

Poll: Nine in 10 sports fans say NFL brain injuries are a problem, but 74 percent are still football fans

By Adam Kilgore and Scott Clement September 6 at 10:00 AM

Six in 10 Americans say they are fans of pro football, far outpacing professional baseball and basketball. (Ross D. Franklin/Associated Press)

As the National Football League opens its season Thursday night, the league faces myriad challenges. A growing body of science connects playing football to dire brain-related health risks. Ratings sagged last season. Quality of play has been scrutinized. Another high-profile player finds himself enmeshed in a domestic-abuse scandal. Some fans are upset about players protesting during the national anthem, and others are angry Colin Kaepernick does not have a job.

Despite those issues and other apparent threats to the league's health, Americans' zeal for football has shown no sign of abating. Professional football remains the most followed sport in America by a wide margin, and its massive popularity has not waned in recent years, according to a nationwide poll conducted in August by The Washington Post and the University of Massachusetts Lowell.

[Read The Post-UMass Lowell poll results | How the poll was conducted]

Six in 10 Americans say they are fans of professional football, roughly similar to polls in 2012 and up from 50 percent in a 2008 Post poll. Fandom for professional football far outpaces professional baseball at 45 percent of Americans and professional basketball at 39 percent. Asked which sport is their favorite to watch, 37 percent say football, little changed from 35 percent in a 2012 Post poll and more than triple the percentage who pick baseball or basketball.

Football's dangers and drawbacks have not turned away younger fans poised to become the NFL's core fan base. Among Americans between the ages of 18 and 29, 61 percent say they are football fans, roughly the same as the public overall. Furthermore, adults under age 30 are the most likely age demographic to say their interest in football has increased, at 41 percent.

Poll results indicated professional football fans recognize the danger the sport poses to its players but have chosen to watch, anyway. In July, neuropathologist Anne McKee published a study in the *Journal of the American Medical Association* in which 110 of 111 brains of former football players had chronic traumatic encephalopathy, or CTE, a degenerative brain disease associated with hits to the head. While the study was limited to brains donated by players' family members, the results built on an already large body of science connecting football to long-term brain damage.

Americans believe the science by overwhelming majority: 83 percent believe it is either certainly true (45 percent) or probably true that playing football causes brain injuries. Among sports fans, 90 percent say head injuries causing long-term health problems for

players is a problem for professional football. Fully 76 percent say it is a major problem, the highest level of concern among nine problems tested in The Post-UMass Lowell poll.

But the acknowledgment of problems has not prevented Americans from watching. Among those who say head injuries are a major problem, 74 percent identify themselves as football fans, 40 percent called themselves “big football fans” and 44 percent say football is their favorite sport to watch.

Toni Hendershot, a 70-year-old from Montana, said she and her family prohibited her grandson from playing football after watching the movie “Concussion,” a film based on the true story of a doctor’s struggle to get the NFL to recognize the threat of CTE.

Hendershot still watches two or three NFL games a week, reconciling the health risks players accept because of the financial incentive.

“What I struggle with is the fact that they are adult men and they should be making good choices for their long-term health,” Hendershot said. “But since it is their long-term health, I shouldn’t be expected to pay for it. I don’t have a problem watching it if they are dumb enough to make those choices for the big bucks.”

While football has retained its popularity, at least some Americans are turning away. More than 1 in 5, 23 percent, say their interest in professional football has decreased in recent years, up from 13 percent in 2012. When asked an open-ended question about why their interest had decreased, 24 percent cite politics, including 17 percent naming the national anthem protests that Kaepernick initiated last preseason. Some 10 percent of those with decreased interest say there are too many penalties or delays. Just 7 percent cite injuries.

[Analysis: Kaepernick remains unemployed, and that’s a bad look for the NFL]

The poll finds 45 percent of Americans say the NFL is doing “too little” to prevent concussions and head injuries among players while 40 percent say they are doing the right amount. That marks a shift from 2011, when an Associated Press survey found 57 percent saying the NFL is doing the right amount.

Concerns about head injuries rank as the biggest problem tested in the survey, but the Post-UMass Lowell poll also finds roughly 6 in 10 sports fans say violent crime and domestic violence committed by players are major problems for the sport. Among lesser concerns, 40 percent say players being paid too much is a major problem, followed by 36 percent who say the same about players speaking out about politics and about 2 in 10 who say low quality of play or the number of penalties during games are major problems.

Television ratings dipped last season, dropping by 9 percent in the regular season and 6 percent in the playoffs. CBS Sports Chairman Sean McManus pointed to several factors that suggest the decrease was temporary.

