

Sleep and Recovery

An applicable approach to a lifestyle of recovery and rest for athletes

LIFE OF AN OWL
PURE PERFORMANCE

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WHY SLEEP?

The top eight finalists in the Olympic 100-meter sprint in track and field were separated by 35 hundreths of one second. The top 10 finishers in the Olympic men's downhill in alpine skiing were separated by 53 hundreths of one second. TIME is important- even the time we spend asleep!

It has been said that little things make big things happen. This manual will shine a light on the absolute importance of sleep in relationship to training, training effect, recovery, and performance. Mental performance and physical performance have now been directly linked to sleep. Scientific studies indicate that humans' requirements for sleep are becoming increasingly compromised in our modern society. Technology, diet, unprecedented stress levels, social drug use, and our changing, complex world push all of us to cram more and more into the 24 hours we have in a day.

The recommendation of eight hours of sleep for humans is not recent. Before any scientific studies on sleep, there was "common knowledge" that sufficient sleep was critical to functions of daily life. We now understand that elite athletes who train multiple times per day need even more sleep to overcome the increased levels of stress on body systems.

The Human Performance Project advises many Olympic, NCAA, and professional teams. The sleep recommendation for athletes training at this level is nine hours and 15 minutes every night.

Hopefully this manual will help athletes, parents of athletes, coaches, and schools understand and take into consideration the effects of sleep on performance.

You can make excuses for why you don't or can't sleep, or you can sleep and ensure that all your time, effort, and energy are leading to the day you have dreamt about.

John Underwood, Director

Life of an Athlete Human Performance Project

SLEEP AS A PREDICTOR OF PERFORMANCE

The brain and central nervous system (CNS) play the most significant role in optimal physical performance. Every movement emanates from brain CNS impulses. For an elite athlete, the CNS controls every aspect of performance potential, including:

- Function of skills
- Biomechanical exact movements
- Firing sequences of muscles during activity
- Reflexes and reactions
- Countless interrelated physiological functions, including both the central system (heart and lungs), and the peripheral system (muscles).

The most significant factor in the brain and CNS functioning at an optimal level is that it is well rested.



Getting enough quality and quantity of sleep is near the top of the list for athlete recovery strategies. Minimal sleep (six hours or less) for four days has been shown to affect cognitive (thinking) function and mood.[1] All sport requires the ability to process information very quickly and react. Athletes also need to have high levels of focus and motivation. These functions will be impaired without adequate sleep. Minimal sleep can also decrease glucose metabolism, which fuels the brain and the body for mental and physical performance.[2] Immune function can also be impaired, which puts athletes at a greater risk for sickness.[3]

If an athlete pulls an "all-nighter", speed, power, and endurance capacities can decrease.[4]

When athletes fail to sleep enough (less than eight hours per night), the body fails to produce the adequate amount of testosterone, a hormone that allows athletes to build muscle and gain training effect from difficult workouts. Muscles are broken down during a workout; testosterone rebuilds them to be larger and stronger.[5] This is why athletes gain muscle when they lift weights or train correctly. This gain in muscle, also called training effect, is decreased without the testosterone to recover from intense physical activity.[5]

1- National Sleep Foundation.

2- Sharma, Sunil & Kavuru, Mani. Sleep and Metabolism: An Overview. 2010.

3- Knutson. Impact of sleep loss on glucose homeostasis and appetite regulation. 2007.

4- Mah, Cheri. Stanford Sleep Studies. 2011.

5- Van Cauter, Eve. Sleep lowers testosterone in healthy young men. Univ. of Chicago Medical Center. 2011

WHY SLEEP?

No one knows completely why we sleep, but without sleep, we cannot think as clearly or process information. In addition, we lose coordination and function of our muscles and muscle movement patterns. Sleep:

- Gives the body and brain time to recover
- Enables us to sort out daily events/information
- Helps build and rebuild muscle
- Allows organs to rest and recover
- Downloads critical movement patterns to brain circuitry and catalogs them in movement and pre-movement sectors of the brain[1]

1- National Sleep Foundation.



WORLD'S POWER TRAINING AUTHORITY, KEIJO HAKKINEN, ON RECOVERY:

» No matter what you may believe, the body is not a machine.

