Sports Pharmacy

DECODING THE SCIENCE OF ELITE HUMAN PERFORMANCE

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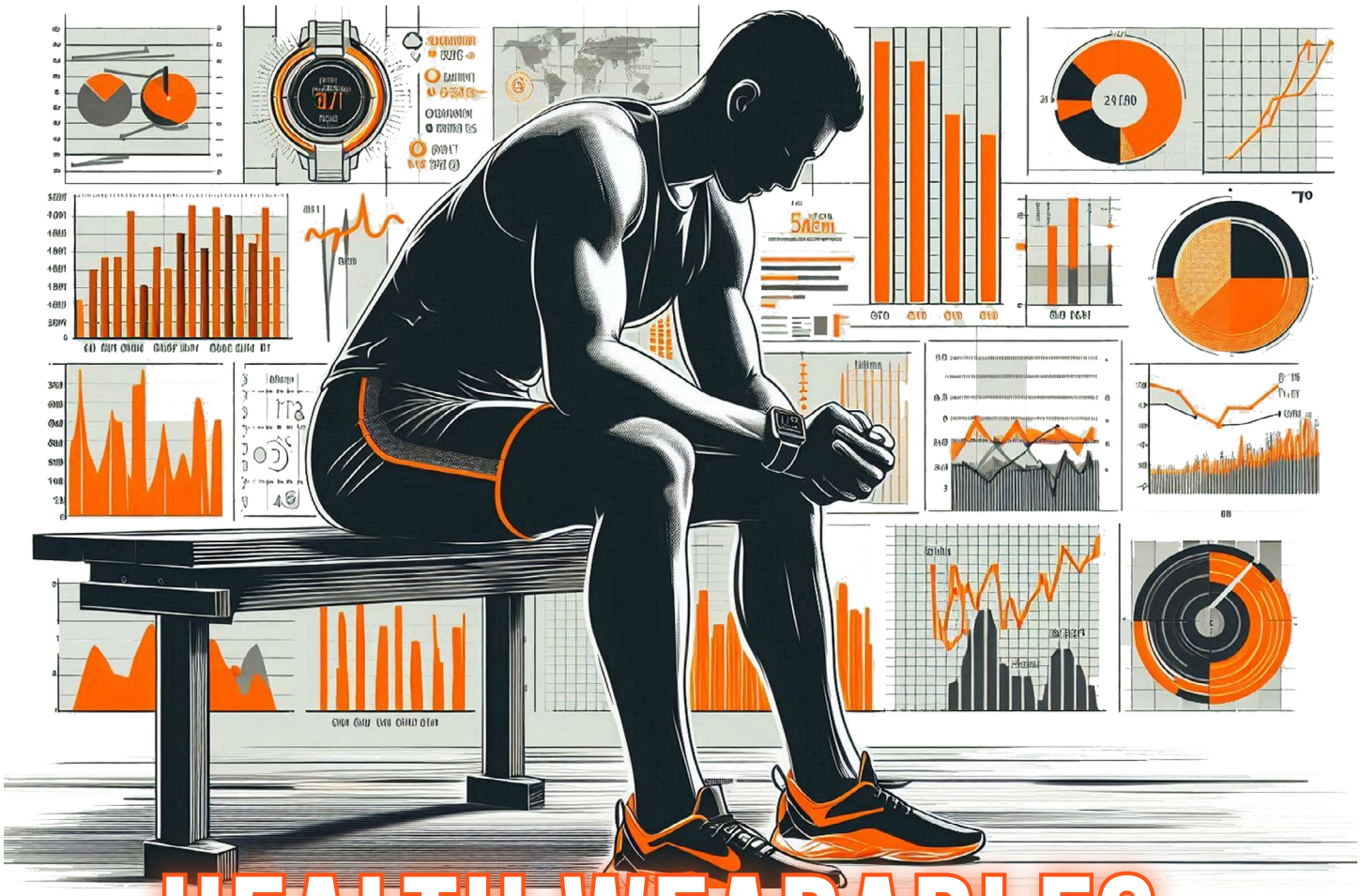

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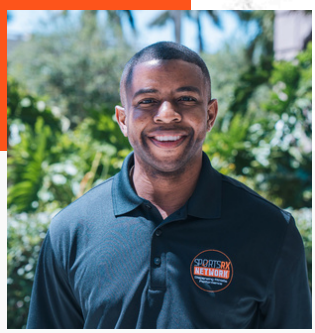

MESSAGE *FROM THE* PRESIDENT

Dear Sports Pharmacy Magazine Subscribers,

Thank you for tuning in to another issue of Sports Pharmacy Magazine, your continued support and passion for advancing athlete care through pharmacy make each issue possible.

As we explore this exciting issue on health wearables, it's clear that technology is transforming the way athletes train, recover, and stay healthy. From tracking biometrics to guiding personalized interventions, wearables are becoming essential tools—and sports pharmacists have a key role to play in interpreting that data and optimizing outcomes.

We're also proud to celebrate a major milestone for our community: the successful launch of the first Clinical Sports Pharmacy Summit! With over 150 interdisciplinary attendees and expert speakers from pharmacy, medicine, athletic training, nutrition, and sports science, it was a powerful reminder of what happens when we come together around a shared mission. The energy, collaboration, and overwhelmingly positive feedback have us already hard at work planning next year's summit—even bigger and better.

Thank you for continuing to advance this movement. Together, we're building the future of athlete health—one innovation, one connection, and one issue at a time.

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President, Sports Pharmacy Network
Clinical Sports Pharmacist

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Stress, Sleep, and Readiness:

Can We Trust Wearables to Monitor Mental Health in Athletes?

By Kristal Potter, PharmD

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Dr. Kristal Potter received her Bachelor of Science in Neuroscience from Florida Atlantic University and her PharmD from the University of South Florida Taneja College of Pharmacy. After graduating, she served as a pharmacist in the United States Air Force at Cannon AFB. She currently serves as an Assistant Professor and Director of Experiential Education and Community Engagement at Larkin University College of Pharmacy. She also continues to serve as an Air Force Reserve pharmacist at Davis-Monthan AFB. Dr. Potter is passionate about holistic approaches to healthcare, inspiring the next generation of pharmacy leaders.

The global wearable market is currently valued at around $157.3 billion. By 2032, the wearable market is projected to surpass $1,695 billion.[1] Many athletes rely on tech to track recovery, sleep, and stress levels. While wearables offer promising insights into mental readiness and stress, the science behind these claims remains mixed. Healthcare professionals must understand the capabilities and limitations of these tools.

The Rise of Mental Health Metrics in Wearables

In recent years, wearable technology has expanded beyond physical performance tracking into the realm of mental health and cognitive readiness. Devices like the Whoop Strap, Oura Ring, Garmin watches, and Apple Watch now promote features that claim to measure stress, recovery, and overall mental preparedness (Table 1). These insights are often based on physiological signals like heart rate variability (HRV), resting heart rate, respiratory rate, skin temperature, and sleep quality. By compiling these metrics into a single "readiness score" or "recovery index," athletes are encouraged to adjust their training intensity, schedules, and sleep routines.

