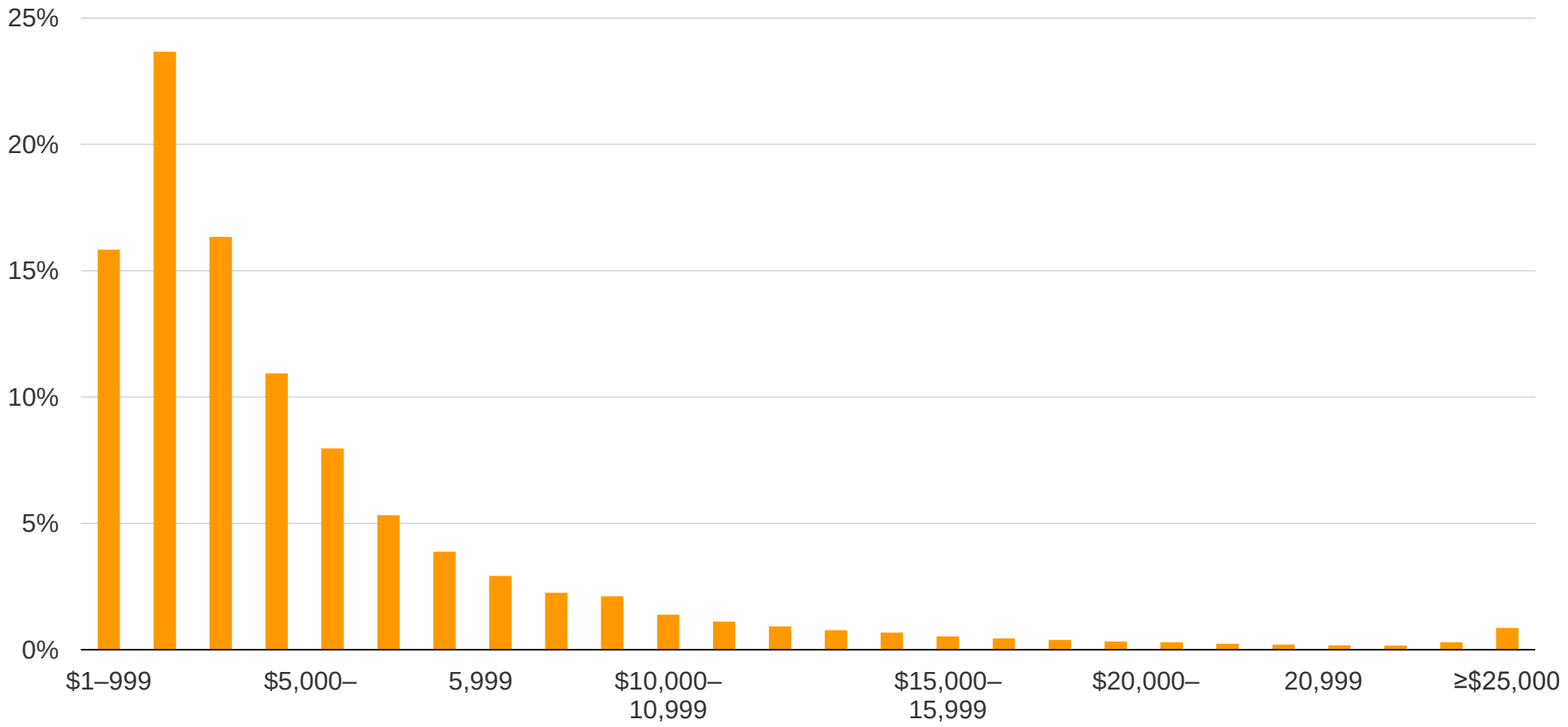
Changes in claim frequency with Audi Traffic Jam Assist

Analysis of 2017 Q7 and A4



Distribution of PDL claims, 2020 calendar year

By claim size and vehicle type, 1981-2021 models



Evaluations of partially automated systems

Rating component 1
Driver monitoring

- Simultaneously monitor where the driver is looking and what the driver's hands are doing
  - Eye, head, and hand monitoring

Rating component 2
Attention reminders

- Start alerting and escalate communication rapidly
- Add more alert modalities at each stage
  - Bimodal alerting within 10-15 sec
  - Trimodal alerting or vehicle slowdown within 20-30 sec

Rating component 3
Emergency escalation

- Vehicle begins slowdown to a stop or a crawl within 35 sec
- SOS call during or after slowdown
- System lockout once slowdown begins

Rating component 4
Automated lane change

- No auto-lane-change functionality, or
- Requires driver input to begin the maneuver (i.e., driver-initiated or driver-confirmed)

Rating component 5
ACC auto resume

- No ACC-auto-resume functionality, or
- Requires driver is looking forward before moving or times out within 10 sec of standstill
- Times out after 2 mins of standstill regardless of driver gaze

Rating component 6
Cooperative steering

- Lane centering must stay on while driver steers within lane
- If temporarily deactivates, lane centering must:
  1. Automatically reactivate while offset from lane's center once driver stops steering, and
  2. Clearly communicate operation status changes

Rating component 7
Safety features

- AEB and LDP must be on and cannot be switched off while system is on
- Driver must be belted to switch on system
- If driver unbuckles while system is on, attention reminder process must begin

