

Topic:	Student Health Impact												
Description:	<p>Secondary Students: 72,000 enrolled in FCPS grades 7-12 plus Mason District Middle Schools include 6th grade (Glasgow, Poe, Holmes)</p> <p>Elementary Students: 84,000 K-6th (minus 6th graders at Glasgow, Poe, and Holmes)</p> <p>(enrollment approximate: based on 12,000/grade)</p> <table border="1" data-bbox="418 510 1430 814"> <tr> <td></td> <td>High School</td> <td>Middle School</td> <td>Elementary School</td> </tr> <tr> <td>Best Option</td> <td>3rd tier A, B,</td> <td>3rd tier C, D,</td> <td>1st/2nd tier A,C</td> </tr> <tr> <td>Worst Option</td> <td>1st tier <i>current</i></td> <td>1st tier E, <i>current</i></td> <td>Early 1st tier B, D Late 3rd tier E</td> </tr> </table> <p>Based on health impact, Option A or C</p> <p>FCPS Student Achievement Goals: 2.1. Demonstrate sound moral character and ethical judgment: 2.1.6. Protect others' health and safety. 2.8. Make healthy and safe life choices.</p> <p>"Health and education go hand in hand; one cannot exist without the other. To believe any differently is to hamper progress. Just as our children have a right to receive the best education available, they have a right to be healthy. As parents, legislators, and educators, it is up to us to see this become a reality." (Former Surgeon General Antonia Novello, <i>Healthy children ready to learn: An essential collaboration between health and education</i>, 1992.)</p>		High School	Middle School	Elementary School	Best Option	3 rd tier A, B,	3 rd tier C, D,	1 st /2 nd tier A,C	Worst Option	1 st tier <i>current</i>	1 st tier E, <i>current</i>	Early 1 st tier B, D Late 3 rd tier E
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Potential Impact:	<ul style="list-style-type: none"> • Improve teen health and quality of life. • Decrease days absent due to illness. Decrease visits to doctors' offices. Decrease tardies due to oversleeping. • Set a school schedule that more closely matches teen body clocks. Promote healthy sleep habits for life. Increase the amount of sleep teens get each school night. Protect the health and safety of our teen students and enable them to make healthy and safe life choices. • Decrease daytime sleepiness, sleeping during class, and falling asleep during homework. • Improve physical performance, including sports and driving. • Decrease sleep debt which can impair metabolism and disrupt hormone levels. 												

	<p>Evidence is growing that sleep is a powerful regulator of appetite, energy use, and weight control. Sleep loss has been linked to increased risk for diabetes. Shorter sleep duration is associated with increased risk for being overweight.</p> <ul style="list-style-type: none"> • Increase the number of high school students who eat breakfast before school. • If tier 1 schools start too early, shifting more elementary students to tier 1 may have a negative impact on elementary student sleep and therefore, health. Pushing elementary schools into a later third tier may mean less outdoor playtime for elementary students in this tier. A and C move a greater number of elementary starts to the current earliest start of 7:50. This would have little impact on student health as it allows enough time for sleep. • May require a new breakfast distribution plan since breakfasts are prepared in high school kitchens and shipped to elementary schools.
<p>Transition Requirements:</p>	<p>Re-organize the distribution of breakfasts to schools if needed.</p>
<p>Majority & Minority Opinions:</p>	
<p>Other Jurisdictions Report:</p>	<p><u>ADDED SLEEP TIME:</u></p> <p>Minnesota: Statistically significant increase in total sleep time. This is true in both suburban Edina and urban Minneapolis districts.</p> <p>Wilton, Conn.: High school students got 35 minutes more sleep on average after 40-minute later start time change.</p> <p>Fayette, Ky.: Students in every grade from 6-12 averaged more sleep in the year after the change, up to 50 extra minutes in the 12th grade. The percent of high school students getting at least eight hours of sleep per night went from 21%-51%.</p> <p><u>ATTENDANCE/TARDINESS:</u></p> <p>Minnesota: Statistically significant improvement in attendance. Attendance improved for Black, Asian, Hispanic, and White students in grades 9-11. Tardies at three similar jurisdictions with different HS start times (8:30 am, 7:25 am and 7:15 am) were significantly lower due to oversleeping at the 8:30 am starting school.</p> <p>Edina, Minn: We have measured fewer absences and fewer students arriving late</p> <p>Wilton, Conn.: Did not see any change in attendance or tardiness.</p> <p>Brevard County, Fla.: Positive: Significant amount of tardies and absences were reduced from first periods</p> <p><u>DECREASED DAYTIME SLEEPINESS, FALLING ASLEEP DURING CLASS/HOMEWORK, ETC.</u></p> <p>Minnesota: The students whose high schools started at 8:30 a.m. or later reported statistically significant better scores on measures of daytime sleepiness, staying awake in class or while doing homework. Also fewer report feeling sleepy while taking a test.</p> <p>Actual scores were nearly identical for urban and suburban students despite the differences in their local economic conditions.</p>

