

FATIGUED AND DROWSY DRIVING

Brain on Board.ca

You're driving home on the highway after visiting friends in a different city.

You went to bed later than usual last night, and are feeling the effects of the lack of sleep. The radio is on, your window is rolled down, and you drank an extra dose of coffee, but your giant yawns show that you are still tired. Your eyes feel hot, and every time you blink you seem to fall asleep for a second. Finally, one of those blinks lasts longer than the others, and you nod off. As your vehicle drifts into the next lane, the booming horn of an eighteen-wheeler finally wakes up you. You quickly manoeuvre the car back to the safety of your lane, but your heart is still racing in your chest. You know you just narrowly avoided what could have been a very bad situation.

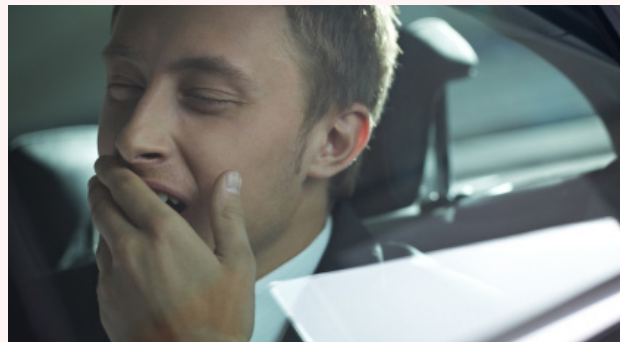
Drowsy and fatigued driving is a significant traffic safety issue that happens frequently enough to make it a major risk on roadways. In a recent survey of Canadian knowledge of and attitudes towards modern vehicle safety features, TIRF found that a concerning 20% of respondents agreed or strongly agreed that they would drive when tired if their vehicle was well equipped with modern safety features. This is a disturbing result because having safety features does not make fatigued driving any safer; in fact, driving while fatigued has the opposite effect and seriously undermines the effectiveness of those very features. So although drivers believe that they are more protected with modern safety features – and are therefore more willing to drive when fatigued – the result is that they may actually be less protected than they would be if they did not have any safety features but were alert and paying attention to the road.

WHAT IS FATIGUED OR DROWSY DRIVING?

Fatigue and drowsiness differ slightly in meaning. However, since the results of fatigue and drowsiness are the same, the two can be considered together. In addition to increasing your chances of falling asleep while driving, fatigue and drowsiness impair your ability to drive safely in a variety of ways. If you have not had adequate sleep; have consumed alcohol or ingested medication; have been driving for a long time; or, feel sleepy behind the wheel of the car, you are most likely driving while drowsy or fatigued.

HOW DOES FATIGUED DRIVING AFFECT TRAFFIC SAFETY?

The danger of falling asleep at the wheel is clear. Drivers who nod off at the wheel put themselves and those around them at a much greater risk of being involved in a collision. The Traffic Injury Research Foundation's (TIRF) 2007 survey of Ontario drivers found that 14.5% of respondents – the equivalent of 1,280,000 drivers in Ontario – fell asleep at least once in the last twelve months while driving. Of the 5.5 million trips in Ontario where a driver fell asleep, 573,441 resulted in braking or steering to avoid a collision. Four percent of drivers in Ontario who fell asleep at the wheel ended up crashing (TIRF 2007).



Even if you do not fall asleep, fatigue can impair various elements of performance that are essential to the safe operation of your vehicle, leading to slower reaction-times, reduced overall attention, slower decision-making, and delayed information processing (TIRF 2004). Although these kinds of impairments no doubt increase your risk of crashing, it can still be difficult to pinpoint which crashes are actually caused by fatigue. Measuring the causal role of fatigue is challenging for a couple of reasons. People are not very good at gauging the level of their own fatigue (TIRF 2007). As such, drivers may under-report their frequency of driving when tired. In addition, fatigue is difficult to directly observe in traffic and may not always be noted in crash reports. In 2006, the total number of Ontario drivers involved in at least one injury or property damage crash caused by fatigue may have been as high as 167,000 (TIRF 2007).

ARE THERE LAWS AGAINST FATIGUED DRIVING?