Overall ratings for safeguards

G Good A Acceptable M Marginal P Poor

2022-24 LS

2023-24 Sierra

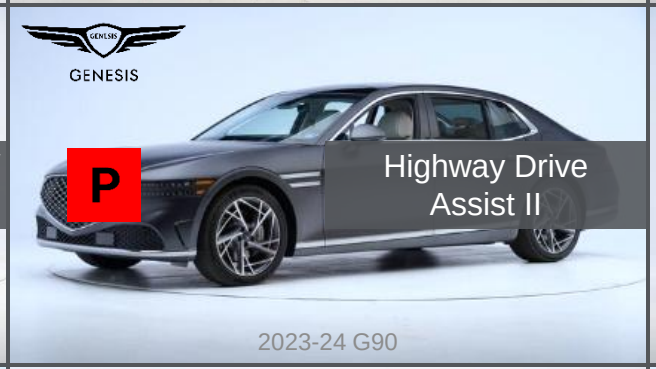
2023-24 Ariya

2023-24 X1

2021-24 Mustang Mach-E

2021-24 Mustang Mach-E

2023-24 G90



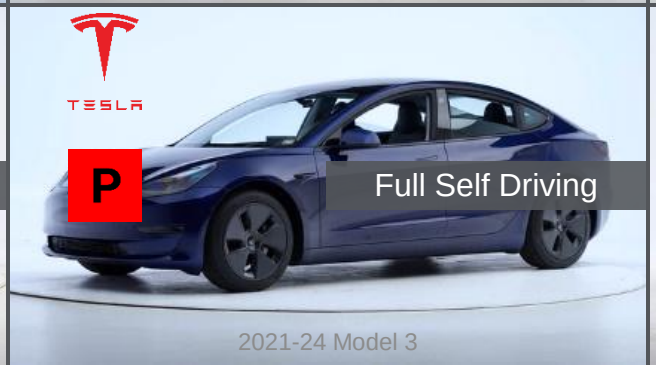
2023-24 G90

2022-24 LS

2022-23 C-Class

2023-24 Ariya

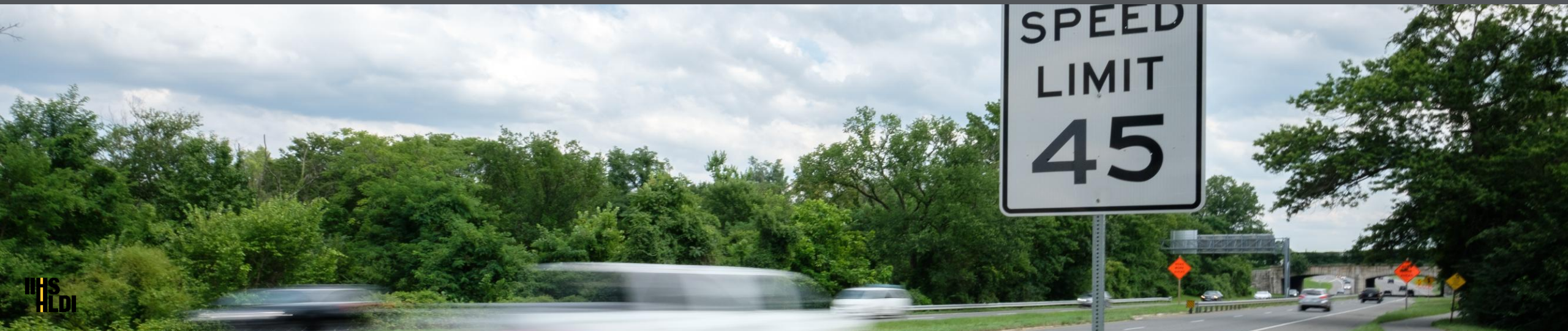
2021-24 Model 3



2021-24 Model 3

2022-24 S90

Intelligent speed assist



12,151 DEATHS

29%

of all fatalities in 2022
were speed related

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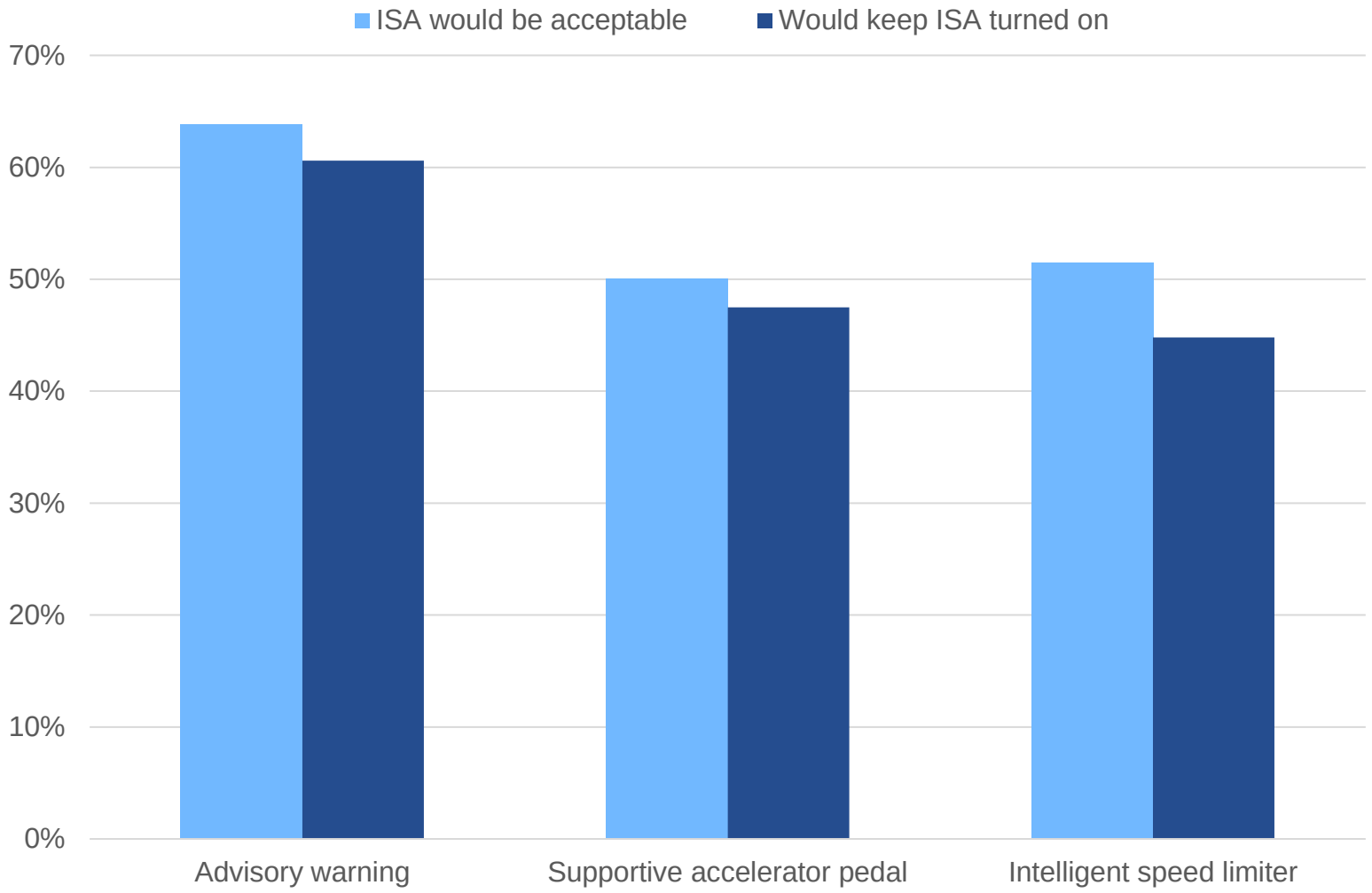
Intelligent Speed Assist (ISA) basics

