

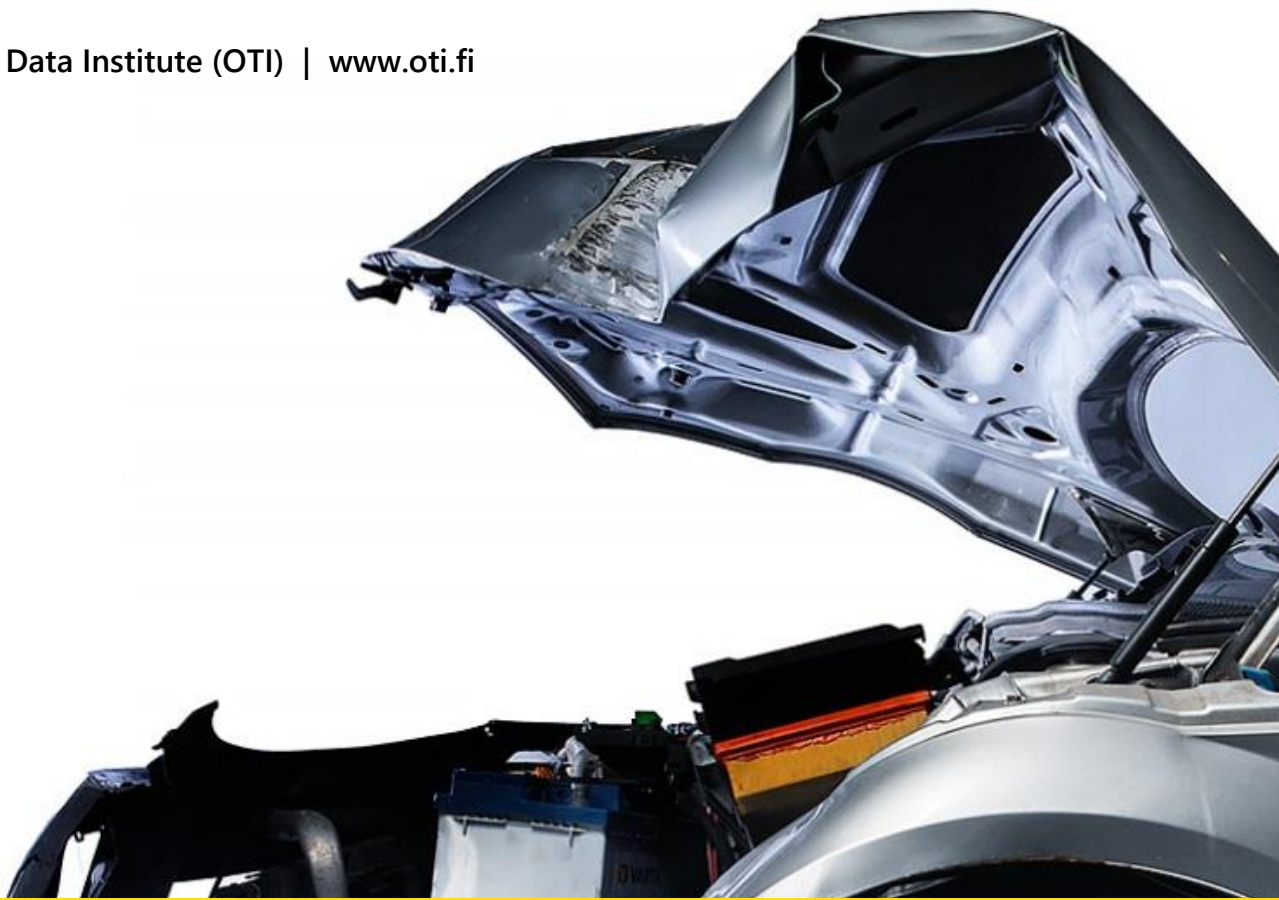


Fit-to-Drive Report

2021

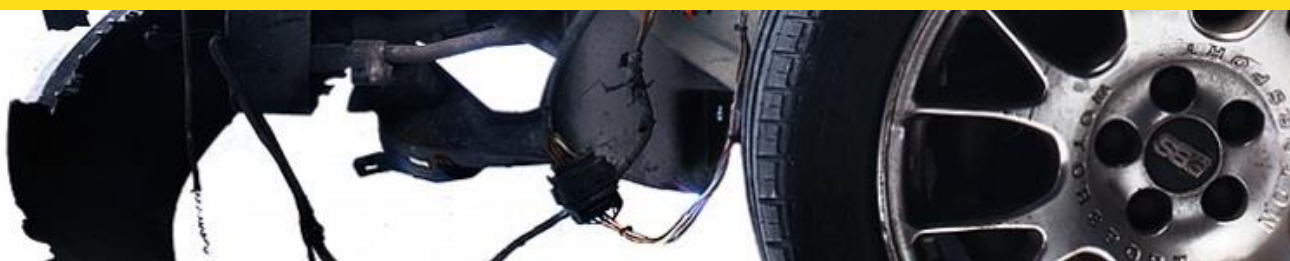
In Finland, road accident investigation teams investigate all fatal road and off-road traffic crashes.

Finnish Crash Data Institute (OTI) | www.oti.fi



Data

This report examines the fatal motor accidents in road traffic in Finland from the period of 2014–2018 investigated by the road accident investigation teams.



Accidents caused by medical conditions and persons involved

During the examined period of 2014-2018, the road accident investigation teams investigated 907 fatal motor accidents in total. Of these accidents, 141 (16% of all accidents) were caused by a sudden illness attack suffered by the driver. These accidents involved 179 people, 169 of whom died and 10 suffered minor injuries. In 124 (88%) accidents, the at-fault driver was a male with a median age of 66 years.

In addition to accidents directly caused by a medical condition, 352 accidents (33% of all accidents) involved a medical condition as a background risk factor. In these cases, the condition may have been a physical or mental one. The accidents with a medical condition as a background risk involved 806 people, 391 of whom died, 73 suffered serious injuries, 161 suffered minor injuries and 181 did not suffer any injuries. 90 % (n=316) of the at-fault drivers for these accidents were male with a median age of 40 years.

