

Best Evidence for School Based Obesity Interventions

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SCHOOL OF NURSING

Case Study: Jon

7-year-old male



- Weight: 95 pounds ($\geq 97^{\text{th}}$ percentile)
- Height: 50 inches (90^{th} percentile)
- BMI: 26.7 kg/m² ($\geq 97^{\text{th}}$ percentile)
- Afraid to play outside because of neighborhood issues
- Currently lives with maternal grandmother (age 70 yrs)
- Sleeps with 2 cousins in double bed
- Grandmother purchases fast food > 3 x/week
- Insulin levels elevated, lipid profile elevated
- Does not go outside after school

Case Study : 14-Year-Old Female

Felisha

- PMH: Of consistent weight gain since age 6 years: Weight > 85-95th percentile since age 6 yrs
 - IZ UTD
 - No sexual activity
 - No drugs, ETOH, tobacco
 - Parents overweight but lifestyle changes; Dad at 40 yr MI with stent placement for blocked vessel
 - Weight Watchers, working out with father- supportive family
 - Weight loss from 12-13 yrs of 45 pounds; weight gain from 13 to 14.5 yrs of 52 lbs.
- History:** Approx 6 hours sleep each night; High Honors Student
- TV, Technology in Bedroom,
 - No exercise
 - Denies depression, although crying about weight gain
 - Ice tea 4-5 8 ounce glasses each day
 - Menses regular cycle
 - **Physical exam:** VS: HR82; BP 134/82
 - Wt: 224lb (>95th)
 - Ht: 65 in (75th)
 - BMI: 37.3 (>95th)
 - Negative for abnormal findings

Obesity in the United States

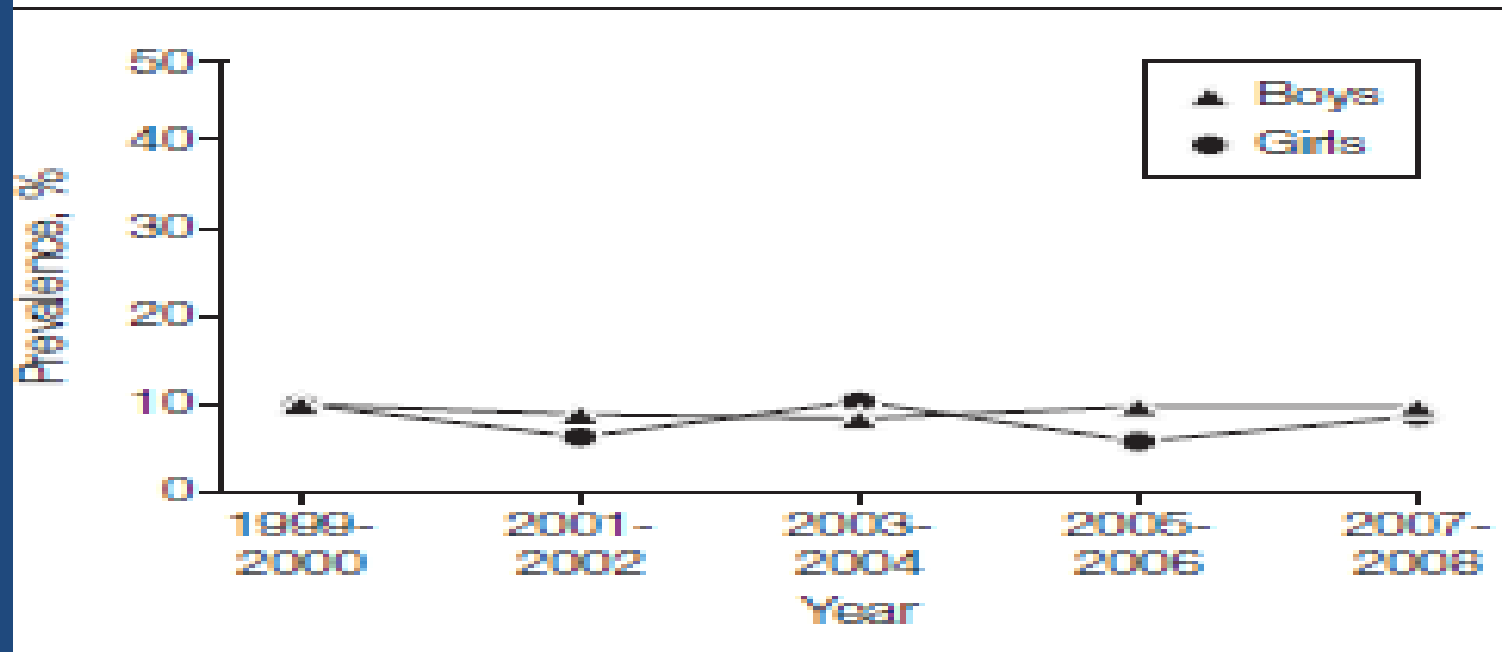
TABLE 2 1. Obesity in America ...Then and Now

