



### Powered by Plants

How Plant-Based Eating Supports Sleep, Cognition, Mobility, and Recovery for Optimal Performance

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### Why Plants?

Approximately 40% of Americans and 65% of consumers globally are opting for more plant-based foods

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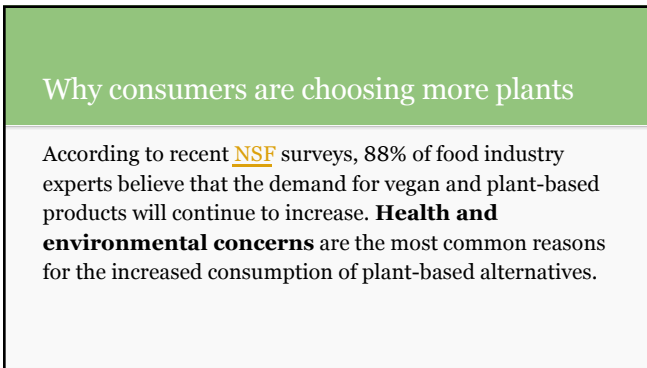
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### Why consumers are choosing more plants

According to recent [NSF](#) surveys, 88% of food industry experts believe that the demand for vegan and plant-based products will continue to increase. **Health and environmental concerns** are the most common reasons for the increased consumption of plant-based alternatives.

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## Plants for health

Plant-based eating has been shown to reduce the risk of:

- Blood pressure
- Heart disease
- Diabetes
- Certain types of cancer
- Alzheimer's disease
- Inflammation

Plant-based eating has been shown to support:

- Immune health
- Digestion
- Gut health
- Cognition
- Performance
- Recovery
- Mobility
- Sleep
- Mood

Key TJ (2022). *Proc Nutr Soc*. 81(2):190-198.

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## Biggest barriers to plant-based eating

- Perception of taste and flavor
- Unsure if it's nutritionally complete
- Belief that it's too expensive



[www.credit-suisse.com/about-us/news/en/articles/media-releases/the-2022-path-to-sustainability-report-75-of-young-consumers-w-202107.html](https://www.credit-suisse.com/about-us/news/en/articles/media-releases/the-2022-path-to-sustainability-report-75-of-young-consumers-w-202107.html)

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## First, debunking vegan/all plant based myths

- Yes, you can get enough protein on a plant-based diet
- Yes, you can get plenty of iron on a plant-based diet
- Yes, you can get plenty of calcium on a plant-based diet

**The key to optimizing nutrition on a plant-based diet: Consume enough calories and a wide variety of whole plant-based foods.**



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## Nutritional support on a vegan/all plant-based diet

- Fortified foods with calcium, B12 and vitamin D
- B12 supplementation
- Vitamin D supplementation
- Omega 3 supplementation
- Extra protein 1.2-2 grams per kg for athletes (focus on high protein plants like beans, peas, lentils, tofu, tempeh, seitan, nuts, seeds, esp hemp seeds, whole grains)



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## The Plant Package

Rather than considering single nutrients, like protein or carbohydrate, when consuming food, consider the full package that contains these nutrients.

Two components in plants that majorly contribute to plants' health benefits:

### Fiber + Phytonutrients



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## Sleep and athletic performance

Sleep deprivation in athletes [has been shown](#) to:

- Alter glucose metabolism, appetite, food intake
- Affect endurance and time to fatigue
- Affect recovery
- Affect mood
- Overall, sleep deprivation can lead to illness, training injuries, early fatigue, and suboptimal performance.
- Studies have also linked decreased sleep duration to declining cognitive function as one ages.

Fallon, K.E. (2007). Br. J. Sports Med. 41:41-4.

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## Sleep and athletic performance

- [One study](#) tracked the Stanford University basketball team for several months and found that players who added an average of almost 2 hours of sleep a night onto their normal sleep schedule (for a minimum of 10 hours sleep total) increased their speed by 5%. Their free throws were 9% more accurate. They had faster reflexes and felt happier. Studies have shown similar benefits for football players and other athletes.
- In a [study](#) from the Australian Institute of Sport, athletes and coaches ranked sleep as the most prominent problem when they were asked about the causes of fatigue/tiredness.
- In older adults, regular activity can [improve sleep quality](#) and poor sleep is [associated](#) with poor physical performance.

