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Lack of Sleep in the Workplace: What the Psychologist-Manager Should Know About Sleep

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Lack of sleep and/or untreated sleep disorders have serious consequences for productivity, safety, health, and quality of life. Despite this, sleep needs tend to be ignored by American culture in general and corporate culture in particular. This article describes the implications of insufficient or inefficient sleep for workplace functioning and the ways in which workplace characteristics affect sleep. Poor sleep costs businesses directly through lost productivity, compromised physical or emotional health, impaired cognition, accident rates and absences, and indirectly through such factors as poor morale, poor social relationships, and depression. A number of steps that businesses can take to improve employees' sleep and their health—and, ultimately, their productivity—are offered.

Sleep—we all do it, although not always very well. It is necessary for life, yet we often knowingly or unknowingly deprive ourselves of adequate amounts of it; we obtain medical care for an illness or injury, but fail to seek treatment for a sleep disorder. This article describes the consequences of sleep loss and raises sleep issues that are related to the workplace. The impact of sleep loss is often unrecognized, but it still has a major impact on how well a business functions. It is, therefore, in the best interest of companies to pay attention to their workers' sleep. As Czeisler has noted, "A good sleep policy is smart business strategy. People think

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they're saving time and being more productive by not sleeping, but in fact they are cutting their productivity drastically" (quoted by Fryer, 2006).

An employee may be sleepy because of complete or partial sleep deprivation, either voluntary (e.g., sacrificed sleep for other activities) or involuntary (such as insomnia), or because of the effects of an untreated sleep disorder (such as Obstructive Sleep Apnea or Restless Legs Syndrome). Some causes of daytime sleepiness can be improved by the use of good sleep hygiene. For example, one obvious way to improve sleep is to allow adequate time for it. Keeping the bedroom dark and quiet and maintaining consistent bedtimes and wakeup times can also improve sleep. Other causes of daytime sleepiness may be resolved by either behavioral or medical treatments. Sleep problems are legitimate complaints; the sleepy individual has a real need for intervention. According to Mahowald (2000), "True excessive daytime sleepiness (EDS) is rarely, if ever (contrary to popular opinion), due to a psychological or psychiatric condition (e.g., depression), laziness, or boredom." A recent survey of working Americans concluded that we spend an average of 9 hours 28 minutes at work, take work home with us, and have trouble staying awake both at work and when driving (National Sleep Foundation [NSF], 2008).

Perhaps the most well-known sleep ailment in the United States is insomnia (Henry, McClellen, Rosenthal, Detrick, & Gosdin, 2008). Insomnia is characterized by poor quality, insufficient, or nonrestorative sleep (Pressman & Orr, 1997) and may be primary (when all other potential causes have been ruled out) or secondary (caused by another disorder). Insomnia may result from a combination of predisposing factors such as emotional reactivity, being a "night-person," or physiologically based hyperarousal (Roth & Roehrs, 2003). It can also be triggered by precipitating factors such as any event or condition that temporarily interferes with sleep, and perpetuated by maladaptive behavior patterns that prolong the insomnia even after the precipitating factor has been resolved (Pressman & Orr, 1997).

Insomnia can be difficult to control. Chronic insomnia usually warrants treatment, but it remains largely undiagnosed and undertreated (Billiard & Bentley, 2004). In the United States it is estimated that around 10–15% of all patients seen in primary care settings suffer from chronic insomnia and 20–49% of adults suffer insomnia intermittently (Billiard & Bentley, 2004). However, according to Ozminkowski, Wang, and Walsh (2007, cited in Cassels, 2007), "It costs far less to treat insomnia than to ignore it. Untreated insomnia affects individuals' health, quality of life, and job performance—and increases their use of healthcare services substantially." Ozminkowski et al. (2007) report that average direct and indirect costs for young adults with insomnia are about $1,253 greater than for patients without insomnia, and among the elderly, direct costs are $1,143 greater for patients with insomnia. Thus, persistent and chronic insomnia is associated with a significant economic burden (Ozminkowski et al.) and is a major public health problem (National Institutes of Health, 2005).