» If you are going to train very, very hard, of course you must rest very, very hard.

» If you train too hard on your easy days, soon you will be training too easy on your hard days.

EVIDENCE TO SUPPORT THE THEORY

Recent studies show that when athletes are allowed to sleep at increased levels, their mood, energy level, and performance levels increase.[4] Does the well-rested athlete have an advantage? It appears so. Sleep is now clearly a predictor of performance in skill-based sport.

A study of participants on the elite Stanford University NCAA men's and women's swimming teams illustrates the magnitude of sleep as a performance predictor.

For the first two weeks of the study, the students maintained their usual sleep-wake pattern. The athletes then extended their sleep to 10 hours per day. Athletic performance was assessed after each regularly scheduled swim practice. After obtaining extra sleep, athletes:

- Swam a 15-meter sprint 0.51 seconds faster
- Reacted 0.15 seconds quicker off the blocks
- Improved turn time by 0.10 seconds
- Increased number of kicks by 5.0 kicks

Many of these swimmers set personal, school, and NCAA records during this study.

"These results begin to elucidate the importance of sleep on athletic performance and, more importantly, how sleep is a significant factor in achieving peak performance. Athletes who get an extra amount of sleep are likely to improve their performance."

-Cheri Mah, Stanford Sleep Disorders Clinic and Research Laboratory

In an additional trial of the Stanford Study, researchers working with varsity NCAA female basketball players saw the entire study group run faster and make more shots during a period of time when they slept at least 10 hours per night as compared to a period of minimized sleep.[4]

*The Stanford Women's Basketball Team in this study went on to play for the NCAA Championship that year.

The researcher went on to state, "If people understood how much of a difference getting more sleep could make athletically, they'd incorporate it into their lives and not focus solely on nutrition and exercise."

4- Mah, Cheri. Stanford Sleep Studies. 2011.

WITHOUT SLEEP

THE EFFECTS OF IMPROPER SLEEP HABITS OVER TIME

Most athletes, parents, and coaches agree that a good night of sleep prior to competition is very important. What most people don't realize is that the body can actually store sleep deficits or reserves. This means that even if an athlete sleeps eight hours the night before a competition, but slept poorly the few nights before, her or she will not be rested. Performance will suffer due to the built-up sleep debt.

" Typically, many athletes accumulate a large sleep debt by not obtaining their individual sleep requirement each night, which can have detrimental effects on cognitive function, mood, and reaction time. These negative effects can be minimized or eliminated by prioritizing sleep in general and, more specifically, obtaining extra sleep to reduce one's sleep debt."

-Cheri Mah, Stanford Sleep Disorders Clinic and Research Lab



The brain and CNS builds up energy reserves, or deficits, over 1-3 days."

-Cheri Mah, Stanford Sleep Disorders Clinic and Research Laboratory

HORMONES, SLEEP, AND RECOVERY

SLEEP IS WHEN MUSCLE GROWTH OCCURS

Most athletes think that you build muscle when you train, lift, sprint, or jump. Your physical training or workout of the day is only a small part of a much larger growth process. Once your workout is over, your body begins to react to the stimulus of your workout and also to the damage you induced. This is the biological work now left up to your body systems.[6]

HOW DOES IT WORK?

When you do a workout, you cause micro-damage within muscle tissue and also damage the complex chains of proteins that are housed within muscle.[6]

The damaged areas are then flooded with chemicals called “reactive oxygen species.” These act like mini-explosions inside muscle fibers causing further damage to muscle tissue. This damage begins with your muscles becoming inflamed (inflammatory response). This is a natural response to the damage you inflicted to output the physical work.[6]

Your body registers the damage by a chemical messenger system. This feedback system from the muscles to the brain then initiates an immune and inflammatory response to deal with this damage. It is like your body doing damage control! Anti-inflammatory agents are sent to the sites of damage. These chemicals remove damaged cells and tissue and begin the process of repair and replacement.[6]

Your body also produces growth factors that form new muscle fiber and replace damaged proteins. Over time, this constant stress of training creates adaptation in muscle that increases muscle size.[6]

STRESS AND RECOVERY

Stress- whether it be relational, education-related, or physical- decreases the body's ability to recover, especially as an athlete. For every two hours of time an athlete spends awake and stressed, it takes one hour of sleep to recover.[7] This means that if an athlete is awake and under stress 16 hours a day, at least 8 hours of sleep are required for the CNS to recover from the overload.

