

Proceedings of the Learning Connection Summit

Nutrition, Physical Activity, and Student Achievement

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There are compelling reasons to address both the health and academic success of American children today. In 2012, the GENYOUth Foundation convened a Nutrition + Physical Activity Learning Connection Summit of scientists, academics, corporate executives, students, and government and non-government leaders to examine the research and develop practical approaches to enhance children's health and their readiness to learn. Although improving children's eating habits and physical activity levels clearly leads to multiple health benefits, the impact of nutrition and physical activity on academic success is less well known, particularly among administrators, educators, and parents. A growing body of evidence from research and school programs suggests that daily breakfast and an active school day can improve students' classroom performance and academic achievement. A bank of potential 30/90-day action steps, generated by the Learning Summit attendees, makes it clear that everyone has an important role to play in improving nutrition and physical activity in schools. *Nutr Today*. 2014;49(1):00-00

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Policy makers and professionals are looking for ways to improve the health and well-being of American children. Educators and school administrators are seeking strategies to enhance classroom learning and academic success in America's schools. The GENYOUth Foundation's mission is to inspire and educate youth and raise funds to improve nutrition and increase physical activity (PA) in schools. In 2012, GENYOUth convened a national summit of scientists, academics, corporate executives, students, and government and nongovernment leaders. As outlined by the event's chair, David Satcher, MD, PhD, 16th US Surgeon General, the Nutrition + Physical Activity Learning Connection Summit was designed to explore the connection between nutrition, PA, and academic achievement from 2 perspectives:

- To examine the growing body of research focused on the association of PA, school-based physical education (PE), school breakfast consumption, and nutrition with learning
- To develop practical approaches to leverage the current science and recommit to work with and through schools to enhance student health and readiness to learn

There are compelling reasons to address both the health and academic success of America's children today. On a daily basis, the overwhelming majority of children in the United States (98%) do not consume adequate daily servings from all food groups, missing nutrient-rich foods essential for growth and development.¹ Nearly 17 million children live in food-insecure homes,² some of whom are uncertain when they will have a meal. Recent surveys suggest that as many as half of school children skip breakfast regularly.^{3,4} There is also growing awareness among policy makers that food insecurity and the high US rates of childhood obesity may be interrelated problems.⁵ According to the Partnership for a Healthier America (a nonpartisan, nonprofit group working with the private sector and third parties to monitor and report on the progress in preventing childhood obesity), there is also a crisis of physical inactivity among our nation's youth. Their September 2012 Policy Snapshot⁶ reports the following: Preschool-aged children often spend less than 5% of their day engaging in moderate to vigorous PA. Only 42% of children aged 6 to

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11 years and 29% of high school students get the recommended 60 minutes of daily PA. A mere 4% of elementary schools, 8% of middle schools, and 2% of high schools provide daily PE.

In a comparison of 30 countries, Harvard University's 2012 *Achievement Growth: International and US State Trends in Student Performance*⁷ reports that the United States ranks 25th in math, 17th in science, and 14th in reading. Millions of dollars have been devoted to reduce these achievement gaps in the United States, including the No Child Left Behind act at the federal level,⁸ as well as many state and local efforts.

Improving children's eating habits and PA levels leads to multiple health benefits. However, their impact on academic success is less well known, particularly among administrators, educators, and parents. Multiple factors influence a child's ability to learn in school, but studies show that lack of a daily breakfast and a sedentary lifestyle may also have an impact on a student's cognition and achievement. The 2004 report *The Learning Connection: The Value of Improving Nutrition and Physical Activity in Our Schools*, spearheaded by then US Surgeon General Dr David Satcher and published by Action for Healthy Kids,⁹ highlighted the link between nutrition, activity, and learning and the cost of unhealthy school environments.