The potential of wearables can also expand into injury prevention and performance tracking. A groundbreaking pilot study tracked the impact of cumulative training, gameplay, and rest on the musculoskeletal health of NBA G League players across the 2023–24 season. The study paired wearable technologies and advanced imaging modalities to monitor structural and functional changes in the knee, focusing on the patellar tendon.[2] STRIVE, a company founded in 2016, developed a pair of compression shorts embedded with electromyography (EMG) sensors. These sensors track muscle activity and total muscle load, offering valuable insights into fatigue and recovery.[3]

The appeal is understandable: if a device can provide a snapshot of mental well-being or detect early warning signs of psychological strain, it could empower athletes and their care teams to intervene earlier and more effectively. However, it's important to note that these metrics are not direct mental health measurements. Instead, they are inferences drawn from biometrics, which may or may not correlate with psychological stress or cognitive function. For sports pharmacists, who are often involved in medication management and wellness coaching, separating fact from marketing hype is essential when navigating wearable tech in performance settings.

Comparison of Popular Wearables for Mental Health & Performance Tracking

Device	Price	Metrics Tracked	Battery Life	General Reception / Reviews
Whoop 4.0 Wrist strap (no screen)	$239/year (membership)	HRV, sleep stages, strain, recovery, blood oxygen, respiratory rate, skin temp	~5 days	Loved by athletes for recovery insights. Some users note the lack of a screen limit utility. Very data-rich.
Oura Ring Gen 4 Ring	$349 + $5.99/ mo subscription	HRV, sleep stages, readiness, body temp, stress	~8 days	Stylish, subtle. Highly rated for sleep tracking and readiness. Some report sizing and durability issues.
Apple Watch Series 10 / Ultra 2 Smartwatch	$399–$799	HRV, heart rate, sleep stages, ECG, SpO2	18 hours 36 hours (Ultra 2)	Excellent app ecosystem. Battery life is the biggest drawback for athletes.
Garmin Forerunner 965 Smartwatch	$599	HRV, sleep score, stress score, respiration, training readiness	~23 days (smartwatch mode)	Very popular with endurance athletes. Strong GPS, deep training analytics. Steeper learning curve.
Polar Ignite 3 Smartwatch	$349	HRV, Nightly Recharge, sleep stages, stress levels	~5 days	Lightweight and affordable. Good beginner option. Less ecosystem support than others.
Fitbit Sense 2 Smartwatch	$199	HRV, stress (EDA), sleep score, SpO2, skin temp	~6 days	Budget-friendly. Decent metrics but less accurate for high-performance athletes. Great for general wellness.

EDA (Electrodermal Activity): measures subtle electrical changes in skin using sweat
HRV (Heart Rate Variability): is a key mental health indicator, but interpretation varies by brand.
SPO2: peripheral oxygen saturation
Prices are approximate as of April 2025 and may change with promotions or newer models.

Decoding the Data: What Are Wearables Really Measuring?

While many wearable devices market themselves as tools for stress management or mental readiness, it's essential to understand what they're actually measuring and what they're not. At their core, most wearables collect a relatively small set of physiolog-ical data: heart rate variability (HRV), resting heart rate (RHR), movement (via accelerometers), and, in some cases, peripheral body temperature. From this foundation, companies use proprietary algorithms to generate more complex metrics like "stress scores," "recovery indexes," "readiness ratings," or "mental fatigue estimates."

These interpreted metrics may sound scientific, but most are not clinically validated or peer-reviewed.[4] The exact algorithmic process is often considered intellectual property and is not publicly disclosed. This makes it difficult for healthcare professionals to critically assess their accuracy or relevance, particularly when these scores maybe used to decide about training intensity, sleep hygiene, or mental health support.

It's also crucial to note that wearables do not diagnose mental health conditions. A "high-stress score" on a smartwatch does not mean an athlete has anxiety; a favorable readiness rating does not guarantee they're mentally prepared to compete. These extrapolated metrics can create false reassurance or false alarms.

Ultimately, sports pharmacists are uniquely positioned to interpret biometric trends, translating the raw data from wearable tech into actionable clinical decisions that promote performance, safety, and recovery.

For example, elevated HRV may reflect good autonomic function, but it doesn't always correlate with psychological stress control especially in athletes who are overtrained, under-recovered, or emotionally overwhelmed.

Future Directions: Does Smarter Tech Mean Smarter Care?

The future of wearables is leaning toward more medical-grade tracking: think continuous blood pressure, blood glucose, and even hydration level monitoring. Apple Watch, in particular, is rumored to be developing non-invasive blood glucose sensing, a breakthrough that could dramatically improve how athletes with diabetes or those optimizing macronutrient intake train and recover.[5]

We can also expect greater use of AI-driven insights and eletronic health record (EHR) integration, potentially triggering automatic alerts or care plan modifications based on biometric trends.[6] Ensuring the accuracy and reliability of AI algorithms in wearables will be critical, as they can influence how health data is interpreted and used. Without rigorous validation and inclusivity across diverse athletic populations, these tools risk generating misleading insights that could lead to inappropriate clinical decisions. All this points to an emerging need for pharmacists to gain digital literacy in wearable health platforms and an opportunity to be the leaders in building evidence-based frameworks for using these technologies safely.

Conclusion

Wearables generate an enormous volume of health data, but that information often lives in silos, confined to apps and dashboards without integration into the broader healthcare ecosystem. For sports pharmacists, this disconnect creates both a challenge and an opportunity. While the data exists, it is rarely shared with pharmacists, coaches, or even primary care providers in a meaningful way. This limits the ability of the athlete's care team to leverage those insights for real-time decision-making.

To overcome this gap, sports pharmacists can take the lead in advocating for collaborative digital health models. This may involve developing protocols for athletes to regularly share relevant metrics, integrating wearable data into existing EHRs, or using third-party apps that allow pharmacists to monitor trends like HRV or sleep quality over time. Beyond the logistics, there is an educational role here: pharmacists must be proactive in helping athletes understand what their data means and how it relates to their health and performance.

Ultimately, sports pharmacists are uniquely positioned to interpret biometric trends, translating the raw data from wearable tech into actionable clinical decisions that promote performance, safety, and recovery.