	<p><u>IMPROVED PHYSICAL PERFORMANCE/SAFETY:</u></p> <p>Fayette, Ky: While the statewide rate of car crashes increased 8% the rate in Fayette County decreased by over 15% during the two years after Fayette County shifted to later start times. Fayette was previously one of the counties with the highest crash rates.</p> <p><u>SPORTS:</u></p> <p>Arlington: Two-thirds of students had the same or increased participation in extracurriculars. School staff able to accommodate extracurriculars, able to minimize impact.</p> <p>Wilton, Conn.: Sports was a serious concern upfront, but fears proved to be unfounded. Wilton saw increased sports participation and one of its best sports seasons ever.</p> <p><u>BREAKFAST:</u></p> <p>Minnesota: students in Edina said they ate breakfast more (CAREI case study)</p> <p>Fairfax: The majority (61.1%) of students do not have enough time to eat breakfast before going to school. Only 39.9% of students eat breakfast before school every day. 89.1% of students report that they would eat breakfast if they had time or if it were available during a block of time at school. (Stuart survey) Some schools provide a breakfast break between 1st and 2nd block (e.g., Langley, Oakton)</p> <p>Some middle school students may not be allowed into the building to get breakfast before school (TTF anecdotes).</p>
<p>Conclusion:</p>	<p>Later middle and high school start times would provide a substantial health benefit for teen students. Options A and C provide these benefits without disadvantage to elementary school students.</p>
<p>Brief Sleep Overview:</p>	<p>Studies show that not getting enough sleep or getting poor quality sleep on a regular basis increases the risk of having high blood pressure, heart disease, and other medical conditions.</p> <p>In addition, during sleep, your body produces valuable hormones. Deep sleep triggers more release of growth hormone, which fuels growth in children, and helps build muscle mass and repair cells and tissues in children and adults. Another type of hormone that increases during sleep works to fight various infections.</p> <p>Hormones released during sleep also affect how the body uses energy. Studies find that the less people sleep, the more likely they are to be overweight or obese, to develop diabetes, and to prefer eating foods that are high in calories and carbohydrates.” http://www.nhlbi.nih.gov/health/public/sleep/healthysleepfs.pdf, p. 2)</p> <p>Sleep is necessary for good health.</p>

