

# THE BRAINHQ GUIDE<sub>TO</sub>

## BRAIN HEALTH





# The BrainHQ Guide to Brain Health



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## What This Booklet Is About

We all want healthy brains that last as long as our bodies do. We want to stay sharp, with good memories, decision-making skills, personal connections, and quality of life. But when it comes to taking care of the brain, it can be very hard to know what to do. The news from scientists seems to go back and forth—one day, you read an article that coffee is good for the brain. Two weeks later, another one comes out saying coffee is bad for the brain. So what is it?

We are a team of scientists who have spent our careers working on brain health and cognitive function. We have read the scientific papers, and talked to other experts in the field. This guide is meant to help you sift through the noise and learn more about a brain-healthy lifestyle.



## What Does the Brain Do?

To understand what we have to do to keep our brains healthy, we first have to understand what our brains do. So why do we have brains, anyway? Well, our brains process information—transforming everything we see, hear, touch, taste, or smell into electrical signals. These signals are interpreted in complex networks of brain cells, so that we can generate the right response (I'd better step on the brakes!) and determine if it is worth saving in memory (what a sunset!)

But we're not born with brains that can do everything we need to do as adults—we have to learn everything, from skills just about every baby eventually masters (like to how to walk) to very specialized skills we use as an adult (like how to design a jet airliner). To learn these increasingly complex skills, our brains have to change: brain cells have to build new connections and get rid of old ones in exactly the right way. When a baby learns how to walk, their brain is literally rebuilding itself from a brain

that can't direct the actions of walking to a brain that can take the signals from the eyes and the inner ear to control the body to walk—and have fun while doing it!

Rewiring itself in this way—which scientists call brain plasticity—is the fundamental way the brain works. It has long been known that the brains of babies are capable of change in this way—just look how quickly and automatically babies learn a language. In fact, the brain has to build itself through learning and brain plasticity—with nearly 100 billion brain cells making around one quadrillion connections, the brain is simply too complex to be specified and encoded by the only 3 billion letters that make up all the genetic information in a human.

It's only recently become clear that brain plasticity is not limited to babies. It's how the brain works throughout our life—from childhood through adulthood and into old age, and in sickness and in health. This discovery was made by Dr. Michael Merzenich, a scientist at the University of California, San Francisco, who went on to win the Kavli Prize—the highest international prize in brain science—for his discovery.

Brain plasticity is not just one thing the brain does—it is core to the way that the brain does everything. And because it is so important for brain function, activities that keep the brain capable of change and learning are activities that keep the brain healthy—and keep you sharp and at your best throughout your life.

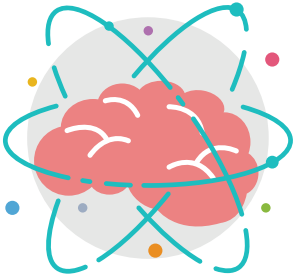
## Basic Cognitive Functions

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- **Memory**
- **Speed**
- **Attention**
- **Executive Function**
- **Social Cognition**
- **Navigation**

**Your brain has specialized regions for different cognitive functions!**

## What Does it Mean to Have A Healthy Brain?



When a brain is healthy and performing well, it's capable of rewiring itself through brain plasticity, so you can learn and change what you do in response to the world around you. It also processes information quickly and accurately, and as a result has good cognitive function—including memory, attention, and decision-making- and enables you to get the most out of life. Healthy brains are also more resilient to dementia, brain injury, and mental illness.

But as we age, our brains tend to get slower and less accurate, and the systems that control learning can weaken. This creates internal “noise” in the brain. This noise can contribute to cognitive problems. Imagine trying to listen to a conversation in a noisy room, or watching TV with a lot of static on the screen—it makes it harder to understand or remember what’s going on. This also happens in a lot of brain disorders (like multiple sclerosis, chemobrain, or after a concussion). And in fact, healthy people of all ages can have different levels of brain noise, simply as a result of having different life experiences. Other choices we make, or health conditions, or just bad luck can worsen brain health as well. For example, smoking, diabetes, and high blood pressure are all associated with poorer brain health, as are having a traumatic brain injury and just about all illnesses that affect the brain.

Fortunately, there are many activities that contribute to good brain health! We’ll discuss them in detail below—including cognitive exercise, physical exercise, diet & nutrition, sleep, and social life.

Based on these observations about brain health, scientists have developed the concept of *brain reserve*, which refers to your overall brain health, given how much you have added through

your current brain healthy activities and how much you have lost through unhealthy choices. And of course your life experience (and just good and bad luck) can both add to and subtract from brain reserve as well.

People with higher levels of brain reserve generally have healthier brains—they show better cognitive performance and have a lower chance of going on to dementia.

Since you can control a lot of the pro-health factors (and can't control many of the anti-health factors) let's focus on what you can do to build brain health!



