

The smart thinking on exercise? It helps kids learn

Parents, teachers and scientists say exercise benefits the brain.

By **DR. DAN COOPER**

SPECIAL TO THE REGISTER

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Editor's note: This is the second in a three-part series of essays by UCI pediatrician Dr. Dan Cooper on children and exercise. The photos are winners from this summer's Children at Play photo contest, sponsored by The Orange County Register, UC Irvine's Pediatric Exercise Research Center, and Children's Hospital of Orange County.

Data from scientists, teachers and the real-life experience of parents provide growing evidence that physical activity influences the brain.

In laboratory studies, physical exercise in animals causes new brain cell growth and releases chemicals involved in learning. Recent exciting studies also show that exercise causes the production of substances that protect delicate neurons from free-radicals and oxidants.

Findings in controlled laboratory settings don't always relate to the real world, so it is encouraging to see more studies showing how people suffering from chronic disease benefit from physical activity.

A number of clinical trials suggests exercise can limit or modestly reduce, the progression of Alzheimer's disease, for example. Other recent studies show that exercise promotes growth of new "circuits" in brains of stroke victims, which leads to restoration of some muscle function.

And finally, a group of researchers at the University of Maryland showed that a six-month treadmill program not only improved walking in stroke victims but also activated parts of the brain that control gait. These exciting findings provide new possibilities for therapy in adults suffering from these chronic conditions involving the brain.

So what about children? Can exercise influence how the brain grows when the rest of the body is developing rapidly? Can it make our kids smarter or, at least, learn better?

Lillian Wald championed that idea in the early 20th Century when she advocated physical activity in schools. She understood that healthy children learn better. Indeed, the fact that physical education is mandatory (though not always optimally implemented) in public schools in the U.S. and throughout the world, attests to an underlying belief that training the muscles and the brain are intertwined.

But hard scientific evidence to support Wald's understanding has been difficult to find, and such unbiased evidence (pro or con) is increasingly important. As school budgets focus on elevating academic test scores, some argue that play or exercise is a waste of time. School resources are far more likely to be channeled toward basic

academics than to P.E., music, or other programs considered marginal to the learning environment.

The challenges to studying objectively the influence of physical activity on learning are enormous – from how to measure the time and intensity of the child's exercise, to defining the end-point. Do we measure grades alone? Time spent in studying to achieve a particular grade? Behavior in class? Also, influences such as neighborhood, socioeconomic status, and family play large, confounding roles in improved learning.

Given these hurdles, it is refreshing to see scientists becoming more interested in this tough question. One just-published study from the U.S. Centers for Disease Control and Prevention focused on more than 5,000 kindergarteners and found that, "physical education did not appear to negatively affect academic achievement in elementary school students." The researchers went on to note, "...among girls, higher amounts of physical education may be associated with an academic benefit." A positive effect in boys in the CDC study was equivocal.

In the early 2000s, then California State Superintendent of Public Instruction Delaine Eastin compared standardized testing data obtained routinely in school-aged children and adolescents and found:

- Higher academic achievement was associated with higher levels of fitness at each of the three grade levels measured.
- The relationship between academic achievement and fitness was greater in mathematics than in reading, particularly at higher fitness levels.
- Students who met minimum fitness levels in three or more physical fitness areas showed the greatest gains in academic achievement.
- Girls demonstrated higher achievement than males, particularly at higher fitness levels.

These results were similar to the ones found by the CDC this year.

Finally, there has been renewed interest in using exercise as a learning aid for children with special needs. Attention Deficit Hyperactivity Disorder comes to mind because the cause of the inability to focus may be the sluggish production of adrenaline-like substances. Most of the successful drug-therapies for ADHD use medicines that boost adrenaline-like functions in the brain and throughout the body. Adrenaline is released naturally with vigorous exercise, and likely causes the increased attention and awareness most people experience when they exercise. Can this natural property help children with ADHD learn better, reducing their need for medicines? The answer is not yet known.

The brain, like so many other organs, can be profoundly influenced by patterns of physical activity. Healthy children learn better, and the right amount of exercise is necessary for optimal growth, development and health. There also is increasing evidence that exercise can, under the right circumstances, help children learn. It clearly does not impair academic performance as judged by standardized testing.

For parents and pediatricians the practical question becomes: At how young an age do patterns of physical activity begin to have long term physical and mental health effects on the growing child?

In the next week's final essay in the series, we will discuss whether we can influence activity levels in babies and, if so, whether the activity level of an infant or baby could change the subsequent development of motor, cognitive, and other critical physiological functions of the human being.

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Lillian Wald (1863-1940) a nurse who championed the cause of Russian Jewish immigrants, a founder of the NAACP, author of 2 books both relating to the house on Henry Street where she and up to 26 other nurses cared for patients.