



 **SOLERA** | eDriving

AWAKE AT THE WHEEL:

WHY LACK OF SLEEP IS NOT A BADGE OF
HONOR, BUT A LICENSE TO KILL

*A whitepaper produced by eDrivingSM,
in association with psychologist and board-certified
Behavioral Sleep Medicine specialist Dr. Shelby Harris.*



*"The AAA Foundation for Traffic Safety estimates that drowsiness is a factor in 10.6%–10.8% of crashes severe enough to be reportable to the police. This is significantly higher than the U.S. government's estimate that fatigue is involved in 1%–2% of all crashes."*¹

—Drowsy Driving Research Brief

INTRODUCTION BY **DR. SHELBY HARRIS, PSY.D.**



Sleep is crucial for our mental and physical development as well as restoring our brains and bodies. When we sleep, we learn; we grow physically and mentally; we regenerate any cellular damage created from the day; and we figure out what we don't need to remember to make room to learn new things. Lack of sleep negatively impacts our attention, concentration, mood, relationships, reaction time, coordination, and memory.

Add all of these areas up and it can lead to a very dangerous situation behind the wheel. Drivers especially need to be aware of the effects of both short- and long-term sleep deprivation. A good night's sleep is extremely important for the safety of all on the road.

Chronic sleep deprivation leads to an increased risk of heart disease, kidney disease, diabetes, stroke, high blood pressure, fatigue, obesity, and hormonal imbalances. And that's only the beginning of what we know sleep can negatively impact—there's continually research being done regarding the importance of gaining a solid night's sleep, and more and more is learned every year on just how deleterious even a few lost hours night after night can be on one's health in the short—and long—run.

PART ONE: Driver Fatigue, The Problem

Sleep: We all need it

Everyone needs sleep. On average, adults need seven hours or more per night to sustain health and safety.² Yet, research shows that more than one-third of people are not getting enough.³

The result is an increased risk to health and an increased crash risk on the road. Every day, an estimated 83.6 million people in the U.S. drive drowsy.⁴ They're taking a huge risk, as research shows that **missing just two to three hours of sleep can more than quadruple a driver's risk of a crash.**⁵

Fatigue poses such a danger to drivers that the National Highway Traffic Safety Administration (NHTSA) recently expanded its definition of impaired driving to include not only drunk, drugged, and distracted, but also drowsy driving.⁶ In 2017, the National Safety Council (NSC) declared fatigue as a "hidden but deadly epidemic."

Fatigue-related collisions CAN be prevented, but drivers and managers first need to understand the importance of adequate rest, the real risks to health and safety of a lack of sleep, and the steps that can be taken to eliminate fatigued driving.

About half of all traffic fatalities occur at night. When you consider the lower number of miles driven at night, the fatality rate per vehicle mile of travel is about three times higher at night than during the day.⁷

A lack of sleep is a threat to health

Failure to get enough sleep is not only directly linked to increased crash risk but can be a serious threat to a person's health. Inadequate sleep is linked to several chronic diseases, including diabetes, obesity, depression, coronary heart disease, and an increased risk of stroke.⁸ A lack of sleep, or quality sleep, is also linked to an increased risk of Alzheimer's disease.⁹ Even missing out on only a few hours' sleep for just one night results in a drop in the body's natural "killer cells"—the cells that attack the cancer cells that appear in the body every day.¹⁰

"Losing even a relatively small amount of sleep—two hours—can have a similar effect on a person's driving ability as drinking three beers."¹²





On a practical, day-to-day level, fatigue impairs productivity, as well as the ability to think clearly. This can jeopardize individuals' safety, both within the workplace and on the road. One survey, which examined the impact of fatigue in the workplace, found that 39% of Americans have trouble remembering things at work and 27% have trouble making decisions because of fatigue.¹¹ The same survey found that 76% of respondents feel tired at work.

