

Medically Unfit Drivers and Age

This document reviews some of the road safety research and data, as well as the situation in other jurisdictions, to demonstrate the reasons for age-based reviews of fitness to drive. Ultimately, such age-based reviews are needed in order to protect the safety and physical security of all road users in the province of British Columbia.

Driving a motor vehicle involves a complex set of tasks and abilities. Drivers must rely, simultaneously, upon three basic human abilities involving sensory, cognitive, and physical motor functions. In other words, drivers must be able to see an obstacle (the sensory part); process information and make a decision about what to do (the cognitive part); and then actually take a physical action, like put their foot on the brake pedal or turn the steering wheel (the motor part).

Unlike most other types of driving behaviours, past driving experience often tell us little about the future crash risk of unfit drivers, because many of these human performance deficiencies come about over time—sometimes suddenly—and most often with age.

Crash risks increase for drivers with vision problems, cardiovascular conditions, pulmonary conditions, diabetes, psychiatric conditions, seizures, and neurological and cognitive impairments like Alzheimer's and vascular dementia.^{1 2} Researchers looking at five years of data from Utah found that drivers with learning and memory conditions, including Alzheimer's, were over three times more likely than average drivers to be in an at-fault crash, and that those with musculoskeletal issues like osteoporosis were as much as eleven times more at risk of causing an at-fault crash.³ Research is conclusive that the incidence of these and other medical conditions rise as a person's age increases.

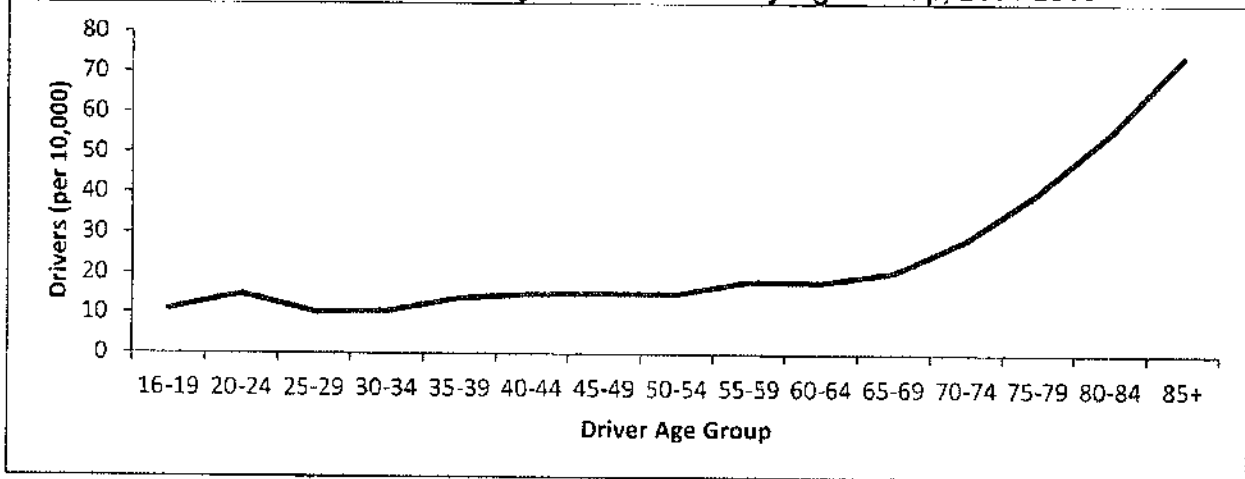
There is a great deal of research to show that older drivers self-regulate not only by driving less but by not driving in the dark, not driving during inclement weather, and not driving on highways.⁴ Several studies, however, show that people who drive just a few kilometres per week are, in fact, some of the most dangerous drivers on the road, based on crash risk per kilometre travelled, with significantly higher crash rates for those who drive less than three thousand kilometres per year than for those who drive fourteen thousand kilometres per year and more.^{5 6} A large number of research papers have explored this issue, and found that fatality and injury outcomes start to increase significantly and exponentially for crashes involving drivers aged seventy to seventy-five.^{7 8 9}

Dr. Eric Hildebrand, from the University of New Brunswick, a road safety researcher and engineer, investigated what the crash rate looks like for older drivers. He looked at the general research literature in the field and road crash data in his province, and found the usual "U-shaped graph" showing high crash rates, per kilometre travelled, for both young and old drivers alike.¹⁰ Hildebrand found that crash risk slowly begins to increase for drivers beginning in their late fifties and early sixties. The only other age groups that have a higher relative crash risk are teenagers and those over seventy years old.

Graphical examples to illustrate these points are presented on the following pages.

Figure 1 shows the count of British Columbia drivers involved in motor vehicle (MV) crashes resulting in a casualty (injury or fatality), and where there was a contributing factor assigned related to driver fitness, i.e., Illness, Loss of Consciousness, Pre-Existing Physical Disability, or Deceased Prior to Collision. The counts are per 10,000 active driver licences, by age group, from 2004 to 2013. The number of these medical fitness related crash contributing factors rises with age and especially at around ages 70 to 75.

Figure 1: Drivers Involved in Casualty Crashes in BC by Age Group, 2004-2013

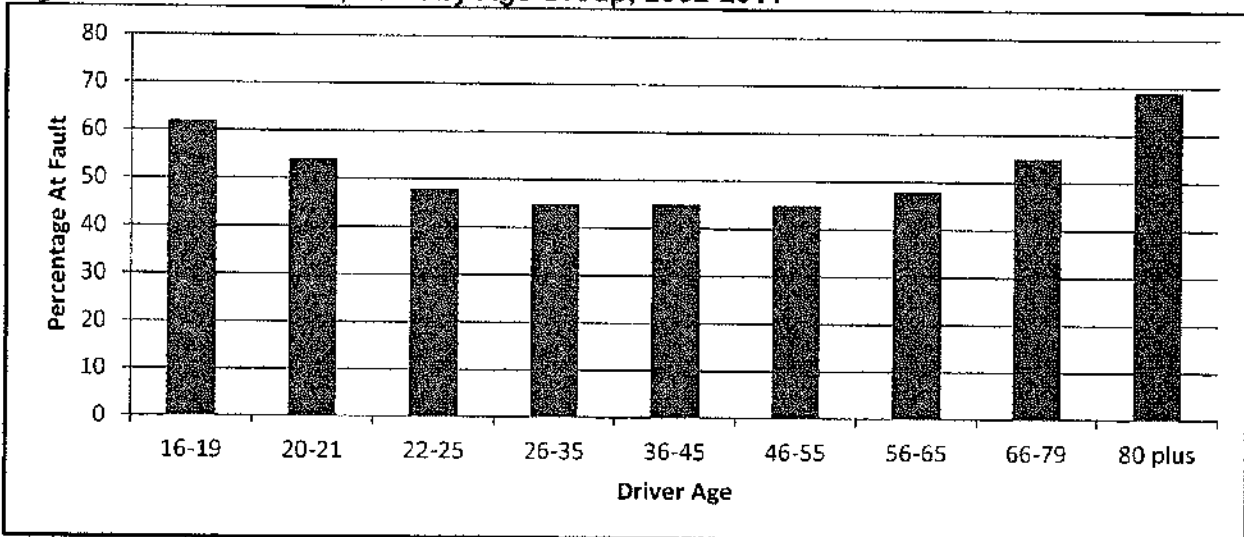


Source: Traffic Accident System crash contributing factor codes include: illness 22; sudden loss of consciousness 23; pre-existing physical disability 26 and deceased prior to collision 87, Report# 2015CMN0938-0. Active driver licences from ICBC Quick Stats, 2014.

This figure is read as follows: In the 10-year period 2004-2013, 11 of every 10,000 drivers aged 16-19 were involved in a casualty MV crash, while 74 of every 10,000 drivers aged 85+ was involved in a casualty MV crash.

Figure 2 shows the U-shaped pattern for young and senior drivers illustrating the at-fault percentage of all drivers involved in MV crashes.

Figure 2: Crashes in BC, Fault by Age Group, 2002-2011



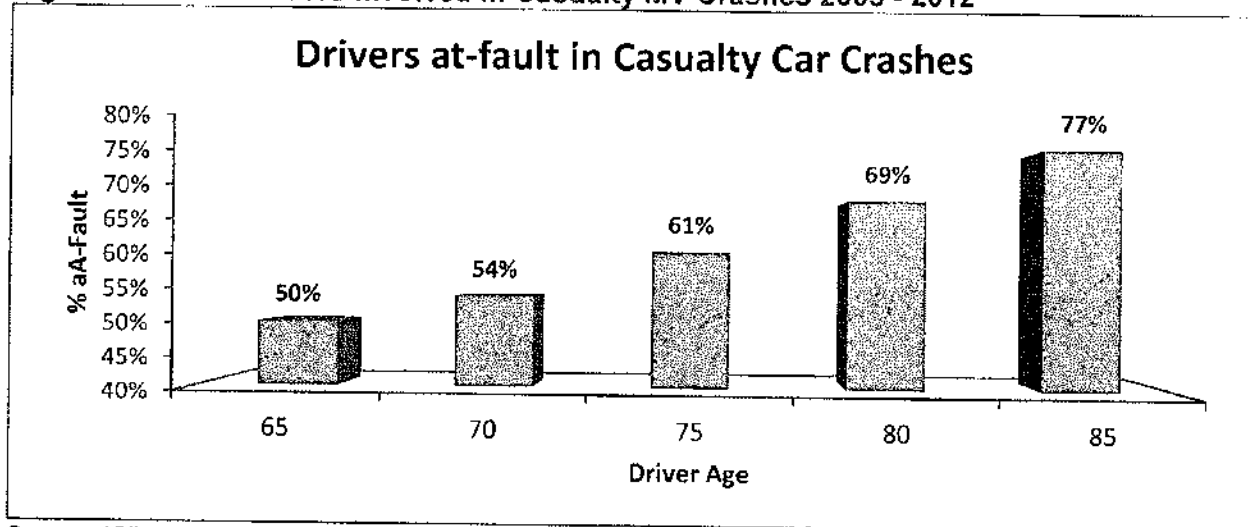
Source: ICBC, 2012 (filename: "W Jensen, 2012, Driver Medical Fitness Research")

Figure 2 is read as follows: Of all 16-19 year old drivers involved in a MV crash, 62% are found to be at-fault. This declines as a driver ages, then increases steadily beginning at around age 60, reaching 69% of drivers by age 80.

