

## School-Based Interventions

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## School-Based Prevention Approaches

- Schools provide ideal settings for primary and secondary prevention intervention initiatives for the following reasons:
  - Access to large numbers of children
  - Costs to families are minimal
  - Integration into current curriculum
  - Opportunities to practice healthy lifestyle behaviors
  - Environments where healthy lifestyles are modeled by teachers, staff and peers

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## Planet Health- Gortmaker et al. (1999)

Measure	Sample	Baseline, %†	Follow-up, %†	Crude Change, %	Crude Odds	Adjusted Odds‡	95% Confidence Interval	P
<b>Female Obesity</b>								
Prevalence, %								
Control	317	21.5	23.7	+2.2	1.00	1.00	0.24-0.93	.03
Intervention	310	23.6	20.3	-3.3	0.99	0.47		
Incidence, %								
Control	249	...	8.0	+5.0	1.00	1.00	0.23-2.38	.57
Intervention	237	...	5.5	+5.5	0.66	0.77		
Remission, %								
Control	68	...	19.1	-19.1	1.00	1.00	1.07-4.35	.04
Intervention	73	...	31.5	-31.5	2.00	2.16		
<b>Male Obesity</b>								
Prevalence, %								
Control	337	34.7	31.8	-2.3	1.00	1.00	0.52-1.39	.48
Intervention	331	29.3	27.8	-1.5	0.97	0.85		
Incidence, %								
Control	220	...	9.6	+9.6	1.00	1.00	0.71-1.75	.58
Intervention	234	...	7.7	+7.7	0.79	1.12		
Remission, %								
Control	117	...	26.5	-26.5	1.00	1.00	0.44-4.24	.54
Intervention	97	...	23.7	-23.7	0.86	1.37		

\* Restricted to cohort students with paired data.  
 † Baseline and follow-up values are the unadjusted percentages.  
 ‡ Adjusted odds control for baseline obesity as well as other baseline covariates, including intervention status, age, ethnicity, indicators for randomization pairs, and baseline measures of energy intake and body mass index. For girls, a variable indicating that the student reported exercising to lose weight at baseline was added to the regressions. Regression estimates were calculated using the generalized estimating equation method to account for cluster randomization.

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### CHOPPS- (James 2004)

- **Subjects:** 644 children (7-11 yrs old) in 6 English primary schools
- **Intervention:** Nutrition education,
  - Discouraged consumption of “fizzy” drinks.
  - Encouraged water consumption.
- **Timeline=1 year.**

James et al., *BMJ* (2004) 328

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- Overweight & obesity prevalence increased 7.5% in control and decreased 0.2% in intervention.

- No significant difference for BMI or z score.

- Intervention reduced intake of carbonated beverages at 1 year (p=0.02)

- Both control and intervention groups significantly increased their water intake (p=0.003, 0.02 respectively) at 1 year.

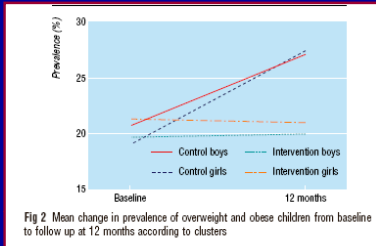


Fig 2 Mean change in prevalence of overweight and obese children from baseline to follow up at 12 months according to clusters

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### A Randomized Trial of a School-Based Obesity Prevention Program

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<sup>4</sup>School District of Philadelphia

<sup>5</sup>University of Pennsylvania

*Pediatrics*, 121(4) 2008.

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### Study Design

- RCT clustered design with repeated measures at baseline, year 1, year 2.
- 35 K-8 schools with  $\geq 50\%$  of students eligible for free or reduced price meals were sorted into 5 clusters to control for enrollment size and food service type.
- 2 schools were randomly selected from each cluster.
- 1 school within each cluster was randomly assigned to either treatment or control condition.