There are at least four ways in which sleep factors can affect daytime functioning (Fryer, 2006). The first is the homeostatic process, sometimes called the sleep debt. The longer it has been since a person last slept, the higher his or her sleep debt and the more likely the brain is to insist on sleeping, even if for only a few seconds (called a microsleep). A microsleep while driving at high speeds can be enough to trigger an accident. The second factor is the amount of sleep a person has gotten over the last few days. A person may have had insufficient sleep either because of sleep restriction, poor sleep hygiene, or disruptions due to an untreated sleep disorder. The loss of a few hours of sleep nightly over a period of several days can be as damaging as 24 hours of total sleep deprivation, which is equivalent to being legally drunk (Fryer, 2006). The third factor is the circadian rhythm, our biological clock that prepares the body to fall asleep or wake up. Humans are more-or-less diurnal, so if they are forced to be alert and focused in the night, they have to fight the biological clock to do so. Since darkness triggers physiological changes that promote sleep, the third-shift worker has to overcome physiological preparedness to sleep. The final factor is the impact of sleep inertia. This refers to the relatively brief period of time (5–20 minutes) of grogginess a person experiences immediately after waking. This can be a handicap to those who may have to make important decisions or take decisive action immediately after waking up (for example, a firefighter who must go into immediate action when awakened from sleep by a fire alarm).

Impact of Lack of Sleep on the Workplace

Sleep loss is costly to society in general and businesses in particular. In 1997, Pressman and Orr reported that sleep disorders cost taxpayers 15.8 billion a year in direct costs. In a national telephone survey of workers in the United States, Ricci, Chee, Lorandeau, and Berger (2007) found that fatigue was common over the previous two weeks (37.9%), and fatigue was responsible for $136.4 billion annually of health-related lost productive time, especially when it co-occurred with another health problem.

Insufficient/disrupted sleep has been associated with many physiological and psychological outcomes relevant to the workplace (see Table 1), including poor memory, accidents, health complaints, and absenteeism (Roth & Roehrs, 2003). Yet, as a society, we tend to underestimate the importance of sleep, sacrificing sleep to work or play, and this is facilitated by such conveniences as 24-hour shopping. The dangers of sleepiness are exacerbated by the fact that we can get so accustomed to being sleepy, we no longer recognize that we are sleepy. And even when we are aware of being sleepy, we are not accurate at perceiving the extent to which our abilities (such as judgment, problem solving, reaction times, etc.) are impaired by sleepiness (Rosekind, 2005). Not everyone is equally vulnerable to the effects of lost sleep. Some are able to withstand sleep loss with no

TABLE 1
A Partial Listing of Outcomes Associated in the Literature with Sleep Deprivation or Sleep Disorders

Physiological	*Psychological*
Delayed reflexes or reaction time	Academic performance
(leading to car wrecks, work accidents)	ADHD
Reduced vision	Learning/memory deficits
Menopause	Depression/anxiety
Microsleep	Panic disorders
Motor decrements	Externalizing disorders
Decreased cortisol	Impaired judgment
Cardiovascular disease	Risk-taking
Changes in immune functioning	Suicide

accompanying cognitive impairment (Durmer & Dinges, 2005) or increased risk of accidents, but only up to a point (Ingre, Akerstedt, Peters, Anund, Kecklund, & Pickles, 2006).

Cognitive Impairment. Inadequate sleep has been linked to lapses of attention (Lim & Dinges, 2008), impaired working memory (Durmer & Dinges, 2005), impaired learning (Curcio, Ferrara, & De Gennaro, 2006), and changes in decision-making ability (Killgore, Lipizzi, KIamimori, & Balkan, 2007). Chronic loss of sleep (routinely getting fewer than seven hours per night) can produce cognitive deficits similar to those seen with one to three nights of total loss of sleep (Banks & Dinges, 2007). A review of the literature by Lim and Dinges (2008) concluded that sleep deprivation affects attentional processes in several ways: it slows responses, causes lapses in attention (such as would be evidenced in errors of omission and errors of commission), and it enhances the "time on task" effect (the decline in performance with longer time engaged in a task). For example, a driver might attend to driving well early in a shift, but attention might decline as sleep debt accumulates.