The Superintendent is charged with the duty to ensure that all drivers are physically and medically fit to drive. At this time, the Superintendent reviews medical information of drivers beginning at age 80. While most drivers continue to be safe drivers at this age, some are not. RoadSafetyBC has long been concerned with the medical fitness of drivers. Beginning in 1960, the Superintendent required drivers to meet the medical standards recommended by the British Columbia Medical Association.

Figure 3 highlights the age 65+ portion of the data from Figure 2, showing how at-fault crash involvement increases with age.

Figure 3: Senior Drivers involved in Casualty MV Crashes 2003 - 2012



Source: ICBC Business Information Warehouse, 2013 (RAD 2013-160).

The figure shows that of all 65-year old drivers involved in a casualty motor vehicle (MV) crash, 50% are found to be at-fault. This increases steadily, reaching 69% of drivers by age 80.

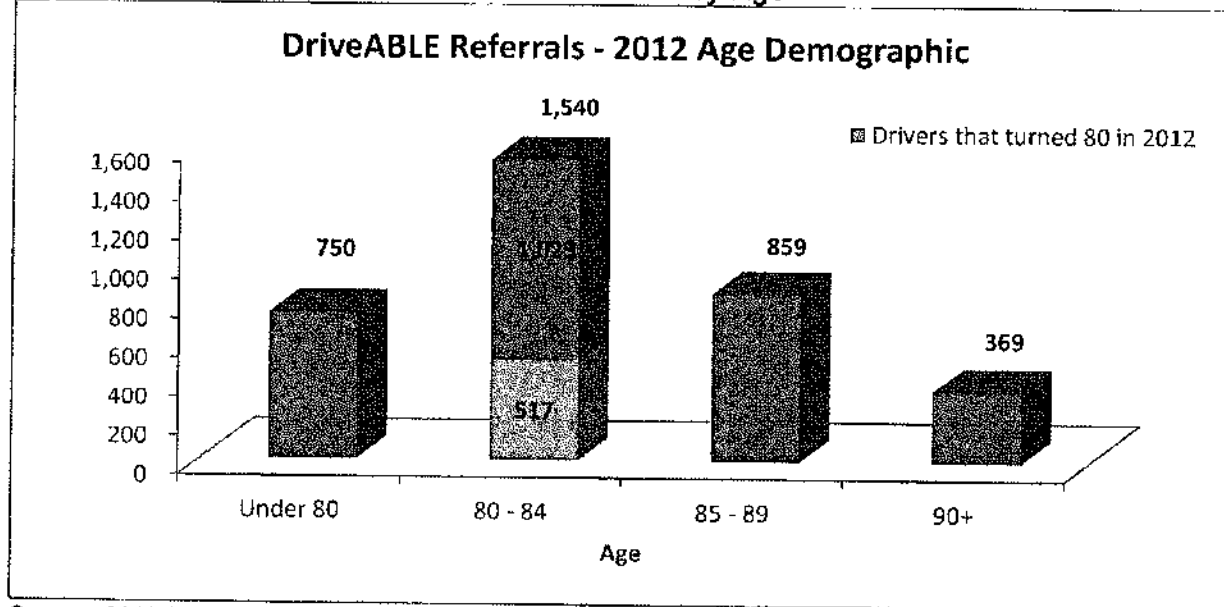
Medical Fitness Evaluation

All drivers in British Columbia who have a licence to drive a commercial vehicle, all drivers who have a known medical condition that may affect their driving ability and all licenced drivers over the age of 80 must complete a Driver Medical Exam Report (DMER) on a regular basis. Additionally, RoadSafetyBC may request that a client complete a DMER if they have received an unsolicited report on the client's ability to drive.

RoadSafetyBC assesses approximately 145,000 DMERs annually, including over 48,000 for age. When a physician indicates that a person's ability to drive may be affected by a cognitive condition such as Alzheimer's or dementia, RoadSafetyBC may refer the driver to DriveABLE. Of the approximately 145,000 drivers asked to complete a DMER, about 2% are referred to a DriveABLE assessment which is a specific type of driver assessment.¹¹

Figure 4 shows the age demographics of the 3,518 drivers referred to DriveABLE in 2012 by RoadSafetyBC.

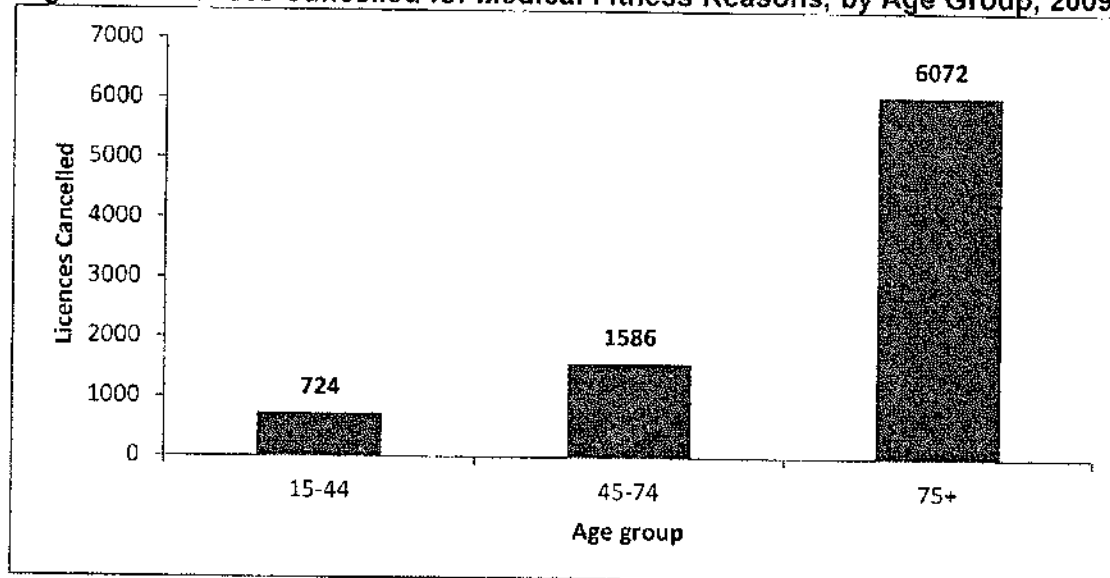
Figure 4: Drivers Referred to DriveABLE in 2012 by Age



Source: 2012 RoadSafetyBC DriveABLE referral logs and ICBC age data (RAD 2013-153).

The number of driver licences cancelled due to medical fitness increases steadily with age. Figure 5 shows the total number of licences cancelled due to medical fitness for the time frame 2009 to 2011, by age group.

Figure 5: Licences Cancelled for Medical Fitness Reasons, by Age Group, 2009 – 2011



Source: DFCMS, 2012 (RAD 2012-163).

Age-based medical fitness requirements for licence renewals vary by jurisdiction. Many countries in the European Union have a medical fitness requirement to renew driver licences beginning at age 70. In Canada, 88% of the population¹² lives in a jurisdiction with an age-based requirement, most of which begin at age 75. Australia is similar, with age-based medical fitness requirements beginning at age 70 or 75.¹³ The requirements throughout New Zealand begin at age 75. A breakdown by country is found in Table 1.

Table 1: Summary of the age-based screening requirements in various jurisdictions
Europe:

Country	Renewal interval	Medical requirements for renewal
Sweden	10-year renewal required	None
Germany	Renewal not determined by age	None
Ireland	Annual renewal regardless of age	At 70, a certificate of medical fitness is required.
The Netherlands	At age 70, medical review required every five years	Depending on physical condition, medical review may be more frequent, vision test required.
United Kingdom	From age 70, mandatory renewal for three-year periods	Self-declaration of ability to meet vision standard required. Any medical condition that could affect driving must be reported to the Licensing Agency.
Portugal	At age 70, renewed every two years	At age 70, a medical exam is required every two years.
Denmark	At age 70, issued for four years	Physician's certificate required
	At age 71, issued for three years	
	At ages 72-79, issued for two years	
	At ages 80+, issued for one year	
	If ill, shorter terms possible.	
Finland	At age 45, renewal every five years	After age 45, medical review every five years, covering general health status and vision. Renewal requires medical examination and verification of ability by two people.
	As of age 70, renewal period depends on the physician	
Italy	Ten-year renewal up to age 50	Medical test required with renewal
	Five-year renewal after age 50. Three-year renewal at age 70.	

Canada:

Province / Territory	Age Threshold	Medical requirements for renewal
British Columbia	80 and every 2 years after	Yes. Medical Examination
Alberta	75, 80, & every 2 years after	Yes. Medical Examination
Saskatchewan	None	
Manitoba	None	
Ontario	Pre-screen at 80; & every 2 years after	Renewal session. Possible medical examination or road test.
Quebec	45, 75, 80, & every 2 years after	Yes. Medical Examination
New Brunswick	None	
Nova Scotia	None	
Prince Edward Island	None	
Newfoundland	75, 80, & every 2 years after	Yes. Medical Examination
Yukon	70, 75, 80, & every 2 years after	Yes. Medical Examination
Northwest Territories	75, 80, & every 2 years after	Yes. Medical Examination
Nunavut	75 and every 2 years after	Yes. Medical Examination

Australia

State	Age Threshold	Medical requirements for renewal
New South Wales	Required annually from 75 years of age	Yes. Medical Examination
Victoria	When reported	When Reported
Queensland	Required to carry medical certificate when driving from 75 years of age	Yes. Medical Examination
Western Australia	Required at ages 75, 78, 80, and annually thereafter	Yes. Medical Examination
South Australia	Required annually from 70 years of age	Yes. Medical Examination
Tasmania	Required annually from 75 years of age	Yes. Medical Examination
Australian Capital Territory	Required annually from 75 years of age	Yes. Medical Examination

New Zealand:

New Zealand	75, 80 and every two years after that
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The situation in Europe, and Sweden in particular, with respect to its systems for regulating drivers for their fitness to drive are covered in detail in **Appendix A**.

