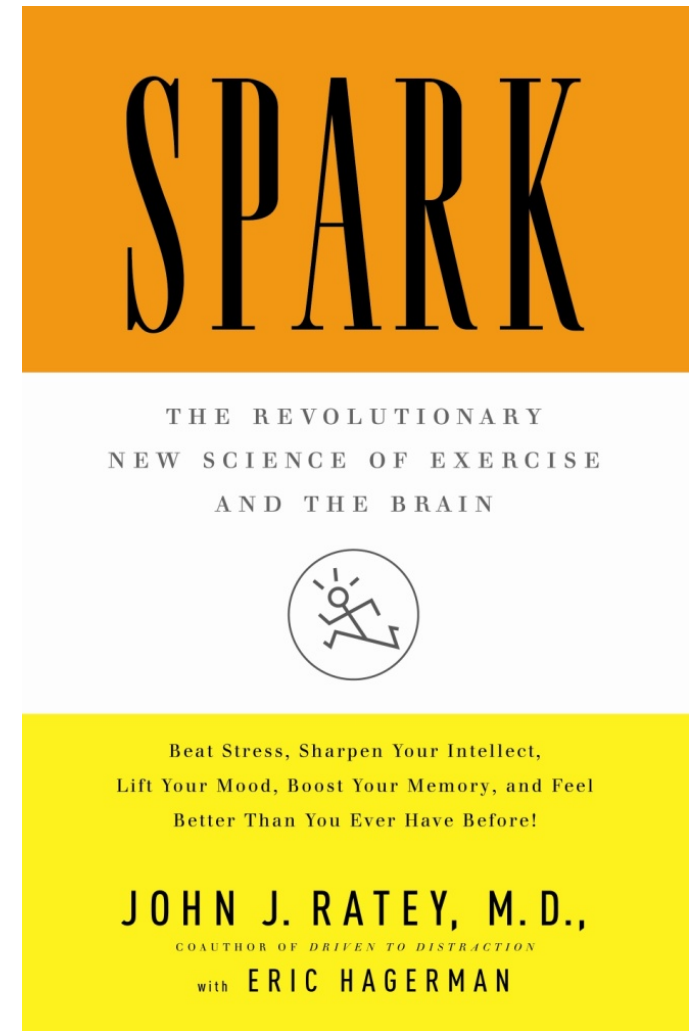


ANOTHER EXAMPLE OF SHAMELESS
SELF- PROMOTION

www.JohnRatey.com

<http://sparklinglife.org>

The Ratey Institute



Partially funded by REEBOK

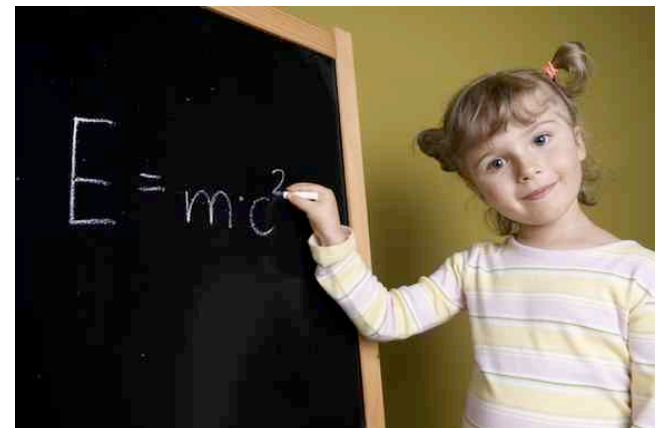
EMOTIONAL REGULATION



EXERCISE PLAY



OPTIMIZING COGNITIVE FUNCTIONING

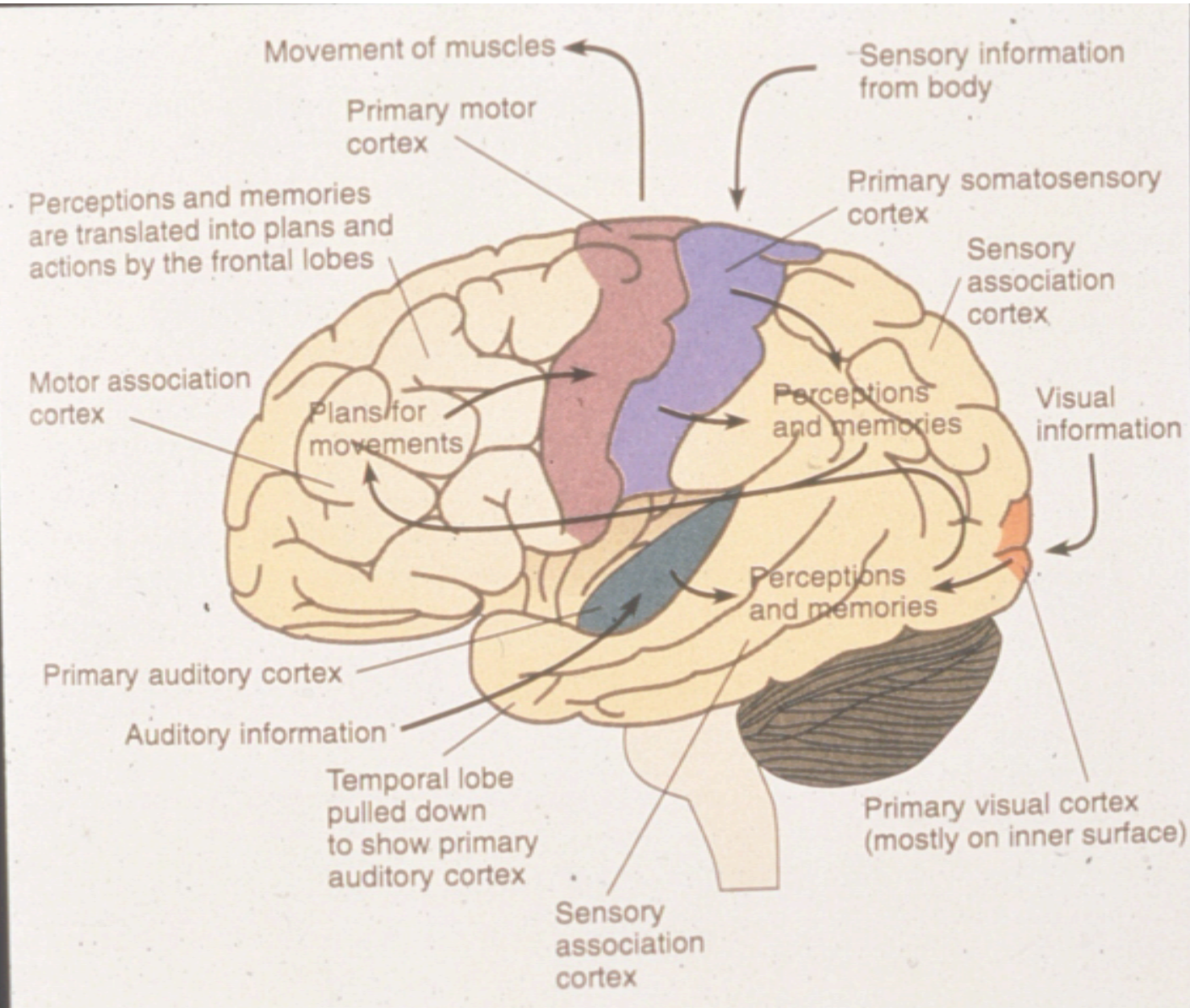


Hunters & Gatherers



Our ancestors were predominately of the hunter - gatherer type.
The "Running Man" was the standard of fitness that ensured survival.
Individuals who could out-run & out-plan their peers would survive.

ADAPTATION, MOVING, LEARNING



Evolution Movement

Thinking

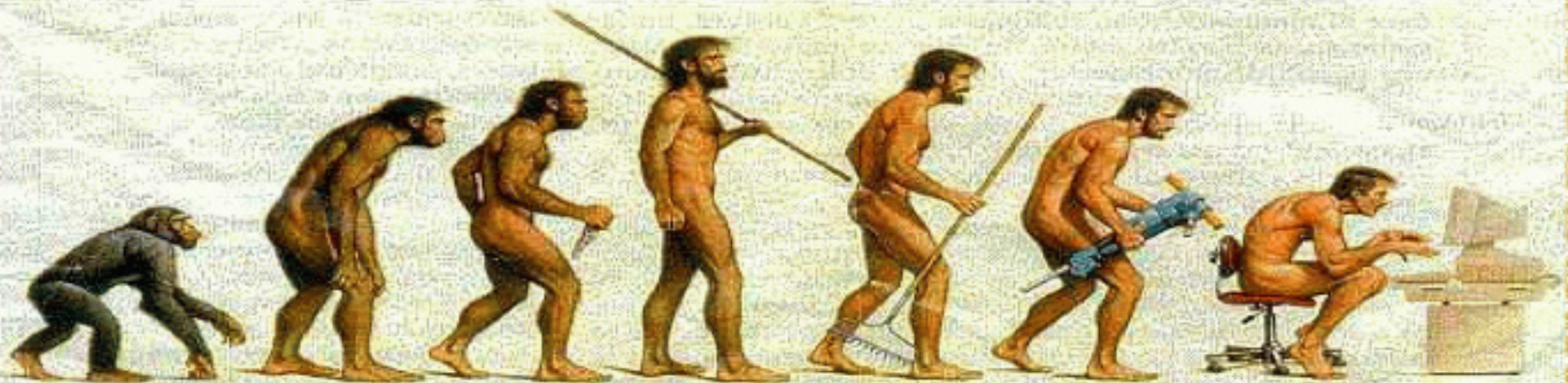
“That which we call thinking is the evolutionary internalization of movement.”

Lilinas, 2001

EVOLUTION TEACHES...

Early humans survived because they had the ability to perform demanding physical work.

Individuals who could out-run & out-plan their peers would survive



Humans are endurance predators

SITTING IS THE
NEW SMOKING



REVENGE
OF THE SIT



Every student at Madison Junior High completes a computer-based fitness test



Students spend one day a week in the school's state-of-the-art fitness center.



California Department of Education 2001 Study

33% of freshmen in California were overweight or obese.

Naperville – District 203 – 2002 Study

3% of freshmen were overweight or obese. 19,000 children in the district.

TIMSS – Trends in International Mathematics / Science.

An international benchmarking test comparing the achievement of eighth-grade students . In 1999, Naperville District 203 scored #1 in science and #6 in math. An amazing 94.1% of Naperville parents were satisfied with the PE curriculum.



NEW PE

Fewer competitive activities.

More **activities that emphasize personal achievement** – Not a replacement for Competitive Sports.

