

## Tired Teens: The Sleep Deficit

Today's teens are severely sleep deprived. Research shows that each night, teenagers need 9.2 hours of sleep to perform optimally the next day.<sup>1</sup> Those who fail to get enough sleep on school nights are more likely than their peers to feel tired or sleepy, be cranky or irritable, fall asleep in school, or have a depressed mood.<sup>2</sup> Yet fewer than one in ten (7.6%) high school students get the optimal amount of sleep most nights of the week.<sup>3</sup>

In 1910, most people slept about nine hours a night, but with changes in technology and increasing movement towards a 24-hour economy, the average adult now sleeps less than

### Number of Hours of Sleep per Night for Teenagers

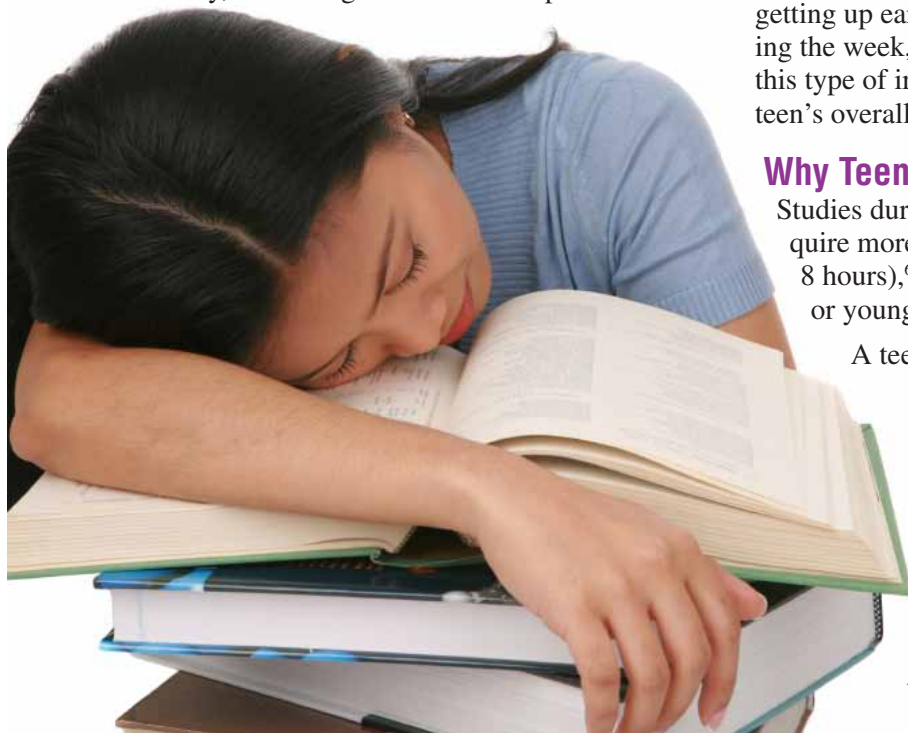
**Optimal – 9.2 hours**  
**Borderline – 8 to 9 hours**  
**Insufficient – less than 8 hours**

seven hours a night.<sup>4</sup> Similarly, adolescents are trying to manage school and social obligations by staying up later and getting up earlier.<sup>5</sup> In order to make up for lost sleep during the week, teenagers often sleep later on weekends, but this type of irregularity in sleep schedule may actually hurt a teen's overall quality of sleep.

### Why Teenagers Don't Get Enough Sleep

Studies during the past two decades show that teenagers require more sleep than adults (9.2 hours compared to 7.5 to 8 hours),<sup>6</sup> and tend to go to bed later at night than adults or younger children.<sup>7,8</sup>

A teenager's natural tendency to stay up later at night and wake later in the morning is determined by hormonal changes during puberty. The melatonin that controls sleep patterns tends to "switch on" later at night as pubertal development progresses.<sup>9</sup> This "sleep phase delay" shifts the teenager's biological clock so that he/she may not be able to go to sleep until 10:30 or 11:00pm.<sup>10,11</sup> The teenage shift in sleep pattern paired with early-morning start times in most high schools helps explain why



<sup>1</sup> U.S. Department of Health and Human Services (DHHS) (2005). Your Guide to Healthy Sleep. [http://www.nhlbi.nih.gov/health/public/sleep/healthy\\_sleep.pdf](http://www.nhlbi.nih.gov/health/public/sleep/healthy_sleep.pdf)

<sup>2</sup> National Sleep Foundation (NSF) (2006). 2006 Sleep in America Poll. [http://www.sleepfoundation.org/sites/default/files/2006\\_summary\\_of\\_findings.pdf](http://www.sleepfoundation.org/sites/default/files/2006_summary_of_findings.pdf)

<sup>3</sup> Eaton DK, McKnight-Eily LR, Lowry R, Perry GS, Presley-Cantrell L, & Croft JB (2007). Prevalence of Insufficient, Borderline, and Optimal Hours of Sleep Among High School Students – United States, 2007. *Journal of Adolescent Health*, 2010, 46.

