



ADOLESCENT SLEEP

APPENDIX: SUPPORTING RESEARCH

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WHITE PAPER

WITH SUPPORTING RESEARCH DOCUMENTS

FOR ***SIMPLE TRUTHS***

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PART I: ADOLESCENT SLEEP BASICS

ADOLESCENT SLEEP

<http://www.stanford.edu/~dement/adolescent.html>

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They Need More Sleep

Adolescent sleep has been a very popular subject lately. People are questioning the fact that it may be true that their teenage sons and daughters may need more sleep than they did as a child, that they are **not** turning into lazy, sleepy young adults by choice.

Sometime in late puberty, the body secretes the sleep-related hormone melatonin at a different time than it normally does. This changes the circadian rhythms that guide a person's sleep-wake cycle. For instance, if you told your teen to go to bed at 10 p.m., she may end up staring at the ceiling until 1 or 2 a.m. waiting to fall asleep. At about 7:30 p.m. a teen feels wide awake and fully alert, unlike an adult who is starting to "wind down" and feel sleepier as the evening progresses so that at 10 p.m. the adult is ready to go to bed. The teen-agers "wind down" time takes place much later.

Changes Are Taking Place

Studies show that the changes taking place in their bodies requires more sleep and they may be physically challenged to getting up early in the morning. Their internal biological clock may slow down in adolescence. That can account for not their being sleepy until 2 a.m. To think that their child, who once awoke at the crack of dawn and was eager to watch cartoons even on Saturday mornings has now by choice, turned into a lazy, sleepy, young adult who wouldn't wake up in the morning if a bomb went off in the next room, is trying to undermine their authority in some way.

How Much Sleep Do They Need?

Adolescents need 9 hours and 15 minutes of sleep. Children need 10 hours and adults need 8 1/4 hours. They rarely get that much due to

early school start time, inability to fall asleep until late at night, work, social life and homework. Parents may need to adjust their child's schedule to allow more sleep. Most teens are chronically sleep deprived and try to "catch up" on their sleep by sleeping in on the weekends. Ultimately they should go to bed and wake up at the same time. That is considered "good [sleep hygiene](#)."

How Does Sleep Deprivation Affect the Teen-ager?

Sleep deprivation can impair memory and inhibit creativity making it difficult for sleep deprived students to learn. Teens struggle to learn to deal with stress and control emotion -- sleep deprivation makes it even more difficult. Irritability, lack of self confidence and mood swings are often common in a teen, but sleep deprivation makes it worse. Depression can result from chronic sleep deprivation. Not enough sleep can endanger their immune system and make them more susceptible to serious illnesses.

Judgment can be impaired. We don't know how many car crashes involving teen drivers are sleep related, but it is certainly a safety risk.

What Can We Do?

Monitor your child's activities. Along with school, teens often play sports, take specialized lessons in the arts, work part time, attend school functions and clubs and spend time with their friends. If he has too much on his schedule, have him choose the most important ones and stick to a reasonable schedule that allows time for homework and adequate rest.

Talk to your PTA about changing the school start time. Many High Schools have pushed the starting bell as early as 7:15 a.m. The average American teen-ager gets 6.5 hours of sleep on a school night, some lots less. There is evidence that many teens snooze through their morning classes. If they had adequate sleep, they would learn more. Some Minnesota schools have moved back start times from 7:20

a.m. to 8:30 a.m. They are reporting better grades and fewer discipline problems.

Here are a few special sleep hygiene tips for teen-agers:

- Stay away from caffeine and nicotine which are both stimulants after noon. Also avoid alcohol which can disrupt sleep.
- Avoid heavy studying or computer games before bed, they can be arousing.
- Avoid arguing with your adolescent just before bedtime.
- Avoid trying to sleep with a computer or TV flickering in the room.
- Avoid bright light in the evening, but open blinds or turn on lights as soon as the morning alarm goes off to aid awakening.
- Let them sleep in on the weekend, but no more than 2 or 3 hours later than their usual awakening time or it will disrupt their body clock.

Note: Sleep experts consider adolescents to be between the ages of 11 and 22.

Articles and Information

- [Sleep Needs, Patterns & Disorders Among Youth](#) - Forum on Sleep & Adolescents -Board on Children, Youth and Families (9/10/99)
- [School Start Time Study](#) - University of Minnesota
- [Adolescent Sleep Researcher Mary Carskadon's Web Page](#) - Brown University
- [Wide Awake in America - A Campaign to Ring the First Bell When Students Are Ready to Learn](#) - Mother's Against Violence in America (Read how good sleep can cut down on violent behavior)
- [For Whom the School Bell Tolls](#) - American Association of School Administrators (3/99)
- [Sleep Starved Students Snoozing, Not Studying](#) - The Salt Lake Tribune (3/25/99)

- [Adolescent Sleep & Rest](#) - Pediatric Assessment Online - Adolescent Rest & Sleep Page
- [Sleepy excuses for bad grades may be true!](#) - Dream Times (1998)
- [Healthy Studying Habits Emphasized](#) - Stanford Daily Online (10/8/97)
- [Study Warns of Harm if Teens Work Too Much](#) - iVillage's Parent's Place (11/6/98)
- [iVillage Parent's Place Preteens/Teens Sleep](#) - (Currently under construction)
- [Do Teen-Agers Need More Sleep in the Morning?](#) - Mayo Health Oasis (10/28/96)
- [Sleep in Adolescence](#) - Providence Sleep Disorders Center, Pediatric Sleep Disorders
- [Prevalence Of Sleep Disorders in Childhood and Adolescence With Headache: A Case-Control Study](#) - JAMA (6/97)
- [Sleep and the Teenager](#) - by Stacie C. Link and Sonia Ancoli-Israel (abstract)
- [Contemporary Perspectives on Adolescent Sleep](#)
 - [Bridging The Gap Between Research And Practice: What Will Adolescents' Sleep/Wake Patterns Look Like In The 21st Century](#) - by Dr. Amy Wolfson
 - [The Regulation Of Sleep/Arousal, Affect, And Attention In Adolescence: Some Questions And Speculations](#) - by Dr. Ronald Dahl
 - [Work, School, Sleep, And Circadian Timing In Adolescents](#) - by Dr. Mary Carskadon
 - [Stress, Anxiety And Adolescent Sleep: A Clinical-Developmental Perspective](#) - by Avi Sadeh
 - [Toward A Comparative Developmental Ecology Of Human Sleep](#) - by Carol Worthman
 - [Sleep Pattern And Daytime Functions In Italian Adolescents](#) - by Flavia Giannotti
 - [Sleep Patterns Of High School Students Living In São Paulo, Brazil](#) - by Miriam Andrade

- [Adolescent Trends In Delayed Phase Shift In Rhesus Monkeys](#) - by Mari Golub
- [Accommodating The Sleep Patterns Of Adolescents Within Current Educational Structures: An Uncharted Path](#) - by Kyla L. Wahlstrom, Ph.D.
- [What Can The Study Of Work Scheduling Tell Us About Adolescent Sleep?](#) - by Roger Rosa, Ph.D
- [Longitudinal Studies Of The Circadian Rhythm Of A Juvenile Diurnal Mammal](#) - by Barbara Tate, Ph.D.
- [Irregular Sleep/Wake Patterns In Adolescents](#) - by Christine Acebo, Ph.D.
- [Endocrine Changes Associated With Puberty And Adolescence](#) - by Gary S. Richardson, M.D.
- [Adolescents At High Risk For Depression Show Sleep EEG Abnormalities: Effects Of Scopolamine](#) - by James T. McCracken

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GOOD SLEEP HYGIENE

<http://www.stanford.edu/~dement/howto.html>

Nothing is more frustrating than not being able to sleep. Tossing and turning. Your mind is racing, going over everything that happened today. Night noises keep you awake. What can you do? There ARE things you can do! Read on and learn some new tricks to sleep well. These tips are also known as "Sleep Hygiene."

