

Working Up a (Brain) Sweat

Physical activity improves students' cognitive performance.

By: Mark M. Jones



If a pill could improve your child's self-esteem, memory, attention span, standardized test scores, and ability to problem solve, would you rush to the store and buy it?

If it did not need a prescription, was free, had no long-term side effects, and likely would increase your child's lifespan by decreasing the risk of heart disease, type 2 diabetes, and some cancers, would you buy it in bulk?

What if you learned that this medicine's only negative feature was that instead of requiring a quick swallow with some water, it would take 30–60 minutes to consume and during that time it would elevate the heart rate and blood pressure and cause rapid breathing and sweating? Would you immediately lose interest and walk away?

This is the medicine of physical exercise. We well know its many physical health benefits, but burgeoning science is now showing us the powerfully positive effects exercise has on the brain. Exercise increases the production of helpful brain proteins and oxygen and causes growth of new blood vessels and nerve fibers. This growth enhances the size of certain brain regions, particularly the hippocampus, which is the center for learning and memory.

As John Ratey, M.D., explains in *Spark: The Revolutionary New Science of Exercise and the Brain*, physical exercise causes a surge in a key protein that acts as a brain fertilizer that "improves the function of neurons, encourages their growth, and strengthens and protects them against the natural process of cell death."

Exercise not only increases the size of brain structures, it has been shown to increase the brain's electrical activity when a person is cognitively engaged, compared to less fit individuals. Of course, all this holds fascinating and important implications for students and educators.

In 2010, the Centers for Disease Control reviewed 50 studies exploring exercise's impact on cognition in children. The CDC concluded that "students who are physically active tend to have better grades, school attendance, cognitive performance (e.g., memory) and classroom behaviors (e.g., on-task behavior)." They also noted that classroom exercise breaks are positively associated with improved reading literacy, standardized test scores, and math fluency. None of the 50 studies reported any decrease in academic performance with an increase in time spent exercising.

Convinced that more exercise is better, the CDC now recommends that children get at least 60 minutes of moderate to vigorous exercise daily. Of course, as a significant added benefit, physical activity provides a key tool in the complex battle against childhood obesity and its lethal companion, type 2 diabetes.

On the Move

During most of the time students are in school, their activity level is controlled by the school, not the student. Outside school, televisions, computers, smart phones, and a multitude of social media suck up vast quantities of many middle schoolers' free time.

Simply urging students to get more exercise will not make a meaningful impact. The school day is a critical block of opportunity to infuse physical activity into students' lives. Unfortunately, in most school districts, the pressure to demonstrate high standardized test scores has led to narrower slots for physical education classes.

Yet, some schools have become creative with the challenge and found ways to instill more activity into their students' lives.

Programs that combine academic lessons with physical activity have been impressive in improving academic learning.



AMLE talks with author Mark Jones about Physical Activity in the Classroom

Each year in an elementary school in Minnesota, PE instructor Joe McCarthy identifies the 30 lowest-scoring students in literacy on that fall's state standardized tests. While other students are just getting settled into their morning classrooms, McCarthy takes 15 minutes before first period language arts class and pairs these students in aerobic activities that include a literacy component.

For example, McCarthy tapes a question relating to a literary passage on the wall at one end of the gym. Students gather at the other end and with a timer running, a student from each team races through an obstacle course to reach the day's passage, reads it, then runs back and records the answer. The runner's partner then immediately takes on another question and continues the relay. According to McCarthy, each year, literacy scores for these lowest-scoring students increase to approximately five times higher than national averages by the end of 12 weeks.

A teacher does not need to be trained in PE or have access to a gym to incorporate physical activity into lessons. Ten-minute exercise "brain breaks" are among the easiest, most enjoyable, and perhaps most effective tools to increase physical activity.

Teachers can start or end lessons with dancing to a music video or lead their own exercise routine. Several websites feature videos to energize crowded classrooms. Many teachers post movement-based lesson plans on the Internet that integrate exercise with science, mathematics, social studies, art, and music. Universities (e.g., East Carolina University, University of Missouri) and states such as Iowa, Colorado, and North Carolina are building online libraries to share lessons that incorporate movement into specific subjects.

These active lessons work. A University of Kansas study led by Joseph Donnelly and his colleagues enlisted teachers at 24 public schools to conduct physically active lessons in 10-minute chunks totaling 90 minutes per week. At the end of three years, kids in the physically active classes performed significantly better on standardized achievement tests than kids in traditional sedentary classes. Unexpectedly, they also became 17% more active on weekends. The clear implication is that physical activity in school promotes an active lifestyle beyond its walls.

Hearts Beating

Of course, even without a literacy component, PE class is a key time for raising heart rates and affords an opportunity to help children develop interests in activities that can continue into adulthood.

Standing around in a dodge ball or kickball game is a waste of valuable activity time. Yet, small-sided soccer, 3 x 3 basketball, wall rock climbing, and even square dancing increase heart rates while simultaneously fostering team building, problem solving, social skills development, and a specific activity interest that may become lifelong.

Because in most schools it will be impractical to provide 60 minutes of activity within every school day, offering readily accessible activities before and after school is critical. Recruiting parent volunteers for physical activity groups allows students who can arrive early or stay late to pump beneficial chemicals into their brains.

The commute to and from school is another key opportunity for exercise. The National Center For Safe Routes To School helps schools and communities develop plans to increase safety and convenience for walkers and bike riders. The Walking School Bus (www.walkingschoolbus.org) organizes groups of students with an adult who walks with them to and from school. The Utah Department of Transportation created a Walking School Bus software app that helps families organize students into walking groups with one or more adults, then notifies all parents when the children arrive safely at school.

Momentum for Change

Administrators, teachers, and education specialists within schools can create momentum to change school culture just by modeling active lifestyles. If students see teachers bike to school or principals convene walking lunchtime meetings, those images make a mark on impressionable minds.

Another boost toward an active school culture may come from launching schoolwide physical activity challenges. Holding contests to determine which grade can accumulate the most active extracurricular minutes a semester or having students track their active minutes in a month can create excitement and build group spirit.

Schools can convince local businesses to donate time and resources. Owners of bicycle shops, yoga studios, health clubs, running shoe stores, and dance studios are partner resources who can profit from fitness taking hold at an early age. Promoting family weekends filled with nature hikes, bike rides, tennis, skating, and dog walks can create a sustained family focus on exercise.

A sedentary lifestyle deprives the brain of the key nutrients and structures kids need to concentrate and learn. Physically active children perform better in school on a wide array of important measures, including classroom behavior, grades, and standardized achievement scores.

Incorporating more movement into the day through school- sponsored brain breaks, morning sports activities, afternoon running clubs, and active commutes is not only good medicine for academic achievement, but a powerful pill in the fight against the adverse consequences of obesity.

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