
THE CrossFit JOURNAL

The Cogni-Gym: From Whiteboard to Chalkboard?

Can workouts help produce smarter kids?
Chris Cooper has a study lined up to answer that question.

By Chris Cooper Catalyst Fitness

November 2010



All images S. Dy/CrossFit

Entering our box at 7 a.m., you're used to hearing the whir of rowers, the whip of skipping ropes. These are the sounds of warm-ups, after all. But today, a new noise: the scratch of chalk. The repetition of numerical tables. An impromptu classroom of kids dripping sweat on their notepads.

This could be what you see in your affiliate a year from now.

1 of 5

Fitter and Smarter?

Imagine a drug that would put you 33 percent ahead of your peers, nationwide, on standardized tests, a pill that would give you a full two months' head start, every year, on every other student. It's out there: it's called Learning Readiness P.E. Mostly, kids just call it exercise.

There's a slowing process happening in our schools. While other countries surge ahead, kids in America just aren't keeping up. In fact, according to the [NAEP 2008 Trends in Academic Progress](#) study, high-school students haven't improved their test scores since they started being tracked—in 1971 (1). If this were any other epidemic, our response would be immediate and dramatic.

Swine flu? Buy duct tape and tarps! Avian flu? Wear breathing masks on the subways! Obesity? Uh ... eat more grains? Failure to improve at maths and sciences ... um. The collective shrug of the health bureaucracies is startling. That's what prompted Paul Zientarski to try something different: exercise. But what he learned—and what we all learned—was a shock.

In Naperville District 203 (Illinois), students can choose from more than a dozen activities each morning to raise their heart rates. The students wear heart-rate monitors and participate in activity for 25 minutes five days per week, elevating their heart rates to between 160 and 190 beats per minute each time. Starting in 2004, students who were tagged as “at-risk” for low test scores in reading and math have participated in early-morning exercise with Mr. Zientarski. These workouts may include a reading or math component or simply games to elevate the heart rate before the start of classes.

“There's sort of no question about it now,” Dr. John J. Ratey, a clinical associate professor of psychiatry at Harvard Medical School, said of exercise and education. “The exercise itself doesn't make you smarter, but it puts the brain of the learners in the optimal position for them to learn” (2).



Increasing evidence is suggesting that exercise puts people in a state that's very conducive to learning.

Your brain produces a chemical (brain-derived neurotrophic factor or BDNF) that assists in the storing of information. In his book *Spark: The Revolutionary New Science of Education and the Brain*, Dr. Ratey frequently refers to BDNF as “Miracle-Gro for the brain.” Post-exercise, BDNF levels are enhanced, and then they taper off through the day. Kids who study immediately after exercise reap the benefits; kids who study a few hours later do not experience the same benefits. And the benefits are enormous.

In Naperville in 2004, students in the “exercise” study group increased math test scores by over 20 percent while students who took math only increased their scores by only 3.8 percent. In a remarkable turnaround, this one small high school in Illinois went from one of the lowest-testing districts in the U.S. to one of the highest. The experiment has prompted more rigorous research, and the results just keep getting better and better:

In the *Journal of Sport and Exercise Psychology*, Darla Castelli et. al. report that children who scored higher on aerobic and BMI tests also scored higher in academic tests, regardless of gender or socioeconomic status (3).

Cognitive and academic benefits increase with the “dosage” of exercise, another study in Augusta, Ga., showed (4). More is better. This also shows a causation effect: exercise actually causes the academic change; the changes aren’t just an interesting correlation.

Ten years ago, Phil Lawler and Mr. Zientarski started using heart-rate monitors in Naperville. Their idea was to promote a lifelong pursuit of health and fitness instead of a fixation on learning the rules of sport, as is the case in the majority of P.E. classes in the U.S. Because these skills aren’t deemed necessary, and especially after the No Child Left Behind program, physical education is now offered five days per week by only six percent of U.S. schools.

Studying Studying and Exercise

CrossFit Kids is, increasingly, offering an extracurricular alternative to gym class. Combining basic gymnastics skills with fundamental movement patterns, including running, calisthenics and weightlifting, CrossFit Kids brings children to an elite level of fitness unequalled in any formal school program. But can we do more? Can we use the intense bursts of exercise to trigger BDNF production in kids and then capitalize by teaching when the brain is primed to learn?



Brain-derived neurotrophic factor (BDNF) is a chemical responsible for aiding in the retention of information. BDNF levels have been shown to be elevated following exercise.



Chris Cooper will be studying the effects of physical activity on learning in a study conducted in Ontario, Canada.

That's what we intend to find out. This summer, we started tracking students from an area high school; in September, two others will join us. They're measured for adherence (the amount of work done) using the tracking system developed for our [2006-2008 study on exercise adherence](#). Their grades will be compared against those of their peers for the same time period. We'll measure correlation between exercise adherence and academic improvement.