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### Sample Description at Baseline by Treatment Group

	Intervention	Control
Female	55.5%	53.7%
Weight (kg)	46.32 $\pm$ 14.86	45.3 $\pm$ 14.2
Height (cm)	146.9 $\pm$ 9.57	146.6 $\pm$ 8.84
BMI z-score	0.73 $\pm$ 1.12	0.65 $\pm$ 1.16
Age (yrs)	11.12 $\pm$ 1.01	11.15 $\pm$ 0.97

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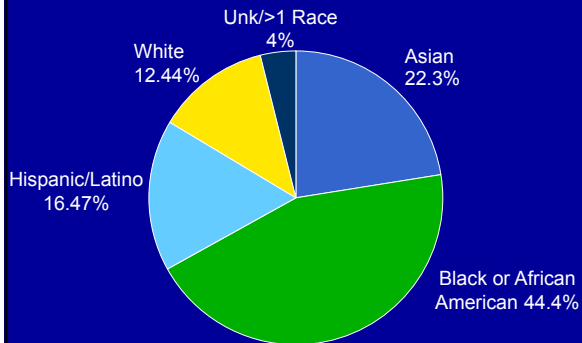
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### Race/Ethnicity



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## Comparison of Weight Status Categories at Baseline

Category	Control (n=365)	Intervention (n=479)	Total (n=844)
Underweight	3.56%	1.04%	2.13%
Normal	56.99%	55.95%	56.40%
Overweight	15.89%	16.28%	16.11%
Obese	23.56%	26.72%	25.36%

There were no significant differences in weight status at baseline between control and intervention groups

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## Intervention

- The School Nutrition Policy Initiative included the following components:
  - school self-assessment
    - Assessed health and environmental impact of (nutrition) wellness policies utilizing CDC’s School Health Index (SHI)
  - nutrition education
    - Offer staff 10 hours of training in nutrition education and provide curricula

thefoodtrust.org

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## Intervention

- The School Nutrition Policy Initiative included the following components (cont):
  - nutrition policy
    - Commit to providing an average of 50 hours of nutrition education per student per school year
  - social marketing
    - Reinforce messages about healthy eating by insuring all foods meet PA Department of Education’s Nutritional Standards for Competitive Foods in PA Schools
  - parent outreach
    - Engage family members and the community

thefoodtrust.org

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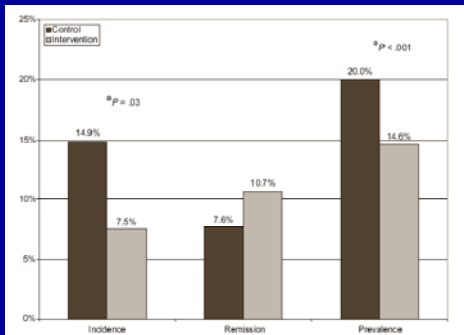
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*The Intervention Halved the # of New Cases of Overweight Children.*



Foster et al. *Pediatrics*, 2008

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*Corner Stores*

- Part of the urban landscape and have the potential to undermine school-based efforts
- Often located a few hundred feet from schools
- Understudied area

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*Healthy Corner Store Initiative (HCSI)*

- Multi-component school based interventions can be effective at curbing the development of overweight
- Still observed 7% incidence of new cases of overweight in the intervention schools
- Still room for improvement
- HCSI targets environments beyond the school

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## HCSI

- Community-based, multi-faceted, and broad-based intervention administered by The Food Trust
- Funded by RWJF
- 2 year study (2008-2010)
- 2 Goals
  - Decrease the purchase of high calorie snacks and beverages
  - Increase the percentage of healthy snacks and beverages available at stores

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## HCSI Research Design

- 10 Philadelphia K-8 schools and 21 proximal corner stores randomly assigned to HCSI or control conditions
- Students in grades 4 through 6 (over 50% of students qualifying for free and reduced meals)
- Measures (data collected twice a year)
  - Student purchases
  - Questionnaire assessing shopping trends
  - BMI z-scores
  - Corner store inventory

