

Mini Review

Game-Changer: Unlocking Student-Athlete Success with Sleep and Later School Start Times

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Abstract

This editorial explores the crucial yet often overlooked role of sleep in enhancing student-athlete performance and well-being. It highlights sleep's impact on physical recovery, cognitive function, and emotional stability, emphasizing the unique benefits for athletes. The editorial examines the detrimental effects of early school start times on adolescent sleep patterns and their subsequent impact on academic and athletic performance. By advocating for policy changes that prioritize sleep, such as delaying school start times, this editorial presents a novel approach to optimizing student-athlete success. Through a synthesis of current research and practical insights, it urges stakeholders in education and sports to recognize and act upon the foundational importance of sleep, positioning it as a key component of athletic and academic excellence.

Introduction

A new perspective on sleep and student athletes

In the realm of sports medicine and education, sleep often takes a backseat in discussions about student-athlete performance and health. Yet, neglecting the importance of sleep can have significant repercussions on both academic and athletic achievements. Traditional approaches have focused on physical training and nutrition, but this editorial introduces a novel perspective, viewing sleep as an equally crucial component of student-athlete success.

Research consistently shows that adequate sleep is essential for peak physical performance, cognitive function, and emotional well-being. For student-athletes, the stakes are even higher, as insufficient sleep can lead to increased injury risk, reduced performance, and compromised academic success. Despite this, many student-athletes struggle to obtain the recommended 8 to 10 hours of sleep per night, largely due to early school start times and the natural shifts in adolescent circadian rhythms.

The current misalignment between school schedules and adolescents' biological sleep needs has created a public health concern, with widespread sleep deprivation among high school students. This editorial advocates for sleep-friendly policies,

particularly later school start times, to foster an environment where student-athletes can thrive both academically and athletically. By prioritizing sleep as a fundamental pillar of student-athlete health and performance, we can pave the way for a more holistic approach to youth sports and education.

Recognizing the role of sleep as a performance enhancer, akin to physical training and tactical preparedness, is crucial for athletes seeking to optimize their potential. The sports medicine and athletic communities are vital in leading this change, advocating for policies that prioritize the well-being of young athletes and educating stakeholders about the profound impact of sleep on performance and health. Through this collective effort, we can ensure a healthier, more successful future for student-athletes.

The science behind sleep and athletic performance

Sleep is a complex biological process essential for physical recovery, cognitive function, and emotional stability. For student-athletes, adequate sleep is crucial for peak performance. Research indicates that athletes who sleep less than 7 hours per night have a 1.7 times greater risk of injury [1]. In sports, where quick decisions are key, a well-rested brain is vital for sharp thinking and minimizing injuries. Adequate sleep reduces the risk of sport-related concussions, which affect up to 3.8 million individuals annually in the U.S. [2].

More Information

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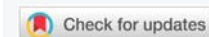
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During sleep, particularly slow-wave sleep, the body undergoes critical healing processes, such as muscle and bone repair through the release of growth hormones and anti-inflammatory agents [3]. The brain's glymphatic system also clears neurotoxic proteins, which are associated with conditions like Alzheimer's disease [4]. REM sleep, crucial for memory and emotional processing, enhances playbook recall and reduces anxiety [5,6]. Stage 2 sleep, on the other hand, is linked to motor skill consolidation, further benefiting athletic performance [7].

Optimal sleep is increasingly recognized as integral to sports performance. Adequate sleep enhances sprint times, endurance, muscle strength [8], accuracy, and reaction times [9]. Furthermore, good sleep quality enhances cognitive skills and decision-making abilities [10]. Sleep deprivation impairs these abilities, as shown in high-performance environments like NASA. Sleep also increases pain tolerance, crucial for recovery and injury rehabilitation [11].

Enhancing performance with sleep technologies and habits

Wearable devices and sleep tracking apps: Wearable devices such as smartwatches and fitness trackers have gained popularity among athletes for monitoring sleep patterns. Currently, 30% of American adults use a wearable device to collect health-related data, including fitness activities and sleep information. These devices offer insights into sleep duration, quality, and stages, allowing athletes to adjust their routines for better rest. Sleep tracking apps provide similar benefits, often offering personalized feedback and suggestions based on the collected data.

A recent randomized controlled trial examined the effects of wearables on sleep in healthy individuals and found that these devices can improve sleep quality and accurately measure sleep and cardiorespiratory variables [12]. While technology can be a powerful tool for optimizing sleep, it also carries the risk of misuse. Athletes may become overly reliant on these devices, potentially experiencing anxiety from striving to achieve "perfect" sleep metrics, which can be counterproductive.

The term "orthosomnia" has been recently proposed to describe the condition where individuals self-diagnose sleep disorders based on sleep tracker data [13]. This refers to an obsessive pursuit of optimal sleep driven by sleep tracker data rather than actual sleep quality. For example, individuals may stay in bed longer than necessary in hopes of improving their sleep tracker metrics.

Despite these challenges, wearable technology represents a promising beginning of a new era of AI-led advancements that promote better sleep habits, increased awareness of sleep quantity and quality, and the creation of optimal sleep environments. Dr. Hon Pak, the Senior Vice President and

Head of the Digital Health Team at Samsung Electronics, stated, "The more informed people are about their sleep, the more empowered they are to make decisions that help achieve better sleep."

