Learning is a Moving Experience

Moving Kids to Move a Community:
Linking Physical Activity and Nutrition to the Body, Belly, and Brain.

November 13, 2013

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A Mind in Motion

Tends to Stay in Motion
Find a Partner
Total Body Rock, Paper, Scissors!
Rock, Paper, Scissors

1st time beat your opponent
Rock, Paper, Scissors

2nd time lose to your opponent
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.
Figure 1 2004 CST in English-language arts by the number of fitness standards achieved

Graph showing the relationship between Overall PFT Score and CST ELA Scale Score for Grade 5, Grade 7, and Grade 9. The graph includes data points for each grade level, with the highest scores for Grade 9 at 355 and Grade 5 at 350.
Figure 2 shows these same results using 2004 CST in mathematics scale scores.
Researchers at West Virginia University evaluated the fitness levels and standardized academic test scores of 725 Grade 5 students in Wood County, West Virginia, and re-examined the results two years later when the children were in Grade 7.
The study found that academic performance dipped when the students' fitness declined and increased when fitness improved. Children with the highest average standardized test scores, which included reading, math, science and social studies, were the ones who were deemed fit at the start and end of the study.
What were the findings in the State of Texas?

2.47 Million Students tested

Most telling tests for Academic Success

Cardiovascular Fitness
CV Fitness Corresponds with Academic Performance when Schools Stratified by State Rating System

2.6 Million students tested

Texas Youth Fitness Study
Student Fitness and BMI Levels Correlate with Attendance and Disciplinary Incidents

Return on Investment: Better attendance = more kids learning

Source: Welk G. Cardiovascular Fitness and Body Mass Index are Associated with Academic Achievement in Schools. Dallas, Texas: Cooper Institute, March 2009
Swedish Study

- Performed - study of all Swedish men born between 1950 on 1976 who entered the MILITARY— At age 18
  - They had grades and test scores at 15
  - They had information on physical fitness at 15 and 18 and made their analyses.

- 270,000 were siblings
- 3100 were fraternal twins
- 1432 were identical twins
- The sample included a total of 1,221,727 men

- The finding was that higher IQ scores were found in those men with the better cardiovascular conditioning, even when comparing TWINS!
Is there any science or empirical evidence to substantiate these findings?
9 and 10 year olds students

Easy Condition

Higher Fit

Lower Fit

Hard Condition

Slide Compliments of Dr. Chuck Hillman University of Illinois
Neurotransmitters

Neurons are specialized cells in the brain that receive and transmit messages through biochemistry called neurotransmitters.

Neurotransmitters cross gaps, or synapses, between neurons, and attach to receptors. Drugs can alter mood or behavior by blocking these receptors.
EXERCISE PREPARES THE MIND

- Improves Impulse Control
- Improves Behavior
- Improves Attention
- Decreases Restlessness
- Improves Arousal - Lessens Fatigue
- Improves Motivation
Exercise Prepares the Mind
Continued

• Helps Mood and Anxiety Regulation
• Combats Depression
• Improves Self-esteem
• Reverses “Learned Helplessness”
• Combats Toxic Effects of Stress Hormones
Here Comes A Big Take Away Moment!
Average composite of 20 student brains taking the same test

Brains after sitting quietly

Brains after 20 minute walk

Research/scan compliments of Dr. Chuck Hillman University of Illinois
Exercise Creates New Brain Cells

New Learning Enhances Brain Cells with More Connections
Neuro-scientists Believe

- Students learn 10% more when they are standing as opposed to sitting.

- Students increase their learning if they are standing and moving by another 3% to 4%
We Remember

20% of what we read
30% of what we hear
40% of what we see
50% of what we say
60% of what we do

However we remember  90% of what
We see, hear , say, and do.

Quote from Dr. David Eagleman neuroscientist researcher Baylor School of Medicine
Kinesthetic Math Lesson
ADD & ADHD Statistics

- 1985 about 500,000 students diagnosed
- 2008 5 to 7 million diagnosed
- 2011 1 out of every 10 students diagnosed
- Boys 3 times more likely to be diagnosed with the condition than girls
- 75% boys with ADD have ADHD
- 60% girls with ADD have ADHD
- 65% of all students with ADHD have discipline problems

Statistics from the Institute of Mental Health
Attention Span

Typical 5 year old: 5 to 7 minutes

Typical 13 year old: 15 to 18 minutes

Typical Adult: 20 to 25 minutes
Malpractice Occurrences

- Didn’t finish work
- Discipline Problem
- Discipline Problem
- More academic Time Needed
- Needed

Recess

PE
How have we used the Research?

We applied it to practice!
Average composite of 20 student brains taking the same test.

Brain after sitting quietly

Brain after 20 minute walk

Research scan compliments of Dr. Chuck Hillman University of Illinois.
How have we used the Research?

