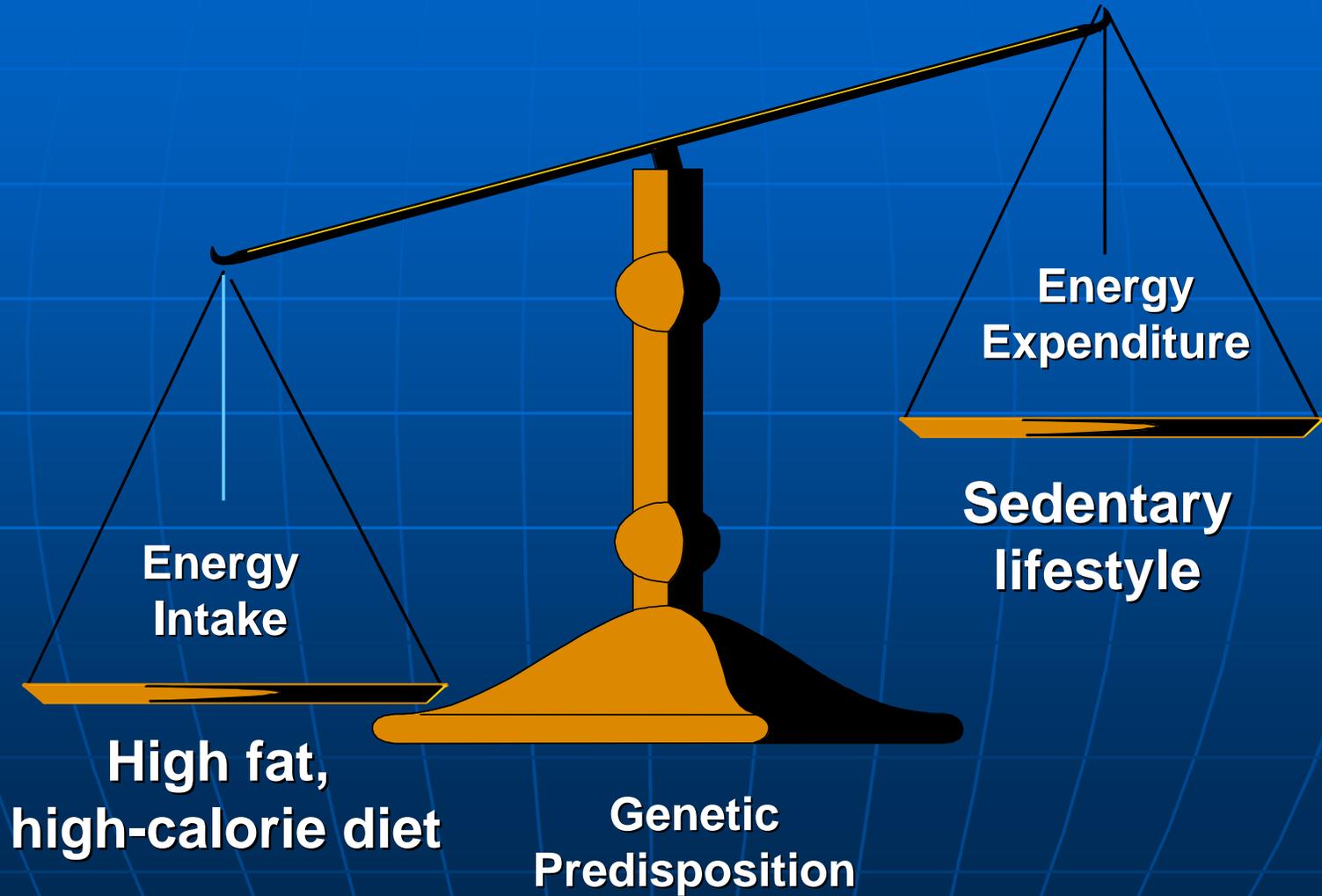




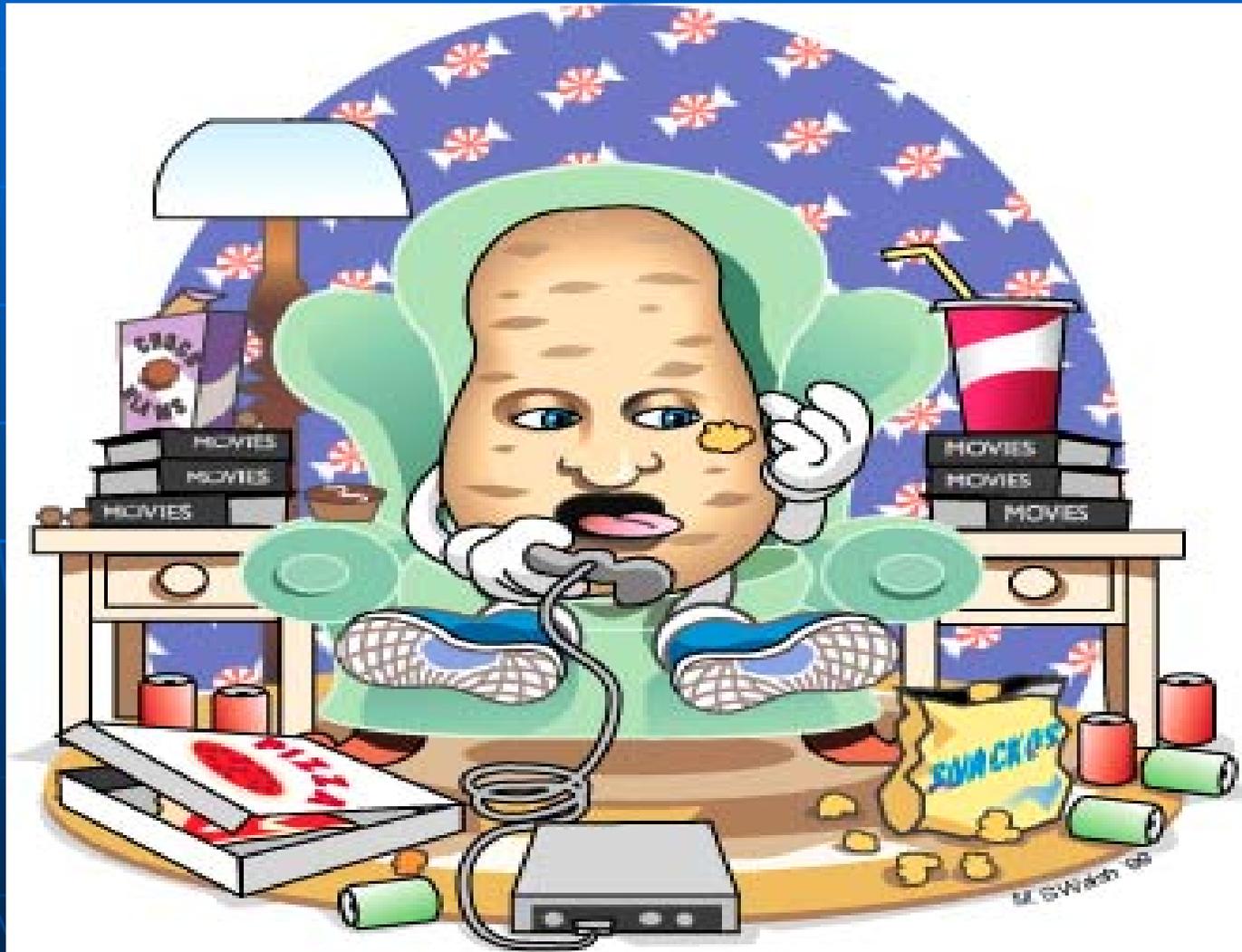
Physical Activity & Nutrition: Interventions to Diminish Childhood Obesity

