

Exploring the Biological Variables That Promote Mental Health

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STORY AT-A-GLANCE

- › There's a strong connection between your body's ability to create cellular energy and your mental and emotional health. When cellular energy production decreases, you have less energy overall, including for brain processing
- › Seed oils and processed foods are rich in linoleic acid (LA), which can impair brain function by causing oxidative stress and the formation of toxic metabolic byproducts
- › Sun exposure is a foundational strategy for optimizing your vitamin D level, which is essential for overall health, including brain function. Near-infrared radiation from the sun also boosts mitochondrial energy production
- › Maintaining an adequate glucose intake is also crucial for your brain function
- › Glycine, found in collagen, reduces neuronal excitability, improves sleep quality, and supports cognitive function, mood and neurological health, while choline in egg yolks is a precursor for acetylcholine, a neurotransmitter for the parasympathetic nervous system

I recently had the pleasure of being interviewed by Dr. Josh Axe on the Ancient Health Podcast (video above). The focus of the interview is the link between emotional wellbeing and physical health. As noted by Axe, the mental health of Americans has nosedived over the past five years, and while there are many contributors to that, one of the factors that I'm most passionate about exploring is the biological variables.

I've come to realize that there's a strong connection between your body's ability to create cellular energy and your mental and emotional health. When cellular energy production decreases, you have less energy overall, including for brain processing. And, of course, your brain regulates your mental state and, subsequently, your emotional well-being.

Seed Oils Wreck Your Brain Function

Your brain makes up just 2% of your body yet consumes 20% of the energy your body produces. That's an extraordinary fact that strongly suggests energy is important for the brain and for mental health. Two decades ago, my primary focus was on insulin. But over time, I've come to appreciate that insulin is, for the most part, just an innocent bystander. It's not the cause of metabolic dysfunction.

Sure, it is probably the single best biometric indicator of metabolic flexibility and 93.4% of Americans are metabolically inflexible. Those data are from 2019, so it's probably even higher than that today. Ideally your fasting insulin should be below 3.0.

My last fasting insulin was below 0.4 and was not detectable. This is despite having well over 400 grams of carbohydrates, proving, at least in my case, that a high carb diet does not have to be related to insulin resistance.

So, if insulin isn't the culprit and merely an innocent victim, what's the cause? The cause is not excessive amounts of carbs or sugar, rather, I believe it's due to excessive intake of seed oils and processed foods, which are loaded with harmful linoleic acid (LA).

Before 1870, seed oils didn't exist. Today, they account for most of the fats consumed daily. There's a severe health consequence to that, because LA is very fragile, perishable and highly susceptible to oxidative stress. The fats themselves aren't particularly dangerous, but because they're so susceptible to damage, they form highly toxic metabolic byproducts called OXLAMs, oxidative linoleic acid metabolites, such as 4-HNE.

There are hundreds of these reactive aldehydes that cause damage. The good news is that if you don't have high LA, you won't make them. So, that's the solution. Antioxidants

have their place, but they cannot make up for all the damage caused by high LA. The most comprehensive solution is to lower your LA intake to avoid all that unnecessary oxidative stress in the first place.

So, that, I believe, is the primary causative factor. Fundamentally, those who are healthier biologically and can create cellular energy will have good thyroid function and healthy brain function. Once you get over 5 grams of LA per day, you increase your risk for almost every disease, especially cancer, but also neurological diseases like Alzheimer's, as well as mental health problems.

On a side note, I believe excesses of estrogen, LA and endotoxin are the three primary causes of cancer because they all destroy metabolic function. When your mitochondria don't work, your body is forced to resort to anaerobic fermentation, where energy is created in the cytoplasm of the cell through glycolysis rather than mitochondria.

Glycolysis is highly inefficient and generates many problems if used inappropriately. So, basically, if you're metabolically inflexible, you're likely relying on what is basically a cancer pathway.

Obviously, as noted by Axe, societal changes involving social media and smartphone addiction also play a role, especially among younger individuals. Many spend hours on their phones or tablets rather than spending time outdoors, which certainly doesn't help matters.

The Importance of Sunlight

Aside from connecting with nature, which has its own proven mental health benefits, spending time outdoors is also required to optimize your vitamin D level. This fall, I'll be releasing a book in which I've condensed 50 years of studying and seeking to understand biology and what optimizes it, and sun exposure is one of the most foundational strategies in this respect.

Granted, you must live in a location where year-round vitamin D production is possible. Many don't. I happen to live in Florida, where there's typically sufficient sunlight year-

round. We only have about two months of the year where you're not going to get sufficient solar radiation exposure.