- Sleep only when sleepy

This reduces the time you are awake in bed.

- If you can't fall asleep within 20 minutes, get up and do something boring until you feel sleepy

Sit quietly in the dark or read the warranty on your refrigerator. Don't expose yourself to bright light while you are up. The light gives cues to your brain that it is time to wake up.

- Don't take naps

This will ensure you are tired at bedtime. If you just can't make it through the day without a nap, sleep less than one hour, before 3 pm.

- Get up and go to bed the same time every day

Even on weekends! When your sleep cycle has a regular rhythm, you will feel better.

- Refrain from exercise at least 4 hours before bedtime

Regular exercise is recommended to help you sleep well, but the timing of the workout is important. Exercising in the morning or early afternoon will not interfere with sleep.

- Develop sleep rituals

It is important to give your body cues that it is time to slow down and sleep. Listen to relaxing music, read something soothing for 15 minutes, have a cup of caffeine free tea, do relaxation exercises.

- Only use your bed for sleeping

Refrain from using your bed to watch TV, pay bills, do work or reading. So when you go to bed your body knows it is time to sleep. Sex is the only exception.

- Stay away from caffeine, nicotine and alcohol at least 4-6 hours before bed

Caffeine and nicotine are stimulants that interfere with your ability to fall asleep. Coffee, tea, cola, cocoa, chocolate and some prescription and non-prescription drugs contain caffeine. Cigarettes

and some drugs contain nicotine. Alcohol may seem to help you sleep in the beginning as it slows brain activity, but you will end up having fragmented sleep.

- Have a light snack before bed

If your stomach is too empty, that can interfere with sleep. However, if you eat a heavy meal before bedtime, that can interfere as well. Dairy products and turkey contain tryptophan, which acts as a natural sleep inducer. Tryptophan is probably why a warm glass of milk is sometimes recommended.

- Take a hot bath 90 minutes before bedtime

A hot bath will raise your body temperature, but it is the *drop* in body temperature that may leave you feeling sleepy. Read about the study done on body temperature below.

Trouble Sleeping? Chill Out! - A press release from the journal *Sleep* about the significance in body temperature before sleep

- Make sure your bed and bedroom are quiet and comfortable

A hot room can be uncomfortable. A cooler room along with enough blankets to stay warm is recommended. If light in the early morning bothers you, get a blackout shade or wear a slumber mask. If noise bothers you, wear earplugs or get a "white noise" machine.

- Use sunlight to set your biological clock

As soon as you get up in the morning, go outside and turn your face to the sun for 15 minutes.

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SLEEP EXPERTS TO TEENS: PLEASE GET YOUR ZZZ'S

CNN.com

<http://archives.cnn.com/2000/HEALTH/children/09/28/sleepy.teens.01/>

WASHINGTON (CNN) -- High school student [Naomi Freeman](#), who has time for only six hours sleep a night, is one of millions of young people who might be putting their health and education at risk by not making sleep a higher priority. On Thursday, experts recommended that schools adopt later starting times to fit the unique sleep patterns of teen-agers.

"Kids are too sleepy to learn well. They're too sleepy to be happy. And they're at great risk for such things as traffic accidents," said Dr. [Mary Carskadon](#), who researches adolescent sleep patterns and is co-chairwoman of the National Sleep Foundation task force on teen-agers and sleep.

The foundation, in what it calls a "wake-up call" to teens, parents and educators, released a report -- "Adolescent Sleep Needs and Patterns" -- that warns of the consequences of sleep deprivation. It also suggests lifestyle changes to ensure adolescents get adequate rest. ([Read the report/Acrobat Reader required](#))

'We are asking them to sleep at the wrong time'

"Teen-agers don't need less sleep the older they get. They still need as much sleep as they did when they were pre-teens," Carskadon told CNN. "We, as a society, are asking them to sleep at the wrong time."

Her research shows that adolescents tend to fall asleep and awaken later than adults and often experience an increase in daytime sleepiness -- even when they get enough rest.

"This can put their circadian rhythm, or biological clock, in conflict with the school bell," Carskadon said. "The result

illustrates a critical trend: too many teens come to school too sleepy to learn. And their fatigue often leads to behavior problems that contribute to a negative overall school performance and experience."

Among the NSF's recommendations is the creation of "sleep-smart schools" that adopt sleep education curricula and review school start times that more adequately respond to a teen's biological shift to a later sleep/wake cycle.

Lifestyle changes at home, to make sufficient sleep on a regularly scheduled basis a top priority for adolescents and adults, are also suggested.

'I normally get about six hours of sleep a night'

Adapting to such changes would be tough for Freeman, 17, who is student council president at her high school in Beacon, New York, as well as captain of the cheerleading squad.

"(On) a typical day, I get up at 6 in the morning to be at school by 7. I go to a pep club until 7:40," she told CNN. Then, it's off to her classes. Freeman's after-school activities include a part-time job, an internship and volunteer work. And after that, she does homework, getting to bed about midnight. "I normally get about six hours of sleep a night... I have no time to get any more," she said.

Such a hectic schedule is typical of many young people, according to [Amy Fishbein](#), health and fitness editor Seventeen magazine.

"Yes, it's really common," she told CNN. "There's a lot more pressure on teens to get into college, to excel academically. Social pressures are really high. There's the computer, all the stuff on the computer, it's more distracting. There are a lot more things to do."

Any suggestion that over-indulgent parents are to blame for sleep-deprived teens ignores the scientific evidence, Fishbein argues. "Teen-agers have a biological tendency to stay up later and sleep later," she explains. "So the way their school day is structured for them actually doesn't help them out any. So it's definitely not the case of the over-indulgent parent, it's definitely all the pressures in society."

Rep. Zoe Lofgren, D-California, who advocates schools setting later start times, has introduced a bill in Congress to provide financial incentives to districts that push back the opening bell. "Teens are paying a heavy price for following the old adage, "early to bed, early to rise," she was quoted as saying in a NSF news release. "It's time for high schools to synchronize their clocks with their students' body clocks so that teens are in school during their most alert hours and can achieve their full academic potential."

The Washington-based foundation describes itself as a non-profit organization dedicated to improving public health and safety by achieving public understanding of sleep and sleep disorders.

CNN.com Senior Writer Jim Morris wrote this report.

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HOW TO DEAL WITH TEEN SLEEP DEPRIVATION

eHow

http://www.ehow.com/how_2074263_deal-teen-sleep-deprivation.html

A teen suffering from [sleep](#) deprivation can be a danger to himself and others. [Teens](#) who don't get enough sleep at night tend to [fall asleep](#) in school causing grades to drop. They can't keep jobs and also have a much higher risk of getting in a car accident while driving tired.

Instructions

Step1

Require your teen get 9 to 10 hours of sleep a night. Limit the hectic school schedule and extra-curricular activities. Help your teen establish a bedtime routine similar to the one he had as a child.

Step2

Teach your teen a relaxation routine to help them wind down at night. Learn it with them, and you'll have something to do together each night.

Step3

Become an activist for later school start times. Most schools begin classes early in the morning and get out in the early afternoon. Help organize a push in your school district for a later start time to allow teens more morning sleep.

Step4

Enroll your teenager in a time-management course. Some schools offer one-time courses to help teens learn how to plan their days, schedule their work, relaxation, extra-curricular and sleep times. Can't find a class, teach them the basics on your own.

Step5

Talk with your teen's teachers on a regular basis to find out if he seems tired in class. Suggest a smaller class load or less activities when the nights are getting too late. While teenagers like to stay up late at night, they may not realize the adverse affects it has on their school, work and even driving abilities.

Step6

Take your teen to a doctor if he is constantly tired during the day. [Sleep deprivation](#) is a serious problem that can have serious consequences if a teenager falls asleep while driving.

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TEEN SLEEP: WHY IS YOUR TEEN SO TIRED?