Obesity Then	Obesity Now
In the early 1970s, the prevalence of obesity was 5% for children ages 2 to 5 years, 4% for children ages 6 to 11 years, and 6% for adolescents ages 12 to 19 years.	In 2007-2008, the prevalence of obesity reached 10% for children ages 2 to 5 years, 20% for children ages 6 to 11 years, and 18% for adolescents ages 12 to 19 years.
In the late 1970s, 15% of adults were obese.	In 2008, 34% of adults were obese.
In the early 1990s, zero States had an adult obesity prevalence rate of more than 25%.	In 2008, 32 States had an adult obesity prevalence rate of more than 25%.

Sources:
 Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among U.S. adults, 1999-2008. JAMA. 2010;303(3):235-241.
 Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among U.S. children and adolescents, 1999-2000. JAMA. 2002;288(4):1728-1732.
 Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in U.S. children and adolescents, 2007-2008. JAMA. 2010;303(3):242-249.
 Centers for Disease Control and Prevention. U.S. Obesity Trends. Available at: <http://www.cdc.gov/obesity/data/trends.html>. Accessed August 12, 2010.
 [Note: State prevalence data based on self-report.]

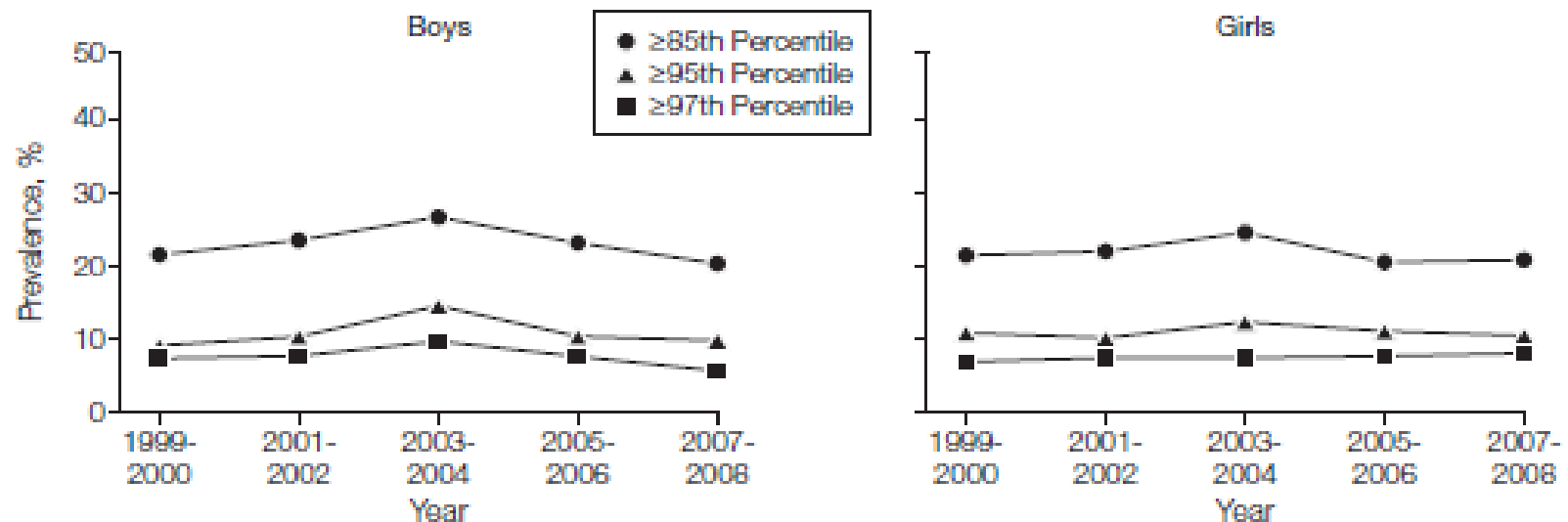
Weight-for-Length at or > 95th Percentile in Children from Birth to 2 Years