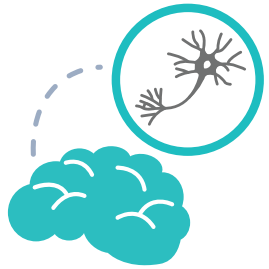
## How to Evaluate Claims About Brain Health

There is a tremendous amount of interest in the science of brain health—and a lot of unfounded hype. Everything—from dietary supplements to brain games—says it's based on science. Here's how to tell what actually has been shown to work.

First, scientists evaluate brain-health interventions with clinical trials. When you hear the news about something new and brain healthy, ask a few questions. Is there data showing that it improves cognitive function? Is the data from mice (promising, but too early to know if it works) or in people (more exciting)? Is the data published in a scientific journal, or just issued as a press release?

You should know that the FDA does not review companies making statements about brain health. Just because a supplement or brain game is on the market does not mean that the FDA has approved it—unfortunately, you'll have to do your own research. If you're reading about a new brain game or supplement, check the websites from the Federal Trade Commission ([www.ftc.gov](http://www.ftc.gov)) and the National Advertising Division ([www.nadreview.org](http://www.nadreview.org)) to see if the company has engaged in false health-related claims.

# The Role of Cognitive Exercise and Learning in Brain Health



The most important part of brain health is using your brain to learn—in the right way. They say old dogs can't learn new tricks—but it's actually the reverse that's true: once you stop learning new tricks, you're an old dog.

The brain is a learning system. As we take in and process information from the world around us, brain cells strengthen specific connections and weaken others in order to adapt our brains to the needs of what we're doing. This process of brain plasticity is physical—it changes the brain itself and contributes to better brain health. The processes that drive brain plasticity happen whenever you use your brain—but some ways that you use your brain activate them much more strongly than others.

First, new learning drives more brain plasticity than well-practiced activities. When you're learning a new activity—like riding a bike for the first time or finding your way around a new part of town—your brain is full of activity, and intensively building new connections to support that learning. But when you're doing something that is old hat—riding a bike once you're an expert, or walking to the store the way you always do—your brain doesn't need to do much. You can probably feel your mind wandering rather than focusing on the task at hand—and that means you're not driving any brain plasticity, and not doing much for your brain health.



Second, engaging in activities that require speed and accuracy from your brain are more likely to be helpful for brain health than activities that require slow thinking. Driving brain plasticity requires strong, large-scale, electrical coordination across the



brain—exactly what happens when your brain is learning activities like a new game or sport, musical instrument, or dance.

## The Brain Health Benefits of Cognitive Exercise



Many large observational studies have shown a relationship between cognitive activity levels and brain health. People who engage in higher levels of sustained cognitive activity show better cognitive function and are less likely to go on to dementia over time. One estimate suggested that people who engage in cognitive exercise have a 32% lower risk of cognitive decline, and a second estimate suggested a 40% lower risk of dementia. Generally speaking, the cognitive activities involving new learning and fast, accurate information processing appear more helpful than those involving repetitive activities and slow thinking.

Scientists have also done randomized controlled trials of cognitive training. What's the difference between cognitive activity and cognitive training? Cognitive activity refers to ordinary activities—like playing games or reading—whereas cognitive training refers to structured activities—like a brain training program, or working with a cognitive performance trainer. In these trials, a group of people are randomly assigned into a cognitive training group or a control group (which sometimes does nothing, and sometimes does

### **Observational Studies vs. Randomized Controlled Trials**

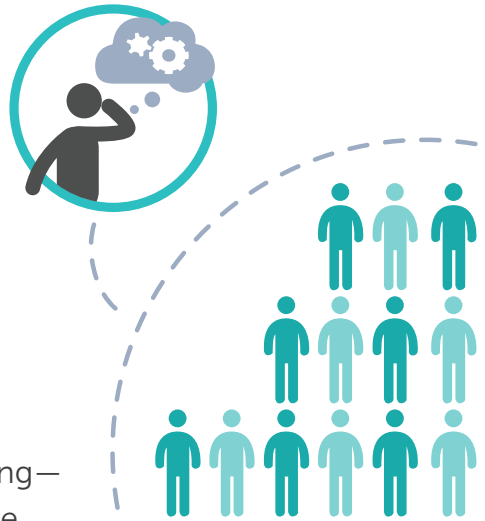
**Observational studies on brain health often show exciting results, but they don't distinguish between two possibilities: perhaps engaging in an activity causes better brain health, but on the other hand, perhaps better brain health allows people to engage in the activity. That's where randomized controlled trials come in. They isolate the activity to show a direct cause-and-effect.**

something that isn't thought to improve cognitive function, like ordinary video games or general education materials). Changes in cognitive function over time are measured in both groups.

Scientists can be confident that any differences in these changes between the two groups are due specifically to the cognitive training—because that is the only difference

between the two groups. A recent review identified 215 clinical trials in older adults of various kinds of cognitive training and concluded that on the average, cognitive training significantly improved cognitive function—with an effect size similar to improving by 4 IQ points. Importantly, this analysis found benefits to cognitive function (abilities like memory and attention) and real-world function, showing people don't just get better at the cognitive training tasks—they get better in a broad functional way.