6- Underwood, John. Human Performance Project Study. 2000.

7- Underwood, John. Human Performance Project Study. 2006.

SLEEP IS TRAINING TOO!

Much of this intra-muscular chemistry and synthesis takes place at night when you are sleeping. It is also well known that during early sleep (90-120 minutes after falling asleep), there is a huge release of human growth hormone (HGH). This is one of the most critical factors in growth.[8] You also need protein available in your system during this time frame. Casein protein- a protein isolate of milk- is a very good choice for this critical nutrient intake. It goes into your system very slowly all night and makes protein uptake available for repair and new mass. If you do not get sound early sleep you miss the release of HGH or greatly diminish it.

In addition, the body needs a set point for the release of melatonin (sleep hormone) so you can get sleepy enough to transition from wake state to deep sleep. A normal bedtime creates this set point as well as a set point for HGH release. One of the most significant events in human physiology over a 24 hour period is HGH night release. In many ways, it is when all your effort and training effect go into the bank! If you miss your normal sleep set point time by 90–120 minutes, you end up losing out on muscle repair, gains, and maintenance.[9] You are training hard, but not much will change in your condition. So your workout is just a small part of getting bigger, stronger or faster. Many of the most important responses happen while you sleep. Now you understand the process!

8- Van Cauter, Eve, Simultaneous stimulation of slow-wave sleep and growth hormone secretion by gamma-hydroxybutyrate in normal young men. 1997.

9- Van Cauter, Eve. Physiology of growth hormone secretion during sleep. 1996.



THE MAJORITY OF MUSCLE REPAIR AND GROWTH OCCURS DURING SLEEP WHEN HORMONES ARE RELEASED. WITHOUT ADEQUATE SLEEP, MUSCLE GAIN IS GREATLY DIMINISHED.[10]

10- Born, J. The significance of sleep onset and slow wave sleep for nocturnal release of growth hormone (GH) and cortisol. 1988.

THE IMPORTANCE OF TIMING

WHEN IS IT TIME TO TRAIN?

As the sun rises, our bodies experience increasing stress levels, which are connected to light. Our stress hormone (cortisol) levels also continue to rise and they generally peak around 9 AM. They continue to stay high until around noon and begin to drop in the afternoon and continue to do so until after the sun goes down. Cortisol levels drop, which allows for the release of the sleep hormone melatonin and increased levels of growth and repair hormones. Much of this repair and growth is in muscle.[11]



WHEN IS IT TIME TO SLEEP?

From sunset onwards our bodies are designed to wind down and will increase the production of growth and repair hormones. At around 10 PM we start our sleep and our body begins its physical repair.[12] This is a very important phase, especially for those who have been doing any kind of physical exercise throughout the day.

The disruption of our sleep patterns consequently disrupts our anabolic (build up)/ catabolic (tear down) processes. Between the times of 10 PM and 2 AM the body goes through a dramatic process of physical repair. Between roughly 2 AM and 6 AM, the body will go through a process of psychological repair. A disrupted sleep pattern will cause the cortisol to elevate and negatively affect the regenerative process.[13] So it is imperative that we get to bed around 10-11 PM and up between 6-7 AM.

11- Ranabir, S. Stress and hormones. 2011.

12- Natelson, BH. Temporal changes in growth hormone, cortisol, and glucose: relation to light onset behavior. American Journal of Physiology. 1975.

13- Van Cauter, Eve. Alterations of circadian rhythmicity and sleep in aging: endocrine consequences. 1998.

REM SLEEP

During REM sleep, the body shifts its resources to the task of repairing tissues and cells. It also begins to reboot CNS energy and function; this is an absolutely vital task after physical and mental stress occurs.[14] REM stands for Rapid Eye Movement because during this type of sleep, your mind is actually more active than at any other time of the day, including when engaged in physical activity and school exams or quizzes. Without REM, information cannot be transferred from short- to long-term memory.[15] This is why cramming for an exam, but failing to sleep, is an ineffective study method, especially in cumulative exam situations.

