

## Sleep Deficit in Teens: A Call for Later High School Start Times

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If you're having trouble getting your teenager up in the morning on school days, you're not alone. Here in Gwinnett County, where most high schools start at 7:10 or 7:20 a.m., many parents report early morning irritability and battles over getting up and out the door. Similarly, many teachers start the day with homeroom and first period zombies. Some teens come home from school and nap till dinner time. When parents go to bed at 10:30 or 11:00, their teenagers are still up, texting and on Facebook, refusing to go to bed, claiming they can't get to sleep anyway, so they might as well as stay up.

### Sleep Patterns In Adolescence

It is no secret that the sleep patterns of adolescents begin to change around puberty. Nine and 10 year olds typically sleep 9 to 10 hours a night, going to bed around 9:00 p.m. and getting up around 7:00 a.m. Parents set the bedtime for younger children, but they are more likely to wake up on time spontaneously and don't sleep in very late on weekends.

Around middle school, however, sleep patterns change in several ways. Adolescents tend to sleep less overall. When sleep is not regulated by the school schedule (on summer vacation, for example), they tend to stay up later and arise later as well. Most state that they just don't feel sleepy till later at night. In fact, studies of teens using the Multiple Sleep Latency Test (a measure of how long it takes to fall asleep when lying down in a dark room) found that at mid-puberty, teens become sleepier in the middle of the day, yet are more alert at 8 p.m. than younger children, and even more alert at 10 p.m. However, school start times around the country often are earlier for high school students than for elementary students.

While adolescents sleep less than young children, studies show that they still need 9 to 9.25 hours of sleep (depending on the study) in order to feel awake and focused the next day in school. This is surprising to many parents who assume that teenagers are like adults and only need 8 hours of sleep per night. So how much sleep are they getting? A 1998 study by Wolfson and Carskadon of Brown University found that 26% of high school students routinely sleep less than 6.5 hours a night. Only 15% slept 8 hours or more each night. A study of 8th graders in the U.S. in 2003 by the same research team found an average bedtime of 10:44 p.m. and a wake time of 6:35 p.m., and total sleep time of 7.9 hours.



In 1998 Carskadon and associates looked at what happened when 9th grade middle schoolers, who started school at 8:25 a.m., transitioned to 10th grade and high school where they began school at 7:20 a.m. Sixty two per cent of the 9th graders got 7 hours of sleep or more, but only 50% of the high school students got that much sleep. The 10th graders were also much sleepier when assessed at 8:30 a.m.. Their latency to falling asleep and going into REM sleep (dreaming) was 3.4 minutes.

In a University of Colorado study by Kenneth Wright (cited in Newsweek in 2007), 82% of high school students said they woke up tired and had trouble concentrating in school. One study (also cited in Newsweek) found that half of a group of 17 year olds slept 7 hours or less per night, and almost one in five said they got less than five hours of sleep a night.

### Causes of Poor Sleep in Adolescents

How can we account for this change in sleep patterns with adolescence? I used to assume it was due to adolescents wanting to assert their independence by bending the rules—and that may be true somewhat—but science has come up with a better explanation. In 1993 psychologist Carskadon and her team discovered that changes in the

sleep pattern of adolescents was due to a change in the circadian timing system in the brain. In humans, the circadian (sleep/wake) pacemaker is located in a bundle of cells in the anterior hypothalamus. This is a small structure deep in the brain, near the pituitary. This system helps us adapt to a 24 hour day and regulates not only sleepiness and wakefulness, but also hormonal activity, body temperature, and such neurobehavioral functions as alertness, concentration, and mood.

Carskadon and colleagues found that a chemical called melatonin—which induces sleep onset—is produced later and later in teens, beginning around puberty. Generally, studies show that it is released around 11 p.m. in most teens. It also is turned off at later times in the morning. Thus, if a teen gets to sleep by 11:30 p.m., which is how nature designed his brain, and gets the 9.25 hours of sleep his body requires, he would need to get up around an astoundingly late 8:45 a.m.! With an hour and 15 minutes to get ready (which may not be reasonable for a teenage girl with "hair issues" or students in ex-urban or rural areas who have long bus rides), high school should start around 10:00 a.m.

## What Are the Consequences of Chronic Sleep Deprivation In Teens?

Some of the effects of sleep deprivation in teens are obvious. Teens who sleep through their morning classes are going to miss much of what is going on around them. Some teachers even penalize students who fall asleep during tests. In 1998 Wolfson and Carskadon found that teens who reported they were getting C's, D's, and F's in school were getting about 25 minutes less sleep than those who were making A's and B's. They were also going to bed about 40 minutes later.

Many teens I see in my practice say they take afternoon naps to make up for the sleep loss and report that they are just fine with it. No doubt some are. Yet some are not. I do hear from parents who come home from work at 6:00 to find their teenager slowly getting up from a long nap, groggy and irritable, with no chores done and no homework started. That same teen has an even harder time going to sleep at 11:00 because the circadian system has been altered and is no longer working efficiently. In other words, the teen brain that has been up for only 5 hours is not ready to go to sleep again, so the teen stays up till 3 a.m. in order to finally get sleepy, only to wake up at 5:30 a.m. for school. Bad idea.