- Camera and/or GPS sensors detect speed limits in real time
- Intervenes when vehicle exceeds limit
  - Warning
  - Supportive accelerator pedal
  - Intelligent speed limiter

Advisory speed warning implemented by Mazda

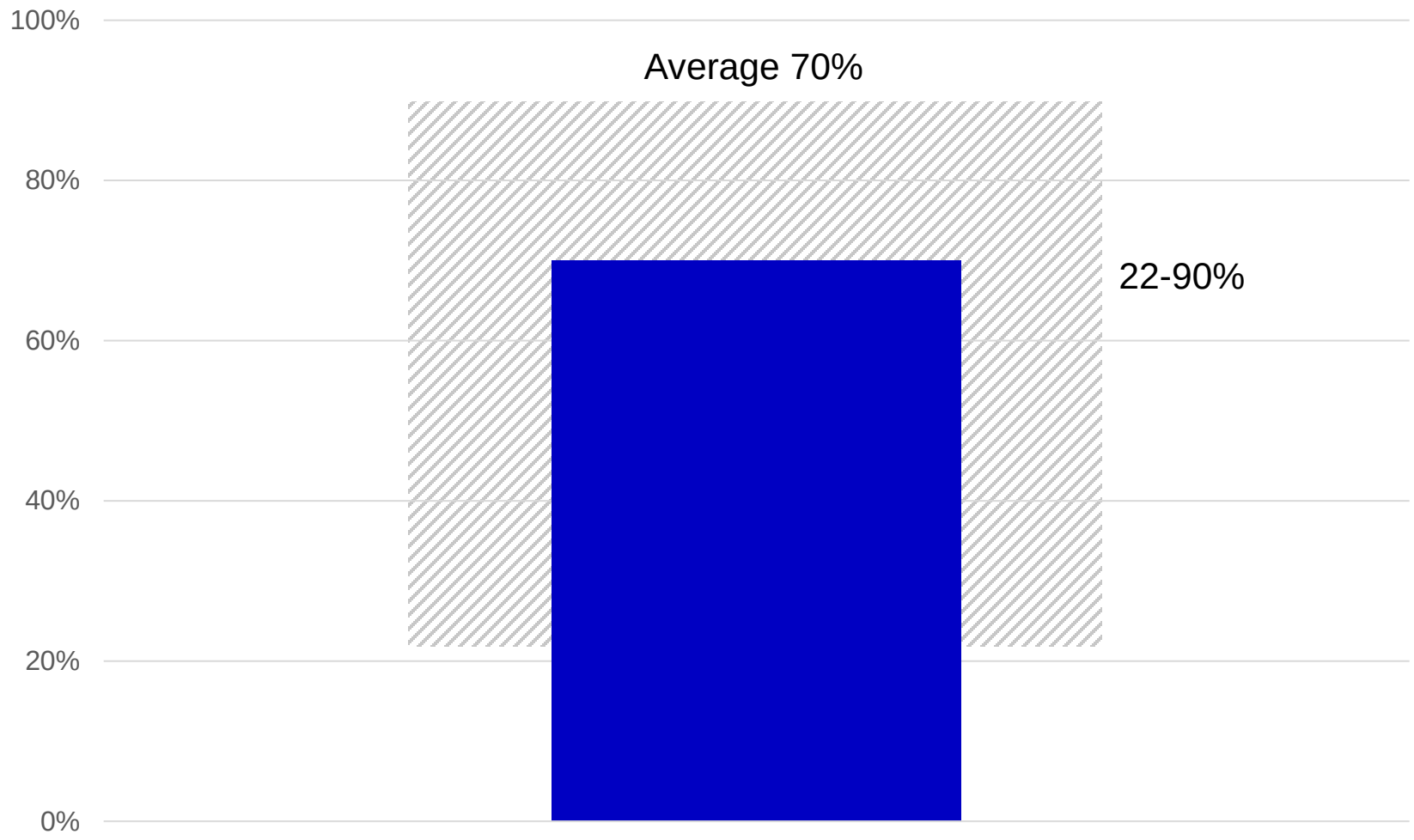
2024 survey of U.S. drivers

Would you find ISA acceptable? Would you keep it turned on?