Sleep also appears to play an important (although not yet well understood) role in learning. A review by Curcio et al. (2006) found that sleep loss produces deficits in both procedural ("how to") and declarative (factual) learning. Current theories suggest that sleep allows for the consolidation of new memories (Plihal & Born, 1997), taking a new memory, initially vulnerable to decay or interference, and integrating it into one's existing memories. The end result is integration and storage of a new memory in a stable form. New material, therefore, is best learned when learning is followed by a period of sleep, whether for a night or even a nap (Mednick, Nakayama, & Stickgold, 2003).

Sleep loss can impair the ability to make good judgments; when combined with poor attention, results on the job can be catastrophic. A crash of a commuter

flight in October 2004, in which 13 of 15 individuals died, may have been caused in part by insufficient sleep. According to the report of the accident by the National Transportation Safety Board (NTSB), the "pilots' unprofessional behavior during the flight *and their fatigue* likely contributed to their degraded performance" (italics added; NTSB, 2006, p. viii). The pilot and copilot had eight hours of rest time before the flight, but this "rest time" included travel, eating, and personal care, as well as sleep. As a result of this tragedy, the Federal Aviation Administration modified flight crew "hours of service" rules.

As this illustration indicates, sleepy people may fail to use good judgment, and they may be more likely to take risks. Killgore et al. (2007) used the Iowa Gambling Task to examine the effect of sleep deprivation and caffeine consumption on risky decision making. Participants were tested at rested baseline and at 51 and 75 hours of sleep loss. At 51 hours of sleep deprivation, participants were more likely to take disadvantageous risks than at baseline. There was no change from 51 to 75 hours of sleep loss. Caffeine consumption did not override the deficits associated with sleep loss. The authors concluded that the ability to integrate emotion and cognition may be vulnerable to the effects of sleep loss. Workers may tend to take more risks when sleep deprived, and this may be particularly critical for workers such as police officers, military personnel, or medical workers who must make fast decisions that affect their own and others' wellbeing.

Sleep also affects the quality of problem solving. Many employees hold positions in which they are expected to produce effective solutions to problems. One study has suggested that a night's sleep may assist with problem solving. Wagner, Gais, Haider, Verleger, and Born (2004) asked participants to solve 90 "number reduction task" problems. Participants were shown a labor-intensive method for solving the problems, though there was also a simpler short-cut method that wasn't demonstrated. The pretest was followed either by a block of sleep or awake time; then, participants returned the next day for retesting. Those who slept performed the task at posttest 16.5% faster than at pretest (compared to 6% among those who did not sleep). More importantly, 59% of those who had slept discovered the shortcut at retest, but only 25% of the "nonsleepers" did so.

Accidents. In the disaster at Three-Mile Island, the Valdez-Exxon oil spill, and the explosion of the Challenger, employee fatigue may have played a role (Pressman & Orr, 1997). Indeed, sleep loss can contribute to an increase in a variety of accidents that can threaten health, productivity, and even lives.

For example, in 1997, 14-year-old Kevin Mackey was hit by a car as he rode his bicycle. The driver who hit him was returning home from an 11-hour shift that had begun at 4:00 a.m., and she acknowledged that she had been fighting sleep as she drove (NSF, 2008). Sleepiness is associated with 1% to 3% of vehicle accidents (and that's just the ones in which it is officially identified as a contributing factor) (Lyznicki, Doege, Davis, & Williams, 1998). Night-shift workers are at increased risk of accidents when driving home (Akerstedt, Peters, Anund, &