Appendix A

Driver Fitness Regulation in the European Union including Sweden

Driver fitness is monitored and assessed differently across Europe depending on jurisdiction. Existing policies range among the 27 European Union (EU) countries, with variances in senior licence renewal requirements, terms and conditions.¹⁴ This section will examine licence renewal procedures for senior drivers and Sweden's current practices in particular. An overview detailing the scope of EU senior licence renewals requirements will first be presented. Next, Sweden's senior licence renewal procedures will be explained. To conclude, a summary will provide an analysis that will compare Sweden's senior road safety performance to other worldwide road safety performing countries and Canada.

Key Findings

- The majority of European Union countries require age-based testing as a licence renewal requirement;
- Although Sweden does not impose age-based testing for licence renewal, all drivers licences must be renewed every ten years, regardless of age;
- Physicians in Sweden are required to report and refer all patients who are medically at risk for driving to The Swedish Transport Agency;
- All drivers reported to The Swedish Transport Agency must complete a standardized medical fitness assessment;
- People 65 and older represent 25% of Sweden's overall road fatalities, but only 19% of total population in 2011; and
- Four out of 5 of the world's top road safety performance leaders require age-based licence renewal.

European Union Senior Licence Renewal Requirements

Current drivers licence renewal procedures for seniors across the EU range from issuing unlimited drivers' licences to annual assessment requirements. Unlimited drivers' licences are administered in six EU countries primarily located in Central Europe (Austria, Belgium, Bulgaria, France, Germany, and Poland).¹⁴ The remaining twenty-one EU countries require drivers' licences to be validated incrementally (Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom). Each of these countries, with the exception of Sweden, also limits licence renewal based on driver's age.¹⁴

The majority of EU countries require age-based renewal assessments at a specific designated age, and subsequently require further assessments at more frequent intervals as the driver ages. Physician assessments are also required for senior licence renewal in all EU countries except those that issue unlimited licences, Hungary, Poland, Sweden and the United Kingdom. Countries that use aged based licence renewal assessments at specific ages are detailed in Table 1 below.

Table 1: Outline of European Union Countries that Require Licence Renewal Assessments by Age

Age	Country
40	Hungary
50	Italy, Portugal
55	Lithuania
60	Luxembourg, Czech Republic
65	Estonia, Greece, Spain, Slovakia
70	Denmark, Slovenia, Cyprus, Malta, Ireland, Netherlands, UK, Finland, Latvia

Source: CONSOL, Driver Licensing Legislation¹⁴

Sweden Senior Licence Renewal Procedures

Sweden issues drivers licences in ten-year incremental time frames regardless of the driver's age.¹⁴ Renewal procedures are administrative and can be completed by mail. Unlike the majority of EU countries, Sweden does not require physician or age-based renewal assessments for seniors at a particular age. However, Sweden requires physicians to report all patients whose driving ability could be a risk or where there are other driving concerns.¹⁴

The Swedish Transport Agency is the central authority responsible for all traffic regulation in Sweden. All drivers reported to The Swedish Transport Agency are required to undergo a medical fitness assessment. Actual medical fitness assessments are completed at The Swedish Transport Agency in a traffic medical centre.¹⁴ The Swedish Transport Agency is able to administer consistent and reliable testing using a centralized traffic medical centre with standardized tests. Sweden has become particularly well established and advanced in the traffic medicine field. Their traffic medicine practices have been evaluated by physicians, traffic medicine professionals, the Association for Traffic medicine, researchers and road authorities.¹⁴

Analysis

Table 2 displays a summary of the top five road safety performing countries according to the International Transport Forum in 2014. Data results in Table 2 are for the year 2012. Each country's international road safety performing rank, number of road fatalities per 100,000 population, age-based testing, age of first assessment and methods used are displayed in Table 2 below. Results indicated that the top four road safety performing countries in the world use age-based testing for licence renewal.

Table 2: Outline of Licence Renewal Methods of Top Five Road Safety Performing Countries

International Rank	Country	Road Fatalities per 100,000 population (2012) ¹⁷	Age-based testing	Age of first assessment	Methods Used
1	United Kingdom	2.8	Yes	70	Medical self-certification checklist must be completed, and if not drivers will be required to undergo a driver's fitness assessment at mobility centre. ¹⁴
2	Iceland	2.8	Yes	65	Physicians statement of driver's health and medical condition required for renewal. ¹⁵
3	Norway	2.9	Yes	70	Driver must carry valid physician medical certificate while driving at all times. ¹⁶
4	Denmark	3	Yes	70	Physical check, Mini-mental test, clock drawing test. ¹⁴
5	Sweden	3	No ¹⁴	-	Licences must be renewed every 10 years, regardless of driver's age. Physicians are required to report patients whose driving ability could be a risk to the Swedish Transport Agency, where all reported drivers must complete medical fitness assessment.

Sources^{14 15 16 17}

Sweden

People 65 and older represented 25% of Sweden's overall road fatalities, but only 19% of total population in 2011. Table 3 below displays Sweden's total number of road fatalities by age group (number of fatalities and percentage of total fatalities) and highlights people over 65.

Table 3: Number of Road Fatalities by age group in Sweden^{15 18}

Age	1990		2000		2010		2011	
0-5	12	1.55%	2	0.34%	3	1.13%	1	0.35%
6-9	10	1.30%	3	0.51%	3	1.13%	0	0.00%
10-14	13	1.68%	14	2.37%	4	1.50%	6	2.11%
15-17	34	4.40%	16	2.71%	9	3.38%	10	3.51%
18-20	88	11.40%	53	8.97%	20	7.52%	16	5.61%
21-24	66	8.55%	49	8.29%	26	9.77%	25	8.77%
25-64	357	46.24%	300	50.76%	137	51.50%	156	54.74%
65+	192	24.87%	154	26.06%	64	24.06%	71	24.91%
Unknown	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total	772	100.00%	591	100.00%	266	100.00%	285	100.00%

Canada

In Canada, people over 65 represent 20% of all road fatalities. This statistic is nearly 5% less than the percentage of overall fatalities people 65 and older have in Sweden. In 2011, 15% of Canada's population was 65 years old or more.²⁰ Table 4 below displays Canada's total number of road fatalities by age group (number of fatalities and percentage of total fatalities) and highlights people over 65.

Table 4: Number of Road Fatalities by age group in Canada^{19 20}

Age	1990		2000		2010		2011	
0-5	101	2.55%	38	1.31%	20	0.89%	21	1.05%
6-9	77	1.94%	41	1.41%	15	0.67%	12	0.60%
10-14	127	3.20%	65	2.24%	28	1.25%	30	1.50%
15-17	223	5.63%	183	6.30%	114	5.10%	90	4.49%
18-20	382	9.64%	293	10.09%	192	8.58%	171	8.52%
21-24	444	11.20%	294	10.13%	211	9.43%	194	9.67%
25-64	2003	50.54%	1460	50.29%	1219	54.49%	1050	52.34%
65+	583	14.71%	505	17.40%	427	19.09%	416	20.74%
Unknown	23	0.58%	24	0.83%	11	0.49%	22	1.10%
Total	3963	100.00%	2903	100.00%	2237	100.00%	2006	100.00%

United Kingdom

The United Kingdom is one of the best road safety leaders in the world. The United Kingdom reported a smaller proportion (22%) of people 65 and older in overall road fatalities. Table 5 below displays the United Kingdom's total number of road fatalities by age group (number of fatalities and percentage of total fatalities) and highlights people over age 65.

Table 5: Number of Road Fatalities by age group in the United Kingdom²¹

Age	1990		2000		2010		2011	
0-5	123	2.28%	41	1.15%	16	0.84%	13	0.66%
6-9	108	2.00%	41	1.15%	14	0.73%	10	0.51%
10-14	163	3.02%	89	2.49%	12	0.63%	29	1.48%
15-17	335	6.20%	169	4.72%	93	4.88%	77	3.93%
18-20	558	10.33%	342	9.55%	206	10.81%	152	7.76%
21-24	616	11.40%	304	8.49%	156	8.19%	189	9.64%
25-64	2223	41.15%	1908	53.30%	1031	54.12%	1051	53.62%
64+	1241	22.97%	679	18.97%	377	19.79%	439	22.40%
Unknown	35	0.65%	7	0.20%	0	0.00%	0	0.00%
Total	5402	100.00%	3580	100.00%	1905	100.00%	1960	100.00%

Citations

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- ¹¹ Source: DFCMS and DriveABLE referral log, 2015 (RAD 2015-009).
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Senior Drivers Summary

The Superintendent is charged with the duty to ensure that all drivers are physically and medically fit to drive. At this time, the Superintendent reviews medical information of drivers beginning at age 80. While most drivers continue to be safe drivers at this age, some are not. RoadSafetyBC has long been concerned with the medical fitness of drivers. Beginning in 1960, the Superintendent required drivers to meet the medical standards recommended by the British Columbia Medical Association.

There are approximately 150,000 driver medical fitness assessments completed each year. Of these, approximately 45% are routine commercial assessments, and about 50,000 are age based assessments for drivers aged 80 and above. The remainder are assessments conducted following a report of a condition or concern from police, family, ICBC or medical professionals.

Of the 150,000 driver medical fitness evaluations, approximately 145,000 drivers are deemed medically fit to continue driving. When a physician indicates that a person's ability to drive may be affected by a cognitive condition such as Alzheimer's or dementia, RoadSafetyBC *may* refer the driver to DriveABLE. About 1% to 2% of all assessments result in a referral to the DriveAble program.

