

Prioritizing Sleep Health: Public Health Policy Recommendations

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Abstract

The schedules that Americans live by are not consistent with healthy sleep patterns. In addition, poor access to educational and treatment aids for sleep leaves people engaging in behavior that is harmful to sleep and forgoing treatment for sleep disorders. This has created a sleep crisis that is a public health issue with broad implications for cognitive outcomes, mental health, physical health, work performance, and safety. New public policies should be formulated to address these issues. We draw from the scientific literature to recommend the following: establishing national standards for middle and high school start times that are later in the day, stronger regulation of work hours and schedules, eliminating daylight saving time, educating the public regarding the impact of electronic media on sleep, and improving access to ambulatory in-home diagnostic testing for sleep disorders.

Keywords

sleep, sleep health, public health, health policy, daylight savings time

The United States is facing a public health crisis. The CDC recommends at least 10 hours of daily sleep for school-age children and 7–8 hours of sleep per night for adults. Recent reports indicate that nearly 30% of American adults report an average of 6 or less hours of sleep per night, and only 31% of high school students report getting at least 8 hours of sleep on an average school night (Centers for Disease Control and Prevention, 2009a, 2009b).

This sleep crisis has important implications for cognitive outcomes, mental health, physical health, work performance, and safety. Sleep-deprived people are less effective in making decisions (Killgore, Balkin, & Wesensten, 2006) and are less creative (Harrison & Horne, 1999). Sleep-deprived individuals suffer negative moods (Dinges et al., 1997) and are more likely to experience distress (Glozier et al., 2010). Sleep-deprived employees are low in work engagement (Lanaj, Johnson, & Barnes, 2014), high in unethical behavior (Barnes, Schaubroeck, Huth, & Ghumman, 2011), and low in performance (Drake et al., 2001). Sleep-deprived people suffer more obesity (Taheri, Lin, Austin, Young, & Mignot, 2004) and are at greater risk for coronary heart disease (Ayas et al., 2003). Sleep-deprived individuals are more likely to be injured (Barnes & Wagner, 2009), involved in motor vehicle crashes (Drake et al., 2010), and die at an early age (Kripke, Garfinkel, Wingard, Lauber, & Marler, 2002).

Overall, sleep deprivation costs America many billions of dollars per year (Coren, 1998a, 1998b). Sleep disorders (most notably when undiagnosed/untreated) cause similar problems, with many of the same harmful outcomes noted above (Young, Peppard, & Gottlieb, 2002) and cost America billions of dollars each year (Hossain & Shapiro, 2002). Even small amounts of lost sleep produce measurable outcomes. For example, four consecutive nights of only 5 hours of sleep per night hinders cognitive performance to the same degree as blood alcohol content of .06 (Elmenhorst et al., 2009).

Reasons for the Crisis

Sleep is influenced by a variety of factors. However, there are some problems that can be targeted by new policies or the revision of current policies. One issue is that schedules that people live by are not consistent with healthy sleep patterns. There are several factors that contribute to this, beginning even before we are adults. School start times are set in a manner that conflicts with the circadian

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rhythms of children. Late adolescence is characterized by a shift in the circadian rhythm toward being a “night owl,” such that high school students have a physiologically driven natural tendency to go to bed late and sleep late (Phillips, 2009). The Centers for Disease Control and Prevention reports that only 17.7% of public middle and high schools meet the recommendation provided by the American Academy of Pediatrics to start school no earlier than 8:30 a.m. (CDC, 2015). As a result, many students have a hard time concentrating, learning, behaving well, and even staying awake while at school.

These schedule issues continue as we become working adults. Shift work involves having employees work at different times of the day. This often involves employees working night shifts that are in direct opposition to their circadian rhythms, making it hard to stay awake while on the job and hard to get sufficient sleep outside of work (Drake, Roehrs, Richardson, Walsh, & Roth, 2004; Wittmann, Dinich, Merrow, & Roenneberg, 2006). Physiological adjustment to night shifts is often slow (Aschoff, Hoffmann, Pohl, & Wever, 1975), such that employees are often in circadian misalignment. This creates health and safety-related outcomes such as increased risk of obesity, Type 2 diabetes, cancer, and accidents while driving (Schlafer, Wenzel, & Hogl, 2014; Steele, Ma, Watson, Thomas, & Muelleman, 1999). Moreover, frequent changes from night shifts to day shifts disrupt circadian rhythms in a manner analogous to jetlag.

Even infrequent changes can produce such harmful effects. Most of the United States participate in daylight saving time, which entails removing an hour from a day in the Spring (and adding one back in the Fall). Although this hour may seem trivial, this yearly removal of an hour is also disruptive to sleep (Barnes & Wagner, 2009; Lahti, Leppamaki, Lonnqvist, & Partonen, 2006; Kantermann, Juda, Merrow, & Roenneberg, 2007), and it has been empirically linked to a spike in workplace injuries (Barnes & Wagner, 2009), increased cyberloafing (Wagner, Barnes, Lim, & Ferris, 2012), hindered moral decision making (Barnes, Gunia, & Wagner, 2015), increased heart attacks (Janszky & Ljung, 2008), increased auto accidents (Coren, 1996), and even a drop of \$60 billion in stock prices (Kamstra, Kramer, & Levi, 2002). Moreover, daylight saving time actually increases energy costs (Kotchen & Grant, 2011), which is contrary to the original goal of saving energy costs.