The biggest reason NFL ratings dropped, McManus said, was the attention viewers paid to the presidential election instead. He also cited the absence of Peyton Manning (retirement), Tom Brady (four-game suspension) and J.J. Watt (injury); the appeal of the Chicago Cubs' World Series run; and a string of non-competitive prime-time games.

"I think those are all factors that contribute to it," McManus said. "Listen, I think the ratings will come back. You've got to look at this relatively speaking: The NFL ratings are still, far and away, the most attractive programming in all of television by a huge margin. So the fact that ratings were down marginally are still of concern. We'd rather be up than down, but nobody is panicking and saying the NFL is slipping in terms of its popularity or in terms of its dominance, relatively speaking to what else is on in television."

[2017 NFL Power Rankings: The New England Patriots have lapped the field]

The Post-UMass Lowell poll was conducted Aug. 14-21 among a random national sample of 1,000 adults reached on cellular and landline phones. The margin of sampling error for overall results is plus or minus 3.7 percentage points, and is 4.7 points among the sample of 598 football fans.

Demographic breakdowns of Americans' responses revealed several striking results. While 14 percent of football fans from the South say their interest in professional football has decreased in recent years, this rises to 26 percent in the West.

Nearly a quarter of suburban football fans (24 percent) say their interest in pro football decreased, compared with 12 percent of urban fans.

Among non-white pro football fans, 29 percent say their interest has increased, while 11 percent say it has decreased. Conversely, 17 percent of white football fans say their interest has increased, while a similar 22 percent say it has decreased.

Beetroot and Coffee: Football's Nutritional Sports Science

ROSS EDGLEY AUGUST 21, 2017

Football is no longer won and lost on the pitch. If you ask a performance nutritionist, it's won or lost in the fridge, cupboards and anywhere food is served to players. That's because nutrition and supplementation today is barely recognisable from the days when oranges were served at half-time and a bottle of whiskey was kept in the changing room to warm players up before a match.

But can an army of nutritionists and culinary experts really make a difference? Will the latest pills and potions improve a team's performance? Or does none of this matter in the beautiful game if you're genetically predestined to be a legend with the ball at your feet? Take for example Dino Zoff's admiration of Paul Gascoigne: "He ate ice cream for breakfast, drank beer for lunch ... But as a player? Oh, beautiful, beautiful. I loved that boy," the former Lazio manager said, according to ESPN.co.uk.

In exploring the evolution of nutritional science in sport, we examined how food in football has progressed since the days of counting calories and force-feeding players giant bowls of pasta. We also identified teams with a dietary advantage thanks to their culinary preparation during training and on matchdays and tried to quantify how much of a difference it makes.

Calories

A player's energy reserves for 90 minutes are determined long before he laces up his boots and steps foot on the pitch. That assessment is based on a field of nutrition called bioenergetics, which is the study of the transformation of energy in living organisms—basically, how players take calories from the food they eat and convert them into energy. This is simply ensuring calories in equals calories out.

Research published in the *Journal of Strength and Conditioning Research* that analysed the diets of young professional football players for one week found that despite eating 2,831 calories per day on average, "A mean daily energy deficit ... existed because daily energy expenditures exceeded that of intake." So, despite consuming that many calories, the players were still burning more than they were eating.

Why? Because unlike in many other sports, football consists of intermittent, repeated episodes of both low and high-intensity activity. Periods of walking and light jogging are coupled with sprints at maximal effort, training up to five days a week and a match at weekends. All this equates to a mountain of calories burned. This is why—again, on a basic level—although Gascoigne's diet would never be considered healthy or optimal, at least he was meeting his calorie requirements for the day.

His breakfast of ice cream was calorie-dense, and considering alcohol comes a close second to dietary fat in terms of its calorie density—roughly seven calories per gram—it's easy to see how he could have consumed more than the 2,831 calories mentioned in the *Journal of Strength and Conditioning Research*.

Carbohydrates

Many traditional sports nutritionists claim carbohydrates are a footballer's primary fuel source. What this means is training and matches should be powered with a plentiful supply of high-carbohydrate foods like pasta, cereals and rice, since it's these food choices that ensure muscles' energy reserves—known as muscle glycogen—are adequately full and able to continue to work at a fast pace.

For those who aren't aware of what happens to the body when it's completely depleted of carbohydrates and muscle glycogen, take a look at this video of the 1997 Ironman World Championship featuring Wendy Ingraham and Sian Welch. It's aptly titled "The Crawl," and you'll see why.