Radiation from the sun peaks at solar noon, and that's the ideal time to be outside with minimal clothing. Spending at least one hour in the sun is a good goal. If you live at a low latitude, 15 to 20 minutes may suffice, especially in the summer months.

Ideally, test your vitamin D level twice a year, in the winter and summer, to make sure you're in a healthy range of 60 ng/mL to 80 ng/mL year-round. (A compelling body of research suggests 40 ng/mL is the cutoff for sufficiency.)

If you cannot get enough sun exposure, taking an oral vitamin D3 supplement would be prudent. Just make sure you're also getting enough vitamin K2 and magnesium, as they work in tandem. For example, having low amounts of magnesium has been shown to significantly increase your supplemental vitamin D requirement.

Research¹ shows you need 146% more vitamin D to achieve a blood level of 40 ng/ml (100 nmol/L) if you do not take supplemental magnesium, compared to taking your vitamin D with at least 400 mg of magnesium per day. Your vitamin K2 intake can also affect your required vitamin D dosage.

Data² from nearly 3,000 individuals revealed 244% more oral vitamin D was required to get 50% of the population to achieve a vitamin D level of 40 ng/ml (100 nmol/L) if they weren't concurrently also taking magnesium and vitamin K2. So, a simple way to optimize your vitamin D absorption is to take it in conjunction with magnesium and K2.

Near-IR in Sunlight Promotes Mitochondrial Energy Production

But the key is to get outside. And, as noted by Axe, there's more to sun exposure than vitamin D production. About 15% to 20% of solar radiation is near-infrared (near-IR) radiation, which has its own set of benefits. The UVB that creates vitamin D is only about 5%.

One of the most important health benefits of near-IR is that it promotes mitochondrial cellular energy production. In the interview, I detail the exact mechanism for this, but in short, near-IR penetrates deep into your tissues where it activates Complex IV in the mitochondrial electron transport chain, also known as cytochrome c oxidase.

Complex IV contains minerals such as iron and copper that function as chromophores – a word that means they magnetize for light. As a result, Complex IV can generate energy more efficiently. Near-IR also creates structured water, H₃O₂, which stores energy much like a battery.

I'm in the process of writing a scientific paper explaining how transducers in your body convert sunlight into biological energy stored as structured water, which then is used by your mitochondria. That energy also increases the hydrogen ion concentration in the intermembrane space, which is what's needed to drive ATP synthase. So, it facilitates production of mitochondrial energy.

Your Brain and Body Need Glucose

Structured water as a storage of energy is very similar to the way glucose is a storage of energy. When you eat more glucose than your body needs, it'll be stored in your liver as glycogen, which is the preferred fuel of your brain. Without a supply of glucose, you'd be dead in minutes.

Sure, ketones supply energy to the brain, but they're a co-factor, not the sole source. Your brain needs glucose. We know this because if you give someone a large-enough dose of insulin, they'll die because it'll drive their blood sugar level down too low. As a result, their brain stops working and they go into a coma.

Unfortunately, many don't get enough glucose from their diet, which means their bodies must produce glucose by activating stress hormones like glucagon, adrenaline, and cortisol. This is also why I don't recommend long-term fasting or chronic keto.

If you fast for a week, you'll activate stress hormones because your body needs glucose. Unfortunately, these stress hormones make glucose by sacrificing the protein stored in

your muscle, bones and brain.

To avoid this, you'll want to make sure you're getting at least 150 grams of glucose a day, ideally from ripe fruit. My carb intake is currently between 400 to 450 grams a day, and I feel great.

If you have a healthy gut, you'll be able to incorporate more fruit fiber without a problem. If your gut is impaired, however, the extra fiber can feed endotoxin-producing bacteria in your gut, which will suppress your mitochondrial function even further. In this case, start by introducing things like pulp-free orange juice.

Glycine Is Important for Brain Health

One food that most people aren't getting enough of is collagen, which is essential for the structural integrity of your bones, skin, hair, nails, tendons and ligaments. Emerging data suggest glycine supplementation is useful, which makes sense considering it's one of the three primary amino acids found in collagen.

If you don't get enough glycine, you cannot build healthy collagen. Glycine also plays several critical roles in the brain, impacting cognition, mood, and overall neurological function. It serves both as a neurotransmitter and a neuromodulator in the central nervous system. It helps reduce neuronal excitability, leading to a calming effect on the brain.

Glycine has also been shown to improve sleep quality. It lowers body temperature and calms the brain, helping you fall asleep more quickly and enhancing the overall quality of sleep. Improved sleep, in turn, can significantly impact cognitive function, mood, decision-making and learning.