References:

1. Fortune Business Insights. (2025, April 14). Wearable technology market size, share: Growth report [2032]. Wearable Technology Market Size, Share | Growth Report [2032]. https://www.fortunebusinessinsights.com/wearable-technology-market-106000\
2. GE Healthcare. (2024, May 13). NBA, NBPA, and NGBPU Collaborate with GE HealthCare and MedStar Health on Musculoskeletal and Joint Health Study. https://www.gehealthcare.com/about/newsroom/press-releases/nba-nbpa-and-ngbpu-collaborate-with-ge-healthcare-and-medstar-health-on-musculoskeletal-and-joint-health-study
3. Ben_Dowsett. (2022, August 8). The NBA is turning to wearable sensors to prevent player injuries. FiveThirtyEight. https://fivethirtyeight.com/features/the-nba-is-turning-to-wearable-sensors-to-prevent-player-injuries/
4. Jerath R, Syam M, Ahmed S. The Future of Stress Management: Integration of Smartwatches and HRV Technology. Sensors (Basel). 2023 Aug 22;23(17):7314. doi: 10.3390/s23177314. PMID: 37687769; PMCID: PMC10490434.
5. Apple (AAPL) secretly tests blood-sugar app in sign of health ambitions - bloomberg. (2024a, October 25). https://www.bloomberg.com/news/articles/2024-10-25/apple-secretly-tests-blood-sugar-app-in-sign-of-health-ambitions
6. Shajari S, Kuruvinashetti K, Komeili A, Sundararaj U. The Emergence of AI-Based Wearable Sensors for Digital Health Technology: A Review. Sensors (Basel). 2023 Nov 29;23(23):9498. doi: 10.3390/s23239498. PMID: 38067871; PMCID: PMC10708748

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Rings Can't Measure Blood Glucose

A Pharmacist's Guide to Accurate Blood Sugar Tracking

By Katherine Gabriel, Pharm.D., RPh

AUTHOR BIO:
Dr. Katherine Gabriel, Pharm.D., RPh., a Yonkers native, is a graduate of St. John's University with over five years of experience in outpatient pharmacy. As the Director of Staff Operations at WritePharma, she leads a team of pharmacy medical writers, ensuring the delivery of high-quality, accurate content. Katherine also contributes to the company's marketing efforts by analyzing social media trends and creating engaging content. Passionate about diabetes education and patient care, Katherine's commitment to personalized, evidence-based practices is central to her approach in improving health outcomes.

Introduction

Finding balance in today's fast-paced world is no easy task. Between career demands, family responsibilities, and maintaining a healthy lifestyle, wellness often becomes a juggling act. As a pharmacist and health enthusiast, I've spent years building a sustainable routine, one grounded in small, consistent changes and supported by tools that help me stay accountable.

One of the most impactful tools in my journey? My Apple Watch.

Wearable technology has transformed the way we engage with our health. From Apple and Garmin watches to Fitbits and fitness rings, these devices provide real-time insights into our movement, heart rate, sleep patterns, and more. Recently, a growing trend has emerged: health wearables promoting features like metabolic tracking and glucose insights. But as pharmacists, it is essential to critically assess how these features are marketed, especially when it comes to interpreting data that could impact clinical outcomes.

While these devices offer valuable wellness data, they are not FDA-approved for blood glucose monitoring. Misinterpretation can pose serious risks for users with diabetes, potentially leading to inappropriate insulin adjustments or overlooked warning signs. Understanding the capabilities and the limitations of wearables is key to helping patients make informed decisions about their health.

Decoding Smart Rings: From Sleep Scores to Strain—but Not Glucose

Given the range of data that smart rings can generate, it is understandable that users might perceive them as offering a more complete view of their overall health than they are clinically designed to provide. Metrics such as heart rate variability (HRV), sleep stages, and daily activity scores are valuable for tracking recovery, managing stress, and improving athletic performance, especially for athletes and fitness-minded individuals [1]. In fact, wearable technology has become a staple in sports performance and injury prevention, with features designed to monitor training loads and guide personalized routines [2]. These devices are often seen as an essential part of optimizing both fitness and overall well-being.

Wearable technology has become a cornerstone of sports performance and injury prevention. Devices such as smart rings and fitness trackers offer real-time feedback on key physiological metrics, allowing athletes to modify training routines, prevent overtraining, and support recovery. By monitoring both external and internal training load, including movement quality, heart rate variability, and activity intensity, health wearables empower athletes to personalize their programs and make immediate, informed adjustments during training [2]. Whether on the field, in the gym, or in dynamic sports like skiing or swimming, these tools offer a proactive edge that traditional methods, like post-session video analysis, simply cannot provide. Despite their sophistication, smart rings do not measure glucose, one of the most critical markers for metabolic health, emphasizing the limitations of wearables when it comes to deeper clinical insights.

Fueling Smarter: Evaluating the Use of Continuous Glucose Monitors in Athletic Performance

In recent years, CGMs have expanded beyond their conventional role in diabetes management and have potential as a valuable tool in athletic performance. Designed to monitor interstitial glucose,

the glucose present in the fluid between cells which lags slightly behind blood glucose [3], CGMs provide athletes with uninterrupted feedback on their glycemic responses to exercise and nutrition. This data enables actionable decisions, such as adjusting carbohydrate intake during training or competition to sustain energy levels and delay fatigue. For example, a mid-race glucose dip might cause an athlete to consume a gel or sports drink to prevent performance decline. Devices such as the Abbott Libre Sport Biosensor are specifically marketed to athletes, supporting the shift towards more personalized fueling strategies [4]. Notably, a 2020 study by Isihara et al established that endurance runners consuming less than 0.8g/kg/hr of carbohydrate during an ultramarathon were inclined to exhibit slower speeds and lower interstitial glucose levels [5]. While encouraging, such findings emphasize the significant inter-individual variability in glycemic responses, reinforcing the need for cautious interpretation of CGM data in the context of performance nutrition.

From a clinical perspective, CGM accuracy is generally acceptable for non-diabetic patients, with most devices showing a mean absolute relative difference (MARD), a standard measure of accuracy, of 9-12% compared to venous blood glucose measurements [6]. Nonetheless, it is vital to acknowledge the physiological lag, typically about 10-15 minutes, between blood glucose levels and interstitial readings, particularly during abrupt changes in glucose levels such as high-intensity exercise or postprandial periods [4]. Bower et al. (2022) emphasized that maintaining normal blood glucose levels during activity may enhance endurance, encouraging athletes to use CGMs as practical tools for refining nutrition strategies. They also facilitate tracking of glucose variability, energy availability , and recovery status, especially important in endurance athletes facing stressors from intense training, fluctuating carbohydrate intake, and psychological load [7]. That said, CGM data should be interpreted alongside subjective cues such as perceived exertion and hunger. As with any clinical monitoring tool, the goal is not to replace an athlete's internal feedback, but to supplement it with real-time, actionable insights.

As CGMs gain traction in sports, sports pharmacists are well-positioned to assist athletes by aiding in the interpretation of data in conjunction with evidence-based nutrition and recovery strategies. Although originally intended for diabetic patients, the use of CGMs in healthy athletes represents an innovative and ongoing application, where expert guidance can improve both safety and performance outcomes.

The Misleading Blood Glucose Claims

Despite the promises made in marketing materials, smart rings cannot provide direct measurements of blood glucose. Blood glucose levels are traditionally measured via invasive methods such as fingerstick tests or continuous glucose monitors (CGMs), which involve a small device that pierces the skin to collect a blood sample [8]. In contrast, health wearables such as Oura utilize optical sensors that passively track biometrics through the skin, without any invasive procedure or blood sample [9].