The *Los Angeles Times* reported in 2007 that over 40 years prior, Dr. J. Robert Cade had invented the first carbohydrate-enriched sports drink to "help the University of Florida football team stay hydrated and in turn inspired the multimillion-dollar sports beverage industry." It was arguably the first sports supplement. Research conducted by the Graduate Department of Community Health at the University of Toronto in Ontario analysed the impact 0.5 litres of a 7 per cent glucose (sugar) polymer solution 10 minutes before the game and at half-time had on a player's performance. The results: Muscle biopsies indicated the supplementation slowed the muscle glycogen depletion.

What this means is if you slow muscle glycogen depletion, you also slow the time it takes to fatigue. According to research by the Institute of Food, Nutrition and Human Health at Massey University in New Zealand, this in turn enables players "with compromised glycogen stores to better maintain skill and sprint performance."

These findings were supported by a second study—again conducted at the Institute of Food, Nutrition and Human Health—that examined the effect of ingesting a carbohydrate-electrolyte solution during the 90-minute Loughborough Intermittent Shuttle Test on football skill performance. Results revealed there was "a 3 per cent reduction in skill performance from before to after exercise in the carbohydrate-electrolyte trial, whereas in the placebo trial the decrease was 14 per cent." This led scientists to conclude "skill performance during the simulated soccer activity appeared to deteriorate in the last 15-30 minutes of exercise. However, providing 52 grams of carbohydrate during exercise showed a tendency to better maintain soccer skill performance than a taste-matched placebo."

This is why when heading into extra time—or even penalties—the winning team might not necessarily be the most skilled but rather the most fuelled. The club's water-carrier becomes the most valuable member of the squad, and the contents of each sports bottle could be the difference between a 3 per cent reduction in performance and a 14 per cent one.

Fats

But how did the Norwegian football team Stromsgodset win the league cup in 2013 for the first time since 1970 on a diet that was void of any large amounts of carbohydrates? Where was the 14 per cent reduction in performance? In fact, how was it that *Health and Living News* reported they "'steamrolled' their opponents during an impressive final 45 minutes" of their winning game?

"Fat" is the short answer. It's something Timothy Noakes—one of the most respected experts in the field of low-carbohydrate, high-fat diets—has been telling athletes from all sports for years.

This is because, according to research published by Nutrition Focus New Zealand Limited, "the number of grueling events that challenge the limits of human endurance is increasing. Such events are also challenging the limits of current dietary recommendations." Scientists concluded that although carbohydrate-loading has been a widely used performance-enhancing approach to nutrition for years, "there are some situations for which alternative dietary options are beneficial." One of those circumstances is perhaps best described in the journal *Human Muscle Fatigue: Physiological Mechanisms*. Scientists noted the energy needed to sustain exercise for longer periods of time comes from the oxidation of two fuels: glucose—carbohydrates—and long-chain fatty acids.

What they found was the latter is arguably a more sustainable and efficient fuel source since it provides the "largest energy reserve in the body" and can supply enough energy to last five days. Typically, this approach has been thought to be useful for marathons and ultra-marathons, so in theory, it would mean fuelling a footballer for 90 minutes should be easy.

Caffeine

In 2017, it seems most clubs are thinking beyond calories, carbohydrates and fats and turning their attention to anything that will give them a competitive edge. In 2012, that something was caffeine, according to the Independent, which reported "England right-back Glen Johnson told BBC 5 Live after Wednesday's 1-1 draw with Poland that some of the players had taken caffeine pills before the postponed World Cup qualifier."

Rio Ferdinand tweeted at the time it had been prevalent in football for some time.

Testing positive for excessive levels of caffeine was removed from the World Anti-Doping Agency banned list in 2004. The supplement has since become one of the most used in sport. For good reason too, since according to research conducted by the Division of Sport and Exercise Science at the University of Luton, caffeine can reduce a footballer's perception to fatigue by stimulating the production of the neurotransmitter beta-endorphin.

Couple these findings with research published in the *British Journal of Sports Medicine* that showed taking caffeine with carbohydrates helped spare muscle glycogen stores by encouraging your body to burn stored fat as fuel, essentially saving your muscle glycogen for extra time or those maximal intensity sprints. This is why James Collins, who is Arsenal's nutrition expert and held the same title for England at the last World Cup, was quoted in the *Telegraph* in 2015 saying, "Players will only use carbohydrate or caffeine gels in a match if they have practiced using them in training. We know that getting this right at half-time can have a big impact on energy levels later in the second half."