### Poor Sleep and ADHD

Many times I have had a parent present an adolescent for an evaluation for ADHD (Attention Deficit Hyperactivity Disorder) due to “lack of focus” and “inability to concentrate in school” only to find that the teen has poor sleep habits. A key element in taking the history is when the problem began. ADHD is a genetic, and for the most part, lifelong disorder. It does not start in adolescence. So when we learn that the problems began around 8th and 9th grades with poor sleep, we know this is probably not ADHD.

Some researchers have questioned whether ADHD, properly diagnosed, causes poor sleep. After all, it is treated with psychostimulants which make the brain more alert, sharp, and focused. Many ADHD teens complain they can't get to sleep at night. A number of studies have examined this issue and have found that while teens with ADHD have more problems getting to sleep, it may be due to the lingering effects of the medications later into the night, or to other emotional problems which tend to occur more often in teens with ADHD.

### Poor Sleep, Depression, and Substance Abuse

There is evidence for a relationship between sleep deprivation in adolescents and depression, but it is complicated and must be considered from both directions. Adolescents who are clinically depressed do report more difficulty going to sleep and staying asleep than other adolescents, though less so than do depressed adults. On the other hand, teens with chronic sleep deprivation over time develop symptoms of depression—irritability, negative mood, and low motivation. Adolescents, in general, have difficulty managing and controlling strong emotions (see my newsletter: “Why is My Teen So Moody and Impulsive?” Spring, 2007), and sleep deficit makes teens have even more difficulty controlling their emotions. Studies of the brain using fMRI find that sleep deprivation causes the frontal lobes to function less efficiently (this is the seat of attention and judgment), and for the emotional center of the brain, the amygdala, to be 60% more reactive. Many teens go into a spiral in which they stay up late upset about conflict with a friend or parent, for example, lose sleep, fail to turn in assignments and fall behind in school. This leads to more anxiety about schoolwork, more arguments with parents about poor grades, and continued negative mood.

Many adolescents who go into a negative cycle like this also smoke cigarettes, and may consume alcohol and marijuana in order to “feel better.” Nicotine is a stimulant and may delay sleep onset at night. Alcohol may bring on sleep quicker, but also contributes to waking during the night and poor quality sleep. Still more conflicts with parents then result over the use of banned substances as well as the poor grades in school and angry acting out at home.

### Poor Sleep and Car Accidents

Did you know that young adults between the ages of 16 and 29 are the most likely to be involved in crashes where the driver fell asleep at the wheel? Crashes such as this are usually characterized by a young male who is driving at night and veers off the road. Interviews with drivers who had sleep related accidents found that those who had slept 6 to 7 hours the night before were 1.8 times more likely to have a sleep related crash (than a non sleep related one); those who had slept less than 5 hours per night had a 4.5 times higher risk.

Robert Verona, a sleep researcher at Eastern Virginia Medical School, out of concern for his daughter who got up at 6 a.m. every day to go to high school, collected data on the car accident rate of 16-18 year olds drivers in two areas of Virginia. In Virginia Beach, where high schools start at 7:20 a.m., there were 65.4 crashes per 100,000 teen drivers. Yet in Chesapeake, where schools start at 8:40 a.m., there were only 46.2 crashes per 100,000 teen drivers. That's a 40% lower rate

### Poor Sleep and Diet

In the last few years sleep researchers have increasingly established a connection between poor sleep and poor health, particularly obesity. Dr. Susan Redline of the Beth Israel Medical Center in Boston, quoted in Businessweek, found that sleep deprived teens consumed 2.2 per cent more calories from fat in their diet, and ate more snacks than those who slept 8 hours or more. The article also quoted Kenneth Wright who studied the eating and sleeping habits of 240 teens for seven consecutive 24 hour periods. Those who slept less than 8 hours a night ate, on average, 1,968 calories a day. However, those who slept 8 hours a night or more ate a typical diet of 1,723 calories a day. It is notable that only 34% of Wright's subjects slept that much.

### Interventions

Getting an adolescent to modify their erratic sleep schedule is very challenging. For teens, setting their own bedtime schedule and staying up late is a badge of honor, a sign that they are no longer little children, they are in the adult world now. Going to bed early is associated with being a small child or an elderly person. It is not cool!

- ◆ Educate your kids about sleep. You can explain to your teen that you understand that their brain doesn't get sleepy till later at night. You can explain to them that they will feel better in the morning if they get enough sleep, but it is hard to take away the cool factor of staying up late.

