

THE EFFECTS OF SLEEP ON SPORT PERFORMANCE

Richard Ebri*, Adam Bouchabchoub* and Lauren A. Fowler

School of Medicine, Wake Forest University, Winston-Salem, NC, United States

YOUNG REVIEWERS:



JACOB

AGE: 12



NEIL

AGE: 8



PRANJAL

AGE: 13

Sleep is an important life function that impacts many things—especially recovery from sports. Recovery is controlled by chemicals called hormones, which are released by the brain to help the body in various ways. A hormone called melatonin controls sleep and the immune system, helping to keep us healthy. Growth and sex hormones also help recovery and are active during deep sleep. While sleep is important for everyone, it is especially important for athletes, to help them recover from training as well as prepare for future training and competitions. Studies have shown that poor sleep is related to muscle and bone injuries and worse performance of certain movements. Sleep also affects accuracy in sports like darts, tennis, and basketball. Recommendations for sleep differ for younger and older people. Children and adolescents need 8–10 h of sleep, while adults need 7–9 h.

RECOVERY

A return to a healthy state.

HORMONES

Chemicals in the body that can do a wide variety of important functions.

MELATONIN

A hormone released by the brain that helps you fall asleep.

CIRCADIAN RHYTHM

The body's 24-hour internal clock that controls cycles of awakensness and sleep.

FINE MOTOR SKILLS

Skills that use tiny muscles in our hands and feet to ensure precision.

Figure 1

Writing on paper and typing on a computer are examples of fine motor skills (image created by Richard Ebri).

WHY IS SLEEP IMPORTANT?

Sleep is incredibly important, no matter your age. One huge benefit of sleep is **recovery** from physical activity, from Marshall and Turner (2016), which is encouraged via substances called **hormones**. Hormones are chemical messengers in our bodies that help control our organs. One hormone, **melatonin**, regulates the **circadian rhythm**, influencing when and how long we sleep and are awake. Melatonin also helps support the immune system and leads to the release of other important hormones. During deep sleep, growth hormones and sex hormones are released. These hormones are important for muscle building and repair as well as bone growth. Deeper sleep also leads to higher rates of blood flow, which helps with injury recovery [1].

HOW DOES SLEEP IMPACT SPORTS PERFORMANCE?

Shooting a basketball, throwing a football, swinging a tennis racket—what do these things have in common? Skill! Sports require a lot of skill and sometimes precision, which normally takes a lot of focus and brain power. Examples of precision include hitting a bullseye in archery and sinking a putt in golf. Skills that involve a connection between wrist muscles, hand muscles, and the brain are called **fine motor skills**. Some examples of everyday fine motor skills include writing with a pen or pencil or typing on a keyboard (Figure 1). Examples of fine motor skills in sports include performing a putt in golf, controlling a soccer ball with a delicate touch, and holding a baseball bat correctly. Sleep can affect fine motor skills, and a good night's rest can actually enhance fine motor skills [2].



Figure 1

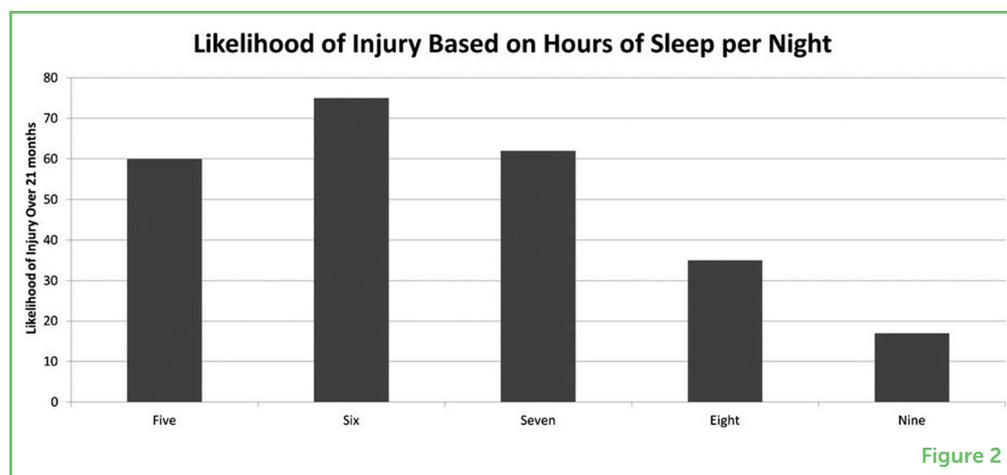
Sleep is so important that it can affect your performance in sports and can even affect your chances of winning. Athletes who reported a good night's sleep placed higher in a tournament than athletes who reported a poor night's sleep [3]. The problem with sleeping and sports is that the nervousness many athletes feel before high-level

competitions makes it harder for some athletes to sleep. In a study about pre-competition sleeping, 70 percent of participants reported low-quality sleep [3] the night before the competition compared to a normal night.

A good night's sleep can also increase accuracy. College basketball players, who increased their sleep from 6.6 to 8.5 h, showed an increase in three-point and free-throw accuracy by 9 percent [4]. These examples show the importance of sleep for competition and how it can affect performance, but sleep can also affect injury. To be able to play sports regularly, it is important to avoid and prevent injuries. Sleep and preventing injury go hand in hand—less sleep increases the potential for injury (Figure 2) and results in a slower recovery time.

Figure 2

This graph shows the percentage of injuries sustained over a period of 21 months based on the number of hours of sleep per night. You can see that children who get more sleep have a smaller chance of injury [5].