Beetroot

Following Leicester City's historic league win in 2016, the BBC published an article titled "Leicester City: The science behind their Premier League title." Within it, Leicester was noted to have "suffered the fewest injuries" in the Premier League, according to Physiroom.com, despite limited resources and a fast counter-attacking game. The article also mentioned that, "according to scientists at the University of Exeter, drinking [beetroot juice] improves sprint performance and decision-making."

Research in the *European Journal of Applied Physiology* found "beetroot juice supplementation attenuated muscle soreness" in "recreationally active males." It also stated "further research on the anti-inflammatory effects of beetroot juice are required to elucidate the precise mechanisms."

Next, according to the American College of Cardiology, just "one week of daily dosing [with beetroot juice] significantly improves submaximal aerobic endurance." It's worth noting this study featured elderly test subjects, but it has since been supported by published work in the *International Journal of Sports Physiology and Performance*, which tested elite rowers.

So, those small shots of vegetable juice have the potential to reduce muscle soreness and increase stamina. Also, Leicester City's success shows maybe sports nutrition doesn't have to be quantified and proved. Instead, just a willingness to test and trial new methods could pay dividends.

The Future

As is obvious from the aforementioned research—and real-life case studies—nutrition in football is evolving. It's far from an exact science, though, which is why as the sport develops, so should each team's approach to nutrition. Arsene Wenger has notably pioneered advancements in his years with Arsenal, as he told FourFourTwo.com: "Food is like kerosene. If you put the wrong one in your car, it's not as quick as it should be."

Leicester City were fuelled for success. Matt Dunham/Associated Press

In summary, it seems nutritional science can be a secret weapon if coaches and teams are prepared to explore the possibilities. From Stromsgodset to Leicester City, the winning team will often be the most reactive, adaptable and willing to try new dietary protocols.

Japan Rising Star Project aims to maximize nation's young talent

BY KAZ NAGATSUKA

STAFF WRITER

Sometimes, the sport you are playing might not be the right fit for you, and you might have the potential to excel in something else.

So why not switch sports?

The Japan Sports Agency and Japan Sports Association have launched a new initiative called the Japan Rising Star Project, which is meant to identify young talent — currently among junior high and high school students — who could potentially be Olympians in other sports.

At the Aug. 26 event at Nippon Sport Science University in Tokyo, a total of 40 boys and 66 girls, who were chosen through the application process in June, gathered to showcase themselves and go through physical tests looking for a chance to become future national team athletes at the Olympics.

The project, which began in July, is being held at nine different sites for Olympics sports, and five for Paralympic sports, and is scheduled to end later this month.

Diving, rowing, weightlifting, handball, cycling, softball and rugby sevens (for female athletes only) are the Olympic sports. Boccia, swimming, powerlifting, wheelchair fencing and cycling are the Paralympic sports.

The tests the participants went through for the Olympic sports included the vertical jump, 30-meter dash, medicine ball throw, shuttle run, mini handball game and riding a Wattbike (indoor training bike).

The applicants listed the sports they like to play on their applications, and those who pass the physical tests will advance to the training camp-style selections run by the national federations of each respective sport, starting in November. Overall, a total of around 40 athletes will proceed to the final stage.

Rui Nakamura, a female senior at Saitama Prefecture's Asaka Nishi High School, plays basketball but came to the event at the recommendation of her physical education teacher, who saw the results of her physical measurement tests at the school.

Nakamura, who said she was fairly satisfied with her performance in the day's tests at NSSU, is seeking a chance to move from the hardwood to the grass field to play rugby sevens.

The 18-year-old from Saitama, said she has never played rugby and that star national team player Ayumu Goromaru is the only player she recognizes. But she continued: "I have confidence in my long-distance running and hope people get to see it."

Male high school student Toyoki Nishisho, meanwhile, has devoted himself to playing baseball all his athletic career since he was a child, and said he could use it to go to a university. But now he is looking to switch to another sport.

"I've played baseball for 13 years, but I came here looking for a chance to excel more (in another sport)," said the 17-year-old, who thinks handball is a good fit for his leaping ability. He notched 69 cm in that day's vertical jump test.

"You live your life only once," he said. "So I want to give it a shot."

Actually, not all the participants were necessarily considering changing sports.

Yayoi Arai, a 14-year-old female junior high school student from Tokorozawa, Saitama Prefecture, is a rugby player and applied for the project to be identified by the rugby federation.

"My parents found this project and I thought it was a chance," said Arai, who plays with boys at a club rugby team in Tokyo.