To highlight recent successes and spark ongoing local, state, and federal action, the GENYOUth Foundation, in collaboration with the National Dairy Council (NDC), American College of Sports Medicine, American School Health Association, and the National Football League, convened the Nutrition + Physical Activity Learning Connection Summit in Arlington, Virginia, on September 18 to 19, 2012. This event combined scientific research, innovative approaches and products, and diverse voices to unlock solutions for the health and academic challenges faced by America's schools. The milestone event was unique on several fronts:

- Most importantly, the Summit was not just *about* youth; young people were also involved in every conversation and activity. Fuel Up to Play 60 (FUTP60) Youth Ambassadors, students in grades 6 through 9, were involved in convening the Summit. They made presentations, participated in panels, and brainstormed solutions while sitting with adult leaders.
- The adult stakeholders and speakers were diverse, representing iconic American corporations; health, fitness, and education associations; professional athletic teams; celebrity chefs; premier academic institutions; and US government agencies and organizations, including the Departments of Education and Agriculture, the President's Council on Fitness, Sports and Nutrition, and Let's Move.
- The event was designed to encourage all attendees to "walk the talk" of healthy lifestyles. Activity breaks, with music and professional athletes as leaders, showcased the energizing effects of fun fitness, whereas the delicious meals highlighted the fact that nutrient-rich foods can be both healthful and great tasting.

As chair and former US Surgeon General, Dr David Satcher brought to the podium his decades-long commitment to

health among children, schools, and communities. His visionary leadership with Action for Healthy Kids in connecting nutrition, PA, and academic achievement set the stage for the Summit. The messages about the relationship between health and education also received strong support, with addresses by national leaders, including US Department of Agriculture (USDA) Deputy Under Secretary for Food, Nutrition, and Consumer Services, Dr Janey Thornton; The White House Senior Policy Advisor for Healthy Food Initiatives, Sam Kass; and US Secretary of Education, Arne Duncan. In videotaped remarks, Secretary Duncan emphasized several key points about the need for increased PA.¹⁰

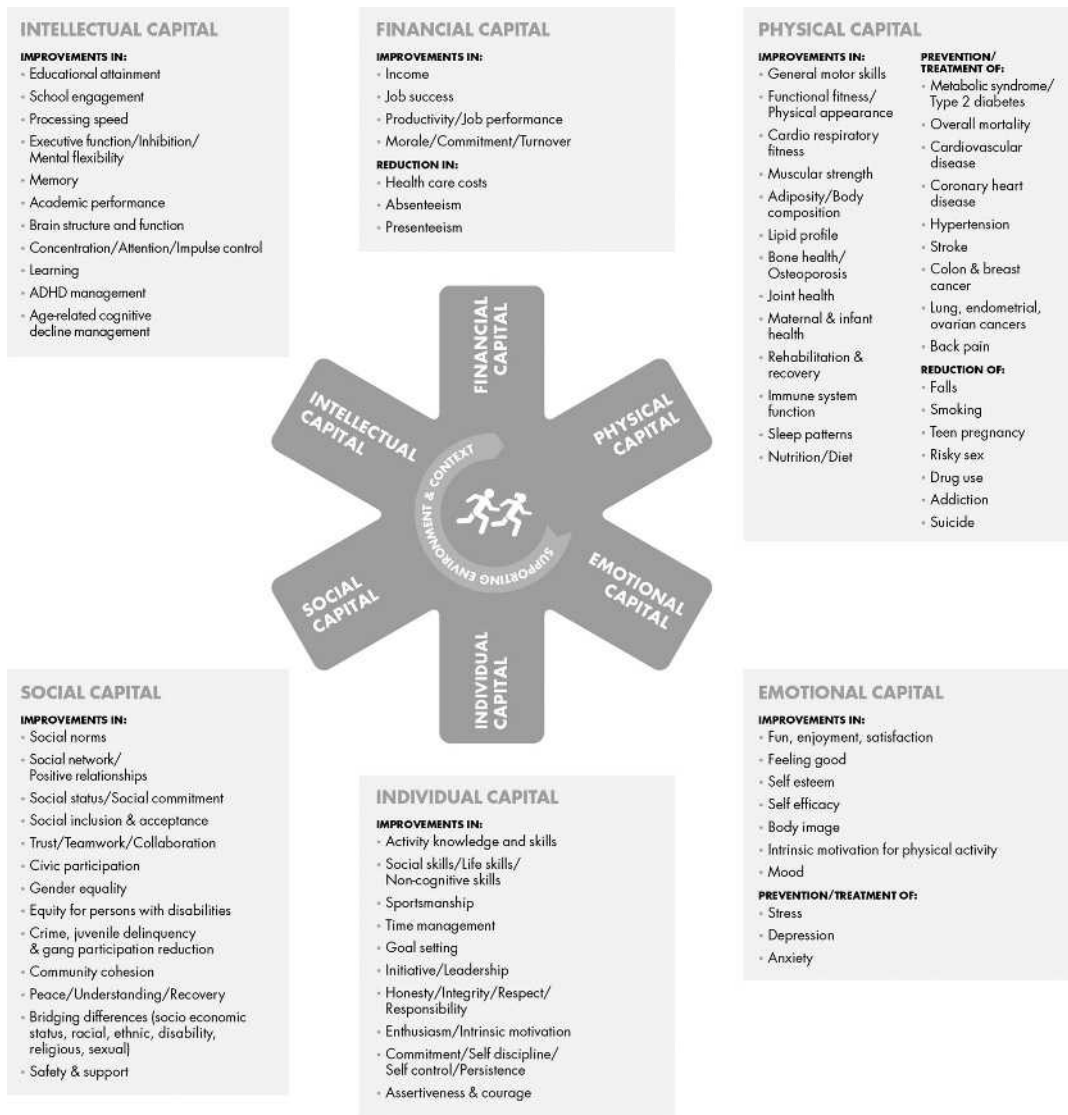
- Schools can both provide PE and inspire the love of activity in young people.
- There is a growing body of research that suggests that there is a link between activity and attendance rates, self-esteem, focus, and classroom learning.
- Increasing PA in schools will necessitate lasting partnerships between corporations, nonprofit organizations, states, and the private sector,