TECHNOLOGY AND QUALITY OF SLEEP

Researchers at the University of California—San Francisco (UCSF) measured the impact of smartphone use on sleep quality. “Objective measures of screen time, measured using an app running in the background on the smartphone, was associated with worse quality sleep,” said Dr. Gregory Marcus, author of the study and Director of Clinical Research, Division of Cardiology, UCSF. “Screen time use right around the reported bedtime was especially tightly correlated with poor sleep.”

Driving tired increases crash risk and collision severity

Fatigue significantly increases the risk of a crash. It makes drivers less alert to what is happening on the road and less able to react quickly and safely if a dangerous situation arises.

According to Dr. Shelby Harris, sleep deprivation and excessive daytime sleepiness are routinely linked to problems with reaction time, judgment, short-term memory, attention, concentration, and sustained attention alertness. Fatigue can also cause brief, uncontrollable “microsleep” episodes lasting 1-3 seconds (or even shorter), with the driver often completely unaware that they even happened.

If a driver falls into a “microsleep” they can lose consciousness for up to 30 seconds,¹³ or worse still, completely fall asleep at the wheel. In 30 seconds, a driver can travel a long distance; at 70mph (112km/h), a vehicle could travel 0.58 miles (0.93 kilometers) in just 30 seconds. Even if a driver nods off for just 3 seconds, they could cover almost 100 meters with their eyes closed. A lot can happen on the road in that amount of time. It's clear why sleep-related collisions tend to have among the most serious consequences.

“It is harder to sleep during the day due to factors such as daylight, noise, and interruptions. Added to this, our brains literally do not produce the hormone melatonin during the day because the sun is out. This makes it more difficult to get to sleep.”

—Dr. Shelby Harris

Fatigue-related crashes are about 50% more likely to result in death or serious injury than other crashes.¹⁴ This is because a driver who has fallen asleep is unable to react to avoid a high-speed impact. Even a driver who is impaired by alcohol might attempt to avoid a collision; a drowsy driver who has nodded off, however, is unable to take any avoidance action if a dangerous situation arises.

Characteristics of a typical sleep-related crash:

- Occurs during late night/early morning or mid-afternoon
- Likely to be serious
- Involves a single vehicle leaving the roadway
- Takes place on a high-speed road
- The driver does not attempt to avoid the crash
- The driver is alone in the vehicle¹⁵

Fatigue: Who is at risk?

Everyone needs sleep, so we all have the ability to succumb to fatigue if we do not get enough sleep or enough good quality sleep. However some people are more at risk than others.

The two **MAIN** causes of fatigued driving are driving at times when you would normally be asleep and a lack of quality sleep (sleep debt). If people don't get enough sleep, they go into debt—they "owe" themselves more sleep. The only way to repay this debt is by sleeping. However, often people lose so much sleep over a period of time that it becomes impossible to pay it back. This is where chronic (long-term) sleep deprivation becomes an issue.

For many people, work interferes with the body's natural sleep patterns. More than 43% of workers are sleep-deprived, with those working night shifts, long shifts, or irregular shifts most at risk.¹⁶ One of the reasons for this is that shift-workers must often sleep in the day instead of at night.

THE BIOLOGICAL CLOCK

Our biological clock is naturally programmed for sleep at night and productivity during the day. Also known as the circadian cycle, the biological clock is regulated by exposure to light and dark; it recurs every 24 hours. The biological clock rises and dips at different times of day. The "low" points, when a person is naturally more tired and will tend to experience the deepest sleep, are between 2:00 a.m. and 4:00 a.m., and in the afternoon between 1:00 p.m. and 3:00 p.m. The sleepiness a person feels between these dips will be less intense if they have had sufficient sleep; dips will be more intense if they are sleep deprived.¹⁷



Self-assessment: Are you getting enough sleep?

Dr. Shelby Harris suggests that the ideal time to determine whether a person is getting enough sleep is during a vacation:

Although there's no ideal way to figure it out, a good rule of thumb is to take a vacation for a solid week. When you're on vacation, go to bed at your usual bedtime when you begin to get sleepy. Don't set the alarm in the morning and wake up naturally when you feel you've gotten a full night's sleep. After night three, start to keep note of your total sleep times at night (for the first few nights you'll be paying back some of your sleep debt). Average together the remaining nights of your vacation from nights four onward and this will give you a sense as to how much sleep you need.