Use and **CO-OPT** technology to serve us.
USE OUR CYBER SLAVES

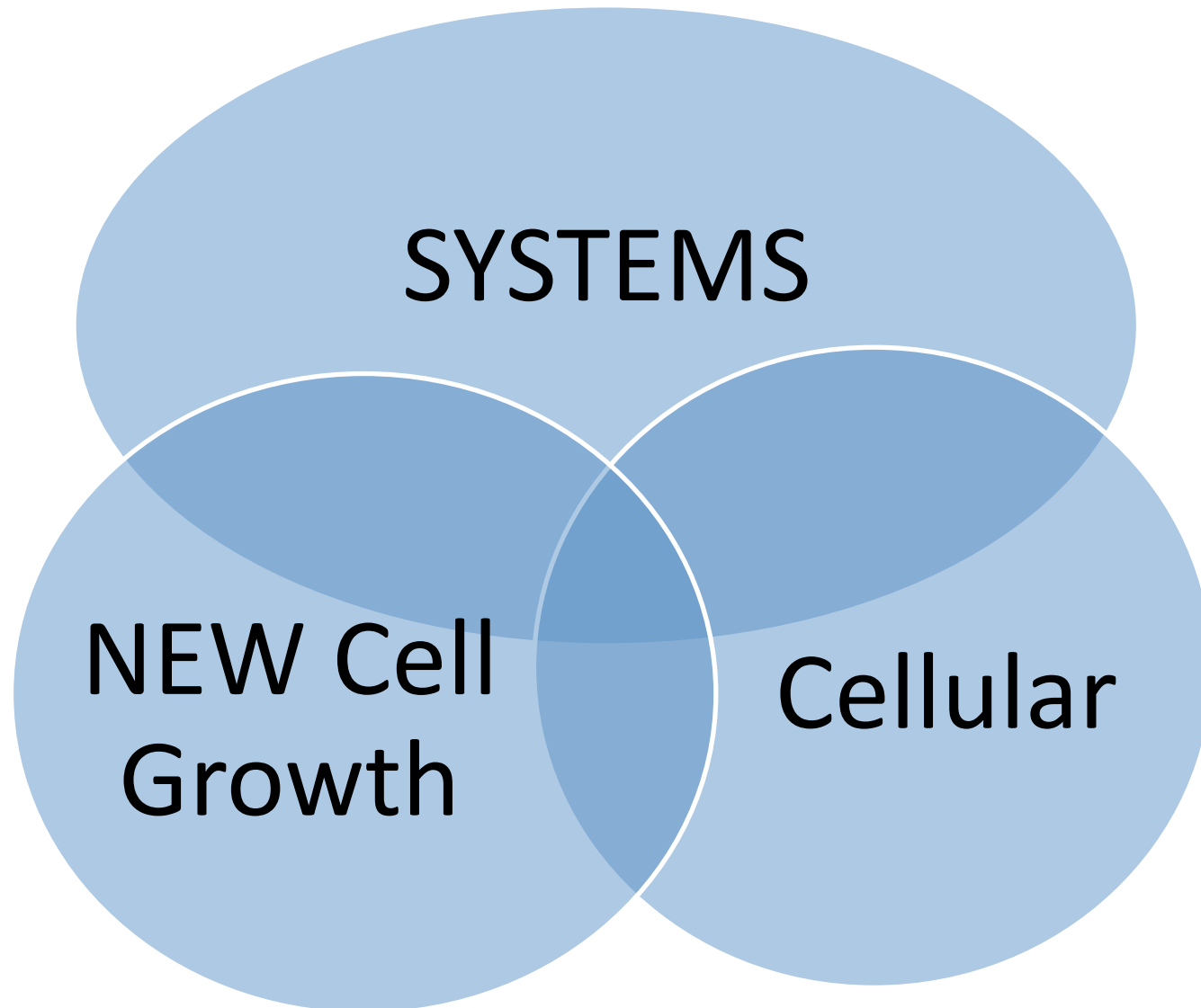
Construct developmentally appropriate curriculum – **PE for BODY and BRAIN**

Builds character & citizenship, teaches how to deal with adversity, and how to give back to one's community.

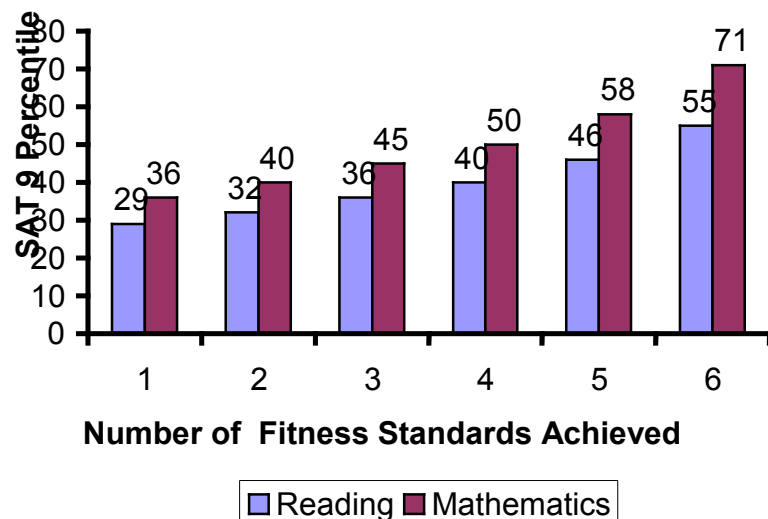
Includes a wide range of activities

Acculturates a lifestyle of PLAY and ACTIVITY

EXERCISE OPTIMIZES LEARNING



2001 Grade 5 SAT 9 and Physical Fitness Scores



California Department of Education Study December 10, 2002

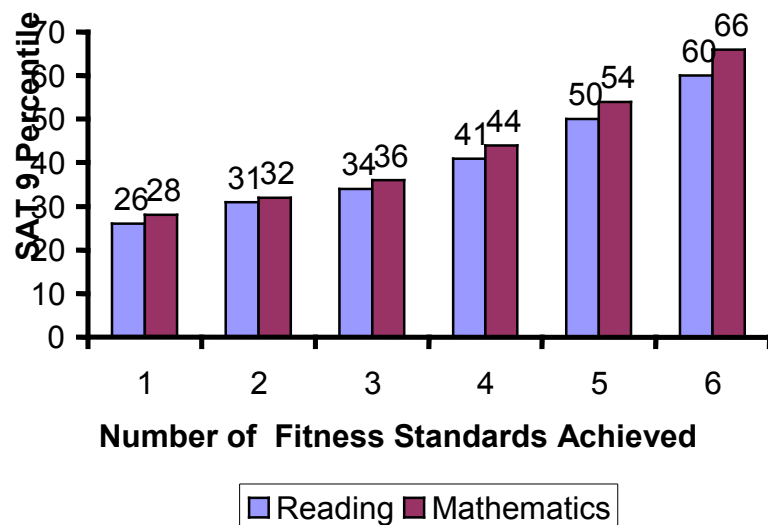
The height of each bar shows the average (median) SAT-9 national percentile rank of those students with a particular fitness score.

The test that was used, *Fitnessgram*, uses criterion-referenced standards to evaluate fitness. These standards represent a level of fitness that offers some degree of protection against diseases that result from sedentary living. Achievement of the fitness standards is based upon a test score falling in the Healthy Fitness Zone (HFZ). Each of the six tasks measures a different aspect of fitness, and the HFZ represent minimal levels of satisfactory achievement on the tasks. **THE X-AXIS IS THE NUMBER OF FITNESS STANDARD REACHED BY EACH INDIVIDUAL.**

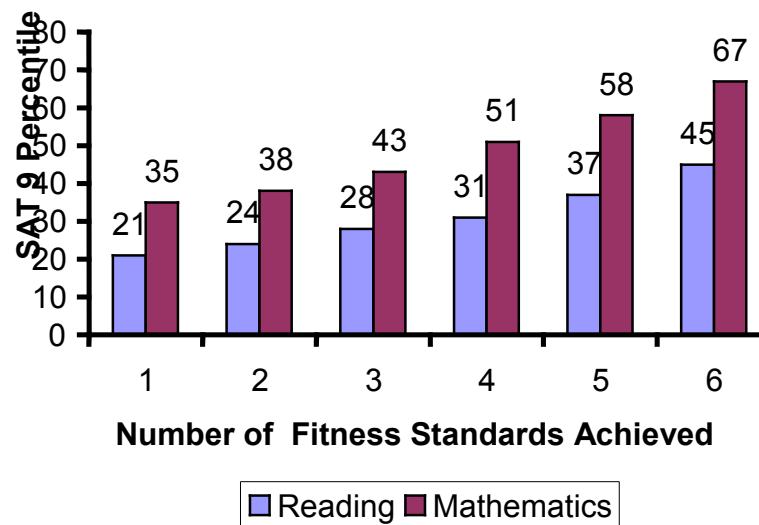
Higher academic achievement is associated with higher levels of fitness in grade 5,7,9. The relationship between academic achievement and fitness in grade 5,7,9 was **greater in mathematics** than in reading, particularly at high fitness levels.

<http://pe4life.org/research.php>

2001 Grade 7 SAT 9 and Physical Fitness Scores



Grade 9 SAT 9 and Physical Fitness Scores



**“If you are in education, you
are in the business of
brain development”**



If I only had a brain !