RESEARCH FOUNDATION: PA, NUTRITION, AND THE LEARNING CONNECTION

Robert Murray, MD, from The Ohio State University, moderated a panel of scientists discussing how food insecurity, hunger, poor dietary choices, and lack of PA may affect health parameters, brain function, and classroom performance.

PA, ADIPOSITY, AND COGNITION

Charles H. Hillman, PhD, Department of Kinesiology and Community Health, University of Illinois at Urbana-Champaign, began the scientific presentations with a discussion of the holistic benefits of PA, in particular its contribution toward intellectual, social, and personal capital, which were derived from Nike's Human Capital Model¹¹ (Figure 1). **[F]** Using multiple brain imaging measures, Hillman described research with 9- to 10-year-old children enrolled in the Fitness Improves Thinking Kids Randomized Controlled Trial.¹² Dr Hillman showed how PA enhanced areas of cognitive control, including inhibition, memory, and cognitive flexibility. The findings indicate that aerobic fitness relates to the structure and function of the preadolescent brain.¹³ He further discussed how fitness and single, acute exercise episodes enhance language processing and academic achievement of reading, spelling, and arithmetic scores on standardized tests in preadolescent children.¹⁴ According to Hillman, there is a complex relationship between adiposity and brain structure and function. Although emerging evidence suggests that adiposity may influence brain function, studies linking obesity and poor academic achievement indicate that obesity may be a marker but not necessarily a causal factor. In summary, Dr Hillman noted



Nike, Inc. initiated a multidisciplinary input and validation process with a pool of experts to develop this model, which is informed by more than 500 pieces of published research. The scholarly foundation for this work is further elucidated in "Physical Activity: An Underestimated Investment in Human Capital?" by Bailey, Hillman, Arnt and Petras (forthcoming, 2013). © 2012 by Nike, Inc. All rights reserved.

AQ6
AQ7 **FIGURE 1.** Benefits.

that research shows a positive association between fitness and key aspects of learning and that time spent in PA does not detract from academic achievement. Early intervention may therefore be critical for lifelong health and effective brain function and cognition.

PA AND ACADEMIC ACHIEVEMENT

Joseph E. Donnelly, EDD, FACSM, director, Energy Balance Laboratory and Center for Physical Activity and Weight Management, University of Kansas Medical Center and University of Kansas-Lawrence, further addressed the connection between activity levels and performance with evidence

from in-school programs. Acknowledging that students are normally sedentary during school, he discussed the goals and results of the Physical Activity Across the Curriculum (PAAC),¹⁵ a 3-year randomized controlled trial of PA and academic achievement for elementary school students. In contrast to many activity programs, PAAC is a classroom-based approach to reducing sedentary time while maintaining the focus on academics. Instruction is delivered through movement, with no decrease in teaching time. Importantly for schools, the framework for PAAC includes no additional teacher preparation time or expense and easy sustainability and offers opportunity for fun for teachers and students alike. Based on the following results, PAAC

supports the link between PA, cognitive function, and academic achievement¹⁶:

- Moderate-intensity PA lessons improved performance on standardized academic achievement tests by 6% compared with a decrease of 1% for controls.
- After the 3-year program, there were smaller changes in body mass index (BMI) from baseline in students with greater than 75 minutes of PAAC lessons per week (BMI, 1.8 kg/m²) compared with those with less than 75 minutes of PAAC per week (BMI, 2.4 kg/m²).
- Donnelly noted that the impact of physically active academic lessons of greater intensity might provide larger benefits for both academic achievement and BMI.

Dr Donnelly also summarized the overall evidence for increased activity before, during, and after the school day, as well as effective strategies to implement such increases. He described a Centers for Disease Control and Prevention review of 50 unique studies¹⁷ that found a positive relationship or no relationship (ie, did not detract from academic achievement) between time in PE/PA and academic achievement and indicators of cognitive function. He also documented positive relationships between classroom PA and several indicators of academic achievement, classroom behavior, and cognitive function. According to Donnelly, school day activity can effectively be increased in multiple ways:

- Increase active time in PE and during recess
- Provide access to PA before and after school
- Promote active transportation through Safe Routes to School¹⁸
- Provide physically active classroom lessons such as those in the PAAC trial

BREAKFAST, FOOD INSECURITY, AND ACADEMIC PERFORMANCE

From his perspective as both a researcher and practicing pediatrician, Ronald Kleinman, MD, MassGeneral Hospital for Children and Harvard Medical School, addressed the value of breakfast for school success, especially for children living in food-insecure households. Dr Kleinman reviewed the biological plausibility, theory, and evidence for a connection between breakfast consumption and improved cognition. Recent reviews of school breakfast programs in both the United States¹⁹ and developing countries²⁰ confirm the benefits of breakfast for classroom performance, as well as attendance and behavior, particularly for low-income and food-insecure youth.

Dr Kleinman also presented the positive results of his research on a Universal Breakfast Program in Boston.²¹ In this 2002 study, more than two-thirds of the 97 participants who were hungry or at risk

- Increased their participation in breakfast at school;
- Improved their overall nutrient intake;
- Improved their math grades;

- Had fewer school absences and lower rates of tardiness; and
- Decreased emotional/behavioral problems.

While supporting the ever-present need for more research, Kleinman reinforced what we already know about cost-effective ways to improve school performance through nutrition. Cognition is affected by nutritional status throughout childhood and adolescence. Factors including behavior, health, and socioeconomic status interact with nutritional status to determine a child's ability to learn and function. School feeding programs mitigate the effects of adverse external environmental factors, such as low socioeconomic status; support improved intake of nutrient-rich foods; are associated with improved learning and behaviors in school; and encourage a healthy lifestyle. Finally, breakfast, especially when consumed at school for food-insecure children, can have a positive impact on health, grades, school attendance, and behavior issues (Figure 2).

F2

RECIPE FOR BREAKFAST SUCCESS: WHAT STUDENTS, FAMILIES, AND STUDENTS CAN DO

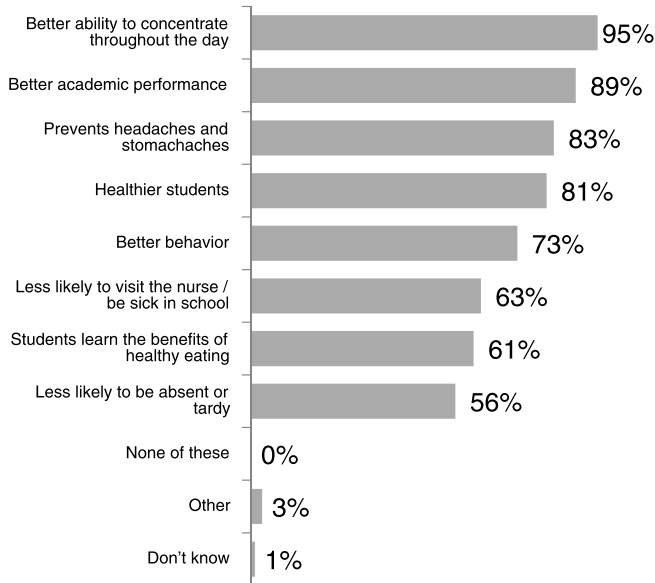
At the Learning Connection Summit, Dr Kleinman's review of the published research provided the foundation for a dynamic session on what makes breakfast work for kids, families, and schools. The ingredients for the session were celebrity chef Carla Hall, cohost of *The Chew*; Sandra Ford, president of the School Nutrition Association; and 8 student sous chefs. Their combined creativity provided a "cook-book" of suggestions for breakfast success at home and school.