This is the approximate count of drivers referred to DriveAble:

<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
2,700	3,500	3,000	1,500

Approximately 4,000 drivers each year are found medically unfit to drive. Some of these are based on the results of a DriveAble assessment.

Approximately 800 drivers voluntarily surrender their drivers licence each year for various reasons. Although some of these could be due to a pending evaluation, the reasons for a driver surrendering their licence are not tracked.

There is a great deal of research to show that older drivers self-regulate not only by driving less but by not driving in the dark, not driving during inclement weather, and not driving on highways.ⁱ Several studies, however, show that people who drive just a few kilometres per week are, in fact, some of the most dangerous drivers on the road, based on crash risk per kilometre travelled, with significantly higher crash rates for those who drive less than three thousand kilometres per year than for those who drive fourteen thousand kilometres per year and more.^{ii iii} A large number of research papers have explored this issue, and found that fatality and injury outcomes start to increase significantly and exponentially for crashes involving drivers aged seventy to seventy-five.^{iv v vi}

The following data focuses on motor vehicle (MV) crash involvement per capita by age group. The impact of fewer kilometers driven in senior age groups is not included.

In the 10-year period 2004-2013, 37 of every 1,000 drivers aged 16-19 were involved in a MV crash per year, while 17 of every 1,000 drivers aged 85+ were involved in a MV crash per year. This is detailed in Table 1.

Table 1: Drivers Involved in MV Crashes in BC, All Contributing Factors, 2004-2013.

2004 – 2013		Injury, Fatality and Property Damage Crashes		Injury and Fatality Crashes	
Driver Age	Active Drivers ²	Drivers Involved in a Crash	per 1,000 Drivers, per year ³	Drivers Involved in a Crash	per 1,000 Drivers, per year ³
16-19	146,200	54,389	37	22,677	16
20-24	229,800	78,225	34	35,118	15
25-29	263,000	61,311	23	28,224	11
30-34	264,600	54,386	21	25,042	9
35-39	266,200	55,302	21	25,605	10
40-44	292,400	59,685	20	27,712	9
45-49	319,200	58,444	18	27,090	8
50-54	326,800	50,398	15	23,587	7
55-59	298,800	40,084	13	18,668	6
60-64	259,000	29,706	11	13,550	5
65-69	194,200	20,016	10	9,084	5
70-74	135,400	15,259	11	6,692	5
75-79	97,000	12,417	13	5,504	6
80-84	56,400	8,595	15	3,706	7
85+	30,400	5,114	17	2,131	7
Total	3,179,400	603,331	19	274,390	9

Source: Traffic Accident System, ICBC Report# 2015CMN1441-0, extracted March 31, 2015.

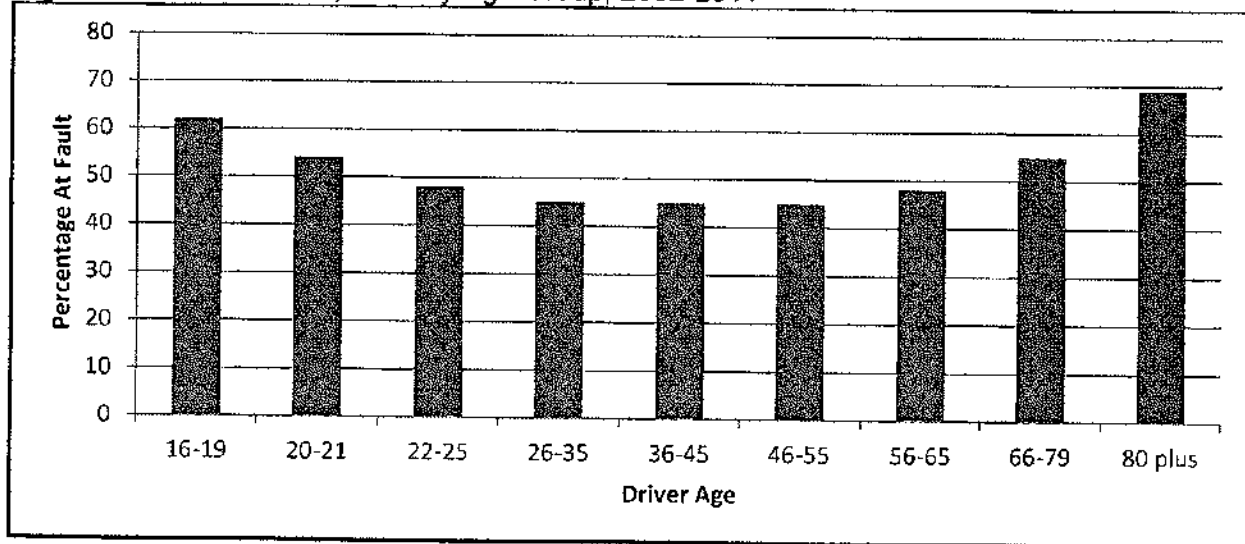
¹ Crashes resulting in property damage over \$1,000.

² Active driver population is the average of the 2009-2013 yearly totals provided by ICBC.

³ This is an annual estimate, for example the 20-24 age group is calculated as: $78,225/10 = 7822.5$ avg per year. Then this is divided into the driver population for that age group, 229,800: $(7822.5/229,800) \times 1,000 = 34$ drivers per 1,000, per year.

Figure 1 shows the U-shaped pattern for young and senior drivers illustrating the at-fault percentage of all drivers involved in MV crashes.

Figure 1: Crashes in BC, Fault by Age Group, 2002-2011



Source: ICBC, 2012 (filename: "W Jensen, 2012, Driver Medical Fitness Research")

Figure 1 is read as follows: Of all 16-19 year old drivers involved in a MV crash, 62% are found to be at-fault. This declines as a driver ages, then increases steadily beginning at around age 60, reaching 69% of drivers by age 80.

ⁱ G. Griffith (2007), *Older drivers: A review of licensing requirements and research findings* (Briefing Paper No 11/07), New South Wales Parliamentary Library Research Service. Retrieved from <http://www.parliament.nsw.gov.au/prod/parlment/publications.nsf/V3ListRPSubject?open&vwCat=Transport>

ⁱⁱ J. Langford, R. Methorst, & L. Hakamies-Blomqvist (2006), Older drivers do not have a high crash risk—A replication of low mileage bias, *Accident Analysis and Prevention* 38(3): 574–78.

ⁱⁱⁱ F.J. Alvarez & I. Fierro (2008), Older drivers, medical condition, medical impairment and crash risk, *Accident Analysis and Prevention* 40(1), 55–60.

^{iv} M.L. Chipman, C.G. MacGregor, A.M. Smiley, & M. Lee-Gosselin (1993), The role of exposure in comparisons of crash risk among different drivers and driving environments *Accident Analysis and Prevention* 25(2), 207–11.

^v A.M. Dellinger, J.A. Langlois, & G. Li (2002), Fatal crashes among older drivers: Decomposition of rates into contributing factors, *American Journal of Epidemiology* 155(3), 234–41.

^{vi} S. Henderson, S. Gagnon, C. Collin, R. Tabone, & A. Stinchcombe (2013), Near peripheral motion contrast threshold predicts older drivers' simulator performance, *Accident Analysis and Prevention* 50, 103–9.

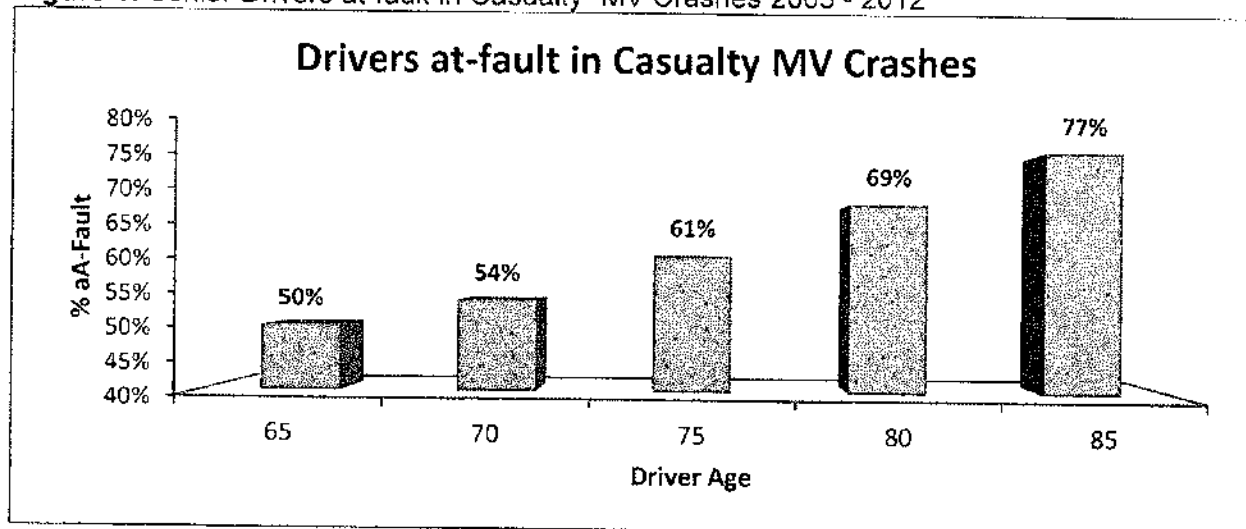
Senior Drivers: Motor Vehicle (MV) Crashes

Table 1: MV Crashes Involving Senior Drivers

Driver Age	Active Drivers	All Crashes ¹				Fatal Crashes			
		2010	2011	2012	2013	2010	2011	2012	2013
80-84	56,400	829	763	858	846	7	13	6	9
85+	30,400	496	531	517	563	5	8	6	11
Total	86,800	1,325	1,294	1,375	1,409	12	21	12	20

Source: Reported by police, prepared by ICBC April 15, 2015 (2015CMN1441-0).

Figure 1: Senior Drivers at-fault in Casualty² MV Crashes 2003 - 2012



Source: Reported by police, prepared by ICBC August 22, 2015 (2013RDS0789-0, RAD 2013-160).