Optical sensors in health wearables are not a reliable measurement of glucose because the sensors rely on indirect signals, including changes in light absorption or reflection through the skin [10]. This method is highly susceptible to interference from factors including skin pigmentation, temperature, and hydration levels, which can result in significant inaccuracies [10]. Some of these factors can also be highly variable during exercise. Therefore, while optical sensors in health wearables are an effective tool for overall wellness tracking, they are not appropriate substitutes for devices specifically designed for precise glucose monitoring.

The FDA issued an official statement in February 2024 addressing the risks associated with smartwatches and smart rings that claim to measure blood glucose levels without the need for invasive techniques [11]. The FDA has elucidated that it has neither authorized nor approved any smart watch or smart ring for the independent measurement or estimation of blood glucose levels.

These unvalidated claims can pose significant adverse health outcomes particularly for individuals living with diabetes. Relying on these devices for blood glucose data, despite their lack of clinical validation, may result in poorly informed adjustments to diabetes regimens, such as inaccurate doses of insulin or sulfonylureas [12]. This can lead to serious health complications, such as hypoglycemia, which, if left untreated, can result in confusion, seizures or even life-threatening outcomes.

Misinterpreting glucose trends from wearables can lead to erroneous insulin dosing, resulting in either hyperglycemia or hypoglycemia. For example, if a device falsely indicates elevated blood glucose levels, a patient may take too much insulin, resulting in dangerously low blood sugar, causing symptoms such as dizziness, increased heart rate or sweating. On the contrary, underestimating glucose levels could result in insufficient insulin, causing blood sugar to rise and increasing the risk of long-term complications such as kidney damage or cardiovascular disease. To

mitigate these risks, clinical practice must prioritize the use of FDA-approved, scientifically-tested health devices, such as glucometers or CGMs, for reliable blood glucose monitoring and appropriate medication adjustments.

Best Practices for Blood Glucose Monitoring: A Pharmacist's Guide to Accurate and Safe Management

When it comes to managing blood glucose levels, two devices stand out as the gold standards: Blood Glucose Meters (BGMs) and Continuous Glucose Monitors (CGMs). Understanding how these devices work, why they are FDA-approved, and how they help ensure precise glucose monitoring is key to supporting safe and efficacious diabetes management. CGMs provide constant, real-time monitoring by measuring glucose levels in the interstitial fluid under the skin [13]. A small sensor inserted subcutaneously sends data wirelessly to a receiver or smartphone app, delivering sustained and round-the-clock insights into glucose trends and alerting users to fluctuations in glucose levels [14]. This facilitates timely adjustments to insulin or diet, reducing the need for frequent fingersticks, resulting in enhanced patient compliance and overall management of diabetes. In contrast, BGMs measure blood glucose at a single point in time using a fingerstick blood sample[15]. While BGMs offer accurate snapshots of glucose levels, they do not provide continuous data and require patients to perform readings multiple times a day.

Both devices are FDA-approved and supported by extensive clinical research for accuracy, though CGMs may show discrepancies during rapid glucose changes and are less reliable when glucose is very low (<40 mg/dl)[12]. Despite this, CGMs are extremely beneficial for individuals with diabetes, providing valuable perspectives that improve glucose control and prevent emergencies, though periodic BGM use is still recommended for calibration and ensuring the accuracy of glucose readings, especially when validating critically low or high BG levels.

To ensure optimal use and accurate readings, it is imperative to follow best practices when utilizing both CGMs and BGMs. Proper application of a CGM requires precise sensor placement to maintain functional efficacy and data accuracy. Avoid placing sensors near insulin pumps, injection sites, bones, scars, or tattoos, and choose an area that is unlikely to be bumped or laid on while asleep. Ensure the area has enough fat or padding for peak sensor function. Clean the skin thoroughly before applying the sensor and, if necessary, shave any thick hair near the site

to prevent irritation. To reduce skin discomfort, it is recommended to use fluticasone nasal spray or a Tegaderm HP patch to create a protective barrier. This is especially important in athletes because their high activity level can increase the risk of devices falling out of place. Rotating application sites is essential for preventing skin damage and improving sensor accuracy [16] . Medications including acetaminophen, vitamin C, and aspirin can interfere with CGM accuracy, leading to skewed readings [17] .

For BGMs, always use a new test strip for each reading and wash and dry your hands to avoid contamination. Store test strips properly in a cool, dry place and check expiration dates to ensure reliability. Testing at the recommended times, such as in the morning before eating or drinking, two hours before meals, at bedtime, or when experiencing symptoms of hypoglycemia or hyperglycemia will provide the most accurate results. Stay mindful of medications, especially those containing Vitamin C, Acetaminophen, or Aspirin, which may affect glucose readings.

By adhering to these best practices, both CGMs and BGMs can provide accurate, reliable readings for superior glucose management and overall health and wellness.

Oura and CGMs: Connecting Lifestyle to Glucose Data

As the use of CGMs and BGMs become more widespread, especially beyond the traditional diabetes

population, wearable technology is stepping in to provide additional layers of insight. One example is the Oura Ring, a sleek and trendy health ring that monitors key health metrics such as sleep, movement, and stress, and has now entered the metabolic health space through integrations with CGM platforms. In 2023, Oura announced partnerships with brands such as January, Supersapiens, and Veri, enabling the syncing of Oura scores — including sleep, readiness, and activity — directly into CGM-enabled apps [18]. This creates a more encompassing view of health, helping users understand how sleep quality, stress, recovery, and physical activity impact glucose levels and overall metabolic function.

That said, while Oura offers powerful context, it does not measure glucose itself. It complements CGMs by showing the reason behind glucose fluctuations. For anyone tracking blood sugar, whether for performance, nutrition, or managing diabetes, CGMs or BGMs remain the gold standard for precise glucose data. Oura adds valuable lifestyle insights, but it is not a replacement for direct glucose monitoring.

The Wrap Up

Health wearables are undeniably appealing. They can serve as a fashionable accessory, provide valuable insights on sleep, stress, and anxiety levels, and can even help people achieve their optimal health and feel their best. However, it is crucial to remember that health wearables should not be considered substitutes for FDA-approved glucose monitoring devices.

These desirable health wearables empower users to stay proactive about wellness and make more informed lifestyle choices. However, it is essential to understand their limitations, especially when managing chronic conditions like diabetes.

Health wearables are not FDA-approved medical devices for monitoring blood glucose and should not be used as replacements for validated glucose monitoring systems. While they can highlight trends and support metabolic awareness, they lack the clinical accuracy needed for dosing decisions or adjustments to treatment regimens. For individuals requiring accurate glucose control, devices such as CGMs and BGMs remain the gold standard.

Nevertheless, wearables can complement traditional glucose monitoring by providing context around lifestyle factors that impact glycemic control. Used together, they offer a more integrated view, but they are not interchangeable.