Here, it's important to realize that meat is a very poor source of glycine, so beef alone will not provide you with the amino acids you really need. The primary amino acids in red meat are methionine, histidine and tryptophan, which are all associated with decreases in longevity. If you balance it out with collagen, then red meat is fine, but eating just

meat can be problematic. You can learn more about this in [“Why Collagen Is a Proven Necessity.”](#)

Amino Acid	% Gelatin Collagen	% Beef
Glycine	28	1.6
Proline	17	1.0
Hydroxyproline	14	0.3
Alanine	11	1.3
Methionine	0.8	3.2
Histidine	0.8	2.1
Tryptophan	0.4	1.3
Cysteine	Trace	0.2

The Easy Way to Make Bone Broth

The best source of collagen is homemade bone broth, which you can whip up in four hours using a pressure cooker. Simply place the bones in the Instant Pot, fill the pot with pure, filtered water – just enough to cover the bones – add salt and other spices to taste, then set it to cook on high for two hours if the bones are CAFO, and four hours if organic and grass fed.

Organic grass fed beef bones are the best. Using bones from CAFO (concentrated animal feeding operation) beef can be problematic due to potential heavy metal contamination. When cooking these bones in a pressure cooker, it's best to limit the time to two hours to avoid introducing heavy metals into your broth.

If you're using beef bones from grass fed organic sources, you can safely cook them for four hours. Using bones from an organic source is even more important if you're using

chicken, as CAFO chickens tend to produce stock that doesn't gel,³ which raises questions about the quality of the collagen you're getting.

When preparing bone broth at home, it is important to chill the bone broth before you eat so the fat will rise to the top and you can skim it off. While some beef fat is good, excess can be problematic.

On a side note, if you have a dog, you can carve off the loose cartilage around the joints after two hours and feed the cartilage to your pet. If you cook the bones for four hours or longer, most of the collagen will be dissolved in the broth, so there won't be anything left to pick off. More importantly, you never want to give your dog cooked bones as they can splinter during chewing and cause great damage to the esophagus.

Eggs Are Great Brain Food

Egg yolks are another excellent brain food, provided you're getting [organic eggs that are low in LA](#) as promoted by Ashley Armstrong. I avoid the egg whites, as they're loaded with tryptophan, which is precursor of serotonin, and excess serotonin is another oft-ignored hazard.

Egg yolks are a primary source of choline, which most are deficient in, unless they eat eggs. You need about 400 to 500 milligrams of choline a day, and one egg yolk contains about 125 mg. Choline is a precursor for acetylcholine, a neurotransmitter for the parasympathetic nervous system which, in many, doesn't function well.

How to Avoid Common Toxins

Axe and I also discuss how to avoid common toxins such as glyphosate and other pesticides. As the name implies, glyphosate is glycine with phosphates on it. It basically acts as a substitute to glycine, which can cause severe problems.

Without doubt, glyphosate is a metabolic poison that should not be in your body. Fortunately, there are simple and easy ways to avoid it. One is to make sure you get

enough collagen. Alternatively, you could take a glycine supplement. By having enough glycine in your body, the glyphosate molecule can't be integrated into your proteins.

The second way is to avoid GMO grains, as genetically engineered grains are typically doused with large doses of glyphosate that get integrated into the grain itself. It cannot be washed off, so it ends up in the food. Conventional wheat, while not a GMO, is also commonly desiccated (dried) with glyphosate, so opt for organic.

Lastly, you'll want to detox as much as possible, and one of the safest, easiest and most effective ways to do that is sauna therapy. I do a near-IR sauna three days a week. The reason sauna works is because you excrete toxins when you sweat.

Walking Does Your Body Good

Exercise is, of course, another foundational health principle, and there's good news on this front as well. Recent research shows that when it comes to exercise, walking takes the top prize, and that's something most people can easily incorporate.

In November 2023 I [interviewed Dr. James O'Keefe](#), a cardiologist with the Mid-America Heart Institute at St. Louis Hospital in Kansas City, about exercise dosing. He completed his cardiology training at Mayo Clinic.

He and three other coauthors published a meta-analysis in the March-April 2023 issue of *Missouri Medicine*,⁴ the journal of the Missouri State Medical Association, which showed that:

- 1. Too much vigorous exercise backfires** – If you're sedentary and begin to exercise, you get a dose-dependent decrease in mortality, diabetes, depression, high blood pressure, coronary disease, osteoporosis, sarcopenia, falls and more. However, beyond 75 minutes per week, you start losing those benefits. Beyond four hours a week, you not only gain nothing in terms of health benefits, you also radically raise your risk of heart problems.