<sup>4</sup> DHHS (2005). Your Guide to Healthy Sleep. <http://www.nhlbi.nih.gov>

<sup>5</sup> NSF (2006). 2006 Sleep in America Poll. <http://www.sleepfoundation.org>

<sup>6</sup> Wolfson AR, Carskadon MA (1998). Sleep Schedules and Daytime Functioning in Adolescents. *Child Development*, 69(4), 875-887.

<sup>7</sup> NSF. School Start Time and Sleep. (accessed 2011) from NSF Web site: <sup>8</sup> These results were found in international studies as well. Barreto M (2001); Carskadon MA, & Acebo C, (1997); Ishihara H, & Miyake (1990); Bearpark H, & Michie P (1987); Strauch I, & Meier (1968); LeBourgeois et al (2005); Thorleifsdottir et al (2002).

<sup>9</sup> Carskadon MA, Viera C, Acebo C (1993). Association between puberty and delayed phase preference. *Sleep*, 16(3), 258-262.

<sup>10</sup> NSF. (accessed 2011) School Start Time and Sleep. <http://www.sleepfoundation.org>

<sup>11</sup> DHHS (2005). Your Guide to Healthy Sleep. <http://www.nhlbi.nih.gov>; Carskadon et al (1993); and Crowley SJ, Acebo C, Carskadon MA (2007) Sleep circadian rhythms and delayed phase in adolescence. *Sleep Med*, 8(6),602-612.

most teenagers get an average of only 7 to 7.5 hours of sleep a night.<sup>12, 13</sup>

One researcher notes that even without the pressure of biological changes, a teenager with an early school starting time (7:30 or before) would wake up around 6:15 in order to accommodate his/her morning routine and commute to school. Such a schedule would require the teenager to go to bed at 9:00pm in order to get enough sleep to be prepared for the following day.<sup>14</sup> However, with school work, extracurricular activities and paid employment taking priority in the evenings, it is rare that a teenager could keep a schedule with such an early bed time. “When biological changes are factored in, the ability even to have merely ‘adequate’ sleep is lost.”<sup>15</sup>

“We have to be educating children, parents, and teachers about the importance of sleep, just as we educate them about exercise, nutrition, and drug and alcohol use.”<sup>16</sup> Two of the methods that teenagers most often use to fall asleep at night – watching television and exercising – actually have a stimulating effect; they are more likely to keep a teen awake than to encourage sleep.<sup>17</sup> Teenagers also have high rates of caffeine use that may affect their sleep schedules.

## Adolescent Caffeine Intake

Children and adolescents often experience difficulty sleeping at night as well as daytime sleepiness because of their use of caffeine.<sup>18, 19</sup> Too much caffeine may cause nervousness, irritability, sleeplessness, and occasionally, rapid heart rate.<sup>20</sup> Dependence on caffeine develops even with low daily doses and short periods of regular daily use.<sup>21</sup> A teenager will experience symptoms of caffeine withdrawal if he/she suddenly quits after just three to five consecutive days of drinking caffeinated beverages.<sup>22</sup>

On a typical day, three fourths of teenagers drink an average of 2 cups/cans of a caffeinated beverage. Research has shown that youth who drink the typical amount of daily caffeine are likely to get an insufficient amount of sleep on school nights, fall asleep at school or while studying, or feel “too sleepy” during the day.<sup>23</sup>



## Energy Drinks

In addition to soda, coffee, and tea, high doses of caffeine are also found in energy drinks such as Red Bull, Monster, and SoBe No Fear (among others). Because energy drinks are classified as “nutritional supplements,” they are neither held to the caffeine limits governing soda nor to the safety guidelines for pharmaceuticals. Energy drinks often contain three to five times the amount of caffeine found in soda.<sup>24</sup>

## How Much Sleep do Teens Get?

In sixth grade, more than half of all students fail to get the optimal amount of nightly sleep. As teenagers move into high school, the percentage of students getting an inadequate amount of sleep continues to increase.<sup>25</sup>

The average teenager gets about 7.5 hours of sleep each school night. However, the amount of sleep a teenager gets varies greatly by grade, gender, and race. Students in the eleventh and twelfth grades, female students, and black students have the highest risk for insufficient sleep.<sup>26</sup>

Nationwide, 69% of high school students report insufficient sleep on an average school night, and another 23.5% report borderline sleep.

Fewer than one in ten high school students (7.6%) report getting enough sleep each night,<sup>27</sup> yet nearly two-thirds of adolescent care-givers believe their teen gets optimal sleep almost every night.<sup>28</sup>

<sup>12</sup> Ibid.