Another group of researchers analyzed trials with computerized cognitive training programs generally available to the public. Of 17 programs analyzed, many had no scientific data supporting them at all. Only one brain training program had had multiple “gold-standard” clinical trials showing that it worked—and we're proud to say that these independent researchers found it was BrainHQ, developed by Posit Science (the authors of this brain health booklet).



# What You Can Do Based on Science

## **TODAY: Sign up!**

If you have access to an internet-connected computer, tablet, or smartphone, sign up for BrainHQ—a brain training program shown effective in more than 100 published research papers. Start by going to [www.brainhq.com](http://www.brainhq.com) on your web browser to sign up, and then you can train on your computer or download the BrainHQ app from your mobile app store. BrainHQ has dozens of brain training exercises designed to engage continuous new learning and improve the speed and accuracy of information processing in the brain. There is no better-proven activity for your brain health than BrainHQ!



## **THIS MONTH: Change it up!**

Doing what you do in daily life, but in new ways, is a great way to challenge your brain.

## **LONG TERM: Keep yourself challenged**

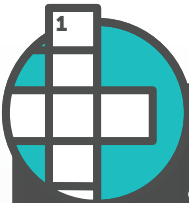
Learn a new skill! Remember that the best activities for brain health are those that require fast, accurate information processing. Here are a few ideas (though there are many other activities you could try!)

- Learn a new language. Try using an app, like Babel or Duolingo, on your smartphone, or join an online class at a community college or adult learning center. Hearing and repeating the subtle sounds in a new language challenges your auditory system to be fast and accurate.

- Take lessons on a new instrument or one you used to play. You can often find tutorials on YouTube, or you can look for an in-person or remote music teacher in your area. Doing this works out your auditory system, as well as your dexterity and rhythm.



- Take up a new activity like juggling or ping-pong to challenge your visual and movement systems to build speed and accuracy.



A lot of people do crossword puzzles and Sudoku as “brain exercise.” While they’re fun, research suggests they don’t do a lot for brain health. Sorry about that!





## The Role of Physical Exercise and Movement in Brain Health

Everyone knows that physical fitness is important for bodily health. We all know that a regular exercise program—and even just staying physically active—can have great benefits for our weight, cholesterol level, and risk of heart attacks—as well as just giving us more energy and pep to enjoy everyday life. But of course the brain is part of the body—and it turns out that physical exercise can have important benefits for brain health as well.

First, physical exercise improves heart health—and what's good for the heart is good for the brain. By improving your heart health it's likely that you can lower the risk of accumulating minor damage to your brain that can accrue from high blood pressure as it flows through your brain—as well as lower the risk of stroke and heart attack, which directly damage the brain.

Second, it's well known that exercise helps your body process blood sugar—your body's source of energy—more effectively (that's why exercise helps lower diabetes risk). This also helps your brain process blood sugar



**Each neuron in the brain generates a tiny electrical charge. Since there are about a hundred billion neurons in the average human brain, those charges add up. When you're awake and your neurons are really firing, your brain generates about 20-30 watts of electricity—enough to power a low-wattage light bulb!**

more effectively—which is important, because your brain consumes more than 40% of the total energy used in your entire body.

Third, physical exercise—and aerobic exercise in particular—increases the production of important neural growth factors that contribute to brain plasticity. Levels of these growth factors generally decline with age, and regular exercise may maintain higher levels of them—making it easier for your brain to change and learn.



## The Brain Health Benefits of Physical Exercise

A number of studies have demonstrated an association between physical exercise levels and brain health. These studies differ in detail but share a common result—people who engage in higher levels of exercise show better cognitive function and are less likely to go to dementia over time. For example, one estimate based on 26 studies suggested that people who engage in high levels of physical exercise have a 14% lower risk of dementia.

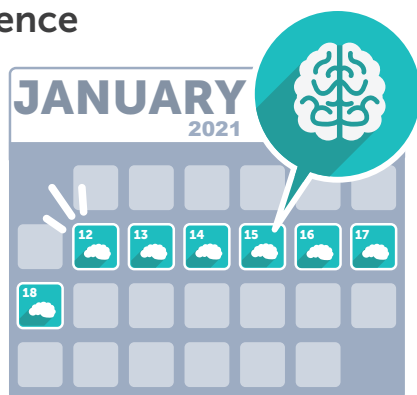
To take this science further, scientists have done randomized controlled trials of physical exercise. A recent review identified 39 clinical trials in older adults of various kinds of physical exercise—including aerobic exercise, strength training, and tai-chi—and concluded that on the average, physical exercise significantly improved cognitive function—with an effect size similar to improving by 5 IQ points. The exact type of exercise didn't matter that much—but exercise sessions of 45–60 minutes with at least moderate intensity were required—

meaning people had to break a sweat (not just take a walk in the park).