Figure 1 highlights how at-fault crash involvement increases after age 65. Of all 65-year old drivers involved in a casualty motor vehicle (MV) crash, 50% are found to be at-fault. This increases steadily, reaching 69% of drivers by age 80.

Medical Fitness Evaluation

The Superintendent is charged with the duty to ensure that all drivers are physically and medically fit to drive. All drivers in British Columbia who have a licence to drive a commercial vehicle, all drivers who have a known medical condition that may affect their driving ability, and all licenced drivers over the age of 80 must complete a Driver Medical Exam Report (DMER) on a regular basis. Additionally, RoadSafetyBC may request that a driver complete a DMER if they have received an unsolicited report on the driver's ability to drive.

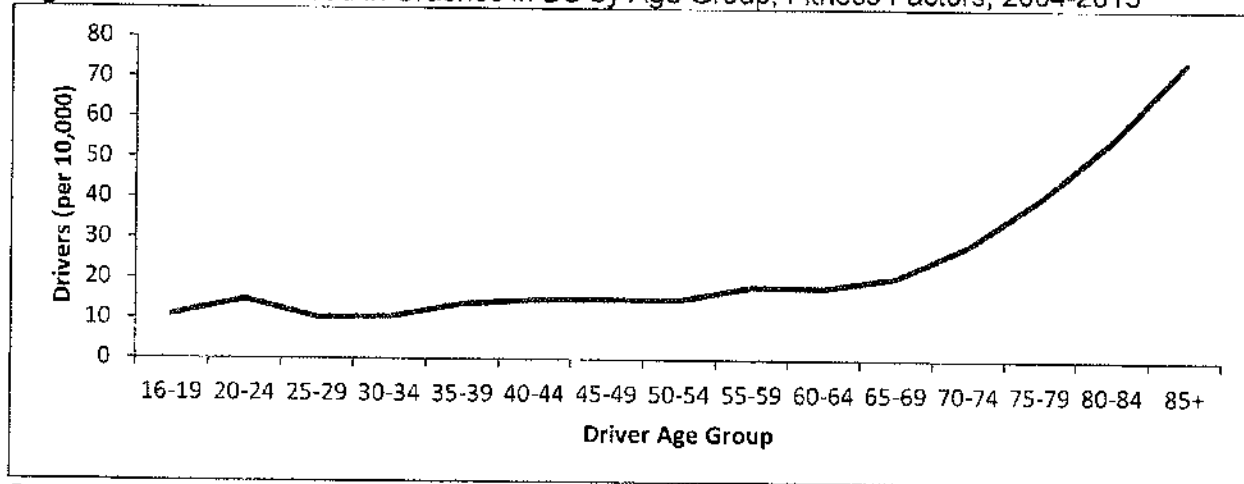
¹ These are crashes involving a fatality, injury, or property damage only.

² Casualty crashes are those involving an injury or fatality. Crashes involving property damage only are not included.

There are approximately 150,000 driver medical fitness assessments completed each year. Of these, approximately 45% are routine commercial assessments, and 33% are age-based assessments for drivers aged 80 and above.

Figure 2 shows the count of British Columbia drivers involved in motor vehicle (MV) crashes where there was a contributing factor assigned related to driver fitness, i.e., Illness, Loss of Consciousness, Pre-Existing Physical Disability, or Deceased Prior to Collision. The counts are per 10,000 active driver licences, by age group, from 2004 to 2013. The number of these medical fitness related crashes rises with age and especially at around ages 70 to 75.

Figure 2: Drivers Involved in Crashes in BC by Age Group, Fitness Factors, 2004-2013



Source: Traffic Accident System crash contributing factor codes include: illness 22; sudden loss of consciousness 23; pre-existing physical disability 26 and deceased prior to collision 87, Report# 2015CMN0938-0. Active driver licences from ICBC Quick Stats, 2014.

This figure is read as follows: In the 10-year period 2004-2013, 11 of every 10,000 drivers aged 16-19 were involved in a MV crash where medical fitness was a contributing factor, while 74 of every 10,000 drivers aged 85+ was involved in a MV crash where medical fitness was a contributing factor.

There is a great deal of research to show that older drivers self-regulate not only by driving less but by not driving in the dark, not driving during inclement weather, and not driving on highways.¹ Several studies, however, show that people who drive just a few kilometres per week are, in fact, some of the most dangerous drivers on the road, based on crash risk per kilometre travelled, with significantly higher crash rates for those who drive less than three thousand kilometres per year than for those who drive fourteen thousand kilometres per year and more.^{2 3 4} A large number of research papers have explored this issue, and found that fatality and injury outcomes start to increase significantly and exponentially for crashes involving drivers aged seventy to seventy-five.^{5 6 7}

A study by Cicchino and McCart (2015) considered crashes where emergency vehicles were dispatched, comparing the proportion of errors made by drivers aged 70 and older with those made by drivers aged 35-54. Among drivers involved in crashes where driver error was the critical reason, a larger proportion (67%) of older drivers was assigned the critical error than middle-aged drivers (49%).⁴

Age-based medical fitness requirements for licence renewals vary by jurisdiction. Many countries in the European Union have a medical fitness requirement to renew driver licences beginning at age 70. In Canada, 88% of the population⁸ lives in a jurisdiction with an age-based requirement, most of which begin at age 75. Australia is similar, with age-based medical fitness requirements beginning at age 70 or 75.⁹ The requirements throughout New Zealand begin at age 75. A breakdown by jurisdiction is found in Table 2.

Table 2: Summary of the age-based screening requirements in various jurisdictions
Europe:

Country	Renewal interval	Medical requirements for renewal
Sweden	10-year renewal required	None
Germany	Renewal not determined by age	None
Ireland	Annual renewal regardless of age	At 70, a certificate of medical fitness is required.
The Netherlands	At age 70, medical review required every five years	Depending on physical condition, medical review may be more frequent, vision test required.
United Kingdom	From age 70, mandatory renewal for three-year periods	Self-declaration of ability to meet vision standard required. Any medical condition that could affect driving must be reported to the Licensing Agency.
Portugal	At age 70, renewed every two years	At age 70, a medical exam is required every two years.
Denmark	At age 70, issued for four years	Physician's certificate required
	At age 71, issued for three years	
	At ages 72-79, issued for two years	
	At ages 80+, issued for one year	
	If ill, shorter terms possible.	
Finland	At age 45, renewal every five years	After age 45, medical review every five years, covering general health status and vision. Renewal requires medical examination and verification of ability by two people.
	As of age 70, renewal period depends on the physician	
Italy	Ten-year renewal up to age 50	Medical test required with renewal
	Five-year renewal after age 50. Three-year renewal at age 70.	

Canada:

Province / Territory	Age Threshold	Medical requirements for renewal
British Columbia	80 and every 2 years after	Yes. Medical Examination
Alberta	75, 80, & every 2 years after	Yes. Medical Examination
Saskatchewan	None	
Manitoba	None	
Ontario	Pre-screen at 80; & every 2 years after	Renewal session. Possible medical examination or road test.
Quebec	45, 75, 80, & every 2 years after	Yes. Medical Examination
New Brunswick	None	
Nova Scotia	None	
Prince Edward Island	None	
Newfoundland	75, 80, & every 2 years after	Yes. Medical Examination
Yukon	70, 75, 80, & every 2 years after	Yes. Medical Examination
Northwest Territories	75, 80, & every 2 years after	Yes. Medical Examination
Nunavut	75 and every 2 years after	Yes. Medical Examination

Australasia

Jurisdiction	Age Threshold	Medical requirements for renewal
New South Wales	Required annually from 75 years of age	Yes. Medical Examination
Victoria	When reported	When Reported
Queensland	Required to carry medical certificate when driving from 75 years of age	Yes. Medical Examination
Western Australia	Required at ages 75, 78, 80, and annually thereafter	Yes. Medical Examination
South Australia	Required annually from 70 years of age	Yes. Medical Examination
Tasmania	Required annually from 75 years of age	Yes. Medical Examination
Australian Capital Territory	Required annually from 75 years of age	Yes. Medical Examination
New Zealand	75, 80 and every two years after that	

Citations

- ¹ G. Griffith (2007), *Older drivers: A review of licensing requirements and research findings* (Briefing Paper No 11/07), New South Wales Parliamentary Library Research Service. Retrieved from <http://www.parliament.nsw.gov.au/prod/parlment/publications.nsf/V3ListRPSubject?open&vwCat=Transport>
- ² J. Langford, R. Methorst, & L. Hakamies-Blomqvist (2006), Older drivers do not have a high crash risk—A replication of low mileage bias, *Accident Analysis and Prevention* 38(3): 574–78.
- ³ F.J. Alvarez & I. Fierro (2008), Older drivers, medical condition, medical impairment and crash risk, *Accident Analysis and Prevention* 40(1), 55–60.
- ⁴ J. Cicchino, a. McCartt (2015), Critical older driver errors in a national sample of serious U.S. crashes, *Accident Analysis and Prevention* 80, 211–219.
<http://www.sciencedirect.com/science/article/pii/S000145751500144X>
- ⁵ M.L. Chipman, C.G. MacGregor, A.M. Smiley, & M. Lee-Gosselin (1993), The role of exposure in comparisons of crash risk among different drivers and driving environments *Accident Analysis and Prevention* 25(2), 207–11.
- ⁶ A.M. Dellinger, J.A. Langlois, & G. Li (2002), Fatal crashes among older drivers: Decomposition of rates into contributing factors, *American Journal of Epidemiology* 155(3), 234–41.
- ⁷ S. Henderson, S. Gagnon, C. Collin, R. Tabone, & A. Stinchcombe (2013), Near peripheral motion contrast threshold predicts older drivers' simulator performance, *Accident Analysis and Prevention* 50, 103–9.
- ⁸ Retrieved from Statistics Canada, population by province and territory, 2014
<http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm>.
- ⁹ Retrieved from the Australian Bureau of Statistics, 2014
<http://www.abs.gov.au/ausstats/abs@.nsf/mf/3101.0>.