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## HCSI Baseline Results

Variable	Mean ± SD
Total amount spent (\$)	1.08 ± 0.93
Total number of items	2.1 ± 1.4
Food Items	1.6 ± 1.2
Beverage Items	0.5 ± 0.6
Calories (kcal)	360.0 ± 288.1
Calories from Fat (%)	29.0 ± 22.5
Calories from Protein (%)	4.8 ± 5.5
Calories from Carbohydrates (%)	65.7 ± 29.5
Dietary Fiber (g)	1.5 ± 1.7
Sodium (mg)	538.9 ± 776.8

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**STOPP-T2D**  
 Studies to Treat Or Prevent Pediatric Type 2  
 Diabetes

**HEALTHY**

Funded by  
 National Institute of Diabetes and Digestive and  
 Kidney Diseases  
 National Institutes of Health

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**HEALTHY**

**“Epidemic” increase: rates of obesity & type 2 diabetes (T2D) in children and youth**

- **Environmental risk factors**
  - Diet quality; physical activity; sedentary behavior
- **The NIDDK funded a primary prevention trial**
  - 4 semester intervention in 6<sup>th</sup> -8<sup>th</sup> grade
  - Preceded by a series of pilot studies
  - Conducted at 7 field centers

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***HEALTHY Feasibility Study***  
***- Study Sample -***

- **1740 participants in 12 middle schools**
  - 145 ± 34 students per school (range 85-199)
- **Age 13.6 ± 0.6 years (range 12-16)**
- **Sex 43% male, 57% female**
- **Ethnicity**
  - 53% Hispanic
  - 23% African American
  - 15% Caucasian
  - 2% American Indian
  - 6% Other
- **Representative sample**



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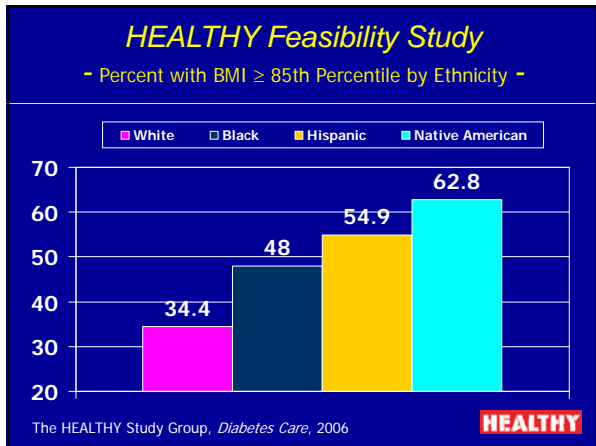
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### HEALTHY Feasibility Study

- Distribution of BMI Percentile Categories -

Obese (≥ BMI 95 <sup>th</sup> ile)	29.2%
Overweight (85-94 <sup>th</sup> ile)	19.8%
< 85 <sup>th</sup> ile	51.0%

The HEALTHY Study Group, *Diabetes Care*, 2006

**HEALTHY**

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### HEALTHY Feasibility Study

- Results (Continued) -

Fasting plasma glucose > 100 mg/dL	40.2%
Diabetes (fasting glucose ≥ 126 mg/dl)	0.4%
Triglycerides > 150 mg/dL	7.3%
Low HDL (M < 40, F < 50 mg/dL)	47.7%
SBP or DBP ≥ 95 <sup>th</sup> ile for age/sex/ethnicity - Males	18.4%
SBP or DBP ≥ 95 <sup>th</sup> ile for age/sex/ethnicity - Females	10.6%

The HEALTHY Study Group, *Diabetes Care*, 2006

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**HEALTHY Feasibility Study**  
*- Distribution of Risk Indicators -*

	BMI < 85 <sup>th</sup> percentile		BMI ≥ 85 <sup>th</sup> percentile	
	Fasting Insulin < 30	Fasting Insulin ≥ 30	Fasting Insulin < 30	Fasting Insulin ≥ 30
Fasting Glucose < 100	28.1%	4.1%	13.6%	13.5%
Fasting Glucose ≥ 100	14.5%	4.0%	7.4%	14.8%