MayoClinic.com

[By Mayo Clinic staff](#)

<http://www.mayoclinic.com/health/teens-health/CC00019>

Teen sleep cycles may seem to come from another world. Understand why teen sleep is a challenge – and what you can do to promote better teen sleep.

Teens are notorious for staying up late at night and being hard to awaken in the morning. Your teen is probably no exception, but it's not necessarily because he or she is lazy or contrary. This behavior pattern actually has a physical cause – and there are ways to help mesh your teen's sleep schedule with that of the rest of the world.

A TEEN'S INTERNAL CLOCK

Everyone has an internal clock that influences body temperature, sleep cycles, appetite and hormonal changes. The biological and psychological processes that follow the cycle of this 24-hour internal clock are called circadian rhythms. Before adolescence, these circadian rhythms direct most children to naturally fall asleep around 8 or 9 p.m. But puberty changes a teen's internal clock, delaying the time he or she starts feeling sleepy – often until 11 p.m. or later. Staying up late to study or socialize can disrupt a teen's internal clock even more.

TOO LITTLE SLEEP

Most teens need about nine hours of sleep a night – and sometimes more – to maintain optimal daytime alertness. But few teens actually get that much sleep regularly, thanks to part-time jobs, homework, extracurricular activities, social demands and early-morning classes. More than 90 percent of teens in a recent study reported sleeping less than the recommended nine hours a night. In the same study, 10 percent of teens reported sleeping less than six hours a night. Big deal? Yes. Irritability aside, sleep deprivation can have serious consequences. Daytime sleepiness makes it difficult to

concentrate and learn, or even stay awake in class. Too little sleep may contribute to mood swings and behavioral problems. And sleepy teens who get behind the wheel may cause serious – even deadly – accidents.

PLAYING CATCH-UP

Catching up on sleep during the weekends seems like a logical solution to teen sleep problems, but it doesn't help much. In fact, sleeping in can confuse your teen's internal clock even more. A forced early bedtime may backfire, too. If your teen goes to bed too early, he or she may only lie awake for hours.

RESETTING THE CLOCK

So what can you do? Don't assume that your teen is at the mercy of his or her internal clock. Take action tonight!

- **Adjust the lighting.** As bedtime approaches, dim the lights. Turn the lights off during sleep. In the morning, expose your teen to bright light. These simple cues can help signal when it's time to sleep and when it's time to wake up.
- **Stick to a schedule.** Tough as it may be, encourage your teen to go to bed and get up at the same time every day – even on weekends. Prioritize extracurricular activities and curb late-night social time as needed. If your teen has a job, limit working hours to no more than 16 to 20 hours a week.
- **Nix long naps.** If your teen is drowsy during the day, a 30-minute nap after school may be refreshing. But too much daytime shut-eye may only make it harder to fall asleep at night.
- **Curb the caffeine.** A jolt of caffeine may help your teen stay awake during class, but the effects are fleeting. And too much caffeine can interfere with a good night's sleep.
- **Keep it calm.** Encourage your teen to wind down at night with a warm shower, a book or other relaxing activities – and avoid

vigorous exercise, loud music, video games, text messaging, Web surfing and other stimulating activities shortly before bedtime. Take the TV out of your teen's room, or keep it off at night. The same goes for your teen's cell phone and computer.

Sleeping pills and other medications generally aren't recommended for teens.

IS IT SOMETHING ELSE?

In some cases, excessive daytime sleepiness can be a sign of something more than a problem with your teen's internal clock. Other problems can include:

- **Medication side effects.** Many medications – including over-the-counter cold and allergy medications and prescription medications to treat depression and attention-deficit/hyperactivity disorder – can affect sleep.
- **Insomnia or biological clock disturbance.** If your teen has trouble falling asleep or staying asleep, he or she is likely to struggle with daytime sleepiness.
- **Depression.** Sleeping too much or too little is a common sign of depression.
- **Obstructive sleep apnea.** When throat muscles fall slack during sleep, they stop air from moving freely through the nose and windpipe. This can interfere with breathing and disrupt sleep.
- **Restless legs syndrome.** This condition causes a "creepy" sensation in the legs and an irresistible urge to move the legs, usually shortly after going to bed. The discomfort and movement can interrupt sleep.
- **Narcolepsy¹.** Sudden daytime sleep, usually for only short periods of time, can be a sign of narcolepsy. Narcoleptic episodes

¹ nar·co·lep·sy (när'kə-lěp'sē)
n. pl. nar·co·lep·sies

can occur at any time – even in the middle of a conversation. Sudden attacks of muscle weakness in response to emotions such as laughter, anger or surprise are possible, too.

If you're concerned about your teen's daytime sleepiness or sleep habits, contact your teen's doctor. If your teen is depressed or has a sleep disorder, proper treatment may be the key to a good night's sleep.

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SLEEP DEPRIVATION MAY BE UNDERMINING TEEN HEALTH

Monitor On Psychology

<http://www.apa.org/monitor/oct01/sleepteen.html>

Lack of sufficient sleep--a rampant problem among teens--appears to put adolescents at risk for cognitive and emotional difficulties, poor school performance, accidents and psychopathology, research suggests.

BY SIRI CARPENTER

Monitor staff

On any given school day, teen-agers across the nation stumble out of bed and prepare for the day. For most, the alarm clock buzzes by 6:30 a.m., a scant seven hours after they went to bed. Many students board the school bus before 7 a.m. and are in class by 7:30.

In adults, such meager sleep allowances are known to affect day-to-day functioning in myriad ways. In adolescents, who are biologically driven to sleep longer and later than adults do, the effects of insufficient sleep are likely to be even more dramatic--so much so that some sleep experts contend that the nation's early high-school start times, increasingly common, are tantamount to abuse.

"Almost all teen-agers, as they reach puberty, become walking zombies because they are getting far too little sleep," comments

A disorder characterized by sudden and uncontrollable, though often brief, attacks of deep sleep, sometimes accompanied by paralysis and hallucinations.
nar'co·lep'tic (-lēp'tik) *adj.*

Cornell University psychologist James B. Maas, PhD, one of the nation's leading sleep experts.

There can be little question that sleep deprivation has negative effects on adolescents. According to the National Highway Traffic Safety Administration, for example, drowsiness and fatigue cause more than 100,000 traffic accidents each year--and young drivers are at the wheel in more than half of these crashes.

Insufficient sleep has also been shown to cause difficulties in school, including disciplinary problems, sleepiness in class and poor concentration.

"What good does it do to try to educate teen-agers so early in the morning?" asks Maas. "You can be giving the most stimulating, interesting lectures to sleep-deprived kids early in the morning or right after lunch, when they're at their sleepest, and the overwhelming drive to sleep replaces any chance of alertness, cognition, memory or understanding."

Recent research has also revealed an association between sleep deprivation and poorer grades. In a 1998 survey of more than 3,000 high-school students, for example, psychologists Amy R. Wolfson, PhD, of the College of the Holy Cross, and Mary A. Carskadon, PhD, of Brown University Medical School, found that students who reported that they were getting C's, D's and F's in school obtained about 25 minutes less sleep and went to bed about 40 minutes later than students who reported they were getting A's and B's.

In August, researchers at the University of Minnesota reported the results of a study of more than 7,000 high-school students whose school district had switched in 1997 from a 7:15 a.m. start time to an 8:40 a.m. start time. Compared with students whose schools maintained earlier start times, students with later starts reported getting more sleep on school nights, being less sleepy during the day, getting slightly higher grades and experiencing fewer depressive feelings and behaviors.

Also troubling are findings that adolescent sleep difficulties are often associated with psychopathologies such as depression and attention deficit hyperactivity disorder (ADHD).

This research, combined with studies showing widespread sleep deprivation among teens, has propelled efforts to educate children and adults about the importance of a good night's sleep and to persuade schools to push back high-school starting times.

