

Does Banking Sleep Before Sleep Deprivation Improve Physical Performance?

By Pierrick J. Arnal, Ph.D., and Guillaume Y. Millet, Ph.D.

Reduced sleep duration and deteriorated sleep quality are increasingly frequent in modern society and probably linked to changes in the socioeconomic environment (*e.g.*, stress at work and shift work) and lifestyle (*e.g.*, physical inactivity and intensive use of electronic devices). Accumulating evidence from both observational and experimental research suggests that acute and chronic sleep restriction may impair cognitive and physical functions, as well as endocrine and metabolism regulation.

Sleep deprivation has become an increasingly prevalent social behavior. To limit these adverse effects on performance and health, several strategies have been used before, during and after the period of sleep deprivation. Numerous studies have been performed with pharmacological/nutritional (*e.g.*, caffeine) or behavioral (*e.g.*, luminotherapy or naps) interventions to counteract the deleterious effects of sleep deprivation or restriction.

In our study, published in the [August 2016 issue of MSSE®](#), we examined the effects of six nights of sleep extension, *i.e.*, an increase of sleep duration above the sleep need during a determined period, on motor performance and associated neuromuscular function— before and after one night of total sleep deprivation. Our subjects were 12 healthy men, nonchronically sleep-restricted, and we employed a randomized crossover study design. The results showed that staying an additional two hours in bed each night over six days allowed the achievement of an average of 75 minutes of additional sleep over our six-day sleep extension condition.

The main finding of our study is that physical performance was improved in the sleep extension condition. Indeed, the time to exhaustion (test of sustained isometric muscle contraction) was increased compared to the control condition. This outcome could not be explained by smaller reductions in maximal voluntary activation, as confirmed by measurements of both electrical nerve and transcranial magnetic stimulation during the muscle contraction test. The beneficial effect of sleep extension on the performance was likely due to reduced rating perceived exertion after sleep deprivation. This paper complements our previous publication (in the journal *Sleep*), showing the beneficial effect of sleep extension on cognitive function. Altogether, the findings suggest that “banking” sleep improves motor performance in a manner mediated by perceptual and cognitive factors. Although this needs to be confirmed in further studies, we believe that the longer the exercise (endurance activity), the more beneficial sleep extension may be — especially in a particular sport competition where sleep deprivation tends to prevail, *e.g.*, as in ultra-endurance races where sleep can be a limiting factor. We also believe that the beneficial effect of sleep extension would be accentuated in people who are chronically sleep deprived for multiple reasons (workload, young or sick kids, excessive usage of new technologies, *etc.*).

These results emphasize the fundamental role of sleep before a sport competition and the importance of developing strategies to improve sleep throughout individualized management of the sleep/wake cycle.

Pierrick J. Arnal, Ph.D., completed his academic training at the French Armed Forces Biomedical Research Institute (IRBA) and the University of Lyon-Saint Etienne in Paris, France, where his research focused on the preventive countermeasures to limit degradation of cognitive and physical performances and hormonal responses induced by sleep deprivation. He currently is a researcher at Rhythm in Paris, France. Rhythm is a startup, dedicated to developing technological solutions to improve sleep.

Guillaume Y. Millet, Ph.D., is a professor in the faculty of kinesiology at the University of Calgary. His general research area investigates the physiological, neurophysiological and biomechanical factors associated with fatigue, both in extreme exercise (ultra-endurance, hypoxia) and with patients (neuromuscular diseases, cancer). Dr. Guillaume also is an ultra-marathon runner.

This commentary presents Dr. Arnal and Millet's views on the topic related to a research article which they and colleagues authored. Their research article appears in the August 2016 issue of Medicine & Science in Sports & Exercise® (MSSE®).

Please review our business at: [Yelp](#) [City Search](#) [Angie's List](#)

Did you know you can work out and exercise with a trainer at your home, office, hotel room or pretty much anywhere in the world through live 2-way webcam using Skype?

[Sign-up](#) for a class with me today.

[Click Here](#) to sign-up for our e-mail list so can receive all of our articles & download your free copy of our Dietary Information e-book.

View our books on Amazon by [Clicking Here](#). Learn how to get a free audio book with all of the key fitness and nutrition principles [here](#).

[Like us on Facebook](#)/[Connect with us on LinkedIn](#)/[Follow us on Twitter](#)
[Pinterest](#)/[Instagram](#)/[YouTube](#)

**(Hold down the Ctrl key & click the underlined words or logos)
Make sure to forward to friends and followers.**