Kecklund, 2005). Employees with insomnia are three times more likely to have two or three serious vehicle accidents (Leger, Massuel, & Metlaine, 2006). Even when drivers are aware of their sleepiness, they are likely to continue to drive, albeit with an increased chance of having an accident. Nabi, Guéguen, Chiron, Lafont, Zins, and Lagarde (2006) concluded that self-awareness of sleepiness was not enough to prevent drivers from having accidents and efforts should be focused on convincing drivers to stop and sleep. Scott, Hwang, Rogers, Nysse, Dean, and Dinges (2007) reported that 67% of nurses who worked extended hours (≥ 12.5 hours), worked night shifts, or struggled to stay awake at work, and those who obtained less sleep, reported experiencing an average of one episode of drowsy driving out of every four shifts they worked (Scott et al., 2007). Unfortunately, nurses and medical residents (as well as workers in any field) who are struggling to stay awake at work pose significant risks to themselves and their patients. Even more alarming, they are also endangering the public's safety while driving drowsy.

It is important to note that younger drivers may be especially susceptible to the deleterious effects of sleepiness. Otmani, Rogé, and Muzet (2005) studied young and middle-aged professional male drivers who did not have a sleep disorder. Half of each group drove (in a simulator) in a low-traffic condition and half in heavy traffic. Younger drivers were less likely to be alert in the low traffic (and therefore more boring) condition and more likely to sleep when driving in the evening.

On-the-job accidents endanger workers and may endanger the public, raising liability issues. For example, when medical personnel are tired, they are more likely to endanger patients because of mistakes (NSF, 2007), and they are also more susceptible to injury themselves. One study interviewed 350 medical workers, including 109 trainees, in five medical centers in the United States and Canada, who were being treated for needlestick and "sharps" (sharp instrument) injuries (Fisman, Harris, Rubin, Sorock, & Mittleman, 2007). The injured trainees worked longer and slept less the night before the injury than did the controls. Fatigue related to sleep deprivation tripled the chance of injury among trainees. A 2006 report by the Federal Railroad Administration (FRA) found that train crew fatigue might have played a role in 40% of train accidents in the United States during the previous five years, and concluded that, unlike other causes of accidents, accidents due to human factors had increased.

Lost Productivity. Some very productive people, such as Thomas Edison, Donald Trump, and John F. Kennedy, have reported that they sleep very little at night (Open Loops, 2008). Although this might seem like a reason to cut back on sleep at night in favor of working, research does not support this position. Who knows what these people might have accomplished with additional sleep? Most of us are not accurate at judging how much sleep we need, so basing amount of sleep on perceived sleep need is likely to be inaccurate.

Sleepy employees are more likely to be late for work, absent, or less productive at work. The NSF (2005) found that sleep problems are often given as the reason people are late for work; in fact, almost 30% of adults surveyed reported that they had missed work or made errors at work because of sleep problems. A study of 738 French workers with insomnia and matched controls found that workers with insomnia were twice as likely to miss work, and this was especially true for blue-collar workers and men (Leger et al., 2006). A national, cross-sectional telephone survey of U.S. workers (Ricci et al., 2007) indicated that in a two-week period, the incidence of fatigue was almost 38%. Of those workers who reported fatigue, 67.5% also reported health-related lost productive time at work, costing employers $136.4 billion a year (or roughly three times the cost of lost productivity for reasons other than fatigue). Mulgrew et al. (2008) studied 428 patients who were undergoing a polysomnogram (PSG) for suspected obstructive sleep apnea (OSA), and 100 of these were resurveyed a year later. Patients with an Epworth Sleepiness Scale (a self-report measure of typical level of daytime sleepiness) score of 18 were more likely to report difficulties with time management, interpersonal relationships, and work output than those with a score of 5. One year later, patients who were treated with continuous positive air pressure (CPAP, a frequently-used treatment for OSA that improves sleep quality and promotes good oxygen/carbon dioxide exchange during sleep) showed improvements in time management, interpersonal relationships, and work output.

Disturbed sleep may be an effective predictor of future long-term absences due to poor health. Akerstedt, Kecklund, Alfredsson, and Selen (2007) asked a national sample of 8,300 participants in Sweden if they had disturbed sleep or nonrestorative sleep (fatigue), then examined their sickness absences two years later. The data were adjusted for demographic characteristics and work-related variables (such as work load and work hours) and included only respondents who had no registered sick leave during the previous year (i.e., who were absent less than 14 days). Both disturbed sleep and fatigue increased the odds of later long-term absence from work ($\geq$ 90 days).

