The Effect of Fitness and Exercise on Brain Function and Learning

Paul Zientarski
Naperville, Illinois
zcoach47@gmail.com
Twitter @PaulZientarski

Thank You!

Eileen Hare
Wayne Sorenson

Find a Partner
Rock, Paper, Scissors

1st time beat your opponent

Rock, Paper, Scissors

2nd time lose to your opponent

A Mind in Motion

Tends to Stay in Motion
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.
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

Texas Youth Fitness Study

2011 2.47 Million students tested

Swedish Study

Performed a 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 and test scores on entering military at 18. As well 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!

2014 Study in Taiwan

400,000 Jr. Hi 9th grade students for entrance exam for HS.

Students who showed a moderate improvement in physical education scores (cardiovascular)
- a 25 percent improvement or less — achieved best in the entrance exam with 276 points on average,
- while students with a significant decline in cardiovascular performance
  — of more than 25 percent — scored lowest in the exam with 260 points on average.
Is there any science or empirical evidence to substantiate these findings???

9 and 10 year olds students

Higher Fit
Easy Test
Lower Fit
Hard Test

Slide Compliments of Dr. Chuck Hillman University of Illinois

The FITKids Randomized Controlled Trial

9 MONTH INTERVENTION

Intervention
Waitlist

221 8-9 year old students

N M O T E N R V H E N T I O N
“Consistent exercise, and certain types of specific exercises, can both temporarily and permanently affect the way your brain is able to focus, its ability to deal with stress and anxiety, and its ability to learn ...

“Exercise is like fertilizer for the brain ... it’s so good, it’s like Miracle Gro”.

- Dr. John Ratey, Harvard Brain Researcher
BDNF – Brain Derived Neurotrophic Factor

A brain that’s low on BDNF shuts itself off to new information, and groups that are deprived of this chemical are not as quick or sharp as those with adequate amounts.

Until the mid-Nineties it was thought that the adult loss of nerve cells was irrevocable, but studies over the past decade have overturned that assumption, showing that “neurogenesis” (formation of nerve tissue) in some parts of the brain can be induced easily with exercise.

Hook ups
Brain Function
Thought Process

Dopamine
Reward
Pleasure
Motivation/Drive

Serotonin
Obsessions
Compulsions

Norepinephrine
Alertness
Concentration
Energy

Attention
Appetite
Sex
Aggression

Cognitive Function
Anxiety
Impulse
Irritability

Mood

Serotonin
Obssessions
Compulsions
Memory

Dopamine
Reward
Pleasure
Motivation/Drive

Brain Chemistry

Neurochemistry
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

A Mind in Motion

Tends to Stay in Motion
Attention Spans

Typical 5 year old: 5 to 7 minutes
Typical 13 year old: 15 to 18 minutes
Typical Adult: 20 to 25 minutes

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

Malpractice Occurrences

More Time Needed for Academics
Discipline Problem
Didn’t Finish Their Work

Recess
PE
How have we used the Research?

We collected data!

Academic Reading Data

2005-2010 2011

<table>
<thead>
<tr>
<th></th>
<th>Non-LRPE</th>
<th>LRPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>1.9</td>
<td>2.9</td>
</tr>
</tbody>
</table>

52-56% Better

Math Data

2006-2011

<table>
<thead>
<tr>
<th></th>
<th>Non-LRPE</th>
<th>LRPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.9</td>
<td>19.1</td>
<td></td>
</tr>
</tbody>
</table>

93% Better
What does L.R.P.E. Look Like?

Based on Fitness
Cardiovascular
Intensity 155 - 200bpm
Cross Lateral Activities
Core Strength
Team Building
Balance and
Gymnastics
Traditional Team
Sports
Academic Support
While Exercising

Move and LEARN

Improve Student Engagement
Help Maintain Student
Achieve all parts of their lives

Question about LRP? Contact
Paul Ziembinski
Learning Resources PTE (LRTPE) Naperville Community School District 203
Phone: 630-756-3329
Email: paul.ziembinski@203.org Dr. Clark for help Paul Ziembinski

Additional Benefits of Fitness

BEHAVIOR

ATTENDANCE
Fitness Changes Academics and Behavior

Anthony Elementary in Leavenworth, Kansas

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**.
Cobb County Georgia

Students in the Healthy Fitness Zone for Aerobic Fitness…

- Scored HIGHER in Math & Reading
- Had FEWER discipline referrals
- And BETTER attendance

SOURCE: Cobb County Schools’ FitnessGram Analysis — Relationship between Aerobic Capacity, Academic Achievement, Attendance and Behavior

In Conclusion

- Quality Physical Education brings value to the learning process
- Quality Physical Education improves student behavior
- Quality Physical Education improves student attendance
- Quality Physical Education enhances the life of students mentally, physically, emotionally, and socially
- We need to advocate to the public, administrators, legislatures and our students about our importance in their life.
- Take pride in what you do each day as you work to make a