<sup>13</sup> NSF (2006). 2006 Sleep in America Poll. <http://www.sleepfoundation.org>

<sup>14</sup> Carskadon as quoted in NSF article (2010). Backgrounder: Later School Start Times. <http://www.sleepfoundation.org/article/hot-topics/backgrounder-later-school-start-times>

<sup>15</sup> Ibid.

<sup>16</sup> Wolfson AR, Spaulding NL, Dandrow C, & Baroni, EM. (2007). Middle School Start Times: The Importance of a Good Night’s Sleep for Young Adolescents. *Behavioral Sleep Medicine*.

<sup>17</sup> Noland H, Price JH, Dake J, & Telljohann SK (2009). Adolescents’ Sleep Behaviors and Perceptions of Sleep. *Journal of School Health*, 79(5).

<sup>18</sup> Roehrs T, & Roth T (2008). Caffeine: Sleep and Daytime Sleepiness. *Sleep Medicine Reviews*, 12(2), 153-162.

<sup>19</sup> Orbeta RL, Overpeck MD, Ramcharran D, Kogan MD, Ledsky R (2006). High caffeine intake in adolescents: associations with difficulty sleeping and feeling tired in the morning. *The Journal of Adolescent Health*, 38(4), 451-453.

<sup>20</sup> Reissig CJ, Strain EC, Griffiths RR (2009). Caffeinated energy drinks – a growing problem. *Drug and Alcohol Depend*, 99, 1-10.

<sup>21</sup> Roehrs T, & Roth T (2008). Caffeine: Sleep and Daytime Sleepiness. *Sleep Medicine Reviews*, 12(2), 153-162.

<sup>22</sup> CJ, Strain EC, Griffiths RR (2009). Caffeinated energy drinks.

<sup>23</sup> NSF (2006). 2006 Sleep in America Poll. <http://www.sleepfoundation.org>

<sup>24</sup> Seifert SM, Schaechter JL, Hershorin ER, and Lipshultz SE. (2011). Health Effects of Energy Drinks on Children, Adolescents, and Young Adults, *Pediatrics*.

<sup>25</sup> NSF (2006). 2006 Sleep in America Poll. <http://www.sleepfoundation.org>

<sup>26</sup> Ibid.

<sup>27</sup> Eaton et al. (2007). Prevalence of Insufficient, Borderline, and Optimal Hours of Sleep.

<sup>28</sup> NSF (2006). 2006 Sleep in America Poll. <http://www.sleepfoundation.org>; National Survey of Children’s Health (2007). <http://www.nschdata.org>

## Signs and symptoms of sleep deprivation<sup>29</sup>

- Teen has difficulty waking up in the morning and yawns frequently throughout the day
- Teen is continuously late for class and has trouble getting out the door in the morning
- Teen can't get through the day without drinking caffeinated beverages like coffee or soda
- A teacher notices that the student periodically falls asleep in class
- Teen is irritable, anxious, and gets angry easily on days when he/she gets less sleep
- Teen's extra-curricular activities, job, or homework cuts into his/her sleep on a nightly basis.



## Driving Drowsy

Drowsiness and fatigue cause more than 100,000 traffic accidents each year, and drivers under age 25 are involved in more than half of all fall-asleep crashes. When people who lack sleep are tested through a driving simulator, they perform just as poorly as people who are drunk.

Teenagers in eleventh or twelfth grade often drive to school early in the morning and drive home from extracurricular activities late at night. More than half of all adolescents who drive (51%) report that they have driven drowsy at least once in the past year. Fifteen percent say they felt drowsy once a week or more while driving.<sup>37</sup>

## Why it Matters

A teenager's lack of sleep has been shown to cause confusion, difficulty focusing or paying attention, and slowed thinking that may lead to faulty decision making and increased risk taking.<sup>30</sup> Conversely, individuals are better able to learn tasks if they are well rested and better remember information if they get a good night's sleep after learning something.<sup>31</sup>

Teenagers who get an insufficient amount of sleep on school nights are much more likely to experience negative consequences the following day.<sup>32</sup> About three in ten high school students say they fall asleep in school (28%) at least once a week, and 22% say they fall asleep doing home work or studying just as often. Fourteen percent of high school students also report arriving late or missing school because they oversleep at least once a week.<sup>33</sup>

Students who report earning Cs, Ds, and Fs in school obtain about 25 minutes less sleep per night and go to bed 40 minutes later than students who report As and Bs.<sup>34</sup>

## School Start Time

In light of the research on teen sleep requirements, a few high schools within the United States have changed their start times to allow students more sleep in the mornings. Some of the considerations these schools face include scheduling conflicts with parent and student employment, existing school bus routes, and after school programs.<sup>38</sup> One researcher suggested that school start time changes happen at the state level so sports and social events can be coordinated between schools.<sup>39</sup>

Despite the challenges, the delayed school start time has had some positive results. Teenagers in schools with later starting times have proven to be less sleepy during the day, to have improved attendance rates, to earn slightly higher grades, and to experience fewer depressive feelings. Research shows that high school students with later school starting times go to bed at similar times as their peers, but net an additional 5 hours of sleep each week.<sup>40</sup>

<sup>29</sup> DHHS (2005). Your Guide to Healthy Sleep. <http://www.nhlbi.nih.gov>

<sup>30</sup> Ibid.