References:

1. Oura. How does Oura Ring work: Smart Ring Health Tracking. Oura Ring. Published 2024. https://ouraring.com/how-it-works
2. çkin, A. Ç., Ateş, B., & Seçkin, M. (2023). Review on wearable technology in sports: Concepts, challenges and opportunities. Applied Sciences, 13(18), 10399. https://doi.org/10.3390/app131810399
3. Diabetes at School | Continuous Glucose Monitoring (CGM). Diabetesatschool.ca. Published 2024. https://diabetesatschool.ca/understanding/continuous-glucose-monitoring
4. Bowler ALM, Whitfield J, Marshall L, Coffey VG, Burke LM, Cox GR. The Use of Continuous Glucose Monitors in Sport: Possible Applications and Considerations. *International Journal of Sport Nutrition and Exercise Metabolism*. 2023;33(2):121-132. doi:https://doi.org/10.1123/ijsnem.2022-0139
5. Ishihara, K., Uchiyama, N., Kizaki, S., Mori, E., Nonaka, T., & Oneda, H. (2020). Application of continuous glucose monitoring for assessment of individual carbohydrate requirement during ultramarathon race. *Nutrients, 12*(4), Article 1121. https://doi.org/10.3390/nu12041121
6. Davis GM, Spanakis EK, Migdal AL, et al. Accuracy of Dexcom G6 Continuous Glucose Monitoring in Non–Critically Ill Hospitalized Patients With Diabetes. *Diabetes Care*. 2021;44(7):1641-1646. doi:https://doi.org/10.2337/dc20-2856
7. Flockhart M, Larsen FJ. Continuous Glucose Monitoring in Endurance Athletes: Interpretation and Relevance of Measurements for Improving Performance and Health. *Sports Medicine*. 2023;54. doi:https://doi.org/10.1007/s40279-023-01910-4
8. Mathew, T. K., Tadi, P., & Zubair, M. (2023, April 23). Blood glucose monitoring. National Library of Medicine; StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK555976/
9. Team, O. (2024, October 3). Smart Sensing: Unparalleled Accuracy and Personalization in Oura Ring 4. The Pulse Blog. https://ouraring.com/blog/smart-sensing/?srsltid=AfmBOootpUzoMDsY3_N70ajN0vUwgE3hlgzNicrclPGqqeXyKmU-xKSf
10. Shokrekhodaei, M., & Quinones, S. (2020). Review of Non-Invasive Glucose Sensing Techniques: Optical, Electrical and Breath Acetone. Sensors, 20(5), 1251. https://doi.org/10.3390/s20051251
11. U.S. Food and Drug Administration. (2024, February 21). https://www.fda.gov/medical-devices/safety-communications/do-not-use-smartwatches-or-smart-rings-measure-blood-glucose-levels-fda-safety-communication#:~:text=Date%20Issued%3A%20February%2021%2C%202024,sugar)%20without%20piercing%20the%20skin.
12. Health, C. for D. and R. (2024). Do Not Use Smartwatches or Smart Rings to Measure Blood Glucose Levels: FDA Safety Communication. FDA. https://www.fda.gov/medical-devices/safety-communications/do-not-use-smartwatches-or-smart-rings-measure-blood-glucose-levels-fda-safety-communication
13. Mihai, D. A., Stefan, D. S., Stegaru, D., Bernea, G. E., Vacaroiu, I. A., Papacocea, T., Lupușoru, M. O. D., Nica, A. E., Stiru, O., Dragos, D., & Olaru, O. G. (2022). Continuous glucose monitoring devices: A brief presentation (Review). Experimental and Therapeutic Medicine, 23(2), 174. https://doi.org/10.3892/etm.2021.11097
14. Russell, S. (2023). Continuous glucose monitoring. National Institute of Diabetes and Digestive andKidneyDiseases.https://www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/continuous-glucose-monitoring
15. Health, C. for D. and R. (2019, May 3). Blood Glucose Monitoring Devices. FDA. https://www.fda.gov/medical-devices/in-vitro-diagnostics/blood-glucose-monitoring-devices
16. 6 Things to Know About Wearing a Continuous Glucose Monitor. (2024, February 26). DiaTribe; diaTribe.https://diatribe.org/diabetes-technology/6-things-know-about-wearing-continuous-glucose-monitor
17. Medications to Avoid When Wearing a Continuous Glucose Monitor. (2023, June 12). DiaTribe; diaTribe.https://diatribe.org/diabetes-technology/medications-avoid-when-wearing-continuous-glucose-monitor
18. Team, O. (2023, June 21). Oura Now Integrates with Continuous Glucose Monitors (CGMs). The Pulse Blog. https://ouraring.com/blog/oura-integrations-continuous-glucose-monitors-cgms/

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Understanding HRV and Using it in Practice.

An interview with Mike T Nelson

Highlights from The Sports Pharmacy Network Podcast

Hosted by Sean Casey, RD CSCS

The Sports Pharmacy Network Podcast brings you dynamic conversations at the intersection of sports and healthcare. Join our team as they sit down with a variety of expert guests, including pharmacists, physicians, dietitians, athletic trainers, mental health professionals, and other specialists, to explore the latest in sports medicine and athlete care. Whether you're a healthcare professional, athlete, or sports enthusiast, the Sports Pharmacy Network Podcast is your go-to resource for optimizing health and performance.

Guest: Dr. Mike T Nelson
Dr. Mike T. Nelson has spent 18 years of his life learning how the human body works, specifically focusing on how to properly condition it to burn fat and become stronger, more flexible, and healthier. He's been called on to share his techniques with top government agencies, universities and colleges, fitness organizations and fanatics. The techniques he's developed, and the results Mike gets for his clients have been featured in international magazines, in scientific publications, and on websites across the globe.

Host: Sean Casey, RD CSCS
Sean Casey is a registered dietitian and physical preparation coach who works with everyone from middle/high school athletes to Olympians including an Olympic Gold Medalist. His expertise is sought after on the international level where he has traveled to 15 countries helping clients reach their athletic potential through nutrition, physical training and recovery techniques. Additionally, Sean serves as the Chief Science Officer (CSO) with the Sports Pharmacy Network.

Sean Casey: Honored to have my good friend and brilliant mind, Dr. Mike T. Nelson on the show today. Mike, you have one of the most eclectic backgrounds that I know in the field of human performance and optimizing health and wellness. Can you share a little bit more about your background?

Dr. Mike T Nelson: Academically I did a Bachelor of Arts in Natural Science, minor in chemis-try and mathematics, and then I did two years postgraduate work. This was followed by two and a half years for a master's in mechanical engineering. I later went back to school to do a PhD in biomedical engineering. Spent four- or five-years doing PhD work in that area before deciding that I didn't want to do any more math, which led me to pursue a PhD in exercise physiology where I studied heart rate variability and metabolic flexibility.

Sean: You mentioned doing your PhD work in Heart Rate Variability (HRV). Now I feel that, at least in terms of general pop, HRV has become a bigger thing in the last five years or so, especially within the fitness community. But how long has HRV been around? And what exactly is HRV?

Dr. Nelson: The earliest concept I can find of HRV dates to an ancient Chinese proverb which said something like, "*if their heart beats like a metronome, their time is very limited*". However it wasn't formerly used as it is now until about the 1960s. At this time, it was used in the Russian cosmonaut program where they measured the RR intervals of a heart EKG line over time, they could see the beat-to-beat variability.

