Evidence Based Strategies to Promote Physical Activity & Nutrition in Children

Joseph E. Donnelly
Professor & Director
Energy Balance Laboratory
Center for Physical Activity, Nutrition, & Weight Management
Girth Of a Nation

Here's some news that's hard to swallow:
Despite the health craze, Americans are fatter than ever
The Shape of Things to Come
(NOW)

The Economist, December, 2003
Prevalence of Obesity* Among U.S. Children and Adolescents
(Aged 2 –19)
National Health and Nutrition Examination Surveys

Survey Period

Percent

NHANES 1971-1974
NHANES 1976-1980
NHANES 1988-1994
NHANES 2003-2006

Age 2-5 years
Age 6-11 years
Age 12-19 years

* Sex-and age-specific BMI > 95th percentile based on the CDC growth charts
Distribution of the Metabolic Syndrome & Its Related Components

Data From PAAC
DK61489
Distribution of the Metabolic Syndrome & Its Related Components By BMI Levels

Data from PAAC
DK61489
TOXIC ENVIRONMENT

- An environment that promotes sedentary behavior
- Few opportunities for physical activity during the course of daily living
- Almost no NEED to be physically active to survive
- Abundance of high density foods
- Little NEED to expend energy for foods
Burritos As Big As Your Head!
The Morning Commute: Then

300 Calories Per Hour
The Morning Commute: Now

< 25 Calories Per Hour
Components of Community Based Strategies for Children

• Identify where children spend their time to allow for repeated exposure
  ➢ School, child care, community programs, home

• Use existing resources that are perpetuated
  ➢ Trained personnel
  ➢ Existing facilities

• Low cost/no cost
Elementary Schools

• Schools are sedentary and therefore have many avenues to increase PA
• 56 million students are enrolled in grades K-12
• Habits and attitudes are formed early making elementary school a desirable target for interventions
Schools Promote Sedentary Behavior and Contribute to the Obesity Epidemic

• A child will spend 6 hours in academic instruction per day, and between 30 and 120 minutes in transportation to and from school

• The typical learning environment is desk based instruction

• The social norm for learning is “sit down and be quiet”
Car Loading = ↓ Active Commuting
Schools Can be Part of The Solution

• Over 95% of children attend school
• The school day is $6^+$ hours
• Multiple opportunities exist to increase physical activity
  ➢ Walking school bus
  ➢ Physical education- time-on-task
  ➢ Before/after/recess
  ➢ Classroom
Physical Activity Across the Curriculum

DK61489  Donnelly et.al., Preventive Med. 2009, 49 (4): 336-341
PAAC Design

- 3 year, cluster randomized, controlled trial
- 24 elementary schools
- Grades 2-3 progressed to grades 4-5
- Primary outcome BMI
- Secondary outcomes
  - Shift BMI%
  - Daily PA
  - Academic achievement
  - Metabolic Syndrome (BP, HDL, TG, CO, GLU)
PAAC Concept

- Minimal intervention, low cost
- Uses existing infrastructure, facilities, personnel, and resources
- Uses existing academic lessons
- Can be completed in multiple settings
- Fun
Effects of \( \geq 75 \) min PAAC/wk on Change in BMI

\[ R^2 = 0.4159 \]
Academic Achievement

The graph shows the change in academic scores for different subjects between PAAC and control groups. The scores are as follows:

- **Composite**: PAAC shows a slight increase, while control shows a slight decrease.
- **Reading**: PAAC shows a slight increase, while control shows a slight decrease.
- **Math**: PAAC shows a significant increase, while control shows a modest increase.
- **Spelling**: PAAC shows a significant increase, while control shows a slight decrease.
Mean Accelerometer Counts/min

- **4-D Ave**: CON 750, PAAC 850
- **Weekend**: CON 700, PAAC 900
- **School**: CON 650, PAAC 750
- **Min MVPA**: CON 100, PAAC 50

Legend:
- CON
- PAAC
Percentage of Teachers Reporting Usage of PAAC 9 Months Post-Intervention

- ≥ 1d/wk
- 2-4d/wk
- most/every day
- not using

Percent Teachers

Percent Teachers
Promotion of Physical Activity and Healthy Snacks at YMCA After School Programs

NIHDK63458
Local Collaboration

• Over 85 YMCA after school programs in the greater Kansas City area (> 300,000 children nationwide)

• After school programs located in the same schools attended by children
  ➢ Reduces parental concerns about safety
  ➢ Eliminates need for transportation
Conceptual Framework

• Use a minimal intervention model that may be replicated

• Add several short bouts (10 to 15 minutes) of moderate intensity PA during play time
  ➢ Existing YMCA staff trained to provide age appropriate activities

• Provide healthy snacks
  ➢ New snack options taste-tested by children
Snack Modification

• Reduce the number of calories per snack serving
• Implement portion control
• Increase the number of fruits and vegetables offered
• Change the type of snacks served
# Snack Analysis (pilot)

<table>
<thead>
<tr>
<th>Intervention Schools</th>
<th>Calories</th>
<th>Fat (g)</th>
<th>% Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>255</td>
<td>6.44g</td>
<td>22.5%</td>
</tr>
<tr>
<td>Control 1</td>
<td>396</td>
<td>15.9g</td>
<td>34.7%</td>
</tr>
<tr>
<td>Control 2</td>
<td>447</td>
<td>17.1g</td>
<td>33.7%</td>
</tr>
</tbody>
</table>
Cost Analysis (pilot)