Asked what her ultimate goal is, Arai ambitiously said, "It would be to compete at the Olympics and win it all."

The project does not only provide a great opportunity for the young athletes, but also for the sports federations. Some federations, especially for minor sports, are desperate to find talent.

Rowing, for example, is a sport that can be picked up late, but it's not easy to find the right talent.

Yuya Inohana, of the Japan Rowing Association, explained that athletes must have “a lot of output power” and be able to perform “for a long time,” and that the Wattbike test is ideal to look for those qualities.

The federation had held talent-identification events across the country on its own even before the Japan Rising Star Project began, but Inohana hopes that the government-led project will advertise the sport and that more young athletes will become interested.

Japan Sports Agency commissioner Daichi Suzuki encouraged the participants at the Aug. 26 event not to miss this rare opportunity.

“I'm hoping that we will have Japanese representatives at the 2020 Olympics and the ones after that,” the swimming gold medalist at the 1988 Seoul Summer Games told the young athletes at the beginning of the event.

 **ESPN.com:** NFL Nation

[\[Print without images\]](#)



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Counting the steps: How Rams use player tracking to optimize availability

By Alden Gonzalez

THOUSAND OAKS, Calif. -- Practicing makes players better at football. That's obvious.

It also wears down their bodies, makes them susceptible to injuries and limits their availability, which ultimately matters more than anything. Tyler Williams, the [Los Angeles Rams'](#) sports science coordinator, operates within those margins, continually pursuing the perfect balance between preparation and availability.

"You want to flirt above and below that line," Williams said. "You don't want to go too far below where you're underprepared, or too far above where you're overworked."

On most days, one can usually find Williams between the two practice fields of the Rams' headquarters. Williams, director of sports medicine Reggie Scott, strength and conditioning coach Ted Rath and a handful of others are equipped with tablets that track every step each player takes, using the data to help determine when they need more work or when they have had enough. The information comes instantaneously through miniature GPS and radio-frequency identification tracking devices that are sewn on players' shirts or inserted into their shoulder pads.

Each player has a running tally for the amount of yards he has covered and the various speeds he has traveled. Pre-established speed zones -- 15 to 20 mph, for example -- provide a gauge for how much time they are operating at higher intensity levels. And each player -- 63 of them, if you include the practice squad -- has his own baseline for what constitutes an optimum amount of work, based on age, position, personal history and overall preference.

The process is complex, but the objective is simple.

"My main focus is to increase player availability," said Williams, who is in his 11th year with the Rams and in his third under his current title. "The more availability you have, theoretically, the better percent chance you have to win."

It ultimately didn't help their record, but the Rams were one of the NFL's healthiest teams last year. Some of that is the luck of avoiding a freak injury. But the Rams' progressive, collaborative approach toward player tracking also helps push the odds in their favor. The vast majority of teams use GPS or RFID tools to track workloads between games, to varying degrees. But Williams said the Rams "like to try to push the envelope as much as we can" with its overall implementation of sports science.

"I think they're the best at it," said outside linebacker [Connor Barwin](#), entering his ninth NFL season.

Barwin spent the previous four years with the [Philadelphia Eagles](#), who were coached by Chip Kelly from 2013-15. Kelly in some ways helped pioneer this method. His Oregon teams implemented Catapult technology to monitor practice workloads, and eventually that data spawned a lot of his outside-the-box philosophies. Barwin was exposed to that in Philadelphia.

"But at that time," Barwin said, "they didn't really know what they were doing."

Nobody really did; the data was too fresh for proper context.

Williams started using this information about five years ago and was overwhelmed at first. The tracking devices spit out hundreds of metrics, so much of it trivial. It took Williams and the Rams' analytics staff two years of combing through reams of data to figure out which ones were relevant, and even now he'll tell you that the process is "evolving."

For the past two years, Zebra Technologies, an Illinois-based company, has been using its RFID chips to track each player's movement on game days. Teams are now privy to that information, but everything else is produced internally. Teams don't share their player-tracking data from practices with one another. For rookies, the only collegiate player-tracking data that NFL teams get comes from the Senior Bowl.

Thus, players who join the Rams essentially come with a clean slate. Their ideal baseline evolves as the team navigates through the offseason program and training camp. Williams' goal is to have a good sense for what their bodies can tolerate as they head into the regular season. They're asked to fill out a survey about how their bodies are feeling almost on a daily basis, and the communication is constant.

"They try to stay on top of everything," Rams inside linebacker Mark Barron said. "They really do their research."

