

The Simple Link Between Core Strength and Brain Health

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STORY AT-A-GLANCE

- › Your abdominal muscles physically influence your brain every time you move by creating pressure changes that affect brain fluid circulation, nervous system signaling, and mechanical stimulation inside the skull
- › Research showed that exercises combining movement with coordination and focus, including yoga, tai chi, Pilates, dance and bodyweight training, improved memory, attention, decision-making and overall thinking ability across all age groups
- › Shorter exercise programs often produced stronger cognitive improvements than long-term workout programs, making brain-supportive movement realistic and sustainable for people with busy schedules or low energy
- › Bodyweight movements like planks, pushups, bear crawls, mountain climbers, glute bridges and slow squats strengthen your core while simultaneously challenging balance, posture and coordination that sharpen brain function
- › Long periods of sitting reduce the abdominal activation and movement-related brain stimulation that support mental clarity, meaning frequent daily movement and posture changes help maintain focus, reaction speed and cognitive resilience

Your abs do more than hold in your stomach. Every time your core contracts, whether you're standing up from a chair, climbing stairs or steadying yourself on uneven ground, those muscles send mechanical waves traveling upward through your body and into your skull. Emerging research reveals that this physical connection between your abdomen and your brain shapes how well you think, remember and focus.

That has real implications for brain health. Cognitive decline continues to rise across all age groups, with memory lapses, poor focus, mental fatigue, and slower decision-making becoming common complaints even in younger adults. Executive function, meaning your ability to organize, focus, plan and regulate impulses, affects nearly every part of your daily life, yet the usual fixes like supplements, stimulants and productivity hacks tend to ignore the physical foundation underneath cognition.

What if mental sharpness is built from the core up, not the head down? Recent evidence points in exactly that direction, and the implications stretch far beyond fitness culture. Extreme intensity, exhausting workouts and rigid training programs aren't required. Gentler movement often outperforms aggressive training when it comes to memory, focus and executive function.

Children, adolescents and individuals with attention challenges showed some of the strongest gains of all. This reframes movement itself. Exercise doesn't simply increase blood flow or burn calories. Your body movement physically interacts with brain tissue, fluid circulation and nervous system signaling. The first study below reveals exactly how your abdomen and brain communicate mechanically every time you move.

Your Core Muscles Physically Push Brain Fluid

A study published in Nature Neuroscience used high-speed imaging to watch how the brain moved inside the skull during movement and rest.¹ Researchers studied 24 mice and monitored their brain tissue, skull position, abdominal muscle activity and locomotion all at once. Instead of focusing only on blood flow or electrical brain signals, the researchers wanted to understand the actual physical forces acting on the brain during movement.

- **The abdomen turned out to be the driving force** — Scientists discovered that contractions in the abdominal muscles closely matched movement of the brain itself. Brain motion started slightly before locomotion began, which showed the

movement didn't come from footsteps or head motion alone. The abdominal muscles tightened first, pressure changed inside the body and the brain shifted almost immediately afterward.

During locomotion, the brain shifted mainly forward and sideways inside the skull. Researchers described this as "rostro-lateral" movement, meaning toward the front and side of the head. The skull itself stayed almost completely stable while the brain tissue moved relative to it. While the mechanism still needs to be fully confirmed in humans, the anatomy in mice is similar enough that researchers expect the same physical relationships to hold.

- **Pressure changes inside the body affect your brain directly** – Researchers found that movement sharply increased pressure inside the skull. Earlier studies cited in the paper showed intracranial pressure in mice rose from roughly 5 mm Hg at rest to more than 20 mm Hg during movement. That pressure shift matters because it physically changes how fluid moves through the brain.
- **Your body contains a hydraulic-like connection to the brain** – The researchers identified a network of veins linking the abdomen, spinal canal and brain. This system acts almost like a pressure-transfer tube. When abdominal muscles tighten, blood and pressure move upward through the spinal region and influence the brain mechanically.

Picture squeezing a water balloon from the bottom; the pressure travels upward and outward. Researchers found the abdomen-to-brain system works the same way. Tightening the abdomen increased pressure in the spinal canal and shifted cerebrospinal fluid upward.

Cerebrospinal fluid, often called CSF, surrounds and cushions your brain and spinal cord. It acts as your brain's circulation and waste-removal system; when CSF stagnates, metabolic byproducts accumulate in tissue, which contributes to brain fog, fatigue, and longer-term cognitive decline.