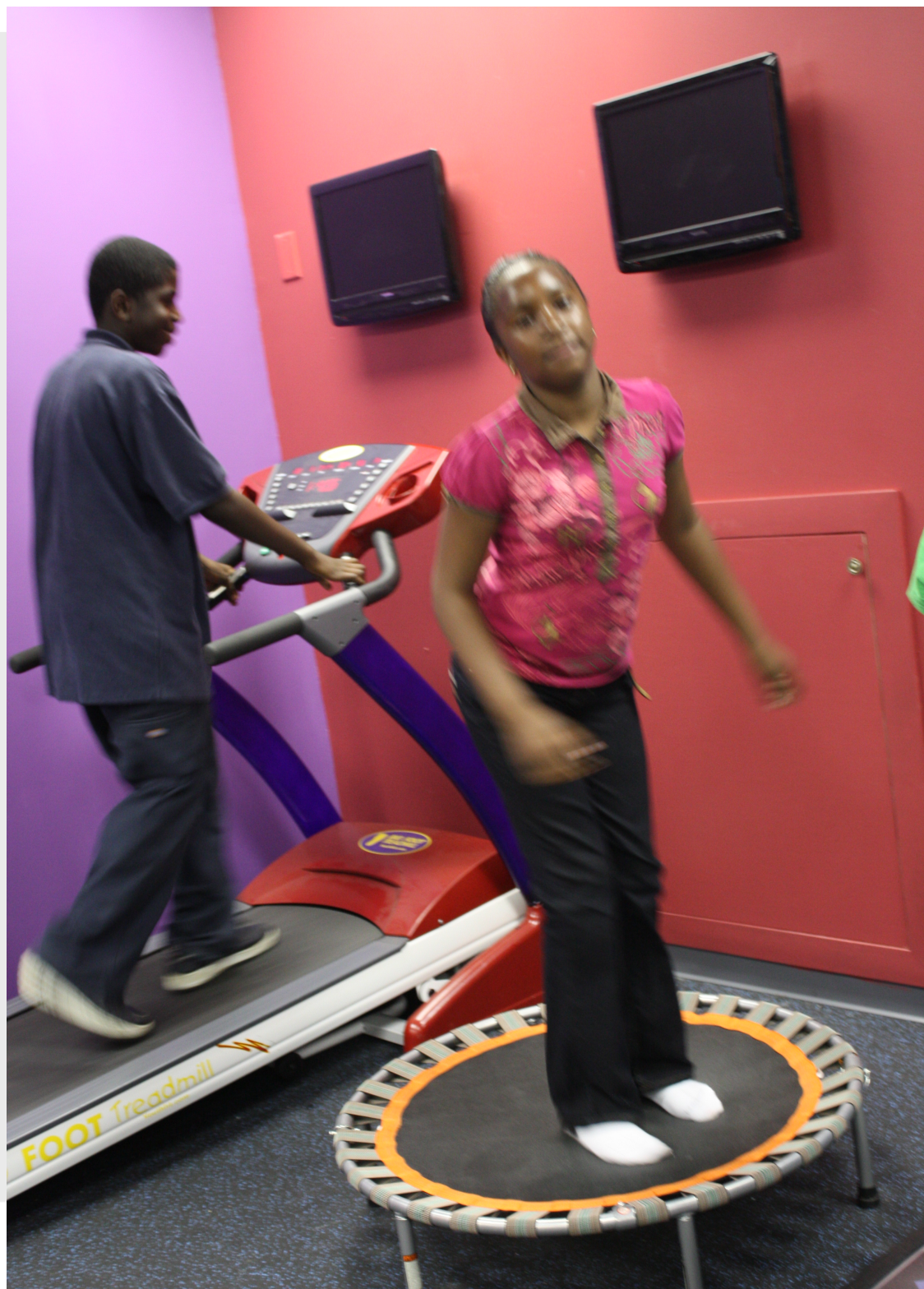


**There is no anti-brain environment
worse than the classroom and cubicle**



Time In versus Time Out







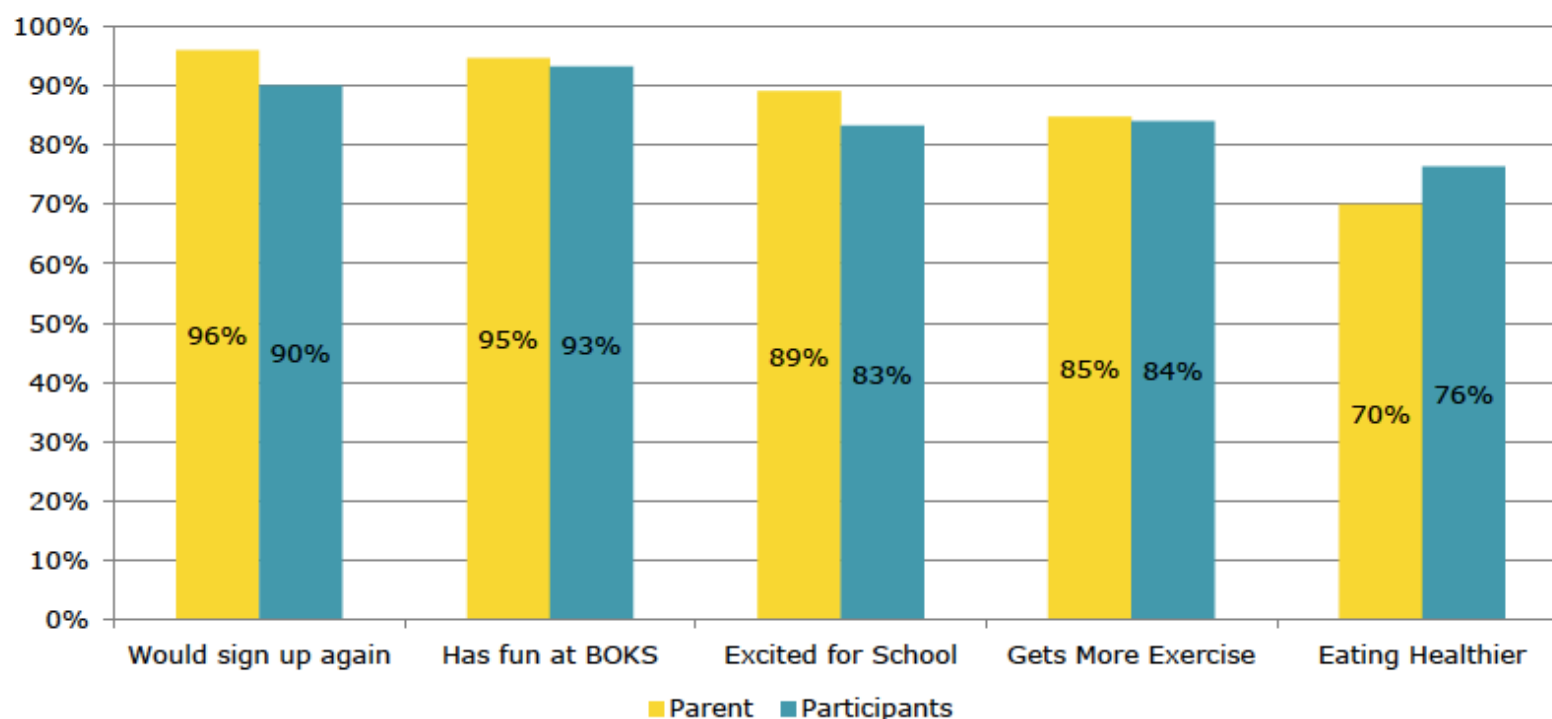
IN THE MOMENT



Spring 2012 Survey Results

Parents and Participants

Parents and Participants Agree with the Following Statements:



These results based on a sample size of parents n=412 and participants n=1087 from schools in Natick, Boston, D.C. and New York.

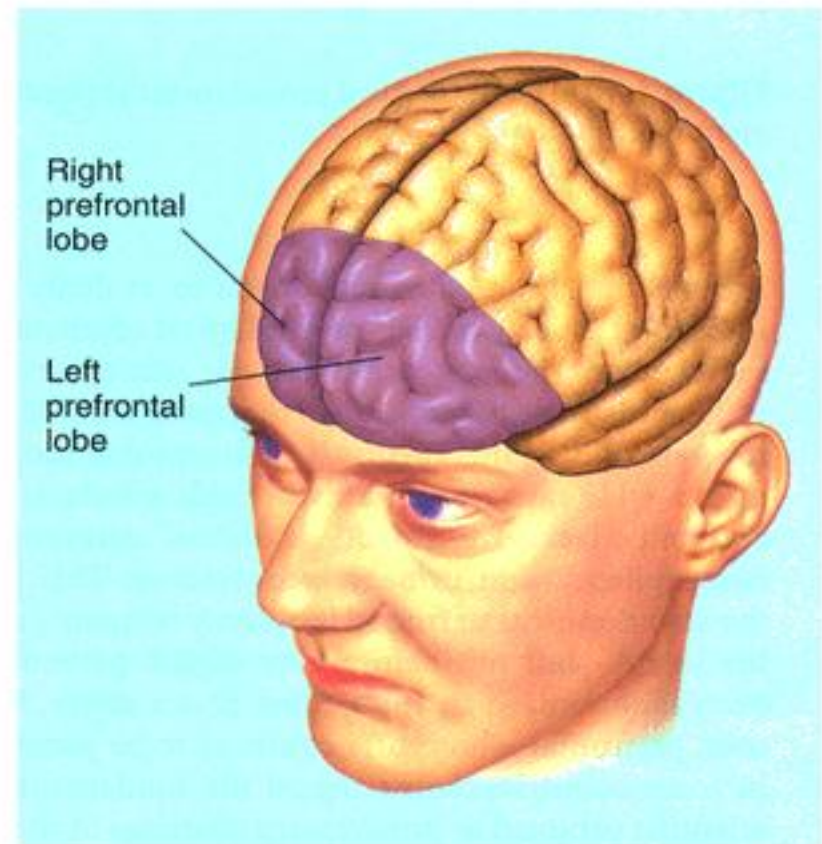
Mayo Clinic Sept 2011

- Dr Ahlskog's Group - looked at >1600 papers on exercise and cognition and countered the NIH consensus panel's conclusion that nothing has been proven to have a preventive effect on dementia or cognitive decline.
- The NIH's panel was very restrictive in each review and did not include many articles that did not meet the strictest of guidelines. They took a broader view and looked at both animal and human studies and of course there is a plethora of evidence supporting the **preventive effect of exercise on cognitive decline and Alzheimer's disease** in the elderly and in middle age.
- Acute Exercise Intervention from 1-12 months in sedentary elderly **has an improving effect on cognitive tests**. The benefits of exercise for atherosclerosis is so solid and this review shows an effect over and above its vascular protective effect.
- Fitness or the result of Chronic Exercise- **shows an increase in size of hippocampus-** essential for memory and memory integration. As well the more fit the person is they have larger cortical volumes and show better Cortical Connections

The Prefrontal Cortex

Major Role in Executive Function

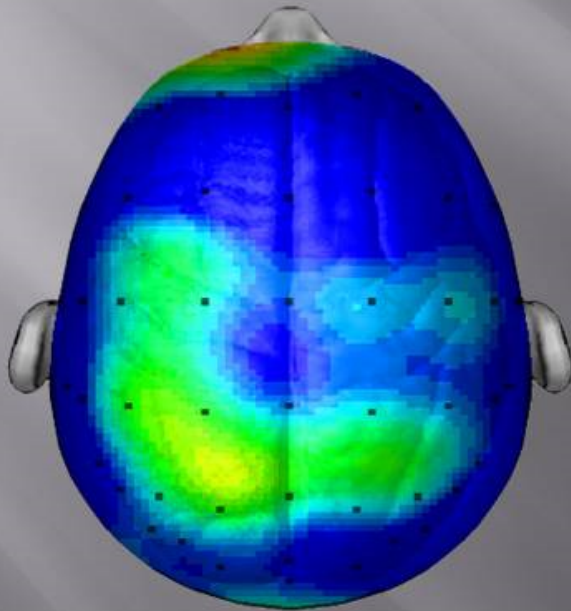
- EXERCISE particularly affects our Executive Function
 - Planning
 - Organization
 - Initiate or delay a response
 - Consequence evaluation
 - Learning from mistakes
 - Maintain the focus
 - Working Memory
- Dysfunction in these areas leads to disruption in the organization and control of behavior