Figure 1. Prevalence of Weight for Recumbent Length at or Above the 95th Percentile in Boys and Girls From Birth to 2 Years of Age, 1999-2008



High BMI for Girls and Boys Ages 2-5 Years

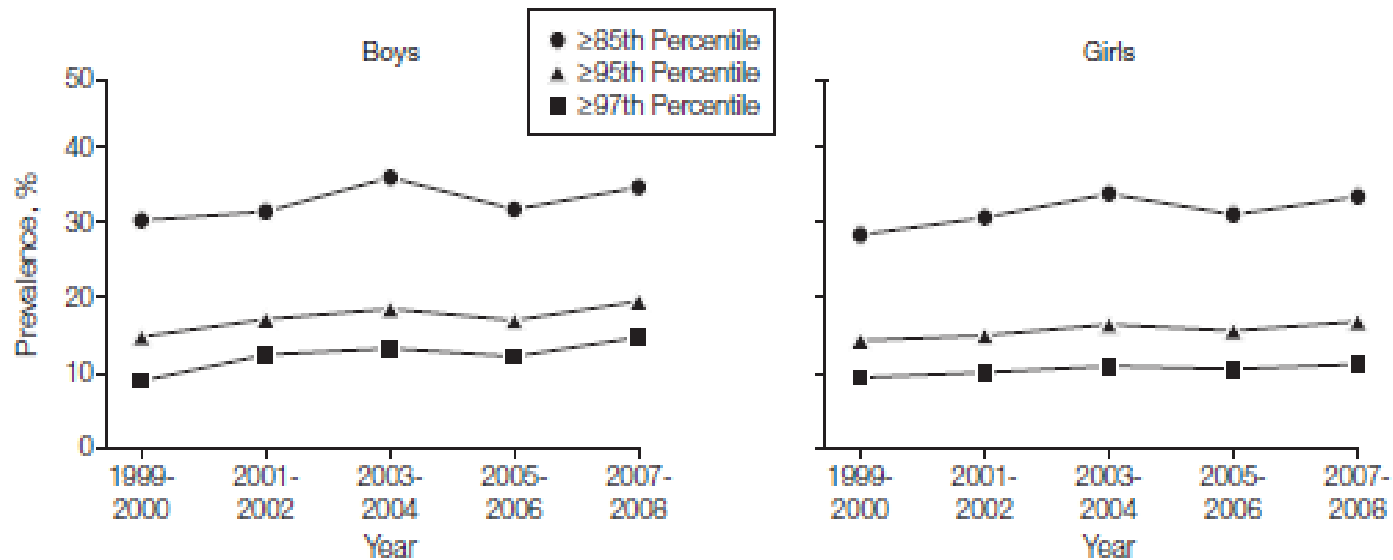
Figure 2. Prevalence of High Body Mass Index for Age in Boys and Girls Aged 2 Through 5 Years, 1999-2008



Sample sizes, sample design, and relative standard error were consistent over the survey years.