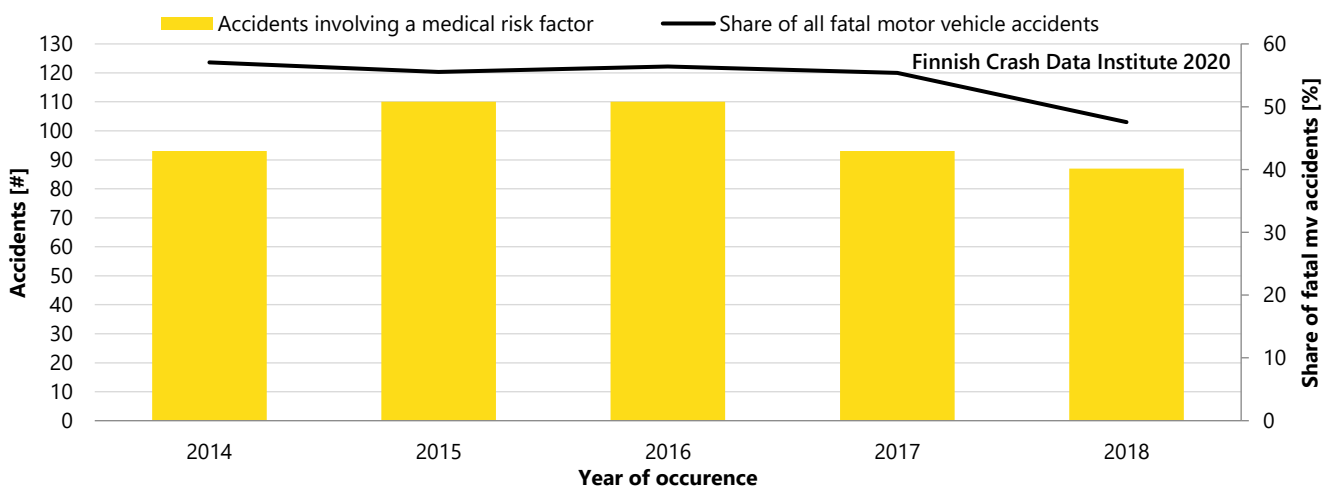


Figure 1. Fatal motor vehicle accidents involving a medical condition as immediate or background risk factor.

Medical condition as immediate risk factor for accident

According to the investigation method of traffic accidents, an illness attack suffered by the driver is classified as an immediate risk factor for an accident in cases where the attack directly caused the accident. Accidents of this kind usually include the sudden death of a driver while steering a vehicle, which often causes the vehicle to collide with roadside objects or with another vehicle. Sometimes the attack progresses in a manner slow enough to allow the driver to stop the vehicle.

Table 1. The most common medical conditions suffered by the at-fault driver in accidents which involved a medical condition as an immediate risk factor (141 accidents).

Driver's disease [# of accidents]	Cardiovascular disease	Mental disorders	Reduced mobility	Cerebrovascular diseases	Epilepsy	Diabetes mellitus	Substance dependence
Cardiovascular disease	119	7	18	10	6	28	15
Mental disorders	7	7	0	0	2	3	2
Reduced mobility	18	0	18	2	0	4	1
Cerebrovascular diseases	10	0	2	12	1	1	2
Epilepsy	6	2	0	1	8	1	3
Diabetes mellitus	28	3	4	1	1	29	8
Substance dependency	15	2	1	2	3	8	19

*Reading guide: The medical conditions have been cross-tabulated to show multimorbidity. In this table, the diagonal in bold type shows the number of accidents in which the condition in question has occurred. For example, seven drivers suffered from a mental illness. Respectively, the other numbers on the same line or in the same column show how many times one accident has involved two different medical conditions (e.g., two drivers suffered from both mental illness and epilepsy).

An illness attack suffered by the driver usually led to a single accident, most typically driving off the road (n=106, 75%). A smaller share (n=21, 15%) of single accidents consisted of, for example, collisions with parked cars or other obstacles while driving in a parking area at a low speed. During the reporting period, one out of ten above-mentioned accidents (n=14, 10%) led to a multiple-vehicle crash. A little over half of the accidents (n=79, 56 %) occurred in a sparsely populated area, and the rest occurred in urban area or near one. Typically, the at-fault driver drove a passenger car or van (n=122, 87%). In nine accidents (6 %), the driver at fault drove a heavy vehicle and in two accidents a tractor (1%).

Medical condition as a background factor for accident

A medical condition may also act as a background risk factor for accidents. Accumulation of background risks usually leads to the emergence of an immediate risk factor for accidents. However, it is usually difficult to analyse how a single background risk factor has affected the occurrence of an accident. This is because the interrelationships between different background risk factors are complex.

A driver's medical condition may act as a background factor in different ways. A driver may be in a great physical condition but still drive in the wrong direction on a one-way street because of, for example, a sudden brain disorder. On the other hand, the driver's physical functioning may deteriorate due to an illness in which case the use of controls may be slower than usual, or the driver may make mistakes while driving.

This report includes accidents where a physical or mental illness has been estimated to form a background risk factor. Diagnosing a driver's substance dependence differs from diagnosing the other medical conditions in this report (see the last page of this report: Defining substance dependence in this report).

Table 2. The most common medical conditions of the drivers at fault in cases where the condition was a background risk factor (352 accidents; The Reading guide of Table 1 applies here; See also: the last page of this report: Defining substance dependence in this report).