In a period of eight hours of sleep, the body will accumulate 1.5 to 2.5 hours of REM sleep.[14] This is necessary for recovery. When an athlete sleeps only four to five hours per night, he or she may only accumulate 40-54 minutes of REM sleep, less than half the required amount.[14] You wake up fatigued and optimal performance is questionable.

SOCIAL DRUGS AND SLEEP DISTURBANCES

Despite claims that alcohol and marijuana use improve sleep, the opposite is actually true. When depressant substances such as these are used, the transition to deep sleep is degraded. With THC (the active ingredient in marijuana) and alcohol in an athlete's system, REM sleep is decreased. This this makes it impossible for the brain to reboot energy levels and function, decreases blood flow to the brain, decreases reaction time, and decreases memory and recall ability including movement memory.[16] If you use alcohol, you will lose critical REM sleep. Alcohol disturbs normal REM and the more you drink, the less REM sleep you will get.

14- Brain Basics. National Institute of Health.

15- Diekelmann, S. The memory function of sleep. Nature Reviews Neuroscience. 2010.

16- Cohen-Zion, Mairay. Sleep Architecture in Adolescent Marijuana and Alcohol Users during Acute and Extended Abstinence. 2009.



DRUGS, ALCOHOL, AND SLEEP

Alcohol and marijuana have negative effects on sleep and sleep quality. These depressants suppress the release of melatonin, HGH, testosterone, and other body systems hormones.[16] Individuals who use these substances may experience relaxing effects initially, but their sleep is disturbed and they lose required REM sleep. Alcohol actually inhibits REM sleep as long as it is present in the bloodstream, while marijuana slows brain waves to sub-REM levels and impairs critical brain functions related to repair and recovery in the CNS.

16- Cohen-Zion, Mairay. Sleep Architecture in Adolescent Marijuana and Alcohol Users during Acute and Extended Abstinence. 2009.

17- Roehrs, Timothy. Sleep, Sleepiness, and Alcohol Use. 2001.



Marijuana (THC) slows the brain waves to a level of sub-REM sleep that does not allow the brain and CNS to achieve restorative processes.

Key Points[18, 19]:

- Marijuana decreases total REM sleep and REM sleep density.
- Using marijuana prior to sleep shortens sleep latency or decreases the time it takes to transition from full wakefulness to sleep.
- As it is fat soluble, it takes longer than a day for the active ingredient, THC, to leave your system. Disturbances in sleep patterns can remain for up to five days after use and normal sleep patterns may not return for one week or longer.
- Marijuana increases stage 4, or slow-wave sleep, in the first part of sleep. This is not restorative sleep.
- Restorative sleep: Because of the increase in slow-wave sleep and decrease in REM sleep, some marijuana users complain of memory impairment, not feeling rested, and not having dreams.

18- Schierenbeck, T. Effect of illicit recreational drugs upon sleep: cocaine, ecstasy and marijuana. 2008

19- Barratt, ES. The effects of marijuana on human sleep patterns. 1974.

SLEEP NUTRITION

Researchers from Columbia University recently monitored the brain activity of 25 men and women while they looked at pictures of various foods, and found that sleep-deprived participants had a significantly stronger neuronal response to the junk food.[20] In other words, the less you sleep, the more you crave sweet, greasy, salty food. Follow that with a 2010 study from the journal, *Sleep*, which found that poor diet choices only partially explained the connection between sleep deprivation and weight gain. The researchers concluded that while the extra calories hurt, there are ultimately other physiological processes that make sleep-deprived people pack on more fat.[21]

In addition, they found that some food groups do, in fact, assist with being well rested. Bananas, yogurt, milk, rice, grapefruit, kiwis, oats, turkey, cherries, walnuts, and almonds are known as sleep inducers. Each contains tryptophan or melatonin, which aids in falling asleep.[21] Use them to try improving quality of sleep, transition to deep sleep, daytime energy levels, and quality of training.