Poor access to educational and treatment aids for sleep also plays a role in people deprioritizing sleep, engaging in behavior that is harmful to sleep, and missing out on treatment for sleep disorders. The ongoing integration of digital devices with backlit displays into the everyday lives of Americans has created unintended consequences. Light exposure—especially blue light—inhibits the production of melatonin, which can disrupt sleep and circadian rhythms. Recent research indicates that using such devices

at night hinders sleep (Chang, Aeschbach, Duffy, & Czeisler, 2014; Lanaj et al., 2014). It is especially problematic when people use these devices in bed, which disrupts the association between bed and sleep. These devices have spread without a commensurate increase in the knowledge of how they can be disruptive to sleep, leading to behaviors that are harmful to sleep.

Other people suffer from sleep disorders: Approximately 20% of Americans have obstructive sleep apnea, and 90% of those are undiagnosed (Finkel et al., 2009). Undiagnosed sleep disorders leave people sleep deprived, fatigued, and suffering the consequences of sleep deprivation noted above. Treatment for such disorders is available and effective (Pepperell et al., 2002), but requires detection before implementation. Until recently, detection has been expensive, restricting access from large segments of the American population.

Policy Implications

Establish national standards for middle and high school start times that are later in the day

Several studies indicate that pushing back high school start times leads to an increase in sleep, as well as improvements in daytime sleepiness, fatigue, mood, attendance, tardiness, grades, and scores on achievement tests, in addition to a drop in the number of teen driver car crashes (Boergers, Gable, & Owens, 2014; Owens, Belon, & Moss, 2010; Wahlstrom et al., 2014). A small proportion of schools have made this change, but a national campaign to do so across all high schools could have a dramatically positive impact on the sleep, and consequent health and productivity, of teenagers.

Stronger regulation of work hours and schedules

Some industries and organizations are developing policies to draw from sleep and circadian science to incorporate guidelines for shiftwork. For example, the National Transportation Safety Board and the Federal Aviation Administration provide such recommendations within the transportation industry. However, currently these guidelines only exist in a subset of industries and organizations in America. The National Institute for Occupational Safety and Health (NIOSH) has recommendations for designing shift work schedules that draw from sleep and circadian science that could potentially be applied to industries outside of medicine and transportation, such as agriculture, manufacturing, retail, finance, and information. However, these are currently suggestions rather than firm regulations.

We recommend that NIOSH work as a regulatory body to actively influence the shift work scheduling systems of

Table 1. Roadmap for Application of Evidence-Based Solutions to the Sleep Crisis

Problem	Solution	Policy examples
School schedules undermine sleep	National standards for later middle and high school start times	National requirement that high schools start their first classes no earlier than 8:30 a.m.
Work schedules undermine sleep	Stronger regulation of work hours and schedules across all industries	Limitations on shift length, regulation of time between shifts, regulation of degree of circadian phase change in consecutive workdays
Daylight saving time policy undermines sleep	Do not practice daylight saving time (like Hawaii and most of Arizona)	Eliminate daylight saving time from all states
Poor access to education regarding sleep	Educate the public regarding the effects of electronic media on sleep	High school module on sleep health utilized nationally; educational module on drowsy driving required before obtaining a driver's license
Poor access to treatment for sleep disorders	Improve access to ambulatory in-home diagnostic testing for sleep disorders	Tax incentives to corporate wellness programs that provide access to ambulatory in-home diagnostic testing for sleep disorders

all American industries and be given the authority to penalize organizations that do not comply. This would be especially appropriate for occupations such as firefighting, police, and emergency medical technicians. Implementing mathematical-model-based scheduling tools (Hursh et al., 2004; Rangan & Van Dongen, 2013) will increase organizational performance and facilitate the transfer of best practices across companies and industries.

Eliminate daylight saving time

Given that switching to daylight saving time disrupts sleep and leads to a variety of negative cognitive, health, and work outcomes, we recommend eliminating daylight saving time.

Educate the public regarding the impact of electronic media on sleep

An education campaign targeting sleep improvement by smarter use of digital devices could improve sleep in America. Indeed, the National Institutes of Health (2005) has a free high school sleep curriculum supplement series titled “Sleep, Sleep Disorders, and Biological Rhythms” that could be broadly implemented across American high schools. We also recommend the creation of an educational module on electronic media use, sleep, and drowsy driving that must be completed before obtaining a driver’s license.

Improve access to ambulatory in-home diagnostic testing for sleep disorders

Home sleep testing (Collop et al., 2011) is a useful resource that could help people with sleep disorders take the first important step toward obtaining treatment. Government

assistance to implement wider screening for sleep disorders would be a powerful approach to improving sleep in America. Provision of tax incentives to health insurance companies, company wellness plans, and medical coverage facilities that provide access to ambulatory in-home diagnostic testing tools would help address this issue.

In summary, the sleep crisis in America can be partly ameliorated with some relatively straightforward policy changes (see Table 1). There will clearly be logistical challenges in implementing many of these recommendations, but the investments involved in meeting those challenges will likely yield a very large payoff.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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