

Putting the 5 mph injury threshold to the test

Brian Henderson reveals the results of his extensive research into the impact of low-speed-change collisions

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THIS AUTHOR NOTES:

It is often claimed that below a certain speed change "injury will not occur," and this threshold is purported to be 5 mph.

Collisions between motor vehicles and the occupants of those vehicles must conform to Newton's Laws of Motion.

"Historically, the argument about injury or likelihood of injury had been the domain of the medical experts, albeit without any true scientific evidence on which to base an opinion."

A struck vehicle will accelerate forward, with or without vehicle damage. This will cause accelerations of the occupant's chest and head.

This author and his colleagues have produced crashes resulting in a change in velocity of 5.97 mph of the struck vehicle. This caused a 4.7 g acceleration of the occupant's chest and an 8.3 g acceleration of the occupant's head. The difference between the head and chest acceleration was 3.6 g. This resulted in the symptoms of strains and headaches.

However, this research also showed that not all occupants reacted in the same manner to the same change in velocity.

This author and his colleagues have also produced collisions that produced a change in velocity between 2.8 to 3.1 mph. This resulted in a chest acceleration of 2.93 g and a head acceleration of 3.46 g. the difference between the chest and head acceleration was 0.53 g.

This author states:

- 1) "It is my opinion that beyond a speed change of 5 mph, the risk of injury is high."

- 2) "The risk [of injury] between 3 mph and 5 mph [speed change] is a grey area that would need further exploration, and injury cannot be ruled out."
- 3) "The risk [of injury] below 3 mph [speed change] is minimal."

KEY POINTS FROM DAN MURPHY

- 1) Collisions between motor vehicles and the occupants of those vehicles must conform to Newton's Laws of Motion.
- 2) "Historically, the argument about injury or likelihood of injury had been the domain of the medical experts, albeit without any true scientific evidence on which to base an opinion."
- 3) A struck vehicle will accelerate forward, with or without vehicle damage. This will cause accelerations of the occupant's chest and head.
- 4) Crashes resulting in a change in velocity of 5.97 mph of the struck vehicle cause a 4.7 g acceleration of the occupant's chest and an 8.3 g acceleration of the occupant's head. The difference between the head and chest acceleration is 3.6 g. This resulted in the symptoms of strains and headaches.
- 5) Not all occupants will react in the same manner to the same change in velocity.
- 6) This author states:
 - A)) "It is my opinion that beyond a speed change of 5 mph, the risk of injury is high."
 - B)) "The risk [of injury] between 3 mph and 5 mph [speed change] is a grey area that would need further exploration, and injury cannot be ruled out."
 - C)) "The risk [of injury] below 3 mph [speed change] is minimal."