Barron was one of several Rams defensive starters who did not appear in preseason games, along with outside linebacker Robert Quinn and cornerback Kayvon Webster (and, of course, defensive tackle Aaron Donald, who is holding out in a contract dispute). Others, including Barwin, nose tackle Michael Brockers, inside linebacker Alec Ogletree and strong safety Maurice Alexander were held out of the third preseason game, which is typically when teams play their starters the most. Rams first-year head coach Sean McVay attributed most of that to a "maintenance program," which has its roots in the data that Williams and others pore through.

The Rams say that what sets them apart is their cohesiveness. Every department -- medical, strength and conditioning, nutrition, analytics, coaching -- buys into the way they implement sports science.

"They communicate well together, and they follow it," Barwin said. "A lot of times the training staff and the strength staff are on different pages. These guys are all on the same page, which I think is really important."

Williams, Scott, Rath and others on the strength-and-conditioning staff all play a hand in monitoring player workloads in the moment, with the analytics team studying a larger sample of data later. They'll split it up by offense and defense and sort through it all on their tablets. For a normal practice, a receiver and a cornerback will cover somewhere between 4,000 and 5,500 yards, while a linebacker will be between 3,000 and 4,000. But some of the most pertinent information comes from the amount of distance a player covers within his pre-established speed zone.

Williams sees it all as a slider scale, with optimal readiness on one side and broken-down fatigue on the other.

The key is to widen that gap as much as possible.

"The more football you play, the better you are at football, but the more exposure risk you are for a breakdown or injury," Williams said. "So, it's that balance. And that's where we use some of that objective data, to make sure we're within that range and balance where we want to be."

Opportunity in the Female-Centric Sports Nutrition Market

BLOG

by Susan M. Kleiner, Ph.D., RD, FACN, CNS, FISSN

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It is hard to exaggerate the effect of Title IX on the participation of women in sports. Since the signing of the bill (Education Amendments of 1972), our numbers have increased more than tenfold across most sports. However, when it comes to the available information for female athletes to support their performance and health, it is in a word: minimal.

Females make up only one-third of the subjects in exercise science research studies even though females are 50 percent of the participants in sports. When it comes to research on injury and performance, the real "meat" of the basis of creating a winning strategy, females are only 2 percent and 3 percent of the research subjects (*ScienceNews* May 25, 2016). We don't even have data on how many female subjects are part of sports nutrition research studies. The numbers are undoubtedly growing, but up until very recently, virtually all sports nutrition recommendations for women were based on data collected on men. Even now most recommendations still depend on male-centric data.

Why does this matter? Because women are not small men or men with hormone issues! Women and girls have unique anatomy and biology, and transferring sports nutrition and training recommendations based on males to females is equally as inappropriate and ineffective, and perhaps dangerous, as the application of male-centric pharmaceutical research results to females.

The void in female-centric sports nutrition research data has allowed the weight-loss industry to swoop in and masquerade as sports nutrition for women. This has led to a dominance of marketing images and emotionally driven information that emphasizes a smaller, skinnier and sexier physique, without any emphasis on sports performance. In a community that already suffers from a greater incidence of dysfunctional body image, these messages can profoundly influence the health and wellbeing of women and girls.

Within the halls of science and academia is the beginning of a call for change. Institutional Review Boards are beginning to highlight a requirement for female, as well as male, subjects in study designs. Journal editors and reviewers are starting to call foul when studies neglect to include females. While there are currently a handful of scientists focusing their research on the needs of the female athlete, most of these scientists are men. Their contributions are wonderful, and I applaud nearly all of them for fostering lab environments where female students are being mentored to take their place among the community of full-fledged faculty members and primary investigators.

We need more female scientists to be role models to enlarge the ranks of female investigators in the fields of sports science and nutrition. By nature, scientists typically study what they find to be personally interesting and, therefore, female scientists will more likely have the desire and drive to study female athletes.

With more female-centric data, we'll have more female-centric recommendations, products and guidelines. Athletes want what works. Women and girls know that what is out there for them today hardly works and, in more than a few cases, can actually hurt their health and performance.

Female athletes want to be the most that they can be, not the least. Skinny and sexy are not athletic goals, and that messaging repels the athletic female consumer. They want to be stronger, faster, more powerful, all to support an outcome of winning. If accomplishing those goals leads to outcomes that also include being leaner and sexier, that's okay. But those are not the primary athletic goals they are seeking.