Compromised Health. The relationship between sleep and health is bidirectional: poor sleep compromises health and poor health disrupts sleep. Insufficient sleep may compromise health by decreasing immune functioning. Lange, Perras, Fehm, and Born (2003), for example, found that one night's sleep deprivation interfered with the effectiveness of a Hepatitis A vaccination. People who slept normally after receiving the shot were compared to people who were sleep deprived for one night immediately after receiving the shot. Those who had normal sleep showed twice as many Hepatitis A antibodies four weeks later, probably due to sleep-related release of immune-stimulating hormones.

Middle-aged women frequently complain of insomnia, and menopause-related "hot flashes" are a frequent cause of nighttime arousals (Rajut & Bromley, 1999). Other medical conditions that frequently disrupt sleep include gastroesophageal

reflux disease, cancer, HIV, chronic obstructive lung disease (emphysema), asthma, peptic ulcer disease, enlarged prostate gland (causes frequent urination), and congestive heart failure with associated shortness of breath, chronic pain, and urinary tract infections (Rujut & Bromley, 1999). Thus, insomnia may have multifaceted links with health. It is less clear how sleep quality affects disease progression and morbidity (U.S. Department of Health and Human Services, 2003).

OSA is characterized by snoring, gasping for air, or difficulty breathing at night, coupled with frequent awakenings and excessive daytime sleepiness (Alattar, Harrington, Mitchell, & Slone, 2007). More importantly, OSA has been associated with chronic diseases such as hypertension (increased blood pressure) and increased risk of heart disease and heart damage (Pressman & Orr, 1997). Additionally, OSA has been implicated in stroke and transient ischemic attacks (TIA), colloquially referred to as "mini strokes" (Kasabeth, Chi, & Krishnaswamy, 2006). Finally, OSA may also impede one's recovery from a stroke (Cherkassky, Oksenberg, Froom, & Ring, 2003).

Sleep disturbances are very common among adults with diabetes (Knutson, Ryden, Mander, & VanCauter, 2006), who are a growing group in the United States. Individuals suffering from diabetes report higher rates of insomnia than nondiabetics, excessive daytime sleepiness, and unpleasant sensations in the legs that disturb sleep (American Academy Sleep Medicine [AASM], 2007b). Further, sleep disorders have been found not only to increase the likelihood of developing diabetes, but also to contribute to the negative outcomes in individuals with Type 2 diabetes (AASM, 2007b). Sleep may also affect the body's ability to use insulin. One study found that total sleep time and sleep quality predicted production of a key marker of glycemic control, suggesting that increasing sleep time and quality might be a useful intervention for glucose control (Knutson et al., 2006). Given these findings, it makes sense to identify and remediate sleep problems as part of the interventions aimed to prevent diabetes in individuals without diabetes and to improve glycemic control and quality of life in individuals with diabetes.

Insufficient sleep may also contribute to obesity, which may exacerbate a number of illnesses. Less sleep is associated with a higher body mass index (Kohatsu et al., 2006), and obesity is linked with both OSA and shorter sleep duration. Poor sleep may affect weight loss indirectly by lowering energy expenditure ("too tired to move"), or directly by short-circuiting the body's hunger signals. During sleep, the body produces leptin (a hormone that suppresses appetite) and eliminates ghrelin (a peptide that stimulates appetite). Insufficient sleep (five vs. eight hours) is associated with low levels of leptin and high levels of ghrelin—both of which promote eating when awake (Singh, Drake, Roehrs, Hudgel, & Roth, 2005). Almost half (49%) of shift workers have reported consumption of foods high in sugar and carbohydrates when sleepy (NSF, 2008).