"There is substantial evidence that the lack of sleep can cause accidents, imperil students' grades and lead to or exacerbate emotional problems," says U.S. Rep. Zoe Lofgren (D-Calif.), who has introduced a bill that would provide federal grants to help school districts defray the cost of pushing back school starting times. Adjusting school schedules, Lofgren says, "could do more to improve education and reduce teen accidents and crime than many more expensive initiatives."

The research has also spurred further investigations into why teens need extra sleep, the effects of sleep deprivation on cognition, emotion regulation and psychopathology, and the long-term consequences of chronic sleep deprivation.

DOGMA REVERSED

For decades, experts believed that people require less sleep as they move from infancy through adulthood.

It's easy to see why this belief persisted: Adolescents sleep less than they did as children, declining from an average of 10 hours a night during middle childhood to fewer than 7.5 hours by age 16. According to Wolfson and Carskadon's 1998 study, 26 percent of high school students routinely sleep less than 6.5 hours on school nights, and only 15 percent sleep 8.5 hours or more. The same study indicated that to make up for lost sleep, most teens snooze an extra couple of hours on weekend mornings--a habit that can lead to poorer-quality sleep.

But to researchers' surprise, in the past two decades studies have shown that teen-agers require considerably more sleep to perform optimally than do younger children or adults. Starting around the beginning of puberty and continuing into their early 20s, Carskadon and colleagues have shown, adolescents need about 9.2 hours of sleep each night, compared with the 7.5 to 8 hours that adults need. In addition to needing more sleep, adolescents experience a "phase shift" during puberty, falling asleep later at night than do younger children. Researchers long assumed that this shift was driven by psychosocial factors such as social activities, academic pressures, evening jobs and television and Internet use. In the past several years, however, sleep experts have learned that biology also plays a starring role in adolescents' changing sleep patterns, says Carskadon.

Indeed, Carskadon's research is greatly responsible for that new understanding. In a pair of groundbreaking studies published in 1993 and 1997, she and colleagues found that more physically mature girls preferred activities later in the day than did less mature girls, and that in more physically mature teens, melatonin production tapered off later than it did in less mature teens. Those findings, Carskadon says, suggest that the brain's circadian timing system--controlled mainly by melatonin--switches on later at night as pubertal development progresses.

Changes in adolescents' circadian timing system, combined with external pressures such as the need to awaken early in the morning for school, produce a potentially destructive pattern of early-morning sleepiness in teen-agers, Carskadon argues. In a laboratory study of 40 high-school students published in the journal *Sleep* (Vol. 21, No. 8) in 1998, she, Wolfson and colleagues examined the effect of changing school starting times from 8:25 a.m. to 7:20 a.m. Their results were disturbing: Almost half of the students who began school at 7:20 were "pathologically sleepy" at 8:30, falling

directly into REM sleep in an average of only 3.4 minutes--a pattern similar to what is seen in patients with narcolepsy.

Those findings, says Carskadon, persuaded her that "these early school start times are just abusive. These kids may be up and at school at 8:30, but I'm convinced their brains are back on the pillow at home."

ELUSIVE QUESTIONS

The evidence of adolescents' increased need for sleep and that many--if not most--teen-agers are chronically sleep deprived has raised further questions. Particularly elusive, says Carskadon, has been the question of why adolescents' circadian clocks shift to a later phase around the beginning of puberty.

One possibility, she believes, is that the brain's sensitivity to light changes during adolescence. At the annual meeting of the Associated Professional Sleep Societies in June, she and colleagues presented research showing that in the evening, exposure to even very dim lighting delayed melatonin secretion for participants who were in middle or late puberty, but not for pre-pubertal participants.

Carskadon is also interested in how teen-age alcohol use might affect the brain's sleep system. Following up on studies in adults that have established a link between drinking problems and changes in sleep patterns, for example, she and her colleagues plan to examine whether during early development, young people with a family history of problem drinking might have abnormalities in the brain mechanisms that govern sleep.

Just as important as the question of why sleep patterns change during adolescence is the issue of how sleep deprivation influences adolescents' emotion regulation and behavior. Many researchers have noted that sleep-deprived teen-agers appear to be especially

vulnerable to psychopathologies such as depression and ADHD, and to have difficulty controlling their emotions and impulses.

Although it's difficult to untangle cause and effect, it's likely that sleep deprivation and problems controlling impulses and emotions exacerbate one another, leading to a "negative spiral" of fatigue and sleepiness, labile emotions, poor decision-making and risky behavior, says Ronald E. Dahl, MD, a professor of psychiatry and pediatrics at the University of Pittsburgh.

Despite the evidence that insufficient sleep affects young people's thinking, emotional balance and behavior, the long-term effects of chronic sleep deprivation on learning, emotion, social relationships and health remain uncertain.

"There's a real need for longitudinal studies to follow through later childhood and adulthood," says psychologist Avi Sadeh, PhD, a sleep researcher at Tel Aviv University. Although research has amply demonstrated that sleep problems affect young people's cognitive skills, behavior and temperament in the short term, he says, "It's not at all clear to what extent these effects are long-lasting." Researchers push for school changes, public outreach.

With such a wealth of evidence about the prevalence of adolescent sleep deprivation and the risks it poses, many sleep researchers have become involved in efforts to persuade school districts to push back high-school starting times so that teens can get their needed rest.

Some schools argue that adjusting school schedules is too expensive and complicated. But others have responded positively to sleep experts' pleas. The Connecticut legislature is considering a bill that would prohibit public schools from starting before 8:30 a.m., and Massachusetts lawmakers are also weighing the issue. And Lofgren's "Zzzzz's to A's" bill, first introduced in the U.S. House of Representatives in 1998, would provide federal grants of up to

\$25,000 to school districts to help cover the administrative costs of adjusting school start times.

These efforts are a move in the right direction, says Wolfson. But, she says, changing school start times isn't the entire answer. "I think 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."

Toward that end, several public-education efforts are now under way:

* With a grant from the Simmons mattress company, Cornell's Maas recently produced a film on teen-age sleep deprivation, its consequences and the "golden rules" for healthy sleep. The film is scheduled for distribution through parent-teacher associations and school principals this fall. In August, Maas also published a children's book, "Remmy and the Brain Train," which discusses why the brain requires a good night's sleep.

* Next year, the National Center for Sleep Disorders Research at the National Institutes of Health plans to release a supplemental sleep curriculum for 10th-grade biology classes, addressing the biology of sleep, the consequences of insufficient sleep and the major sleep disorders. In a related effort, the center is coordinating a sleep-education campaign aimed at 7- to 11-year-olds.

* Wolfson and colleague Christine A. Marco, PhD, a psychologist at Worcester State College, are pilot-testing an eight-week sleep curriculum for middle-school students. As part of the curriculum, students keep sleep diaries, play creative games and participate in role-playing about sleep, and set goals--for example, for the amount of sleep they want to get or for regulating their caffeine intake. Preliminary results indicate that the curriculum helps students improve their sleep habits.

"Changing school start times is one critical measure we can take to protect young people's sleep," says Wolfson. "And then, if we can

only understand what's going on with sleep in these sixth-, seventh- and eighth-graders, we can intervene to change their sleep behavior before it gets out of hand."

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TEEN SLEEP DEPRIVATION A SERIOUS PROBLEM

By Joyce Frieden

WebMD Health News

Reviewed by Michael W. Smith, MD

WEBMD

<http://www.webmd.com/sleep-disorders/news/20000821/teen-sleep-deprivation-serious-problem>

Aug. 21, 2000 -- Think you're sleep-deprived? Consider the schedule of this typical 14-year-old:

He rises at 6 a.m. to go running. Then he dresses, eats breakfast, and arrives at high school in time for his first class at 7:40. After school, there are piano lessons and homework, in addition to Boy Scouts and other activities. He usually falls asleep by 10 or 11 p.m. -- and must fight the temptation to doze throughout his morning classes the next day.

