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Sleeping for Performance

How much does sleep affect your athletic performance?

Martin Rawls-Meehan explains the science behind getting enough rest.

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Think back for a moment to what your life was like before you were introduced to CrossFit.

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What did you eat? How did you work out? How did you measure your fitness from one week to the next?

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If you're like most of us, you probably thought about what you ate a bit. Maybe your diet was based loosely on some nutritional tips you'd picked up along the way, but it probably wasn't based on sound science. The same probably can be said for how you worked out. You used

the machines that were available and probably picked up workout tips from friends, coaches, magazines, etc. Chances are you never did a squat snatch before CrossFit, nor did you stay away from bread and grains in favor of lean meat, nuts, seeds and veggies. Now compare your level of fitness and health now to then. Big difference, right?

CrossFit's workout methodology is based on science. Like science, it is continually evolving. Similarly, Paleo nutrition principles are based on science and an evolutionary framework. Workout methodology and nutrition are two essential elements of fitness and general well-being. When you follow scientifically sound principles that are consistently tested, proven and refined within a large community of experimenters, you are going to see strong results. For many of us, the results have been quite amazing.

Sleep: Another Key to Fitness

How much do you think about how well you sleep? How important do you think sleep is to your CrossFit performance? What about your general health?



Stay up too late watching a Real Housewives of Orange County marathon, and it will haunt you during your WOD.

If you're like most, you probably don't think much about how well you sleep. All know they feel better when they sleep more, so you probably want to sleep well and are upset when you don't sleep as much as you want.

Exercise, nutrition and sleep make a virtuous circle comprising the three essential elements of fitness.

But getting good sleep is more than just sleeping more, and it does a whole lot more for you than make you feel a little better during the day. Good sleep is one of the most important elements of health maintenance, as well as athletic performance and improvement.

Like the science of nutrition and exercise, sleep science has been undergoing a revolution over the last few decades. Researchers are beginning to understand how sleep impacts our performance over the short term and long term.

Just how much can sleep impact you as an athlete? Consider the following:

- Researchers conducted a study of over 30 years of National Football League game data and demonstrated that teams that traveled three time zones to play night games experienced disrupted sleep and exercise schedules and were 67 percent more likely to lose even when the point spread was factored in (1).
- Studies have shown that athletes who consistently get around 10 hours of sleep per night show marked improvement in strength, speed, agility and reaction time (2).
- Athletes who get around 10 hours of sleep demonstrate significantly better muscle memory for movements learned the day before (3).

- People who don't get enough sleep are more prone to diabetes, obesity, hypertension and other various cardiometabolic and endocrine disorders (4).
- Researchers have shown that just a few days of little to no sleep impact the body's insulin sensitivity by more than 25 percent in normal, healthy people. This essentially brings them to a pre-diabetic state—the equivalent of gaining 18 to 30 lb. (4).
- Military research shows that sleep-deprived soldiers demonstrate decreased ability in marksmanship, judgment and overall performance in mental and physical tasks (5).
- People who don't sleep enough are often more irritable because the brain works differently when we are sleep deprived (3). An irritable athlete usually is not a positive athlete. Thus, sleep deprivation can rob you of the mental edge necessary for success.

To see significant improvements in performance, we have to train right and eat right. But without enough sleep, that work is wasted and could even be harmful for a body so sleep deprived it can't heal itself. Exercise, nutrition and sleep make a virtuous circle comprising the three essential elements of fitness. You can't achieve your body's maximum potential in athletic performance or be at peak levels of health unless you pay attention and work hard at all elements.

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The good news is that—like nutrition has Paleo and exercise has CrossFit—there are ways for you to improve your sleeping habits and realize your maximum potential as an athlete. But before we get into that, let's delve a little deeper into the science behind why sleep is important to health and athletic performance.