	Sleep & Pre-sleep Nutrition to Minimize Sleep Debt & Disorders
Practice Day	10 hrs sleep/ 40g casein protein before sleep
Pre-Game Day	10 hrs sleep/ 20g casein and cherries or banana before sleep
Game Day	9.5 hrs sleep
	Whey protein after game and casein protein before sleep
Recover Day	9.5 hrs sleep/ casein and cherries, almonds or walnuts before sleep
Practice Day	9 hrs sleep/ casein and milk before sleep

20- St. Onge, Marie-Pierre. Sleep restriction increases the neuronal response to unhealthy food in normal-weight individuals. Univ. of Columbia. 2014.

21- Greer, Stephanie. The impact of sleep deprivation on food desire in the human brain. 2013.

STIMULANTS AND DISTURBANCES TO SLEEP

CAFFEINE

Decades of research on caffeine indicates that if used properly, caffeine is effective for improving mental and physical performance. The equivalent of two standard cups of coffee or 100-200 mg. of caffeine is the optimal level. However, because caffeine impairs sleep, individuals should stop all caffeine consumption at least six hours prior to scheduled sleep.[22] Otherwise, sleep quality could be impaired without the person even being aware of it.

For athletes to make informed decisions about energy drink use, it is critical to raise awareness about the adverse effects consuming these drinks has on sleep and athletic performance.



ENERGY DRINKS

The popularity of energy drinks has risen dramatically over the past decade, and their use has particularly increased in teenage and young adult athletes.[23] Although energy drinks are frequently promoted to increase energy levels, more recently they have been marketed as sports beverages that can enhance performance. At minimal levels, caffeine does have a positive effect on mental and physical performance. In a Navy SEAL study, 100-200mg of caffeine (the equivalent of two standard cups of coffee) was shown to increase performance function.[22]

The popularity and promotion of these drinks has become common. Unfortunately, many young athletes quickly escalate their use of these drinks, thinking more is better. The use of stimulants also can have drawbacks. Overstimulation of the central nervous system can put an athlete in an over-aroused state, which can lead to declined performance. High level use of these drinks has been linked to serious side effects, including deaths, strokes and seizures.[24]

22- Lieberman, Harris R. Effects of caffeine, sleep loss, and stress on cognitive performance and mood during U.S. Navy SEAL training. 2002

23- National Council on Strength and Fitness.

24- American College of Sports Medicine/American Academy of Pediatrics.

ENERGY DRINKS CONTINUED

The majority of athletes using energy drinks or caffeine are using it to counteract fatigue. Mental stress, physical training, and lack of sleep create fatigue. Athletes often self-medicate with these beverages believing they will overcome pre-training or competition sensations of tiredness, lethargy, sleepiness, or lack of arousal. Most athletes have experienced preparing for a practice session or competition and having no pep or energy. Unfortunately, use of stimulants only gives you an energy spike and then you sink into a deeper deficit. Proper sleep is a much wiser choice.

Performance boosting effects of energy drinks are due to their caffeine content; however, most of these drinks also contain other stimulants and high levels of sugar. This can lead to disruptions in blood glucose levels.

Dependence on these drinks is mostly habitual, but there is clear evidence that caffeine can become addictive.[25]

The use of caffeine or energy drinks in early evening can create sleep disturbances for nighttime sleep, delay the transition from wake state to sleep state, and prevent or disturb early sleep.

The use of energy drinks to make up for sleep loss is not effective and has other negative effects on performance. Those who consistently use energy drinks are 1.8 times more likely to report morning sleepiness than those who do not use energy drinks.[26]

Caffeine, in the form of coffee or energy drinks, should never be used to compensate for lack of sleep. The replacement is unequal and causes future reliance on caffeine for poor sleep choices.

Best advice: Sleep and have all the energy you will ever need to train, recover, and perform on game day.



Overuse of caffeine or energy drinks limits the ability to maintain high-level mental or physical performance rather than increasing it.[26]

25- European Food Safety Authority.

26- Carskadon, Mary. Teens and Sleep. EP Bradley Hospital and Brown Medical School. 2013.

TECHNOLOGY AND SLEEP



A likely cause of sleep loss emerged in a recent study that determined today's teens use electronic devices an average of seven hours and 45 minutes per day.[27] Connecting the dots between sleep loss, sleep debt, and diminished performance is important for coaches, parents of athletes, and athletes. Lifestyle changes may need to be considered.