Driver disease [# of accidents]	Cardiovascular disease	Mental disorders	Reduced mobility	Cerebrovascular diseases	Epilepsy	Diabetes mellitus	Substance dependence
Cardiovascular disease	108	28	21	11	2	29	57
Mental disorders	28	162	22	3	5	7	108
Reduced mobility	21	22	38	2	0	5	25
Cerebrovascular diseases	11	3	2	24	1	3	4
Epilepsy	2	5	0	1	9	0	5
Diabetes mellitus	29	7	5	3	0	34	18
Substance dependency	57	108	25	4	5	18	217

The most common immediate risk factors in accidents involving medical conditions as background risks were the errors of different levels of severity in controlling the vehicle (n=103, 29%). 76% of at-fault drivers making these kinds of mistakes were intoxicated. The second most common immediate risk was an accident caused deliberately (n=99, 28%). Accidents involving medical conditions as background risks usually occurred in a sparsely populated area (n=278, 79%) and the majority of these accidents (n=188, 53%) were collisions between two vehicles. Typically, the driver at fault drove a passenger car or van (n=304, 86%). Three percent of the at-fault drivers (n=9) drove a heavy vehicle and 1% drove a tractor (n=4).

Medication affecting fitness to drive

Assessing the impact of medication on one's fitness to drive is challenging. The problem with even quite ordinary medicinal products appears to be polypharmacy. As shown in tables 1 and 2, the drivers at fault often suffer from multiple chronic diseases (multimorbidity) and often use multiple medications. There is very limited research data available on how combinations of different medications affect one's fitness to drive.

Some medications affect the fitness to drive even when taken alone. Of all drivers that caused an accident because of an illness attack, three (2%) were under the influence of this kind of medication. The corresponding number in accidents with a medical condition as a background risk factor was 20 % (n=71), but in 52 of these cases, the driver had also taken alcohol or narcotics in addition to medication affecting fitness to drive.

Drivers with Group 2 driving licence

In accidents involving a medical condition as an immediate risk factor (n=141), 44 of all drivers at fault (31%) had a Group 2 driving licence. Ten of these drivers (7% of all 141 accidents) were professional drivers on duty. In addition, the data included 4 professional drivers who were off duty at the time of the incident. None of the aforementioned 44 drivers were under a driving ban by the police, but at least one driver was under a driving ban by a doctor. The driver under a driving ban by a doctor tried to circumvent the ban by operating from abroad.

Of the aforementioned 44 drivers, two (5%) were under the age of 45 and three (7%) were 70 years old or older. The median age of drivers was 58 years. Apart from three (7%) cases, the illness attack which caused the accident was due to a cardiovascular disease. The next most common diseases were diabetes (n=8, 18%), substance abuse (n=7, 16%) and kidney disease (n=3, 7%).

In addition to accidents involving a medical condition as an immediate risk factor, a medical condition acted as a background risk factor in 352 fatal motor vehicle accidents. 90 (27 %) of all drivers involved in these accidents had a valid Group 2 driving licence (in the case of 22 drivers, the driving licence category was not known whereas 10 drivers had never had a driving licence). 5 drivers were professional drivers on duty (1% of all 352 accidents).

Of all 90 drivers with a Group 2 driving licence and a medical condition as a background risk factor, 53 (59%) were under the age of 45 and 3 (3%) were 70 years old or older. The median age of drivers was 41 years. The most common diseases as background risk factors were substance dependence (n=59, 66%), mental illness (n=46, 51%), cardiovascular disease (25, 28%) and reduced mobility (n=15, 17%). More rare diseases were diabetes (n=8, 9%), epilepsy (n=3, 3%) and eye conditions (n=3, 3%). The sum consisting of the shares of different conditions exceeds 100% since multimorbid drivers were included.

Recommendations by the road accident investigation teams regarding fit-to-drive issues

When examining all accidents caused by insufficient driver health (medical condition as immediate or background risk factor) as a whole, we can reach a slightly different conclusion about the measures necessary to prevent these accidents than when looking at only the accidents caused by sudden illness attacks.