- **Movement appears to help push waste-related fluid out of the brain while awake** — Researchers used computer simulations to study how this motion changed fluid flow. The models showed that movement pushed fluid out of brain tissue and into surrounding spaces around the brain. This differs from sleep-related flow, where fluid moves deeper into brain tissue for [cleanup and repair](#).

Movement Keeps Your Brain Mechanically Active

Long periods of sitting reduce abdominal activation, reduce full-body movement and reduce pressure shifts that stimulate circulation around the brain. Your body evolved around movement. Constant stillness changes the mechanical environment surrounding brain tissue.

The abdominal muscles involved in this study included the external oblique, internal oblique and transverse abdominal muscles. These muscles tighten before movement starts to stabilize the torso. Researchers showed that this stabilization process also sends mechanical force upward toward the brain.

- **The findings connect movement to real-world brain performance** — Every [walk](#), squat, twist and posture adjustment activates abdominal muscles in some way. That means ordinary movement throughout the day continuously influences brain pressure, circulation and fluid movement. Even light movement creates physical stimulation inside the nervous system.
- **Researchers found that respiration alone was not the main driver during wakefulness** — Earlier theories focused heavily on breathing and heartbeat as the main causes of brain movement. This study found abdominal activation and locomotion had a much stronger relationship to brain motion in awake animals. Heartbeat-related pulsations were extremely small compared to the shifts caused by movement.

- **Mechanical stimulation inside the brain affects more than fluid movement** – The paper also discussed mechanosensitive channels, which are specialized structures in nerve cells and support cells that respond to physical force. This means movement itself influences signaling inside the brain through direct mechanical stimulation, not just chemistry or blood flow.
- **The findings create a different way to think about exercise** – Many people view movement only as calorie burning or cardiovascular training. This research shows your body movement physically interacts with your brain every second you move. Your abdomen, spine, blood vessels and nervous system work together as one connected mechanical system.

Short Workouts Build Faster Thinking

While the first study reveals how movement reaches your brain, a second reveals what that does across hundreds of thousands of real people. For the analysis, published in the British Journal of Sports Medicine, researchers evaluated 133 systematic reviews covering 2,724 randomized controlled trials and 258,279 participants to determine how exercise affects cognition, memory and executive function across all age groups and health conditions.²

Instead of focusing on one exercise style or one disease, the review examined nearly every major category of movement, including aerobic exercise, resistance training, yoga, **tai chi**, dance and exergaming.

- **The cognitive benefits appeared across nearly every population studied** – Researchers found consistent improvements in general cognition, memory and executive function in children, adults, older adults and individuals with chronic diseases or neurological conditions.

Overall thinking ability showed noticeable improvement, while memory and mental skills like focus, planning, and decision-making also improved consistently after exercise. Researchers also found improvements in specific cognitive tests widely

used to measure memory, attention and thinking speed.

- **Children and adolescents experienced some of the strongest memory gains –** Younger participants showed a far larger memory improvement than most adult groups. Researchers believe movement stimulates developing brain networks aggressively during childhood and adolescence.

That matters for attention span, academic performance and learning speed. If your child struggles with focus or mental fatigue, consistent movement creates measurable changes in brain performance rather than simply "burning off energy."

- **Individuals with attention-deficit hyperactivity disorder (ADHD) showed especially strong executive function improvements –** Participants with **ADHD** produced an executive function improvement that was far higher than most other populations studied.

Researchers discussed how exercise improved task engagement, attention control and impulse regulation. The paper also highlighted working memory tasks such as digit span testing, which measures how well the brain temporarily stores and manipulates information.

- **Shorter exercise programs often worked better than longer ones –** Interventions lasting one to three months produced stronger cognitive improvements than programs lasting more than six months. Researchers discussed several explanations for this pattern:
 - Better adherence
 - Lower dropout rates
 - More novelty
 - Greater mental engagement
 - Less psychological burnout

Shorter exercise programs often produced stronger real-world cognitive improvements, not because brief workouts are inherently superior, but because participants were more likely to stay consistent and avoid burnout. The findings suggest that sustainable movement habits matter more than extreme workout duration.

- **The findings challenge the idea that harder exercise always produces better brain results** — Low- and moderate-intensity exercise repeatedly performed well across cognitive categories. Tai chi, yoga and exergaming stood out because they combined movement with coordination, focus, and memorization. Exergaming refers to video games that require physical movement and fast reactions rather than sitting still with a controller.

Movement Challenges Your Brain in Real Time

Researchers repeatedly emphasized that exercises requiring coordination, sequencing and attention appeared especially effective. Tai chi requires memorizing movement patterns. Yoga demands body awareness and breath control. Exergaming forces quick decisions and visual processing. Your brain stays active during the workout instead of drifting mentally.