Topic:	Student Mental Health															
Description:	<p>Secondary Students: 72,000 enrolled in FCPS grades 7-12. Mason District Middle Schools include 6th grade (Glasgow, Poe, Holmes)</p> <p>Summary of options:</p> <table border="1" data-bbox="412 415 1490 718"> <thead> <tr> <th></th> <th>High School</th> <th>Middle School</th> <th>Elementary School</th> </tr> </thead> <tbody> <tr> <td>Best Option</td> <td>3rd tier A, B,</td> <td>3rd tier C, D,</td> <td>1st/2nd tier A,C</td> </tr> <tr> <td>Worst Option</td> <td>1st tier <i>current</i></td> <td>1st tier E, <i>current</i></td> <td>Early 1st tier B, D Late 3rd tier E</td> </tr> </tbody> </table> <p>Based on mental health impact, Option A or C</p>					High School	Middle School	Elementary School	Best Option	3 rd tier A, B,	3 rd tier C, D,	1 st /2 nd tier A,C	Worst Option	1 st tier <i>current</i>	1 st tier E, <i>current</i>	Early 1 st tier B, D Late 3 rd tier E
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Potential Impact:	<p>Improve teen mental health, behavior, mood, and social interactions.</p> <p>Decrease visits to the school counselor, the school psychologists, and to the office for disciplinary action.</p> <p>Decrease depression, anxiety and other emotional problems.</p> <p>Decrease risk-taking behaviors, ADHD symptoms, such as impulse control, irritability and ability to concentrate.</p>															
Transition Requirements:	<p>None. May ease the burden on school counselors and psychologists.</p> <p>Fairfax County:</p> <p>2005 Youth Risk Survey shows 33.9% of Fairfax County 8th to 12th graders show classic signs of depression (“During the past 12 month felt so sad or hopeless almost every day for weeks or more in a row that they stopped doing some usual activities.”)</p> <p>15% of 8th-12th graders (including 18.9% of females) had considered suicide</p>															
Majority & Minority Opinions:																
Other comments:	<ol style="list-style-type: none"> 1. “Unlike adults, children who don’t get enough sleep at night typically become more active than normal during the day. They also show difficulty paying attention and behaving properly. Consequently, they may be misdiagnosed as having attention deficit hyperactivity.” (p. 31 NIH: Your Guide to Healthy Sleep.) 2. A large survey of 12- to 15-year-old subjects showed correlations between sleep problems, rebelliousness, depressive symptoms, and cigarette smoking.” (Hansen, et.al, 2005, Pediatrics, p. 1555-1561) 3. Sleep also affects mood. Insufficient sleep can make you irritable and is linked to poor behavior and trouble with relationships, especially among children and teens. People 															

	<p>who chronically lack sleep are also more likely to become depressed. (National Institutes of Health: http://www.nhlbi.nih.gov/health/public/sleep/healthysleepfs.pdf, p.2)</p>
<p>Other Models:</p>	<p>Minnesota: Statistically significant improvement in depression measures. This is true in both suburban Edina and urban Minneapolis districts.</p> <p>Minnesota: Statistically significant increase in total sleep time. This is true in both suburban Edina and urban Minneapolis districts.</p> <p>Minnesota: High School Principals report the mood of the students in the hallways, during passing times, was now calmer. They also cited that calmness as being evident in their student cafeterias during lunch.</p> <p>Minnesota: School counselors and nurses reported significantly fewer students were coming to them to report peer relationship problems and/or difficulties with their parents. They echoed the principals' perceptions that the overall mood in their schools was calmer, with the students' temperaments seeming much more even.</p> <p>Minnesota: Both urban and suburban parents noted that their high school children were "easier to live with." They found that they were having fewer confrontations with their children in the morning about getting out of bed and getting to school on time. They also commented that they were having more actual conversations with their teenage children in the morning, finding that they had new "connection time" with their child.</p>

