NIOST National Institute on Out-of-School Time at the Wellesley Centers for Women

Research Brief

January 2013

Study of Association of Physical Activity with Positive Youth Outcomes

Introduction

Researchers from the National Institute on Out-of-School Time (NIOST) at the Wellesley Centers for Women at Wellesley College conducted a study from September 2011 through June 2012 in the Natick Public Schools in Massachusetts examining possible associations of physical activity with selected academic related youth outcomes. The study sample included 570 students from five elementary schools enrolled in grades K–2.

Rationale for the Study

The Centers for Disease Control and Prevention (2010) recommends 60 minutes or more of moderate to vigorous physical activity (MVPA) each day for children and adolescents. According to data from the NICHD Study of Early Child Care and Youth Development, children and youth are not getting adequate physical activity time at school (NICHD ECCRN, 2003). NICHD findings show that, on average, children only attend 2.1 physical education (P.E.) classes per week, totaling 68.7 minutes of physical activity per week. Research has also shown that exercise improves cognitive function and psychological traits that influence behavior (e.g., mood, level of motivation). Sattelmair and Ratey (2009) found a positive correlation between youth test scores and their involvement in high levels of strenuous physical activity.

Some evidence suggests that physical activity is positively linked to a particular type of learning. Kubesch et al. (2009) found that executive functions (e.g., processes that are responsible for planning, cognitive flexibility, abstract thinking, rule acquisition, initiating appropriate actions and inhibiting inappropriate actions, and selecting relevant sensory information) that are closely related to learning achievement can be improved by acute and recurring physical activity. Executive functions are more strongly associated with school readiness than are intelligence quotients (IQ) or entry-level reading or math skills (Blair & Razza, 2007; McClelland, Morrison, & Homes, 2000).

Study Methods and Findings

The 2011–2012 school year was the first of a multi-year study to examine the potential associations of physical activity with youth level outcomes related to school success. Specifically, this study is examining the association of physical activity level with children's executive functioning, social, and school readiness skills in addition to a standard district academic assessment. Data for the study were collected through (a) child-level school assessment data, (b) teacher and parent surveys, and (c) school data. This report reflects evaluation and research conducted during the period from September 2011 through June 2012.

Methods

Study participants were recruited in September 2011 through flyers sent home from school with children. All families who responded to the study invitation and returned an enrollment form were admitted to the study. In total 570 students enrolled in the study. All families gave voluntary written informed consent for all study data collection protocols. Teacher and Parent pre-surveys and Physical Activity Logs were distributed and collected in November 2011. Because some classrooms had 15 or more participants, the number of surveys each teacher completed was capped at eight (8). Follow-up surveys were distributed to teachers and parents in late April 2012. Physical Activity Logs were again distributed and collected in May. Incentives for participation were offered to teachers, parents, and students. Children's books (two books per teacher) were distributed in late December to all participating teachers who completed surveys. Parents who returned surveys (fall and spring) were included in two ticket lotteries for Boston Red Sox baseball and Boston Celtics basketball games. All child participants received a jump rope, notebook, and $5 coupon for the Reebok store.

Survey Tools

Three survey tools were used for data collection from teachers and parents. The Inhibit, Shift, Working Memory, and Plan/Organize subscales from the Behavior Rating Index of Executive Function (BRIEF) were completed by parents and teachers. Parents also completed the Social Skills Rating System (SSRS), which included scales for cooperation, responsibility, assertion, and self-control. The Survey of Afterschool Youth Outcomes (SAYO) was completed by teachers and included scales for behavior, initiative, engagement, and academic performance.

AIMSweb

AIMSweb is a web-based assessment, data management, and reporting system that provides the framework for Response to Intervention (RTI) and multi-tiered instruction. Designed specifically to universally screen and monitor progress, AIMSweb uses brief, valid, and reliable general outcome measures of reading and math performance for grades K–8 that can be used with any curriculum. AIMSweb assessments were administered by the Natick Public Schools in October 2011 and May 2012. Data for the study was prepared by and collected from the individual schools.