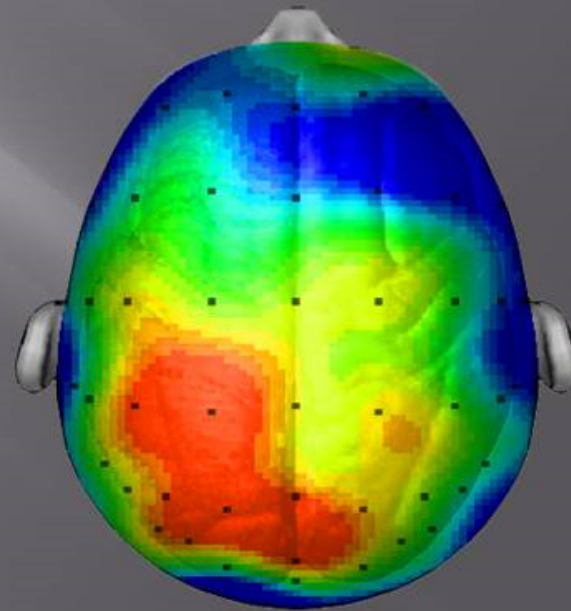
http://www.driesen.com/prefrontal_cortex.htm

Average composite of 20 students brains taking the same test

BRAIN AFTER SITTING
QUIETLY



BRAIN AFTER 20 MINUTE
WALK



Research/scan compliments of Dr. Chuck Hillman University of Illinois





Dr. James Levine keeps a 1 mph pace on his treadmill while checking his e-mail, at the Mayo Clinic in Rochester, Minnesota



The Board Meeting of the Future

BY JOHN J. MEDINA If you wanted to create a work environment in direct conflict with what the brain is equipped to do, you'd design the standard cubicle. Instead, imagine a brain-friendly workplace where board meetings are conducted on treadmills, desks are equipped with stationary bicycles, and people wear gym clothes, not suits.

AT BOARD MEETINGS, people wear gym clothes and walk on treadmills at about 1.8 miles per hour—to cool down right after a period of intense physical activity.

TREADMILLS are installed in the office. Morning and afternoon exercise breaks are encouraged.

WORKSTATIONS include stationary bicycles that fit under the desks. Employees keep their legs moving while answering e-mail.

IN A COMPETITIVE climate, exercise is as close to a magic productivity bullet as you'll get.

The Brain's Active History

If our ancestors sat still in the savanna for eight hours straight—heck, for eight minutes—they became somebody's lunch. Our brains developed while we walked about 12 miles a day, seven days a week, for several million years.



How Exercise Jogs the Brain

EXERCISE IMPROVES blood's access to brain regions where learning cells to derived neurotrophic factor (BDNF), which a Miracle-Gro for the brain. If you want more of it, you can't just sit there.

THE BRAIN'S neurons—higher-valued by bushy where—respond. They help an engineer design a satellite hitting his boss' performance review.

JUST AS ROAD to goods and makes it easier to get to over the blood, and Thanks to exercise, natural hazards more tissues and cleanup job.

Clinical Proof Food for Thought

YOU LEARN 20% faster immediately after exercise than after sitting still.

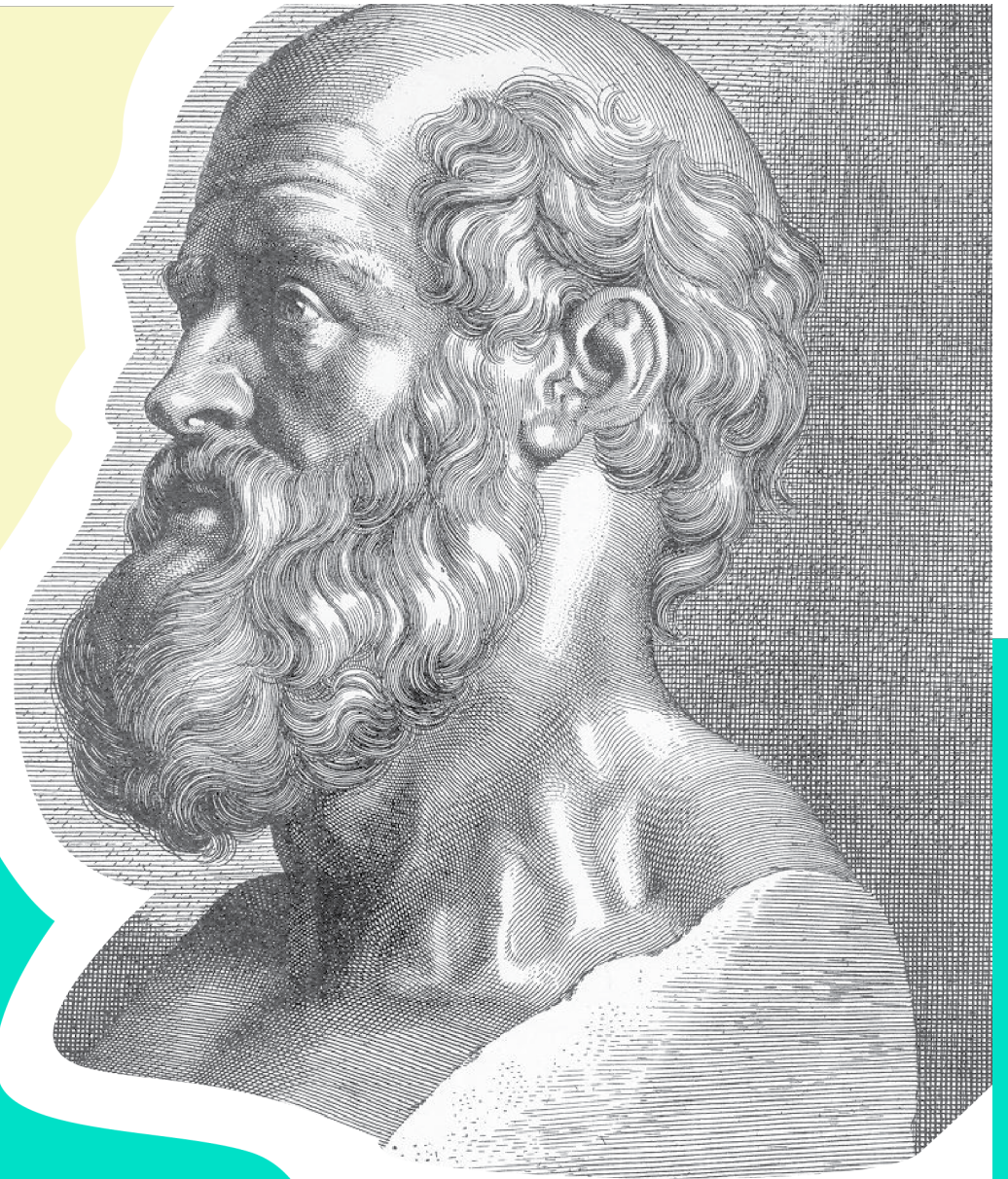
AN ACTIVE LIFESTYLE reduces the risks for Alzheimer's disease, dementia, anxiety, and depression—and for hospital visits. It doesn't take a brain scientist to see the inverse relationship between exercise and health care costs.

STUDY PARTICIPANTS who jog for 30 minutes two or three times a week for 12 weeks improve their cognitive performance. When they stop the exercise regimen, the cognitive benefits evaporate.

THE COGNITIVE of exercise demonstrates people, the and even Japanese.

IF YOU'RE IN A
BAD MOOD, GO
FOR A WALK...

IF YOU'RE
STILL IN A
BAD MOOD, GO
FOR ANOTHER WALK.



HIPPOCRATES



EXERCISING RATS MAKE MORE
GABA CELLS IN HIPPOCAMPUS-

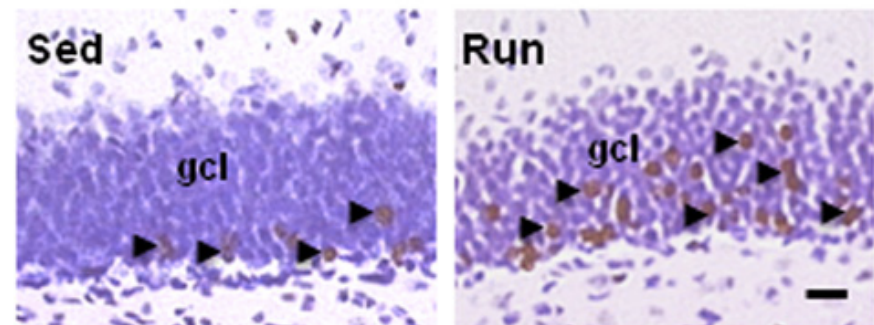
MORE RESISTANT TO THREATS –
IMMEDIATE
AND LONGER TERM

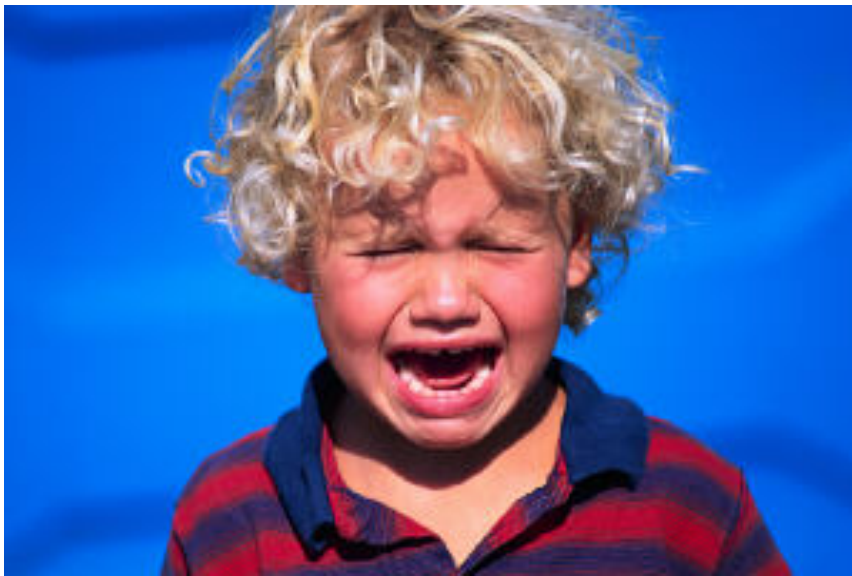
STRESSORS HAVE TO BE MORE
THREATENING

6 WEEKS OF RUNNING VS CONTROL

[Physical exercise prevents stress-induced activation of granule neurons and enhances local inhibitory mechanisms in the dentate gyrus.](#) Schoenfeld TJ, Rada P, Pieruzzini PR, Hsueh B, **Gould** E. J Neurosci. 2013 May 1;33(18): 7770-7. doi: 10.1523/JNEUROSCI.5352-12.2013.