2. You cannot overdo moderate exercise – In the case of moderate exercise, however – loosely defined as exercising to the point where you're slightly winded but can carry on a conversation – it's very clear that more IS better and cannot be overdone.

Perhaps even more surprising, moderate exercise also improves all-cause survival better than vigorous exercise – about two times better. Examples of moderate physical activity include gardening, housework, yoga and walking, just to name a few.

3. Overdoing strength training is worse than doing nothing at all – The benefits of strength training maxes out at 40 to 60 minutes a week. Beyond that, you're losing benefit, and once you get to 130 to 140 minutes of strength training per week, you actually end up with WORSE long-term survival than people who don't strength train!

So, 20 minutes twice a week on non-consecutive days, or 40 minutes once a week is the sweet spot. You also don't want your exercise regimen to center around strength training. It should be an add-on, as you get far greater benefits simply from walking, or any other moderate exercise.

What all of this means in practical terms is that there's no need to engage in high-intensity strenuous exercise beyond 75 minutes per week, or strength training beyond 40 minutes a week. Doing so can be highly counterproductive.

Instead, focus on mild to moderate physical activities, things that keep your body in motion without placing much strain or stress on it. Walking is perhaps the best activity you can do. It's about 2,000 steps per mile, and every 1,000 steps you get on average per day reduces your mortality by 10% to 15%.

And, again, while benefits begin to plateau around 12,000 steps, they do not decrease and become counterproductive, as what happens when you're doing too much high-intensity exercise.

In the interview, I also discuss the importance of mobility-enhancing exercises, such as exercises to **improve your neck flexibility** and **hand grip strength**, the latter of which is a reliable marker of your biological age.

The Importance of Connecting to Spirit

Last but certainly not least, we also discuss the importance of connecting to spirit, and how optimizing your biology facilitates that. The energy produced by your cells is essentially identical to the energy that created the material universe – including you – and by optimizing your mitochondrial energy production, you're also opening the door to greater connection with Spirit or the Source from which you came.

So, not only do you improve your biological health, but you also improve your spiritual health and your ability to connect to your consciousness, which in turn will grant you access to resources and wisdom that is not available in your mind alone. Your mind is usually polluted with brainwashing and propaganda, and the easiest way to “cleanse” yourself of that is by connecting to your own center of wisdom and peace. Axe comments:

“I feel like going through this COVID pandemic, there were a lot of people that were asleep. Most haven't woken up, but a lot more have. I think a lot more people are aware now because they tried to force things on us in such a strong way.

Carl Jung, the famous psychologist said, ‘Most people don't think [because] it's hard.’ That's why most people don't do it. One of the things that you've really inspired so many people to do is be able to think. You were one of the first people I remember who said that a way to get to the truth is to ask why, again and again, to where you get to the root.

And so, one of the last questions I have for you is, how do you recommend people learn to think? How do you recommend they learn to start to get to the root of the issues like you have done? Because again, you've really been able to do this, to get to the root of the problems earlier than many people.”

That's a great question that doesn't have a simple answer. I do believe it goes back to the basics though. You must have sufficient energy production to think. If your energy

production is low, your brain is not going to work well, and your logical faculties will be impaired.

Covering the Basics Will Take You Far

You need energy, and you get it from whole, unadulterated foods, you get it by avoiding LA, which is a mitochondrial poison. You get it from sun exposure and making sure you have enough healthy carbs in your diet.

As your energy production improves, your brain function will improve, and the door to greater consciousness will also crack open, which is like gaining a superpower. Because you'll have access to information that isn't necessarily based on logic, but on an inner knowing that defies explanation.

You'll just "know" what is right for you. So, in a sense, your need for regular logical "thinking" lessens, leaving your brain with more energy for more creative pursuits instead.

Connecting with Spirit is also the best shield against fear-based narratives, because your Spirit and your guides know how to protect and guide you. That's who you need to really listen to. Avoid brainwashing propaganda and connect to valid sources of truth and wisdom, and then follow your own internal guidance. You have an innate intelligence. You just need to activate it, and you do that by optimizing your biology.

So, that's the first step. You have to have fuel in the tank. Other common-sense strategies that will improve your thinking skills include things like walking every day, getting plenty of sun exposure and enough sleep. None of this is rocket science. Just give your body what it needs, and it will take care of itself.

In closing, you can find more interviews by Axe on the Ancient Health Podcast, available on several different platforms, including [Apple podcasts](#) and [Spotify](#). You can also learn more on his website, draxe.com.

Sources and References

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- ² [GrassrootsHealth, Are both supplemental magnesium and vitamin K2 combined important for vitamin D levels?](#)
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- ⁴ [Missouri Medicine March-April 2023; 120\(2\): 155–162](#)