Driver Fitness -- What Other Provinces Do

Quebec (updated June 6, 2012)

Quebec requires drivers to submit a DMER at age 45, and again six months prior to turning 75, 80, and every two years thereafter.

The SAAQ (their equivalent of the OSMV) does not pay for any DMER's.

Doctors can charge whatever they want; most charge between \$50 and \$100.

Source: Valerie Martin, SAAQ Medical Fitness Section 1-418 643-5506

Reference: saaq.gouv.qc.ca/en/driver_licence/medical_assessment.php

SAAQ: 1-800-561-2858

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Nova Scotia (updated June 6, 2012)

Nova Scotia has no age-related DMER trigger.

They require DMER's only after a medical condition is brought to their attention.

They do not pay for any DMER's.

Doctors can charge whatever they want; most charge between \$40 and \$100.

Source: Bob McAuley, Coordinator, Medical Fitness Unit, Access Nova Scotia
(902) 424-7521 Public: (902) 424-5200 or 1-800-670-4357

Web reference: www.gov.ns.ca/snsmr/rmv/licence/medicals.asp

DMER with fee reference:

www.gov.ns.ca/snsmr/pdf/ans-rmv-drivers-medical-examination-report.pdf

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Prince Edward Island: (updated June 6, 2012)

PEI has no age-related DMER trigger.

They require DMER's only after a medical condition is brought to their attention.

They do not pay for any DMER's.

Doctors can charge whatever they want; most charge between \$40 and \$100.

Source: Access PEI Driver Licence Office (902) 368-5200 press 8

Web-reference: www.gov.pe.ca/infopei/index.php3?number=61987

Newfoundland & Labrador: (updated June 6, 2012)

Newfoundland and Labrador requires a DMER at age 75, at 80, and every year thereafter. This has been the policy since 1996.

They do not pay for any DMER's.

Doctors can charge whatever they want; most charge between \$25 and \$85.

Source: Motor Registration Division in St. Johns: 1-877-636-6867

Web reference:

www.serviceni.gov.nl.ca/drivers/DriversandVehicles/driverlicensing/application.html

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New Brunswick: (updated June 6, 2012)

New Brunswick has no age-related DMER trigger...or DMER's, period!

If a medical condition is brought to their attention, they request the driver undergo a free written and road test.

Source: Service NB Driver Licensing Section: 1 (506) 684-7901 press 5

Web reference: www.SNB.ca/e/6000/6901e.asp

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updated by Alan Perry at OSMV BC on June 7, 2012

Alan.Perry@gov.bc.ca (250) 953-8680

Alberta: (updated June 6, 2012)

Alberta requires a DMER at age 75, at 80, and every year thereafter.

They do not pay for any DMER's.

Doctors can charge whatever they want; most charge between \$50 and \$100.

Source: Alberta Transportation, Driver Fitness and Monitoring (780) 427-2731

Web reference: <http://canlii.org/en/ab/laws/regu/alta-reg-320-2002/latest/alta-reg-320-2002.html>

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Ontario: (updated June 6, 2012)

Ontario requires drivers who turn 80 to complete a free three-part program: a vision test, a written test, and a seniors' driving group session. A DMER may be requested if a session coordinator senses a problem.

They do not pay for any DMER's.

Doctors can charge whatever they want; most charge between \$70 and \$100, but coverage for this is available through Ontario Long Term Health plans.

Source: Ontario Driver and Vehicle Licensing Contact Centre at: **416-235-2999**

Web: www.MTO.gov.on.ca/english/dandv/driver/senior/renewal80.shtml

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Saskatchewan: (updated June 6, 2012)

Saskatchewan does not have any age-related DMER triggers.

If health concerns are reported by doctors, police or concerned citizens, Saskatchewan Government Insurance (SGI) requests and pays for DMER's on the following basis: \$75 for physical exams, \$140 for specialists' reports, and a \$40 subsidy for vision examinations (optometrists may assess additional fees). Physicians and optometrists bill the province directly for these services and province in turn bills SGI for the portion it pays.

Source: SGI Medical Review Unit 1-800-667-8015 ext. 6176

Web reference: www.SGI.SK.ca/individuals/medical/driveconditions/index.html
and www.SGI.SK.ca/individuals/medical/family/agingdrivers.html

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Manitoba: (updated June 7, 2012)

Manitoba does not have any age-related DMER triggers.

They do not pay for DMER's, the cost of which is regulated by Doctors Manitoba. There is some discrepancy as to what that cost is; it appears to be about \$85.

Source: Victoria MacDonald, Manager, MPI Medical Compliance & Assessments Section (204) 985-1900 or toll-free (866) 617-6676 VMacDonald@MPI.MB.ca and

Mark Venten at Doctors Manitoba 204-985-5888 or toll-Free: 1-888-322-4242

Web reference: www.MPI.MB.ca/English/dr_licensing/DLFAQ.html#DIQ2

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Yukon: (updated June 6, 2012)

Yukon Territory requires drivers to submit a DMER at age 70, and again at 75, 80, and every two years thereafter.

The Yukon Motor Vehicles Branch (YMBV) pays doctors for all requested and age-related DMER's; the current rates vary by doctor from \$88 to \$208, and the YMBV pays whatever the doctors charge within that range.

Source: Keeley D'Avignon, YMBV Medical Fitness Section 1-867-667-3563

Keeley.Davignon@gov.YK.ca

Web: www.hpw.gov.yk.ca/pdf/medical_brochure_english.pdf

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Northwest Territories: (updated June 6, 2012)

The Northwest Territories requires drivers to submit a DMER at age 75, again at 80, and then every two years thereafter.

The NWT Road Licensing and Safety Branch (RLSB) does not pay for any DMER's.

Current fees average \$100

Source: Gene at the NWT Road Licensing and Safety Department 867-873-7972

Web: www.dot.gov.nt.ca/live/pages/wpPages/newDLandGIC.aspx

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Nunavut Territory: (updated June 7, 2012)

Nunavut has **age-related DMER triggers at age 75, and every two years thereafter.**

Nunavut does not pay for DMER's, which currently cost \$63 in Iqaluit, and up to \$160 in remote communities.

Source: Wanda Bursey at Nunavut Motor Vehicles Division, Ministry of Transport in Iqaluit

(867) 975-7840 WBursey@gov.nu.ca

Web: www.gov.nu.ca/files/driver's%20licence%20applications_eng.pdf

updated by Alan Perry at OSMV BC on June 7, 2012

Alan.Perry@gov.bc.ca (250) 953-8680

Age Triggered Medical Exams	BC	AB	SK	MB	ON	PQ	NB	NS	PEI	NF	YK	NWT	NVT
Trigger Age	80	75, 80, & every 2 yrs after	None	None	Pre-screen at 80; DMER if needed	45, 75, 80, & every 2 yrs after	None	None	None	75, 80, & every year after	70, 75, 80, & every 2 yrs after	75, 80, & every 2 yrs after	75 and every 2 yrs after
Cost (set by doctor)	\$50 to \$200	\$50 to \$100	\$75 for DMER, \$140 for specialist \$40 for vision	\$50 to \$100	\$70 to \$100	\$50 to \$100	N/A	\$40 to \$100	\$40 to \$100	\$25 to \$85	\$88 to \$208	Approx \$100	\$63 in equalit up to \$160 in other places
Who Pays for age-related DMER's?	User pays	User pays	Sask Gov't insurance pays	N/A	User pays	User pays	N/A	N/A	N/A	User pays	Yukon MVB pays	User pays	User pays
Who pays for medical-related DMER's?	OSMV pays first \$75	User pays	Sask Gov't insurance pays	User pays	User pays	User pays	No DMER, free written & road test instead	User pays	User pays	User pays	Yukon MVB pays	User pays	User pays
Date updated	June 6 2012	June 6 2012	June 5 2012	June 6 2012	June 6 2012	June 6 2012	June 6 2012	June 6 2012	June 6 2012	June 6 2012	June 6 2012	June 6 2012	June 7 2012



Senior drivers in casualty car crashes and assigned fault by age

This document presents the number and percentage of drivers in casualty car crashes, by driver age and assigned fault, for the 2003-2012 decade.

After the age of 65, more drivers are at-fault (over 50% assigned fault) than not (see figure 1); on the other hand, the number of drivers involved in crashes decreases drastically with age. One reasonable hypothesis is that this is because of lower exposure (less km driven).

The table below shows drivers assigned fault in casualty crashes by age. The table is limited to drivers over the age of 65.