The initial workouts focused on familiarization with the CrossFit program and followed the progressions we use in our OnRamp program and our [exercise progression template](#).

With the new school year starting, two other area high schools will join the study, and we'll be tracking grades along with adherence. Each school has a class for students identified as "at risk" for dropping out: low test scores, poor attendance, bad behavior. Students from these classes will be asked to volunteer for an exercise session each morning before first period. Participation will be limited to 50 percent of the class total enrollment, which provides us with a control group.

Mind and Body

A brain-based workout session would look like this:

5-minute warm-up using functional movements to increase:

1. The heart rate to allow secretion of BDNF.
2. Coordination of the functional movements.
3. Alertness and focus on the task to be explained next.

Next we would engage in a 5- to 10-minute left-brain and right-brain integration movement. This is where we focus on focusing. Goal setting for the lesson is a must as well as noticing any factors that may interfere with learning the new task or skill; i.e., having a bad day, sore muscles, etc.

Then we're ready to learn a new movement or skill, and then something academic like reading, writing, listening, math problems, etc. The academic lesson will directly reflect the goal set during the warm-up. Example: Goal: I want to write a full sentence in cursive and stay in the lines. Lesson: Practice writing each letter in cursive, then words, then sentences. This is where a student may bring in any homework from school or work on a subject they would like to improve. We spend about 20 minutes here.

Next, we would reinforce the learning with a workout using the movement learned combined with the academic goal. Positive reinforcement and constant feedback are crucial for the learner during this workout because the experience will be learned on a deep cognitive level. Time: 10-20 minutes.

We would end the session with a stretch to improve mobility and flexibility, and we would also reflect on the learning that took place for 10-15 minutes.

—Tyler Belanger | Catalyst Fitness

Midway through the semester, and again at the end, students' attendance and grades will be compared against the statistical median for their class. Workouts will be dictated by us at Catalyst and coached by teachers who practice CrossFit on their own (we're trying to get them Level 1 certified). Twice per semester, the whole class will participate at an event at Catalyst for fun and instructional purposes.

At the end of the first semester, we'll be able to produce a three-dimensional model of attendance, adherence and improvement in youth: adherence vs. academic progress of the group, adherence vs. personal (historical) academic progress, and personal academic progress vs. academic progress of the group. We'll use this information to approach more schools in the district, with the goal of broadening the study to more than eight local high schools. We'll also make the physical curriculum available online for other schools to try after the first semester.

Success will be determined as:

1. Improvement in personal attendance among participants.
2. Improvement in personal test scoring among participants.
3. Improvement in adherence. Note that physical improvements will be tracked (merely tracking a few objective criteria will improve adherence) but not recorded as part of the results for this study.

And what if we're doing it wrong? Instead of spending more time studying, could we use our time better? What if—using the CrossFit model—we could create students with a greater capacity for memory and learning? What if one single kid benefits?

The possible benefit of this style of coached tutoring is the opening of a new paradigm in coaching: the combination of extracurricular exercise *and* academia could be a brand new world for kids, teens, their parents and the CrossFit affiliate community.

We'll get back to you.



Editor's Note: Special thanks to the high-school students from CrossFit Sacramento/Fourth Power Fitness.

References

1. National Center for Education Statistics. [NAEP 2008 Trends in Academic Progress](#): 12, 2008.
2. Viadero D. [Exercise seen as priming pump for students' academic strides](#). *Education Week*: 2, 2008.
3. Castelli DM, Hillman CH, Buck SM, Erwin HE. [Physical fitness and academic achievement in third- and fifth-grade students](#). *Journal of Sport and Exercise Psychology* 29: 239-252, 2007.
4. Davis CL, Tomporowski PD, Boyle CA, Waller JL, Miller PH, Naglieri JA, Gregoski M. Effects of aerobic exercise on overweight children's cognitive functioning: a randomized controlled trial. *Research Quarterly for Exercise and Sport* 78(5): 510-519, 2007.

Additional Reading

Dr. John J. Ratey's blog:
johnratey.typepad.com/blog/2008/04/index.html

Brain Gym International:
www.braingym.org/faq.



Courtesy of Chris Cooper/Catalyst Fitness

About the Author

Chris Cooper is president of Catalyst Fitness in Sault Ste. Marie, Ont., Canada. Split between two facilities—a private personal-training center and a CrossFit box—Catalyst Fitness is engaged in research, athletic development and the pursuit of all things fitness. Chris has two small kids, a 14-hour workday, a 2:51 Diane and a 520-lb. deadlift PR. He also has an incredible staff of trainers, therapists and coaches, as well as a probable case of mild ADD and a very patient wife. Reach him at catalystfitness@yahoo.ca or visit catalystgym.com.