## What You Can Do Based on Science

### TODAY: Set a schedule

Decide when you have time to exercise, then set a schedule for this week. Keep in mind that any exercise is better than none—even a good gardening session can be useful!



### THIS MONTH: Make it a habit

Aim to get 45-60 minutes of exercise at an intensity where you break a light sweat at least three times per week. Good choices include regular walks outside, swimming at a local pool, or taking a tai-chi or pilates class (though you should stay socially distanced for now—online classes are a good way to go!) Make it more fun by joining a group—meet a friend for a regular walk or take the same online class as a friend, and talk about it later. It's easier to stick to your goals if your workouts support other people's goals as well!



### LONG TERM: Stay motivated

Tracking your progress—how far or fast you can walk, how many laps you can finish in the pool, or how long you can hold that plank position in pilates—can help you stay motivated to keep up your exercise routine. Use a fitness tracking wristband or an app on your phone to see your progress over time.



We've discussed how physical exercise and movement can improve brain health—but did you know the reverse is true? It turns out that improving brain health may lead to better control of movement. As you stand up, walk, bike, or even drive, your visual system and your balance systems continually process information about how you are moving through the world—and the more quickly and accurately your brain processes that information, the faster your brain reacts in case you miss a step or notice a driving hazard. That makes it more likely you'll be able to keep your balance, stay on your feet, and stay safe on the road.





# The Role of Proper Nutrition in Brain Health

It turns out that the same approach to nutrition that helps your heart stay healthy also helps your brain stay healthy—especially with a few added twists that are unique to the brain.

Eating a brain healthy diet affects your brain in two ways. First, the core of a brain-healthy diet is a heart-healthy diet. Just as we saw with physical exercise, everything that is good for your heart—like lowering your blood pressure and lowering your cholesterol by eating well—is good for your brain—because it lowers ongoing microdamage to your brain and lowers your risk of stroke and heart attack. Second, specific food groups contain nutrients—like vitamin E, flavonols found in fruits and vegetables, B vitamins, and omega-3 fatty acids found in fish—that are crucial for the normal functioning of the brain and help protect brain cells against physical and chemical injury.

So what to eat? Scientists have developed a nutritional approach specific to brain health called the MIND diet. This is based on the well-known Mediterranean diet for heart health, and has at its core foods like vegetables, nuts, beans, and whole grains, with moderate amounts of seafood, poultry, dairy, and eggs. Then it adds specific foods like green leafy vegetables (rich sources of lutein, folate, vitamin E, beta carotene, and polyphenols) and berries (a source of polyphenols). And a glass of wine with your dinner can be part of the plan as



well, if you like—light to moderate alcohol consumption is OK with the MIND diet.

Certain foods are specifically associated with worse brain health—and you can probably guess the types—red meats, butter/margarine, cheese, pastries/ sweets, and fried/fast food. But this doesn't mean never eat a cheeseburger and fries! It just means to make that meal a treat rather than a regular event.



## The Brain Health Benefits of Proper Nutrition

Most studies of nutrition and brain health take a group of people and, over a period of several years, have them fill out questionnaires about what they eat and measure their cognitive performance. These studies frequently showed that people who eat healthier diets have better cognitive function. One analysis showed that people who ate more Mediterranean-like diets enjoyed better cognitive function, and a second showed a 33% reduction in the risk of mild cognitive impairment or dementia. Studies specific to the MIND diet have shown that people with good adherence to the diet had slower cognitive decline, a 53% lower risk of Alzheimer's and an 11% lower risk of Parkinson's disease. And a nice aspect of these studies is that you don't have to have a perfect diet—the better people ate, the better brain function they had—but even moderate levels of good nutrition were more helpful than very poor diets.

To take this science further, scientists have done randomized controlled trials of nutrition and brain health. A recent review identified 15 clinical trials in adults of all ages (typically with weight or heart problems) and concluded that on the average, a better diet significantly improved cognitive function—with an effect size similar to improving by ~2 IQ points.

## What You Can Do Based on Science

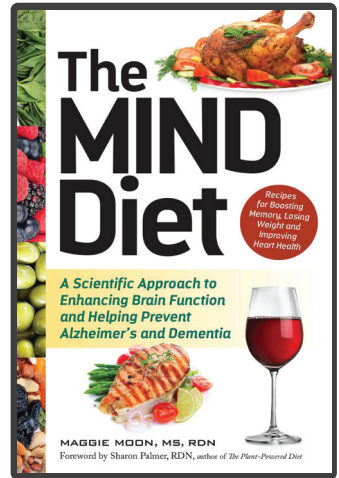
### **TODAY: Log your meals**

Start a log on what you eat to get a “gut check” on your diet. Having a good sense of what you currently eat will help you make good choices on how to change your diet for better brain health.



### **THIS MONTH: Learn about the MIND diet**

Read “Diet for the MIND: The Latest Science on What to Eat to Prevent Alzheimer’s and Cognitive Decline” by Martha Clare Morris. It’s packed full of information, and includes many great brain-healthy recipes for every meal. Review what you learned with your food log and see where you can most effectively make change! Start by replacing one meal per week with a brain-healthier option.



