ScienceDaily
Your source for the latest research news

Web address:
http://www.sciencedaily.com/releases/2009/03/090331183800.htm

Physical Activity May Strengthen Children's Ability To Pay Attention

ScienceDaily (Apr. 1, 2009) — As school districts across the nation revamped curricula to meet requirements of the federal "No Child Left Behind" Act, opportunities for children to be physically active during the school day diminished significantly.

Charles Hillman and Darla Castelli, professors of kinesiology and community health, have found that physical activity may increase students' cognitive control -- or ability to pay attention -- and also result in better performance on academic achievement tests. (Credit: Photo by L. Brian Stauffer)

Future mandates, however, might be better served by taking into account findings from a University of Illinois study suggesting the academic benefits of physical education classes, recess periods and after-school exercise programs. The research, led by Charles Hillman, a professor of kinesiology and community health and the director of the Neurocognitive Kinesiology Laboratory at Illinois, suggests that physical activity may increase students' cognitive control – or ability to pay attention – and also result in better performance on academic achievement tests.

"The goal of the study was to see if a single acute bout of moderate exercise – walking – was beneficial for cognitive function in a period of time afterward," Hillman said. "This question has been asked before by our lab and others, in young adults and older adults, but it's never been asked in children. That's why it's an important question."

For each of three testing criteria, researchers noted a positive outcome linking physical activity, attention and academic achievement.

Study participants were 9-year-olds (eight girls, 12 boys) who performed a series of stimulus-discrimination tests known as flanker tasks, to assess their inhibitory control.

On one day, students were tested following a 20-minute resting period; on another day, after a 20-minute session walking on a treadmill. Students were shown congruent and incongruent stimuli on a screen and asked to push a button to respond to incongruencies. During the testing, students were outfitted with an electrode cap to measure electroencephalographic (EEG) activity.

"What we found is that following the acute bout of walking, children performed better on the flanker task," Hillman said. "They had a higher rate of accuracy, especially when the task was more difficult. Along with that behavioral effect, we also found that there were changes in their event-related brain

potentials (ERPs) – in these neuroelectric signals that are a covert measure of attentional resource allocation."

One aspect of the neuroelectric activity of particular interest to researchers is a measure referred to as the P3 potential. Hillman said the amplitude of the potential relates to the allocation of attentional resources.

"What we found in this particular study is, following acute bouts of walking, children had a larger P3 amplitude, suggesting that they are better able to allocate attentional resources, and this effect is greater in the more difficult conditions of the flanker test, suggesting that when the environment is more noisy – visual noise in this case – kids are better able to gate out that noise and selectively attend to the correct stimulus and act upon it."

In an effort to see how performance on such tests relates to actual classroom learning, researchers next administered an academic achievement test. The test measured performance in three areas: reading, spelling and math.

Again, the researchers noted better test results following exercise.

"And when we assessed it, the effect was largest in reading comprehension," Hillman said. In fact, he said, "If you go by the guidelines set forth by the Wide Range Achievement Test, the increase in reading comprehension following exercise equated to approximately a full grade level.

"Thus, the exercise effect on achievement is not statistically significant, but a meaningful difference."

Hillman said he's not sure why the students' performance on the spelling and math portions of the test didn't show as much of an improvement as did reading comprehension, but suspects it may be related to design of the experiment. Students were tested on reading comprehension first, leading him to speculate that too much time may have elapsed between the physical activity and the testing period for those subjects.

"Future attempts will definitely look at the timing," he said. Subsequent testing also will introduce other forms of physical-activity testing.

"Treadmills are great," Hillman said. "But kids don't walk on treadmills, so it's not an externally valid form of exercise for most children. We currently have an ongoing project that is looking at treadmill walking at the same intensity relative to a Wii Fit game – which is a way in which kids really do exercise."

Still, given the preliminary study's positive outcomes on the flanker task, ERP data and academic testing, study co-author Darla Castelli believes these early findings could be used to inform useful curricular changes.

"Modifications are very easy to integrate," Castelli said. For example, she recommends that schools make outside playground facilities accessible before and after school.

"If this is not feasible because of safety issues, then a school-wide assembly containing a brief bout of physical activity is a possible way to begin each day," she said. "Some schools are using the Intranet or internal TV channels to broadcast physical activity sessions that can be completed in each classroom."

Among Castelli's other recommendations for school personnel interested in integrating physical activity

into the curriculum:

- scheduling outdoor recess as a part of each school day;
- offering formal physical education 150 minutes per week at the elementary level, 225 minutes at the secondary level;
- encouraging classroom teachers to integrate physical activity into learning.

An example of how physical movement could be introduced into an actual lesson would be "when reading poetry (about nature or the change of seasons), students could act like falling leaves," she said.

The U. of I. study appears in the current issue of the journal *Neuroscience*. Along with Castelli and Hillman, co-authors are U. of I. psychology professor Art Kramer and kinesiology and community health graduate student Mathew Pontifex and undergraduate Lauren Raine.

***Disclaimer**: This article is not intended to provide medical advice, diagnosis or treatment. Views expressed here do not necessarily reflect those of ScienceDaily or its staff.*

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of Illinois at Urbana-Champaign**.