<table>
<thead>
<tr>
<th></th>
<th>Per Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention Schools</td>
<td>38¢</td>
</tr>
<tr>
<td>Control Schools</td>
<td>42¢</td>
</tr>
</tbody>
</table>
# SOFIT Scores (pilot)

<table>
<thead>
<tr>
<th>School</th>
<th>Mean Activity All Students</th>
<th>Mean Activity Boys</th>
<th>Mean Activity Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention Overall Mean</td>
<td>3.9*</td>
<td>3.9</td>
<td>3.9</td>
</tr>
<tr>
<td>Control Overall Mean</td>
<td>3.3</td>
<td>3.4</td>
<td>3.2</td>
</tr>
</tbody>
</table>

1 = Lying down, 2 = Sitting, 3 = Standing, 4 = Walking, 5 = Jogging/Running

\*p < .01
Take Home Message

• PA may be accumulated in a variety of activities; not just PE or sports
• PA is not reserved for a special place (e.g., gym)
• There is no need for special clothes or to learn special skills to be physically active
• Snacks are easily modified to provide lower fat content, fewer calories, and higher nutrient and fiber content
Center for Physical Activity, Nutrition & Weight Management- KU/CMH Partnership
Center for Physical Activity, Nutrition, & Weight Management
Mission

• Conduct original research to promote physical activity and nutrition and to reduce obesity and its co-morbid diseases.

• Translate research into evidence based programs for the promotion of physical activity and nutrition and for the reduction of obesity and its co-morbid diseases (be wary of imposters).

• Provide education and training programs for health agencies and community advocates.
Children’s Mercy Hospital
Promoting Health in Teens and Kids (PHIT Kids) Weight Management Program

Sarah Hampl, MD  (shampl@cmh.edu)  Meredith Dreyer, PhD  (mldreyer@cmh.edu)
• Children/teens are identified through PHIT Kids clinic at CMH
  
  ➢ Evening group consists of 24 weekly 2 hour visits
    PA, education, nutrition
  
  ➢ Participants are followed monthly thereafter for a total of 24 months

• 86 participants have completed the 24-week program; statistically significant results are:
  
  ➢ Decline in BMI percentile
  ➢ Decline in triglycerides, improvement in HDL
  ➢ Decline in consumption of sugar-sweetened drinks
  ➢ Increase in physical activity, family meals
  ➢ Improvement in weight-related quality of life
Healthy Hawks

- Free of charge
- Children 2-18 with BMI > 85th %
- At KUMC, every Mon 5-7pm
  - 5-6pm
    - Parents Group (English or Spanish)
    - Teen, Middle School, Elementary, Tots Groups
  - 6-7pm
    - Family Exercise at Kirmayer Fitness Center
- 12 weeks active intervention
- To enroll: 913-588-2452
Healthy Schools Project

• Free of charge
• “Rural” Healthy Hawks
  – 8 months (throughout school year)
  – Telemedicine and Phone contact
  – Nutrition, Behavioral and Exercise Topics
  – At School
  – Parents and Children
  – Rural focus
• Supported by NIH/NIDDK
• Still need 4 more schools!
• Contact adavis6@kumc.edu
Weight Control Research Project (WCRP)

Ongoing clinical research project (1986)

- Treated over 3,000 adults
- Provides evidence based behavioral strategies
- Targets long-term weight management
- Targets new delivery systems (i.e. phone conference call)
- Supports NIH and industry projects

Donnelly et. al., 2007, IJO, 31(8), 1270-6
The Center for Physical Activity and Weight Management

The Center's major feature is the Energy Balance Laboratory and contains state-of-the-art instrumentation to measure energy intake and energy expenditure. Funded by the National Institutes of Health, we investigate exercise, nutrition, prevention of obesity, and weight loss in both adults and children.

Annual Obesity Conference


Current Research Projects

LONG TERM EXERCISE

This study is designed to compare the effects of two levels of exercise training on weight loss. There will also be a control group that will not perform exercise training during the study but will be paid. The exercise training will take about 1 hour to complete. You will perform the training 6 days per week for 10 months in a private exercise room equipped with state-of-the-art equipment (treadmills, elliptical trainers, recumbent bike) and entertainment (individual TVs with cable, radio, DVD player). The project lasts 10 months, and you will be required to stay in the Lawrence area and train 5 days/week over the summer. The majority of exercise training will be walking or jogging (your choice) on a treadmill. MORE

Order Products  Contact Us  BMI Calculator  Site Map  Coordinator Login

www.ebl.ku.edu
Where to Find Evidence-Based Programs

- Professional organizations (i.e. ACSM, ADA, AMA, etc.)
- State agencies (i.e., Kansas Department of Health & Environment, Coordinated School Health, etc.
- “The literature” has both original investigations and review papers
- CDC, USDA, NIH

➤ Note- recent NIH HHLBI-10-15 “Studying Community Programs to Reduce Childhood Obesity”
"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"
Three more, two more, one more, Okay!... Five-million leglifts right leg first!... Ready, set!...

Aerobics in hell