Blue light- the light used in virtually every cell phone, laptop, and TV screen- is detrimental to sleep. Exposure to this light severely decreases the body's output of melatonin, the hormone that naturally makes people feel drowsy. Exposure to blue light causes a disturbance of the CNS, which will put off melatonin production for 90 minutes and make falling asleep much more difficult.[28]

Blue light, which is in the frequency of light emitted by cell phones, TV, and computer screens, has been linked to ocular degeneration and high levels of eye irritation. More important, it decreases the output of melatonin (sleeping hormone), which delays the transition from wake state to sleep state.[29]

27- Kaiser Family Foundation Study. Generation M^2: Media in the Lives of 8- to 18-Year-Olds. 2010.

28- Gooley, Joshua J. Exposure to Room Light before Bedtime Suppresses Melatonin Onset and Shortens Melatonin Duration in Humans. Harvard Medical School. 2011.

29- Shaban, H. A2E and blue light in the retina: the paradigm of age-related macular degeneration. 2002.

TECHNOLOGY AND SLEEP (continued)

People who watch TV or use backlit devices within 90 minutes of falling asleep, or fall asleep with the TV on, set themselves up for sleep disturbances that result in issues related to decreased mental and physical performance capacities.[28] Many of those people will adjust to functioning on less quality sleep, but over time will become tired callused.

TEENS AND TECHNOLOGY TIPS:

- No LCD, blue light, or backlit devices within 90 minutes prior to sleep.
- Sleep in a dark room without Netflix or cell phones lighting up the room
- Create a "digital sunset," and turn it all off. Set a time and turn off technology!
- Use glasses to filter out blue light if up late using devices
- Use blue light blocking apps on phones and computers/laptop



28- Gooley, Joshua J. Exposure to Room Light before Bedtime Suppresses Melatonin Onset and Shortens Melatonin Duration in Humans. Harvard Medical School. 2011.

"STUDENT" ATHLETE

Too little sleep impairs information acquisition- that is, the ability to process information input. In addition, lack of sleep impairs information retrieval, or the ability to access learned information.[26]

When exhausted, the central nervous system and brain are compromised in their ability to transmit impulses, which greatly affects the brain's cognitive processes. Processing, evaluation, determination, focus, visual tracking, and many skill-related functions are compromised immediately. Blood flow to an exhausted brain is greatly decreased. The confusion and physical inability that exists the day after pulling an all-nighter may be explained simply from this lack of blood flow.

AVOID PULLING ALL-NIGHTERS: After two weeks of sleeping fewer than six hours per night, students perform as poorly as someone who hasn't slept in 48 hours.[30] This is why students who stay up all night studying actually have lower GPAs on average than those who get adequate rest.

Students who pull all-nighters: **2.95 GPA**

Students who don't pull all-nighters: **3.20 GPA**

When it comes to learning, too little sleep leads to higher levels of distractibility, lack of focus, inattentiveness, and lower levels of motivation.[26] In the same way that reaction time as an athlete decreases with lack of sleep, the ability to quickly process information on an exam decreases when mentally fatigued from lack of sleep.

Sleeping strengthens the neural connections that form our memories. The hippocampus is the part of the brain where memory is stored; during sleep, the hippocampus is restored, leading to better memory and recall.[30]

In addition, for the average person, reaction to a visual stimulus is .186 seconds. When fatigued, this reaction time increases to .246 seconds. In an academic setting, as well as athletic setting, this can be extremely detrimental to performance.[31]

26- Carskadon, Mary. Teens and Sleep. EP Bradley Hospital and Brown Medical School. 2013.

30- Kurth, Salome. Mapping of Cortical Activity in the First Two Decades of Life: A High-Density Sleep Electroencephalogram Study. 2010.

31- Underwood, John. Human Performance Project Study. 2011.

SLEEP AND SOCIAL BEHAVIOR

In a 12-month period, 30 percent of the American population is diagnosed with a mental illness; half of all mental illness starts by age 14.[32] Teens who experience sleep issues are predicted to have worse future mental health than teens who sleep an optimum amount (greater than eight hours per night). In addition, insomnia and depression tend to co-occur. Insomnia is an independent predictor of suicidal behavior in depressed patients.[32] In addition, people who self-identify as "night-owls" tend to have more depression, anxiety, emotional instability, and aggressive behavior than those who sleep at normal hours.[33]

Neurotransmitters are our "mood modulators." If you are sleep-deprived, mood swings, it is common to experience mood swings, erratic behaviors, and irritability. Key neurotransmitters are replenished during sleep.