High BMI for Girls and Boys ages 6-19 Years

Figure 3. Prevalence of High BMI for Age in Boys and Girls Aged 6 Through 19 Years, 1999-2008





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caglecartoons.com



CHILDHOOD OBESITY EPIDEMIC..

Etiology

Obesity is a complex condition

**Multiple social and behavioral
influences impact childhood
overweight**

- **Heritability (Genetic contribution)**
- **Environment**

Etiology of Obesity

- Genetic contribution
- Increased energy intake
- Reduction in Activity
- Increase in Inactivity
- Shortened Sleep Duration
- Stress
- Viral illness
- Prescription Drugs

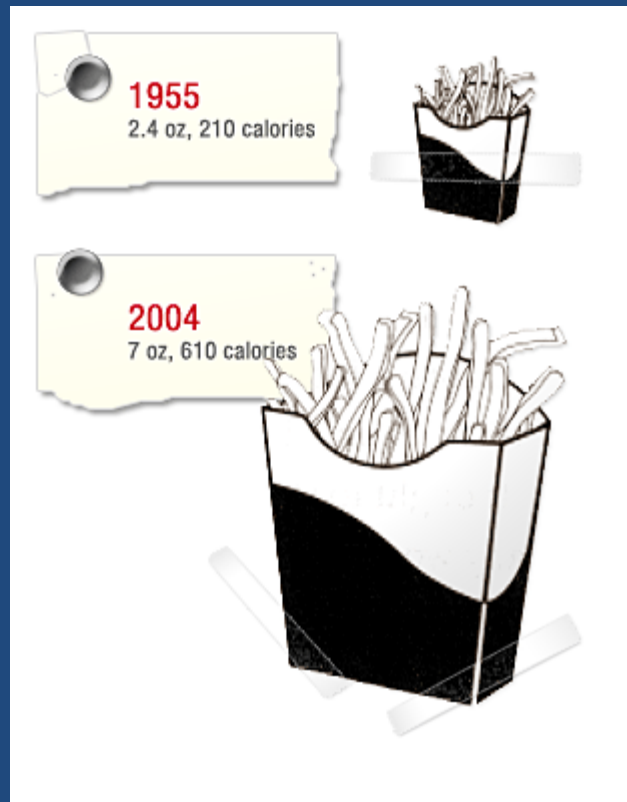
Genetic Factors in Childhood Overweight

- Adoption studies found a high correlation between increased adiposity in adopted children and their biologic parents
- Twins reared together or apart have similar rates of obesity
- Having one or two obese parents increases a child's risk of becoming overweight-
specifically maternal obesity

Nutrition and Obesity



Portion Size Comparisons





Maternal-Child Feeding Interaction: What foods are infants and toddlers eating?

Children ages 7 to 24 months:

- 18-33% consumed no discrete servings of vegetables
- 23-33% consumed no fruits
- French fries one of three most common vegetables by 9-11 months
- French fries MOST common by 15-18 months of age
- 46% of 7- to 8 month-olds consumed some kind of dessert or sweetened beverage
- 62% by 19-24 months consumed a baked dessert, 20% consumed candy, 44% consumed sweetened beverage