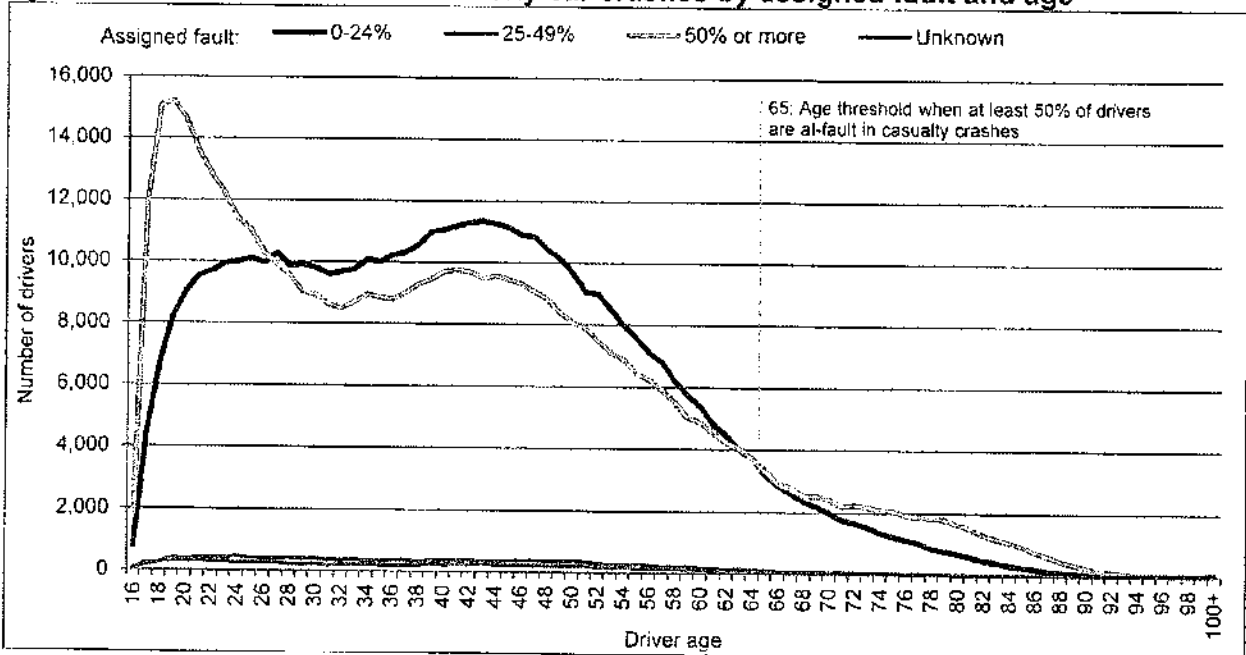
Table 1: Drivers in casualty car crashes by assigned fault and age (65 and up)

Driver Age	Number Drivers by Assigned Fault				Percent at-fault	Total Drivers
	Unknown	0-24%	25-49%	at-fault 50% or more		
65	120	3,190	68	3,345	50%	6,723
66	98	2,838	58	2,912	49%	5,906
67	75	2,603	52	2,781	50%	5,511
68	91	2,322	57	2,515	50%	4,985
69	73	2,181	33	2,509	52%	4,796
70	56	1,981	45	2,420	54%	4,502
71	70	1,763	48	2,195	54%	4,076
72	49	1,664	51	2,249	56%	4,013
73	45	1,530	39	2,177	57%	3,791
74	65	1,352	42	2,088	59%	3,547
75	41	1,240	44	2,057	61%	3,382
76	39	1,135	24	1,914	62%	3,112
77	28	1,023	33	1,853	63%	2,937
78	33	848	36	1,846	67%	2,763
79	23	773	37	1,786	68%	2,619
80	19	678	22	1,636	69%	2,355
81	26	584	23	1,492	70%	2,125
82	16	470	18	1,300	72%	1,804
83	13	401	9	1,172	73%	1,595
84	16	308	13	1,060	76%	1,397
85	8	264	9	920	77%	1,201
86	11	197	8	740	77%	956
87	9	143	8	614	79%	774
88	4	111	2	455	80%	572
89	4	72	6	352	81%	434
90	3	59	0	240	79%	302
91	1	31	0	168	84%	200
92	3	14	1	108	86%	126
93	1	14	2	64	79%	81
94	0	10	0	27	73%	37
95	2	2	0	27	87%	31
96	0	1	0	10	91%	11
97	0	0	0	2	100%	2
98	0	1	0	6	86%	7
99	0	0	0	5	100%	5
100+	63	60	2	49	28%	174
Total 2003-2013						
	1,231	33,559	864	48,777		84,431

Source: ICBC Business Information Warehouse, August 22, 2013. Numbers will continue to change, especially for the most recent time periods, because of late reporting, and corrections and adjustments. Data 2003 to 2012 included.



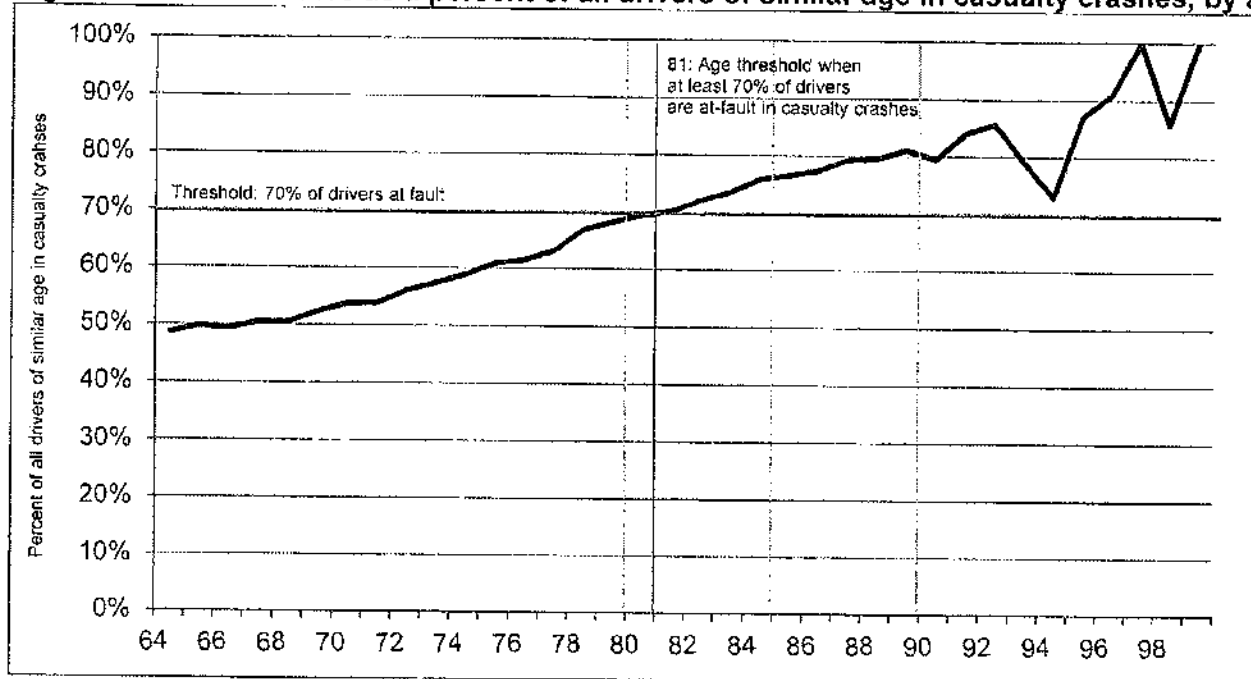
Figure 1: Number of drivers in casualty car crashes by assigned fault and age



Source: ICBC Business Information Warehouse, August 22, 2013. Numbers will continue to change, especially for the most recent time periods, because of late reporting, and corrections and adjustments. Data 2003 to 2012 included.

Figure 2 below shows that, on average, 70% of the drivers become at-fault in casualty crashes at the threshold age of 81 (average 2003 and 2012).

Figure 2: At-fault drivers as a percent of all drivers of similar age in casualty crashes, by age



Source: ICBC Business Information Warehouse, August 22, 2013. Numbers will continue to change, especially for the most recent time periods, because of late reporting, and corrections and adjustments. Data 2003 to 2012 included.

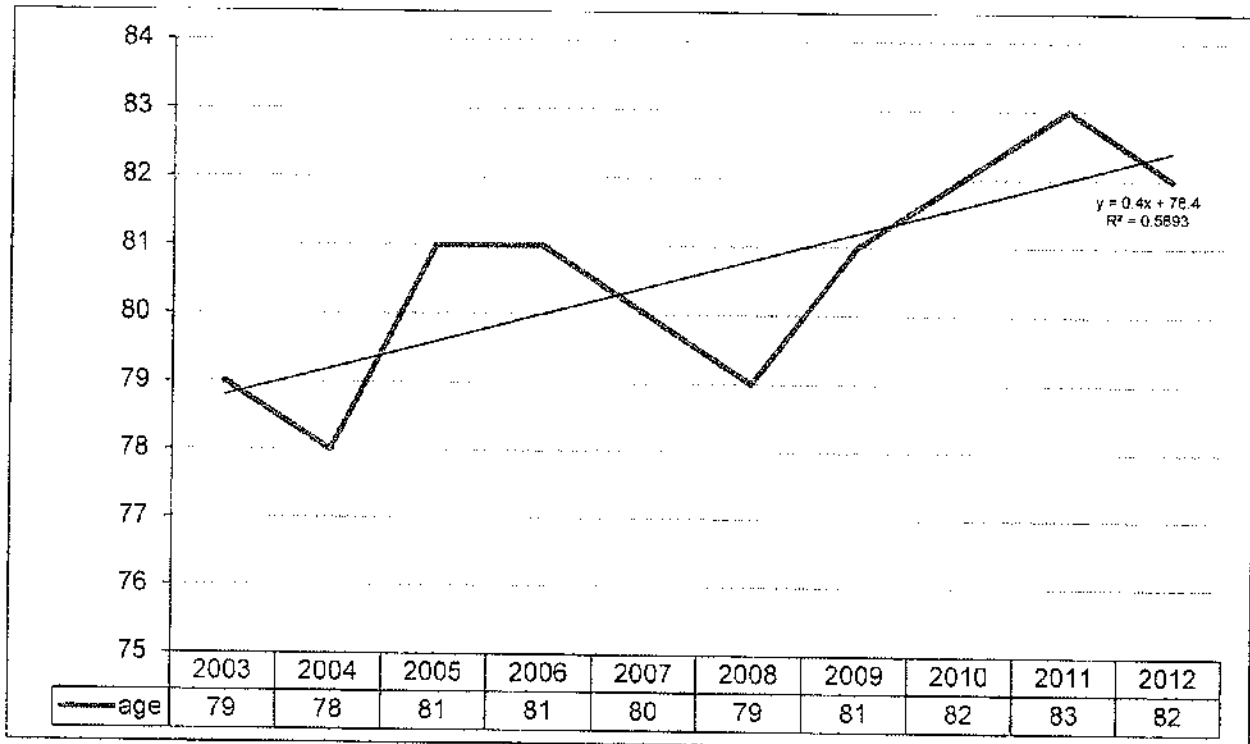
Trends 2003-2012



Yearly trends were examined to determine whether the age at which 70% of drivers became at-fault in casualty crashes had changed during the past decade.

