

SLEEP: THE FOUNDATION OF HEALTH AND WELLBEING



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IT STARTS WITH SLEEP

The importance of sleep cannot be overstated. In fact, the World Health Organization describes sleep as a basic human need. Without sleep, a person's health, safety, quality of life, and performance become radically compromised. Decades ago, smoking cigarettes, overindulging in alcohol, driving without a seatbelt, and forgoing sunscreen were not only socially acceptable, but instead wryly celebrated as living life to the fullest.

While individual claims of "not needing sleep" or sleeping very little each night are still met with public approval, research now overwhelmingly demonstrates that insufficient sleep has drastic, negative impacts on health, safety, and human performance. Researchers have shown that enduring 24 hours without sleep, or a week of sleeping only four to five hours nightly, induces a physical, emotional, and cognitive impairment equivalent to a blood alcohol level of 0.1%.

Modern culture sets unrealistic expectations for 24/7 stimulation, propelled by artificial stimulants and never-ending access to technology and globalized social networks. Extremely long workdays create an unhealthy cycle that involves overindulging, sleeping in, and sedentary weekend activities. The Centers for Disease Control and Prevention has declared insufficient sleep to be a public health epidemic.

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THE MYTH OF 24/7

Simply put, a good night's sleep is just as important to a healthy life as diet and exercise. Doctors, sleep therapists, researchers, and other medical professionals concur that sleep must be prioritized along with traditional health efforts (1).

The viewpoint that a body can be “trained” to require only five hours of sleep is incorrect. There are no “natural” 5-hour sleepers, merely individuals who have grown accustomed to functioning at dangerously poor levels – with great risk for health and safety. Needing only five hours of sleep is a biological impossibility (2). Individuals might think they are operating at full function without appropriate sleep, but the truth is that sleep deprivation reduces a person's ability to self-assess their own performance (2). Research demonstrates that many sleep deprived individuals will continue to insist that their processes are not impaired, when actually they are demonstrably impaired. (2).



*Sleep deprivation reduces a person's ability to **self-assess** their own performance*

30%
of U.S. adults *suffer*
from *sleep deprivation*

AN EXHAUSTED NATION

Though seemingly invisible, sleep deprivation is everywhere, impacting huge swaths of the population and creating costly problems for all involved. We now know that 40% of the population is sleep deprived, receiving less than the seven recommended hours of sleep each night (3). Generations of doctors have recommended seven to eight hours of sleep each night – and for good reason. Today’s experts continue to validate that recommendation.

Yet the Centers for Disease Control and Prevention states that 30% of the population receives less than six hours of sleep each night. The problem is similar in scope to obesity, which affects 34% of the population. The two primary sleep disorders include insomnia, which impacts 12% of adults, and Obstructive Sleep Apnea, or OSA, which affects 25% of male adults and 9% of female adults (4).

There’s no getting around sleep. Caffeine can’t replace it. The body doesn’t get “used to” less than seven to eight hours of sleep each night. The only way to get sufficient sleep is to get sufficient sleep. And that means seven to eight hours, every night.

SLEEP: THE INVISIBLE THIEF

Sleep robs companies. In 2002, Sleep and Breathing reported that the International Classification of Sleep Disorders distinguishes more than 80 different disorders, which can be effectively treated (5). Yet the “prevalence, burden, and management” of sleep disorders is unfortunately “ignored or overlooked” by society in general (5). Given the high prevalence, severe complications, and serious illnesses associated with undiagnosed and untreated sleep conditions, cost implications are “immense” (5).

Sleep and Breathing describes costs as “direct, indirect, related, and intangible” (5). Fortunately, considerable evidence points to the fact that treating patients for their sleeping disorders is cost-effective. The study states unequivocally that sleep medicine and education, combined with diagnostic and therapeutic facilities, reduces the “profound socioeconomic implications” of untreated sleep disorders (5).