Although it is acknowledged that driving while fatigued is dangerous, there is no specific law targeting fatigued driving in Canada. It is challenging to determine if fatigue was a factor in a crash or to measure fatigue on the roadside. In addition, it is not always easy for drivers to tell when they themselves are fatigued, and it is equally difficult for crash investigators to measure the influence of fatigue in crashes.

There is currently only one law in North America that targets fatigued driving specifically. The state of New Jersey's "Maggie's Law" makes drivers liable for vehicular homicide if they have been awake for more than twenty-four hours and are in a crash that results in a fatality. Violation of this law carries a maximum prison sentence of ten years and a \$100,000 fine. This

Your brain is your vehicle's most important safety feature.

Your brain is your vehicle's most important safety feature.

law was passed in 2003, after a 20-year-old college student was killed by a driver who had fallen asleep at the wheel after being awake for over thirty hours (Reuters US 2007).

HOW MANY MOTORISTS DRIVE WHILE FATIGUED?

TIRF's most recent survey of Canadian drivers found that 14.3% of respondents report often driving while fatigued in the past year. In addition, TIRF's 2004 survey of Canadian drivers found that 57% of Canadians reported driving while fatigued "at least occasionally" (TIRF 2004). The large number of drivers who report even occasional fatigued driving is concerning, particularly because, in some cases, fatigue is comparable to alcohol intoxication. Studies show that a person who has not had proper rest in over 17 hours is equivalent to a person with a blood alcohol concentration (BAC) of 0.05, which will result in a roadside suspension from police. Sleep deprivation for a full day equivalent to a BAC of 0.10, which is legally drunk (Stutts et al. 1999). Even more concerning, 18.5% of Canadian respondents reported "nodding off" while driving (TIRF 2012). Of the 18.5% that actually fell asleep, 40.3% said they had done so on one occasion, 29.2% said they had done so on two occasions, and the remaining 30.5% said they had fallen asleep at the wheel three or more times.

WHO IS MOST LIKELY TO DRIVE WHILE FATIGUED?

Anyone who has not had adequate sleep or who has been driving for a significant amount of time can be prone to fatigue. Generally, however, fatigued drivers share some common characteristics:

- Young people aged 16-24 are more likely to drive while fatigued: almost two thirds of this

age group reports having driven while tired (TIRF 2004).



- Fatigued drivers are most likely to be male (Wang et al. 1996; Pack et al 1997).

- Fatigued drivers are more likely to report having inadequate sleep. In general, they report sleeping less than eight hours and are likely to describe their sleep quality as "poor" (TIRF 2004).

- Fatigued drivers are more likely to be driving between the hours 2pm and 4pm, and between the hours of midnight and 7am. These hours correspond to the sleepest times on our biological sleep cycles (TIRF 2012).
- Fatigued drivers are more likely to work shifts that take them off of a normal sleep rhythm, e.g., night shifts or irregular shifts (Dalziel & Job 1997; Marcus & Loughlin 1996; McCartt et al. 1996).

In addition to the characteristics shared by fatigued drivers, their crashes also have some common features:

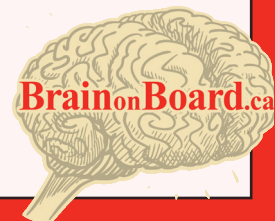
- Typically, these crashes occur at night or mid-afternoon (TIRF 2012, Stutts 1999).
- The only occupant is usually the driver, typically a young male (TIRF 2012).
- Fatigued driver crashes normally involve a single vehicle running off the roadway or a head-on collision, often without any signs of braking (Stutts 1999).
- Fatigued driver crashes usually occur on higher-speed roads, such as highways (TIRF 2012).

HOW DOES FATIGUE AFFECT MY ABILITY TO BENEFIT FROM MY SAFETY FEATURES?

Fatigue can have serious implications for the effectiveness of vehicle safety features. In the most serious cases of fatigue where you actually fall asleep, any benefit that you would have had from having safety features such as ABS, brake assist, adaptive headlights, and electronic stability control is effectively wiped out. This is because such safety features – no matter how technologically advanced – cannot act as a substitute for your eyes. The majority of safety features do not have any way of "watching the road" for you, and work only on the basis of your braking and steering actions. Clearly, if you are asleep, you are not able to provide the correct braking or steering information.