Indirect Effects. The impact of poor sleep on business may be direct, through accidents or decreased productivity, or indirect, through reduced quality of life,

lowered motivation, irritability, or difficulty interacting with others. For example, a study of elderly individuals in Japan concluded that daytime sleepiness is associated with depressed morale (Ichimiya, Igata, Ogomori, & Igata, 2005). Further, in a recent survey, 25% of shift workers reported that sleepiness interfered with their intimate life (NSF, 2008). Without sufficient sleep, quality of life is diminished (Centers for Disease Control and Prevention, 2008), and increased sleep may improve quality of life. For example, a mandated decrease in allowable work hours by residents and fellows in an intensive care unit produced a small increase in self-reported sleep time, improved sleepiness, and improved some aspects of quality of life (Parthasarathy, Hettiger, Budhiraja, & Sullivan, 2007). The workers with insomnia in the Leger et al. (2006) study described lower work-related self-esteem, less satisfaction with their job, as well as less efficient functioning at work. Drake, Roehrs, Richardson, Walsh, and Roth (2004) examined shift workers with shift-work sleep disorder, defined as having insomnia or excessive daytime sleepiness (EDS) and working at night or on rotating schedules. About 10% of the shift workers met the criteria for the disorder, and they reported higher rates of ulcers, accidents related to sleepiness, absences, depression and missed social activities than shift workers without the disorder or day workers with EDS or insomnia.

Some evidence suggests that sleepy people are less motivated to engage in challenging tasks. Engle-Friedman et al., (2003) deprived 50 college students of sleep for one night, then asked them to solve math problems. Participants were able to select the level of difficulty of the problems. After sleep loss, participants were more likely to choose easier math and nonacademic problems to solve. There is some evidence, however, that sleep-related loss in motivation can be partially offset by working as part of a team rather than working individually (Baranski et al., 2007). In addition, some work suggests that up to a point, motivation can temporarily overcome deficits associated with sleep loss (Oken, Salinsky, & Elsas, 2006).

There are well-documented links between sleep and depression (Ohayon, 2002), and this relation also is likely to be bidirectional. Sleep disorders predict the development of psychiatric disorders such as anxiety, depression, and substance abuse (Ford & Kamerow, 1989). Poor sleepers are more likely to become depressed (Ford & Kamerow, 1989), and depressed individuals often report difficulty in initiating or maintaining sleep or excessive sleep (American Psychiatric Association, 2000). Anxiety and depressive disorders account for 40% to 50% of all cases of chronic insomnia (Becker, 2006).

Sleepy people are less likely to have good control over their emotions and emotional expression. If an employee is entertaining an important client and the client makes a derogatory or foolish comment, an employee who did not sleep well for the last few nights may respond with a sarcastic remark before discretion can kick in. The NSF notes that sleepy people are more likely to report feeling

stressed, sad, and angry and to have a worse attitude in general. Anger might be displayed in a negative way, such as road rage (Gelula, quoted by NSF, 2008), threatening employees' health as well as that of the public, and possibly increasing their employer's liability.

Work Issues Affecting Sleep

Poor sleep affects work performance, and work-related issues can hamper sleep, creating a downward spiral in both personal well-being and work success. Akerstedt, Knutsson, Westerholm, Theorell, Alfredsson, and Kecklund (2002) found that stress and social conditions at work contributed to worry that hampered the ability to fall asleep and stay asleep. Younger workers, workers with demanding jobs, those who perceived low social support, males, and smokers were more likely to report difficulty in awakening.

One way in which work clearly affects sleep is shift work. Also, social responsibilities outside of work can exacerbate sleep problems related to shift work, and shift work can complicate social relationships. For example, Clissold, Smith, Accutt, and Di Milia (2002) found that female nurses who worked nights and had partners and/or children were not free to use their off-work hours for sleep because of their responsibilities at home. As a result, they slept about one hour less per 24 hours than did nurses without family responsibilities. Shift work contributed to their stress by decreasing the time available to participate in social relationships. Fatigue combined with family responsibilities reduced their available resources for coping with stress. Akerstedt et al. (2002) found that demanding or hard physical work predicted disturbed sleep, but perceived social support at work reduced the risk for disturbed sleep. A similar pattern of results was found for difficulty in awakening. The authors suggested that inability to stop thinking about work when away from the job may in part explain the link between sleep and stress.