The assumption for most individuals was that if you measured something at rest, it's just like a metronome. In other words, it's a consistent 62 beats per minute. And what they found was that's not true. Even in a complete resting state, in a healthy person, your heart rate might be 59.5, 60.4, 61.2, 61.7. In short, it varies a little bit beat to beat.

And as it turns out, this HRV score not only tells about the status of the heart, but it tells the status of the autonomic nervous system as a whole. Your autonomic nervous system has two branches – the sympathetic and parasympathetic system.

Using a car analogy, the parasympathetic branch is like stepping on the brake of the car. If you step on the brake harder, the car is going to slow down. This is classically called your rest and digest branch of your nervous system, which is the parasympathetic side.

The sympathetic or stress side is like the gas pedal on the car. If you step on the gas harder, you're going to increase stress on the engine, but you're going to get a little bit more performance from it. So that stress side of the equation is the sympathetic side.

And when you're looking at heart rate variability, you're doing a variability analysis. So you're looking at how much the heart rate varies just a tiny bit at rest from one beat to the next.

The more fine scale variability you have, the more you're on that parasympathetic side.

Sean: That's interesting – did not realize how long it had been around. Now there are a lot of monitors on the market - Polar, whoop, etc. Are there certain things that one should look for when deciding which type to get?

Dr. Nelson: Yeah, I mean, the biggest thing is just ask the company how they verify their heart rate variability and what it is based on. Most good companies who have spent the money to do that will tell you. Again, you're not asking for their proprietary algorithm, and you may not even understand anything they come back and tell you. But the fact that they gave you something and told you that is usually, I'd say useful.

Sean: Does it matter which device you use to assess HRV?

Dr. Nelson: So my criticism of HRV is there's two main ways to assess it which affects results. One you're going to pull the electrical signal directly as is the case with Polar. You're taking the electrical signal directly off the cardiac system or you're going to use with someone of a surrogate model.

The other method is optical. I have a Garmin and an Oura ring. What you'll see looking at the back of these is a little light in the back. This light shines through the skin and it's not looking for electrical signals. It's looking for that pulse wave of that pressure that's created in the vessel. Each time your heart beats, you're going to see a spike in the pressure wave and that's going to drop down again. So newer devices are using just that optical sensor and a lot of times they're using it at distal places.

In truth, the wrist is actually a horrible place to try to get a clean signal.

Oura was founded by using a ring because they can get access to the vessel right below in the finger. It's a lot closer to the skin. It's actually not nearly as variable as the wrist. There has been some pretty decent algorithms and technology advancements that have enhanced the accuracy of the optical sensors. I'd say that probably wasn't really true even four years ago. So that's good.

That said, I'd still say electrical is probably still a little bit better to assess vs. optical.

Sean: Ok, so let's say someone has gotten either something like a Polar which uses an electrical signal or one that uses an optical sensor. What are the next considerations one should consider?

Dr. Nelson: The next part then is, okay, so. you've accurately grabbed the signal, whether it's using optical

or electrical. But are you making sure that that thing doesn't have a ton of noise on it? Because even if you inject just one sort of poor interval into a 60 second data capture, you can see radically different scores/outputs. You wanna make sure that what you're measuring is actually the thing you think you're measuring – your autonomic nervous system vs. an artifact.

For instance, some of the more popular wrist devices currently, for whatever reason, appear to grab HRV at all sorts of wonky times. They appear to have the technology to get it relatively accurately. But again they're gathering it at different times. And if you're doing exercise, then you're going to be more sympathetic. If you're sleeping, hopefully you're going to be more parasympathetic. So again, that doesn't necessarily mean that if you grab an HRV data point from those two things that it's wrong per say, you just got to understand when it's pulling the numbers.

Sean: In other words, it's like comparing someone's vertical jump score when they're dead tired vs. when they're fresh – you can't really compare the numbers.

Dr. Nelson: Exactly! You have to take into context what's going on. So again, my bias is doing the measurement after the most stable period, which is either going to be first thing in the morning, or grab it over the course of the night.

If you are grabbing it over the course of sleep, you're still introducing more variables to interpret in context of your HRV score which can skew things. In other words, how was your sleep? How many times did you get up? If you go to bed at different times every night, what part of your sleep cycle is the data

being pulled from. These are all considerations when interpreting scores.

Sean: Great info – make sense why you're such of fan of grabbing it during stable periods. Assuming one obtains data at same time and device is accurate, how exactly should someone go about interpreting HRV and what it means for their health performance?

Dr. Nelson: So across the board, the higher the number, the more you're on the parasympathetic rest digest recovery side. The lower the number, the more you have lost fine scale variability. Therefore, you're on more of the sympathetic stress side. My other little, I call it the golden rule of HRV is whatever number you get is only "accurate" at the time that the device grabbed that data.

So what you see is an instantaneous point in time. Granted, this may be averaged over sleep or it could be command and measurement in the morning, but it's really only telling you the status of your autonomic nervous system at that point in time. Now I would argue that if you are at a stable baseline, that's still a really good marker. It's still telling me the baseline status of my nervous system before I do anything, before I exercise, do a lot of movement, drink coffee, whatever. You can take actionable steps based on this.

For example, I use it with clients to help them determine how they're going to train.

Case in point - if someone's HRV shows that they're really stressed and today is supposed to be a heavy deadlift day and tomorrow's an easy cardio day, I'm probably going to have them flip those days.

HRV can also help on behavior change as a client may be like "*Cool, I've been focusing more on micronutrition, more magnesium, etc. and over the last two weeks I can see my HRV is a little bit higher in the morning. I may not feel a ton better yet, but I can show that my nervous system and my body is responding better to these things*." So you can use it for both performance and also more on the lifestyle side of the equation too.

Sean: Now, as we're looking at these numbers and you mentioned how a higher HRV reflects being more recovered on the parasympathetic side of things. A question I get asked a lot is, "*Can you go too high on the opposite side with the parasympathetic?*"

Dr. Nelson: The short answer is yes. So when I first started doing this stuff, I was like, oh cool, HRV is a marker of recovery. So more recovery equals more parasympathetic, less recovery equals more sympathetic. Using myself for example, approximately 10 years ago I was training for just a novice strongman competition and it was winter in Minnesota. So I thought to myself,

Well, I'll just do Trap Bar Deadlifts at 225 for reps of 25 as fast as I can. And then I'll rest a little bit and then I'll do it again. I'm trying to stimulate that 60 second kind of medley type thing with a moderately heavy load. I did that which is absolutely freaking horrible. Not fun at all. But the next day I was like, "WOW, my HRV is a little bit higher. Oh, this is weird, okay."

Next week comes and rolls around again, let's do the same thing again. "Wow, my HRV is a little bit higher the next day." So, here I go thinking, maybe this is some weird advanced recovery technique no one's figured out yet. So, I start adding another day of it. And then I add another day. And still, each day, HRV goes up the next day.