EINSTEIN
Albert Einstein College of Medicine
OF YESHIVA UNIVERSITY
Science at the heart of medicine

DAILY SCHOOL RECESS IMPROVES CLASSROOM BEHAVIOR

January 26, 2009 — (BRONX, NY) — School children who receive more recess behave better and are likely to learn more, according to a large study of third-graders conducted by researchers at Albert Einstein College of Medicine of Yeshiva University.


Romina Mariel Barros, M.D.

The study, published in Pediatrics, suggests that a daily break of 15 minutes or more in the school day may play a role in improving learning, social development, and health in elementary school children. The study's principal investigator is Romina M. Barros, M.D., assistant clinical professor of pediatrics at Einstein.

Dr. Barros looked at data on approximately 11,000 third-graders enrolled in the national Early Childhood Longitudinal Study. The children, ages 8 to 9, were divided into two categories: those with no or minimal recess (less than 15 minutes a day) and those with more than 15 minutes a day. There were an equal number of boys and girls. The children's classroom behavior was assessed by their teachers using a questionnaire.

According to the American Academy of Pediatrics, free, unstructured play is essential for keeping children healthy, and for helping them reach important social, emotional, and cognitive developmental milestones. Unstructured play also helps kids manage stress and become resilient.

However, some studies indicate that children are getting less and less unstructured playtime, a trend exacerbated by the 2001 No Child Left Behind Act. "Many schools responded to No Child Left Behind by reducing the time for recess, the creative arts, and physical education in an effort to focus on reading and mathematics," says Dr. Barros.

A 2005 survey conducted by the National Center for Education Statistics showed that the 83 percent to 88 percent of children in public elementary schools have recess of some sort. But the number of recess sessions per day and the duration of the recess periods have been steadily declining. Since the 1970s, children have lost about 12 hours per week in free time, including a 25 percent decrease in play and a 50 percent decrease in unstructured outdoor activities, according to another study.

The present study shows that children from disadvantaged backgrounds are especially affected by this trend. "This is a serious concern," says Dr. Barros. "We know that many disadvantaged children are not free to roam their neighborhoods, even their own yards, unless they are with an adult. Recess may be the only opportunity for these kids to practice their social skills with other children."

"When we restructure our education system, we have to think about the important role of recess in childhood development," adds Dr. Barros. "Even if schools don't have the space, they could give students 15 minutes of indoor activity. All that they need is some unstructured time."

Dr. Barros' coauthors include Ellen J. Silver, Ph.D., associate professor of pediatrics, and Ruth E.K. Stein, M.D., professor of pediatrics.

The paper, "School Recess and Group Classroom Behavior," was published in the February 1 issue of *Pediatrics*.

ScienceDaily
Your source for the latest research news

Web address:
http://www.sciencedaily.com/releases/2009/01/090120204919.htm

School-Based Physical Activity Has Benefits Even If It Doesn't Help Lose Weight

ScienceDaily (Jan. 23, 2009) — School-based health and exercise programs have positive outcomes despite having little effect on children's weight or the amount of exercise they do outside of school, say Cochrane Researchers who carried out a systematic review of studies on physical activity programs in schools.

The research shows that school-based programs increased the time children spent exercising and reduced the time spent watching television. Programs also reduced blood cholesterol levels and improved fitness – as measured by lung capacity. However, programs made little impact on weight, blood pressure or leisure time activities.

Physical inactivity is a key factor behind 1.9 million deaths every year and almost a quarter of all cases of coronary heart disease. People who are overweight as children are more likely to develop heart disease as adults. Exercise helps to maintain a healthy weight, yet studies show most children do not do enough exercise to give any health benefit. The World Health Organisation has identified schools as important settings for promotion of physical activity among children.

The researchers reviewed data from 26 studies of physical activity promotion programs in schools in Australia, South America, Europe and North America. Most studies tried to encourage children to exercise by explaining the health benefits and changing the school curriculum to include more physical activity for children during school hours. Programs included teacher training, educational materials and providing access to fitness equipment.

"Given that there are at least some beneficial effects, we would recommend that schools continue their health promotion programs. These activities should also be supported by public health unit staff, and parents and teachers as positive role models," says lead researcher, Maureen Dobbins, who works at the School of Nursing at McMaster University in Ontario, Canada.

Dobbins believes that schools should make spaces in their timetables to create environments that encourage pupils to engage in physical activity each day as well as having an ethos that encourages increased duration of moderate to vigorous activity each week. "Schools have great opportunities to help pupils learn how to promote health and minimise the risk of acquiring a chronic disease. Providing a healthy structure to their day should enable them to develop healthier lifestyles that may track in adulthood," she says.

She also suggests an explanation for why some programs often don't improve physical health measures such as weight and blood pressure. "Physical activity classes may be too closely associated with school work, so for some students this makes them feel like they are being made to do more work. Perhaps the key is to promote physical activity by getting children and adolescents to 'play' in ways that promote

better fitness levels, while at the same time represent fun and adventurous activities," says Dobbins.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Wiley-Blackwell**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Dobbins M, De Corby K, Robeson P, Husson H, Tirilis D. **School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6-18**. *Cochrane Database of Systematic Reviews*, 2009, Issue 1. Art. No.: CD007651 DOI: 10.1002/14651858.CD007651