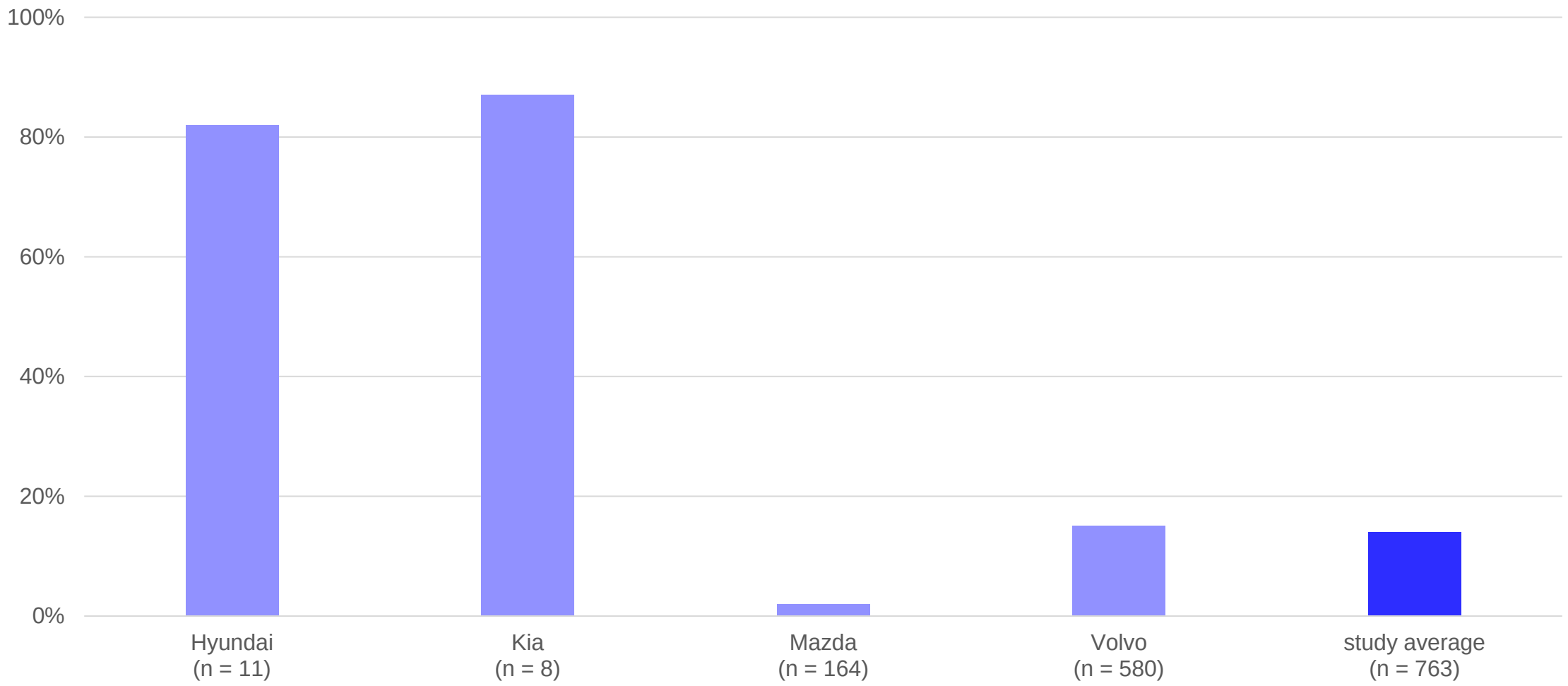
Activation rates of visual speed warning system alerts

2024 dealership observation study



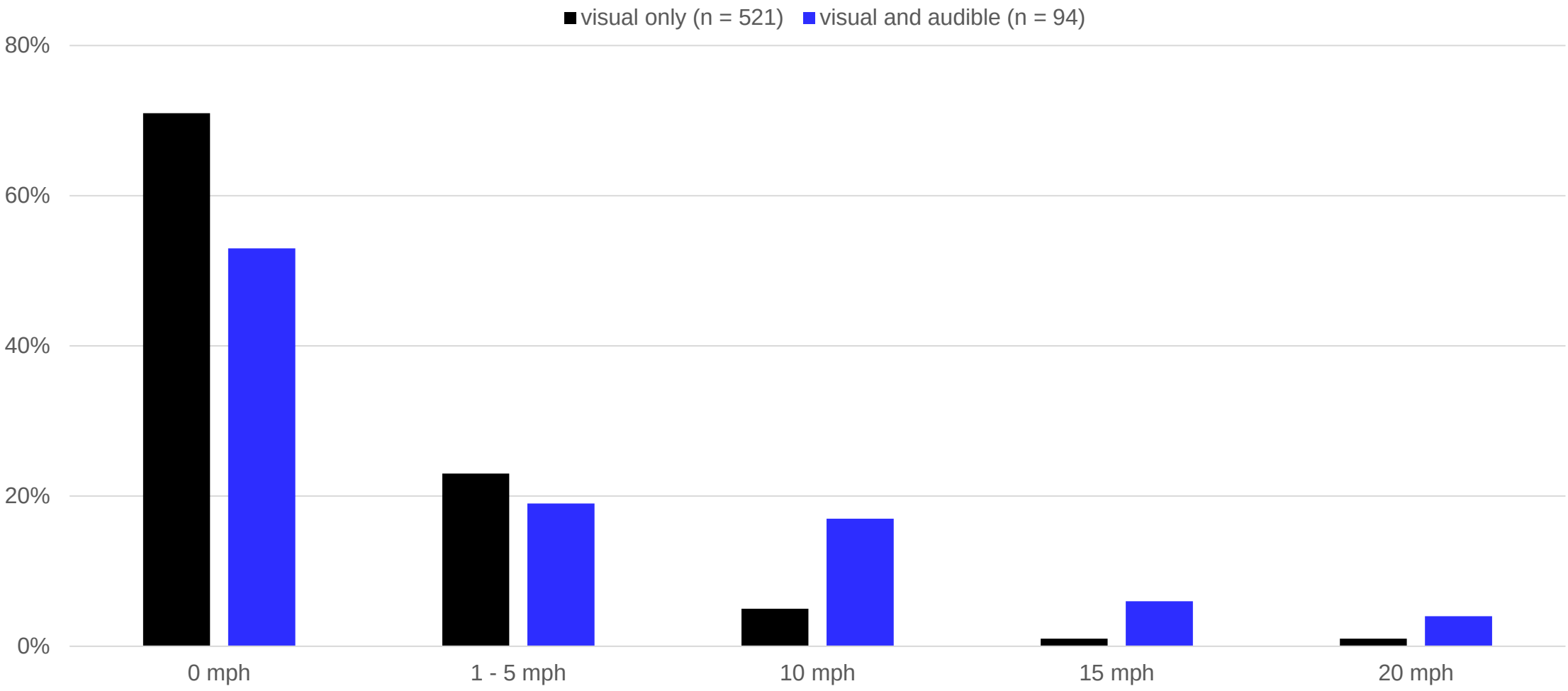
Activation rates of audible speed warning alerts by manufacturer