Rank	Overall, Ages 2+ yrs (Mean kcal/d; Total daily calories = 2,157)	Children and Adolescents, Ages 2-18 yrs (Mean kcal/d; Total daily calories = 2,027)
1	Grain-based desserts ^b (138 kcal)	Grain-based desserts (138 kcal)
2	Yeast breads ^c (129 kcal)	Pizza (136 kcal)
3	Chicken and chicken mixed dishes ^d (121 kcal)	Soda/energy/sports drinks (118 kcal)
4	Soda/energy/sports drinks ^e (114 kcal)	Yeast breads (114 kcal)
5	Pizza (98 kcal)	Chicken and chicken mixed dishes (113 kcal)
6	Alcoholic beverages (82 kcal)	Pasta and pasta dishes (91 kcal)
7	Pasta and pasta dishes ^f (81 kcal)	Reduced fat milk (86 kcal)
8	Tortillas, burritos, tacos ^g (80 kcal)	Dairy desserts (76 kcal)
9	Beef and beef mixed dishes ^h (64 kcal)	Potato/corn/other chips (70 kcal)
10	Dairy desserts ⁱ (62 kcal)	Ready-to-eat cereals (65 kcal)
11	Potato/corn/other chips (56 kcal)	Tortillas, burritos, tacos (63 kcal)
12	Burgers (53 kcal)	Whole milk (60 kcal)
13	Reduced fat milk (51 kcal)	Candy (56 kcal)
14	Regular cheese (49 kcal)	Fruit drinks (55 kcal)
15	Ready-to-eat cereals (49 kcal)	Burgers (55 kcal)
16	Sausage, franks, bacon, and ribs (49 kcal)	Fried white potatoes (52 kcal)
17	Fried white potatoes (48 kcal)	Sausage, franks, bacon, and ribs (47 kcal)
18	Candy (47 kcal)	Regular cheese (43 kcal)
19	Nuts/seeds and nut/seed mixed dishes ^j (42 kcal)	Beef and beef mixed dishes (43 kcal)
20	Eggs and egg mixed dishes ^k (39 kcal)	100% fruit juice, not orange/grapefruit (35 kcal)
21	Rice and rice mixed dishes ^l (36 kcal)	Eggs and egg mixed dishes (30 kcal)
22	Fruit drinks ^m (36 kcal)	Pancakes, waffles, and French toast (29 kcal)
23	Whole milk (33 kcal)	Crackers (28 kcal)
24	Quickbreads ⁿ (32 kcal)	Nuts/seeds and nut/seed mixed dishes (27 kcal)
25	Cold cuts (27 kcal)	Cold cuts (24 kcal)

TOP 25 SOURCES OF CALORIES IN CHILDREN 2 TO 18 YEARS NHANES 2005-2006

Macronutrient Intake

TABLE 2-4. Recommended Macronutrient Proportions by Age

	Carbohydrate	Protein	Fat
Young children (1-3 years)	45-65%	5-20%	30-40%
Older children and adolescents (4-18 years)	45-65%	10-30%	25-35%
Adults (19 years and older)	45-65%	10-35%	20-35%

Source: Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Washington (DC): The National Academies Press; 2002.

NUTRITION and CALORIES

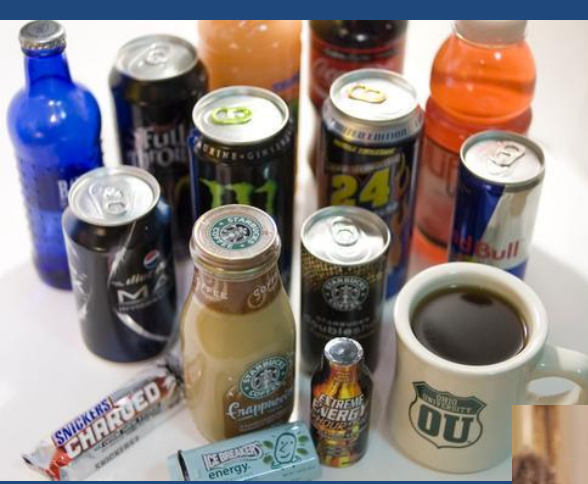
Estimated amounts of calories needed to maintain calorie balance for various gender and age groups at three different levels of physical activity. The estimates are rounded to the nearest 200 calories. An individual's calorie needs may be higher or lower than these average estimates.