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Sleep Research:	<p>Why do we need sleep? From NIH: http://www.ninds.nih.gov/disorders/brain_basics/understanding_sleep.htm#how_much</p> <p>“Although scientists are still trying to learn exactly why people need sleep, animal studies show that sleep is necessary for survival. For example, while rats normally live for two to three years, those deprived of REM sleep survive only about 5 weeks on average, and rats deprived of all sleep stages live only about 3 weeks. Sleep-deprived rats also develop abnormally low body temperatures and sores on their tail and paws. The sores may develop because the rats' immune systems become impaired. Some studies suggest that sleep deprivation affects the immune system in detrimental ways.</p> <p>Sleep appears necessary for our nervous systems to work properly. Too little sleep leaves us drowsy and unable to concentrate the next day. It also leads to impaired memory and physical performance and reduced ability to carry out math calculations. If sleep deprivation continues, hallucinations and mood swings may develop. Some experts believe sleep gives neurons used while we are awake a chance to shut down and repair themselves. Without sleep, neurons may become so depleted in energy or so polluted with byproducts of normal cellular activities that they begin to malfunction. Sleep also may give the brain a chance to exercise important neuronal connections that might otherwise deteriorate from lack of activity.</p> <p>Deep sleep coincides with the release of growth hormone in children and young adults. Many of the body's cells also show increased production and reduced breakdown of proteins during deep sleep. Since proteins are the building blocks needed for cell growth and for repair of damage from factors like stress and ultraviolet rays, deep sleep may truly be "beauty sleep." Activity in parts of the brain that control emotions, decision-making processes, and social interactions is drastically reduced during deep sleep, suggesting that this type of sleep may help people maintain optimal emotional and social functioning while they are awake. A study in rats also showed that certain nerve-signaling patterns which the rats generated during the day were repeated during deep sleep. This pattern repetition may help encode memories and improve learning.”</p> <p>“REM sleep stimulates the brain regions used in learning. This may be important for normal brain development during infancy, which would explain why infants spend much more time in REM sleep than adults (see <i>Sleep: A Dynamic Activity</i>). Like deep sleep, REM sleep is associated with increased production of proteins. One study found that REM sleep affects learning of certain mental skills. People taught a skill and then deprived of non-REM sleep could recall what they had learned after sleeping, while people deprived of REM sleep could not.”</p> <hr/> <p>From: http://www.helpguide.org/life/sleeping.htm</p> <p>“Sleep helps you to restore and rejuvenate many body functions:</p> <ul style="list-style-type: none">• Memory and learning – Sleep seems to organize memories, as well as help you to recover memories. After you learn something new, sleep may solidify the learning in your brain.• Mood enhancement and social behaviors - The parts of the brain that control emotions, decision-making, and social interactions slow down dramatically during sleep, allowing
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	<p>optimal performance when awake. REM sleep seems especially important for a good mood during the day. Tired people are often cranky and easily frustrated.</p> <ul style="list-style-type: none"> • Nervous system – Some sleep experts suggest that neurons used during the day repair themselves during sleep. When we experience sleep deprivation, neurons are unable to perform effectively, and the nervous system is impaired. • Immune system – Without adequate sleep, the immune system becomes weak, and the body becomes more vulnerable to infection and disease. • Growth and development – Growth hormones are released during sleep, and sleep is vital to proper physical and mental development. <p>The effects of sleep deprivation can be felt both physically and mentally. These may include:</p> <ul style="list-style-type: none"> • Poor decision-making, poor judgment, increased risk-taking • Poor performance in school, on the job, and in sports • Impaired driving performance and more car accidents • Increased incidence of obesity, diabetes, illness in general, high blood pressure, and heart disease • Impaired memory, concentration, and ability to learn • Physical impairment, poor coordination, delayed reaction time • Anxiety, depression, and other emotional problems • Magnification of the effects of alcohol on the body • Exacerbation of the symptoms of ADHD, such as impulse control, irritability, and lack of concentration”
<p>Children and Sleep</p>	<p><u>How do sleep needs change as students move through our school system?</u></p> <p>“Sleep needs ... change throughout the lifecycle. Newborns sleep between 16 and 18 hours a day, and children in preschool sleep between 10 and 12 hours a day. Schoolaged children and adolescents need at least 9 hours of sleep a night.</p> <p>The hormonal influences of puberty tend to shift adolescents’ biological clocks. As a result, teenagers are more likely to go to bed later than younger children and adults, and they tend to want to sleep later in the morning. This sleep–wake rhythm is contrary to the early-morning start times of many high schools and helps explain why most teenagers get an average of only 7–7.5 hours of sleep a night.” 1, p19 <u>Your Guide to Healthy Sleep, by the U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, National Institutes of Health.</u></p> <p>“Myth 9: Children who don’t get enough sleep at night will show signs of sleepiness during the day. Unlike adults, children who don’t get enough sleep at night typically become more active than normal during the day. They also show difficulty paying attention and behaving properly. Consequently, they may be misdiagnosed as having attention deficit hyperactivity. (p. 31 NIH: Your Guide to Healthy Sleep.)</p>

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Teens and Sleep

Teen sleep needs and patterns differ from those of younger children and adults. Understanding the differences is important in our deliberations about the bell schedule options.