Fast forward a bit and now I'm six weeks into this, I'm like, man, I don't feel very good. Like, I feel like I've got hit by a truck.

I'm having to sleep 10.5 to 11 hours a night to be functional. I'm drinking like three more cups of coffee than usual. And I thought, "Maybe I should look at my overall HRV trend and not just the next day measurement for the past six weeks."

It was basically up and down, but the whole trend was like straight down. Looking at long term data, the day following my 225 for reps on the trapbar, my parasympathetic increase the next day was on average, like eight to 10 points, which on that scale is pretty darn significant. But it would then drop almost 12 to 13 points the following day. So you can definitely go too far. As it relates to research on this, there's only like two pieces of data I've seen. It's something called a parasympathetic overreach.

But I've seen it in clients like a fair amount. So if you have a really, really stressful day and someone who's generally healthy, they'll kind of overshoot into that parasympathetic range the next day. And if everything goes well, they'll kind of come back to baseline. If you continue with the stressors like I was doing it'll tank further down the next day.

Sean: Now let's say the sports pharmacist, coach or whoever is monitoring the athlete's load notices things are trending downward without bouncing back up. How should they adjust based off what they're seeing with the numbers?

Dr. Nelson: Yeah, so a downward trend means you're more on the sympathetic side. So to increase more parasympathetic tone or just help you get back to baseline faster you need to focus on nutritional things like protein, micronutrition, fruits, vegetables, etc.

Also, I think caloric surplus is highly underrated as a way to help with recovery, which many times gets missed. Sometimes athletes are just unfortunately in a caloric deficit, not necessarily on purpose, which gets into the whole, RED's syndrome and all that kind of stuff.

Outside of that, sleep is a big one. Just simple metric. What time you went to bed? What time you got up?

If your actual time in bed is five hours, I don't care how amazing your sleep is, you're going to need more sleep than that.

As much as I love coffee and other stimulants, if you're living on them, that's a sign that you're just adding more sympathetic stressors. So slowly pair back on that. Note of caution, don't go drink four cups of coffee today and try to abstain from caffeine the next day.

I'll also program in Zone 2 work. Walking is highly underrated for recovery. Just go take a walk outside in nature. When you're moving and looking at nature, you have something called optic flow.

Your brain has to figure out, are you moving through the environment or is the environment kind of moving past you? And so seeing stuff go by in your peripheral vision at a low rate is also more parasympathetic. Being outside, looking far away, low level movement, all that kind of stuff.

If you have access to a sauna, breath work, meditation, prayer, all that stuff can be beneficial on the recovery side.

Usually that'll make the biggest change while at least temporarily removing some of the high sympathetic things.

If training, either flip days or just cut the volume in half.

If you run into this chronically and people are like, well, you know, my sleep's pretty good, nutrition's pretty good, like everything's pretty good. Then I'm starting to think about, OK, you as a system, like what things are you missing?

And so for chronic adaptations, one of the major "system" issues I'm looking at is what is your aerobic system? What is your VO2 max? And if your VO2 max is 22, I can guarantee that you're just not going to be able to handle a lot of stressors and you just need to increase that.

Sean: Love those recovery techniques! Now turning to HRV on more of the medical end.

How do health conditions affect HRV? Is there anything that sports pharmacists, coaches and other members of an individual's performance or care team should be aware of?

Dr. Nelson: There's a fair amount of data showing that HRV in general with almost any pathology will trend down. It will trend to be more sympathetic, which again is your body's simple survival mechanism. If your glycemic variability is like a roller coaster all day, then that is 100% a definite stressor on your system and you will see lower HRV because of that.

The hard part is all of that becomes highly individual and it's hard to correlate them exactly. So usually with that, if someone is a type two diabetic, for example, I'm thinking, "How's your A1C? How's your blood glucose?" Maybe we have glycemic variability and maybe we have Glycomark test. Maybe we've got some other markers. As those things improve, in general, we should see HRV will also improve.

If HRV is changing and there's no other dramatic stressors that we're aware of, then in some rare cases, I've sent them back to their physician sooner. Like, hey, let's look at some of these other markers, know, insulin, C-peptide, et cetera. There might be some change that we're not seeing right now.

Sean: What about medications effect on HRV?

Dr. Nelson: Some medications will dramatically affect HRV. For example, ADHD meds will absolutely crush your heart rate variability. And it makes sense because what are they doing? They're basically ramping up your sympathetic nervous system. I worked with a guy recently who was on the highest dose of his

> HRV is still really powerful because it's going to give you the status of your autonomic nervous system, and when you understand the context and how that is applied, I do think it is an extremely useful tool.

ADHD medication. He ended up cutting his medication dose down and his HRV went from 20's to upper 40's in a short period of time.

Medications like semiglutide, or any of those types of drugs, you will see resting heart rate go up and you will see HRV go down. I've talked to Joel Jamieson a fair amount about this too. As far as I can tell, no one's really sure why this is taking place. Now it could be that we just slashed a whole bunch of calories out of your diet because that will definitely do it.

But my gut feeling is there's probably something more than that. But those are kind of the main two that I see quite often.

Sean: Okay, so it's being aware of how medications may alter someone's baseline HRV and potentially add in more rest/recovery days just to try to help that stabilize a little bit more.

Dr. Nelson: Yeah, at least know that you'll need to establish a new baseline. Because people are like, "what do I do now?" I'm like, well, just be aware that that's, we just can't use your old baseline. Let's say if you were in the 40s and now you're on Vyvanse and you're in the 20s, we can't assume that you're going to hit 40 again on that drug. Overtime you may do some aerobic training and a whole bunch of other stuff to increase it, but you're talking like months to years and you may never get back that original number.

So for the intermediate time when you're on that medication just be aware that is your new baseline. Work off that and try not to use that old baseline because that didn't have the drug taken into account with it.

Sean: Great info as always Mike! As we're closing, I want to give your newsletter a shoutout. You're one of four newsletters that I actually subscribe to because I love the content. Where can people go to access that and all the other stuff you're doing?

Dr. Nelson: Yeah, best place is probably the newsletter. Just go to miketnelson.com. There'll be a little tab up near the top that says newsletter. You can hop on there for free. I do have some other stuff on Instagram, which is @drmiketnelson. And then I also have a podcast, which is the Flex Diet podcast, which you can on the old iTunes.

Sean: Good deal. Well, Dr. Mike, as though it's been a pleasure talking with you, a lot of great information in terms of HRV. Is there any closing things that you want to share before we wrap things up?

Dr. Nelson: HRV is still really powerful because it's going to give you the status of your autonomic nervous system, and when you understand the context and how that is applied, I do think it is an extremely useful tool.

This transcript is based on a podcast episode and has been edited for length and readability. While we have made every effort to accurately capture the essence of the conversation, certain sections have been modified or condensed to enhance clarity and flow. Some filler words, pauses, and non-verbal cues have been omitted. The views and opinions expressed in this interview are those of the speakers and do not necessarily reflect the official policy or position of the podcast producers or the Sports Pharmacy Magazine. Please visit sportsrxnetwork.com to listen to the full episode.