		Physical Activity Level ^b		
Gender	Age (years)	Sedentary	Moderately Active	Active
Child (female and male)	2-3	1,000-1,200 ^c	1,000-1,400 ^c	1,000-1,400 ^c
Female^d	4-8	1,200-1,400	1,400-1,600	1,400-1,800
	9-13	1,400-1,600	1,600-2,000	1,800-2,200
	14-18	1,800	2,000	2,400
	19-30	1,800-2,000	2,000-2,200	2,400
	31-50	1,800	2,000	2,200
	51+	1,600	1,800	2,000-2,200
Male	4-8	1,200-1,400	1,400-1,600	1,600-2,000
	9-13	1,600-2,000	1,800-2,200	2,000-2,600
	14-18	2,000-2,400	2,400-2,800	2,800-3,200
	19-30	2,400-2,600	2,600-2,800	3,000
	31-50	2,200-2,400	2,400-2,600	2,800-3,000
	51+	2,000-2,200	2,200-2,400	2,400-2,800

Sweetened Drinks and Obesity: What We Currently Know

- Recent systematic review demonstrated weight of epidemiologic and experimental evidence indicates
 - ↑ consumption sweetened soft drinks associated with obesity across all age groups
 - Other studies may not agree!!
- But... Sweetened drink intake:
 - ↑ 300% in past 20 years
 - 56-85% of children in school consume at least one soft drink daily

Caffeine and Energy Drinks



- Sales have grown >60% each year
- US 2011 sales to top \$9 Billion dollars
- Half of the energy-drink market consists of:
 - children <12 years old
 - adolescents 12–18yr
 - Young adults 19 –25yr