If you never feel refreshed during the day, struggle to get a full night's sleep, or feel that the quality of your sleep is insufficient, a trip to your doctor might be appropriate to help rule out any medical or psychiatric causes that are impacting your ability get a good night's sleep.

Falling asleep at the wheel: Risk factors

Many factors—driver-related, work-related, and environment-related—can increase a person's risk of falling asleep at the wheel, including:

Driver-related

- Driving long distances
- Driving through the night, or in the early afternoon (particularly after eating a large meal), or when one would usually be asleep
- Taking medication that can cause drowsiness
- Health conditions
- Age—young people are more likely to stay up late, sleep too little, and drive at night
- Diet, fitness, and lifestyle
- Driving alone, particularly on long, monotonous roads
- Drinking alcohol or taking drugs (including the evening before driving)
- Having a hectic lifestyle—this can affect a person temporarily; for example, around the holidays, when juggling social occasions and work
- Family and personal issues, such as a new baby in the family, money worries, relationship problems

Work-related

- Length of work shifts
- Time of day
- Lack of adequate rest periods
- Volume of workload
- Frequent traveling, particularly through different time zones

Environment-related

- Type of road(s)
- Weather conditions
- Availability of rest areas



Sleep apnea is only diagnosed from a sleep study, either in lab or at home, depending on what type your sleep doctor requests. If you are diagnosed with sleep apnea, there are several treatment options available, but the gold standard treatment (and most commonly used) is called PAP therapy. This simple treatment involves wearing a mask at night with gentle pressurized air to keep your airway open and breathing well all night long. There are other treatments depending on the type/severity. Avoiding alcohol and sedating medicines is always recommended for patients with untreated sleep apnea.

—Dr. Shelby Harris



Sleep disorders

There are more than 100 sleep disorders,¹⁸ and it is estimated that up to 70 million Americans suffer from one.¹⁹ Perhaps the most commonly known is insomnia, or inability to fall asleep. About one in three adults report short-term insomnia, while one in 10 report chronic insomnia.²⁰

Obstructive sleep apnea (OSA) is another very common and underdiagnosed sleep disorder.²¹ It is estimated that there are approximately 30 million adult sufferers in the U.S.²²

People with sleep apnea have their sleep constantly disrupted by obstructed breathing that causes them to briefly wake. The sufferer often has no idea this is happening, even though it can happen several hundred times a night. Most people with sleep apnea (nine out of 10) don't realize they have it because the main symptom—snoring—is relatively common.²³ Other symptoms include—but are not limited to—waking with a dry mouth or sore throat, morning headaches, excessive daytime sleepiness, attention problems, and irritability.²⁴

Sleep apnea can affect anyone, but some factors increase risk, including:

- **Excess weight**—people who are obese have four times the risk of sleep apnea than people of normal weight
- **Neck circumference**—men with a neck circumference of 17 inches or greater are more at risk
- **A narrowed airway**—often the result of a naturally narrow throat, enlarged tonsils, or enlarged adenoids
- **Use of alcohol, sedatives, or tranquilizers**—these relax muscles in the throat
- **Smoking**—smokers are three times more likely to have sleep apnea
- **Nasal congestion**—people who have difficulty breathing through their nose are more likely to develop sleep apnea
- **Age**—although sleep apnea is seen at all ages, risk increases as people get older
- **Family history of sleep apnea**—those who have family members with sleep apnea may be at increased risk²⁵



PART TWO: Helping Employees Manage Fatigue

Environment, Health, Safety and Sustainability (EHS&S), Risk, and Fleet Managers and indeed anyone who manages employees driving for work purposes are in a key position to observe the potential impact of fatigue at work and, as such, help employees take preventive action.