### **LONG TERM: Do your best to follow the MIND diet!**

Again, perfection isn’t necessary—any effort is useful! In addition to the benefits of the MIND diet foods, you’ll stimulate your brain by learning new recipes, and stimulate your taste buds with some delicious food. Once you start to find some new favorites, keep at it by making those meals a regular choice. Don’t forget to keep some brain-healthy snacks on hand—think blueberries and nuts instead of potato chips and candy. Your brain will thank you!

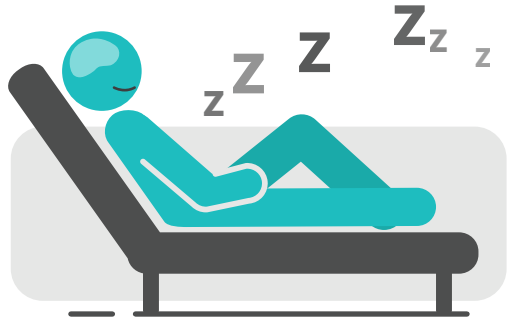


What you do after you eat may also affect your brain health. There is increasing evidence that gum disease and higher levels of bacteria in the mouth are associated with a higher risk of dementia—which could mean that brushing your teeth and seeing your dentist regularly could help lower your risk!



## The Role of Sleep in Brain Health

Your brain is busy doing important work during sleep—even if you don't notice! One crucial activity that your brain does while you are asleep is to replay your day's experiences, rewiring connections between



brain cells to make sure you remember the important things you've learned. It also lets go of the things that don't matter. Scientists have shown that the brains of sleeping mice show exactly the same patterns of activity as when those mice were learning to solve a maze during the day—as if the mouse brains were practicing running that maze while asleep, to be better at it the next day. And studies in people who are learning new skills have shown they are better at the skill after a night of good sleep—but if that sleep is interrupted, they are no better at the skill than the day before. In this way, good sleep is a key contributor to brain health because it contributes directly to brain plasticity—allowing your brain to learn and change.

All that activity in your brain all day long creates a lot of mess. As your brain cells use energy, they also create waste products that build up in the fluid that surrounds your brain. If this waste builds up over time, it can impair your brain's ability to do its work. Fortunately, while you sleep, this fluid is cleaned with a series of gentle waves, ensuring that you wake up the next day with a fresh, clean brain, ready for a new day's activities.

## The Brain Health Benefits of Sleep

Most studies of sleep and brain health take a large group of people, track how well they sleep over a period of several years, and measure their cognitive performance.

One analysis of six studies showed that people with sleep-disordered breathing were 26% more likely to experience significant cognitive decline, and a second analysis of 27 studies showed a 55% increased risk of Alzheimer's disease in people with sleep problems. These studies are exciting—but as with all observational studies, they do not show that better sleep caused the brain health improvements. Since the brain controls sleep just as the brain controls cognitive function, it's possible that an underlying brain health problem causes both poor sleep and cognitive decline. Despite the obvious relationship between sleep and cognitive performance, there have been few randomized controlled trials in the field—this is definitely an area where we need to see more studies done.



## What You Can Do Based on Science

### **TODAY: Set good habits**

If you're having a hard time getting good sleep, scientists have developed a number of ways to help you get to sleep more easily and awake more well-rested. One is to have a regular bedtime, and develop a ritual that helps you get ready for bed—perhaps reading a magazine for 15 minutes, or drinking a warm glass of milk. Sleep is a habit your brain has to learn, and just like any other habit, you'll get better with regular practice. Avoid alcohol and snacks before bed, and put your phone away well before you get into bed—all of these activities are associated with worse sleep. Make sure your bedroom has a comfortable temperature, and is kept dark at night. You can get more advice by searching for “sleep hygiene” online—you'll find helpful websites from the Centers for Disease Control and the Sleep Foundation.



### **THIS MONTH: Keep it up**

Continue with the bedtime and rituals you have set up! Retraining your brain for better, more consistent sleep may take some time.

### **LONG TERM: Take new steps, if needed!**

If after giving good sleep hygiene a try, you're still having trouble sleeping, consider asking your doctor about melatonin (a natural hormone that helps people with sleep, especially with falling asleep faster). You might also try a cognitive behavioral therapy

(CBT) app for your smartphone—Sleepio, ShutEye, and CBT-i Coach (from the Veterans Administration) are all science-based programs. These apps offer coaching and scientifically proven methods to help you sleep better. You may also ask your doctor about getting a sleep study. These studies can identify sleep apnea and other conditions that may be helped!



**The U.S. has an issue with sleep culture. Some people think it's more "productive" to sleep very little, high schools begin too early in the morning, and 50-70 million of us have some kind of sleep disorder. Given the importance of sleep, we should be working on this!**



## **The Role of Social Interactions in Brain Health**

People are social—we live with families and in communities, and interacting with other people is a crucial part of almost all our daily activities, including our work, home, and personal lives. And it turns out that social contact is a crucial part of our brain health as well.