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How to use Technology to Optimize Athlete Recovery and Sleep

By TrueSport

AUTHOR BIO:

The TrueSport mission is simple and bold: to change the culture of youth sport by providing powerful educational tools to equip young athletes with the resources to build life skills and core values for success on and off the field. TrueSport is founded on three cornerstones: sportsmanship, Character Building & Life Skills, and Clean & Healthy Performance. We're powered by the experience and values of USADA (U.S. Anti-Doping Agency) – the country's most trusted guardian of sport dedicated to preserving the integrity of competition at every level – and entrusted by the United States Congress to promote a positive youth sports experience through the provision of educational materials that reflect the TrueSport cornerstones.

It's no secret: We know that sleep is an athlete's superpower. Athletes who get enough sleep and have good sleep hygiene are able to recover faster, while those with poor sleep quality tend to be injured more and recover slower.

So, is it important to know exactly how well you're sleeping? Most smartwatches will give you a rough estimate of how much you're sleeping, and some wearables will go even more in-depth on sleep data. There are even apps that can run on your phone if you sleep with it close by that can track your sleep. But are any of them accurate—and does the information that they provide really matter?

Here, Dr. Laura Lewis, the Director of Science at the U.S. Anti-Doping Agency (USADA), busts some myths around sleep trackers and explains the situations where they might actually be useful.

Are Athletes Actually Sleeping Well?

Unfortunately, many studies have found that athletes are actually some of the worst sleepers compared to the rest of the population, though it's unclear why this happens. Athletes often report increased sleepiness during the day. And certain athletes are even at higher risk of sleep issues like sleep apnea, which can lead to even worse sleep and require medical intervention.

Sleep is critical for physical recovery as well as mental health. And young athletes need even more sleep than adult athletes. For example, it is recommended that teenagers get 8 to 10 hours of sleep every night for optimum health, not the 7 to 9 hours recommended for adults. This can be tough, especially if athletes are doing a school sport and a club sport in addition to schoolwork, other extracurriculars, a part-time job, and/or maintaining a social life.

If athletes are only spending six hours in bed every night, they don't need a sleep tracker to tell them that their sleep is inadequate. They just need more hours.

While athletes may not be able to control the amount of time they have to sleep every night, there are ways they can practice good sleep hygiene and set themselves up for sleep success.

What is Good Sleep Hygiene?

"I don't think young athletes need to get too scientific with their sleep tracking if they're not even doing the basics," says Lewis.

Before you spend money on trackers or wearables for sleep data, make sure you're doing the basic things that will improve your sleep. That means sleeping in a quiet, dark, cool room, says Lewis. It also means keeping your phone away from you at night if possible—or at least, make sure it's set to 'do not disturb' mode. On that note, sleep trackers that are app-based may not be a good idea for someone who struggles to put the phone away at night.

The type of sleep you're getting matters as well. There are three primary sleep stages: light/deeper, REM, and deep sleep. Light/deeper sleep is the bulk of the sleeping that you do, and it's where memories are consolidated. REM—rapid eye movement—sleep is when you dream and is not particularly restful. Deep sleep is the most important for athletes, since it's when the body repairs and regrows tissues, builds bone and muscle, and

strengthens the immune system. It's also the hardest stage to get to, and that's why the amount of time you're able to spend in an optimal sleep environment matters so much. If you're constantly being woken up by notifications on your phone or a light outside your window, you're less likely to experience much deep sleep.

What Are Sleep Trackers Doing?

Sleep tracking is still not a perfect science unless you're doing a sleep study in a lab. Lewis is quick to note that wearable sleep trackers and sleep tracking apps are not a substitute for clinical sleep studies, which monitor your brain, heart, and breathing while you sleep. Most wearables and sleep trackers work simply by tracking your movement when you sleep, gauging your sleep quality by how still or how restless you are.

"Most smartwatches and apps are only looking at if you're moving," says Lewis. "So, they're not perfectly accurate: Many can't tell if you're really asleep, or if you're just lying still."

Some of the more expensive wearables use heart rate variability, body temperature, breathing rate and movement to track your sleep, which leads to a more in-depth analysis of how much deep sleep, light sleep, and REM sleep you're getting.

If you suspect you have a sleep disorder like sleep apnea or are struggling with insomnia, Lewis notes that you shouldn't rely on a sleep tracker to diagnose any issues. Instead, talk to your doctor.

Are There Any Downsides to Sleep Trackers?

Sometimes, the obsession with sleeping better can actually lead to sleeping worse! Research published in the Journal of Clinical Sleep Medicine argues that for many people, sleep trackers can lead to orthosomnia, or an unhealthy obsession with your sleep stats.

"Patients are preoccupied or concerned with improving or perfecting their wearable sleep data," the researchers note. If you tend to be a perfectionist, or you find that seeing that you had 'poor sleep' is upsetting, it might be a good idea to stop tracking your sleep.

Furthermore, sleep trackers are notoriously inaccurate, and if you stop tuning in to how tired you actually feel in the morning, the information from them can negatively affect your day. For example, if you wake up and feel well-rested and excited for practice, but then see that your smartwatch reported you only slept five hours and much of it was poor quality, you may ignore how good you feel and believe that you are more tired. On the other hand, you may wake up feeling groggy and exhausted, but your wearable's sleep data assures you that you had a great night of sleep—so you push through practice despite feeling terrible.

"It's so important that athletes focus first and foremost on how they actually feel, and tune into that rather than relying on a wearable to tell them how they're feeling," says Lewis. If you do use a sleep tracker, try an experiment: Every morning, before you check your sleep data, write a quick note about how tired/awake you feel and then check your data. Does it align? If it doesn't, take the sleep tracker's information with a grain of salt: These devices aren't foolproof.

Are Sleep Trackers Worth the Money?

It depends. If your budget is tight, then spend money on creating a better environment to sleep in rather than a way to track your sleep. "Really good blackout blinds would be a better purchase if you don't already have a room that's entirely dark," says Lewis. The wearables that do track sleep using more than just movement in bed are often expensive and subscription-based, so you'll continue to pay for them on a monthly basis.

Phone apps that track sleep are the cheapest sleep tracking option, but proceed with caution, says Lewis. "For most people, having the phone outside of the bedroom is better for sleep than having it next to you all night," she says. If you do use a sleep tracking app, consider setting time limits on all the other apps on your phone that you may be tempted to use.

Ultimately, sleep trackers may be helpful in providing reminders about spending more time in bed (remember, eight hours in bed doesn't equal eight hours of sleep!). Knowing that it's being tracked may help you stick to your bedtime schedule. But if you're already sleeping as much as you can given the time that you have available, a sleep tracker telling you that you need more sleep may not be very helpful.

Takeaway

While sleep trackers may provide some helpful information around quantity and quality of sleep, they do come with some potential downsides. Before considering a wearable, prioritize basic sleep hygiene and bedtime protocols.

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