2024 dealership observation study

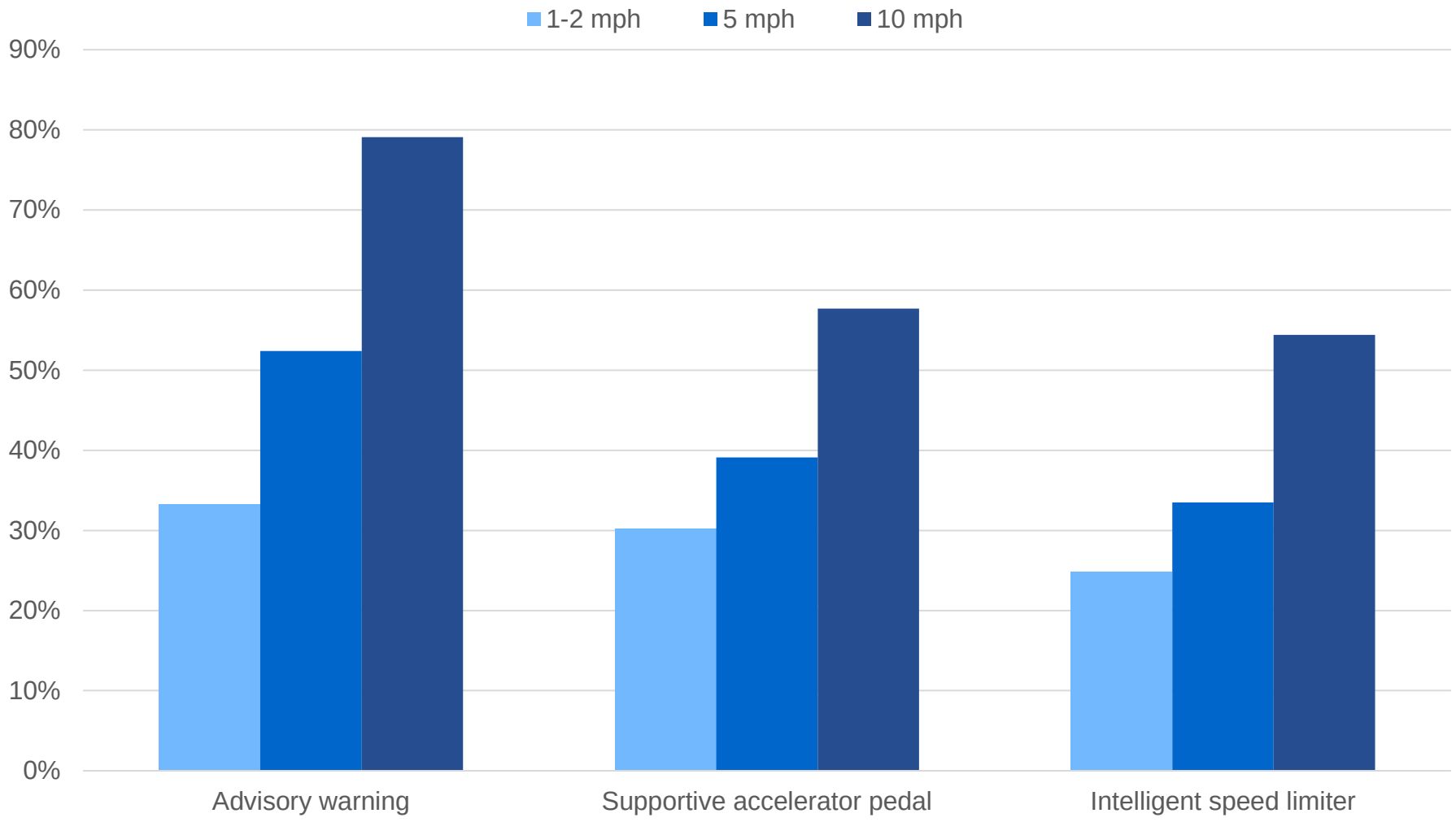


Speed limit alert, observed threshold settings

When systems were turned on with customizable threshold



Percent of survey respondents agreeing that interventions at 1-2 mph, 5 mph and 10 mph over the speed limit would be acceptable



States and cities are considering legislation to mandate ISA

Planetizen

California Bill Requiring Speeding Warnings Heads to Governor's Desk

The law would require all vehicle models 2030 and later to include technology that warns drivers when they exceed the speed limit.