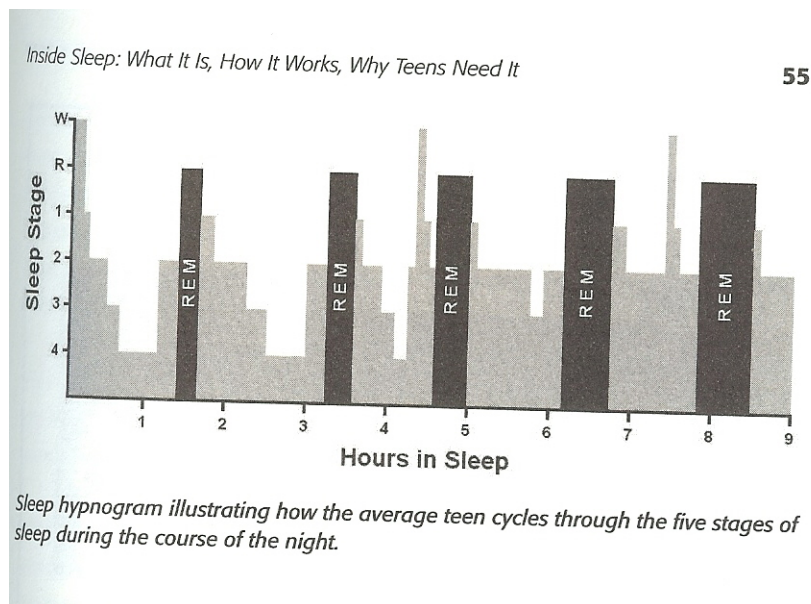
Basic Teen Sleep Information:

- Teens NEED about 9 hours of sleep per night. Most teens average 7.5 hours (with ¼ sleeping 6.5 hours or less)—(based on National data—local survey showed an average of less than 7 hours).
- To get the requisite 9.25 hours of sleep needed, teens who must get up at 6 a.m. should be in bed and asleep by 8:45! (And, remember, some of the buses are coming before 6 a.m., so)
- Because the teen body clock shifts to a later sleep cycle, 8:45 p.m. is often physically IMPOSSIBLE for teenagers. The hormone, melatonin, that makes people feel sleepy, peaks at a later time in the teen body and stays in their system until later in the morning—about 8 a.m. The tendency to be an early bird or a night owl is genetic, so there is a range of 'normal', but even the body clocks of early birds tend to shift later during adolescence. This 'phase' shift lasts throughout puberty.

Teen bodies and brains are still developing. They are NOT the same as adults. They cannot function well on the same amount of sleep as adults do nor should we expect them to.

- Teens with later start times do sleep more hours each night. Studies show that teens maintain similar bedtimes before and after a shift in high school start times, so later start times equate with more sleep for teens.

REM Sleep



(from: *Snooze or Lose*, 2006, Dr. Helene Emsellem)

The average teen cycles through the 5 stages of sleep during the course of a night. Note: This is for a whole night of uninterrupted sleep—9 hours. If a teen goes to sleep at 11 p.m. and wakes up at 6 a.m. for school, we have interrupted their natural sleep cycle at about 7 hours—(average in SLEEP's survey was 10:51 p.m.). This eliminates one of the longest periods of REM sleep.

Research for Student Health Impact Report 1.22.2008

	<p>REM sleep is non-negotiable. During REM, the psyche is restored, and recent evidence shows that REM sleep is also involved in the processing of information. REM sleep is also crucial for the anabolic, or energy building and healing, activities that take place in the brain and in the body. If you miss enough of it, your body tries to catch up by taking “micronaps” (or microsleeps) in the middle of the day—these very brief stretches of sleep may interrupt our consciousness in the middle of algebra or while we drive down the street. (<i>Snooze or Lose</i>, 2006, Dr. Helene Emsellem)</p> <p><i>Contributed by TTF member, Phyllis Payne, MPH:</i></p>
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BEDTIMES THAT WOULD PROMOTE ENOUGH SLEEP w/ each scenario
(used **worst case** transit and **best case** prep time; 20 min. arrival for HS and ES).