B





Discipline

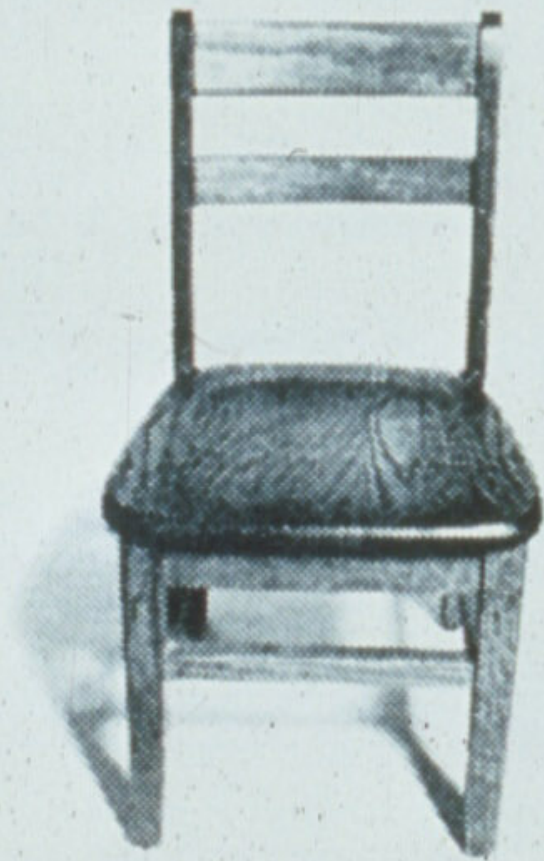
Bullying

Class Participation

Attendance



This is a typical
hyperactive child.



Funny, he was here just a second ago.

MICHAEL PHELPS OFF RITALIN



At age 9, Michael was put on Ritalin, a stimulant used to treat hyperactivity. His mother thinks it helped a little. He seemed to be able to focus longer, he could get through homework without moving around so much. She said he was still a middling student. It might have raised some C's to B's, she said. But if a homework assignment had to be at least four sentences, she said, He'd just do four sentences.

After two years, Michael asked to get off the meds. He had to go to the school nurse's office to take a pill at lunch, she said, and felt stigmatized. Just out of the blue, he said to me: 'I don't want to do this anymore, Mom.'

After consulting with the Dr., Michael stopped medication. In the meantime, Michael the swimmer had appeared. By 10, he was ranked nationally in his age group. Ms. Phelps watched the boy who couldn't sit still at school sit for four hours at a meet waiting to swim his five minutes' worth of races.

At age 12 Michael needed an algebra tutor, and was so antsy in school that his mother suggested the teacher sit him at a table in the back. And yet he willingly got up at 6:30 daily for 90-minute morning practices and swam 2 to 3 hours every afternoon.

How Far Do I have to Run Today?



Exercise & Learning

The JACK Effect



NO RECESS





Evidence, implications.

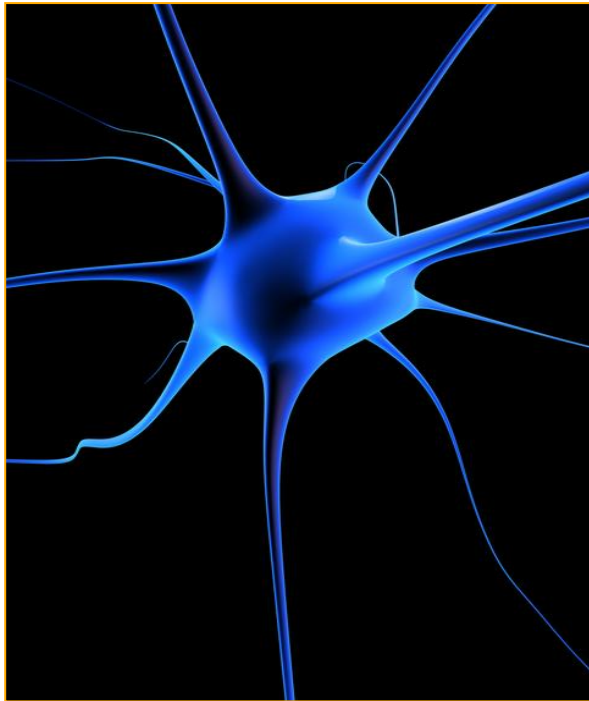
- At the end of one semester students who took part in both the early morning exercise program and the literacy class showed 1.34 of a year's growth in standardized reading tests. The gain for students in the literacy only group was .70





Harvard on the Move, a new initiative sponsored by President Drew Faust (from left), kicked off with a panel discussion at Sanders Theatre on Wednesday. Panelists included Daniel Lieberman, professor of human evolutionary biology and department chair of human evolutionary biology in the Faculty of Arts and Sciences, Christopher McDougall '85, author of "Born to Run: A Hidden Tribe, Superathletes, and the Greatest Race the World Has Never Seen," and John Ratey, an associate clinical professor of psychiatry at Harvard Medical School.

Brain Chemistry

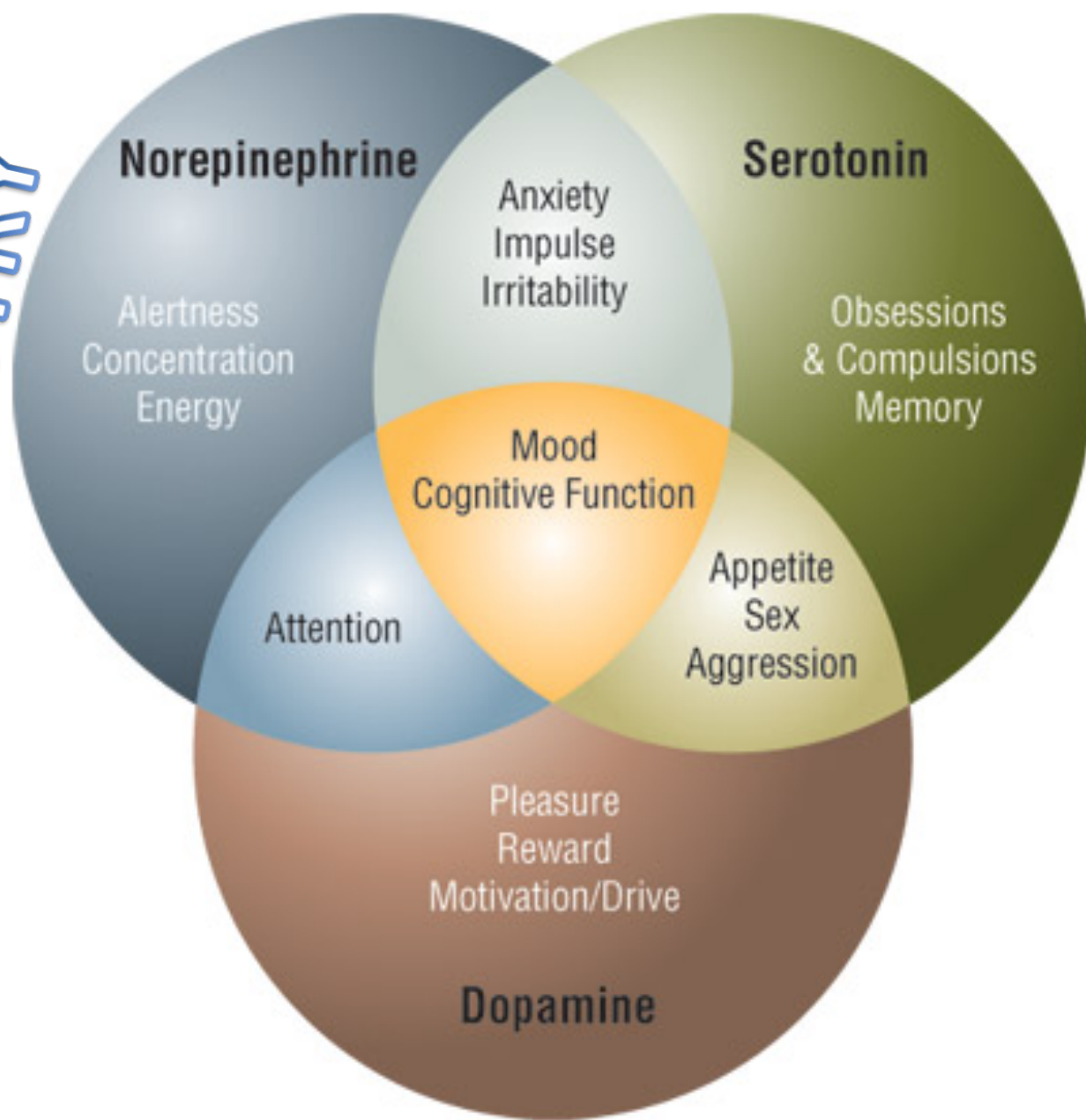


EXERCISE.

It's like taking
a little Prozac & a little Adderall

Improves emotional Regulation and Optimizes Learning and Memory

NEUROCHEMISTRY





=

B D N F





==

ENDORPHINS



ENDOCANNABINOIDS

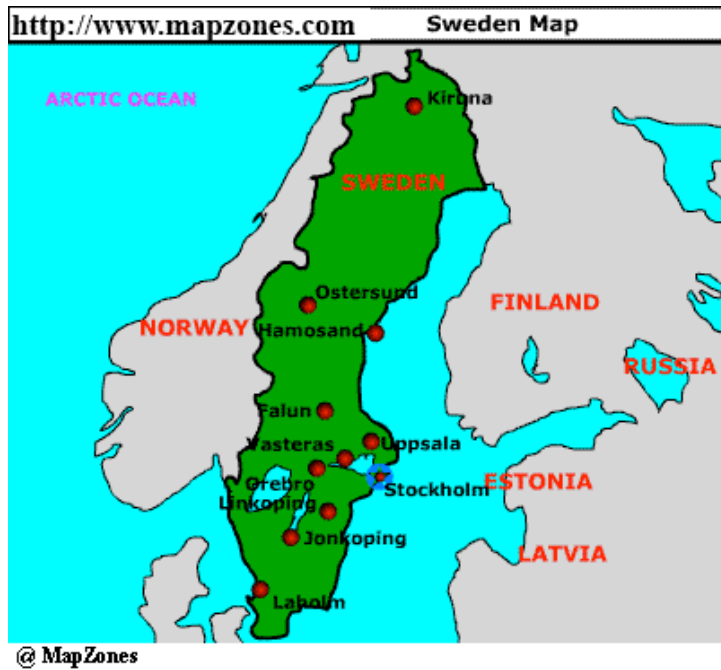


The Association between School-Based Physical Activity, including Physical Education, & Academic Performance

A CDC Report, April 2010



Sweden The Proof



Love to measure and keep records

1.2 million boys born 1950-76; finished H.S. 15 and entered military 18. 270,000 brothers, 1300 identical twins

Tested cardio (ergonometric) muscle (knee, elbow, hand) and cognitive appraisal-both at 15 and 18.