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**HEALTHY**

*- Main Trial Design -*

- 42 middle schools – 6 in Philadelphia – randomized to intervention or control
- Intervention:
  - Environmental changes to school food service and physical education class activities
  - Communications and promotional campaign
  - Behavior change activities, messages, and goal setting
- Intervention goal: ↓ risk factors for T2D
- 3 primary outcomes indicating risk
  - BMI ≥ 85<sup>th</sup> percentile
  - Fasting glucose ≥ 100 mg/dL
  - Fasting insulin ≥ 30 μU/mL

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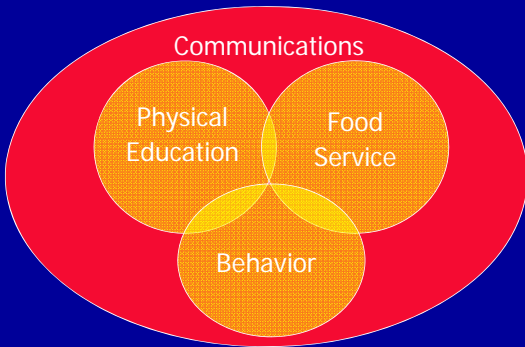
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**Primary Prevention Trial**  
**Integrated Intervention Components**




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## Primary Prevention Trial Physical Education

- Increasing MVPA levels in PE classes
- PE lesson plans in units or themes
  - Core units: basketball, fitness, soccer, team handball, FLOW
  - Additional units: cooperative games, dance, frisbee, football, lacrosse, softball, street hockey, track & field, racquet sports, volleyball
- Training programs focusing on
  - Class management
  - Reducing inactivity
  - Motivational techniques to maximize PE teacher willingness to participate in intervention

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## Primary Prevention Trial Nutrition

- Lower the average **fat content** of all items served in order to decrease student dietary fat intake to  $\leq 35\%$  of total calories from fat
- Increased **fruit and vegetables** served to 3 servings per student each day in order to increase student total daily intake to 5 servings
- Serve dessert **snack foods** with  $\leq 200$  calories per single serving size package in order to reduce student energy intake from these foods
- Eliminate all **added sugar beverages** served except for flavored milk  $\leq 1\%$  fat in order to reduce student energy intake from these sources;  $\leq 6$  oz of 100% fruit juice can be served only as part of NSBP
- Increase **whole grain foods** served with  $> 2$  g fiber per serving in order to increase student intake from these sources

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## Primary Prevention Trial Behavior

- FLASH (*Fun Learning Activities for Student Health*)
  - Brief classroom activities designed to increase knowledge, enhance decision making skills, enhance social influence, and promote peer involvement/interaction
- More/Less Campaign
  - Individual and group behavior change initiatives aimed at enhancing self-awareness, self-efficacy, and skill in performing healthier behaviors
- Family Outreach
  - Involve parents/guardians/family by providing information, strategies, and planned opportunities to support youth in accomplishing behavior goals

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## Primary Prevention Trial Communications

- School-wide campaigns to support and extend
  - PE and food service environmental interventions
  - Behavior intervention components
  - Recruitment and retention
  - Engage school staff
- Project identity and branding
  - Student Generated Media
- Reflect themes of choice, strength, and balance



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## HEALTHY

### - Consented 6<sup>th</sup> Grade Students -

- **Total Consented: 6,554 (59%)**
- **Total Screened: 6,415 (58%)**
- **Total in Cohort: 6,358**
- **Family History of Diabetes: 3,885 (63.9%)**
- **Race/Ethnicity**
  - 53% Hispanic
  - 20% African American
  - 19% Caucasian
  - 5% Mixed Race
  - 2% Asian
  - 1% Other

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## HEALTHY

### - Distribution of BMI Percentile Categories -

	Control	Intervention	Overall
	n(%ile)	n (%ile)	n (%ile)
Obese (≥BMI 95%ile)	944 (29.8)	949 (29.7)	1,893 (29.7)
Overweight (85-94 %ile)	630 (19.9)	631 (19.8)	1,261 (19.8)
Normal Weight (5-84%ile)	1,536 (48.4)	1,576 (49.3)	3,112 (48.9)
Underweight (< 5 %ile)	63 (2.0)	38 (1.2)	101 (1.6)

