

Flying elephants and the science of seat belts

As part of a seat belt awareness campaign, the Community Traffic Safety Project posed the question — “Do you have flying elephants in your car?”

Though it may seem like a peculiar thing to ask, the question is grounded in science.

In a 30-mile-an-hour crash, an unrestrained adult is thrown with a force of 3½ tons — about the weight of an elephant.

Imagine the flying elephant hitting you, a friend, or a child. Now think of what it would be like to be the flying elephant.

This may seem like an odd exercise of the imagination, but the point should be taken quite seriously whenever you drive a vehicle.

Most crashes happen at speeds under 40 mph, when people are in familiar neighborhoods. Therefore, you should buckle up every trip, every time.

Using a seat belt reduces the risk of fatal injuries by 45 percent for front-seat passenger in a car and 60 percent in a light truck.

So what is the science behind the use of a fabric strap to save countless lives every year?

The purpose of a seat belt is to counteract the principle of inertia, which states that an object in motion will stay in motion at its current velocity unless acted upon by another object.

In the case of a crash, a vehicle and those inside may all be traveling at 50 mph



(velocity). If the vehicle hits something like a tree (another object), it may stop. While the tree has only acted upon the vehicle, the people inside the vehicle will keep going in the same direction and same velocity as before (50 mph). This action will cause the unrestrained people to slam into something within the vehicle or even be ejected from the vehicle.

Seat belts, when worn properly, act on the person to break or slow down the velocity of the person buckled in. The proper use of a seat belt will also keep the wearer from being thrown from the vehicle or slamming into a dashboard, windshield or the rapidly opening air bag.

Seat belt webbing is made of a flexible material, which will give a little during a crash or sudden stop. Though seat belts are designed to extend and retract, during a crash they will tighten to hold the driver or passenger in place.

Additional information is available online at www.carinsurance.org/seat-belt-science.

Covered in this issue:

Embedded Tech and Engineering Topics — Newton's first law of motion

Vocabulary Terms — Inertia, velocity

Mythbusters: There's No Excuse Not to Buckle Up

Don't fall victim to common seat belt myths. No matter where you sit or how long you ride in a vehicle, you are always safer when you buckle up.

Just Drive PA debunks five popular misconception about seat belt usage.

- I'm not driving very far. **FACT:** Three out of four crashes occur within 25 miles of home.
- I'm riding in the back seat. **FACT:** You can still be thrown from a vehicle even if you are riding in the back seat. If you are unrestrained, you pose a risk to others in the vehicle with you.
- I'm driving at night and the police won't see me. **FACT:** Police departments are increasing nighttime enforcement. In addition, there are more high-risk drivers on the roads at night such as impaired drivers and drowsy drivers, which may present increased risk for a crash.
- I'm pregnant and the seat belt is too tight. **FACT:** Wearing your seat belt is the best defense for you and your baby in the event of a crash. Adjust the lap belt so that it fits snugly over the hips and pelvis, below your belly.
- I don't want to be trapped by a seat belt in case my vehicle catches fire or is submerged in water. **FACT:** Less than one-half of one percent of all injury crashes involves fire or submersion. Also, national research has shown you are 25 times more likely to be killed if you are ejected from the vehicle.

DID YOU KNOW... In Pennsylvania, the seat belt usage rate was 84 percent in 2014. National statistics show that for every 1 percent increase in seat belt usage, eight to 12 lives can be saved on the highways, according to Just Drive PA.

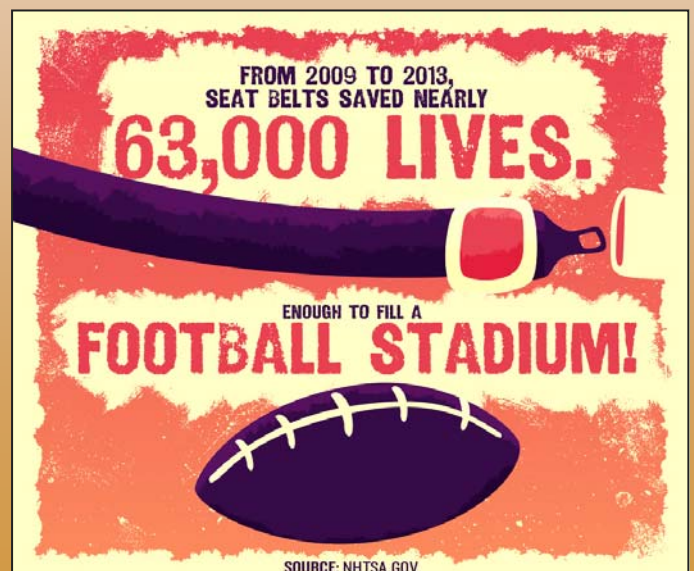
Click It or Ticket

Pennsylvania participates in the national Click It or Ticket campaign, where more than 600 municipal police departments and Pennsylvania State Police conduct usage enforcement during waves in May and November.

State law requires all drivers and front-seat passengers to buckle up. Those under 18 years of age must use a seat belt no matter where they sit.

The National Highway Traffic Safety Administration gives detailed directions on how seat belts should be worn.

- Place the shoulder belt across the middle of your chest and away from your neck.
- Adjust the lap belt across your hips, below your stomach.
- Both straps should fit snugly.
- Never put the shoulder belt behind your back or under an arm.



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