But wait, you say. He's managing nearly eight hours a night -- an amount some working parents would kill for. What's wrong with that? Plenty, according to sleep experts. Not only do many teens keep busy schedules, but biological changes in their bodies mean that they need more sleep than ever -- nine to 10 hours per night, for most -- and that they are naturally inclined to go to bed later. The problem is so serious that a few high schools across the country have begun starting classes later in the day.

"This is a much bigger problem than people think," says Richard D. Simon, Jr., MD, medical director of the Kathryn Severyns Dement Sleep Disorder Center in Walla Walla, Wash. "They underestimate the problems of being sleepy in the daytime and how it impairs mood and affects performance."

Sleep deprivation can even be fatal. Some 55% of all car crashes in which drivers fell asleep involve people under age 26, according to the National Institutes of Health's National Center on Sleep Disorders Research in Bethesda, Md.

In a report issued earlier this year, the National Sleep Foundation (NSF) in Washington says that the total average sleep time during the school week decreases from 7 hours and 42 minutes for 13-year-olds to 7 hours and 4 minutes for 19-year-olds. At the same time, teens' needs for sleep actually increase.

Studies show that while fifth and sixth graders can be wide awake all day after about nine hours' sleep, teenagers need 10 hours to be alert all day long, says Simon. "The average teenager gets about six hours' sleep, so he's sleep-depriving himself completely," he says. Other researchers put the necessary amount of sleep for teens at about 9 hours and 15 minutes a night.

In addition, high-school-age children appear to undergo a shift in their biological 'body clock,' which tells them when to rise and go to bed, he says: "There's some evidence that teenagers' biological clock may be programmed to start turning off later at night and turn on later in morning." According to the National Sleep Foundation report, studies have shown that the typical high school student's natural bedtime is 11 p.m. or later.

Teenagers' sleep problems are aggravated by the schedules they keep, says Simon. "In high school, socialization starts, and parents start allowing children to go to football games and go out afterward, and then they let them sleep in on Saturday mornings." On Saturdays, the children will wake up at 10 a.m. and go outside, and the natural

light reinforces the message to the brain that this is the "starting time" for the day, he says.

"Then they stay out late again Saturday night and sleep in Sunday morning. When Sunday night comes, the kids want to get into bed earlier, but they can't fall asleep. Then, when 6 a.m. comes, they can't wake up. Their biological clock has changed."

Some school districts have begun trying to address this problem. Exact data are hard to come by, but Amy Wolfson, PhD, a member of the NSF task force that put out the report, says she knows of 14 districts that have changed their start times to 8 a.m. or later, and another 20 that are contemplating the idea. Meanwhile, 11 school districts have voted against making such a change, says Wolfson, an associate professor of psychology at Holy Cross College in Worcester, Mass.

One school that has made such a schedule switch is the West Windsor-Plainsboro Middle School in Plainsboro, N.J. It came after Deborah Hornstra and Michele Brett, who both had children attending the school, mobilized a group of parents to demand a change in the 7:34 a.m. start time. "My kids were given a 6:45 a.m. bus pickup because we live quite far from the school, and they were on an earlier run," said Hornstra, who lives in Princeton Junction, N.J. "They had to be up at 6 and really run around to shower, dress, get organized and have anything resembling breakfast. They'd beg me for five or 10 minutes of extra sleep."

Getting the kids to bed earlier wasn't really an option, since they were already starting to get ready for bed at 9 p.m. and were usually asleep by 9:30 or 10, she says. "Teenagers seem to need a minimum of nine-and-a-quarter hours a night, but that would be asking them to fall asleep at 8:45, and I don't think that's going to happen, especially with the homework and all the other things they're expected to do," Hornstra says.

After intensive lobbying and a letter-writing campaign to local newspapers, Hornstra's group convinced the superintendent to push the starting time back by 15 minutes, to 7:49, starting this fall. Still, Hornstra says, "I'd like to see school start at 8:30 if I had my druthers."

At New Century High School in Lacey, Wash., students don't have to worry about setting the alarm to go off at 8 a.m. That's because their school, which bills itself as the only afternoon/evening high school in the state, runs from 2:30 p.m. to 9 p.m. "The kids walk in here and they're rarin' to go, although they do drag a little after dinner," says school principal Jim Slosson.

Slosson, who has worked at several schools with earlier starting times, says he used to have a trick for his most disruptive students: "I'd put them in the class they hate the most during first period, because they're still asleep then."

One school district that decided against changing its start time was Fairfax County, Va. "We have a very large school system with a busing system that's incredibly efficient," says district spokesman Paul Regnier. "It depends on the fact that every bus makes multiple runs. As soon as you start looking at substantially changing that schedule, you've got a problem."

The district considered flopping the elementary and high school starting times so that elementary school children, who are on an earlier biological clock anyway, would start earlier than the high school students. "But people don't want their kids standing in the dark waiting for buses," Regnier says. And changing the high school starting time would cut down on the time available for after-school activities, he adds.

Communities should use a multi-pronged approach to attack the problem of sleep deprivation, says Wolfson. First, schools should educate teenagers about proper sleeping habits. "I'm working on

evaluating a program that teaches middle schoolers how they can change their own sleep and wake schedules," she says. "I don't know if we can get teens to go to bed at 10 p.m. and keep a regular schedule, but we can start by having [a] curriculum ... about sleep the same way we teach about [exercising](#) and good [nutrition](#)."

Starting school later in the day is a good step, but the overall culture -- including the student's home life -- has to change as well, Wolfson says.

"We live in a very fast-paced society where parents themselves skimp on sleep," she says. "So it's hard to expect one's own son or daughter to shut down the computer or turn the TV off or not call their friends if that's the family's lifestyle. And when we have expectations about the homework teenagers do and the activities they participate in, we need to take into account the fact that they need time to take care of their bodies."

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TEENS AND SLEEP DEPRIVATION

Making Time for Sleep and Homework

By [Grace Fleming](#), About.com

About.com

<http://homeworktips.about.com/od/timemanagement/a/sleeptime.htm>

Studies suggest that teenagers often sacrifice their sleep time when it comes to making choices about time management. The problem is, studies also show that they need a lot more sleep than they probably get.

According to a [study by sleep expert Mary Carskadon](#), PhD, teens should receive more than nine hours of sleep every night. That's a great thought, but is it possible? Think about it--do you ever sleep that long? OK, maybe on the weekends. But very few teens receive sufficient sleep on school nights.

Dr. Carskadon's study suggests biology might be the cause for sleep deprivation among teens. Their internal time clocks are just a little different during teenage years--and late nights and sleep-ins are a natural part of growing into adulthood. Lack of sleep makes it more difficult for students to concentrate in school, especially during those early-morning classes.

STUDIES ABOUT SLEEP AND MEMORY

Our ability to remember is related to our ability to learn, and there have been many studies about sleep and its effects on memory, learning, and retention. These studies suggest that good sleep habits are essential to good study habits.

[One study](#) about learning languages shows that it is good to study right before going to sleep because "there is near-consensus that sleep promotes learning of certain types of perceptual memories." In other words, sleep helps students store memories to be retained and remembered the next day.

Another study shows that [sleep strengthens memories](#) so they become clear and resistant to interferences and distractions. A study from 1999 suggests that [information becomes "cemented"](#) in our brains as we sleep. These studies show that sleep is important, but they also suggest that it may be most helpful to study right before bedtime.

AVOIDING SLEEP DEPRIVATION

So what can you do if you know you aren't getting enough sleep?
Turn off the TV at night. Some teens fall asleep with the TV on, and some are so used to the noise they think they can't sleep without it. Not true! The TV noises and flashing lights will only keep you from getting a sound sleep. If you can remember things you heard during your sleep, you're not sleeping well.

Try caffeine free drinks. Try reducing caffeine by switching to something healthier, like bottled water. OK, if that's too much to ask, at least try a caffeine-free version of your favorite drink!