Too often, drivers simply power on, despite feeling sleepy. And many managers and employees don't think anything of it if they witness a colleague yawning before getting behind the wheel. But a yawn should be viewed as a warning sign—particularly considering that being in control of a vehicle while fatigued can be just as dangerous as driving after drinking alcohol.²⁶

“Low levels of sleep should not be celebrated around the water cooler as badges of honor for fortitude and dedication. Companies have a responsibility to the public to ensure their drivers understand it’s not cool, brave, or admirable to get out on the road tired—it’s just irresponsible and puts people’s lives at risk.”

—Celia Stokes, CEO, eDriving

Employers' responsibilities

Under health and safety laws, employers have a duty to manage fatigue risks associated with driving for work. Developing a fatigue risk management program helps organizations to handle the risks associated with fatigue and enables successful communication with employees about fatigued driving.

A successful fatigue risk management program will include ways to measure, monitor, and manage risk, as well as tools to educate employees. It should encompass everything from driver hours and rest breaks to processes that encourage open communication about fatigue-related issues.

Research reveals that employers are significantly impacted by the hidden costs of fatigue. Exhausted employees could cost a U.S. employer with 1,000 workers about \$1.4 million each year in absenteeism, diminished productivity, and healthcare costs.²⁷



Fatigue management policies

These should make it clear how fatigue is managed within the organization and what is expected of employees. For example, policies might include:

- Driver hours and rest breaks
- Procedures for identifying risks
- Procedures for reporting fatigue-related issues, including suspected sleep disorders or temporary sleep problems
- Procedures for investigating fatigue-related incidents
- Procedures for training and educating employees, including remedial coaching
- Procedures for monitoring drivers and identifying suspected fatigue

Policies should be reviewed periodically and be openly accessible to employees.

Driver education and training

A formal education process is recommended that includes fatigue-related education and training for new recruits, periodic refresher training for all employees, and “intervention” coaching for drivers considered high risk or identified as requiring additional support. It could also be useful for drivers to receive updates from management on the latest research/best practice tips relating to driver fatigue. Employees should be made aware of the factors that can affect sleep and quality of sleep; the effects of sleep deprivation; and how to maintain better sleep hygiene. Employees should also be informed of the best ways to ensure adequate sleep and the emergency actions they should take if they feel tired behind the wheel.

An “open door” for employees

Employees affected by fatigue (for example those suffering from a sleep disorder), might worry about approaching their managers for fear that their jobs could be at risk.²⁸ This could result in drivers knowingly putting their own lives, and the lives of others, at risk. Employees should feel comfortable approaching their managers without having this concern. An effective policy will involve the manager encouraging such an employee to consult their doctor and taking the employee off driving duties until treated.



Trip scheduling and route planning

Trip scheduling should be planned to help drivers minimize the risk of fatigue. For example, where possible, trips should be scheduled so that drivers can avoid traveling between the hours of 2 a.m. and 6 a.m. unless essential. The afternoon “dip” of the biological clock should also be considered. If drivers must drive during these times, it is important that they have been given the opportunity to have adequate rest prior to the trip. Effective trip planning will also consider factors such as the types of roads and weather conditions.

Schedules should also be planned to allow for unexpected delays—such as traffic problems or other hold-ups—and employees should be given flexibility in their schedules to continue with planned breaks regardless of time constraints. Managers should also be mindful of employees’ trips to and from work to determine how these trips fit into overall daily schedules.

Managers who interact with employees in an office are also able to look out for them displaying “every day” warning signs of fatigue, such as yawning or appearing “distracted.”

Ongoing driver monitoring, coaching, and remediation

Ongoing monitoring can help managers to keep track of risk factors for fatigue such as driver hours, trip types, trip times, and rest breaks. Telematics data can be useful for providing insights into driver performance and potential problems. For example, such data can be utilized to obtain driver hours, trip times, trip lengths, and break times.