Social interactions with other people are like a type of intensive brain training. Listening to people talk and understanding the

details of what they say and how they feel about saying it, thinking about the emotions expressed on the faces of other people, and figuring out what people are thinking about are all activities that engage your attention, processing speed, memory, and planning skills. What's more, interacting with people is interesting and rewarding—spending time with people doing something fun or working on a worthwhile project activates attention, novelty, and rewards systems that contribute to brain plasticity and brain health.

## The Brain Health Benefits of Social Interactions

Many studies have been done that link social interactions with cognitive performance and brain health. One study that summarized 51 studies of 102,035 participants showed strong associations between social interaction and cognitive performance—lower social isolation, higher social activity, and a larger size of social networks were each correlated with better cognitive function. Another study looked specifically at dementia risk and found that good social engagement reduced dementia risk by 12%.

## What You Can Do Based on Science

### **TODAY: Stay in touch**

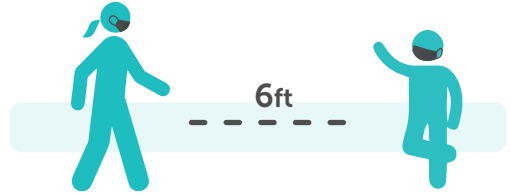
Call someone you haven't talked to in a while. Check in with them and see how they're doing! Try to reach out to someone outside your household at least every other day to keep your connections going strong.





## THIS MONTH: Arrange a meet up

Plan to get together with someone you haven't seen recently—or that you'd like to get to know better. Going for a (socially distant) walk together is a good option!



## LONG TERM: Meet new people

Making new friends can be challenging at any age, from our first day in preschool all the way through our retired years. But it's important for social life, and is a great way to expose your brain to new experiences. Try taking a class (online, for now, but in person when it's safe!) to meet new friends and get the added challenge of learning a new skill!



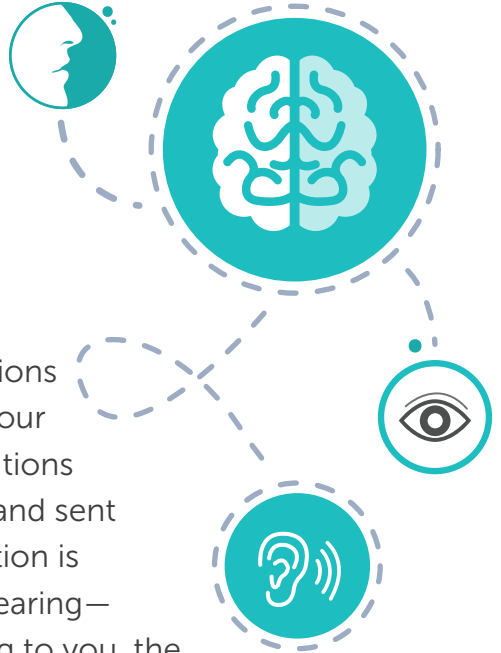
**Your brain is very social! There are distinct regions in the brain that are specialized for processing faces, understanding emotions in other people, and managing your own emotions.**



# The Role of Good Hearing and Vision in Brain Health

The world comes into your brain through your senses—your hearing, vision, touch, taste, and smell. The higher the quality of information that comes in through your senses, the better your brain will do.

When you hear a sound, vibrations in the air cause tiny hairs inside your ear to vibrate as well. Those vibrations are turned into electrical signals and sent to your brain, where the information is processed and you experience hearing—your favorite song, a friend talking to you, the dialogue in a movie. If you have good hearing, those vibrations in the air are transformed into electrical signals quickly and accurately, giving your brain high-quality information to work with. However, if your hearing has gotten worse—because of a lot of exposure to noisy working conditions, or just because you are getting older—those vibrations are transformed into electrical signals in a more messy and disorganized way. This means that your brain is getting lower-quality information to work with—which means that your brain systems involved with learning, memory, attention, and thinking/planning don't work as well. The same principles apply to vision (and all of your sense, s)—the better they work, the better the flow of high-quality information to your brain is, and the better your cognitive skills will do.



# The Brain Health Benefits of Good Hearing and Vision

Most studies of hearing/vision and brain health take a large group of people, track their hearing or vision performance over a period of several years, and measure their cognitive performance. One study of hearing loss suggested that people with hearing loss have a 22% higher risk of cognitive decline and a 28% higher risk of dementia. There have been fewer studies of vision and cognitive function, but one example found that even mild vision loss was associated with a 19% increase in the risk of dementia. There haven't been randomized controlled trials of the effects on cognitive performance or dementia of offering people hearing aids or updated prescriptions for glasses. That's because everyone who needs them should get a hearing aid and a current prescription—it's not appropriate to ask people to withhold those benefits in the control group of a clinical trial.