After investigating a fatal motor vehicle accident, the road accident investigation teams give safety recommendations to prevent similar accidents happening in the future. The road accident investigation teams have most often recommended the introduction of alcolocks to improve road safety (227 accidents, 46 % of accidents caused by insufficient driver health).

The second most common recommendation is also related to vehicles: contributing to the emergence of active safety systems in the vehicle fleet (n=182, 37%). The third most common recommendations, on the other hand, is related to the road environment: installing median barriers (n=121, 25%). These suggestions might seem a little surprising. On one hand, they tell something about the nature of the medical conditions acting as background risk factors, and on the other hand, they show how contributing to the emergence of active safety systems and separating the driving directions with road structures are effective ways to prevent different kinds of risks in traffic.

Communicating and informing people about the risks related to insufficient driver health (n=109, 22%) and further developing the system of doctors specialised in traffic (n=93, 19%) are recommendations by the road accident investigation teams which are more directly related to driver health. recommendations about improving the recognition of the effects of medical conditions and medication when assessing fitness to drive (n=87, 18 %), supervision of driver health (n=86, 17%), and referral to treatment or rehabilitation supporting mental health, developing these kinds of treatments and organising short-term, preventive emergency aid (n=76, 15%). Of all recommendations to police, the most common ones were the surveillance of driver health and enhanced surveillance of intoxicated drivers (n=85, 17%).

Summary

During the years 2014-2018, a medical condition acted as a risk factor (immediate or background risk) in 54% (n=493) of all fatal motor vehicle accidents (Figure 1) on average. These numbers include substance dependence which we have tried to recognise in the manner described at the end of this report. In cases where a medical condition has been an immediate risk factor (141 accidents, 16% of all accidents), the drivers at fault have been clearly older (median age 66 years) than in cases which involved a medical condition as a background risk (median age 40 years). Accidents with a medical condition as a background risk factor involved more people per accident (2,3 vs. 1,3), but rather surprisingly, more people died in accidents with a medical condition as an immediate risk factor (1,2 vs. 1,1).

In accidents with a medical condition as an immediate risk factor, cardiovascular diseases were the most common ones, suffered by 84% (n=119) of at-fault drivers in this group. The most common comorbid conditions with heart cardiovascular diseases were diabetes (28 drivers) and musculoskeletal diseases (18 drivers). Indications referring to substance dependence were detected in 19 drivers (Table 1).

In accidents involving a medical condition as a background risk factor (352 accidents, 39% of all accidents), the most common conditions were substance dependence (n=217) and mental illness (n=162). The comorbidity of these conditions was relatively high (108 drivers). The third most common disease group was cardiovascular diseases (also 108 drivers).

Of the aforementioned 352 accidents, 103 (29%) involved an erroneous driver input or vehicle path, and 99 (28%) were caused deliberately. 76% (n=78) of the drivers that made mistakes in controlling the vehicle were intoxicated. In addition to the immediate risk factors mentioned, errors in judgement (n=41, 12 %) and observation (n=33, 10 %) were common. 27 cases of falling asleep also occurred.

There was a significant difference in the use of medication affecting fitness to drive, when comparing medical conditions as immediate and background risk factors to an accident. In the case of accidents with a medical condition as an immediate risk factor, only 2% of drivers at fault drove under the influence of medication affecting fitness to drive, whereas the corresponding number in accidents with a medical condition as background risk factor was 20%. The difference is largely due to the fact that in the latter group, drivers had used medication for intoxication purposes.

All in all, the effects of medication on one's fitness to drive should be examined further since many of the drivers at fault used different kinds of medication. When studying the accident investigation reports of single accidents, it becomes clear that in addition to the side effects caused by medication, the effects of, for example, not taking the prescribed medication or changes in medication have acted as risk factors when it comes to the use of medication affecting the central nervous system, among other things. These factors could not be examined more closely in connection with this report since the examination would require extensive work. A separate study focusing on these effects would be necessary.