There are many reasons why kids skip breakfast on school mornings: They like to sleep as late as possible, rushed home schedules, late school arrival, they would rather visit with friends, or they just are not hungry first thing in the morning. In addition, in food-insecure homes, there may be no food available for a morning meal. For many children, school is the best place to kick-start their day with a nutrient-rich breakfast. Eight students from schools across the United States offered insights on breakfast meals that merit a kid seal of approval. Smart breakfast ideas from the student panel included French toast sticks and/or pancakes dipped in or topped with apple sauce, cereal and milk, breakfast pizzas with veggies and cheese, breakfast sandwiches, breakfast burritos, and yogurt parfaits.

School Nutrition Association President Sandra Ford, director of Food and Nutrition for Manatee County School District in Florida, noted that student acceptability is a major factor in deciding what foods to offer in school meals. Active student involvement is an important way to both increase participation and reduce waste in cafeterias. Many schools involve students in taste tests and contests to encourage their intake of nutrient-rich items. "Transform School Nutrition" is the theme of Ford's year as School Nutrition



Teachers See Benefits Of Breakfast



- A large majority of teachers believe that there are numerous benefits of eating breakfast.
- Nine in ten teachers point to the ability to concentrate and better academic performance as advantages
- Health is also a major factor; eight in ten say breakfast prevents head and stomachaches and leads to healthier students.

NO KID HUNGRY

2012 No Kid Hungry "Hunger In the Classroom" report conducted by Apco Insight - NoKidHungry.org/teachers

FIGURE 2. Share Our Strength 2012 Teacher Survey.

Association president, and she discussed that like transformer toys, improvements in school breakfast and lunch are happening 1 twist and turn at a time. For example, schools are adding more whole grain cereals and fruit smoothies to their breakfast options. Across the country, health-conscious students are a key part of the implementation of USDA's 2012 Nutrition Standards in the School Lunch and Breakfast Programs.²²

REAL-WORLD SUCCESSES: WHAT SCHOOLS AND COMMUNITIES ARE DOING

Schools face very real obstacles to improving nutrition and PA. Some are as simple as space, where cafeterias serve as places for children to eat, engage in PE classes, and attend assemblies. Many are much more complex, such as school funding and lack of coordination with community resources. Others are fundamental, such as competing priorities for classroom time as well as teacher training and development. The Learning Connection Summit focused on real-world success stories that put theory into action in local classrooms, cafeterias, and playgrounds as told by school wellness champions from across the country. Panelists included Stephen Conley, PhD, executive director,

American School Health Association; Shellie Pfohl, MS, executive director, President's Council on Fitness, Sports, and Nutrition; and the First Ladies of Nebraska and Oregon, as well as district superintendents and school board members. Jean Ragalie, RD, president of NDC, introduced a panel of local school champions with a description of the FUTP60 Program.²³ This program was developed in partnership between NDC and the National Football League and now engages more than 11 million students in 73 000 schools. A recent survey of adults involved in those schools indicated that 70% believe that the program is helping youth make healthier food choices and 62% say that it is helping increase the amount of time students are physically active at school.²⁴ According to the Learning Connection Summit leaders, the principles for game-changing improvements in nutrition and PA at school include the following:

- Everyone has a role to play in creating healthier school environments.
- Youth empowerment and leadership are essential for maximum impact.
- Adult school champions complement and accelerate student work.
- Incentives and rewards, even small ones, are important.
- Best practices come in many forms, and flexibility is the key to success.

These principles were brought to life by student leaders and teachers sharing their stories from the frontlines of innovative school-based approaches to nutrition and PA. Here are 3 inspiring examples.