According to the NSF, most shift workers are chronically sleep deprived. The 2008 Sleep in America Poll (NSF) found that one third of shift workers reported getting fewer than six hours of sleep per night during the week. Shift work asks workers to fight their biological rhythm, and biology usually wins. Even though the shift worker remains awake during the night, his or her body is signaling the person to sleep, and that may result in compromised attention. In addition, the shift worker is at increased risk for accidents (both on the job and during the drive home), compromised relationships (both because of sleepiness and because of operating on a different schedule than loved ones), falling asleep on the job (reported by 10–20% of night shift workers, according to the NSF), and poor health problems, such as stomach problems, menstrual irregularities, colds, weight gain, hypertension, and heart problems (Drake et al., 2004; NSF, 2005). In fact, the World Health Organization has identified overnight shift work as a

probable carcinogen (Straif et al., 2007). This does not necessarily mean that that night work causes the cancer (it is possible that people who work nights tend to engage in detrimental health behaviors), but it may indicate that there are serious consequences to disrupting the circadian rhythm over an extended period of time.

One way in which businesses have reduced the excessive sleepiness, turnover, absenteeism, and low morale that can be associated with shift work has been to allow employees to participate in the decision about work hours (Kerin & Aguirre, 2005). Not everyone is equally vulnerable to the negative effects of shift work. An epidemiological study of gender, type of work (white vs. blue collar), gender, and mortality found that women with white-collar jobs who worked at night were at greater risk for death (over a 21-year period) than women with white-collar jobs who worked during the day (Akerstedt, Kecklund, & Johansson, 2004). There was no time of workday difference, however, among blue-collar workers. Therefore, employees, who know the time of day of their peak productivity, can choose a work time that coincides with their circadian clocks.

Suggestions for the Workplace

Despite what we know about the vital importance of sleep, corporate culture often conflates sleeplessness with productivity and accomplishment—either explicitly, by requiring employees to work extra hours, or more subtly by admiring those who skimp on sleep. It would appear, however, that it is in the best interest of a business to value sleep, to encourage employees to get enough sleep, and to educate them about the importance of sleep and good sleep practices.

Today, many businesses offer corporate- or company-sponsored health promotion programs or employee assistance programs (EAP) that are designed to promote health by reducing health risks and actively preventing disease (Aldana, 2001). Typically, these health promotion programs include interventions and programs designed to reduce stress, increase physical activity and fitness, reduce high blood pressure and cholesterol, reduce excess body weight, improve nutrition, and reduce tobacco, alcohol, and substance use (Talvi, Järvisalo, & Knuts, 1999). However, few of the programs offer interventions to identify, assess, and monitor individuals with sleep disorders or fatigue-related issues. Managers should consider advocating for the incorporation of sleep education and sleep hygiene practices as an added health maintenance benefit to improve the physical and psychological health and safety of their employees. For example, Kerin and Aguirre (2005) found that an educational program for night shift workers improved health, fatigue, and increased daytime sleep.

By providing on-the-job training about shift work-related lifestyle issues and coping methods, businesses can lower absenteeism, improve employee morale, and reduce turnover. Education about sleep and sleep hygiene should include basic information about sleep processes and functions, developmental sleep

changes, circadian rhythms, individual sleep needs, the impact of sleep deprivation, and effective sleep practices (Dirksen & Epstein, 2008). Sleep promotion makes particular sense for companies where drowsiness may cause physical harm to employees and clients or customers (Brown, 2004). Education, however, will be unhelpful unless it is accompanied by supportive policies. For instance, professional drivers should be educated about the dangers of drowsy driving, but unless their employer supports reasonable schedules, the dangers may be ignored in favor of faster transportation.