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for Physical Activity & Weight
Management, The University of Kansas

Energy Balance



Factors Associated with Obesity



TOXIC ENVIRONMENT

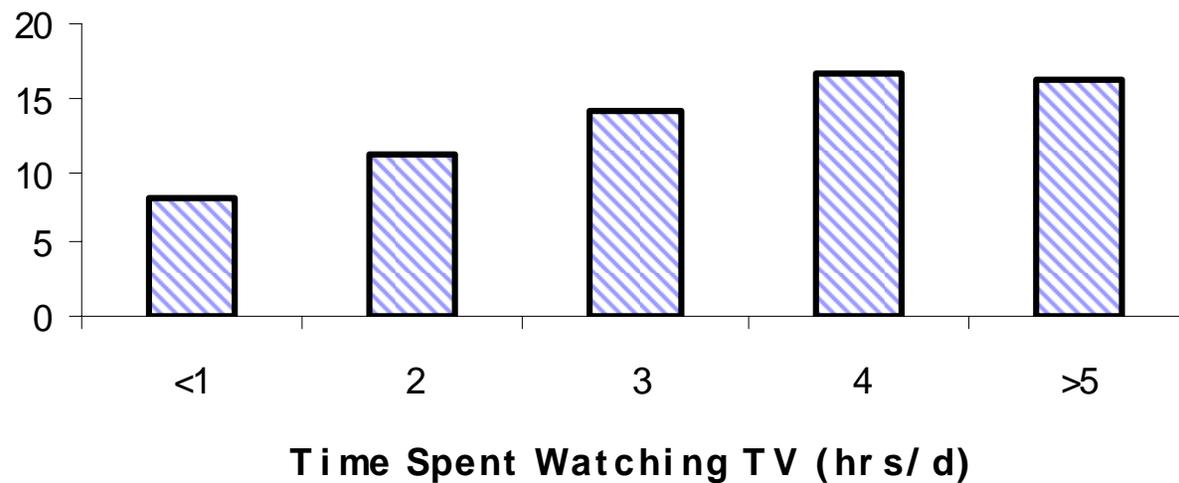
- An environment that promotes sedentary behavior
- Few opportunities for physical activity during the course of daily living
- Almost no need to be physically active to survive
- Abundance of high density foods
- Little need to expend energy to obtain food

Physical Activity

- The **NEED** for physical activity has diminished
- Children (individuals) must *choose* to be active or be “forced” to be active by their environment either through necessity or by making the sedentary choice undesirable

Sedentary Behavior and Obesity

Prevalence (%) of obesity by daily hours of television watched among US children 8 to 16 years, from 1988-1994. (Adapted from Crespo et al March 2001)



The Morning Commute: Then



**300 Calories Per
Hour**

The Morning Commute: Now



**< 25 Calories Per
Hour**





Burritos AS Big
AS your Head!



