Exercise and the Brain

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BrainVolution

Survival of the Fittest

• Biologically, it was part of survival
• Historically, it was built into daily life, as regular hours of physical work
• Originally it was transportation

How Will We Age? Table Teaser

What do you do to protect your health and________?

“There isn’t much difference between a ___year old brain and a ___year old brain.”
Cognitive Decline is not_________
Is there ONE factor that predicts how well you will age?

• Your DNA?
• Your food choices?
• Your lifestyle?


_________ Seems to be the Answer

• Active Lifestyle
• Improved
• Less risk for

Treating Brain Disorders
What affect does exercise have on:

D_________?
A_________?
D_________?
Strokes?
The Wow Moment . . .
• Risk for Dementia is cut in _____
• Risk for Alzheimer’s cut _____
• Cut the risk of stroke by _____
• Regulates depression releasing s___________, do__________, and norepinephrine

So . . . it works!
How much of it must be done to get the benefit?

The Gold Standard
• _____several times a week
• Strengthening exercises
• Aerobic exercise
  ____________at a time
  ______times a week
Are you Losing Neurons as you Get Older?

- Yes, you lose brain cells every day because of decay and disuse
- You have enough to last for your whole lifetime
- So...don’t worry!

Jensen, Eric, Brain Conference, 2010

Certain areas of the brain more prone to _________ and _________ over time

One is the hippocampus which transfers new memories to long-term storage elsewhere in the brain

Fred Gage, Salk Institute

Exercise at the Molecular Level

- Exercise affects molecular machinery
- Increases neuron creation
- Survival and resistance to damage and stress
Exercise Since the 1990s:

- Boosts levels of brain-derived neurotrophic factor (BDNF), a substance important for a substance essential for the growth of brain cells
- Stimulates neurogenesis—the birth of new neurons
- Mobilizes the expression of genes that are believed to enhance brain plasticity—i.e., the ability of the brain to change its neural pathways
- Prevents brain tissue loss in older adults

Nerve Cells Wiring = The Building Block of Learning

- By increasing neurotransmitter activity, improving blood flow and producing Brain Growth Factors that I call Miracle Grow or Brain Fertilizers, exercise readies our nerve cells to bind more easily and stronger.

Exercise does this better than any other factor we are aware of at the present time.

Exercise and Executive Function

- Exercise had its beneficial effect in specific areas of cognitive function that are rooted in the frontal and prefrontal regions of the brain
Exercise Boosts Brain Power

• And yet . . .

Many work/school environments are anti-brain!

Let’s Be Extraordinary

• Think tanks with treadmills instead of cubicles
• Gym clothes at work instead of suits
• Treat the world as if it is backward

The Naperville Phenomenon

• In the fall of 2005, this elementary school had PE one day per week of 50 minutes. This year Jan-June 2006 a PE4life Program was offered five days a week at 45 minutes.
• The changes are remarkable. This is an inner city school with 80% of kids on free lunch program, mostly Hispanic and African American heritage.
• The PE4LIFE added elements were cardiac monitored watches, Dance Revolution, a few exercise bicycles, and a small number of fitness machines.
• Mostly what was added was a new attitude
So does a regular workout also make you smarter in school?

Yes. Take the Naperville school district in Illinois, for example. In 1990, a physical education teacher there named Phil Lawler launched a fitness revolution: He had the kids run a mile every single week. He also handed out grades for PE based on effort and not skill. The kids at Naperville not only got stronger, but they also started to do really well on the Trends in International Mathematics and Science Study, a test designed to compare how well kids from different countries do in math and science. In recent years, kids in China, Japan and Singapore have outperformed American kids, but in 1999 the Naperville kids scored sixth in math and first in the world for science. That really grabbed me.

And the winner is You on exercise. . .

✓ Improves d________
✓ Treats d________
✓ Improves reasoning
✓ Improves _________ memory
✓ Creates fluid intelligence
✓ Reduces Alzheimer’s ______
✓ Manages ______
✓ Counteracts symptoms of _____

Simple

If you are not exercising, start!
Bibliography

- Jürgen, Gage, Fred H. & Kuhn, H. Georg. Enriched environment and physical activity stimulate hippocampal but not olfactory bulb neurogenesis. European Journal of Neuroscience 17 (10), 2042-2046.