Indeed, the threshold age seems to have slightly increased since 2003, from 78-79 in 2003-2004 to 82-83 in 2011-2012 (see figure 3). Considering the importance of yearly variations, the number of data points is too limited, to draw final conclusion about the trend.

Figure 3: Threshold age when drivers become at fault in 70% of the casualty crashes - Trend 2003-2012



Appendix 3: Aging Drivers

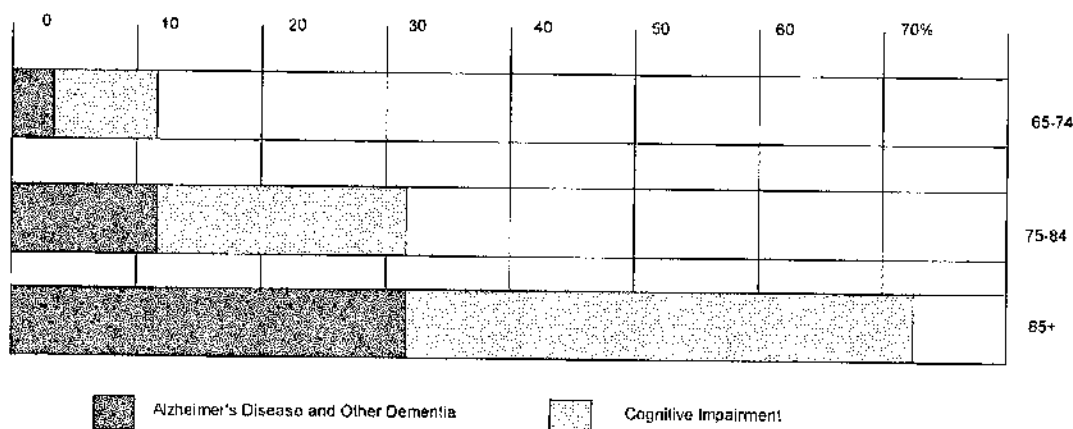
About aging drivers

As with the general population in Canada, the driving population is aging. The functional declines associated with aging are well documented. These functional declines in healthy aging drivers are unlikely to lead to unsafe declines in driving performance, except in the case of extreme old age.

However, aging is also associated with increased risk for a broad range of medical conditions, such as visual impairments, musculoskeletal disorders, cardiovascular disease, diabetes, and cognitive impairment and dementia. These medical conditions and medications used to treat them may affect fitness to drive.

Although there are many age-associated medical conditions that may affect driving, there is a particularly strong association between cognitive impairment and dementia and impaired driving performance. A large, national population-based study done in Canada in 1991 showed that 25% of the population 65 and older have some form of cognitive impairment or dementia, rising to 70% for those 85 and older.

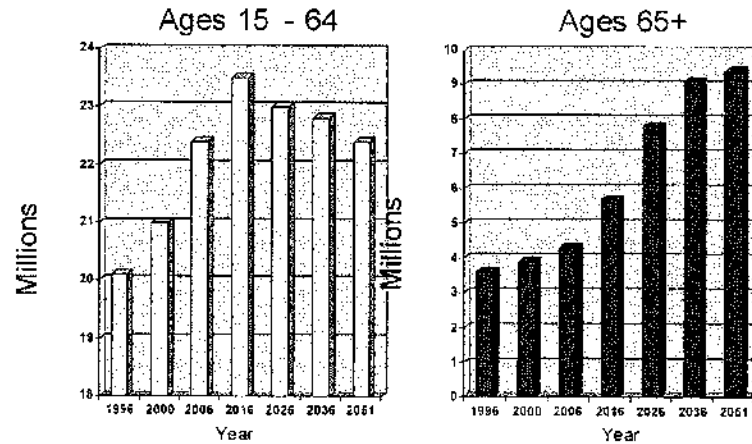
Prevalence of Cognitive Impairment



Demographics

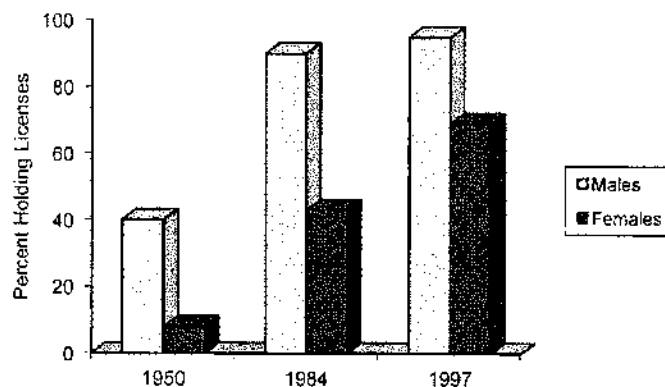
The number of people in Canada over the age of 65 increased from 3.5 million in 1996 to 4.2 million in 2006. By 2051, it is projected to be more than 9 million.

Population Change



Source: Statistics Canada, 2002

These increases are reflected in the driving population, with the percentage of drivers who are older increasing over time. Increases in the percentage of older women who have a driver's licence will also have an impact. Currently, 50% of females over the age of 65 are licensed to drive; in 2031 it is projected to be 85%.

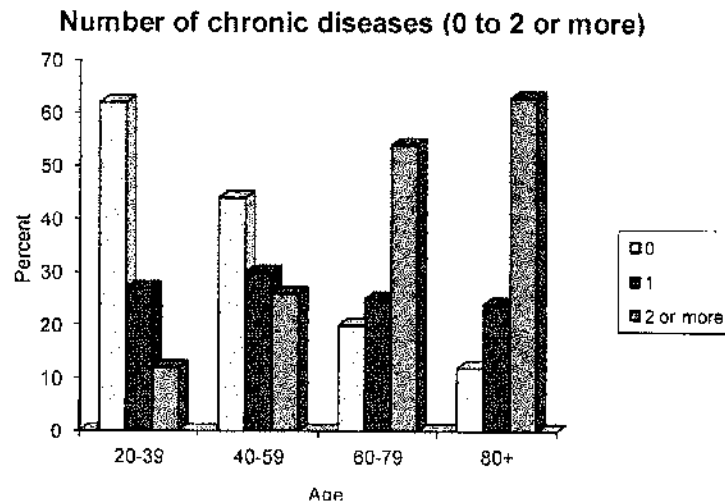


Source: Rosenbloom, 1998

Aging and multiple medical conditions

Because of the association between age and many chronic medical conditions, aging drivers are more likely to have one or more of these conditions. A 2003 survey found that 33% of Canadians age 65 and older had 3 or more chronic medical conditions, compared with 12% of younger

adults. The survey also found that the average number of chronic conditions increases with age.



Source: Rapoport, Jacobs, Bell & Klarenbach (2004)

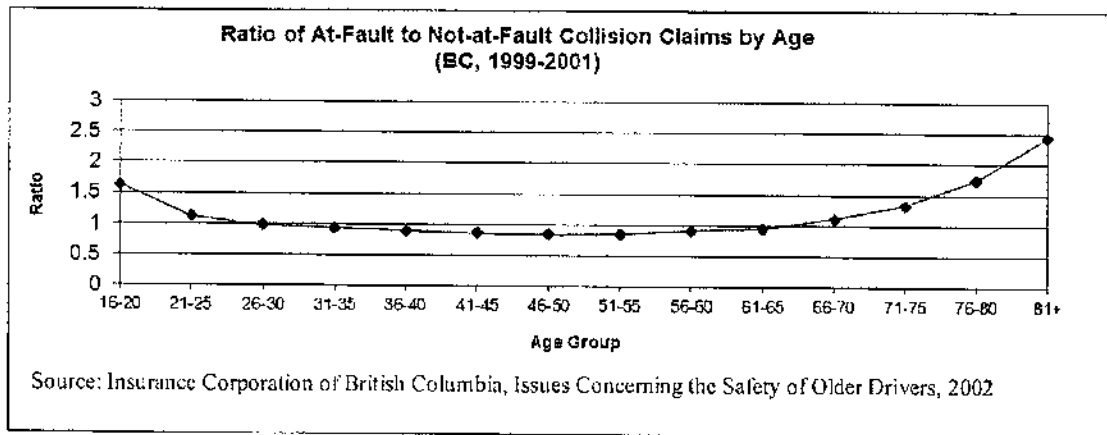
With an increased rate of multiple medical conditions, there is also a greater likelihood that aging drivers will be taking multiple medications (polypharmacy). With each additional medication taken, there is an increased risk of side effects and adverse interactions between medications, which may affect fitness to drive. While in many cases the adverse effects may be temporary or avoidable, where specific medications or dosages are required there may be a persistent impairment of the functions needed for driving.

Aging and adverse driving outcomes

As a group, older drivers are less likely to be involved in a crash than other age groups. However, the reason for this is that older drivers spend less time driving than others. When driving exposure is considered, older drivers show an increased crash risk, an increased risk for at-fault crash, and an increased risk of being injured and dying in a crash.

Statistics from ICBC indicate that older drivers are involved in a disproportionate number of at-fault crashes. The chart below shows the ratio of at-fault (50% liable) to not-at-fault crashes for different age groups. Drivers between the ages of 16 and 20 have more than 1.5 times the average at-fault versus not-at-fault crashes. Drivers in the 30 to 65 age group have a lower-than-average at-fault crash ratio. At about age 70, the

ratio of at-fault crashes begins to rise, climbing to 2.5 for drivers who are 81 and older.



An examination of driver fatality rates, adjusted for driving exposure, indicates that there are two high risk age groups: ages 16 to 19 and 65 and older. Older drivers are also more likely to be injured in a crash and to incur more severe injuries than younger drivers. The higher injury and fatality rates of older drivers is, in part, attributable to an increased susceptibility of older people to injury and death.

Unlike younger driver crashes, most traffic fatalities involving older drivers occur during the day time, on week-days, and in safe road conditions, with the majority of the crashes involving another vehicle.

Driver Fatality Rate (per 100 million VMT)

