



Senior Drivers

It is a beautiful sunny day and you are driving home from your local grocery store.

In such nice weather and with a clean, 50-year driving record, potential crash involvement is the last thing on your mind. You approach a busy four-way stop and, when you think it is your turn, you accelerate through the intersection. The problem is that it was not your turn. A honking horn warns of the imminent crash, just as the passenger side of your vehicle is struck. Luckily, due to the low speed of travel, the damage to both vehicles is minimal and no one sustains any injuries. However, as the driver of the other car exits their vehicle and demands to know why you did not yield the right of way, you have a sinking feeling that this crash is entirely your fault.

The number of senior drivers is growing on the road. Although they generally have more experience than other drivers, various aspects of aging can pose road safety risks. Research shows that vehicle safety features can prevent and mitigate crashes when paired with safe driving techniques. In order for senior drivers to accrue the maximum benefits of safety features, it is important to understand how the effects of aging influence driving ability, and the scope of protection that safety features offer.

Who are senior drivers?

Most studies on senior drivers define this group as 65 years of age or older. Occasionally researchers will differentiate groupings of seniors, including those 64-74, 74-85, and 85 and older due to differences in their crash risk.

How do senior drivers affect road safety?

According to Transport Canada, in 2019 around 94% of Canadian seniors aged 65 and older held a driver's licence. The number of senior drivers has been increasing in Canada, accounting for around 17% of all licensed drivers in the country (Transport Canada, 2020). Research has also consistently found a positive relationship between age and crash involvement (Mayhew & Simpson, 2006; Gomes-Franco et al., 2020), that is, elderly drivers are a higher crash risk group. According to the World Health Organization (WHO), in 2020, the number of people aged 60 years and older outnumbered children younger than 5 years, and between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22% (WHO, 2022). With respect to road safety, as the population ages this means that more drivers with age related declines will be on the road in the future.

There are a variety of reasons why seniors represent a higher crash risk group. One important reason is that seniors tend to drive mostly on local streets and avoid freeways (Robertson & Vanlaar 2008; Mayhew & Simpson 2006; Braitman et al. 2011; Hansen et al., 2020). Since local streets tend to be more congested and contain more intersections than freeways, there are more opportunities for seniors to be involved in crashes. In addition to driving mostly on busy city streets, older drivers tend to drive less overall than younger drivers. Despite years of driving experience, the typically low annual mileage rate of senior drivers is positively correlated with an increased crash risk (Alvarez & Fierro, 2008; Hansen et al., 2020).

Some older drivers may experience medical problems or conditions that interfere with their ability to drive safely. More than 80% of drivers aged 65 and older involved in crashes had one or more driver-impairing diagnoses, (e.g. more than 50% had a cardiovascular disease, more than 40% had a vision impairment and also more than 40% had a diagnose affecting motor-functions indicating driver-impairing diagnoses to be common in drivers also before the age of 65) (Skyving, Möller & Laflamme, 2023).

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In addition to the above, senior drivers have the third highest death rate per 100,000 drivers, after drivers aged 20 to 24 and 25 to 34 (Transport Canada, 2022). An important reason for this is the physical frailty of some senior drivers. In a crash of equal severity, a senior driver is more likely to suffer serious or fatal injuries than a younger driver (Robertson & Vanlaar, 2008).

What factors affect senior drivers?

Many factors associated with advancing age can affect driving ability. Some factors, such as slower reaction times and reduced mobility, occur as a function of normal age-related declines in abilities (Alvarez & Fierro, 2008; Dobbs, 2005; Bucshazy et al., 2020; Zhao, Yamamoto & Kanamori, 2020). In addition, there are many medical issues that commonly occur among the elderly which may adversely affect driving, such as visual impairment, more pronounced physical limitations that affect a driver's ability to move, in addition to other medical factors such as heart disease, stroke, and cognitive declines such as dementia (Charlton et al., 2004; Dobbs, 2005; Zhao, Yamamoto & Kanamori, 2020).

The driving ability of elderly people may also be further impaired by a number of medications, such as antidepressants, benzodiazepines, non-steroidal inflammatory drugs, anticoagulants, and angiotensin converting enzyme inhibitors (McGwin et al. 2000; Hetland & Carr, 2014; Lu et al., 2020; Zitoun et al., 2022). This is important because the frequency and



quantity of prescription drug use tends to increase with age.

The influence of these factors on crash risk can be gauged by examining the types of crashes involving senior drivers. Elderly drivers are more likely than other drivers to be involved in intersection crashes, side-impact crashes, angle crashes, and when turning, particularly when turning left across traffic flow (Mayhew et al., 2006; Braitman et al., 2010; IIHS, 2023). Among passenger vehicle drivers involved in fatal crashes in 2021, multiple-vehicle crashes at intersections accounted for 39% of the crashes for drivers 80 and older, compared with 20% for drivers ages 16-59 (IIHS, 2023). In addition, elderly drivers are also more likely than other drivers to be involved in collisions because of a traffic violation, such as failure to yield right-of-way or disregarding the traffic signal (Mayhew et al., 2006; Braitman et al., 2010; IIHS, 2023). Involvement in these types of crashes tends to increase with age, especially after the age of 80 (Mayhew et al., 2006; IIHS, 2023).

What effect does age have on the ability to benefit from safety features?

Vehicle safety features reduce crash risk and enhance overall road safety when paired with safe driving practices. However, some of the driving errors that elderly drivers are prone to make can have a negative effect on their ability to drive safely and therefore can affect the optimal performance of a variety of safety features. There are several ways this can happen.