ADEQUATE SLEEP DECREASES DEPRESSION:

When you go to sleep, and whenever your body is relaxed, the hormones melatonin and serotonin are released.[33] These hormones help eliminate stress hormones, which can make you happier. A lack of sleep forces your body to release stress hormones so it can function in a "less-than-ideal" situation. Adequate quality sleep completely balances the hormones, making the body happier and both physically and emotionally stronger.[33]

32- The National Institute of Mental Health (NIMH).

33- Harvey, Allison. Adolescent Depression and Sleep. University of California, Berkeley. 2013.

CREATING YOUR HEALTHY SLEEP SCHEDULE

7:00 AM	**Wake up:** Set a consistent time to wake each morning so your body's clock will begin to naturally wake you up.
2:30 PM	**Nap:** If you're feeling sleep deprived, a 30-minute afternoon nap is a great way to overcome sleep debt. Set your alarm so you don't transition into deep sleep.
6:00 PM	**No more sugar:** Eliminating sugar after dinner aids in the body's ability to fall asleep. In addition, avoid caffeine or spicy foods.
8:30 PM	**Technology sunset:** Shut off/ put away all electronics 90 minutes before bed (including laptop, cell phone and TV) to avoid blue light.
9:00 PM	**Eat a banana:** Foods like bananas, cherries, and walnuts help induce sleepiness.
9:00 PM	**Avoid physical activity:** Physical activity stimulates the body and mind, which makes sleep more difficult.
9:30 PM	**Pre-sleep protein**: Drink 8-10 oz. of liquid, casein protein before sleep to promote muscle repair and to build muscle during sleep: the best time to build muscle!
10:00 PM	**Get to sleep:** Sleep in a completely dark room, with a temperature between 68-72 degrees.

Are you doing things off the field that ruin what you do on the field?

Lifestyle will strike back!

KEY POINTS FOR HEALTHY SLEEP

- No drug use, including alcohol and marijuana
- Drink plenty of water
- Don't use stimulants prior to sleep in an attempt to overcome deficits of sleep debt
- Don't go to bed on a full or an empty stomach
- Maintain a consistent schedule
- Consider sleep a part of the "training regimen"





To imagine that sleep is not a critical factor in the readiness to train or compete would be foolish. It all comes down to understanding optimal performance.

EFFECTS OF SLEEP DEBT

- PERCEIVED EXERTION INCREASES 17-19% AFTER 30 HOURS WITHOUT SLEEP[4]
- TWO DAYS OF SLEEP RESTRICTION CAN LEAD TO A 3X INCREASE IN LAPSES OF ATTENTION AND REACTIVITY[4]
- DECREASE OF 1.5 HOURS OF NORMAL SLEEP TIME CAN RESULT IN 30% DROP IN ALERTNESS[4]
- SLEEP LOSS REDUCES TIME TO EXHAUSTION DURING EXERCISE BY 11%[4]
- ATHLETES BUILD UP SLEEP RESERVES OR DEFICITS OVER 1-3 DAYS[4]
- SLEEP IMPROVES SPLIT-SECOND DECISION MAKING ABILITIES BY 4.3%[4]

Fatigue is a state when energy loss is exceeds energy availability. Sleep loss clearly increases this phenomenon. It seems very likely that the processes of anabolic (increasing a capacity) and catabolic (decreasing a capacity) in muscle processes are also greatly involved. An individual who loses sleep and has no requirements for physical activity faces much less trauma than an athlete, who must train or compete despite the fatigue. These energy drains may be a result of insufficient anabolic function related to insufficient sleep.

When exhausted, blood flow to the brain actually decreases. Blood flow is required for pre-movement, movement, and balance. When the brain doesn't work, the body doesn't work.[34]



4- Mah, Cheri. Stanford Sleep Studies. 2011.

34- The Journal of American Psychiatry/American Psychiatric Association.



These are given suggestions for sleep that can help you have more energy and be a better athlete.

The rest is up to you! Unlock your potential with the

Sleep and Recovery Manual.