Limit after-school activities. It's hard to do, but try to limit your extra-curricula's. Sometimes you just have to make a hard choice and stick to it.

You may need to strike a balance between making time for homework and sleep and gaining valuable experience in an extracurricular activity that will help your chances of getting into a great college. Know your priorities.

Don't think too hard right before bed time. If you have calculus homework, you might not want to put it off until night. It's harder to relax and get to sleep when your mind is stuck in the deep-thinking mode. It takes awhile to unwind, so maybe you should tackle the hardest subject earlier.

Same for crazy video games. Video games may also cause your brain to enter the overdrive zone. If you play video games, don't do them just before you go to bed.

Turn off the cell phone. What's so important it can't wait until morning? Unless you have a really good reason--like your parent works at night and might need to reach you, turn it off and get some rest.

Keep track of time. Often, students have great intentions, but other tasks seem to keep them up late, time after time. That's because teens have to develop an understanding of time management and task completion. It's hard to put a timetable on things like running an errand or completing a science experiment.

Start keeping track of things you do routinely and the amount of time needed to do certain tasks. Then plan ahead so you can get to bed on time.

Play music if you want, but not too loud. Many people play music at night. If it doesn't bother you, go ahead. Don't play it too loud, though, or it will disrupt your sleep.

Do you really need that after-school job? This might be a really tough decision, too. Some students need to work so they can pay for car insurance or save up for college. You'll just have to decide on your own, what's necessary and what's not.

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ADOLESCENT SLEEP NEEDS AND SCHOOL PERFORMANCE

An Excerpt

Number 98-19 ▪ November 1998

Research & Educational Services

<http://nysut.org/research/bulletins/981202adolescentsleep.html>

Contrary to popular belief, teenagers do not need less sleep than others. In fact, as they move through their teenage years, adolescents need increasing amounts of sleep – about nine hours nightly, as compared to eight hours needed by adults. Excessive sleepiness in teenagers and young adults is related to physiological changes during puberty. Yet, school starting times get earlier and earlier as students mature, despite the fact that puberty demands more sleep. This may have serious physical, mental, and social consequences for adolescents and negatively impact their academic performance.

What Does Medical Research Tell Us?

There is mounting medical evidence that amount of sleep, time of day, and circadian rhythms, i.e., rhythmic cycles of the body, do play a part in how prepared an adolescent is to learn. Studies have shown, for example, that sleep deprivation is associated with memory deficits, impaired performance and alertness, and delayed responses. The loss of REM, or rapid eye movement sleep (a period of intense sleep) can result in increased irritability, anxiety and depression, decreased socialization, reduced concentration and decreased ability to handle complex tasks and to be creative. Students experiencing

sleep deprivation can also experience an increased potential for drug and alcohol use, as well as vulnerability for accidents.

What Time of Day Do Adolescents Appear to Do Their Best Learning?

Not only is the proper amount of sleep important for cognitive processes to function adequately, but the time of day also has an effect on learning. Research indicates that many high school students do their best learning in the afternoon. One study found that afternoon reading instruction produced the greatest increase in reading scores as compared to morning instruction. However, most exams, such as the SATs and ACTs, are administered during morning hours.

According to researchers, adolescents experience a natural circadian phase delay and therefore, stay up later and sleep in later than in preadolescence. It is not uncommon for many teenagers to sleep until the mid-afternoon during the weekends. Despite the increasing need for sleep, many adolescents are actually getting less and less.

According to one study, 20% of all high school students fall asleep in school. Additional research has shown that over 50% of students report being most alert after 3:00 p.m. In other words, most students are in school during the period they reported being least alert and are released from school at the time they are reaching their peak alertness.

PART II: TECHNOLOGY & TEEN SLEEP

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TEXTING & TEEN SLEEP DEPRIVATION

Anne Collier

NetFamilyNews.org

<http://www.netfamilynews.org/2009/07/texting-teen-sleep-deprivation.html>

Sleep specialists are concerned about teens keeping cellphones on all night, right by their beds and under their pillows - because of "how important sleep is to their developing brains," the [Charlotte Observer reports](#). It tells of a 17-year-old in California was getting "near-debilitating migraine headaches throughout the day." The first thing her doctor checked was her eyes. No problem. Then a CAT scan. "It came back clear." He was stumped. What finally came to light was that she slept with her phone at bedside "just in case a friend called or text-messaged her in the middle of the night. Sometimes, she said, she would receive calls or messages as late as 3 a.m. - and she would wake right up to call or text right back." The article doesn't say, but I hope the prescription was that the teen turn off her phone at night. Other problems specialists cite as resulting from sleep deprivation: "impaired concentration, weakened immune systems, crankiness, increased use of nicotine or caffeine and hyperactive behavior often misconstrued as attention deficit hyperactivity disorder." And one other added by Dr. Carolyn Hart at the Presbyterian Center for Sleep Disorders: a decline in school performance and risky driving while drowsy.

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TEENS LOSING SLEEP OVER TECHNOLOGY

By LINDA SHRIEVES

THE ORLANDO SENTINEL

January 20, 2008

ORLANDO, Fla. — If you bought your teenager a cell phone for Christmas, you might have reason to regret it. Some sleep researchers think today's teens are loading up on "junk sleep" — the sleep equivalent of junk food — because they sleep with so many distracting devices: cell phones tucked under their pillows, handheld computer games on the bedside table, TVs or music playing in the background.

"We have an epidemic of obesity and we have an epidemic of junk sleep," says Dr. Morris Bird, head of Florida Hospital's Center for Sleep Disorders. "With our 24-hour days, the availability of all these things — all of these things are like a big apple pie that is sitting in front of them — and they can't resist." At a time when parents are busy trolling store aisles for the latest electronics for their kids, it appears that American teens are getting more gadgets and less quality sleep.

Natasha Parish, 17, loves to keep her cell phone on her bedside table, just in case a friend calls or text-messages her in the middle of the night. Sometimes, she receives calls or texts as late (or early) as 3 a.m. If she's awake, or if the call wakes her up, Natasha texts right back.

"I don't like not being able to respond right away," says Natasha, a senior at Winter Park (Fla.) High School. Likewise, she keeps her laptop computer powered up until bedtime, just to catch any e-mails that friends send her.

"It's probably one of my biggest distractions and one of the reasons I don't go to bed earlier," Natasha says.

COMPETING WITH SLEEP

In a 2006 poll by the National Sleep Foundation, 97 percent of teens said they have at least one electronic item, such as a television, computer, phone or music device in their bedroom. On average, sixth graders reported having more than two electronic gadgets in their room, while high-school seniors said they have four.

In the survey, teens with four or more electronic devices in their bedrooms were much more likely than their peers to get an insufficient amount of sleep.

"These devices keep you awake. They are in competition with sleep," says Dr. Mary Carskadon, a Brown University psychiatry professor who specializes in the sleep-wake pattern of children and adolescents. "The message we're trying to send is: Sure, you can have these gadgets, but do you have to have them in the bedroom?"

The problem, says Carskadon, is two-fold. Not only do teens tend to stay up later, playing video games or surfing the Internet in their bedrooms while their parents have already gone to sleep, but many kids leave the TV or iPod or telephone on all night. And the noise from those gadgets can wake them up repeatedly during the night. Making matters worse, any gadget with lights – such as a computer monitor left on all night – can trick the brain into thinking it's daytime.

MOODY TEENS

Researchers haven't yet studied the effect of sleeping with a cell phone tucked under your pillow, but studies suggest that televisions disrupt sleep.

"After two hours of sleep, the child wakes up, the TV's on and there's something on that they want to watch. So they wake up and watch," says Carskadon. "Two things have happened: First, their sleep is disrupted. And second, now they're getting light, which can impact their sleep rhythm."