As in science, we need women in decision-making roles in product ownership, research and development, manufacturing, marketing and sales, who have a personal interest in athletics and sport to create the change that women desire and the authentic products and stories that appeal to the female athlete consumer. The companies that pioneered the female athletic wear brands of Title Nine and Athleta, have demonstrated this to the big brands of Nike, Under Armour and Adidas by creating an enormously successful new market trend of not only female athletic wear, but the greater general public market category of female active wear.

The market opportunities are enormous for female-centric food and supplement companies funding female scientists to study the needs of the growing market of active and athletic women and girls. The companies that create evidence-based, pure products to support athletic performance with authentic campaigns will certainly create their own winning bottom line.

Sue Kleiner, Ph.D., R.D., FACN, CNS, FISSN, is the founder and owner of the internationally recognized consulting firm, High Performance Nutrition®, LLC. She is also the author of the best-selling book Power Eating, as well as a consultant to professional athletes, teams, Olympians and athletes in countless sports. She is currently a consultant to the Seattle Storm. She is a co-founder and fellow of the International Society of Sports Nutrition (ISSN), a fellow of the American College of Nutrition, a member of The American College of Sports Medicine and The National Strength and Conditioning Association.

CALLOUT

Dr. Kleiner is on the Formulating for Athletes panel on Thursday, Sept. 28, at SupplySide West 2017. Learn how to target hardcore athletes using the best approaches to formulation, safety and communication.

Football's Secret Sports Science: The Power of Sleep

ROSS EDGLEY/AUGUST 2, 2017

STAN HONDA/Getty Images

Sleep could be the next frontier of sports science, with Europe's top-flight teams turning to experts to recharge their multimillion-pound assets and gain a competitive advantage on the field. As reported by Mark Bailey of the *Telegraph*, teams such as Manchester United, Chelsea and Real Madrid are recruiting "sleep coaches" to help their players snooze better.

Why? Because, as Bailey put it, "Despite the boom in sports science services designed to improve every component of an athlete's life, from nutrition and hydration to psychological wellbeing and physical conditioning, sleep is a subject which has often been neglected."

Studies published in the *World Journal of Biological Psychiatry* agree, stating, "Sleep is crucial for psychological functioning and daily performance."

Which is why teams are investing heavily in things like sleep kits, personalised mattresses, daily wellbeing questionnaires on smartphones and tablets and, according to the *Guardian*, even "snoozeboxes" and "sleep pods," which players can use to rest between training sessions.

Alastair Grant/Associated Press

The *Daily Mail* even cited the work of sleep coach Nick Littlehales as being partly responsible for the extended career of Ryan Giggs, saying "natural ability, a rigid conditioning programme and regular yoga" all helped, but it was the Manchester United legend's willingness to learn about his nocturnal activity that may have played a key role.

So what are the benefits of a good night's sleep? Can having an expert invade your bedroom make that much of a difference? Finally, if all of the above does work, which players are embracing it, and what methods are they using to wield its power?

The Science of Sleep in Sport

Studies show sleep can impact everything from mental focus to energy and recovery. This is because, contrary to popular belief, players don't get fitter on the training ground. No, training merely provides the body with the necessary stimulus. It's the period players spend sleeping when the body recovers and adapts, becoming faster and stronger.

That's because your immune system—the body's defence mechanism that stops us becoming ill—recuperates. Your rejuvenating hormones, like human growth hormone (HGH), begin to naturally peak. Your muscles, tendons and ligaments repair and regrow. Even neurotransmitters—the chemical signals in the brain—are replenished.

But it appears the above is already known and being practiced in sports like basketball after Stanford University analysed the impact sleeping 10 hours a night had on athletes' performance after five to seven weeks. The players had only been sleeping six to nine hours previously, and what the study found was that their performance dramatically improved.

Not just a little, either.

"Shooting accuracy improved, with free-throw percentage increasing by 9.0 percent and three-point field goal percentage increasing by 9.2 percent ... Subjects also reported improved overall ratings of physical and mental wellbeing during practices and games."

The conclusion?

"Improvements in specific measures of basketball performance after sleep extension indicate that optimal sleep is likely beneficial in reaching peak athletic performance."

Marcio Jose Sanchez/Associated Press

Could this be the secret to LeBron James' decorated career? Maybe, as ESPN.com reports he sleeps, "an average of 12 hours per day, compared to about seven hours for the average American."

Where does this nocturnal magic come from? According to research published in *Frontiers in Systems Neuroscience*, it's closely related to our previously mentioned neurotransmitters.