Screen use and blue light filters

Excessive screen time before bed can significantly disrupt sleep quality by suppressing melatonin production, a hormone crucial for sleep. The blue light emitted by screens is known to interfere with circadian rhythms. To mitigate this effect, athletes should avoid using screens at least 60 minutes before bedtime. If screen use is unavoidable, they can use blue light filters or apps that adjust screen brightness and color according to the time of day. Incorporating these tools into a broader sleep hygiene strategy can help athletes maintain their natural sleep rhythms and improve overall sleep quality.

Sleep environment and technology integration

Innovative solutions such as smart lighting and temperature control systems can help create an ideal sleep environment. Smart lighting systems can simulate natural sunrise and sunset, promoting healthy circadian rhythms, while temperature control systems can adjust room temperature for optimal sleep conditions. However, athletes need to balance the use of technology with traditional sleep hygiene practices to avoid dependency and ensure a holistic approach to sleep improvement.

Other essential methods to improve sleep

Consistency and routine: Establishing a consistent sleep schedule is vital for athletes to achieve peak performance. Maintaining regular bedtimes and wake-up times, even on weekends, helps regulate the body's internal clock, leading to more restorative sleep. Athletes should aim for 8 to 10 hours of sleep per night to fully experience the benefits of each sleep stage.

Relaxation techniques: Incorporating relaxation techniques such as reading, stretching, or meditation into pre-sleep routines can enhance sleep quality. These activities help reduce stress and prepare the body and mind for rest, contributing to improved athletic performance and recovery.

Strategic napping: Short, well-timed naps can be a valuable tool for recovery and achieving peak performance. Athletes can use naps to compensate for lost nighttime sleep or to recharge during the day. However, naps should be kept brief (20 minutes - 30 minutes) to avoid disrupting nighttime sleep patterns.

Sleep banking: Athletes can engage in sleep banking to prepare for travel or anticipated periods of reduced sleep. This involves extending their regular nightly sleep or taking additional naps before the expected sleep loss, such as during travel. By proactively banking sleep, athletes can help



maintain their performance levels and minimize the negative effects of sleep deficits [14].

The detrimental effects of early school start times

Sleep is vital for the holistic development of children and adolescents. The National Sleep Foundation recommends 8 to 10 hours of sleep per night for adolescents and 9 to 11 hours for children [15,16]. However, data from the CDC highlights a crisis: 78% of high school students and 34% of children do not get enough sleep on school nights [17]. Two primary factors contribute to this:

- **Natural circadian rhythm shift:** During adolescence, a natural shift in circadian rhythms causes a biological drive to sleep later and wake up later [18].
- **Early school start times:** In the U.S., 83% of public middle and high schools start before 8:30 a.m., with some beginning as early as 7:30 a.m. [19]. This misalignment with adolescents' biological clocks leads to significant sleep deprivation.

Early start times conflict with adolescents' natural sleep patterns, resulting in widespread sleep deprivation. This lack of sleep has far-reaching consequences, including reduced academic performance, increased mental health issues, higher rates of accidents, and diminished athletic abilities [15,20,21]. For student-athletes, this can be the difference between adequate and exceptional performance in all areas.

The case for delaying school start times

Aligning school start times with adolescents' natural sleep patterns not only improves academic performance but also enhances athletic capabilities. A schedule that allows for adequate sleep aligns with biological rhythms, leading to more restorative sleep. The benefits of this adjustment are extensive, impacting many aspects of student life.

First, later start times lead to improved academic performance and mental health. Studies show increases in GPA, standardized test scores, and graduation rates with later start times [22]. Mental health also improves, creating a healthier learning environment [23]. Notably, each additional hour of sleep can reduce the risk of suicidal thoughts and behaviors by 11% [24].

Furthermore, well-rested students demonstrate improved physical abilities, coordination, and stamina, essential for athletic success. Enhanced sports performance boosts self-esteem and team spirit, enriching the overall school experience.

The role of the sports medicine and athletic communities

The sports medicine and athletic communities are crucial advocates for change in the lives of student-athletes. Their expertise in health and performance positions them to push

for policies prioritizing young athletes' well-being, such as delayed school start times. These professionals must also lead educational initiatives, teaching students, parents, and administrators about sleep's critical role in performance and health.

The COVID-19 pandemic demonstrated our ability to adapt when necessary. Similarly, sports medicine and athletic professionals are vital advocates for change, ensuring the future health and success of student-athletes. Their actions can drive a societal shift toward a healthier approach to education and athletics.

Conclusion

A call to action

Transforming student athletics is a shared responsibility across communities capable of driving change. Delaying school start times is not just a policy shift but a critical step toward improving young athletes' health and potential. This effort involves more than adjusting sleep schedules; it is about nurturing each student athlete's full potential.

By coming together in this mission, we can significantly impact the future of young athletes. Our decisions today will mold a healthier, more successful future for student-athletes, creating a legacy of wellness and support for their dreams. Together, we can shape a brighter, more prosperous future for student-athletes, now and for generations to come.

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