*The cost implications of **untreated** sleep conditions are immense...*



SLEEP: IMPACT ON HEALTH

The Centers for Disease Control and Prevention states that people experiencing sleep insufficiency are more likely to suffer from chronic diseases such as obesity, diabetes, hypertension, and depression, as well as cancer, increased mortality, and reduced quality of life and productivity. Regularly sleeping less than five hours each night increases the chance of death, from all causes, by about 15% (6).

According to the National Institute of Neurological Disorders and Stroke, sleep is a basic human need, like eating or drinking water. Sleep supports essential brain and nervous system functioning, allowing the body to recover from daily life.

*Sleep Deprived? You're **more likely to suffer from:***

- **OBESITY**
- **DIABETES**
- **HYPERTENSION**
- **DEPRESSION**
- **CANCER**
- **INCREASED MORTALITY**

SLEEP PROMOTES HEART HEALTH

Sleeping five hours or less each night is associated with a 45% increase in risk of heart attack. Sleep disordered breathing increases risk for high blood pressure and heart disease, because of distress within the heart due to multiple oxygen deprivation events throughout the night (7). Sleep deprivation can also contribute to cardiovascular disease (8).

- In 2011, the Journal of the American Heart Association reported that among people with insomnia, there was an increased risk of 27% to 45% for heart attack (8).
- A 2013 European Heart Journal study reported that people with chronic insomnia had three times the risk of heart failure (8).
- A 2014 study published by Stroke reported that people with insomnia had a 54 percent higher chance of being hospitalized for a stroke over a four-year period (8).
- The risk of stroke doubles with less than six hours of sleep (9).

*Chronic insomnia sufferers
have **3x the risk of heart failure***



SLEEP AND DISEASE ONSET

Sleep deprivation can contribute to decreased production of cytokines proteins, which the body uses to combat infection and inflammation (8). Sleep deprivation also makes it harder for antibodies and cells to fight infection (8). Not getting enough sleep has been linked to heart disease, weakened immune response, diabetes, illnesses, and weight gain (6).

Among people who get less than seven hours of sleep each night, susceptibility increases for serious medical conditions including diabetes, cardiovascular disease, hypertension, obesity, and depression (1). Individuals with sleep apnea may have a higher risk of cancer (10). Sleep deprivation is also linked with higher blood pressure, pancreatic stress, and damaged brain cells (6).

During sleep, the brain works to eliminate toxic chemicals; one of the proteins that accumulates in the human brain during waking hours is associated with Alzheimer's disease (11).



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*Not sleeping enough can cause people to consume an average of **549 extra calories daily.***

SLEEP AND OBESITY

Sleep length may help regulate body weight and metabolism (12). Among large population samples, researchers have noted associations between short sleep time and increased body mass index, or BMI (12). Sleep modulates a primary component related to neuroendocrine control, regulating appetite in a normal, healthy manner (13). Chronic sleep restriction can increase appetite levels and stress hormones; it can also reduce a person's ability to metabolize glucose (7). Sleep deprivation increases production of the hormone ghrelin, which causes carbohydrate and sugar cravings that can lead to weight gain and sleep apnea (7).

Sleep deprivation makes it harder to resist food stimuli, leading to higher risk for overeating (14). In addition to eating too much, sleep deprivation might make it harder for people to make healthy food choices (15). Not sleeping enough can cause people to consume an average of 549 extra calories daily (16).

Scientists have shown that for every hour of lost sleep below the recommended seven hours, odds for obesity become five times higher (17).

SLEEP AND DIABETES

Not getting sufficient sleep vastly increases risk for diabetes. In fact, sleeping for only five hours each night more than doubles your risk for diabetes (18). “For every hour of lost sleep (below 7), obesity odds become 5x higher.”