Considering the following questions can also help managers to build up an overall picture of each employee and their potential for being affected by fatigue:

- How many hours does the employee drive each day/week?
- Does the employee work night shifts?
- If the employee works night shifts, do they have the opportunity for adequate, quality sleep before returning to work?
- Does the employee have the opportunity to sleep for 7-8 uninterrupted hours, every day?
- Does the employee work overtime hours?
- Is the driver awake during typical hours of sleep?
- Does the driver experience any symptoms of a sleep disorder?
- Has the employee experienced any changes in personal life, e.g., a new baby, death in family, etc.?
- Is there a provision for alternative transportation or overnight accommodations if the employee requires it?



DEBUNKING MYTHS ABOUT DRIVER FATIGUE

- *Plenty of fresh air through the window WILL NOT help keep you alert*
- *Young people DO NOT need less sleep*
- *Drivers ARE NOT always aware when they are getting tired and about to fall asleep*
- *Short breaks WILL NOT keep you safe. Once you are fatigued, you must sleep*
- *Playing loud music WILL NOT keep you alert*

Investigation of fatigue-related incidents

If an employee is involved in an incident while driving at work, the contributory factors might not be obvious. However, collision/incident investigation can help to determine possible causes, and in some cases might indicate fatigue as a potential factor. Factors to consider include:

- Time of incident
- Severity
- Number of vehicles involved
- Location
- Avoidance action taken
- Driving behavior prior to the collision (e.g., lane drifting, harsh braking)
- Number of occupants in vehicle

These factors can be combined with additional knowledge about the involved driver—for example, shift patterns, working activities in the hours, days, weeks prior to the incident, personal life, etc.—to build up an overall picture of the circumstances surrounding an incident, and can help fleet managers to determine possible causes and, most importantly, what remedial action is required.

Fatigue avoidance advice to share with employees

Help employees understand that fatigue management requires people to balance the following four factors in their lives: **sleep, work, health, and body clock**.

Good habits to improve sleep:

- Go to bed and get up at roughly the same time every day, including on weekends
- Maintain a dark, quiet environment in the bedroom, at a comfortable temperature
- Reduce the use of electronic devices in the evening and eliminate them completely from the bedroom
- Be physically active during the day
- Introduce an evening routine, such as a bath/reading/listening to relaxing music/meditation
- Avoid large meals, stimulants (such as caffeine and tobacco/nicotine), and alcohol before bed

People who continue to feel tired despite taking steps to improve quantity and quality of sleep, or people with symptoms of a sleep disorder—such as snoring or excessive sleepiness during the day—should consult a doctor.

Planning trips to avoid fatigue:

- Get a good night's sleep before making a long trip
- Factor in the natural body clock dips—during the night and early afternoon
- Eat only light meals before driving
- Take breaks of at least 15 minutes for every two hours of driving—these breaks should be used to relax, not catch up on other work
- Get out of the vehicle to stretch and get some fresh air during breaks
- Stay hydrated and eat sensibly during rest breaks
- Keep the vehicle well-ventilated and at a comfortable temperature
- Consider overnight accommodations or alternative transport where appropriate

AVOID:

- Drinking alcohol before driving, including the evening before
- Making long trips after a tiring day; for example, after being at a conference
- Driving immediately after flying; **and especially avoid driving after flying across time zones or overnight. This should be a company-enforced policy.**

Recognizing the warning signs of fatigue

Often, people will know they are tired and know the reason(s) for feeling fatigued. They might have a new baby in the family, for example, and be fully aware they are not sleeping very well. Other times, however, people might not realize how tired they are.

A person who is sleep deprived might not notice the effects until they are driving on a long trip or driving at night. That's why it's important for fleet managers to help their drivers be aware of the warning signs—and encourage drivers not to ignore them.

Common signs of being tired while driving:

- Difficulty concentrating
- Constant yawning
- Sore or heavy eyes
- Frequent blinking
- Neck muscles relaxing, causing the head to droop
- Difficulty remembering the last few miles of a trip
- Varying speed for no reason
- Delayed reactions
- Drifting in the lane
- Feeling irritable



Short-term fatigue management solutions

It is important that managers do not encourage drivers to rely on “quick-fix” solutions such as opening the window or drinking an energy drink to help them stay awake on an ongoing basis. However, drivers should be made aware of **emergency** steps to help them deal with temporary bouts of tiredness and should incorporate these strategies into their trips, as needed.