Even if you manage to stay awake, fatigue has effects that can undermine the safety features on your car. Your reaction time slows down, you cannot process information as quickly, decisions take longer to make, and your overall ability to get a sense of what is going on around you is impaired or reduced. The more tired you become, the more you remove yourself from the act of driving. Relying on safety features to do the driving for you is a dangerous risk to take, since



these features are not designed to replace you, and cannot be safely relied upon to be your substitute in any regard.

WHAT KINDS OF VEHICLE SAFETY FEATURES ARE DIRECTLY AFFECTED BY FATIGUE?

Fatigue has direct implications for many vehicle safety features. To illustrate, your reduced alertness may cause you to brake later for an obstacle. This impairment will affect brake-specific features like ABS, electronic brake-force distribution, and brake assist, and may result in not stopping in time to avoid a collision. Safety features that help you brake are of little or no benefit if you brake too late or fail to apply the brakes at all. In a similar situation, fatigue may delay your ability to recognize an obstacle in the road. Swerving harder to avoid this obstacle could make it impossible for electronic stability control – one of the most talked-about and promising new safety features – to stabilize your vehicle and prevent a rollover or you losing control.

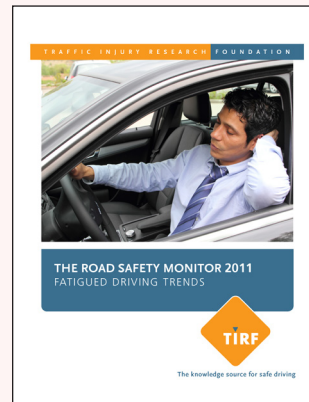
Driver assistance technologies like adaptive headlights will also be negatively affected by fatigue. The smart headlight technology highlights objects in your path that you would not normally have seen, but you still have to react appropriately to any obstacles or hazards that are illuminated. The ability to make quick avoidance action is hindered by the effects of fatigue. So, although your adaptive headlights help you to see upcoming hazards, you may still be unable to avoid them due to the impairing effects of fatigue.

Even technologies like advanced collision warning and lane departure warning that sound alarms of impending collisions or movement out of your lane are limited by driver fatigue. Both safety systems have design limitations that prevent the alarms from going off in certain cases. For instance, advanced collision warning systems are designed to look for

large, metallic objects (i.e., another vehicle), and will not sound an alarm for a cyclist or pedestrian. Similarly, lane departure warnings only work on roads where the lanes are marked clearly. In cases where the alarms do not sound, driver fatigue may easily lead to a collision.

When the alarms do go off, fatigue may still result in later braking, harder swerving, and an overall decline in your ability to safely avoid collisions. Unlike an alert driver who has their eyes on the road, warning systems are unable to get the “bigger picture” of what is happening on the road. They cannot notice potential hazards far ahead or on the side of the road, nor can these systems identify hazards like an alert driver can.

WHERE CAN I FIND OUT MORE INFORMATION ABOUT FATIGUED DRIVING?



Every year, the Traffic Injury Research Foundation (TIRF) publishes The Road Safety Monitor (RSM), a survey designed to gauge public opinion on a range of key road safety issues. In 2012, TIRF released an RSM dedicated to the issue of fatigued and drowsy driving. In addition, in 2007 TIRF published a report detailing the attitudes, concerns, and practices of Ontario drivers when it comes to fatigued and drowsy driving. Drowsiness and fatigue are also topics of much of TIRF's current research. Many of the facts, statistics, and research in this document are pulled from these TIRF publications. You can access these reports, previous



Program
proudly
supported by



reports, and other TIRF publications on this website or by visiting the TIRF website at www.tirf.ca.

Fatigued driving has also been the focus of research and publications by Transport Canada. Their findings can be found at www.tc.gc.ca. In addition, the National Highway Traffic Safety Administration (NHTSA) in the United States has researched the effects of fatigue and drowsiness on driver safety. Results of this research can be located by visiting their website at www.nhtsa.gov.

REFERENCES

Visit www.brainonboard.ca/program_resources/references.php for a full list of references.

WANT TO LEARN MORE?

Visit www.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. www.brainonboard.ca/program_resources/.