- **The review found cognitive gains regardless of workout frequency or duration** — Improvements didn't depend heavily on exercising every day or performing extremely long sessions. Benefits appeared even with lower weekly exercise volumes. That removes some of the biggest mental barriers people face:
 - "I don't have enough time."
 - "I missed a few days."
 - "My workouts are too short."

- **Exercise physically reshapes brain function through several biological pathways –** Researchers explained that movement increases neuroplasticity, which means your **brain becomes more adaptable** and efficient at forming new connections.

Exercise also increases cerebral blood flow, meaning more oxygen and nutrients reach active brain tissue. At the same time, movement improves neurotransmitter activity, the chemical signaling system your brain uses for focus, motivation and memory formation.

- **Inflammation reduction played a major role in the findings –** Chronic inflammation interferes with memory formation, mental clarity and energy production inside cells. The paper explained that exercise lowers systemic inflammation while improving communication between brain cells. This creates an environment where learning, memory storage and mental flexibility improve more efficiently.
- **Researchers also discussed changes in brain structure itself –** Neuroimaging studies referenced in the paper showed short-term exercise interventions changed gray matter volume, connectivity patterns and activation in regions involved in cognitive processing. Gray matter contains many of the brain's nerve cell bodies and plays a major role in learning, decision-making and emotional regulation.
- **The study reinforces that movement acts like brain training, not just physical training –** Every session gives your nervous system a new challenge to solve:
 - Balance
 - Timing
 - Spatial awareness
 - Coordination
 - Reaction speed

You don't need extreme athletic performance to strengthen brain function. Consistent movement, mental engagement and short-term progression produced measurable improvements across huge populations. That creates a much lower barrier for someone starting from a place of fatigue, inactivity or cognitive burnout.

How to Build a Brain-Friendly Movement Routine

Your brain responds to movement all day long, not just during workouts. Core activation, circulation, coordination, and consistent physical activity all influence how well your brain processes information, clears waste and maintains focus. Many people attack brain fog and mental fatigue from the wrong direction.

They look for stimulants, supplements or productivity tricks while ignoring the physical inactivity, poor posture and metabolic stress that weaken brain function at its foundation. This isn't about punishment-style exercise. It's about restoring regular movement patterns that support brain circulation, abdominal activation and cellular energy production.

1. Train your core through full-body movement instead of isolated "ab workouts" –

Your abdomen acts like a pressure-regulation system for your brain. Walking uphill, carrying groceries, split squats, sled pushes, crawling patterns and rotational movements all activate the deep abdominal muscles that support healthy brain mechanics. Endless crunches and situps don't train your body the same way real movement does.

Pilates stands out because it strengthens deep stabilizing muscles while improving posture and breathing mechanics at the same time. [Yoga](#) adds controlled movement, flexibility and balance challenges that force your brain and body to coordinate together. Tai chi slows movement down enough that you become more aware of posture, weight shifting and body positioning.

Bodyweight training and **calisthenics** also work extremely well because they force your core to stabilize your body naturally during movement. Pushups, planks, side planks, bear crawls, mountain climbers, hanging knee raises, bird dogs, glute bridges and slow **bodyweight squats** all challenge the abdominal wall while training coordination and posture at the same time.

Even simple movements like getting up from the floor without using your hands activate stabilizing muscles that support spinal and brain mechanics. If you sit most of the day, start with simple movement: slow squats, stair climbing, standing during phone calls and short walks after meals. Your body responds best to consistency first.

- 2. Use manageable exercise programs that you can sustain consistently** – The research found exercise programs lasting one to three months produced stronger cognitive improvements than programs lasting longer than six months. Shorter intervention periods often produced better results because people stayed more engaged, consistent and mentally invested in the routine.

Your brain responds strongly to repeated movement challenges that feel achievable instead of **overwhelming**. If your schedule already feels overloaded, stop thinking in terms of perfect hour-long workouts or complicated fitness plans that become exhausting after a few weeks.

A 10-minute brisk walk after lunch, 15 minutes of beginner Pilates or a short yoga flow before dinner still stimulates circulation, coordination, and cognitive function. A short calisthenics circuit using pushups, bodyweight squats, bear crawls, planks, mountain climbers and glute bridges challenges your core and nervous system without requiring gym equipment.

Even movement-based video games improved cognitive performance in the research because they forced quick reactions, visual processing, and physical coordination at the same time. Shorter sessions reduce mental resistance. The

easier a routine feels to repeat, the more likely you are to maintain enough consistent movement to keep stimulating brain adaptation over time.