The HEALTHY Study Group, *Diabetes Care*, 2009

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**HEALTHY**  
- Fasting Glucose at Health Screening -

	Control	Intervention	Overall
	n (%)	n (%)	n (%)
Mean Glucose	93.5 ± 6.8	93.3 ± 6.6	93.7 ± 6.7
< 100 (mg/dL)	2585 (83.6)	2621 (84.1)	5206 (83.9)
100-109 (mg/dL)	461 (14.9)	452 (14.5)	913 (14.7)
110-125 (mg/dL)	40 (1.3)	37 (1.2)	77 (1.2)
126+ (mg/dL)	5 (0.2)	6 (0.2)	11 (0.2)

The HEALTHY Study Group, *Diabetes Care*, 2009

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**Distribution of BMI Percentile Categories**

	HEALTHY Feasibility Study (8 <sup>th</sup> grade cohort)	HEALTHY Study (6 <sup>th</sup> grade cohort)
Obese (≥ 95 <sup>th</sup> ile)	29.2%	29.6%
Overweight (85-94 <sup>th</sup> ile)	19.8%	19.7%
<85 <sup>th</sup> ile	51.0%	50.7%

The HEALTHY Study Group, *Diabetes Care*, 2006  
The HEALTHY Study Group, *Diabetes Care*, 2009

**HEALTHY**

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**HEALTHY**  
- 6<sup>th</sup> Grade vs. 8<sup>th</sup> Grade -

**6<sup>th</sup> Grade versus 8<sup>th</sup> Grade Distribution of Fasting Risk Factors**

	6 <sup>th</sup> grade				8 <sup>th</sup> grade			
	BMI < 85 percentile		BMI ≥ 85 percentile		BMI < 85 percentile		BMI ≥ 85 percentile	
	Insulin < 30	Insulin ≥ 30	Insulin < 30	Insulin ≥ 30	Insulin < 30	Insulin ≥ 30	Insulin < 30	Insulin ≥ 30
Glucose < 100	43.5%	0.3%	36.2%	4.0%	28.1%	4.1%	13.6%	13.5%
Glucose ≥ 100	6.6%	0.2%	6.9%	2.3%	14.5%	4.0%	7.4%	14.8%

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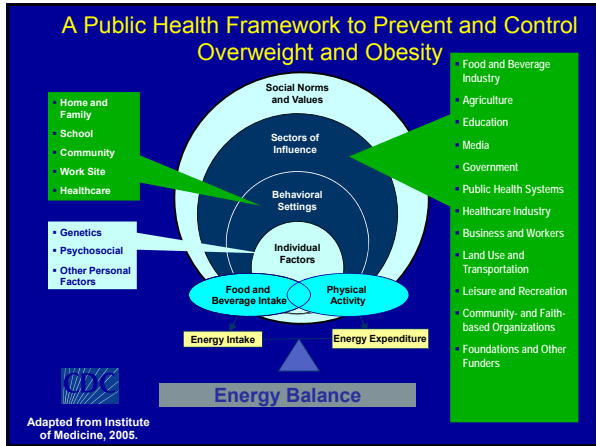
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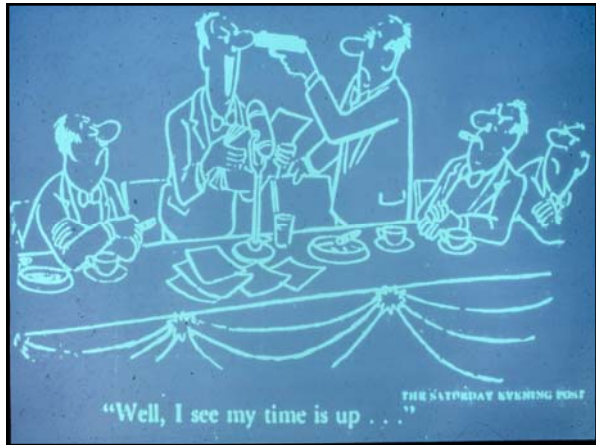
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