So what's happening to a generation growing up on junk sleep? They're becoming a generation of sleepy, sometimes moody and irritable teens who doze off in school. "What parents probably experience most is the difficulty waking the teen up in the morning," says Carskadon. "The teachers will see it more. They'll see what I call the 'slack-jawed droolers,' the kids who are not with it in the morning."

NOT ENOUGH REST

The National Sleep Foundation says school-aged children and adolescents need at least nine hours of sleep a night, but in a national survey conducted in 2006, only 20 percent of American teens said they get nine hours a night. Nearly half sleep less than eight hours on school nights and 28 percent of high-school students reported falling asleep in school at least once a week. But teens have become accustomed to gadgets – and to cutting corners on sleep.

Monica Risley, a senior at Winter Park High School, sleeps between five and six hours a night. Like many of her friends, she falls asleep each night with her cell phone next to her pillow. To drift off to sleep, she watches TV, but sets a sleep timer to turn off the TV after 30 minutes. Yet Monica, a student in the school's International Baccalaureate program, blames homework, not her cell phone and TV, for her sleep deficit. "Depending on my homework, I go to bed at 11 on a good night, but many times 12 or 1 o'clock," she says. She then gets up each morning at 5:30 a.m. to go to the gym before school. "Very rarely do I get enough sleep."

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TECHNOLOGY TAKES ITS TOLL ON TEEN SLEEP

ASPEN Education Group

<http://www.aspeneducation.com/Article-teen-sleeping.html>

With many teens occupying bedrooms equipped to the rafters with technology, kids are getting less sleep than ever, according to the results of a 2006 poll by the National Sleep Foundation. The poll found that only 20% of adolescents get the recommended nine hours of sleep on school nights, and 45% sleep less than eight hours on school nights. Attention-stealing devices like televisions, computers, MP3 players and cell phones take a good chunk of the blame. Check out these stats:

Watching television is the most popular activity (76%) for adolescents in the hour before bedtime, while surfing the internet/instant-messaging (44%) and talking on the phone (40%) are close behind.

Boys are more likely to play video games (40%) while girls are more likely to talk on the phone (51%) in that time.

Nearly all adolescents (97%) have at least one electronic item - such as a television, computer, phone or music device - in their bedroom. On average, 6th-graders have more than two of these items in their bedroom, while 12th-graders have about four.

Most sleep experts say it is unwise to use a computer immediately before bedtime because the bright computer screen may affect the

biological rhythms that govern sleep. A study in the Journal of Applied Physiology further suggests that performing "exciting" computer tasks, such as playing a video game, may actually suppress the production of melatonin, the so-called "sleep hormone."

SLEEP DEPRIVATION IS DANGEROUS

Lack of sleep is a dangerous thing, especially for adolescents whose brains are still developing. The poll found that adolescents who had four or more technological devices in their bedrooms were almost twice as likely to fall asleep in school and while doing homework. But it's not just schoolwork that suffers... many teens also reported "driving while drowsy." According to the National Traffic Safety Administration, drowsy driving causes more than 100,000 police-reported crashes, 71,000 injuries and 1,550 deaths each year. Being groggy can also lead to behaviors that may be mistakenly attributed to or exacerbate existing learning disorders, like ADHD, or mental health problems, like depression.

WHAT'S A PARENT TO DO?

Remember when they were babies and you had a nice, soothing ritual to help them relax from the day and get ready to fall to sleep? Well, teens need that kind of transition period as well. And they need a restful environment.

Take the television and the video game console(s) out of the room. Same goes for the computer, handheld gaming devices and cell phones. The portables have to charge sometime - why not try putting the charging devices in another room and make it a rule that after a certain time at night, about an hour before lights out, the devices have to be in their chargers.

Reserve that last hour before bed for nighttime rituals like showering, brushing teeth, putting away homework, making sure there are clean socks and underwear for the next day, etc. Pleasure reading can be a great way to unwind as well. And be courteous -

it's hard for a kid to get to sleep when the TV in the living room is emitting tantalizing sounds of mayhem and music.

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Caffeine and technology: Cutting Down Teen Sleep time

Beth Israel Deaconess Medical Center

A teaching hospital of Harvard medical School

by [Pamela Jones, MA](#)

<http://www.bidmc.org/YourHealth/HealthResearchJournals.aspx?ChunkID=512482>

[Sleep](#) is an important part of overall health, yet it is one of the most underrated health habits. Sleep gives the body and brain time to repair and regenerate itself. Lack of sleep can slow your ability to learn or remember, decrease concentration and physical abilities, and cause mood swings. While some sleep disturbances are caused by certain health conditions, lack of sleep is most often caused by lifestyle choices. Caffeine and an over-stimulating sleep environment are two common contributors to poor sleep.

Researchers from Drexel University wanted to determine if teens' constant access to technology and caffeinated drinks are causing significant disturbances in their sleep. The study, published in *Pediatrics*, found that the use of multiple technologies and caffeinated beverages were linked to decreased sleep times in teens.

About the Study

The [observational cohort study](#) surveyed 100 middle and high school students aged 12-18. The teens were asked about their sleep behavior, caffeine intake, and nighttime media technology use. The technology activities included watching television or movies, texting, browsing the internet, talking on the phone, or using computer games and MP3 players.

The teens engaged in an average of four technology activities per evening. Television, telephone, and MP3 players were the most

popular. The teens with the highest use of technologies after 9 pm were more likely to have:

- Decreased amount of sleep
- Higher incidence of falling asleep in school
- Increased caffeine intake

Teens that had an average of 8-10 hours of sleep per night were 1.5-2 times less likely to report multitasking technologies. About 33% of all participating teens reported falling asleep during school, and 76% of those teens had higher rates of caffeine consumption compared to teens that did not report falling asleep during school hours.

How Does This Affect You?

The teens in this study demonstrated a common problematic sleep pattern. The use of numerous multi-media technologies late at night creates a steady stream of stimulation that decreases sleep time; the resulting daytime drowsiness encourages them to reach for caffeine stimulant drinks, which exacerbates the poor sleep cycle. This lack of sleep can impair learning since the brain requires adequate sleep to process and store information gathered during the day. Needless to say, staying awake in class is likely to promote learning.

Find out how long your teen is spending on these technologies. Although this may be easier said than done, negotiate (or impose) time limits and bed times to help them get proper amounts of sleep (a minimum of 7-½ hours per night). Discourage the consumption of [caffeinated beverages](#), particularly in the late afternoon or evening when it is more likely to interfere with sleep. If you notice, or are advised about, daytime drowsiness, talk to your teen about sleep habits. If lifestyle changes do not improve sleep, consult his or her doctor who can identify and address any additional problems like [allergies](#), [asthma](#), or other medical conditions that can interfere with sleep.

TECHNOLOGY FURTHER DEPRIVES TEENS OF SLEEP

Deseret News

By Jackie Burrell
Contra Costa Times

<http://www.deseretnews.com/article/705332429/Technology-sleep-deprived-teens.html>

Between their crazy schedules and upside-down circadian rhythms, teens always have been somewhat sleep-deprived. Now technology is making it worse.

Teens are not just texting, instant-messaging and surfing Facebook all day; they're sleeping with their cell phones or laptops, too. Or rather, not sleeping. And doctors and parents, many of them raised in an era when phones were attached to walls, are concerned.

"So many teens are having sleep issues, and parents aren't necessarily regulating the use of the electronic devices enough," says Margie Ryerson, a Walnut Creek, Calif., therapist who specializes in adolescent issues. "It's impossible to wind down and relax the body, the mind, the senses and be ready to fall asleep." The texting doesn't stop, she says, even after Mom and Dad are snoring softly in their beds. One of Ryerson's clients discovered her 17-year-old daughter was sending more than 3,000 text messages per month, many in the wee hours.

"Many people assume these problems arise directly from adolescence, which is not really true," he says. "The real issue is sleep deprivation. Late-night texting can certainly make the situation worse. But one has to ask: Are the teens texting because they can't sleep, or are they staying awake because they are texting? We really don't know."