We collected data!
Slap

Count Down from 54

Counting

BY 3’s
Energizing Brain Breaks

Every 30 minutes

- Refocus
- Cross the Mid-line
- Movement
- Challenge the Brain

Get Refreshed in 1-2 Minutes

By David Sladkey

Energizing Brain Breaks 2

Every 30 minutes

- Refocus
- Cross the Mid-line
- Movement
- Challenge the Brain

Get Refreshed in 1-2 Minutes

By Scott Miller
Can this be replicated in another district?
After an in-service from NCHS staff Oak Park River Forest H.S. started a LRPE program.

- They use the Gates-McGinity Reading Test to access student reading levels.

- All students were in a 3rd hour English class.

- The 2nd period LRPE class did much more cardio work as opposed to the PE classes attended by the controlled group. The LRPE class included many cross lateral movement activities.
2008 Data Oak Park
River Forest High School

LRPE Non-LRPE

0.5

1.68
Year Two Project Update
Grades 4 and 5
Fall 2006 – Spring 2007

Woodland Elementary School, a K-5 school in the urban core of Kansas City, Missouri, implemented a PE4life program in the 2005-2006 school year. Significant improvements were seen in the first year. The graphs below indicate improvements made in the second year. (Note: Modified Sit & Reach measures flexibility and PACER measures cardio fitness).

Woodland Elementary School also displayed a significant reduction in discipline incidents. Within one school year of PE4life program implementation, Woodland Elementary demonstrated a 50% reduction in discipline incidents, resulting in a 07% decrease in out-of-school suspension days. In the two years since implementing the program, the school has displayed an average of only 111 discipline incidents per year, compared with 228 incidents occurring the year before PE4life. Additionally, the number of out-of-school suspensions averaged 468 per year, compared to 1,177 the year before PE4life was implemented.
Fitness Changes Academics and Behavior

Anthony Elementary in Leavenworth, Kansas  Edutopia (Dec/Jan 2006)

In 2004 Anthony increased PE and PA from one to five days a week, revamped their school lunch program, and added vitamins to the daily menu. Anthony had three remarkable changes in one year:

1. There was a **1300+% increase** in those passing the fitness test.
2. They went from 10th in Reading and 9th in Math (in a district with 10 elementary schools) to 2nd in Reading and 1st in Math.
3. Office referrals for discipline were reduced from **438 to 18**.

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<th>Unsatisfactory</th>
<th>Advanced</th>
<th>Exemplary</th>
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<table>
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<th>Year</th>
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<th>Exemplary</th>
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<td>2003</td>
<td>27.3%</td>
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<td>2004</td>
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<td>23.8%</td>
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iPE

Intensive Physical Education

22 Males
Lowest Academic Performers
Highest Behavioral Problems
(8 or more referrals first semester)
BMHS 7th Grade Boys Discipline

Fall 2011 Data
Referrals
Per Student/ Per Day
Average

Referral Trending

Referrals per School Day

Aug  Sep  Oct Month  Nov  Dec
BMHS 7th Grade Boys Discipline

Spring 2012 Data Intervention (iPE)
Started January 9, 2012

Referral Trending

<table>
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<th>Month</th>
<th>Referrals per School Day</th>
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<tr>
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</tr>
<tr>
<td>Feb</td>
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<td>Mar</td>
<td>1.4</td>
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<td>Apr</td>
<td>1.2</td>
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<tr>
<td>May</td>
<td>0.8</td>
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Chart showing referrals by month, with a significant decrease from January to May.
### BMHS 7th grade boys Reading MAP Data

<table>
<thead>
<tr>
<th>Name</th>
<th>Fall Reading RIT</th>
<th>Spring Reading RIT</th>
<th>Differer</th>
<th>Target Goal</th>
<th>Goal Met?</th>
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<td>212</td>
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**AVERAGE MAP POINT GAIN:** 5.6

*Fall 2011 to Spring 2012 Intervention Started January 9, 2012*
in **4 months** these 7\(^{th}\) graders made a year and half growth in their **Reading MAP scores**

**Reading MAP Data**
BMHS 7\(^{th}\) grade boys

**Fall 2011 to Spring 2012**
### BMHS 7th grade boys Math MAP Data

**Fall 2011 to Spring 2012**

**Intervention Started January 9, 2012**

**Average Map Point Gain:**

4.7

<table>
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<tr>
<th>Name</th>
<th>7 Fall Math</th>
<th>7 Spr Math</th>
<th>Difference</th>
<th>Target Goal</th>
<th>Goal Met?</th>
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**Gross Gain:** 4.7
in **4 months** these 7th graders made a full year’s growth in their **Math** MAP scores

**Math MAP Data**
BMHS 7th grade boys

**Fall 2011 to Spring 2012**
We changed how we teach and where we teach.
New Designed Classrooms
New Classrooms & Furniture
GOT CHA
The Science of Breakfast
What are the “right” foods for breakfast?
“Right” Foods

- Foods that contain WHOLE GRAINS instead of those made with refined flour. Example: whole grain muffins, bagels, whole wheat bread for toast or sandwiches, cereals (especially oatmeal and bran cereals)
“Right” Foods

