

MUARC ECIS Fact Sheet 3: Vehicle safety, speed, and injury severity^{1 2}

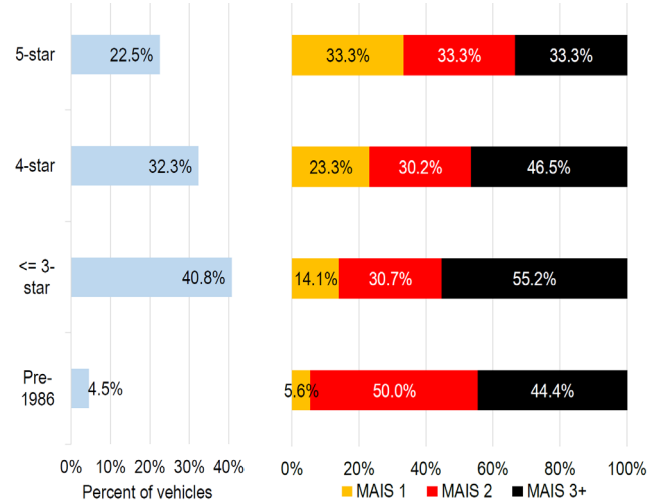
Safe Vehicles are integral to eliminating serious injury

Vehicles differ in their capability to protect drivers from injury in the event of a crash. Vehicle safety ratings, such as the ANCAP star-ratings, provide an index of this level of safety.

The ECIS data highlight the crucial role that vehicles play in protecting occupants from injury. Relatively fewer drivers in 5-star rated vehicles sustained MAIS 3+ (serious and higher) severity injuries compared to drivers in cars with lower safety star ratings.

Impact speeds based on crash type (head-on, side impact, rear impact), collision object, and ANCAP vehicle safety ratings were used to determine whether the impact speed estimated through crash reconstruction was within or exceeded the engineered-in safety (i.e., safety envelope) of the vehicle (see ECIS Report 1).

For 41.7% of crash-involved drivers of 5-star safety rated vehicles, the impact speed was higher than the speed at which the vehicle could protect occupants from serious injury.



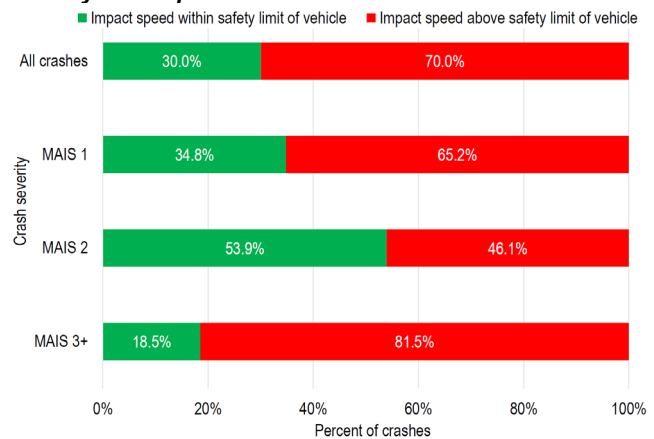
Injury severity is higher when the impact speed is greater than the safety envelope of the vehicle

The ECIS data show that in 70% of crashes the speed at impact exceeds the safety envelope of the vehicle based on its safety rating, crash type and collision partner / impact object.

The proportion of crashes where the impact speed was above the safety envelope was higher for Lane Departure crashes (78.9%) compared to Across Path crashes (62.4%) and Rear Impact crashes (57.4%). This aligns with the higher injury severity of these crashes.

There is a clear link between impact speed exceeding the in-built protection capability of the vehicle and injury severity.

The proportion of crashes where the impact speed was outside of the safety envelope of the vehicle(s) was highest for those where MAIS 3+ injuries were sustained (81.5%) compared to MAIS 2 (moderate) (46.1%) and MAIS 1 (minor) severity injuries (65.2%).



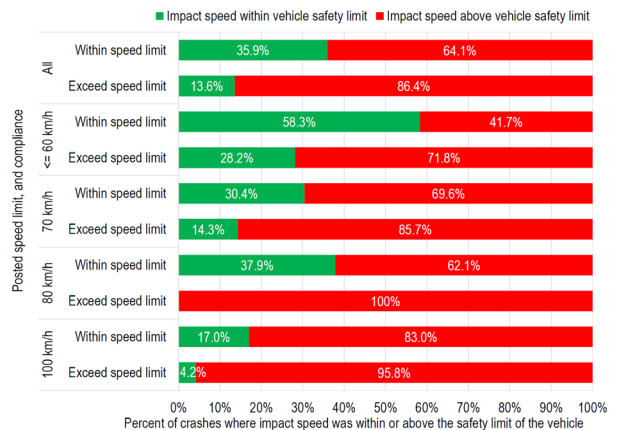
The link between speed limits, speed limit compliance, impact speed and the vehicle

The proportion of crashes that occurred at impact speeds within the engineered-in safety limit of the car was higher (35.9%) where the involved driver(s) was complying with the speed limit prior to the crash, compared to where an involved driver had been exceeding the speed limit (13.6%).

Exceeding the speed limit was associated with 3.6 times higher odds of the crash impact speed being beyond the point where the vehicle can protect the driver and occupants from serious injury.

The percentage of crashes that occur at speeds above the safety envelope of the vehicle increases with each higher speed zone.

Key point: even for drivers compliant with the speed limit, crashes occurred at impact speeds where the safety measures of even the safest vehicle cannot protect drivers from serious injury. Exceeding the speed limit further inflates this high risk.



Implications

The ECIS findings highlight the fundamental mismatch between current speed limits and the ability of vehicles to protect drivers from serious injury. This includes modern, 5-star safety rated vehicles.

Lowering speed limits to match the level of protection in the road environment and the safety offered by vehicles given foreseeable crash types would be highly effective in addressing this risk factor. Ensuring driver compliance with these speed limits would ensure optimal reductions in serious injuries could be achieved.

While reductions in serious injury occur as the proportion of 5-star safety rated vehicles increase in the fleet, the magnitude of this reduction will be constrained by the high impact speeds that occur on high-speed roads.

Advanced vehicle technology, including Intelligent Speed Assist (ISA) will act to ensure speed limit compliance, while Autonomous Emergency Braking (AEB) will assist crash prevention and reducing impact speed. However, given technology fitment and current fleet turnover rates, full fleet penetration of these technologies will take 25 years to occur.

Given the long-lead times in the availability of advanced safety technology across the vehicle fleet, the use of speed limit reductions as a means of ensuring driver safety represents the single most cost-effective population-based countermeasure available to reduce the incidence of serious injury in crashes.

Speed limit reductions are especially important on roads where *Safe Roads* infrastructure is cost-prohibitive, and as an interim countermeasure to ensure safety.

1 Fitzharris, M, Lenné, MG, Corben, B, Pok Arundell, T, Peiris, S, Liu, S, Stephens, A, Fitzgerald, M, Judson, R, Bowman, D, Gabler, C, Morris, A & Tingvall. Enhanced Crash Investigation Study (ECIS): Report 1: Overview and Analysis of Crash Types, Injury Outcomes and Contributing Factors. Melbourne Vic Australia: Monash University, 2020. <https://www.monash.edu/muarc/ecis>
 2 Fitzharris, M, Corben, B, Lenné, MG, Peiris, S, Pok Arundell, T, Liu, S, Stephens, A, Bowman, D, Morris, A & Tingvall. Enhanced Crash Investigation Study (ECIS): Report 2: Speed, crash risk and injury severity. Melbourne Vic Australia: Monash University, 2022. <https://www.monash.edu/muarc/ecis>