Businesses can create a corporate culture in which sleep is valued by establishing policies that discourage working more than a set number of hours without rest. Managers can insist that employees take scheduled breaks. In some types of businesses, especially those whose employees engage in dangerous tasks, it might be wise to institute a system of screening and referral for chronic daytime sleepiness or untreated sleep disorders. Mulgrew et al. (2007) concluded that workplace screening for sleepiness and sleep-disordered breathing could identify a reversible cause of lost work productivity.

Other recommendations (Fryer, 2006) include limiting the workday to no more than 12–16 hours, requiring at least 11 consecutive hours of rest out of every 24, limiting the workweek to 60 scheduled hours and limiting actual work to no more than 80 hours. Night or shift workers should work no more than 4–5 consecutive days. Workers should have at least one, and ideally, two consecutive days off each week. Policies should protect company executives as well. If overnight travel is unavoidable, an extra day should be allowed to adapt to the new time zone and make up for lost sleep before engaging in dangerous or delicate activities. Overnight travelers should be provided with safe transportation after arriving at their destination (e.g., taking a taxi from the airport rather than driving a rental car).

Several inventories are available for screening for sleep problems. A caution, however, is in order here. These paper-and-pencil instruments are for screening and referral purposes, and are not diagnostic by themselves. The gold standard for identification of sleep disorders is overnight polysomnography, and daytime sleepiness is best measured by either a Multiple Sleep Latency Test or Maintenance of Wakefulness Test, all of which are administered by a trained sleep professional. There also is some debate as to whether these tests of sleepiness are precise enough and have sufficient predictive validity to be used as a basis for workplace decisions (see Arand, 2006, and Bonnet, 2006, for a summary of this debate).

Legal implications to identifying (or failing to identify) sleepiness and/or sleep problems in employees are beyond the scope of this article but nonetheless have to be thought through. According to Charles A Czeisler (quoted in Fryer, 2006), “Putting yourself or others at risk while driving or working at an impaired level is bad enough; expecting your employees to do the same is just irresponsible” (p. 56). Businesses have an ethical responsibility to prevent sleepy employees from driving or engaging in some other type of activity that places the employee

or others at risk. Companies can benefit from developing standards and procedures that address sleep-related "fitness for duty." Emerging technology may facilitate this. For example, efforts are underway to develop physiological recording equipment that can detect early signs of sleepiness to alert a driver to the need to take a break (Papadelis et al., 2006).

Some businesses have instituted opportunities for on-the-job napping; daytime siestas, of course, are an institution in some cultures, even going so far as to provide napping opportunities and facilities (Anthony & Anthony, 2005). In a recent survey, one third of workers reported that their job permitted napping during breaks, and 16% reported that their employer provided a place for napping (NSF, 2008). One study found that a 40-minute nap improved performance and mood among medical personnel working extended hours in an emergency room (Smith-Coggins et al., 2006). Naps may be particularly useful for nightshift workers (Takeyama, Kubo, & Itani, 2005) and workers making the transition to a night shift (Purnell, Feyer, & Herbison, 2002).

Another option for businesses is to implement corporate-sponsored mind-body therapies/workshops for employees. Such mind-body therapies are frequently used for the treatment of sleep disorders. Mind-body therapies are inexpensive self-care-based activities that include hypnosis, imagery/relaxation, meditation, massage, and yoga. According to Highley, (2003) "Workplace massage therapy programs help to increase job satisfaction and create a caring environment that employees really appreciate." Yoga has been practiced in India for thousands of years and in its simplest form is a meditation program that includes exercises to promote relaxation by improving flexibility and breathing, decreasing stress, and maintaining health (Bardot, 2004). Thus, employers might want to consider providing training for employees in meditation, imagery, and yoga to improve stress management and promote relaxation in the workplace and to enhance sleep at home. Most workshops teach a basic regime of stretching and relaxation, guided imagery, and various forms of seated meditation that employees could continue to practice at home to promote relaxation and improve sleep quality.

It makes good sense for businesses to pay attention to employees' sleep needs, because well-rested workers are likely to be happier, healthier, and more productive. "Paying attention to sleep is the low-hanging fruit that could dramatically raise productivity" (Czeisler, cited by NSF, 2007).

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