- Reduced fat dairy products such as skim milk for cereal or low-fat yogurt
- Fresh fruits and vegetables as side items
  Especially Bananas (Source of Complex Carbs)
- Eggs, cheeses and various nuts (almonds) are all high in protein. Eggs are a great source of Omega 3’s which are important.
9 Foods That May Help Save Your Memory

- Olive Oil
- Avocado
- Peanut Butter
- Grape Juice
- Berries
- Whole Grains
- Fish
- Kale
- Exercise
1 Daily Multiple Vitamin
2 Omega 3 Capsules

Omega 3 does a lot of things. It is believed that omega 3 may also prevent blood cells from sticking to each other and to the blood vessels in which they travel, lowers cholesterol and reduces plaque. This will help promote clear and flexible blood vessels and lower blood pressure.

Helps bone and skin health, improves mental health by reducing depression. Bipolar disorders, ADHD. Aids in the reduction of cancer in colon, breasts and prostrate.

1 Vitamin D-3

Low vitamin D status is now associated with an increased risk for heart disease, at least 17 types of cancer, diabetes, depression, asthma, lowered immunity, autoimmune diseases, chronic pain, arthritis, osteoporosis, macular degeneration, and multiple sclerosis. Research indicates the 77% of adults are deficient in Vitamin D.
• Highly sugared drinks and soda, foods full of artificial colors and flavorings, frosting and any foods that list corn syrup as a primary ingredient.
The American Heart Association warns that no more than 6 teaspoons sugar per day for adult women and no more than 9 tsp for adult men.

For children, the recommended amount is 3 tsp daily. For teens, the amount should not exceed 8 tsp.

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<tr>
<th>Beverage</th>
<th>Typical serving</th>
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<tr>
<td>COKE</td>
<td>12 oz</td>
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<td>Pepsi</td>
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<tr>
<td>Sunkist Orange Soda</td>
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<td>13 tsp</td>
</tr>
<tr>
<td>Snapple Lemonade Ice Tea</td>
<td>16 oz</td>
<td>13 tsp</td>
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<tr>
<td>Rock Star Energy</td>
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<td>16 tsp</td>
</tr>
<tr>
<td>Red Bull</td>
<td>8 oz</td>
<td>7 tsp</td>
</tr>
<tr>
<td>Original Gatorade</td>
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<tr>
<td>Vitamin Water</td>
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</tr>
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<td>Sunny D</td>
<td>6.75 oz</td>
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</tr>
<tr>
<td>Capri Sun small pouch</td>
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</tr>
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</table>
In a study on rats, it was discovered that the animals that had the best ability to learn spatial and memory tasks also had the highest amount of BDNF.

It took only two months on a high sugar and high fat diet to significantly reduce BDNF in the brains of the experimental animals and for the reduction to have an effect on the animal’s ability to perform spatial and memory tasks.
Obese people have 8 percent less brain tissue than normal-weight individuals and their brains appear to have aged prematurely by 16 years.

The same is true for children!
Another Suggested Reading on the Subject

“ The BRAIN ”

brain rules

12 Principles for Surviving and Thriving at Work, Home, and School

JOHN MEDINA
Sleep Hygiene

• Well rested students show a 22% increased ability to be creative.

• Sleep is important in memory formation, organization, retention, and RETRIEVAL

• 8 hours is needed..1st 6 hours the “OUT SIDE BRAIN” IS AT WORK

• LAST 2 HOURS THE INSIDE BRAIN IS AT WORK

• THERE IS NO SHORTCUT!

Dr. John Medina “Brain Rules”
Dr. Medina talks about sleep and math on page 161 of “Brain Rules”

With 8 hours sleep math calculations thought process

Triples
"Brain imaging and behavioral studies are illuminating the brain pathways that are blocked or contorted by sleep deprivation, and the risks this poses to learning, memory, and mental health."

Clifford Saper, PhD, MD, from the Harvard Medical School, an expert on sleep and its deprivation.
A preliminary 2012 study from the Washington University School of Medicine found that poor sleep may be linked to brain plaques found in people with Alzheimer's.

Researchers used fMRI scans to examine the brains of 37 human subjects with and without chronic insomnia. Insomniacs had a smaller volumes of gray matter in three brain areas—and the more serious the insomnia, the greater the loss of volume.

In a study published in the June 2011 issue of Science, University of Washington researchers worked with a special breed of fruit flies that could be induced to sleep on demand. Following a period of training, flies who then underwent 4 hours of induced sleep formed long-term memories of that training. Note that training alone was not enough to trigger memory consolidation—sleep was a necessary component. Flies who trained but did not sleep did not form long-term memories.
Study done on US Naval recruits

Division Average Grades Attrites Removed

2000 and 2001 recruits were allotted 6 hours of sleep per night. 2003 recruits were allotted 8 hours of sleep per night. The lowest in 2003 was higher than the highest in the previous years.
Time for Q and A

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