Kaylene, a high school freshman from western Colorado, epitomized the poise and passion of a student leader. While attending middle school, Kaylene was president of the FUTP60 club and helped start a walking club, Feet to Street, for students during recess. Through FUTP60 grants, she helped add a healthy sandwich station in the middle school cafeteria and implement a breakfast-in-the-classroom program. Kaylene involved her entire school (>600 students) in a free smoothie taste test. Subsequently, root beer floats were replaced with fruit and yogurt smoothies on Fridays. She is currently creating a map for students to track distances walked to and from school each day, as well as how many steps it takes them to travel between classes. Kaylene walks the fitness talk by participating in basketball, cross-country, track, and volleyball. She also is the president of the student council and a member of Kiwanis Builders and National Academic League.

Tyler, a 10th grader at a Michigan high school, is also a FUTP60 Student Ambassador Alumnus. While in middle school, Tyler implemented a grab-n-go breakfast program, which involved packing breakfasts for all 1200 middle school students and delivering the meals during their first-hour class. He also set up a smoothie bar in the cafeteria. Tyler helped start an activity called TEXT (Talking and Exercising to Tunes), which features quick activity breaks throughout the school day—with 100% participation by more than 1000 students. He helped encourage the food service personnel to post nutritional information for all foods offered in the cafeteria and successfully obtained grant funds to support an innovative “black light sports night” tournament. Tyler truly inspired the attendees with his can-do attitude to keep making schools healthier places. Empowering student leaders—essential for improving nutrition and PA in schools—requires supportive adult champions like Joseph McCarthy, PE teacher at Meadowview Elementary in Farmington, Minnesota. McCarthy has created a culture of fitness by introducing a series of innovative programs that get all kids active while having fun. These supplementary activity programs include Jammin’ Minutes (daily activity coordinated by a group of fifth-grade student leaders in every classroom), a Running Club (open to students in grades 1-5 during recess), and the Century Club (rewarding students for reaching personal goals of walking/running 100 miles). As president of the Physical Education Council for Minnesota Alliance for Health, Physical Education, Recreation and Dance and member of the state board of PE, he has lobbied for PE to become a core subject and supports the link between PE/PA and academic achievement. McCarthy recently received a grant from the Active Schools Acceleration Pro-

ject²⁵ to further advance health and wellness programming at Meadowview Elementary.

The launch of “Let’s Move!” the First Lady’s initiative to raise a healthier generation, has clearly served as a catalyst to improving nutrition and PA in schools. Summit attendees learned about several programs and organizations that provide grants, incentives, and materials to support healthier school environments, including the following:

- USDA’s HealthierUS School Challenge,²⁶ established in 2004, is a voluntary certification to recognize those schools participating in the National School Lunch Program that have created healthier school environments through promotion of nutrition and PA. As of April 22, 2013, 6079 schools—representing all 50 states—have received awards and monetary incentives.
- Chefs Move to Schools,²⁷ founded in May 2010, is an integral part of the Let’s Move! initiative.²⁸ The project is a platform for chefs and schools to create partnerships in their communities with the mission of collaboratively educating kids about food and healthy eating.
- The Presidential Youth Fitness Program,²⁹ revamped in September 2012, is an initiative of the President’s Council on Fitness, Sports, and Nutrition³⁰ that focuses on assessment, development, and motivation to empower students to adopt and maintain an active lifestyle. It signals a move from measuring performance to assessing health, using the research-based FITNESSGRAM developed by The Cooper Institute to provide physical educators with a tool to communicate fitness testing results to students and to parents.
- Partnership for a Healthier America Design Filters for Physical Activity Programming,³¹ released in September 2012 in partnership with Let’s Move!, serves as guidelines for addressing our crisis of inactivity. The recommendations, developed by global experts, offer a framework for creating PA programs that provide active and positive experiences for many children. In his Summit remarks, Senior Policy Advisor for Healthy Food Initiatives, Sam Kass, reinforced the strategies as proven ways to break the cycle of inactivity. The best youth PA programs should be designed to:
 - Strive for universal access
 - Include a range of age-appropriate activities
 - Aim to reach the recommended guidelines on dosage and duration
 - Be engaging and fun for kids
 - Be led by well-trained coaches and mentors
 - Track progress both individually and for the group
 - Provide consistent motivation and incentives