September 3, 2024

Streets Blog USA

D.C. to Dangerous Drivers: We Will Slow You Down!

Dangerous drivers would be forced to slow down thanks to in-car technology under first-in-the-nation bill that just passed in the Washington, D.C. City Council.

February 8, 2024

Spectrum News

Lawmakers propose 'speed limiters' for repeat offenders in New York

Repeat speeders in New York would be required to install technology, or "speed limiters," in their vehicles under legislation introduced Tuesday by two state lawmakers.

August 1, 2023

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Phase-in of collision avoidance systems

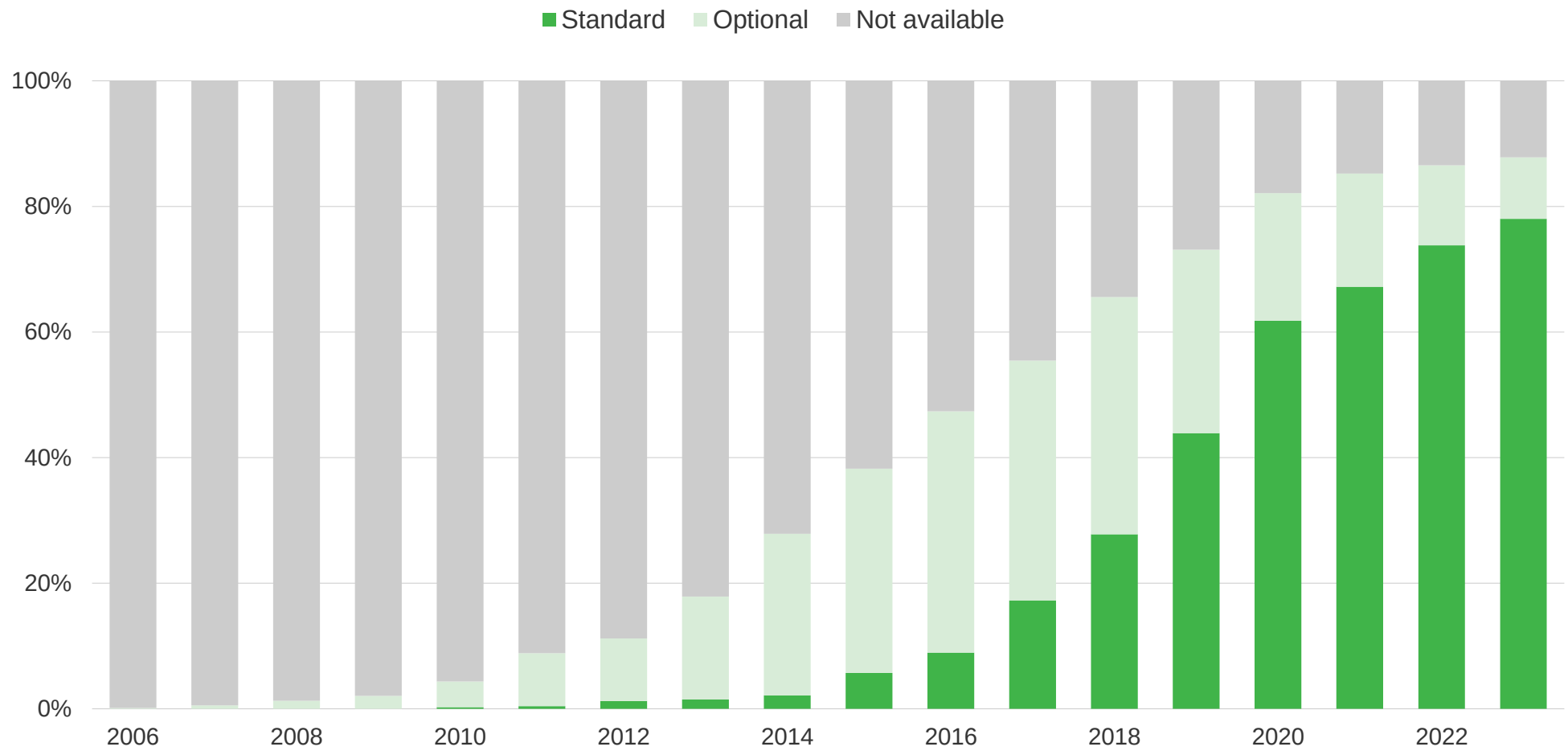
Which ADAS feature is most prevalent in the fleet

Which ADAS feature is most prevalent in the fleet?