Those that improved cardio fitness improved IQ and smarts. Not as much with muscle strength. Also those that improved went on to be better education, more satisfaction with life, and higher socio-economic standing.

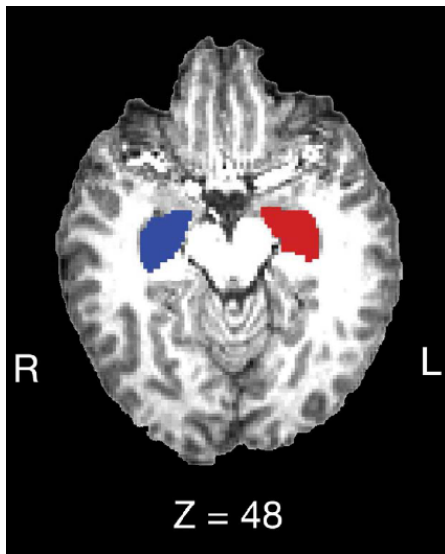
Brothers, identical twins showed the same association-those that improved their physical fitness improved their brain power. Its not just about the genes.

"We believe the present results provide scientific support for educational policies to maintain or increase physical education in school curricula as a means to stem the growing trend toward a sedentary lifestyle, which is accompanied by an increased risk for diseases and perhaps intellectual and academic underachievement," write researchers Maria Aberg and colleagues of the University of Gothenburg in Gothenburg, Sweden in the Proceedings of the National Academy of Sciences. 2009 Nov 30. [Epub ahead of print]

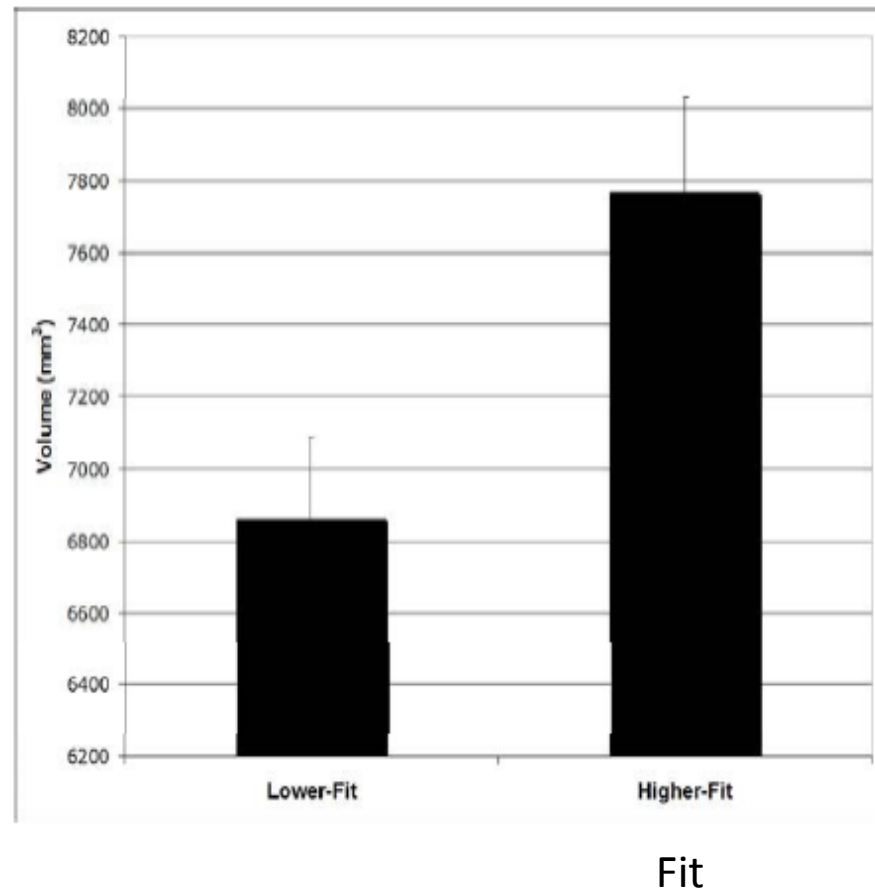
© 2008 Photo by George Legeros



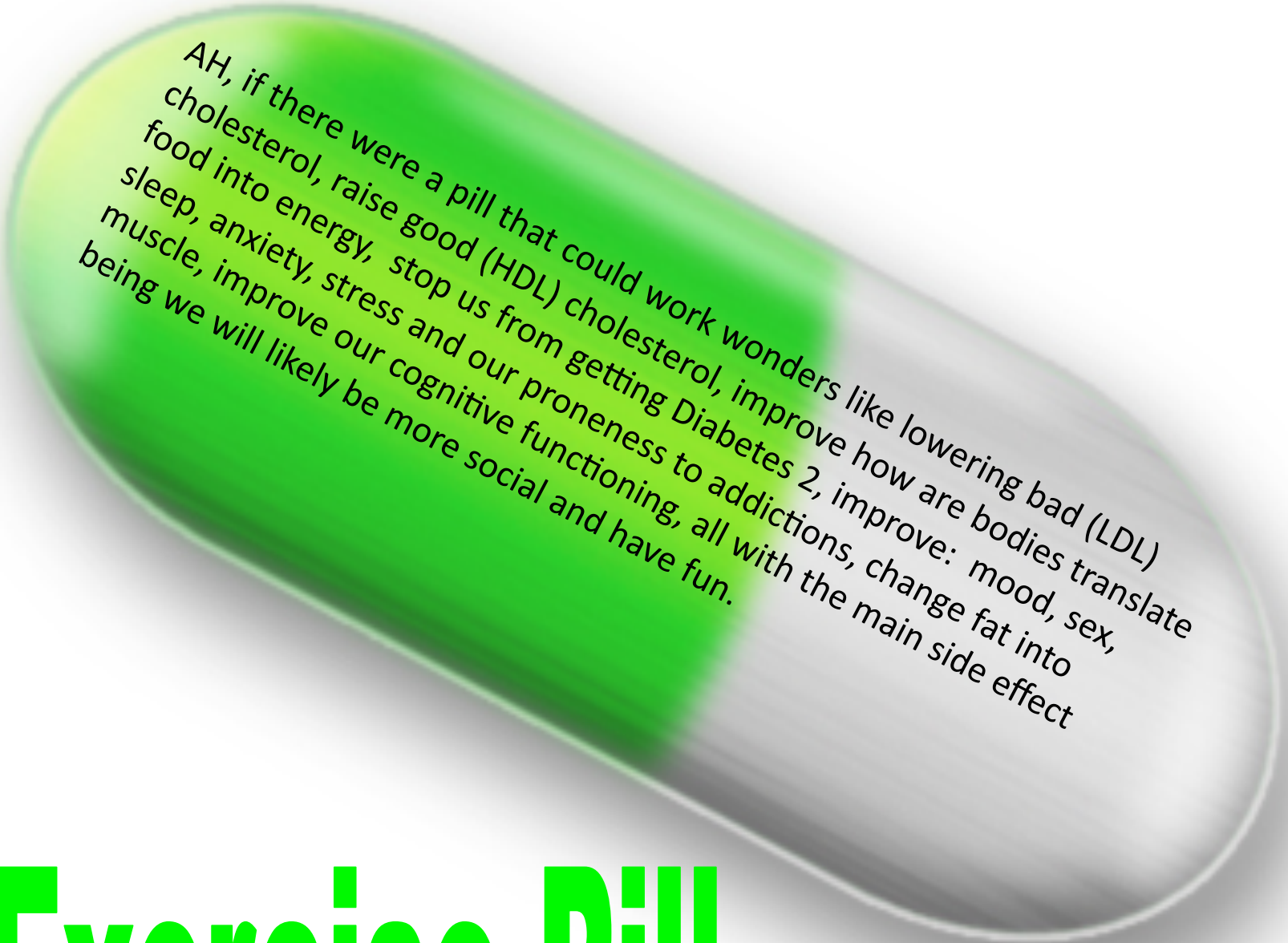
Fitness, Hippocampus Size, and Memory



- Kids who were fit and who had better memory, also had larger hippocampi
- Fitness increases neurons, connectivity- 28 fit 21 non