ROADMAPS FOR LOCAL SCHOOL AND COMMUNITY ACTION: WHAT WE CAN DO

After learning from the researchers and being inspired by the success stories, GENYOUth Foundation Chief Executive Officer Alexis Glick challenged the Learning Connection Summit participants to develop a personal roadmap for taking effective action in their own schools and communities. An interactive session—Moving the Agenda Forward: What’s Your “30/90”?—invited everyone to become part of the solution. 30/90 is a way of looking at immediate solutions to nutrition, PA, and wellness challenges in the short- and medium-term. It is about developing a specific

A **Actions to Improve Nutrition and Physical Activity at School**

Audience	Action
Students	Recruit other students to sign up for Fuel Up to Play 60 – or other health and wellness programming at school.
Parents	Write a letter to local school administrators describing learning connection science and recommending that breakfast be served to students and that increased time be allowed for recess and physical education.
Educators	Become a Fuel Up to Play 60 program advisor and apply for grants to support student-led initiatives.
Physical Education Teachers	Design and share classroom energizers that student leaders and other teachers can integrate into daily lesson plans.
School Nutrition Professionals	Invite students and parents to taste test new healthier products and recipes for school breakfast and lunch programs.
School Administrators	Commit to collecting data on the impact of increasing nutrition and physical activity opportunities on academic achievement.
Health & Wellness Professionals	Convene local Learning Connection Summits, bringing together school district staff and health stakeholders to enhance nutrition and activity environments.
Public Officials	Support legislation and policies that integrate learning connection science into school days, like making breakfast in the classroom count as instructional time.

B

Improving Nutrition & Physical Activity



A bank of potential 30/90-day actions, generated by the Learning Summit attendees, makes it clear that everyone has an important role to play in improving nutrition and physical activity in schools. Several examples are listed below and a complete list is available on the GENYOUth Foundation website (<http://www.genyouthfoundation.org/idea-banks>).¹ These measures can inspire those in schools and the community to create a culture of wellness so that young people have positive nutrition and fitness models.

Potential 30/90 Day Actions



Students

Recruit other students to sign up for Fuel Up to Play 60 – or other health and wellness programming at school.

Parents

Write a letter to local school administrators describing learning connection science and recommending that breakfast be served to students and that increased time be allowed for recess and physical education.

Educators

Become a Fuel Up to Play 60 program advisor and apply for grants to support student-led initiatives.

Physical Education Teachers

Design and share classroom energizers that student leaders and other teachers can integrate into daily lesson plans.

School Nutrition Professionals

Invite students and parents to taste test new healthier products and recipes for school breakfast and lunch programs.

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Commit to collecting data on the impact of increasing nutrition and physical activity opportunities on academic achievement.

Health & Wellness Professionals

Convene local Learning Connection Summits, bringing together school district staff and health stakeholders to enhance nutrition and activity environments.

Public Officials

Support legislation and policies that integrate learning connection science into school days, like making breakfast in the classroom count as instructional time.

¹ GENYOUth 30/90 Idea Bank. <http://www.genyouthfoundation.org/idea-banks>. Accessed January 30, 2013.

course of action that will have an impact in 30 days and a more pronounced impact in 90 days. Participants brainstormed ideas in small groups (as states and other locales), shared ideas with the larger group, and made written commitments to personal action plans.

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SUMMARY

The Learning Connection Summit established that healthy behaviors and academic achievement are mutually reinforcing and demonstrated that many programs are available to help create healthier school environments, with grants, incentives, and resource materials. In closing the Summit, Dr Satcher emphasized that when schools work with students to address nutrition and PA needs along with academic requirements, they improve health and readiness to learn. They also contribute immeasurably to the long-term success of all of our children and our country as well (Figure 4).

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While acknowledging the harsh realities of school funding and resource disparities among communities, Dr Satcher inspired attendees to imagine a school environment in which every child has access to proper nutrition and regular PA. He invited everyone to return to their states and school districts focused on the positive benefits for student health, well-being, and classroom performance. He emphasized the need for diverse groups to work together toward solutions. Having “led the charge” on the Learning Connection for nearly a decade, Dr Satcher acknowledged his gratitude for the new faces and partners at the table, especially the sometimes underrepresented business and industry partners and, most crucially, the student leaders themselves.

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