Sleep deprivation has also been identified as contributing to a greater risk of dementia and accelerating disease onset (19). Other problems include:

- **Immune Function:** Sleep duration may be linked to immune system health. In one study, participants who received less than seven hours of sleep were 2.94 times more likely to get a cold, compared to those who slept eight hours or more (20).
- **Mortality:** Insufficient sleep can shorten a person’s lifespan. In a 2010 Sleep journal study, researchers found that during a 14-year period, men who complained of chronic insomnia, and who frequently slept for six hours each night, were four times more likely to die (8).



*Sleeping for only five hours each night more than **doubles your risk for diabetes***

The risk for major depression increases 10 times for those affected by insomnia



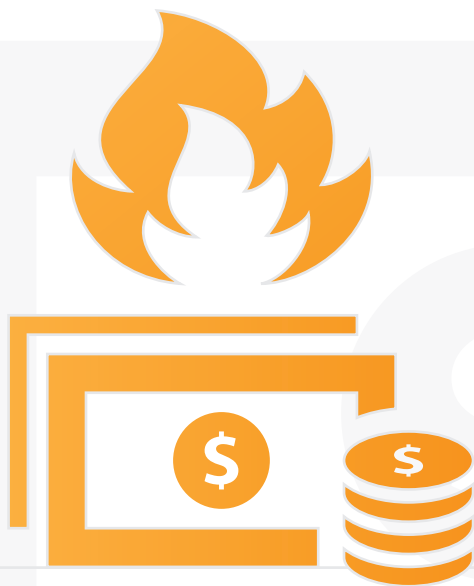
SLEEP AND MENTAL HEALTH

Sleep deprivation can also have damaging effects on mental health, because sleep regulates the brain's flow of chemicals such as epinephrine, dopamine, and serotonin, which are closely linked to mood and behavior. Because mood and sleep rely on the same neurotransmitters, it can be difficult to determine whether a patient is suffering from sleep loss or depression (11). Disrupted neurotransmitters can cause chemical changes within the brain, creating mood swings that can make it appear as if someone is suffering from bipolar disorder (8).

Scientists have shown that sleep deprivation negatively impacts parts of the brain associated with "depression, anxiety, stress, and other psychiatric disorders" (22). Additionally, insomnia increases risk for panic disorder by 20 times (23). The risk for major depression increases 10 times for those affected by insomnia (24). Employees who suffer from insomnia are 10 times more likely to experience depression and anxiety (25). For every employee diagnosed with chronic insomnia, an employer will pay \$4,589 [in Canadian dollars] annually in both direct and indirect costs according to a 2009 study (26). In American dollars for that year, that cost translates to \$3790.37 lost per employee each year in direct and indirect costs.

ADDITIONAL MEDICAL COSTS ASSOCIATED WITH SLEEP DEPRIVATION

The Institute of Medicine of the National Academies reports that people struggling with sleep are not only “less healthy,” they require more medical care (27). In fact, struggling with sleep-related conditions is associated with a “10 to 20% increase” in healthcare utilization (28). In 2012, The National Institutes of Health publication, NIH Medline Plus, reported that American companies spend \$16 billion on healthcare expenses resulting from sleep problems (29). Harvard University determines that for each employee suffering from undiagnosed obstructive sleep apnea, an employer will spend between \$3,200 and \$4,000 each year (4).



*Sleep-related conditions are associated with a **“10 to 20% increase”** in healthcare utilization*

SLEEP DEPRIVATION AND PRODUCTIVITY

The National Institute reports that during deep sleep, activity in parts of the brain controlling emotions, decision-making processes, and social interactions is “drastically reduced,” helping people to maintain normal, healthy emotional and social processes during the day (1). People who don’t receive enough sleep might struggle to concentrate or experience mood swings (1).

Sleeping an average of six hours or less each night for one week is the equivalent to two nights of total sleep deprivation. Individuals may not be aware of decreased productivity, but it can be identified and quantified nevertheless. Scientists have shown that employees with severe insomnia miss work twice as often as “good sleepers” (31).