Finally, sleep can also improve learning ability. Learning ability is important for sports because memorizing plays or new moves is a part of almost every sport. You probably know that it is also important to have a rested mind for learning in school!

HOW MUCH SLEEP IS RECOMMENDED?

Now you know that getting the required amount of sleep each night helps with performance, injury recovery, injury prevention, and learning ability [6]. The recommended amount of sleep for adults is different from the recommended amount of sleep for adolescents and children. Adolescents and children need more sleep, around 8–10 h per night, for growth and rest. Adults need less sleep—only around 7–9 h a night [3]. According to sports medicine reports, accumulated **sleep debt** throughout the school week leads to worse reaction times by the end of the week. Sleep debt is the hours you owe your body if you do not get the required hours of sleep every night (Figure 3). So, if you need 8 h a night and you only get 7 h, you are 1 h in sleep debt [4]. Naps or sleeping longer can help recover sleep debt.

SLEEP DEBT

The amount of sleep we owe our bodies to reach the required nightly hours.

Recovering sleep debt is important to keeping sports performance at an all-time high.

Figure 3

This is a formula to calculate sleep debt. If we subtract the amount of sleep we get from the amount of sleep we need, the result is our sleep debt.

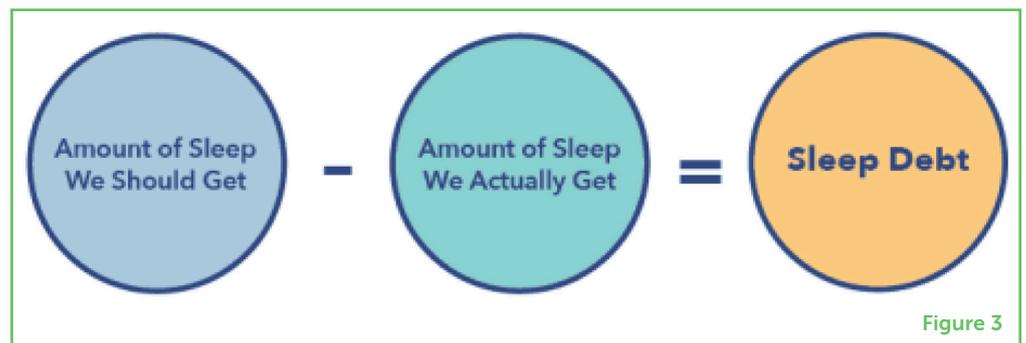


Figure 3

CONCLUSION

Hopefully, you now understand the important role that sleep plays in our overall health and athletic performance. It helps with recovery by using our hormones, improving our fine motor skill control, increasing precision, and decreasing the risk of injury. Athletes, both children and adults, benefit from quality sleep as it promotes muscle repair, learning ability, and overall performance. However, despite these facts, many athletes struggle with pre-competition sleep due to anxiety and nerves. Future research could focus on ways to manage pre-competition anxiety and develop personalized sleep routines based on individuals' needs and their sport's demands.

For young athletes, it can be tough getting the right amount of sleep, but some tips include having a consistent bedtime, limiting screen time at least an hour before bedtime, and creating a regular nighttime routine. By sleeping the recommended hours, young athletes can recover better, stay healthy, and perform at their highest level.

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YOUNG REVIEWERS

JACOB, AGE: 12

I am a 12-year-old boy who loves to learn and gain knowledge. Some of my hobbies include playing sports such as basketball and baseball. I am always up for a challenge while having a good time. I really enjoy solving problems and being patient in the process. I also enjoy playing video games with my friends. Overall I am enjoying life and looking forward to what is to come next.

NEIL, AGE: 8

I enjoy being active, especially when it comes to gymnastics and trying new sports. When I am not moving around, I like to get creative with ceramics—I am pretty good at shaping and painting my own little masterpieces. I also have a sister and a brother, and we always find fun things to do together. I dream of becoming a basketball player one day.





PRANJAL, AGE: 13

I am Pranjali, I have a curious and inquisitive mind. I like nature, science, writing stories, reading books and writing computer programs. I love exploring science and computers in my leisure time. Recently, I got my first chance to review a research paper and I enjoyed doing so. It was good to read others' opinion on a life-aspect. Looking forward to read and review more such research papers.

AUTHORS



RICHARD EBRI

I am a current Master's student in the Biomedical Science program at the Wake Forest School of Medicine. I graduated from the University of North Carolina at Chapel Hill in May 2023. I plan to attend medical school in the near future, and I hope to be involved in more fun research like this soon! *richebri@gmail.com



ADAM BOUCHABCHOUB

My name is Adam Bouchabchoub. I am a Master's student at the Wake Forest School of Medicine. I am currently getting my Master's in Biomedical Science. I am originally from Orlando, Florida but I moved to North Carolina when I was younger. I also did research in an orthopedic lab with knee tissue! *abouchab@wakehealth.edu



LAUREN A. FOWLER

My research focuses on how we change (physiologically, cognitively, behaviorally, and emotionally) in relation to our biological rhythms. As PI on several university, NSF, and NIH grants, and consultant for the Air Force Research Laboratories Human Effectiveness Directorate, I have established myself as a leader in the field of circadian desynchronization and fatigue, assessing how it affects our thoughts, our emotions, our perceptions, and our behavior. Much of my work has focused on physiological variables related to circadian desynchronization, however, my recent research has expanded to include how fatigue affects healthcare worker cognition, empathy, burnout, and perceptions, especially in emergency medical workers (ED physicians and EMTs).