The Four Stages of Sleep

Sleep occurs in cycles throughout the night, with each sleep cycle taking approximately 90 minutes. Our body's biological clock controls all of this, and technically the sleep cycle is one of our many circadian rhythms. There are four identifiable stages in each sleep cycle; each has a significant impact on athletic performance and improvement.

- Stage 1: Lasts for about 20 minutes and is the stage where the heart rate slows and the body temperature begins to cool. Brain activity during this time shows up in "spindles," which are essentially tightly packed brain-wave patterns. These spindles have been linked to muscle memory and internalizing movements learned during the day (3,6).
- Stages 2 and 3: Stage 2 is the transition from light to deep sleep, and Stage 3 is complete deep sleep where the body produces very slow delta waves. This stage of sleep is often called "slow-wave sleep," or SWS. During this stage, human growth hormone, or HGH, is released and blood rushes from the brain to the muscles to initiate recovery and re-energize your body (3,4). Up to 70 percent of the body's daily production of HGH might occur during this state (7). Additionally, elements of the parasympathetic nervous system are triggered while the sympathetic nervous system is suppressed. All this supports immune function and normal glucose metabolism during the day (4).
- Stage 4: Otherwise known as "rapid-eye-movement sleep," or REM. This is the stage where we dream. Our arms and legs are paralyzed, and this is the only stage of sleep where the body doesn't actually move. This stage of sleep is associated with learning and memory retention, where the hippocampus transfers and filters the day's information to the neocortex (3), kind of like a computer uploading information and clearing its RAM onto a hard drive.

During the first few cycles, deep-sleep periods are longer and REM periods are shorter, but after the fourth cycle, REM periods become much longer and the deep-sleep phases much shorter.

Important Benefits of Slow-Wave Sleep

- Maximum natural production of HGH: This is a hormone that the body naturally produces. If you want to get stronger and faster, then you need your body to maximize natural production. You only can do this by getting adequate amounts of deep sleep. While it is true that most of the HGH released during the night is released in the first few sleep cycles, research has shown that sleep deprivation can throw this off and eliminate the HGH bursts we get in the first few cycles of sleep (3).
- Suppression of cortisol production: High levels of cortisol in the night create insulin resistance in the morning, and it is linked to cardiometabolic disorders such as Type 2 diabetes, as well as memory loss and cognitive impairment (3,7). Additionally, if you are a Paleo and/or Zone practitioner, it will significantly throw off your body's ability to process glucose throughout the day.
- Suppression of sympathetic nervous system in favor of parasympathetic nervous system: The sympathetic nervous system is what is activated under stress, whereas the parasympathetic nervous system is what the body activates to recover and recuperate (4).
- Release of prolactin, which has been shown to be connected to proper immune system function (4).

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Important Benefits of REM Sleep and Stage 1 Sleep

Spindles are critical to the brain's ability to transfer learned muscle movements to permanent memory (3,6).

It is the period where the hippocampus transfers information to the neocortex, allowing us to recall information, motor skills and other important information when we wake up (3). Without enough REM sleep, we can't remember and internalize important movements. Therefore, athletes in sports that require highly skilled movements—like the snatch, clean and jerk, and muscle-up, where fractions of an inch are the difference between success and failure—need enough REM sleep to maintain and improve performance.

Insufficient REM sleep has a negative impact on the brain as a whole and causes it to function abnormally. As a consequence, the hippocampus works less and other parts of the brain, like the amygdala, work more. Because the amygdala is associated with rage and aggression, sleep-deprived people often are more irritable and moody (3). Because a positive attitude is so important to a sport like CrossFit, athletes simply can't afford lapses that will cause them to lose their positive edge.

Steps to Sleeping for Performance

Make a decision here and now that sleep is an integral part of your training and that you are going to take it as seriously as exercise and nutrition.