Teens tend to see sleep-deprivation as a "victimless crime," says San Jose psychologist David Marcus. So what parents can do is help them understand cause and effect. Have them go one week doing what they're doing; then have them try getting some phone-free, undisturbed sleep for a week, and evaluate the differences. Ask, "How's your energy for sports, quizzes and class work? Your ability to handle conflicts with your friends? How do you really want to treat yourself?"

STAYING CONNECTED

The surge in all-hours texting has been helped by unlimited text-messaging plans, Nielsen researchers say. But it also stems from the fact that a phone is no longer just a communication device; it's a carrier of games, facilitator of research, organizer of schedules and all-around boredom quencher. It's also an alarm clock, hence its location on bedside tables everywhere, including that of Andrew Jones' at home in Alamo, Calif., and at his college quarters at the University of Pennsylvania.

The psychology behind this constant contact is certainly understandable, Ryerson says. "It comes from wanting to avoid being left out. They won't be considered important and significant in their peer group, if they don't know what's going on. If they're on top of everything, they belong," she says.

It's not limited to the teen crowd either. Jones says there's substantial pressure at the college level, too.

"Since everyone else is always connected," he says, "they expect their peers to constantly be at the same level of connectedness. And when they're not, people rarely go out of their way to keep those less connected informed of what is happening."

SETTING LIMITS

What helps, at least for younger kids, says Danville psychologist Sara Denman, is parental involvement. "If all of their friends are all able to text into the wee hours of the night, it is hard for a middle or high schooler to set the limit themselves," Denman says. "Often they appreciate parents stepping in. "... I encourage parents to set a technology curfew."

Some parents find that cell phones carry their own curfew enforcers – their batteries have to be recharged. "Many parents have their kids charge the phone and computer in the hall outside of their room, which confirms the curfew is being followed," says Denman.

Less Sleep Is a Factor in Teen Obesity

Softpedia

By Tudor Vieru

<http://news.softpedia.com/news/Less-Sleep-Is-a-Factor-in-Teen-Obesity-113704.shtml>

The spread of the obesity pandemic in the young population around the world is very troublesome, researchers say, especially because no one really knows what's causing it. Among the suggestions, too much sedentary time, as in watching TV and using computers all day long, coupled with an inappropriate diet, high on carbohydrates, proteins and sugar-filled products, may be the leading causes of teen obesity. However, a new study highlights the fact that a poor sleep hygiene, together with an increased use of technology and a massive intake of caffeine, may also contribute to the problem. Snoring is one of the key elements in analyzing the quality of sleep. The more, the worse, researcher say, as it is a clear indicator that something is amiss with the body. Before bed, more and more teens are consuming either sodas or energy drinks and coffee, which stimulate their brain during the night, and so they get only a limited amount of disturbed sleep. During the hours they do catch forty winks in, they often tend to sweat and move around a lot, not being able to enjoy the full benefits of sleeping.

Amy Drescher, PhD, a research specialist at the University of Arizona in Tucson (UAT), said that, in a new investigation, the body mass index (BMI) of test subjects was directly associated with the number of hours each of them slept per night. The discovery will be presented today, June 9th, at the 23rd Annual Meeting of the Associated Professional Sleep Societies, dubbed SLEEP 2009. Drescher has been the lead author of the new study.

"Boys had significantly more vigorous exercise, recreational activity than girls. The sleep and obesity connection is not always seen because factors such as exercise may keep weight in check," she said. The researcher also underlined the fact that more hours of screen time, when teens used the computer, the Internet, video game consoles, or the TV, also had a detrimental effect on the amount of sleep they got every night, which in turn might be making their conditions worse.

The study, which followed 320 children aged at an average of 13.3 years, found that higher caffeine intakes, coupled with more screen times, had the potential to adversely affect the teens' sleep patterns, health, as well as academic performances. The researchers also said that the trend in which children were allowed to drink coffee and energy drinks at such a young age was also very concerning.

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Short Sleep Duration Linked To Obesity, Consistently and Worldwide

Science Daily

<http://www.sciencedaily.com/releases/2008/05/080501062808.htm>

ScienceDaily (May 2, 2008) – A new study is the first attempt to quantify the strength of the cross-sectional relationships between duration of sleep and obesity in both children and adults. Cross-sectional studies from around the world show a consistent increased risk of obesity among short sleepers in children and adults, the study found.

Francesco P. Cappuccio, MD, of Warwick Medical School in the United Kingdom, and colleagues performed a systematic search of publications on the relationship between short sleep duration and obesity risk. Criteria for inclusion were: report of duration of sleep as exposure, body mass index (BMI) as continuous outcome and prevalence of obesity as categorical outcome, number of participants, age and gender.

Of the 696 studies identified from the search, 12 studies on children and 17 studies on adults met the inclusion criteria. For the children, 13 population samples from the 12 studies were included in the pool analysis, for a total of 30,002 participants from around the world. The subjects' age ranged from two to 20 years.

Seven of 11 studies reported a significant association between short sleep duration and obesity.

For the adults, 22 population samples from the 17 studies were included in the pool analysis, for a total of 604,509 worldwide participants. The subjects' age ranged from 15-102 years. Seventeen population samples showed a significant association between short duration of sleep and obesity. Unlike studies in children, all studies in adults showed a consistent and significant negative association between hours of sleep and BMI.

According to Dr. Cappuccio, this study showed a consistent pattern of increased odds of being a short sleeper if you are obese, both in childhood and adulthood.

"By appraising the world literature, we were able to show some heterogeneity amongst studies in the world. However, there is a striking consistent overall association, in that both obese children and adults had a significantly increased risk of being short sleepers compared to normal weight individuals. The size of the association was comparable (1.89-fold increase in children and 1.55-fold increase in adults). This study is important as it confirms that this association is strong and might be of public health relevance. However, it also raises the unanswered question yet of whether this is a cause-effect association. Only prospective longitudinal studies will be able to address the outstanding question," said Dr. Cappuccio.

While an increasing number of adults are considered overweight, the number of overweight children is also on the rise. According to the National Heart, Lung and Blood Institute, the percentage of overweight children and teens has more than doubled in the past 30 years. Today, about 17 percent of American children aged two to 19 are overweight. An estimated 61 percent of U.S. adults aged 20-74 years are either overweight or obese. About 34 percent of these people are overweight and 27 percent or 50 million people are obese. While eating healthy and exercising regularly are important

precautions to take to reduce one's chances of being overweight, getting enough sleep is equally as important.

Being overweight can lead to cardiovascular disease and type two diabetes, and can also increase the risk for developing obstructive sleep apnea (OSA), a sleep-related breathing disorder that causes your body to stop breathing during sleep. OSA, which can disturb your sleep numerous times on any given night, can result in daytime sleepiness, as well as elevate the risk for stroke, diabetes and heart disease. OSA is a serious sleep disorder that can be harmful, or even fatal, if left untreated. OSA occurs in about two percent of young children, four percent of men and two percent of women.

Snoring is a sound made in the upper airway of your throat as you sleep. It normally occurs as you breathe in air. It is a sign that your airway is being partially blocked. About one-half of people who snore loudly have OSA. OSA happens when the tissue in the back of the throat collapses to block the entire airway. This keeps air from getting in to the lungs. Almost everyone is likely to snore at one time or another. It has been found in all age groups. Estimates of snoring vary widely based on how it is defined. The rate of snoring in children is reported to be 10 to 12 percent, and in about 24 percent of adult women and 40 percent of adult men.

It is recommended that infants (three to 11 months) get 14 to 15 hours of nightly sleep, while toddlers get 12 to 14 hours, children in pre-school 11-13 hours and school-aged children between 10-11 hours. Adolescents are advised to get nine hours of nightly sleep and adults seven to eight hours.

The article, entitled, "Meta-analysis of Short Sleep Duration and Obesity in Children and Adults", was published in the May 1 issue of Sleep.