	BEDTIME (15 minutes to fall asleep)	WAKE TIME	Bus pick-up (worst case transit time: HS/MS=60 minutes) In-boundary	Arrival Time HS/MS: 10-25 minutes for MS/HS	START TIME
Teen Body Clock (9 hours)	11:00 pm	8:00 am	8:30 am	9:30 a.m.	9:50 a.m.
<i>current</i>	8:15 p.m.	5:30 am	6:00 a.m.	7:00 a.m.	7:20 a.m.
MS Option E	8:25 p.m.	5:40 am	6:10 a.m.	7:10 a.m.	7:30 a.m.
HS Option A MS Option C	10:15 p.m.	7:30 am	8:00 a.m.	9:00 a.m.	9:20 a.m.
HS Option B MS Option D	9:55 p.m.	7:10 am	7:40 a.m.	8:40 a.m.	9:00 a.m.
HS Option C MS Option A	9:30 p.m.	6:45 am	7:15 a.m.	8:15 a.m.	8:35 a.m.
HS Option D,E MS Option B	9:10 p.m.	6:25 am	6:55 a.m.	7:55 a.m.	8:15 a.m.
Elementary (need 9 or 10 hours)			transit ES=45 min.	Arrival ES: 5-25 minutes Used 20 minutes	
8:30 bedtime and 10 hours	8:30 p.m.	6:30 am	7:00	7:45	8:05 a.m.
Options B, D, (small # E)	7:55-8:55 p.m.	5:55 am	6:25 a.m.**	7:10 a.m.	7:30 a.m.
Options A, C (<i>current</i>)	8:15-9:15 pm	6:15 am	6:45 a.m.	7:30	7:50 a.m.

**civil twilight?? Will 7:30 be possible for enough schools?

<p>Sleep and Health, Metabolism, and Hormone Levels</p>	<p>“The combination of delayed circadian sleep phase and early start times at high schools in the United States causes adolescents to lose sleep during the school week. Chronic partial sleep loss has negative effects on neurocognitive performance, mood, and health. A large survey of 12- to 15-year-old subjects showed correlations between sleep problems, rebelliousness, depressive symptoms, and cigarette smoking.” (Hansen, et.al, 2005, Pediatrics, p. 1555-1561)</p> <p>Minnesota: Correlations were found between sleep deprivation and:</p> <ul style="list-style-type: none"> ▪ deficits in information processing and memory,
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Research for Student Health Impact Report 1.22.2008

	<ul style="list-style-type: none"> ▪ increased irritability, ▪ anxiety, ▪ depression, ▪ hyper-sexuality, ▪ decreased creativity, ▪ poor ability to handle complex tasks, ▪ increased potential for drug and alcohol use, and ▪ vulnerability for accidents. ▪ Sleep lag syndrome correlates with poorer grades. <p>(Patricia Velkoff's TTF summary--Kyla Wahlstrom, Ph.D., Center for Applied Research and Educational Improvement (CAREI), University of Minnesota (1998 & 2001))</p> <p>How does sleep affect metabolism and hormone levels?</p> <p>“Evidence is growing that sleep is a powerful regulator of appetite, energy use, and weight control. During sleep, the body’s production of the appetite suppressor <i>leptin</i> increases, and the appetite stimulant <i>ghrelin</i> decreases. Studies find that the less people sleep, the more likely they are to be overweight or obese and prefer eating foods that are higher in calories and carbohydrates. People who report an average total sleep time of 5 hours a night, for example, are much more likely to become obese compared to people who sleep 7–8 hours a night.</p> <p>A number of hormones released during sleep also control the body’s use of energy. A distinct rise and fall of blood sugar levels during sleep appears to be linked to sleep stage. Not getting enough sleep overall or enough of each stage of sleep disrupts this pattern. One study found that, when healthy young men slept only 4 hours a night for 6 nights in a row, their insulin and blood sugar levels mimicked those seen in people who were developing diabetes. Another study found that women who slept <i>less than 7 hours</i> a night were more likely to develop diabetes over time than those who slept between 7 and 8 hours a night.” (NIH: http://www.nhlbi.nih.gov/health/public/sleep/healthy_sleep.pdf, p. 21)</p>
<p>Sleep and Performance</p>	<p>FCPS: On the FCPS Athletic Programs: Health Information Page</p> <p>http://www.fcps.edu/supt/activities/athletics/health.htm</p> <p>Sleep (and athletes)</p> <p>Athletes are putting extra demands on their bodies and need adequate time to recover from a demanding schedule of school and sports training. A good night's sleep is essential for an athlete to succeed. Managing time is essential for success, in the classroom and in the sports world.</p> <p>http://www.fcps.edu/DIS/gt/faqsprocess.htm</p> <p>FCPS: From the Gifted and Talented Frequently Asked Questions page:</p> <p>Question: How can I prepare my child to take the tests? Can I see sample questions or practice sheets?</p> <p>Answer: Sample questions are practiced by students as part of the test preparation. Sample tests are not commercially available. The best test preparation is a good night's sleep and a healthy breakfast.</p> <p>http://pn.psychiatryonline.org/cgi/content/full/40/16/21</p>