Activation depends on prior reaction:

Since active safety features have no way of autonomously watching the road, many features must take their cues based on braking and steering input from drivers. These safety features are only triggered after drivers take specific actions. Since elderly drivers typically take longer to react to situations, safety features may activate later than they would otherwise. Safety features work best when given optimal time and distance to perform, so a delayed reaction time on the part of drivers can detract from the performance of safety features by limiting the time and distance available for these features to work.

Significant amount of coordination and force:

Before and during the activation of safety features and performance of emergency driving maneuvers, a high level of force and/or coordination will likely be required on



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the part of drivers. First, some safety features like **brake assist** requires the initial application of the brakes be hard and fast. Declines in motor skills and mobility among older drivers may make achieving this level of force and speed difficult. Second, while safety features are working, high-level decision-making and acting may be required on the part of drivers to work with the safety features to resolve the situation. For example, **electronic stability control (ESC)** may initiate targeted braking to help bring a vehicle back under control, but drivers must still moderate the speed and steer the vehicle out of danger. In high-stress situations where safety features engage, the ability of drivers to think and act quickly is of crucial importance. The natural aging process affects this ability, and declines may be exacerbated further by certain medical conditions and medications.

Age-related collisions and safety feature limitations: Safety features cannot address many types of collisions where age-related deficits cause the collision. Crashes that take place at relatively low speeds, in good weather, and over short periods (e.g., a driver fails to yield the right-of-way to another at a four-way stop), may not activate many safety features. Furthermore, while airbags and seatbelts will always be available to protect vehicle occupants from further injury, the fact remains that elderly drivers are at an increased risk of injury in less severe collisions



because of their increased frailty. This means the scope of collisions that are not addressed by many safety features but may nevertheless cause injury could be broader for older drivers.

When factors that influence the performance of safety features are challenged by factors that affect the ability of older drivers to drive safely, the result is a potential loss in the overall benefits that safety features can offer road users. The best way to accrue optimal safety benefits from safety features is to focus on driving safely, and to avoid relying on safety features to compensate for declines in driving ability.

What safety features are directly affected by age?

Longer reaction times, impaired visual ability, limited physical mobility, and cognitive declines can directly affect several safety features, notably those whose peak performance requires active participation from the driver. **Antilock braking systems (ABS), electronic stability control (ESC), brake assist, and electronic brake-force distribution (EBFD)** all are activated based on driver input and continue to rely upon appropriate driver directions after activation. Anything that delays activation of these features - be it a slow response to roadway hazards caused by poor vision or difficulty processing a dangerous situation and judging what actions are required - can make it difficult for these safety features to work at their best.

Other safety features like **adaptive headlights, forward collision warning systems, and lane departure warning systems** are passive and do not rely upon prior driver action. However, realizing the safety benefits of these features still depends upon the driver's reaction. For example, adaptive headlights will light up parts of the road at night that would normally be left unlit, but if a potential hazard is illuminated, it is still up to the driver to take evasive action to avoid a collision. This may require night vision, quick thinking and a considerable level of precise driving skill; qualities that diminish with age.



Some safety features may seem to target exactly the types of problems that affect some senior drivers. For example, lane departure warning systems and forward collision warning systems alert senior drivers of potentially dangerous situations that result from momentary declines in driving ability. However, it is not advisable for elderly drivers to rely on these features to protect them, particularly since once an alert sounds, drivers could have a very limited amount of time to react to the situation. Senior drivers who, for example, experience bouts of sleepiness or temporary loss of

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consciousness, should consider limiting their driving exposure as opposed to purchasing a car with safety features that sounds warning when danger is detected.

Are there any laws specific to senior drivers?

Currently, there are no laws in Canada specific to senior drivers. However, for drivers who are over 80 years old, there are some changes in the licensing process. The details of these changes vary across Canada, as licensing standards are set by provinces and territories.

In Ontario, for example, prior to their 80th birthday and then every two years thereafter, senior drivers receive notice instructions and licence renewal forms in the mail from the Ministry of Transportation, Ontario (Ministry of Transportation Ontario, 2023). The licence renewal process includes: a vision test, an in-class screening exercise, a driver record review, a G1 road test if necessary, and a Group Education Session (GES). If successful, drivers are issued a new licence that is valid for two years (unlike drivers in other age groups, whose licences are valid for five years).

Where can I find more information on senior drivers?

Information for and about senior drivers is available from a variety of sources. TIRF has published research – accessible at tirf.ca – on the topic of older drivers. The Insurance Institute for Highway Safety in the United States has made its research available at www.iihs.org.

More information including safety tips for older drivers is available from Transport Canada – www.tc.gc.ca – and the Canadian Association for Occupational Therapists, at www.olderdriversafety.ca. In the United States, the National Institute on Aging is a good resource for older drivers. Their information is located at www.nia.nih.gov.

References

Visit brainonboard.ca/program-resources/references for a full list of references.

Want to learn more?

Visit brainonboard.ca to learn more about vehicle safety features:

- Active Safety Features
- Passive Safety Features
- Driver Assistance Technologies
- Safety Technologies in Development

Driving instructors, road safety educators, car dealers and service providers can download and order program resources and materials through the Brain on Board website: brainonboard.ca/program-resources.

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64.8% of Canadians think it's important to pay careful attention to driving, even with advanced safety features like brake assist.

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