- 3. Add coordination and balance work to wake up your brain** — Your brain benefits most when movement forces attention, sequencing and coordination. Simple repetitive exercise still helps, but mentally engaging movement stimulates more brain regions simultaneously. **Dance workouts**, martial arts drills, balance exercises, agility ladder work, animal-style crawling movements and yoga transitions force your nervous system to adapt continuously.

Even changing your walking route or learning a new bodyweight movement pattern gives your brain a stronger stimulus. If you're older or mentally burned out, this style of movement builds confidence quickly because progress becomes noticeable in everyday life. You react faster. You feel steadier. You remember tasks more easily.

- 4. Support brain energy production with proper food and sunlight** — Movement gives your brain the mechanical stimulation it needs, but that stimulation only pays off if your cells can produce enough energy to act on it — and the fats you eat directly shape how well your mitochondria work. Your brain requires carbohydrates, protein, minerals, and light exposure to maintain efficient energy production. **Low-carb dieting**, for instance, raises stress hormones and reduces metabolic resilience over time.

Focus on consuming healthy carbohydrates from whole fruit, root vegetables, and well-tolerated starches along with steady protein intake. Aim for about 0.8 grams per pound (or 1.76 grams per kilogram) of lean body mass, with one-third coming from **collagen-rich sources** like slow-cooked meats or bone broth. Avoid seed oils and ultraprocessed foods, which contain high levels of **linoleic acid** (LA) that interferes with mitochondrial energy production.

Daily sunlight exposure matters too. Morning light helps regulate circadian rhythms while midday sunlight supports nitric oxide production, mitochondrial function and cellular energy production. Avoid intense sun exposure from 10 a.m. to 4 p.m. until

you've reduced seed oil intake for at least six months, since high LA levels increase your skin's sensitivity to the sun.

5. Break the cycle of prolonged sitting throughout the day – Your brain wasn't built for stillness. Eight to 10 hours of sitting changes circulation, posture, abdominal activation and nervous system signaling. Even a daily workout doesn't fully offset long stretches of inactivity. Treat movement as a running tally throughout the day, not a single workout to check off.

Spend more time standing, stretching, kneeling, walking and changing positions throughout the day. Floor sitting, mobility work and [posture resets](#) force your core muscles to stay engaged more often than remaining in a chair all day.

Those small movement changes accumulate quickly. Once your energy production improves, movement starts feeling rewarding instead of draining.

FAQs About Core Strength and Your Brain

Q: How does my core affect my brain?

A: Your core muscles do far more than stabilize your torso. Research showed that every time your abdominal muscles contract during movement, they create pressure changes that physically influence brain tissue and fluid circulation. These pressure shifts help move cerebrospinal fluid around your brain and stimulate brain activity through mechanical signaling. Simple movements like walking, climbing stairs and changing posture continuously activate this brain-body connection.

Q: What types of exercise improved memory and thinking the most?

A: The strongest cognitive improvements came from exercises that forced the brain to stay mentally engaged during movement. Tai chi, yoga, Pilates, dance, exergaming and calisthenics stand out because they combined coordination, balance, sequencing and focus. Pushups, planks, crawling drills, bodyweight squats and rotational movements also challenge the core while improving posture and nervous system coordination at the same time.

Q: Do I need intense workouts to improve brain function?

A: No. The research repeatedly showed that low- and moderate-intensity exercise improved cognition, memory and executive function across nearly every population studied. Shorter exercise programs often worked better than long, exhausting routines because people stayed more consistent and mentally engaged. Even short daily movement sessions produced measurable improvements in focus, reaction speed and mental clarity.

Q: Why does sitting too much affect mental sharpness?

A: Long periods of sitting reduce abdominal activation, circulation changes and full-body movement that normally stimulate the brain mechanically. Researchers found that inactivity changes the physical environment surrounding brain tissue. Over time, constant stillness reduces the movement-related stimulation that supports focus, memory and cognitive flexibility. Regular posture changes, walking and core activation throughout the day help counteract those effects.

Q: Which groups experienced the biggest brain benefits from exercise?

A: Children, adolescents and individuals with ADHD showed some of the strongest improvements in memory, focus and executive function. Researchers found that movement strongly stimulated developing and attention-related brain networks.

However, benefits appeared across nearly every age group and health condition studied, including older adults and individuals with chronic diseases. The findings showed that consistent movement improved brain performance even without elite athletic training.

Sources and References

- ¹ [Nature Neuroscience April 27, 2026](#)
- ² [British Journal of Sports Medicine 2025;59:866-876](#)