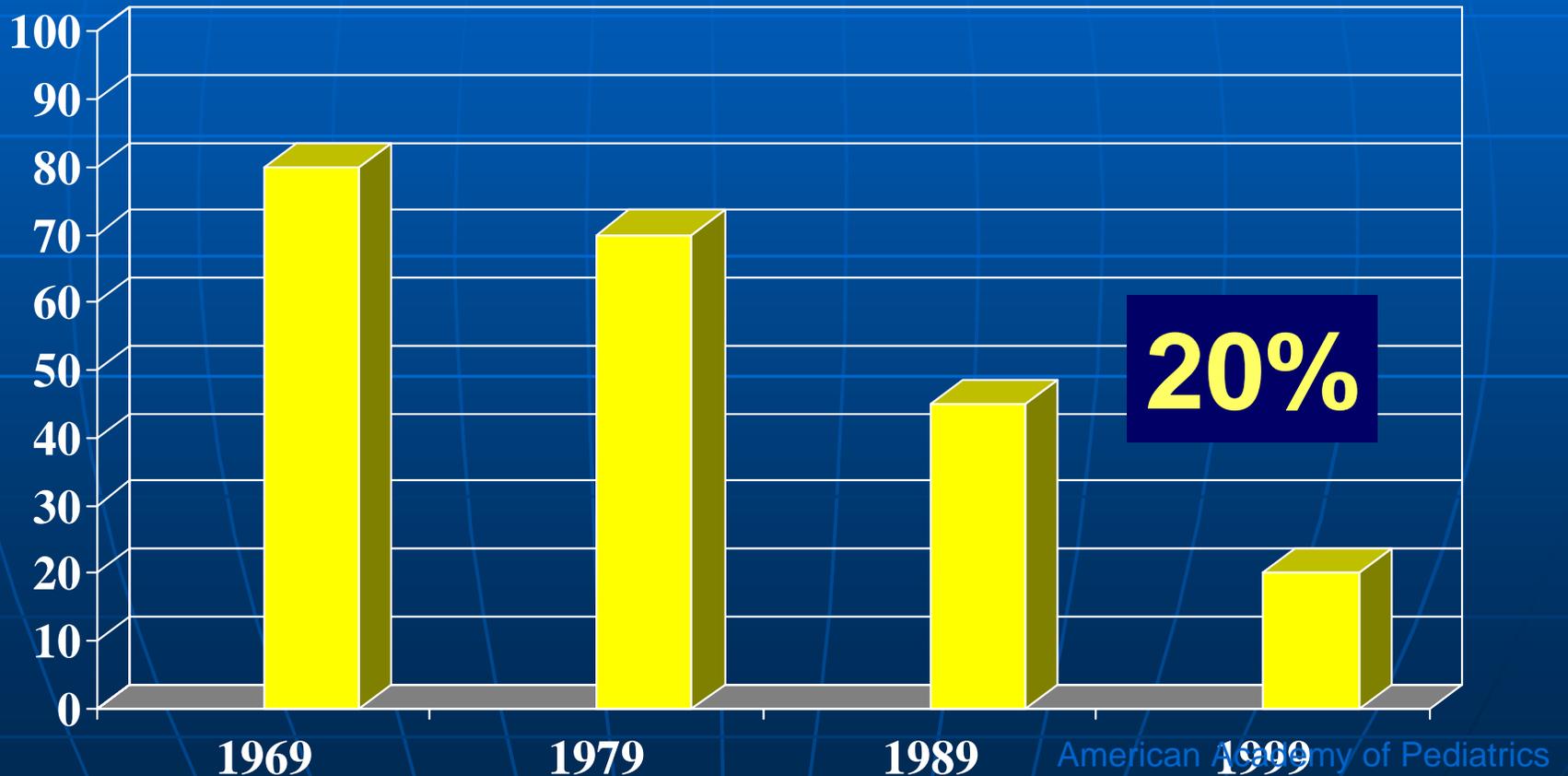
Children are Targeted for Consumption of Large Portions



Schools Promote Energy Dense Foods and Sedentary Behavior

- Less than 25% of schools meet USDA guidelines for school lunches
- A child will spend 6 to 8 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*"

Percentage of Children Involved in Daily Physical Education Programs



Physical Education in our School Systems

Observations revealed that physical education specialists provided students with only

3 minutes of moderate to vigorous physical activity per physical education class.

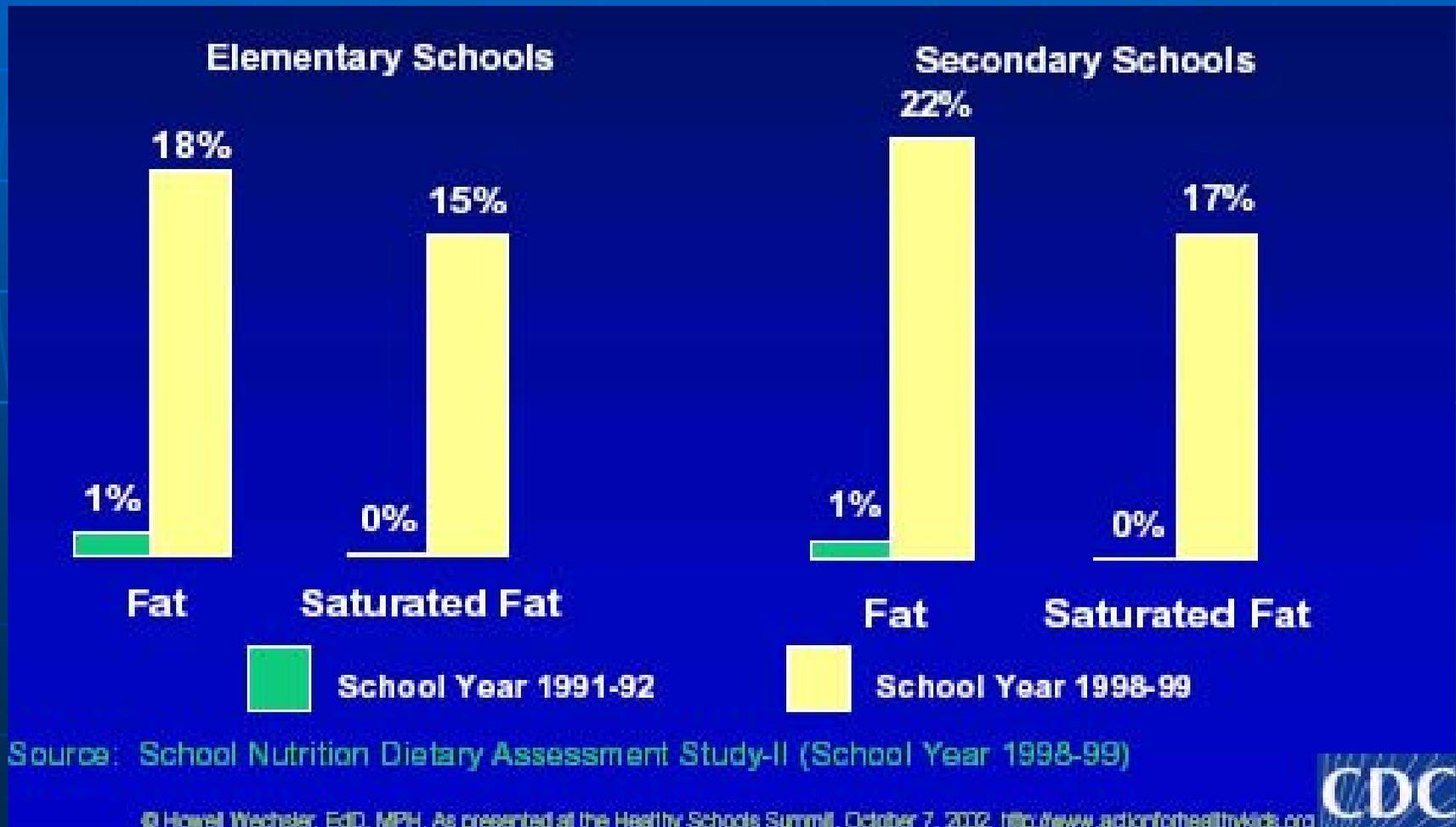
Am J Public Health. 1993;83:262-265
Prev. Med 1994;23:437-441