## What You Can Do Based on Science

### **TODAY: Do an active vision and hearing check**

Try this: Sit still and look straight ahead. What can you see? How far into your peripheral vision can you identify objects, without moving your head? Many of us start to lose some of our peripheral vision over time, especially when we have to notice something quickly. It's a skill you can rebuild! Try something similar with your hearing: Turn on a TV or radio at your usual volume. Then turn it down until you can still hear it, but have to work at it—and really pay attention. How low can you go?



## THIS MONTH: Pay attention

We tend to walk through life without paying close attention to a lot of what goes on around us. It's good for the brain to practice paying closer attention to what we see and hear. Next time you go for a walk, try to really notice the buildings, trees, and other features around you. When you get home, try to recreate the walk by remembering those items. Keep practicing this skill whenever you leave the house! Similarly, try listening to a song. Learn the lyrics until you can sing along with it. This type of active, focused looking and listening helps exercise your brain's attention networks.

## LONG TERM: See your doctors

It's a great idea to regularly get your hearing and vision checked by professionals. Having sharp hearing and vision is critical to good brain health; they help to deliver clear information to the brain, which makes it easier for the brain to store and recall. Many people begin to have hearing loss and don't notice it. You can schedule a hearing check with your local primary care provider or audiologist—just find out how your hearing is doing, and then you can make an informed decision about what to do about it. Likewise, vision can change without you being aware. Make sure you see your optometrist once per year for a prescription check-up—and get those new glasses (or contacts) when you need them.



# Building a Personal Brain Health Program for You

You've read a lot about brain health now! But how do you put it all together into a brain health program that's right for you?

Improving your brain health is about the cumulative effects of better behaviors—a lot of little actions can add up over time to big changes in your brain health.

You can build your own personal brain health program—one that's right for you—by picking and choosing the activities that suit you best. You don't have to do every single one of these activities—you can pick ones that suit your interests and fit into your life. What's most important is to get started on one of them, build that new habit, then add more over time!



"It's a popular fact that 90 percent of the brain is not used and, like most popular facts, it is wrong...It is used. One of its functions is to make the miraculous seem ordinary, to turn the unusual into the usual. Otherwise, human beings, faced with the daily wondrousness of everything, would go around wearing a stupid grin, saying 'Wow,' a lot. Part of the brain exists to stop this from happening."

**-Terry Pratchett in *Small Gods***

## Just for Fun

### Brain Teaser: Missing Letters

Count the "f"s in this passage.

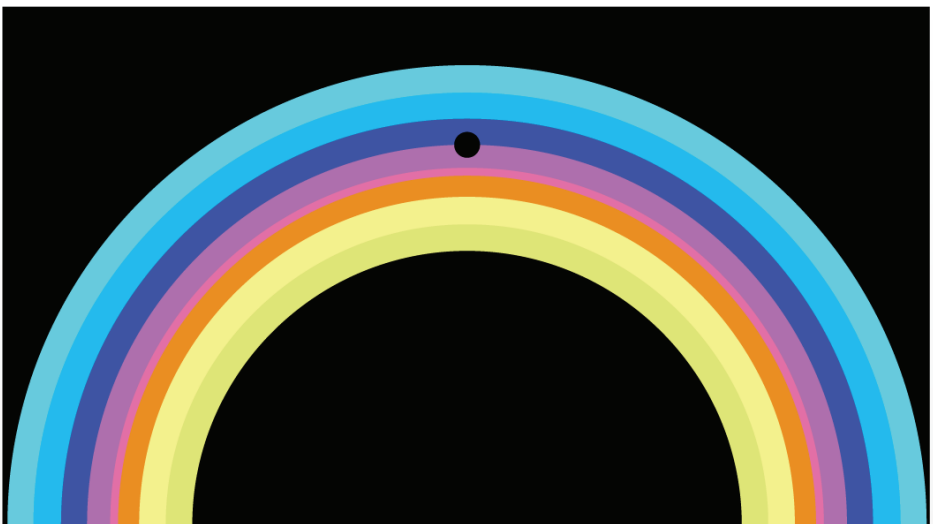
*Finished files are the result of years of scientific study combined with the experience of years.*

How many did you count? Most people count three, but there are actually six. Why? It seems that the brain has trouble correctly processing the word of. The letter "f" usually makes the /f/ sound, like in fox. In the word of, though, it makes the /v/ sound. As a result, the brain overlooks the word of as it scans for the sound of /f/.

### Optical Illusion: Seeing Rainbows

What happens when you stare at this oddly colored arc? Your brain will make a candy-colored surprise out of thin air.

1. Stare at the black dot for 20 seconds.
2. Look up at the sky or a light-colored wall.



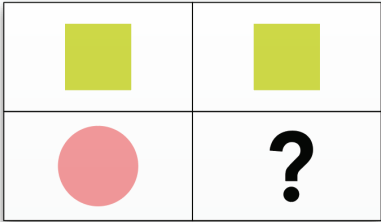
Why do you see a rainbow where there is none? This type of illusion is called an “afterimage” illusion. There are two kinds of afterimages—negative and positive. In a positive afterimage, the original color of the image is retained, but in a negative afterimage, like this rainbow illusion, the colors become inverted.

