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

Research Brief

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Examining the Benefits of Participation in BOKS for K-3rd Grade Children in an Urban School District

Introduction

BOKS (Build Our Kids' Success) is a before-school physical activity program which takes place in schools and was developed with support from the Reebok Foundation. Researchers from the National Institute on Out-of-School Time (NIOST) at the Wellesley Centers for Women at Wellesley College examined the association of program participation with selected academic related youth outcomes and physical activity measures for K-3rd grade children in an urban school district in the Northeast from September 2011 through June 2012.

Background

Research has shown that exercise can improve 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 participation in high levels of vigorous physical activity. Some evidence suggests that physical activity is positively linked to a particular type of learning. Specifically, 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).

Given existing research on the benefits of physical activity on youth physical, psychological, and social outcomes, the BOKS program was created to get kids up and moving in the morning in order to promote improved physical and mental health as well as increased confidence and well-being. BOKS uses a functional-fitness curriculum, which mimics day-to-day movements and play. BOKS trainers present "BOKS Bits" during each session – youth-friendly nutritional talks about making smart food choices and building healthy habits.

Study Methods

The aims of the study were to examine the association of physical activity participation with children's executive functioning, social skills, school readiness abilities, and academic skills (as measured by a standard district academic assessment). Researchers also examined the association between the amount of time youth spent in physical activity and their performance on a 400 meter run. Data for the study were collected through (a) child-level school assessment data, (b) teacher and parent surveys, and (c) program data. This report reflects evaluation and research conducted during the period from September 2011 through June 2012.

Methods

All children (Grades K-5) enrolled in the BOKS programs in nine elementary schools in the district were invited to participate in the study. Flyers explaining the study were sent home from school with children. All families who responded to the study invitation and returned an enrollment form were admitted to the study. Families of children in the 2nd and 3rd grade in a non-BOKS school were also invited to participate as members of a comparison group. All families gave voluntary written informed consent for all study data collection protocols.

Teacher and parent pre-surveys were distributed and collected in November 2011. Follow-up surveys were distributed to teachers and parents in late April 2012. Program level data was collected throughout the year. School district data was collected during the fall 2012. Children's books (two books per teacher) were distributed as a gesture of gratitude in December 2011 to all teachers who completed surveys. Students with incomplete records were excluded from the analysis.

Physical Activity Time

To assess time spent in motion during physical activity, timed observations were conducted in each program every 10 minutes until the stated end time of the program. Program duration was typically 45 minutes. At each ten minute interval, researchers recorded the number of children engaged in a type of activity as expressed on an activity summary sheet. Such examples of activities included: (a) lying down, (b) sitting, (c) standing, (d) walking, (e) active, or (f) very active. Activity was designated "very active" at the observance of sweating and rapid breathing.

Study group children who volunteered and had returned a consent to wear a pedometer were given pedometers at the start of the BOKS session. Pedometers were collected back when children were dismissed to classrooms. Pedometers were then opened by the researcher and step counts recorded in a data log.

Children participated in two administrations of a 400 meter run during both the fall and spring semesters. A running course was developed and measured at each of the program sites by program leaders. At each run administration, a race starter and several program staff were present and equipped with stopwatches. An additional staff member recorded children's running times after completing the run. Researchers collected run times from the program leader at the end of each semester.

Survey Tools

Scales from three assessments 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 Cooperation, Responsibility, Assertion, and Self-control scales from the Social Skills Rating System (SSRS). Finally, scales for behavior, initiative, engagement, and academic performance from the Survey of Afterschool Youth Outcomes (SAYO) were completed by teachers.

School Assessments

Two standard school assessments focused on English Language Arts (ELA) and Math were collected through the public school district research and evaluation office records and examined to compare relative progress of study and comparison group students. The assessments were a district grade level Predictive Assessment executed in September of 2011 and a district End of

Year Assessment executed in June of 2012. The testing vendor scaled the scores to allow for comparison as pre/post assessments.

Sample

In total, 284 students (K-5) enrolled in the study. Slightly more than one-half (55%) of the students were male and 10% were Special Needs students. Fifty-one percent (51%) of the students were Black or Hispanic. Researchers also narrowed the study sample to a smaller 2nd and 3rd grade analysis group since those grades represented the largest grade groups participating in the study. The 2nd and 3rd grade analysis group consisted of 106 students from which 48 participated in the BOKS program.

Findings

Researchers observed and recorded physical activity patterns in all nine elementary schools during two school visits. Data on physical activity patterns were averaged for the two visits which occurred in the fall 2011 and the spring 2012. On average 54% of the children were observed to be "active" or "very active" while only 16% were sedentary or sitting. The percent of youth recorded as "active" or "very active" varied by program, with some sites showing a likelihood of children being "active" or "very active" as high as 72% at any given time in the session .

Pedometer data was collected in December 2011. The overall mean time that children wore their pedometers was 43 minutes. The mean number of steps taken by youth across all programs was 2177 steps. Although there is variation in grade levels, 11,000 steps for girls and 13,000 steps for boys are typical average step counts for elementary-aged youth. Thus, 2000 steps represents about 17% of the elementary youth target daily step goal and a meaningful contribution from the before school time period.

Children participating in BOKS showed significant improvement on the 400 meter run. Mean improvement in the 400 meter run time for students (N=106) participating in the fall BOKS session was 16 seconds. In the spring, students (N=140) completing both the pre- and post-run recorded a mean decrease of 20 seconds in run time. The median decrease for both sessions was 14 seconds.

Based on parent and teacher assessments using the full study sample, both the BOKS group and the non-BOKS group of children did improve skills in each of the tested domains between the pre- and post-assessment. Regression analyses showed that children in the BOKS group did not show any significant improvement in executive function, social, or school readiness skills compared to children in the non-BOKS group. Improvement on school district standardized test scores was also not significantly different between the two groups. However, when analyzed by grade, classroom teachers rated BOKS 3rd graders significantly more engaged than non-BOKS 3rd grade students. Engagement skills were defined according to the following characteristics: (a) staying focused on task, (b) being alert during class time, (c) showing interest in learning new things, and (d) contributing to class discussion.

Within group analysis of the BOKS 3rd graders showed that BOKS students attending more program hours performed significantly better on the district ELA assessment than their BOKS peers with lower attendance.

Summary

The research findings suggest that participation in a before-school physical activity program can make a valuable contribution to the target physical activity level for elementary-aged children. Children participating in the BOKS program were able to significantly decrease their time on the 400 meter run, a general marker of fitness and endurance. Benefits to program participation also appeared in non-physical domains such as school engagement, although this effect was only found among third graders. Findings also suggest that more time spent in the intervention may be associated with comparatively better performance on school ELA achievement measures.

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

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