In addition to medical conditions and medications involved in accidents, the road accident investigation teams collect data on the assessments of fitness to drive. Unfortunately, in many cases it is difficult to determine whether a doctor has assessed the driver's fitness to drive before the accident or not.

As a conclusion of this report, it should be noted that the overall picture obtained on the basis of the data differs from the official accident statistics of many European countries since illness attacks and deliberately caused accidents have been included in the data examined in this report. Had the aforementioned accidents been left out, 239 accidents (48%) would have been missing from the data. This would have led to a decreased prevalence of cardiovascular diseases in particular as well as mental illnesses. Respectively, the relative prevalence of rare diseases, such as eye conditions, would have increased.

The Finnish Crash Data Institute (OTI) works to prevent road accidents in Finland. OTI coordinates independent investigations of fatal road accidents and administers the data collected from them. In addition to this data, OTI receives comprehensive road accident statistics from insurance companies. The amount and quality of the statistical data are unique by international standards. OTI provides important information that can be used to improve traffic safety at both legislative and practical levels. The institute operates as an independent unit within the Finnish Motor Insurers' Centre. Read more: <https://www.lvk.fi/en/the-finnish-crash-data-institute-oti/oti/>.

Definitions

Data examined in this report: the fatal motor accidents in road traffic investigated by the road accident investigation teams, also including fatalities due to sudden illness attacks. The investigation teams mainly investigate accidents which lead to a death within three days. Due to scope of investigation, the numbers are not convergent with those published by Statistics Finland which count deaths within 30 days of accident as road accident fatality but do not include deaths caused by illness attacks.

Fatal motor vehicle accident: collision or single vehicle accident where a driver or passenger of one of the vehicles involved lost their life.

Collision: Accident with at least two parties involved.

Single vehicle accident: Accident with only one party involved. These include accidents involving animals.

Party: A road user involved in an accident (driver of a motor vehicle, cyclist or pedestrian).

At-fault party: A party which, based on the assessment of the road accident investigation team, had a more significant effect on the occurrence of the accident ("the A party" (driver) in collisions, or the driver in single vehicle crash). Note: An accident involving one cyclist and one pedestrian is classified as a cycling or walking accident according to the mode of travel of the person killed in the accident.

Opposite party: A party which, based on the assessment of the road accident investigation team, had a less significant effect on the occurrence of the accident ("the B party" in collisions).

Defining substance dependence in this report: Defining substance dependence is difficult, and the range of intoxicants prevalent among road users is constantly increasing. Defining a driver's substance dependence differs from defining other medical conditions in this report.

Other medical conditions have been diagnosed by a doctor before the accident whereas substance dependence has been recognised from the gathered investigation data during the compilation of this report. The downside of this practice is that the assessment is not clinically valid. On the other hand, this practice strives for solving the problem of underdiagnosis of substance dependence. The data examined in this report includes several at-fault drivers indicating substance abuse who had not been diagnosed with that condition.

This report has classified drivers as suffering from substance dependence if at least one of the following criteria was met: The driver had been convicted of drink-driving repeatedly (two or more times), the driver's blood alcohol content was 2,5 promille or more at the time of the accident, or the driver's blood contained at least two of the following: alcohol, drugs or medication affecting fitness to drive.

More information:

The Finnish Crash Data Institute OTI
Itämerenkatu 11–13, 00180 Helsinki
Communications department:
tel. +358 40 450 4700

Director
Kalle Parkkari
Kalle.Parkkari@oti.fi
tel. +358 40 450 4627

Tapio Koisaari
Tapio.Koisaari@oti.fi
tel. +358 40 450 4782

Here is how to refer to the report:
Koisaari T., 2021. OTI Fit-to-Drive Report.
Finnish Crash Data Institute (OTI), Helsinki.
ISBN 978-952-5834-78-9.