

It's Mean to Just Look at the Average: Athletic Sleep Research and Data

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"The purpose of today's training is to defeat yesterday's understanding."

—MIYAMOTO MUSASHI

Many of us love sports; they provide escapism from our day-to-day lives, and can be a means for us to socialize, band together and enjoy the pursuit of victory. The chance to sit back and watch teams battle each other, such as football or basketball, or individual athletes compete in a sport that requires a high level of skill, timing and precision, such as boxing or mixed martial arts, draws us into the world of sports.

What equally draws our attention is what these athletes do outside of competition to prepare for such events. We want to know their strength and conditioning routines, diet and mindset, and in the last five to 10 years, we have wanted to know more about their recovery strategies such as sleep, sleep timing, and sleep before and after a competition. Famous athletes such as Tom Brady and LeBron James have publicly spoken about the importance of sleep, specifically as they get older. Irish rugby scrum half player Peter Stringer played rugby into his forties and credits a focus on sleep, nutrition and recovery to his longevity in the sport. I have worked with elite athletes over 30 years old to focus specifically on these areas in Major League Baseball (MLB) and Formula 1 (F1). Athletes at this level grapple with repeated competition, such as baseball with 162 games in a season, the duration of the competition, such as an F1 race, and travel and jet lag associated with travelling the world to compete. Therefore, a focus on sleep and recovery is paramount to an athlete's performance.

But how much do we know about sleep, recovery and performance in elite athletic populations? How good is the research? Are the practitioners' approaches to athletes adequate? Since 2010 we have observed a significant increase in the quantity and quality of athletic research. More than 80% of this research is original and the vast majority of it has taken place in the last five years.¹

Two main countries have contributed to this research. They are Australia, where I live (although I am from Ireland), and the United States. Australia is also home to the top four academic institutions that publish this research, including the Australian Institute of Sport; Central Queensland University; University of Technology Sydney and the University of Western Australia, where I am currently an adjunct senior research fellow.

While this increase in research and research outputs is excellent, the current approach is generally geared towards collecting large data sets to appease the statistical power required to find an effect over time or prove an intervention. Achieving large-scale data or repeated data collection over a day, week/s or season becomes cumbersome and difficult with athletes who are often overburdened with lots of data collection. It gets in the way of the technical aspect of the sport and the sport-specific training with the coaches and athletes. Imagine asking players to self-report one to two times a day their fatigue, sleepiness or mood and then imagine that over an entire season. The athlete and the coaches start viewing the data collection

as non-value adding and a pain to keep collecting over time.

In many studies, the focus has been on group data to collect sleep-wake behaviours over time using wearable devices such as actigraphy and sleep diaries or questionnaires. This helps generate group or team data to identify trends on specific days or nights, home versus away games, and for extended travel or periods of extreme jet lag. In addition, coaches and performance staff can use this data to plan practice times, travel, recovery and media engagements. However, we may be losing out with this approach as we are missing so much related to the individuals who make up that data point with standard deviation. We tend to lack the focus on the individual athlete, and there is a scarcity of studies in athletic populations aimed to support the individual athlete.

No one has been more guilty of this than me. I have published several studies with combat and contact athletes to generate group data to quantify the group sleep behaviours and have done this with teams and individuals.^{2,3} There can be a significant variation between athletes. In a study my fellow researchers and I conducted with



elite rugby union players in the Super Rugby competition in the southern hemisphere, we found that the players went to bed three hours after a game compared to training days (23:08 ± 66 min versus 02:11 ± 114 min; $p < .001$). What is lost in that data is that four players did not sleep after the game, and when looking at the maximum time at sleep onset, some players went to bed at 07:00.²

In recent years, I have redirected my focus, placing a greater emphasis on the individual athlete. In a current research project with an elite female basketball team, 12 female players and three male coaches wore actigraphy devices for 60 nights to assess sleep behaviors and completed questionnaires. We generated group and individual data and invited the group to a sleep education program consisting of a two-hour sleep education session followed by a personal consultation to identify improvements to sleep behaviours. In this applied research project, we analyzed the group data to improve the timing of training sessions, travel, recovery and chronotypes. The individual data allowed us researchers to engage with individual athletes with specific advice or referrals.⁴ You can hear what the players thought of the project [here](#). (We have taken a similar approach with older amateur athletes, which is currently under review, "Understanding the sleep of ultra-marathon swimmers: Guidance for coaches and swimmers.")

I am proposing that research studies for sleep and recovery work with athletes going forward need to have a two-pronged approach to be conducted in tandem. The first approach being team focused, similar to the fatigue risk management systems approach in the industry,⁵ whereby there is a focus on the organizational design, and the second being athlete focused, where the approach is more individualized.

A team-focused approach, and I have advocated this approach in recent work in high-risk remote mining environments,⁶ is where coaches, performance staff and researchers should aim to collect group- or team-based data that includes:

- Training times and types (e.g. strength training, conditioning, skill specific)
- Timing of games or competition (e.g. early morning, afternoon, late at night)
- Overall sleep habit behaviours and sleep disorders
- Recovery and social time
- Additional support (e.g. psychological, financial)

An athlete-focused approach should aim to:

- Identify, diagnose and treat sleep disorders or problems if present
- Strategically use the chronotype of the athlete to maximize their recovery and performance
- Analyze individual sleep habits and behaviors with the athlete to identify areas for improvement
- Include individual consultation, education and support

Going forward we can do both through a shared, joint responsibility model that incorporates collaborating with the individual athlete to engage and educate them as well as equip them with the knowledge and skills to master their performance for a safe and healthy career. If we can do this, then the group or team data will improve and reflect this. So let's not just focus on the mean, let's get personal. 🌙

Research studies for sleep and recovery work with athletes need to be a two-pronged approach.



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Sleep4Performance, an adjunct senior research fellow at the University of Western Australia and an adjunct associate professor at Edith Cowan University. He is currently the sleep and performance advisor to the McLaren F1 team, works in MLB and has worked in an array of sports including mixed martial arts, rugby, boxing, judo and many more. Ian has completed >20 mountain ultra-marathons, swam ocean ultra-marathons, holds a black belt in Brazilian jiu jitsu and enjoys boxing.

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