- A. Automatic emergency braking
- B. Adaptive headlights
- C. Blind spot monitor
- D. Front AEB
- E. Front crash prevention
- F. Lane departure warning
- G. Rear camera
- H. Rear parking sensors

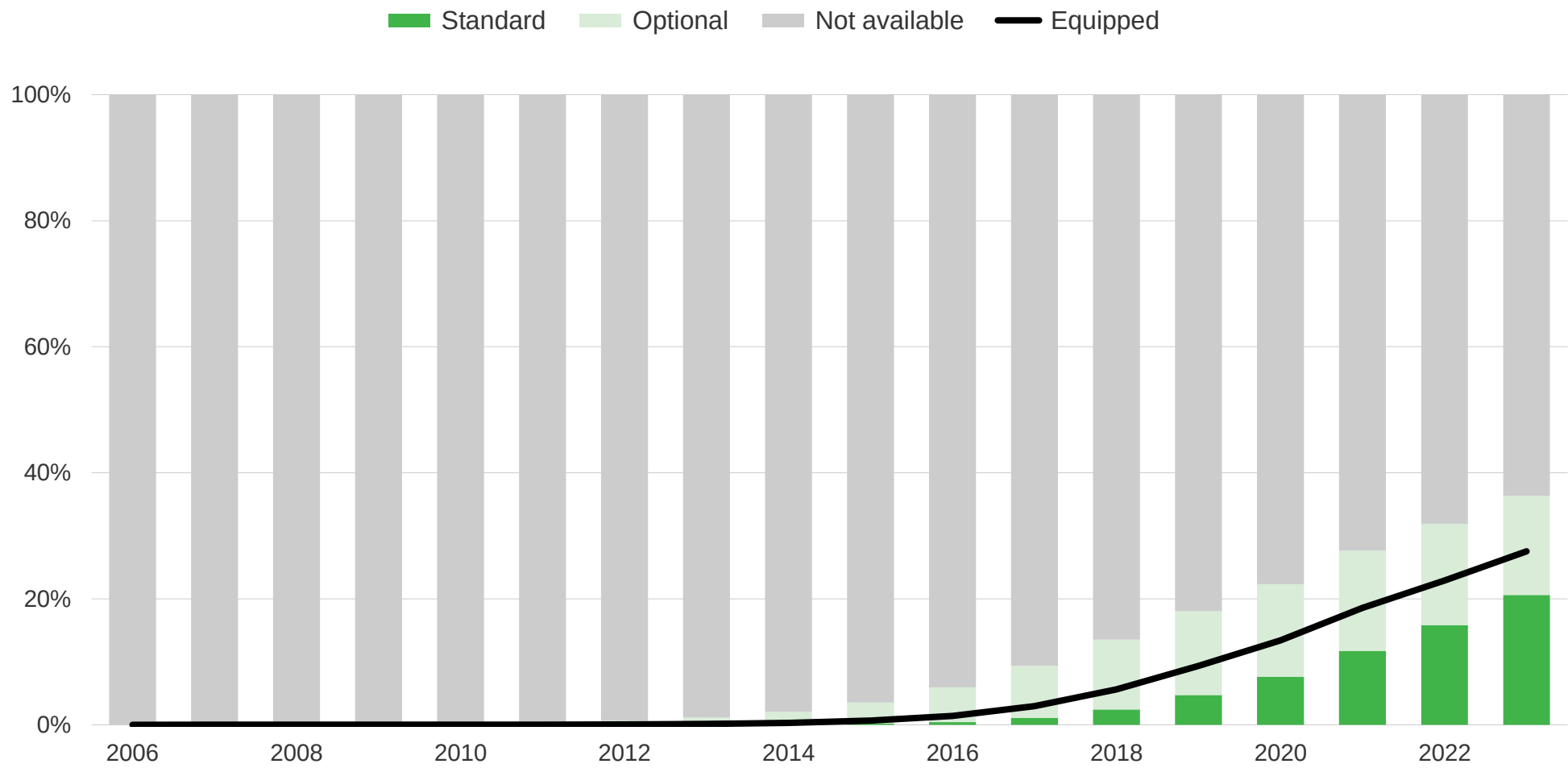
New vehicle series with front automatic emergency braking

By model year



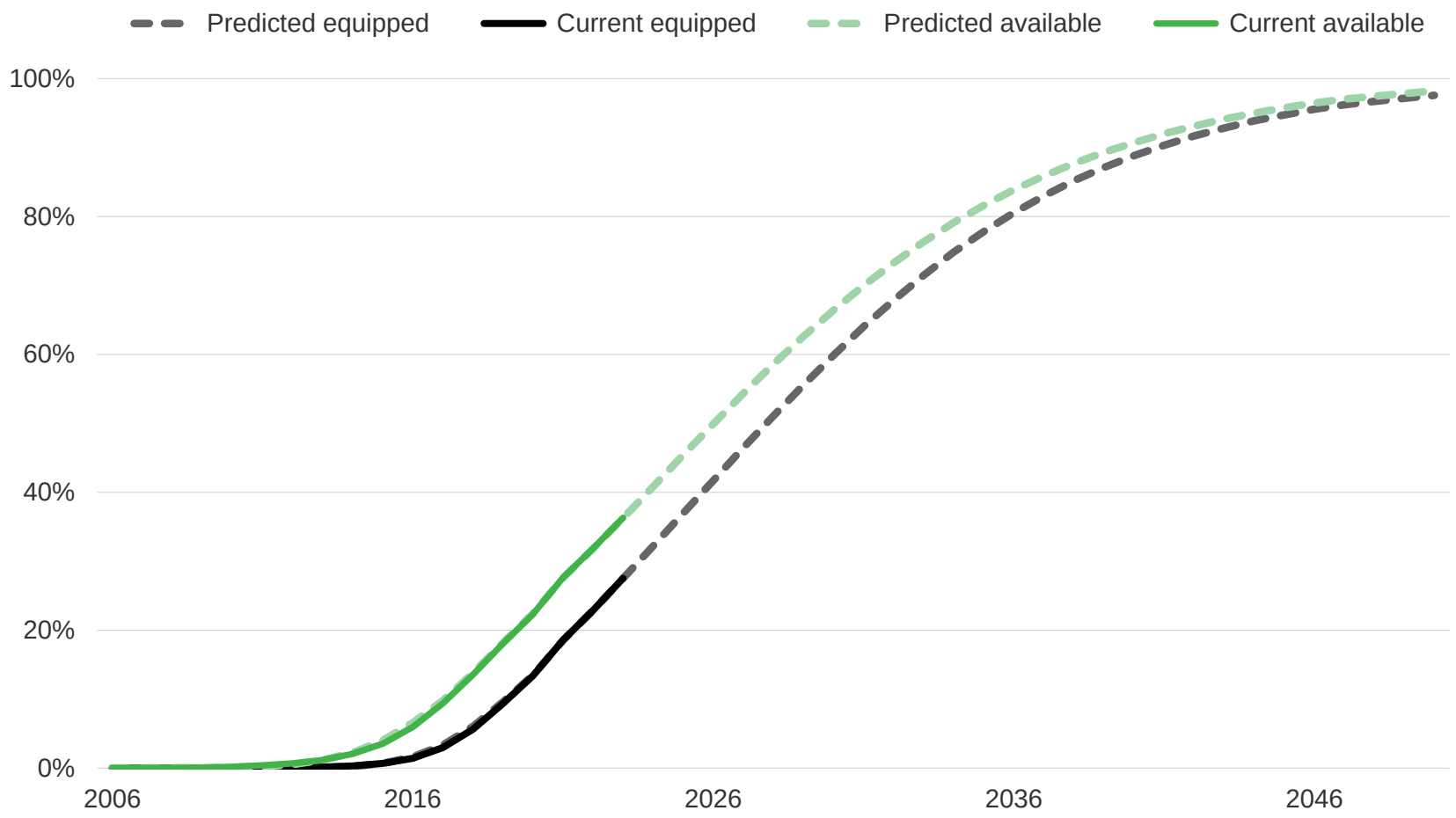
Registered vehicles with front automatic emergency braking