Total Daily Energy Expenditure



Adapted from Rowland, 1990.

Percent of Schools Meeting the Fat and Saturated Fat Standards for Lunches Offered



- Chips and french fries make up one-third of teenagers vegetable intake
- 31% of American 15 year-olds' eat french fries *every day*

<http://www.cnn.com/HEALTH/9909/05/chips.fries.ap/index.html>

<http://www.cnn.com/2000/HEALTH/children/02/01/teenhealth.ap/index.html>

- Soda accounts for 8% of the total calorie intake of today's children.
- 25% of kids drink more than 26 ounces per day (> 300 calories)

Programs to Reduce Obesity in Children and Adolescents

Framework & Rationale for Interventions with Children

- Alter the school environment
- Minimal intervention strategies
- Both sides of the ebal equation
- No new resources
- Train using existing mechanisms (ie. in-service)
- Dissemination network in place

Framework & Rationale for Interventions with Children

- Environmental changes “force” children to be active and consume healthier foods
- Behavioral economics may be used to manipulate the environment so the healthy choice is more desirable than the unhealthy choice
- A saturated environment provides statistical probability that a child will “land on” a healthy choice



PAAC/TAKE10!

- The University of Kansas
- Physical Activity Across the Curriculum
 - International Life Sciences Institute TAKE10!

JE Donnelly, R Washburn, B Smith, K DuBose
University of Kansas

D Sullivan, C Gibson, M Mayo
University of Kansas Medical Center

DK61489

Background

■ Schools (-)

- ↓ PE time
- ↓ Recess
- Promote sedentary behaviors

■ Schools (+)

- Access to many children
- Repeated exposure to intervention
- Policies can be changed and personnel trained

Physical Activity Across the Curriculum (PAAC)



Purpose

- Primary aim- to determine the effects of a minimal physical activity (PA) intervention on obesity levels (BMI) in elementary school children across 3 years
- Secondary aim- to determine the effects of a minimal PA intervention on health risk and academic achievement in elementary school children
 - Lipids, glucose, insulin, fitness, diet, academic achievement

Physical Activity Intervention

■ PAAC

- Incorporate PA into regular academic lessons
- Accumulate 90-100 minutes per week of PA in addition to PE or recess

Conceptual Framework

- Minimal intervention
- Enhances learning
- No additional teacher preparation time
- Changes environment
- No additional cost
- Training through existing in-service
- Easily perpetuated and replicated
- Desirable for both teacher and student (ie. FUN)

The Program

- **A classroom-based approach to reduce sedentary behavior while maintaining the focus on academics**
- **PAAC/Take 10! is a technique to deliver regular academic instruction through movement**

The Program

Integrate 10 minute periods of physical activity within academic lessons

- **Language art**
- **Math**
- **Science**
- **History**

The Program: Integration of Mind + Body

INTEGRATION allows more students to master the objective, learn it quickly, retain it longer, and apply it in more diverse ways

- Knowledge transfer
- Different learning styles

The all important link...

Between academics + physical activity

Physically active children:

- ◆ **Achieve higher math and reading scores**
- ◆ **Calmer in class**
- ◆ **Less absenteeism**

Intervention

Math Lesson

Linked to
Core
Academic
Objectives

INVISIBLE JUMP ROPE

WARM-UPS:

2,4,6,8,10,12,14,16,18,20 . . . 100

1,3,5,7,9,11,13,15,17,19, . . . 99

COUNTING BACKWARDS:

By 2's starting at 100

COUNTING BY 5'S:

Five, ten, fifteen, twenty,
Count by 5's to 100.

COUNTING BY 3'S:

Three, Six, Nine
staying healthy is really fine!
While you jump count by three
See if you can reach 90.
Ready, go!

YOU DO THE MATH:

$2 \times 2 = 4$

$2 \times 3 = 6$

$2 \times 4 = 8$

$2 \times 5 = 10$

$2 \times 6 = 12$

$2 \times 7 = 14$

$2 \times 8 = 16$

$2 \times 9 = 18$

$2 \times 10 = 20$

$3 \times 3 = 9$

$3 \times 4 = 12$

$3 \times 5 = 15$

$3 \times 6 = 18$

$3 \times 7 = 21$

$3 \times 8 = 24$

$3 \times 9 = 27$

$3 \times 10 = 30$

$4 \times 4 = 16$

$4 \times 5 = 20$

$4 \times 6 = 24$

$4 \times 7 = 28$

$4 \times 8 = 32$

$4 \times 9 = 36$

$4 \times 10 = 40$

$5 \times 5 = 25$

$5 \times 6 = 30$

$5 \times 7 = 35$

$5 \times 8 = 40$

$5 \times 9 = 45$

$5 \times 10 = 50$

$6 \times 6 = 36$

$6 \times 7 = 42$

$6 \times 8 = 48$

$6 \times 9 = 54$

$6 \times 10 = 60$

$7 \times 7 = 49$

$7 \times 8 = 56$

$7 \times 9 = 63$

$7 \times 10 = 70$

$8 \times 8 = 64$

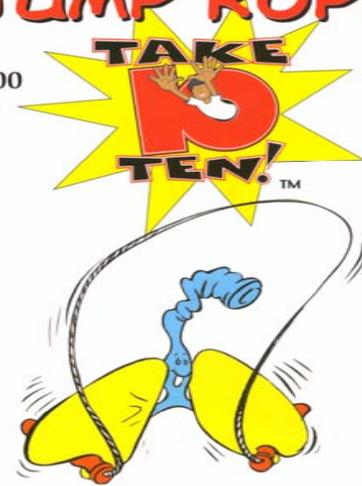
$8 \times 9 = 72$

$8 \times 10 = 80$

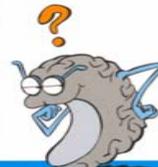
$9 \times 9 = 81$

$9 \times 10 = 90$

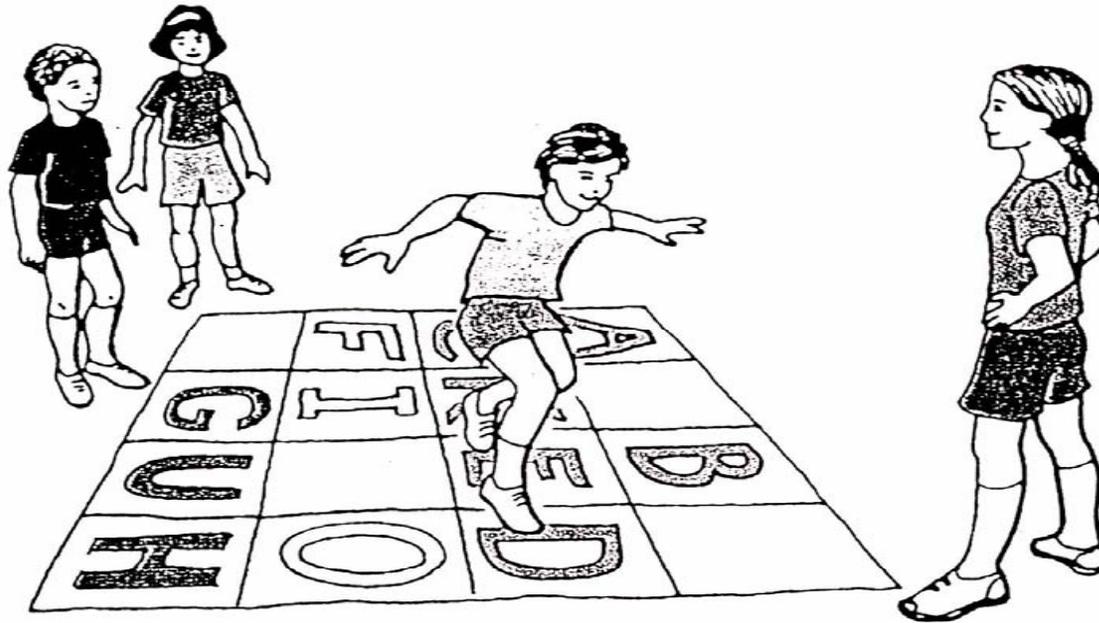
$10 \times 10 = 100$



SWITCH
AND DO
DIVISION



Learning to Spell



Evaluation Methods

- Direct observation of physical activity using SOFIT weekly, BMI yearly
- Teacher & administration surveys, weekly, yearly
- Focus groups with teachers yearly
- Health risk, academic achievement baseline and 3 years

KU Medical
Center
800-332-4199

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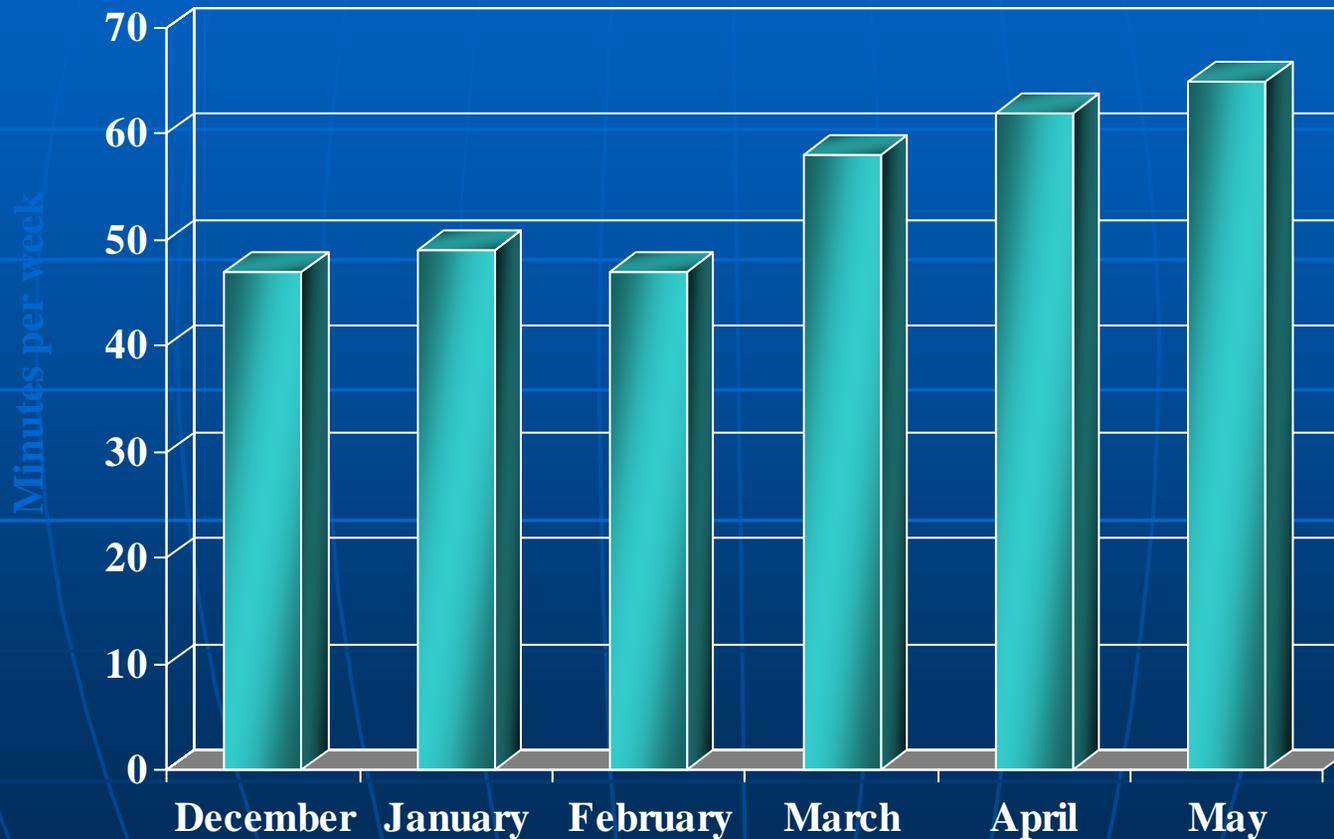
*Center for Environmental
& Occupational Health*