Mark Rosekind of the National Transportation Safety Board has stated:

“Every aspect of who you are as a human, every capability is degraded, impaired, when you lose sleep. What does that mean? Your decision-making, reaction time, situational awareness, memory, communication are reduced by 20 to 50 percent.” (11)

*Scientists have shown that **employees with severe insomnia miss work twice as often as “good sleepers”***



WITHOUT SLEEP, PRODUCTIVITY SUFFERS

Averaging four hours of sleep per night for four or five days results in the same level of cognitive impairment as remaining awake for 24 hours; it is also the equivalent to legal drunkenness (7). Within 10 days of this level of sleep deprivation, impairment is equivalent to 48 hours without sleep (7). Negative effects include a lengthened reaction time, impeded judgment, and disrupted problem solving processes (7). When an individual experiences this level of sleep deprivation, drinking a single beer can have an equivalent effect as six beers on a well-rested person (7).

Staying awake for more than 18 consecutive hours causes the following processes to suffer: reaction speed, short-term and long-term memory, ability to focus, decision-making capacity, math processing, cognitive speed, and spatial orientation (7). Accumulated sleep deficits only magnify negative effects (7).

Individuals with insomnia or sleep deprivation have “significantly worse” productivity, performance, and safety measures (32). Productivity losses associated with fatigue are estimated to cost \$1,967 per employee annually (32). Additionally, presenteeism associated with individuals struggling with insomnia is considered to be equivalent to 11.3 days of lost work performance per year; when controlled for co-morbidity factors, this decreased to 7.8 days per year (33).



*Individuals with insomnia or sleep deprivation have “**significantly worse**” productivity, performance, and safety measures*



*Even modest gains in accumulated sleep are **associated with “significant improvement”***

LOST SLEEP, LOST MONEY

Lost productivity is costly. The individual-level human capital value of this loss is estimated at \$2,280; generalizing this number in proportion to the total American workforce, this results in an equivalency of 252.7 days and \$63.2 billion (33). Researchers commenting on the negative impacts of sleep deprivation on human productivity include Ronald C. Kessler, psychiatric epidemiologist at Harvard Medical School:

“We were shocked by the enormous impact insomnia has on the average person's life. It's an under-appreciated problem. Americans are not missing work because of insomnia. They are still going to their jobs but accomplishing less because they're tired. In an information-based economy, it's difficult to find a condition that has a greater effect on productivity.”

Unfortunately, employers sometimes ignore consequences related to insomnia because it is not considered to be an illness resulting in worker absenteeism. Kessler and other researchers suggest that employers must take a second look. Insomnia treatments can range from \$200 to \$1,200 per year, depending on intervention level required (34). Fortunately, even modest gains in accumulated sleep are associated with “significant improvement” in employee alertness and emotional regulation (35).

SLEEP AND STRESS

Sleep decreases the levels of stress neurochemicals in the brain (36). During the REM stages of sleep, stress chemistry processes within the brain shut down, and the brain can begin to process emotional experiences and positively address painful or difficult memories (37). By supporting emotional and cognitive processes during sleep, sleep enables people to optimize decision-making processes (38).

Not receiving sufficient sleep means that the body and mind cannot function at optimal levels. Sleep can “inspire creativity, re-balance emotions, help refresh cardiovascular health, metabolic health and boost our immune system” (11).

It’s possible that for every hour of lost sleep, employees spend an additional 8.4 minutes procrastinating online during the subsequent workday (6).

*Not receiving sufficient sleep means
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SLEEP DEPRIVATION AND SAFETY

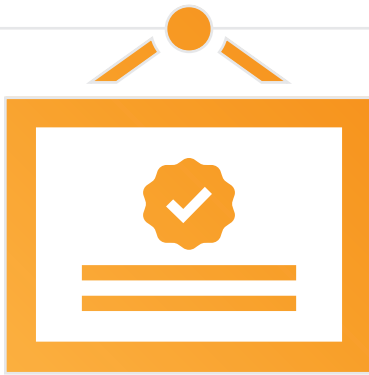
Driver sleepiness plays a role in 20 percent of serious car injuries, independent of alcohol effects (27). Highly fatigued workers are 70% more likely to be involved in accidents than workers reporting low fatigue levels. Sadly, the National Highway Traffic Safety Administration reports that in the past five years, driver fatigue has accounted for more than 1.35 million car accidents in the United States.