Hans Van Dongen, Ph.D., and David Dinges, Ph.D., of the University of Pennsylvania, described studies assessing psychomotor vigilance performance after sleep deprivation. This skill involves reaction time and sustained attention. It is needed for not only sports performance but also everyday activities such as driving. It is highly sensitive to sleep loss, often experienced by athletes on road trips, particularly after they cross multiple time zones.

`Sleep Debt' Snowballs

Chronic sleep restriction, widespread among American adults, has serious adverse consequences for physical and mental performance, asserted sleep researcher William Dement, M.D., Ph.D., a professor of psychiatry at Stanford University. The most important aspect of the body's homeostatic regulation of sleep, he said, is that sleep loss is cumulative. "When total nightly sleep is reduced by exactly the same amount each night for several consecutive nights," he reported, "the tendency to fall asleep in the daytime becomes progressively stronger each day."

Dement calls this phenomenon "sleep debt." As he explains, the brain records as a debt every hour of sleep that is less than a person's nightly requirement. This snowballing debt may include an hour of sleep lost a week or month ago, as well as the hour lost last night, he speculated. A large sleep debt can be reduced only by extra sleep.

In a landmark 1994 National Institute of Mental Health study, subjects stayed in bed in the dark 14 hours every night for 28 consecutive nights. At first, they slept as long as 12 hours a night, suggesting they entered the study with sizeable sleep debts, Dement said. By the fourth week, their sleep stabilized at a nightly average of eight hours and 15 minutes—a figure interpreted to mean that most adults need this amount of sleep each night.

Does `Secret' Advantage Accrue?

When subjects slept until "slept out," their mood, energy level, and sense of well-being as indicated on daily questionnaires all improved. Athletes who obtain all the sleep they need, Dement suggested, might have a "secret" advantage over their competition.

The adage "practice makes perfect," long a truism of athletic training, has been modified by sleep and chronobiology studies in the past decade, according to Matthew Walker, Ph.D., and Robert Stickgold, Ph.D., of Harvard Medical School. After initial training, the human brain continues to learn in the absence of further practice, they said. The improvement develops in sleep.

These findings have a direct application to athletes' training schedules, they asserted. Athletes who train consistently across the day and then cut short their sleep to get up early the next morning for practice might shortchange their

Research for Student Health Impact Report 1.22.2008

	<p>brains of sleep-dependent consolidation and plasticity.</p> <p>http://www.sciencedaily.com/releases/2005/05/050511072041.htm</p> <p>Lack of sleep doesn't just affect athletics in teenagers. Studies repeatedly show that reaction time, vigilance, learning and alertness are impaired by insufficient sleep; so students with short nights and irregular sleep patterns perform poorly in school and in other aspects of their life and have a tendency for a depressed mood.</p>
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