Preliminary Results

Intervention

Average PAAC Minutes/Week At the End of Year 1



These values are averages across all intervention schools

Average PAAC Min/Week

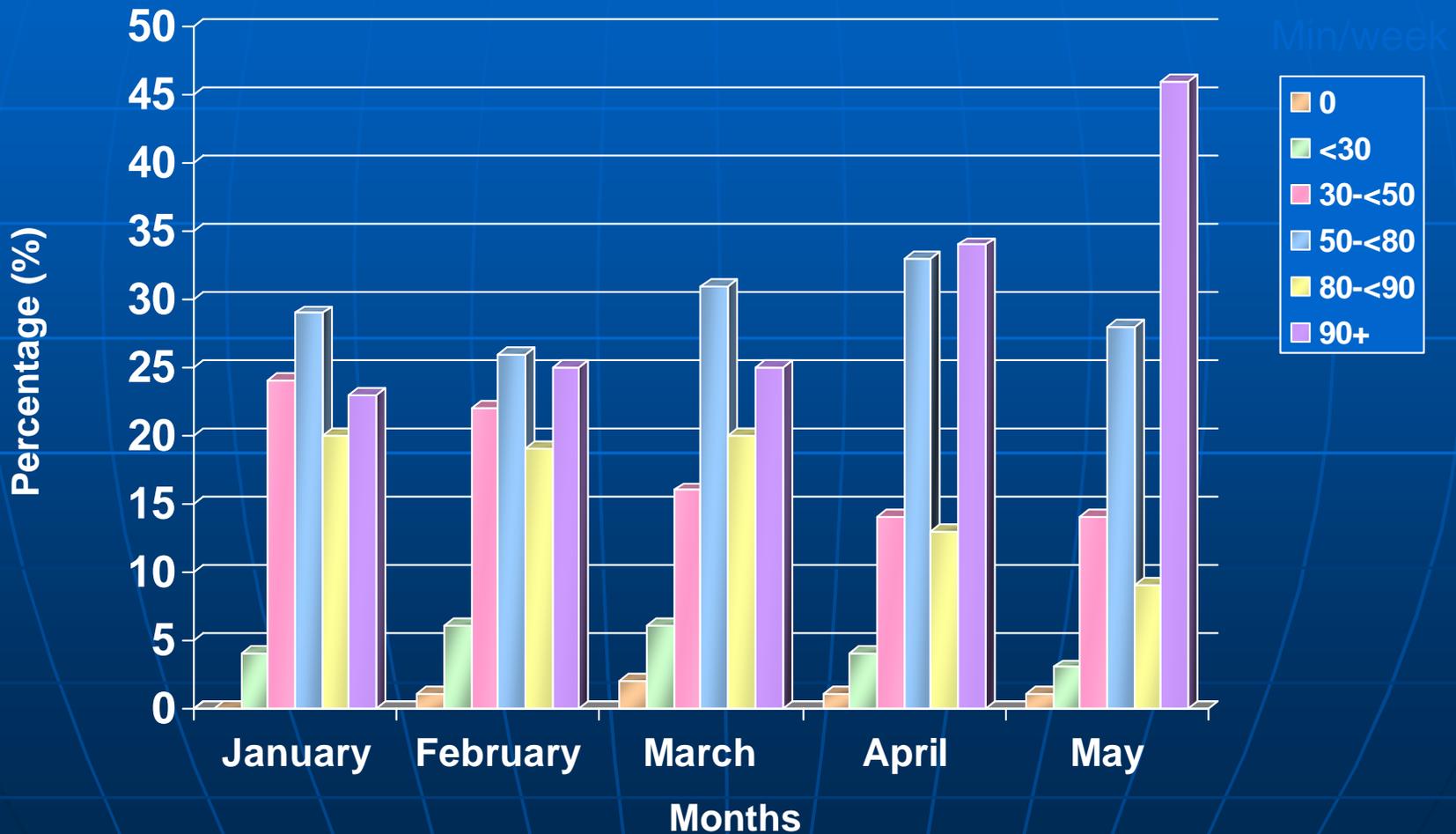
Average PAAC Min/Wk At the End of Year 2