Among hospital interns, working for 24 consecutive hours increased their odds of stabbing themselves with a needle or scalpel by 61% (7). They also increased their risk of a car crash by 168 percent, and their risk of a “near-miss” accident by 460 percent (7). Within the U.S., drowsy drivers cause 20% of all motor vehicle accidents, resulting in 8,000 deaths annually (2). Every day, 80,000 drivers fall asleep at the wheel, and 10% of them run off the road (7). Every two minutes, one of those drivers crashes (7). In a 1997 FHWA survey, 28 percent of surveyed drivers stated that they had fallen asleep during the previous month, and that one-third of those same drivers admitted to falling asleep at the wheel between three to six times during the prior month (39).

Sleep deprivation also affects airline safety. In 2010, a sleep deprived pilot caused a Boeing 737 crash in southern India, killing 158 people (40).



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Cognitive Behavioral Therapy, or CBT, is more effective than sleeping pills in both the short-term and long-term

COGNITIVE BEHAVIORAL THERAPY

Dr. Gregg Jacobs of Harvard Medical School reports that Cognitive Behavioral Therapy, or CBT, is more effective than sleeping pills in both the short-term and long-term (7). Although hypnotics, or sleeping pills, have long been the primary medical treatment for insomnia, only 25% of patients using these treatments report that they feel satisfied with this treatment (7). Instead, they cite concerns about side effects and the possibility that they will become dependent (7). Sleep-related sedatives can “greatly disrupt” the brain’s natural sleep process, because these interfere with cycles associated with memory sorting, storage, and discarding (21).

The AASM Clinical Guidelines for the Management of Chronic Insomnia in Adults recommends that all insomnia patients, including those with active hypnotic prescriptions, participate in Cognitive Behavioral Therapy (41). Unlike medications, which “incur recurring costs,” benefits from CBT are ongoing, and “increase long after treatment is completed” (41).

MOVING FORWARD WITH BETTER SLEEP

In 2006, a consort including the National Academy of Sciences, American Academy of Sleep Medicine, the Department of Health and Human Services, the National Sleep Foundation, and the Sleep Research Society reported the need for increased awareness among public and health care practitioners (7). Health and Life Sciences professionals do not currently allocate enough time and resources to the study of sleep-related materials, they concluded (7). The consort recommended greater investment in sleep medicine and technology. Encouraging “a culture of sleepless machismo” is considered to be “downright dangerous” (7). Raising workplace performance requires attention to the fundamental biological concern of sleep (7). An attitude of nonchalance about the importance of sleep has become outdated and demonstrably dangerous.

Without doubt, sleep has proven to be the primary foundation of health and well being – equally as important as proper nutrition and exercise, if not more so. Today’s very brightest researchers, working in the nation’s most respected university and hospital labs, resoundingly conclude that without sleep, a person’s safety, health, and productivity become badly compromised. There is no question that investing in sleep has tremendous payoffs on the individual level, and for a healthy, flourishing society as a whole. Today’s companies serve as the crucial link between those two entities. The simple truth is that when employees sleep well, employers benefit. Lowered health care costs, fewer costly workplace accidents, and a well-rested, tightly focused, highly alert and happier staff make for a remarkable and profitable equation. Research validating the power of sleep will continue to compound. We see a sharp line delineating those individuals, businesses, and organizations who have embraced sleep from those continuing to run on an unsustainable mix of caffeine, exhaustion, and bravado. **When it comes to making smart decisions for your company, sleep makes sense.**

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