- ◆ You may want to tie sleep deprivation to some consequence that is really meaningful to them. Ex. “You know how sleepy you get when you stay up late. That boy you like in chemistry class isn't going to think you're so cute when you're snoring over your lab desk, your mouth hanging open, a little string of spit sliding down your chin.” You might also explain to your teen daughter that it has been proven scientifically that poor sleep will make her fatter. Another tactic might be to use what we call natural and logical consequences

for poor sleep. Ex. “You can stay up late, it’s your choice, but if you’re not in bed by 10:00, you can’t drive tomorrow morning. It’s just too dangerous. You’ll have to ride the bus. I’m sorry if your image will suffer, but I can’t take the risk of your driving drowsy.”

◆ Keep a regular sleep/wake schedule. This is a good idea. Tough to enforce. Many parents I talk to actually want their teens to sleep late on weekends “to catch up on sleep,” but this is not a good plan. If you get them up on Saturday and Sunday a little later, but not much later, like 8:30 or 9:00 a.m., and don’t let them nap on weekends, they will be better able to go to sleep on Sunday night. Thus, they will be better able to get back into a routine for the rest of the week. The circadian system in the brain evolved over millions of years to keep us on track with the length of the day and night. Keep it on a schedule, and it will function like an alarm clock in the morning and keep us focused and alert all day.



◆ Limit caffeine intake or use it wisely. Teens love drinks high in caffeine—Red Bull, Mountain Dew, Coca Cola, Latte, Frappuccino—and they drink them in the afternoon and at night. Not a good idea. These drinks do add to the delay in sleep onset at night. At best you might simply not buy them so they are not available in the home. You might deter your teenage from them by pointing out the high caloric content in them. Chocolate is also high in caffeine and should not be consumed after 3:00 p.m. or so.

◆ Monitor late night activities. Teenagers are entry level adults and they do reflect the habits of the larger adult society. Like us they are using more and more electronic media and using it later and later at night. Keep the TV and the videogames in the family room, not the bedroom. These are mentally stimulating and do emit high levels of light which, again, throw off the circadian system.

◆ Even more of a problem, from what I see, is the use of Facebook and texting. I have seen teen girls—who are typically not doing well academically—on Facebook as much as two to three hours a night, late at night, after their parents go to bed. They are exposing themselves to the light from the computer screen and entering into adolescent dramas which turn up the volume on their already volatile emotions. If not that, they take the cell phone to bed with them, talking and texting in the dark, sometimes waking at 2 a.m. to receive a text message and send a reply. Help them develop good habits. Take the computer and the cell phone out of their rooms as well. Put the cell phone in its charger in the kitchen at 9 p.m. Keep the computer in the family room. If it’s a laptop, move it to the family room at 9 p.m. as well. Can’t extricate these devices from your teen? Here’s a tip from my college student daughter. Go to: <http://stereopsis.com/flux/> and download software which will dim the light on your electronic gadget and shift it from blue light to warm, orange light.

◆ Help them develop a wind down time. Teens today are so dependent on electronic media, they literally go into withdrawal when they disconnect and go “unwired.” Let them discover the merits of quiet time—reading a book or magazine, drawing, or writing in a journal. Better yet, talk to them, tell them your stories. They are most vulnerable and open late at night.

## Research Studies on Later Start Times for Teens

There have been several large scale studies of the effect on teens of later high school start times. In 1993 the Minnesota Medical Association launched an initiative for later start times based on the research about sleep deficit in teens. In 1996 the start time for urban Minneapolis schools was moved from 7:15 a.m. to 8:40 a.m.. And the start time for suburban schools in Edina were moved from 7:25 a.m. to 8:30 a.m.. The study was conducted by Kenneth Wahlstrom and described in a book by Carskadon in 2002. The results of three years of data collection on 7,000 students found the following in both school systems: improved attendance, an increase in continuous enrollment, less tardiness, students making fewer trips to the school nurse, grades went up slightly.

Suburban teachers, counselors, and principals reported: students seemed more alert in class, there were improvements in student behavior, there was less disruptive behavior, fewer disciplinary referrals, fewer students seeking help from counselors for stress relief, and fewer students coming to counselors with peer and family problems. In suburban schools, after-school athletics and club activities were shortened, and students arrived home later. However, actual participation in these activities remained the same. In the urban schools, there were fewer students in after school activities and many reported conflicts with their jobs. Over all, the suburban parents had positive reactions to the change. Urban parents had mixed reactions.

In the Fall of 1998 a school district in Fayette County, Kentucky decided to push back its start time also, from 7:30 a.m. to 8:30 a.m.. Students averaged more than 50 minutes more sleep a night. The study found that the crash rate for 16-18 year olds dropped by 15% following the change, even while crash rates for 17-18 year olds actually rose by 8% in the rest of the state.

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## Coming Soon...

Sexual harassment of teens by other teens is a growing national problem that schools are taking seriously.

But did you know that results of a major national study found that the psychological effects of sexual harassment on teens are more serious than the effects of bullying?

Did you know that sexual harassment is illegal but bullying is not?

We'll review this topic in the Fall 2012 issue.