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Block out at least nine hours a day for sleep—ideally 10 hours. You might not actually sleep that long, but that should be your goal. We often fall short of what we set out to do, so if you set out to do nine, you might only get eight, which basically is the minimum for an athlete. That said,



“You were up late reading CrossFit Journal articles, weren't you?”

everyone has unique sleep needs. If you think you need nine and half hours a night to perform at a peak level, then find that out. How do you know if you are sleeping enough? If you consistently wake up feeling good without an alarm clock, that is a strong sign you're close to where you need to be in terms of sleep.

The Do's

- Eat better. Better nutrition helps sleep. In turn, sleep helps metabolism. It's a cycle. To maximize the benefits of nutrition and sleep, you need to do both well.
- Give up smoking or any other form of tobacco (3).
- Perform WODs in the late afternoon or early evening, finishing the workout before 7:30 p.m., if possible. Your circadian rhythms prime your body for peak performance during this time. In contrast, early morning and late night are the circadian-rhythm low points for performance. If you do multiple workouts in a day, try to put the hardest one in the late afternoon or early evening and avoid doing any workouts too early or too late in the day.
- When doing particularly hard workouts during a day or the course of a week or month, be sure to get extra sleep during that time to maximize your gains.
- Keep your room dark, quiet and cool at night. Light, hot temperatures and noise can disrupt sleep patterns and cause you to sleep poorly.



Sleeping like a fit, well-tanned baby.

The Don'ts

- Avoid caffeine after the early afternoon (3,8). Caffeine can keep you up and shorten the length of time you sleep (9).
- Do not eat a big meal or have alcohol within 3 hours of going to bed (3,8).
- Avoid taking long naps during the day. Sometimes it's unavoidable, but try to keep them under 30 minutes to avoid throwing off your biological clock. Taking long naps can have a similar effect on the body as jet lag. If you need to take a nap that is longer than 30 minutes, try to get in at least one full sleep cycle—about 90 minutes—to avoid feeling groggy.
- Don't wake up early to do a workout and keep yourself from getting enough sleep. You are moving backward, not forward. The body needs sleep like it needs water. You wouldn't deprive yourself of water so you could work out, right? Of course not; it would be counterproductive.
- Do not watch anything on an electronic screen right before bed. These screens emit blue light, which essentially inhibits production of melatonin and prevents sleep. If you need to watch TV, etc., before bed, then buy a pair of blue-light-blocking sunglasses for a few dollars and wear them while watching. You'll notice the difference in sleepiness right away.

Sleep Systems

For a good night's rest, you need a good sleep system. Full disclosure: I helped found a company that sells sleep systems.

You spend one-third of your life in bed, so it's worth it to get the right system. Disruption of sleep—be it tossing and turning or actually waking up—throws off your sleep patterns and deprives you of the true benefits of sleep. Many people wake up and toss and turn because they sleep on an uncomfortable surface that cuts off circulation to their muscles during the night.

Here's what I recommend:

- A mattress made primarily of natural materials. Synthetics, including urethane and memory foam, might emit harmful volatile organic compounds, or VOCs, that create an unhealthy environment around the bed.
- A mattress that creates airflow from top to bottom. Airflow keeps you cool at night. A cool sleeping environment helps you sleep better and undisturbed.
- A mattress with softness/firmness you can customize.
- A foundation with head and foot adjustability to allow for relaxation and a comfortable sleeping position. Ideally, the foundation would have a massage feature to help break up lactic-acid build-up and improve circulation while you are resting.
- A pillow that is as soft/firm and thick/thin as you like it to be.

Sleep Well, Train Hard

At this point you probably are worrying you aren't reaching your full potential because you're not sleeping enough. That's a good thing because it's probably true. But keep in mind that sleeping better isn't difficult; it just takes some effort and discipline. Yeah, I know: 10 hours sounds like a lot of sleep. Trust me, as an athlete you probably need it if you want to maximize your gains. The good news is it's the easiest way to see significant improvements in performance. So by just following some of the above tips, you should be well on your way to better health and better fitness.

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