<sup>31</sup> Ibid.

<sup>32</sup> NSF (2006). 2006 Sleep in America Poll. <http://www.sleepfoundation.org>

<sup>33</sup> Ibid.

<sup>34</sup> Wolfson AR, Carskadon MA (1998). Sleep Schedules and Daytime Functioning in Adolescents.

<sup>35</sup> National Highway Traffic Safety Administration (accessed Feb. 2011). Drowsy Driving and Automobile Crashes. [http://www.nhtsa.gov/people/injury/drowsy\\_driving1/Drowsy.html](http://www.nhtsa.gov/people/injury/drowsy_driving1/Drowsy.html)

<sup>36</sup> DHHS (2005). Your Guide to Healthy Sleep. <http://www.nhlbi.nih.gov>

<sup>37</sup> NSF (2006). 2006 Sleep in America Poll. <http://www.sleepfoundation.org> \*This rate mirrors the drowsy driving rates for adults

<sup>38</sup> Wahlstrom K (2002). Changing Times: Findings from the First Longitudinal Study of Later High School Start Times. *Sleep*, 86, 3–21.

<sup>39</sup> Hansen M, Janssen I, Schiff A, Zee PC, Dubocovich ML (2005). The Impact of School Daily Schedule on Adolescent Sleep. *Pediatrics*, 115, 1555-1561.

<sup>40</sup> Wahlstrom K (2002). Changing Times: *Sleep*, 86, 3–21.



In one Kentucky county, a large school district pushed back high school start times and auto collision rates dropped significantly, while the rest of the state's rates increased. Other outcomes of that district-wide start time change varied between urban and suburban schools. While suburban schools kept steady enrollment in extracurricular activities and afterschool jobs, urban school students cited conflicts with activities and compromised earnings from jobs. However, both suburban and urban parents said that they had fewer confrontations and more conversations with their children in the mornings.<sup>41</sup>

### Tips for getting a good night's sleep<sup>42</sup>

- Stick to a sleep schedule. Go to bed and wake up at the same time every day, including weekends.
- Avoid caffeine and naps after 3:00pm.
- Establish a calming and relaxing bedtime routine like taking a bath, writing in a journal, or drinking a warm glass of milk.
- Have a comfortable sleeping environment that is cool, dark and quiet.
- Get an hour of exposure to bright sunlight each morning and avoid bright light in the evening.
- Keep electronics like televisions, computers, and cell phones in a living room or den instead of in the bedroom.

## Resources about Sleep

**National Institutes of Health and National Heart, Blood, and Lung Institute** - Provides general information on sleep and its impact on the body, addresses the top 10 sleep myths, and provides tips for getting a good night's sleep.

[http://www.nhlbi.nih.gov/health/public/sleep/healthy\\_sleep.pdf](http://www.nhlbi.nih.gov/health/public/sleep/healthy_sleep.pdf)

**National Sleep Foundation** – Provides information and fact sheets on teenage sleep issues.

*Parents of Teens: Recognize the signs and symptoms of sleep deprivation and sleep problems*

Tip sheet for recognizing the signs that a youth is sleep deprived.

<http://www.sleepfoundation.org/sites/default/files/teensigns.pdf>

*Helping teens get a good night's sleep*

Tip sheet for parents on how they can help their adolescents get a good night's sleep.

<http://www.sleepfoundation.org/sites/default/files/teenstips.pdf>

*Adolescent sleep needs and patterns research report*

Resource guide contains tips for teens to get a good night's sleep and pointers for parents for helping them to do so.

[http://www.sleepinfairfax.org/docs/sleep\\_and\\_teens\\_report1\\_NSF.pdf](http://www.sleepinfairfax.org/docs/sleep_and_teens_report1_NSF.pdf)

<sup>41</sup> Danner, F, & Phillips, B. (2008). Adolescent Sleep, School Start Times, and Teen Motor Vehicle Crashes. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2603528/>

<sup>42</sup> DHHS (2005). Your Guide to Healthy Sleep. <http://www.nhlbi.nih.gov>

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## IYI Resources

**The latest data is at your fingertips with IYI's Data Center. Search statistics and gather data to improve your program planning and grant writing. Or, request customized data.**

**Get the most comprehensive overview of children's well-being in Indiana.** Download the 2010 Kids Count in Indiana Data Book.

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