Mah, C.D., et al (2011), *Sleep*, 34(9):919-926. [Kilgallon \(2007\)](#), *Br J Sports Med*, 41(1): 41-44. [Denson 141 \(2001\)](#), *Sleep Health*, 7(2): 209-211. [Solito-Nawaro \(2002\)](#), *Clockwork Sleep*, 2(2): 152-166.

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## Plant-based eating and sleep

- [Studies show](#)\* that a fiber-rich, low saturated fat diet may support good sleep
- Phytoestrogen-rich diets [have been shown](#) to support good sleep
- [Studies also show](#) that vegetarians sleep better than omnivores as a result of less depression
- Plant-based foods are rich sources of magnesium, which may help the body [relax into sleep](#)

One study reported that "The modern human diet, which is calorie-dense with added preservatives but lacking essential micro and macronutrients, is also responsible for the rise in sleep disorders in recent years."

\*see following slides for citations

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## Fiber + Sleep

**Study:** Greater fiber intake predicted more time spent in the stage of deep, slow-wave sleep. In contrast, a higher percentage of energy from saturated fat predicted less slow-wave sleep. Greater sugar intake also was associated with more arousals from sleep.

"It was most surprising that a single day of greater fat intake and lower fiber could influence sleep parameters."

St. Onge MP, et al (2016), *J Clin Sleep Med*, 12 (1).



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## Fiber + Sleep

**Study:** Another study found that fiber may help with sleep disorders (like difficulty falling asleep and frequently waking up) by positively modulating gut bacteria and improving communication with the brain that triggers sound sleep.



Tang M, et al (2022), Food and Function, Issue 23.

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## Plant Protein + Sleep

**Study:** Another study looked at the sleep quality and duration in 106 women, ages 20-75 years, and found that those who ate the most plant-based protein had better sleep quality and significantly longer sleep duration than those who ate animal protein.



St. Onge MP (2018), Current Sleep Med Rep. 4(1): 74-78.

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## Phytoestrogens + Sleep

**Study:** A Japanese study looked at the isoflavone intake of 1076 women aged 20-78 and found that the higher the isoflavone content the better the sleep quality and longer sleep duration. These foods are also rich in tryptophan, a precursor to serotonin and melatonin.



Cui Y (2015), Nutr J. 14: 127.

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# Vegetarians Sleep Better Than Omnivores?

**Study:** Researchers looked at sleep habits of 280 vegetarians and 280 omnivores and found that, after controlling for confounding factors, there was positive association between depression condition and sleep quality. They concluded that a vegetarian diet might improve sleep quality by mitigating depression.



Wang X (2023). Nature, 7210.

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## Cognition

Cognitive function is defined as "the performance of the mental processes of perception, learning, memory, understanding, awareness, reasoning, judgment, intuition, and language." There have been numerous studies suggesting good gut bacteria may be beneficial for cognitive functioning.

**One study reports:** Sports performance at the highest level requires a wealth of cognitive functions such as attention, decision making, and working memory to be functioning at optimal levels in stressful and demanding environments.

American Psychological Association  
Walton CC (2018). Front Psychol, 9: 1121.

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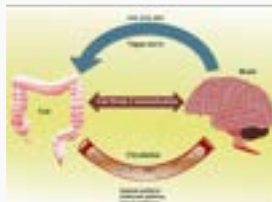
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## Plant-based eating and cognition

- Plant-based diet may directly affect brain health by reducing inflammation
- Plant-based diet may directly affect mood and alleviate symptoms of depression
- Plant-based diet may indirectly affect brain function and mood through the gut



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### Gut Health + Cognition

A [fiber-rich diet](#) through plant-based foods can support microbial diversity, which supports brain health, hormonal balance, healthy metabolism, and a better mood. Foods that either starve healthy bacteria or feed bacteria that don't serve good health may lead to mood disorders, blood sugar swings, or sluggish metabolism.