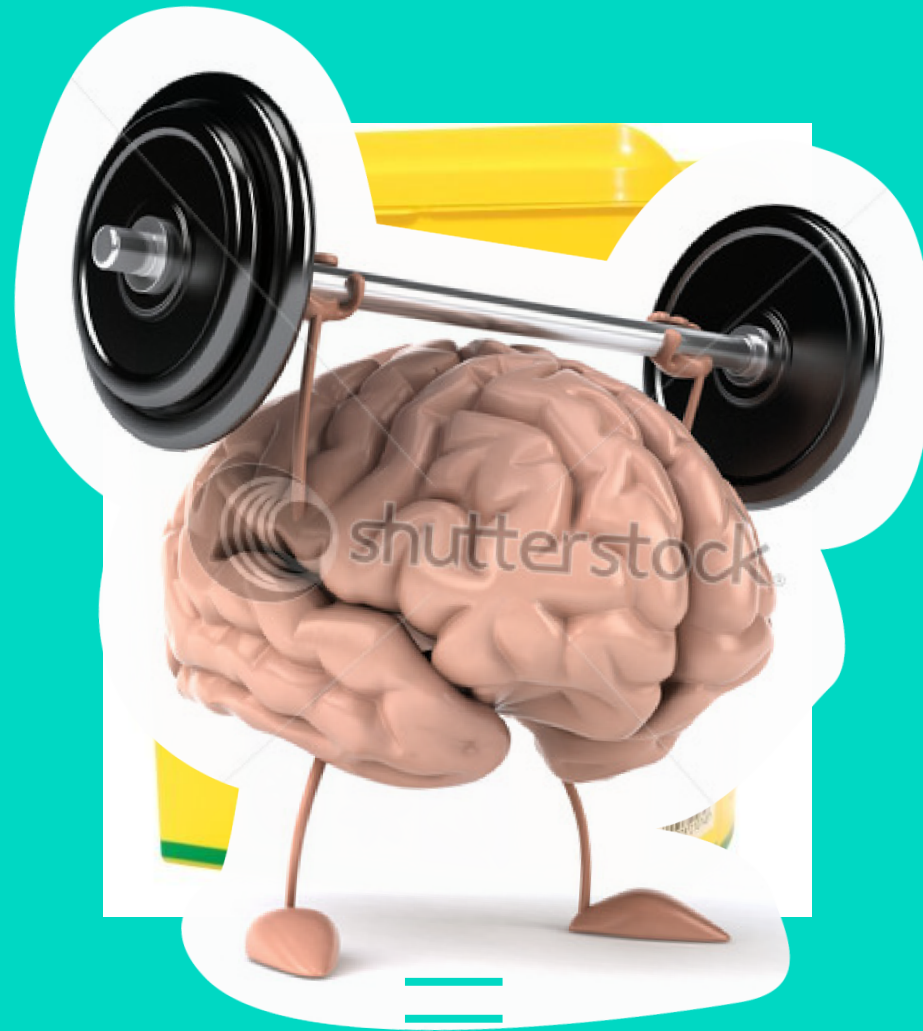






AH, if there were a pill that could work wonders like lowering bad (LDL) cholesterol, raise good (HDL) cholesterol, improve how our bodies translate food into energy, stop us from getting Diabetes 2, improve: mood, sex, sleep, anxiety, stress and our proneness to addictions, change fat into muscle, improve our cognitive functioning, all with the main side effect being we will likely be more social and have fun.

Exercise Pill



EXPERIENCE!

EXERCISE PREPARES THE LEARNER



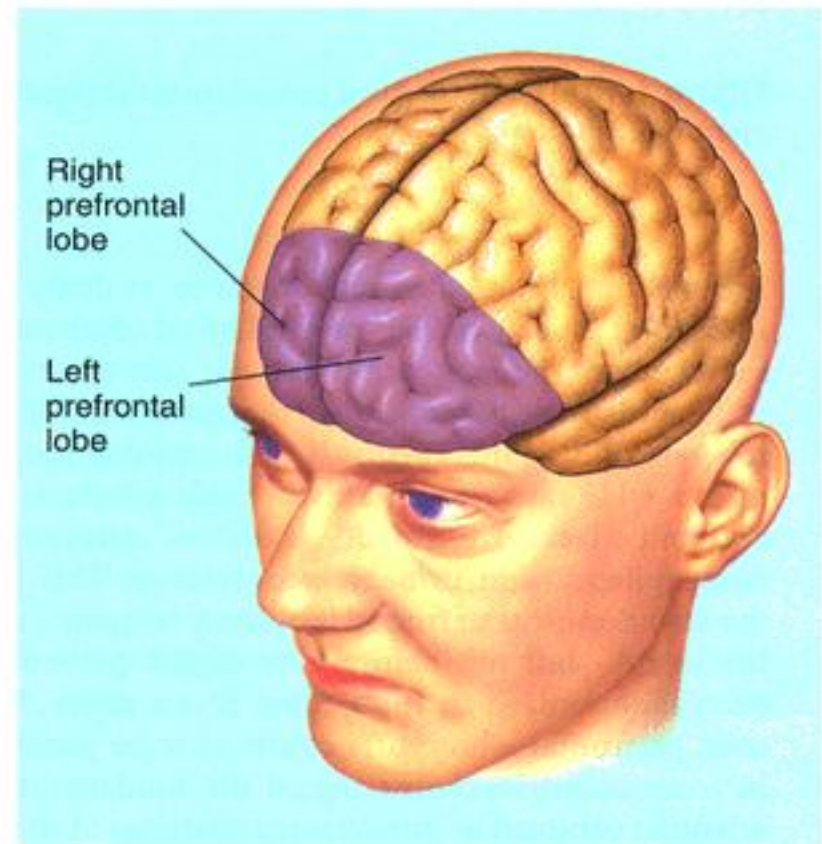
Improves Impulse Control
Improves Behavior
Improves Attention
Decreases Nudginess
Improves Arousal - Lessens Fatigue
Improves Motivation
Helps Mood and Anxiety Regulation
Combats Depression
Improves Self-esteem
Reverses "Learned Helplessness"
Combats Toxic Effects of Stress Hormones



The Prefrontal Cortex

Major Role in Executive Function

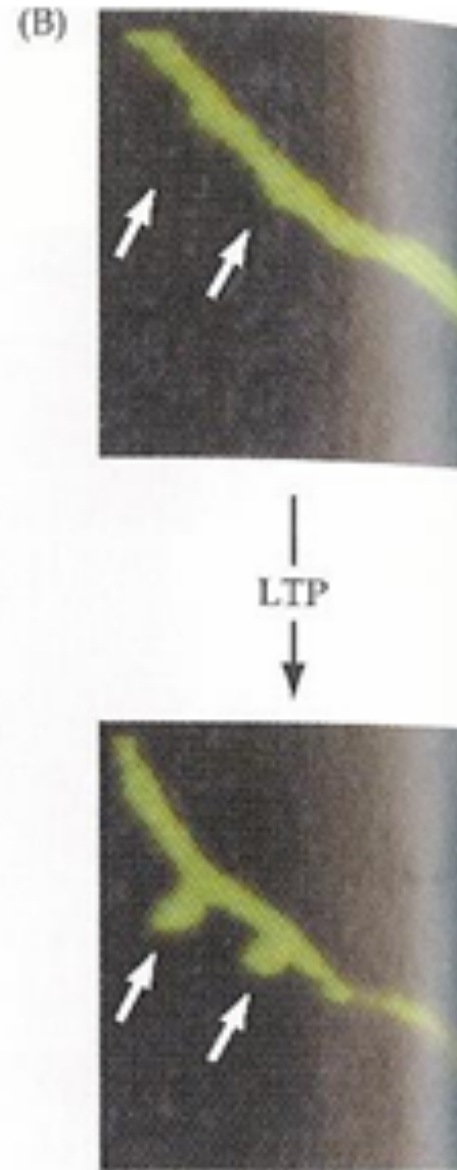
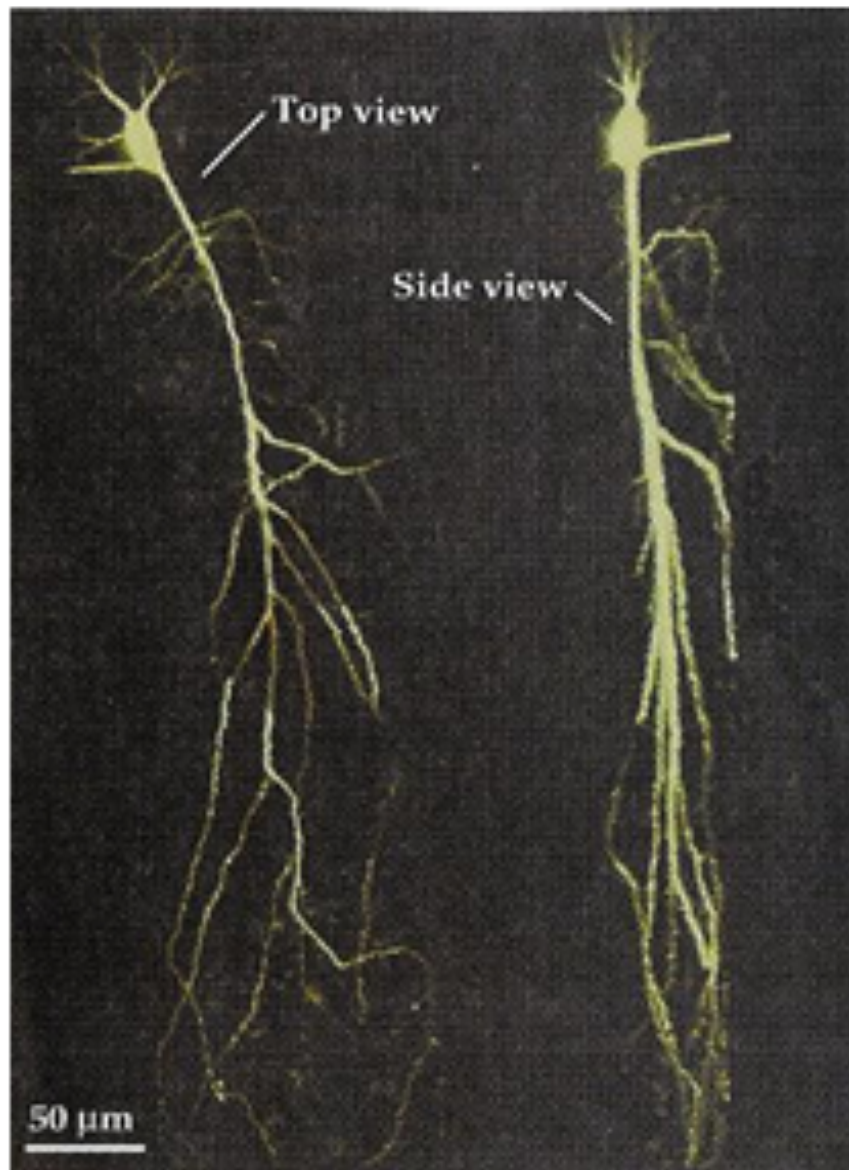
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- Dysfunction in these areas leads to disruption in the organization and control of behavior



http://www.driesen.com/prefrontal_cortex.htm

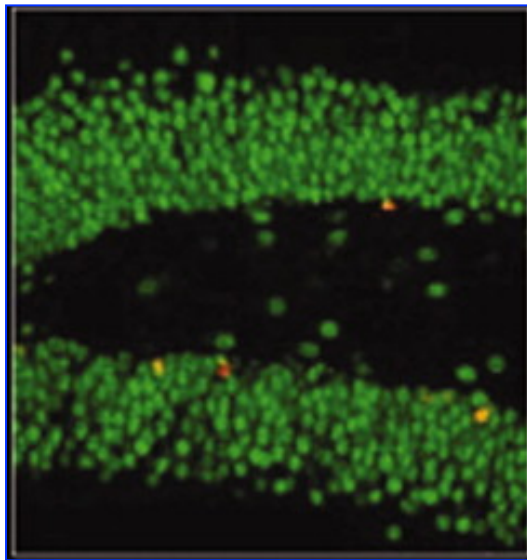
Growth in the brain....especially in the hippocampus

In B

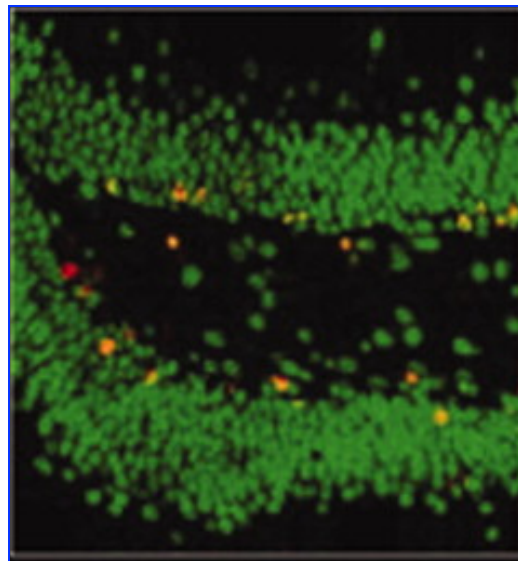


ONE HOUR after stimulus see the sprouting of new dendritic spines to connect to neighboring nerve cells—this is a structural change that is part of the cellular basis of learning.