Negative afterimages happen because staring at something brightly colored overtaxes the visual system’s cells and they become overstimulated, which makes them less sensitive. In response, the cells for the bright color weaken while their opposing color signal strengthens. In other words, staring at something green for too long will result in a reddish afterimage.

### Task: Find the missing piece

Can you find the shape that fits the pattern? In this activity, you will see a set of shapes with one missing. Below that, you will see five choices (labeled A through E). Which one of those fits the pattern and should replace the blank space? Answers are on page 34.

1.



A

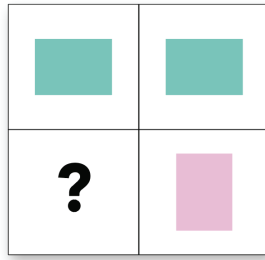
B

C

D

E

2.



A

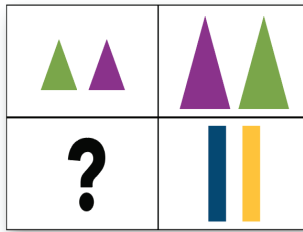
B

C

D

E

3.



A

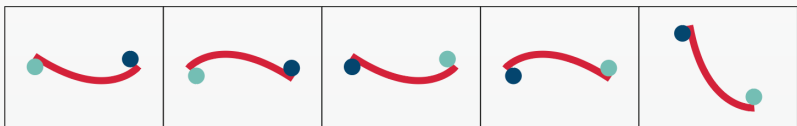
B

C

D

E

4.



A

B

C

D

E



5.



A

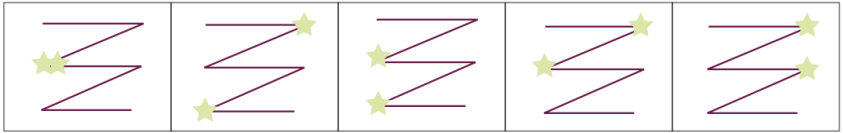
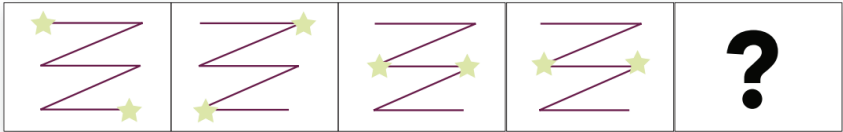
B

C

D

E

6.



A

B

C

D

E

7.



A

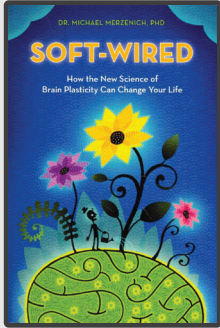
B

C

D

E

# Further Reading

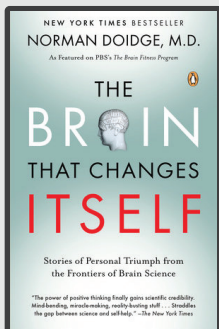
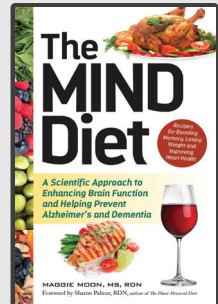


## ***Soft-Wired: How the New Science of Brain Plasticity Can Change Your Life.***

Dr. Michael Merzenich, co-founder of Posit Science, explains how the brain rewires itself across the lifespan, and how you can take control of that process to improve your life.

## ***The MIND Diet: A Scientific Approach to Enhancing Brain Function and Helping Prevent Alzheimer's and Dementia.***

Maggie Moon discusses the latest science around how proper nutrition can help brain health. The MIND diet is a modified Mediterranean diet, with special emphasis on foods associated with good cognitive function.

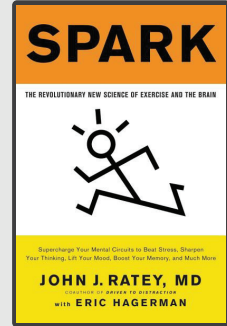


## ***The Brain That Changes Itself.***

Dr. Norman Doidge traveled the country to meet both the scientists championing neuroplasticity and the people whose lives they've transformed. Their stories are contained in this engaging best-seller.

***Spark: The Revolutionary New Science of Exercise and the Brain.***

Dr. John Ratey covers the science of how what you do with your body can affect your brain.



## Find the missing piece: Answers

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1: B

4: C

2: B

5: D

2: E





## **About Posit Science**

The authors of this booklet are from Posit Science, the makers of BrainHQ. BrainHQ is the most effective brain-training program available, and has been proven to help people think faster, focus better, and remember more.

At Posit Science, we take science seriously: many of our staff members have PhDs in scientific fields, and we pride ourselves on our commitment to clinically proven solutions for better brain health.

Learn all about us at  
**[caresource.brainhq.com](https://caresource.brainhq.com)**