Neurotransmitters are the chemicals that relay signals from a neuron to a target cell across a synapse within the body. Pretty much every function within the body is controlled (or impacted) by neurotransmitters, from emotional states to mental performance and our perception of fatigue and pain. They're the brain's little messengers, and if they're not working correctly due to lack of sleep, you can't expect to be effective come matchday.

Obviously, it's hard to quantify just how much of an impact lack of sleep has on players, but there's strong evidence to suggest it's amplified when battling jet lag resulting from long-haul flights. Jet lag is a term used to refer to the disruption of circadian rhythms—our 24-hour physiological body clock that determines when hormones peak and dip—which can cause extreme fatigue.

Of particular importance during the 2014 FIFA World Cup in Brazil, research published in the *Journal of Science and Medicine in Sport* monitored the impact travelling 14,695 kilometers across 11 time zones had on players. It found through self-reporting questionnaires that, "Sleep disruption during and following long-haul air travel, together with exacerbated jet-lag symptoms may result in reduced player wellness. Consequently, player preparedness for subsequent training and competition may be impeded."

This is why the *Daily Mail* reported that England invested heavily in "support staff, hi-tech training facilities and luxury accommodation" during their 2014 World Cup campaign.

This was after their previous Brazilian World Cup in 1950 went down as "an object lesson in how not to win the World Cup" after the team arrived following a 31-hour flight, during which they made just four stops to refuel.

It's also why the *Daily Mail* reported club managers were frustrated with the amount of distance their players had to travel during a fortnight of international fixtures. Most notably, Filipe Luis, Oscar and Willian—who all played for Chelsea at the time—and Liverpool's Philippe Coutinho travelled a total of 14,600 miles to compete with Brazil in Singapore, and Arsenal's Alexis Sanchez made a 14,500-mile round-trip journey to play for Chile in his home country.

Although articles—like that published in *The Sun*—that compare Arsenal and Bayern Munich's travel habits might seem trivial, they could play a key role in the team's success. All because in a sport where the difference between winning and losing is so small, the difference could be a business class flight compared to a premium economy one.

Train Hard, Sleep Hard

So why is sleep so important after periods of intense training?

The answer is complex—and sports science is still trying to understand the intricacies of it—but the short answer is because this is the time your body uses to repair, recover and regrow.

During a match, the body's oxygen usage skyrockets, and there is a dramatic increase in lactic acid accumulation in the muscles (that burning sensation you get as you tire). This, in turn, causes the body to pull alkaline reserves from bones and other mineral-dense sources.

Equally, tiny micro-tears are formed in the muscles when a person lifts weights, and the body's molecular form of energy, adenosine triphosphate, is exhausted.

Needless to say, the human body has a lot to cope with, and the more miles a player covers on the pitch, the more sleep they will need. According to *The Sun*, this means Jurgen Klopp's Liverpool should have slept like babies over the Christmas period after totalling 464.8 kilometers in their first four matches, an average of 116.2 kilometers a match.

It is an idea supported by scientists from the University of Toronto who monitored the sleep patterns of six runners following a 92-kilometer ultramarathon. Results showed sleep time for each runner increased significantly compared to normal sleep patterns on each of the four nights after the marathon, illustrating the body's desperate need for quality sleep to recover.

Using an electroencephalogram (EEG), which utilizes electrodes to measure electrical activity in the brain, they specifically found long periods of "deep sleep" were induced on the first two nights. This led researchers to conclude this objective and quantitative increase in total sleep time, and particularly deep sleep, supports the theory that it's incredibly important for optimal recovery in athletes.

Again, reasons for this are incredibly complex, but one is that HGH peaks during deep sleep. HGH is a peptide hormone that stimulates cell reproduction, cell regeneration, growth and recovery and is thus one of the most revitalizing hormones in the body. So if a coach suspects his players are running on tired legs during the season, he should pay close attention to research published in the *Journal of Clinical Investigation*, which noted as far back as 1968 that, "sleep results in a major peak of growth hormone secretion."

Based on this, the 30 inflatable, portable sleep rooms called Snoozy pods that Swansea City's head of sports science and fitness bought now seem like a pretty good idea. The *Telegraph* reported, "Each Snoozy pod comes with a double or twin bed and can be erected in just eight minutes."

Kirsty Wigglesworth/Associated Press

But even putting "sleeping pods," snoozing experts and state-of-the-art facilities to one side, sleep represents a powerful tool available to each and every team. From the Sunday league amateur ranks to the top flight of the Premier League, it could be the most cost-effective secret to sporting success.