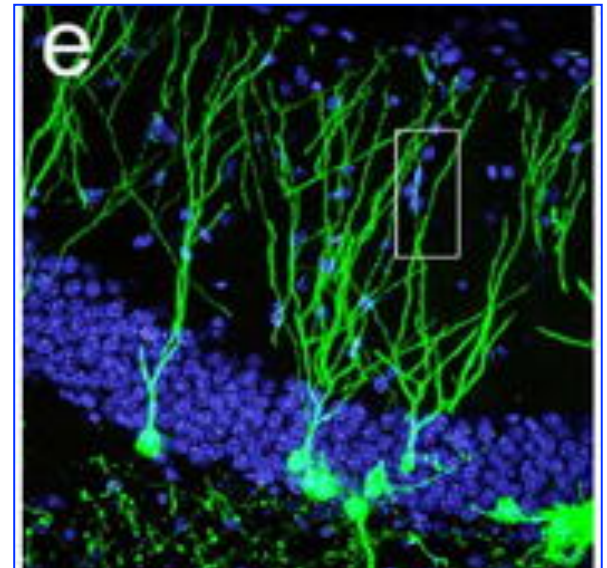
Exercise promotes hippocampus neurogenesis in mice



Control



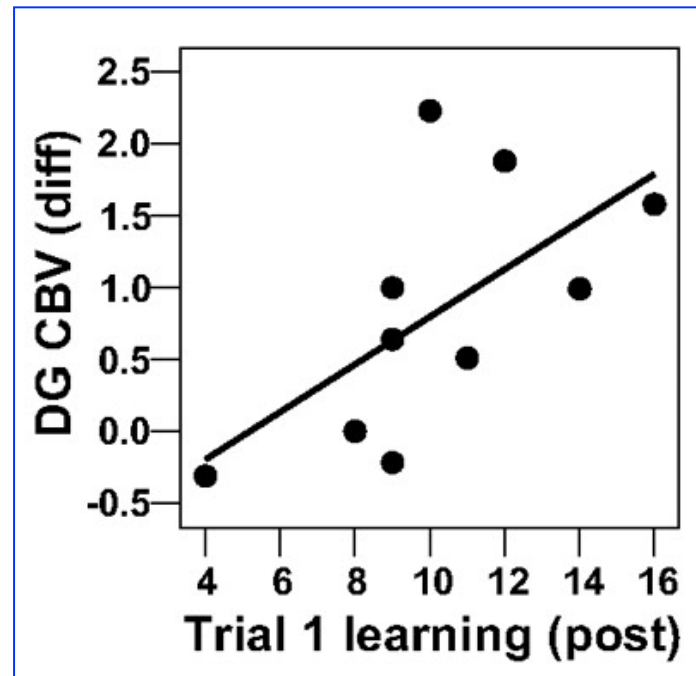
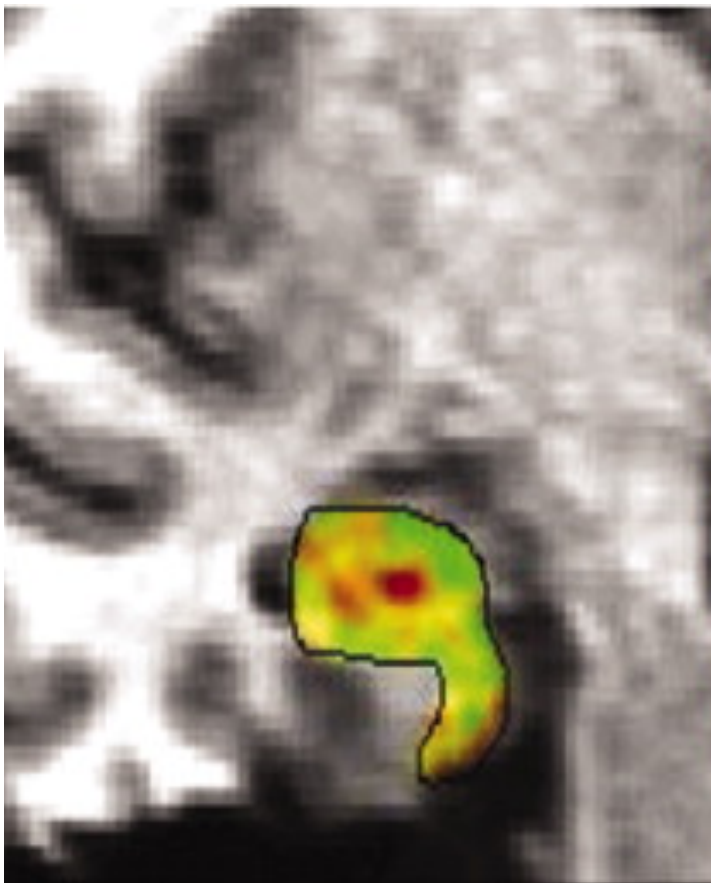
2 weeks on
running wheel



Integration of
newborn neurons
in hippocampus

Exercise promotes hippocampus blood flow in humans

Age 21-45, below average fitness
12 weeks: 4X/wk aerobic training; VO2-max

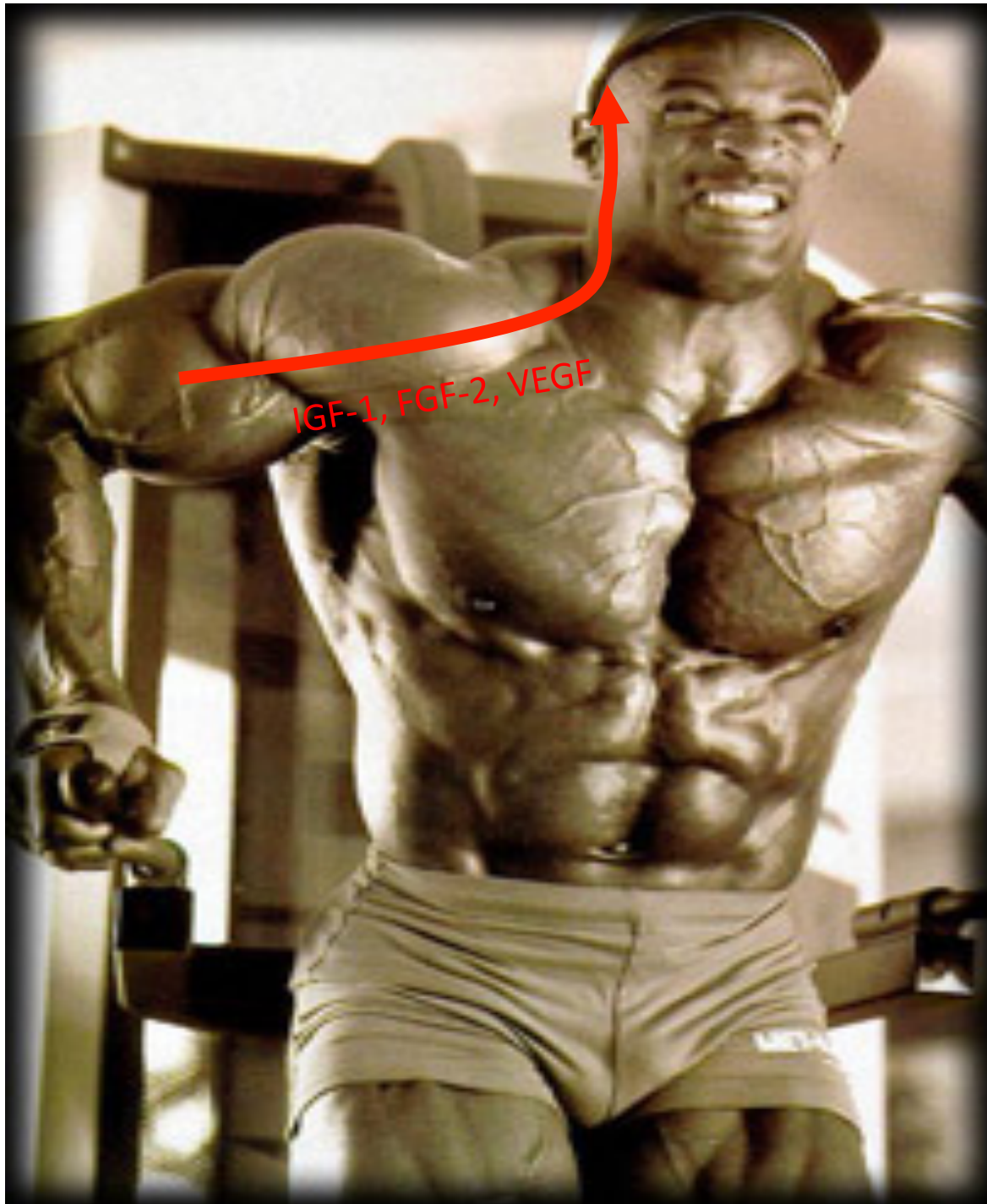


Rey auditory verbal learning test

Pereira et al.,
PNAS 2007

Exercise





BODY  BRAIN

IGF-1 Insulin-like Growth Factor

VEGF Vascular endothelial factor

FGF-2 Fibroblast growth factor

ANP- Atrial Natriuretic Factor

ALL THESE COME FROM MUSCLE CONTRACTION AND TRAVEL TO THE BRAIN AND HAVE AN EFFECT ON LEARNING AND BRAIN CELL HEALTH AND GROWTH