Physical Activity Logs

All participants (students in grades K–2 from the five schools) were given a Physical Activity Log to complete with a parent twice during the school year (November and May) for seven consecutive days. Children were instructed to check off physical activities they engaged in each day (after school until bedtime) and to record the number of minutes spent doing each activity. All activities engaged in over the course of the weekend were also recorded. The checklist included 25 physical activities such as biking, jogging, swimming, ball play (baseball, football, soccer, and basketball), outdoor play, active games, hockey, gymnastics, and dance. Children and parents could also write in any activities that were not listed. Logs were returned to school in sealed envelopes via backpacks and collected from the school office by the research team.

In the fall, 570 logs were distributed and 365 were returned (64% return rate). The same return rate was observed in the spring session, with 551 logs distributed and 354 returned. Matched sets of logs from the fall and spring totaled 297 (53% female). The weather temperature during the first data collection week ranged from 46 to 71 degrees, with four days having a high of 62 or above and minimal precipitation. Weather during the second week of data collection in May was seasonably warm with very little precipitation.

Findings
Of the 570 total children in the study, 297 children completed both physical activity logs. On average children reported more than 60 minutes of daily activity (after school and on weekends) based on a seven-day physical activity log report. Children were generally more active on weekends than on weekdays. The median amount of daily minutes reported spent in physical activity was 70. To examine associations of physical activity time with the youth outcome measures included in the study, we established two categories of activity based on the log self-report. The high activity group was designated as those children with reported mean daily minutes equal to or exceeding 60 minutes. The low activity group was designated as those children with reported mean daily minutes less than 60 minutes. We then examined results for each group on the BRIEF, SSRS, SAYO, and AIMSweb.

Regression analysis showed that children in the high activity group were more likely to be rated by parents as improved on their cooperation skills (helping others, sharing materials, and complying with rules and directions) at post-assessment compared to their less active peers. This effect was particularly evident among first-graders. Improvements in the ability to move freely from one situation to another, transition, or solve problems flexibly were greater for more physically active kindergarteners. In general, children with higher activity levels tended to set goals, carry out tasks in a systematic manner, and communicate key concepts more than their less active peers, particularly among girls and first-graders. Differences in performance on the AIMSweb were insignificant between the two activity groups. Findings should be viewed within the context of the study's limitations, which include self-selection into the study and self-report on physical activity logs.

Summary

The research findings highlight the potential benefits to youth who regularly engage in physical activity and exceed the National Institute of Health's goal of 60 minutes of physical activity each day. This study did not account for in-school or before-school physical activity, so many of the children are participating in physical activities even more than reported in the logs. The findings suggest that higher participation in physical activity is associated with improved social, problem-solving, and communication skills.

This Research Brief was prepared by the National Institute on Out-of-School Time (NIOST) at Wellesley College. Funding was provided by the Reebok Foundation. For more information on the research findings contact:

Georgia Hall, Ph.D.
National Institute on Out-of-School Time
Wellesley Centers for Women, Wellesley College
Wellesley, MA
Phone: 781-283-2530
Email: ghall@wellesley.edu
Website: www.niost.org

References
Blair, C., & Razza, R. A. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development, 78,* 647–663.

Centers for Disease Control and Prevention. *How much physical activity do children need?* Retrieved from http://www.cdc.gov/physicalactivity/everyone/guidelines/children.html

Kubesch, S., Walk, L., Spitzer, M., Kammer, T., Lainburg, A., Heim, R., & Hille, K. (2009). A 30-minute physical education program improves students' executive attention. *Mind and Brain Education, 3*(4), 235–242.

McClelland, M., Morrison, F., & Homes, D. (2000). Children at risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly, 15*, 307–329.

NICHD Early Child Care Research Network. (2003). Frequency and intensity of activity of third-grade children in physical education. *Archives of Pediatrics & Adolescent Medicine, 157*, 185–190.

Sattelmair, J. & Ratey, J. (2009, Winter). Physically active play and cognition: An academic matter? *American Journal of Play, 1*(3). Retrieved from http://johnratey.typepad.com/SattelRatey.pdf