These values are averages across all intervention schools

Percentage meeting goal

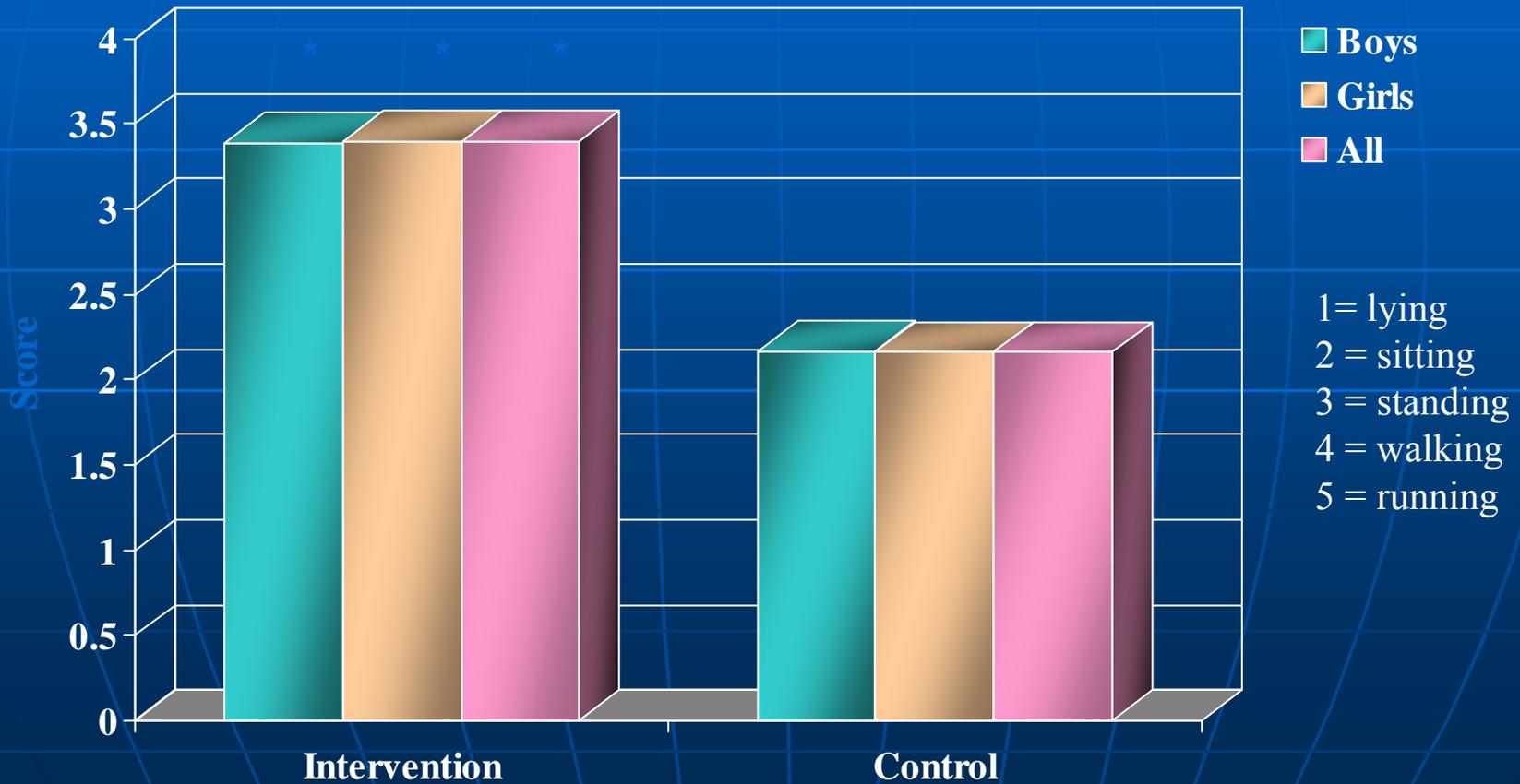
During Phase 2 of the Incentive Program



These values are averages across all intervention schools

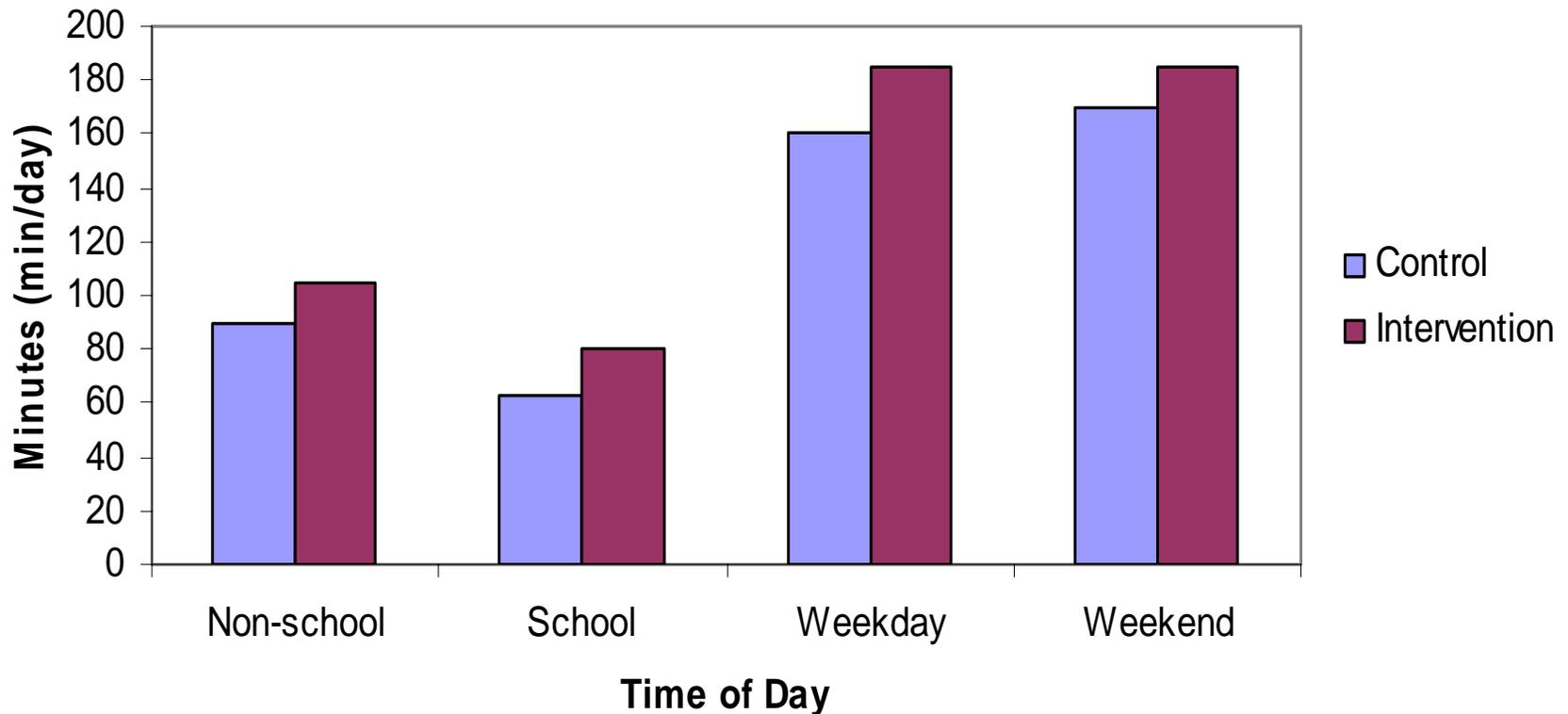
Intervention

Direct Observations by SOFIT



p<0.05, intervention vs controls

Minutes per day spent in moderate physical activity (3-6 METs) during the week for control and intervention children in PAAC



YMCA Physical Activity & Nutrition (PAN)

- YMCA After School Programs serve 330,000 children in 8,000 locations
- YMCA established programs in elementary schools using YMCA staff
- Transportation and safety issues are eliminated
- Continuity is excellent with <25% drop out from K-4

YMCA PAN - AIMS

- Provide 30 min MVPA, void of advanced motor skills, 5d/wk
- Provide reduced energy and fat snacks with increased nutrient density and no additional costs