By calendar year



Predicted percentage of registered vehicles: front automatic emergency braking

By calendar year



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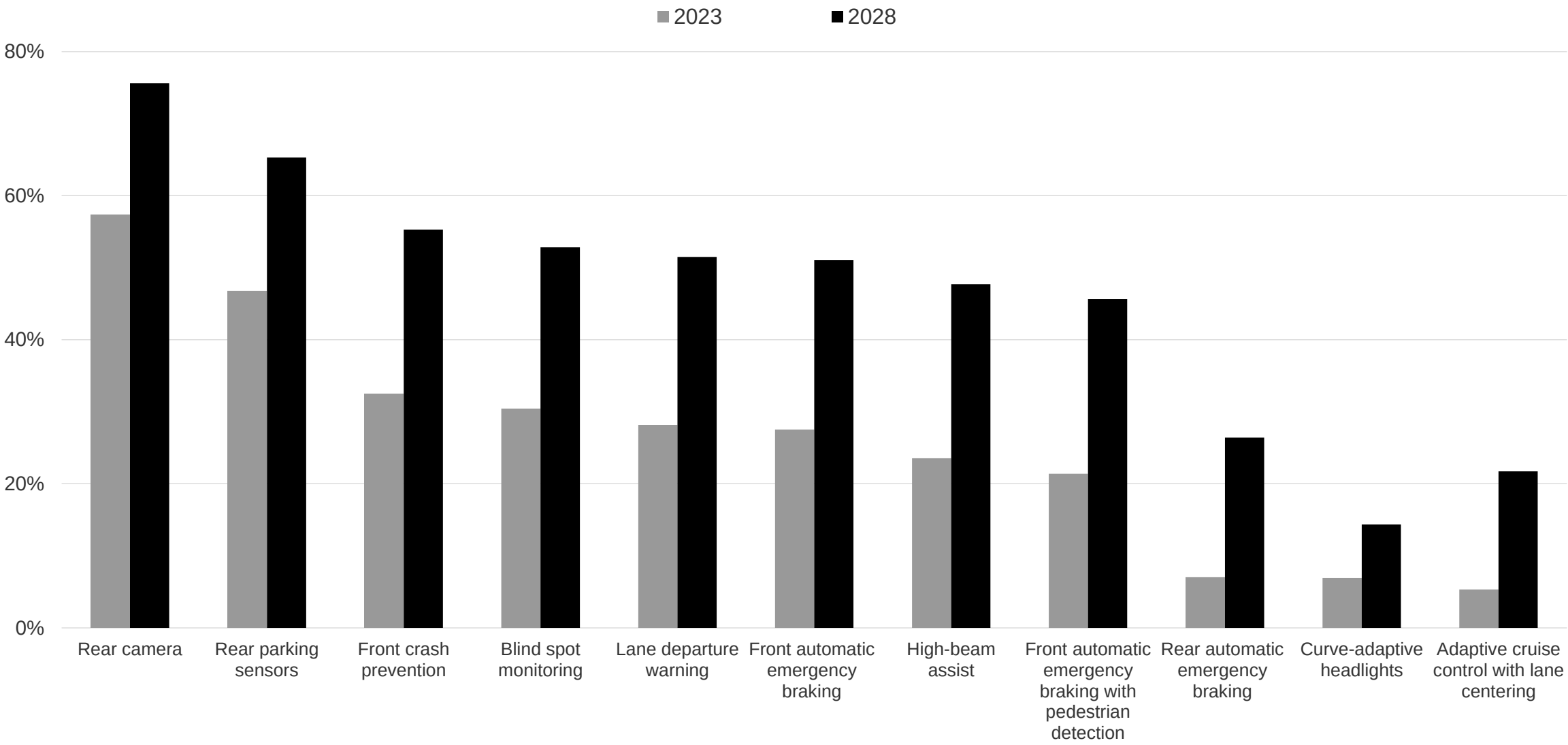
Estimated registered vehicles by feature

Calendar years 2023 and 2028



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Questions?

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THANK YOU