Judgment and Safety

The Takeaway

- **Drowsy driving causes 1 million crashes, 500,000 injuries, and 8,000 deaths each year in the U.S.**
- **Just one sleepless night can impair performance as much as a blood-alcohol level of 0.10 percent, beyond the legal limit to drive.**
- **Like alcohol, sleep deprivation also affects judgment, making it harder to assess how impaired you are when you're tired.**

If you're depriving yourself of sleep and you're a police officer, doctor, nurse, or pilot, then there's a very good chance that in the line of duty you may be exposing other folks to risk as well.

Dr. Christopher P. Landrigan

A Tragic Example

Nineteen-year-old Candy Lynn Baldwin was well acquainted with the 80-mile drive between Baltimore, Maryland, and her home in the Eastern Shore town of Millington. She had made the drive, which crosses the Chesapeake Bay, many times. On Saturday evening, August 9, 2008, following a busy Friday night and full day Saturday preparing for and attending her mother's wedding, Baldwin and a cousin set out for Baltimore. They didn't give their return trip much thought, even though they knew they would be returning late.

The Chesapeake Bay Bridge connects Maryland's urban Western Shore with its rural Eastern Shore.

Just before 4:00 a.m. Baldwin steered her 1997 Chevrolet Camaro onto the Chesapeake Bay Bridge toward home. By that time, she had been awake for many hours straight. In addition, her internal biological clock, a part of the brain that helps control the timing of alertness and sleep, was likely sending out strong signals that her body needed to sleep.

The accident left John Short's semi-truck underwater below the bridge's eastbound span.

At the same time, John Short was pulling onto the far end of the massive bridge, driving a semi-truck full of refrigerated chicken. On this particular night, maintenance had forced both directions of traffic onto the same eastbound span. As the two vehicles converged at highway speeds, Baldwin nodded off and veered across the centerline, far too quickly for Short to avoid. Short's attempt to avoid a crash, and the subsequent collision, sent his truck hurtling into the opposite lane before smashing through a guardrail and plunging into the water below. He died of multiple injuries and drowning, according to autopsy reports. Baldwin's cousin escaped relatively unscathed, receiving only minor injuries. Baldwin herself sustained two broken kneecaps and damage to her spleen and liver. She has no recollection of the crash.

A National Epidemic

Although this is an extreme and tragic example of the hazards of driving while sleep deprived, the circumstances that led up to Baldwin's accident are all too common. According to a National Sleep Foundation survey, one-third of all adult drivers say they have fallen asleep at the wheel.[1] On the basis of the best available research, the Institute of Medicine estimates that drowsy driving is responsible for 20 percent of all motor vehicle crashes. That means that drowsy driving causes 1

million crashes, 500,000 injuries, and 8,000 deaths each year in the U.S.[2]

Driving is not the only activity negatively impacted by insufficient sleep. Virtually any task or profession that requires alertness and sound judgment may be affected by too little sleep. The medical profession, for example, is notorious for the long, sleepless hours required of doctors, nurses, and other healthcare providers, and this has an impact on the quality of care patients receive. Although the precise number of medical errors attributable to insufficient sleep is unknown, a randomized, controlled trial at Harvard's Brigham and Women's Hospital found that more than one-quarter of the errors that interns (first-year doctors-in-training) made in the care of ICU patients were attributable to their traditional extreme work schedules.[3,4] Given that medical errors are responsible for as many as 98,000 deaths each year in the U.S.[5], the reduction of doctors' and nurses' sleep deprivation has become a major public health issue.

One-third of all adult drivers say that they have fallen asleep at the wheel.

Extended Work Shifts (1:22)
Dr. Charles Czeisler discusses the hazards of extended work shifts.

How Poor Sleep Affects Performance

Several sleep-related factors can affect an individual's ability to stay alert and perform a task safely and competently. The first is the number of hours that person has been continuously awake. With each hour of wakefulness, the drive to sleep increases and alertness fades. Another common factor is insufficient sleep on a regular basis, also known as chronic sleep deprivation. Scientists have found that a small nightly decrease in sleep has serious cumulative effects; for instance, a week and a half spent sleeping just six hours per night, rather than seven to nine, can result in the same level of impairment on the tenth day as being awake for the previous 24 hours straight.[6] Another factor is an individual's internal biological clock. Shift workers, in particular, are affected by the timing of their internal clock, especially when they try to be alert when their internal clock says they should be sleeping, or when they try to sleep when their clock says they should be awake.

Sleep Deprivation and Judgment (1:01)
Dr. Christopher Landrigan explains the effect that sleep deprivation has on judgment.

Drowsy or Drunk, the Effects Are Similar

Studies have shown that staying awake for just 17 to 19 hours

The first part of your brain that turns off with sleep deprivation is

straight impacts performance more than a blood-alcohol level of .05 percent (the level considered legally drunk in most western European countries). This level of impairment slows an individual's reaction time by about 50 percent compared to someone who is well rested. Twenty-four hours of continuous wakefulness induces impairments in performance equivalent to those induced by a blood-alcohol level of 0.10 percent, beyond the legal limit for alcohol intoxication in the United States.[7]

Perhaps even more profound is the effect of poor sleep on judgment. The prefrontal cortex, an area near the front of the brain responsible for logical reasoning and complex thought, seems particularly vulnerable to sleep deprivation. Experts think this may explain why people typically have such a hard time recognizing their own fatigue and level of impairment. Like the drunk driver who thinks he or she is just fine to drive, the tired driver is not always the best judge of his or her ability to operate a vehicle safely.

Read more about Sleep, Performance, and Public Safety in the Healthy Sleep module. The Philadelphia Police Department used its understanding of how insufficient sleep affects performance to institute important policy and work hour changes. Find out how in Lou's Killer Shift .

For more on the role the biological clock plays in sleep regulation, see The Drive to Sleep and Our Internal Clock in the Healthy Sleep module.

So, How Awake Are You? Take our alertness test to find out.

the little part that says, 'I'm not performing so well.'

- Dr. Robert Stickgold

Related Content:

How Awake Are You?

Lou's Killer Shift

Adopt Good Sleep Habits

References

1. National Sleep Foundation, 2008 Sleep in America Poll.

2. Colten HR and Altevogt BM, eds. *Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem*. Board on Health Sciences Policy; National Academies Press. 2006.

3. Lockley SW, et al. *Effect of Reducing Interns' Weekly Work Hours on Sleep and Attentional Failures*. NEJM. 2004; 351(18): 1829-1837.

4. Landrigan CP, et al. *Effect of Reducing Interns' Work Hours on Serious Medical Errors in Intensive Care Units*. NEJM. 2004; 351(18): 1838-1848.

5. Kohn LT, et al., eds. To Err Is Human: Building a Safer Health System. Institute of Medicine; National Academies Press. 2000.

6. Van Dongen HPA, et al. *The Cumulative Cost of Additional Wakefulness: Dose-Response Effects on Neurobehavioral Functions and Sleep Physiology from Chronic Sleep Restriction and Total Sleep Deprivation*. SLEEP. 2003; 26(2):117-126.

7. Williamson A, Feyer A. *Moderate Sleep Deprivation Produces Impairments in Cognitive and Motor Performance Equivalent to Legally Prescribed Levels of Alcohol Intoxication*. Occup Environ Med. 2000 October; 57(10): 649–655.

back to top

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