If a driver begins to feel sleepy during a trip, they should have a cup of coffee then take a “power nap” of 20 minutes. The effects of the caffeine and a brief sleep can increase alertness for a short period of time. Remember personal security: find a safe and legal place to stop, keep doors locked, windows closed, and valuables secured out of sight.

Other immediate short-term options include:

- Pull over and stop in a safe place—even if not due a break
- Get some fresh air, get out of the vehicle, and move around
- Perform some stretching exercises

Remember, sleep is the ONLY true cure for fatigue; everything else is a temporary countermeasure.

Products to help assess risk and manage fatigue in the workplace



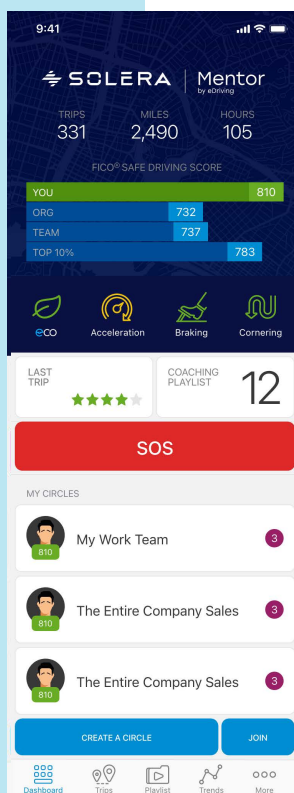
Identifying individual driver risk with **RoadRISK®**

eDriving's research-validated risk assessment tool establishes a thorough risk profile of drivers based on personal information including:

- **Driver Detail:** health, personality, type of professional driving, age, experience, tenure with company, driving habits, training taken, collision history, speeding violations, and more.
- **Vehicle Detail:** company vs. personal car, service record, mileage, age of vehicle, maintenance history, safety features, and more.
- **Trip Detail:** hours spent driving professionally and personally, types of roads and vehicles driven, work hours, schedule, miles driven, and more.

RoadRISK also includes a critical Defensive Driver Assessment with sections assessing driver attitude, behavior, and knowledge. Drivers are subsequently classified as High, Medium, or Low risk, helping fleet managers to assess the likelihood of a collision and address risk before it causes problems.





Monitoring miles driven and other driving performance indicators with MentorSM Program

[MentorSM by eDriving](#) is a smartphone-based telematics solution that turns the smartphone into a “driving fitness program.” Each driver can self-monitor how long they are driving each day, as well as how safely they are driving on each trip. Each trip and week gets scored and compared to other drivers in the organization. Plus, managers get a weekly report where they can view hours driven in addition to all the other performance metrics. Mentor also provides a “playlist” of personalized 2- to 3-minute interactive coaching modules to drivers, based on specific risk exposures, including fatigue, featuring eDriving’s sleep advisor, Dr. Shelby Harris.

Visit www.edriving.com/fleet/products-and-services/ to view eDriving’s comprehensive portfolio of world-class fleet services designed to help fleet drivers better control their decisions and actions behind the wheel.

About eDriving

eDriving is the largest provider of online driver training and global driver risk management, with more than 10 million U.S. consumer customers to date and over one million fleet drivers served annually. In addition to providing state-regulated online novice driver training and online driver improvement courses (a.k.a. traffic school), its focus is on helping drivers become smarter and safer behind the wheel in close partnership with corporations, fleet services, and insurance companies.

eDriving’s FLEET division provides the industry’s most comprehensive portfolio of driver risk reduction programs validated by large-scale research studies, refined by decades of experience with some of the world’s largest blue-chip corporations, and backed by 40 case studies, 60 published research papers, and over 70 global safety awards. eDriving’s mission is to address the 94% of collisions and incidents caused by driver attitude and behavior through the use of technology and online learning expertise. We empower smarter, more reliable, more deliberate drivers.

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