Silva YP (2020). Frontiers. Vol 11.

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### Cognition + Carbohydrates

The brain's preferred direct source of energy is carbohydrate. The gut microbes' preferred source of energy is fiber. When bacteria chomp away on fiber, they produce short chain fatty acids (SCFA), which regulate food intake, change the brain's learning pathways (neuroplasticity), alleviate anxiety, and support the immune system. Low SCFA production [has been associated](#) with increased inflammation, triggered immune responses, and low serotonin production.

Berding K (2022). Curr Opin Psychiatry. 35(4): 3-9.

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### Cognition + Polyphenols

Polyphenols [exhibit anti-inflammatory properties](#) that may protect the brain and cells throughout the body. They can cross the blood brain barrier to exert antioxidant and anti-inflammatory properties, playing an important role in delaying the onset of age-related health disorders, including cognitive decline. They have been shown to suppress neuroinflammation, and carry the potential to promote memory, learning, and cognitive function.

Vauzour D (2012). Oxid Med Cell Longev. 914273.

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### Cognition + Omega 3 Fatty Acids

Omega 3 fatty acids [have been associated](#) with a reduced risk in developing depression and other inflammation-related disorders that may affect the brain. Omega 3's are involved in neurotransmitter creation, brain membrane integrity, and stress regulation.

Dighriri IM (2022). *Carens*. 14(10): e30091.

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### Plant-Powered Recovery

1. **Phytonutrients**, including polyphenols, fight inflammation, repair tissue injury, reduce environmental toxins.
2. **Fiber** results in less short- and long-term inflammation.



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### The Physicians Committee for Responsible Medicine (PCRM) 2019 review

Looked at the ability of plant-based diets to reduce the risk of cardiovascular disease and how the diet affects performance.

Barnard ND (2019). *Nutrients*. 11 (5): 130.

1. Endurance athletes on a plant-based diet often have lower body fat, which can give them a performance advantage. Studies show that athletes on a plant-based diet increase their VO<sub>2</sub> max—the maximum amount of oxygen they can use during intense exercise—leading to better endurance.
2. Increase blood flow and tissue oxygenation: A low saturated fat diet can improve blood flow, which can help more oxygen reach the muscles and ultimately improve athletic performance.

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## The Physicians Committee for Responsible Medicine (PCRM) 2019 review

Looking at the ability of plant-based diets to reduce the risk of cardiovascular disease and how the diet affects performance.

3. Reduce oxidative stress and inflammation: Plant-based eaters consume many more phytonutrients which help to neutralize free radicals that lead to muscle fatigue, reduced athlete performance and impaired recovery.
4. Lower risk of heart disease: There's strong evidence that a plant-based diet keeps hearts strong by reversing plaque, bringing down blood pressure and cholesterol, and reducing weight.

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## Polyphenols

act like antioxidants by scavenging free radicals, dilating blood vessels by releasing nitric oxide, and fighting inflammation that results from intense exercise.

A Critical Review on Polyphenols and Health Benefits of Black Soybeans, *Nutrients*, 2017 May; 9(5): 455.

Some studies show that supplementation with ~ 300 mg polyphenols an hour prior to exercise may enhance endurance and repeated sprint performance, most likely due to improved muscle perfusion. Others show that supplementation with more than 1000 mg of polyphenols per day for 3 or more days before and following exercise may enhance recovery from exercise-induced damage. While there is growing evidence that short-term and long-term supplementation with fruit-derived polyphenols may enhance exercise performance, most likely due to their antioxidant and vascular effects, more research is needed.

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## Polyphenol Sources

berries, apples, cherries, legumes, whole grains, nuts, seeds, onions, dark chocolate, spices, green tea



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Fueling performance through plant-based foods not only meets athletic nutritional needs and may reduce the risk of lifestyle diseases, but it may also give athletes an edge by supporting good sleep, better cognition, enhanced recovery, and improved performance.

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## Thank you!

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RDN

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Nutrition Handbook: The  
Essential Guide to Plant-Based  
Performance*

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