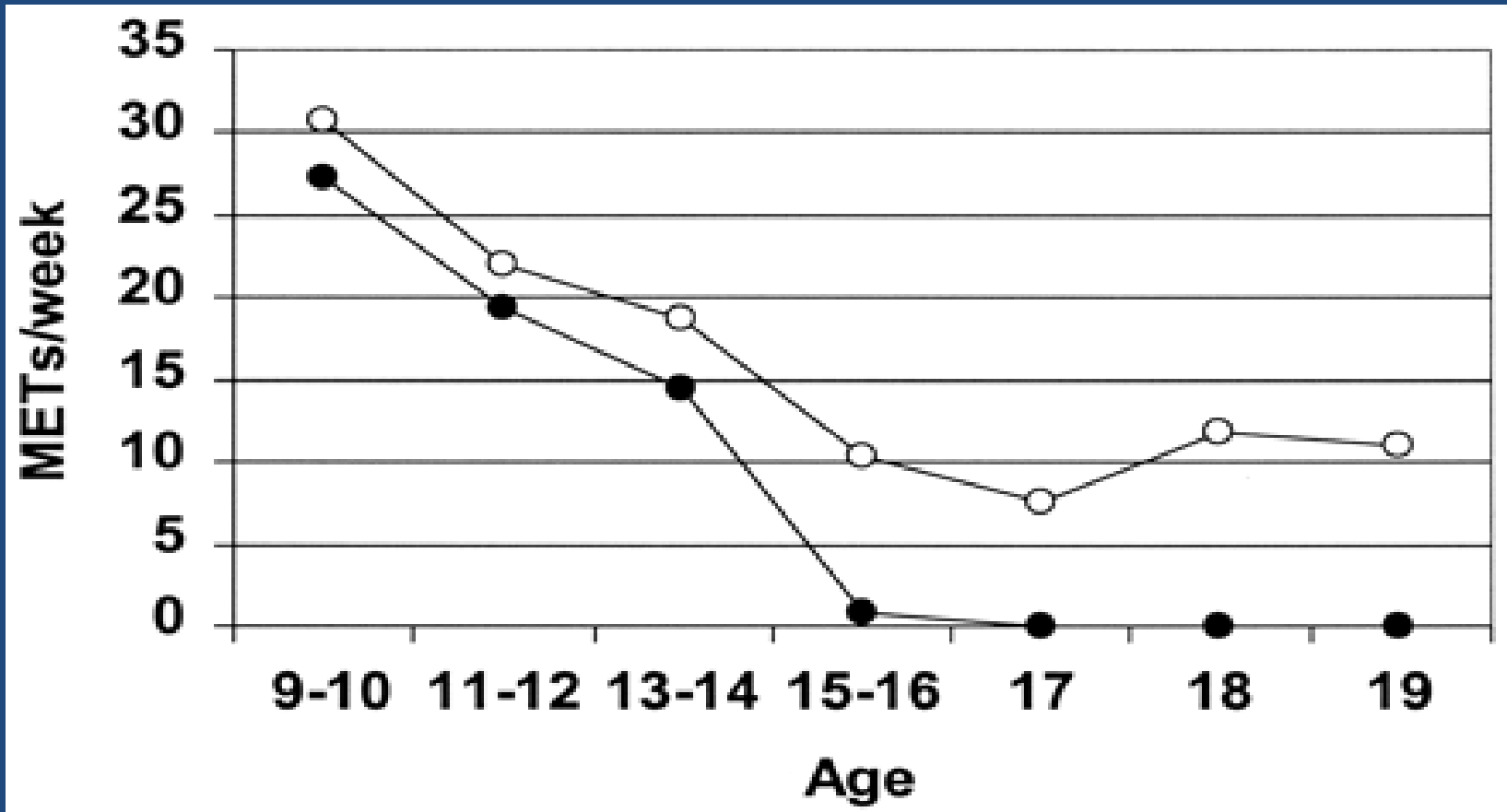


Physical Activity and Obesity

Activity and Obesity

- Youth Media Campaign Longitudinal Survey: 61.5% of children no participation in any organized physical activity during their nonschool hours
- 55% Adolescents in this country do not meet recommended physical activity guidelines
- Children choose sedentary behavior over physical activity

Physical Activity in Girls 9- 19 Years



○ Median habitual activity (in metabolic equivalent times [METs] per week). ●, black girls;
○ white girls