- Use existing in-service mechanism for training of existing YMCA personnel

YMCA PAN - Outcomes

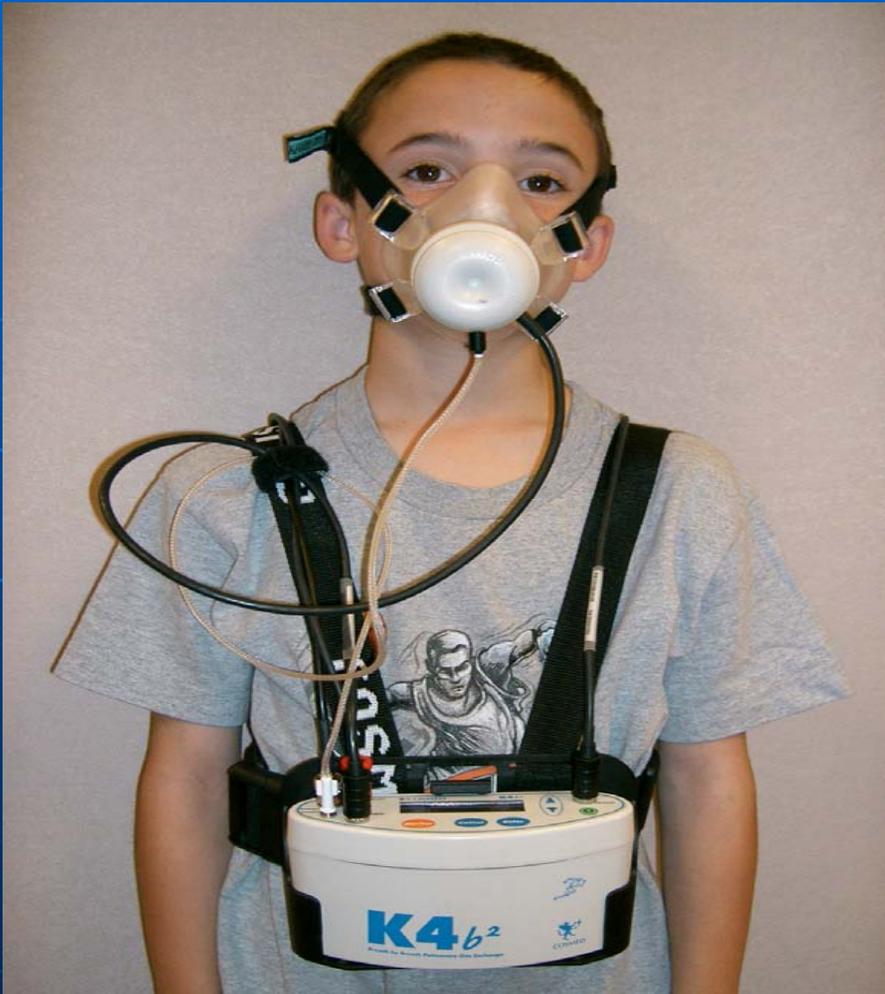
- Primary
 - BMI
- Secondary
 - Metabolic fitness
 - Waist circumference
 - 24-h PA
 - Aerobic fitness
 - Process to engage YMCA, staff, children, and parents

YMCA Snack Consumption

	Intervention	Control
Energy (kcal)	183.6±97.9	255.4±161.
Fat (g)	4.6±4.2	9.8±10.5
Carbohydrate (g)	31.6±17.9	36.9±22.2
Protein (g)	5.0±4.1	6.5±6.5
% Calories from Fat	22.0±15.0	30.0±18.3
% Calories from CHO	69.9±19.7	63.1±22.9
% Calories from Protein	10.8±7.6	9.5±6.3

Values are mean ± SD.

Verification of EE for MVPA



- Portable indirect calorimetry
- 20- to 30 min
- METS = 5.1 to 7.5
 - Average 6.6

Summary

- Minimal interventions
- Altered environment and behavioral economics increase likelihood of participation
- Low cost
- Utilize existing structures (school, YMCA)
- Minimize burden for care giver
- Evidence based outcomes