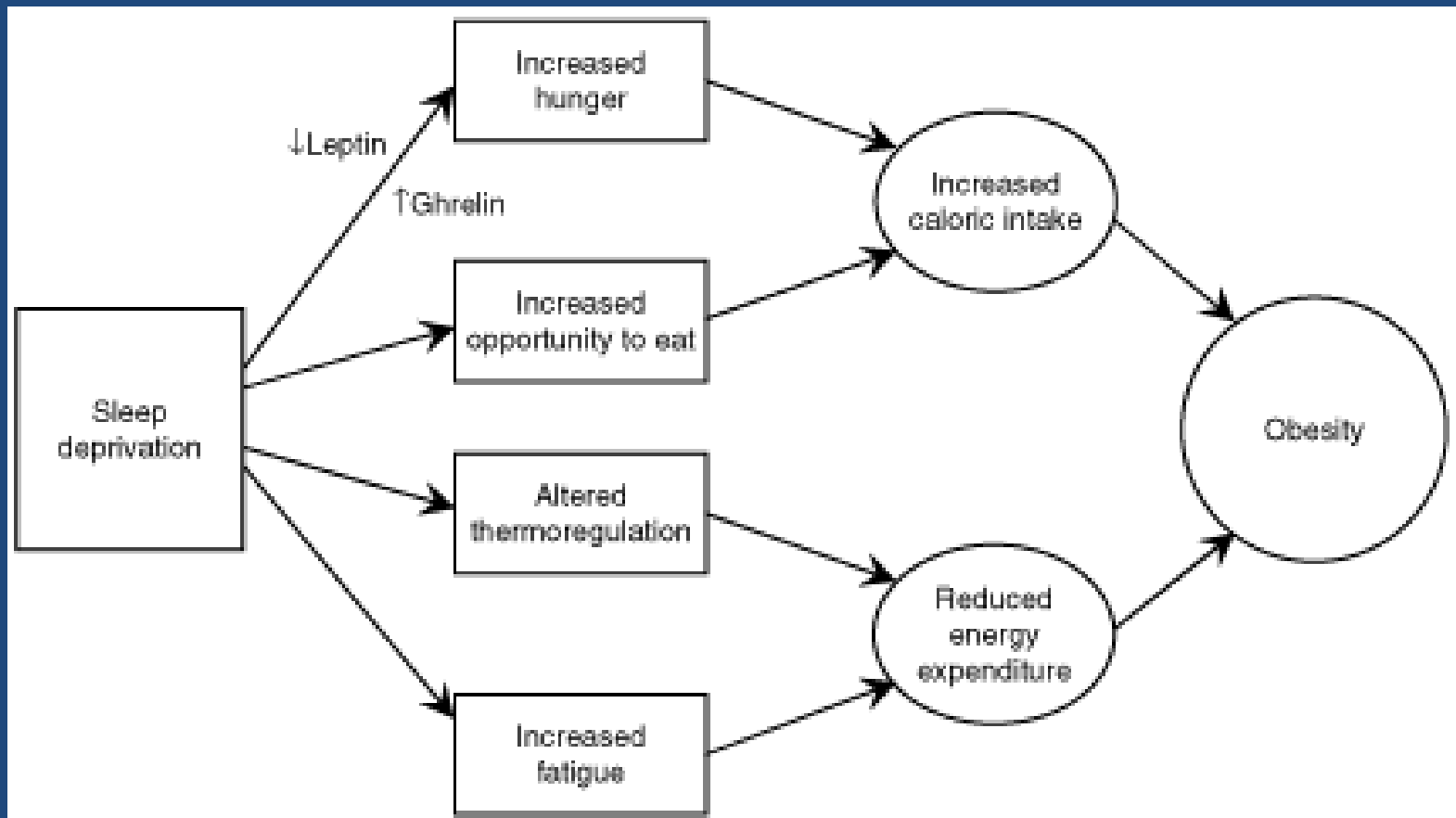
SLEEP and OBESITY



Obesity and Shortened Sleep

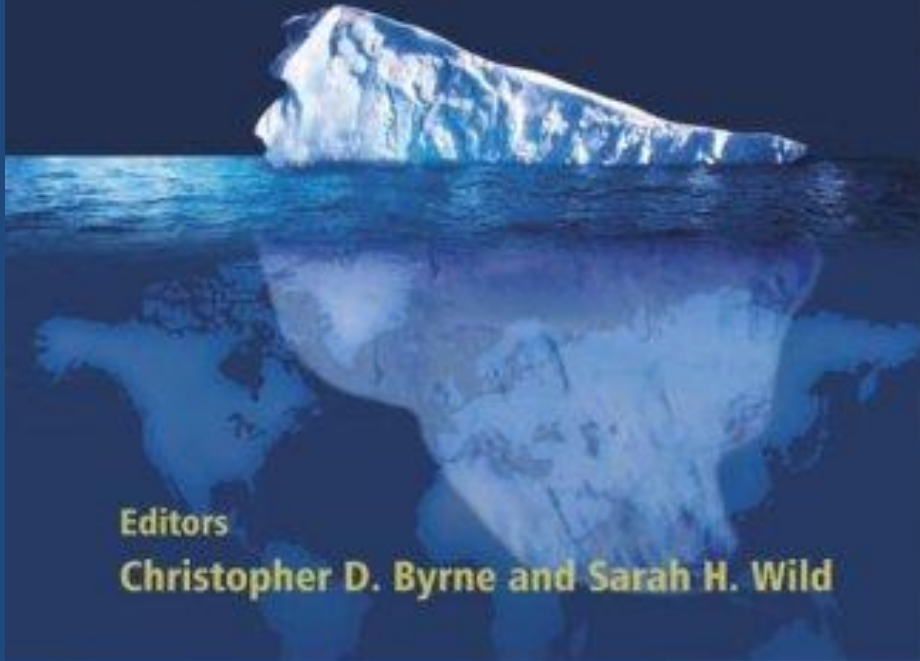
- Multiple cross-sectional studies across the age spectrum in both genders, and from multiple countries have identified similar associations between chronic short sleeping and increased BMI
- Hormonal changes that have been associated with an increased risk of obesity

Sleep and Obesity: Relationship



The Metabolic Syndrome

Diabetes
dp
in Practice



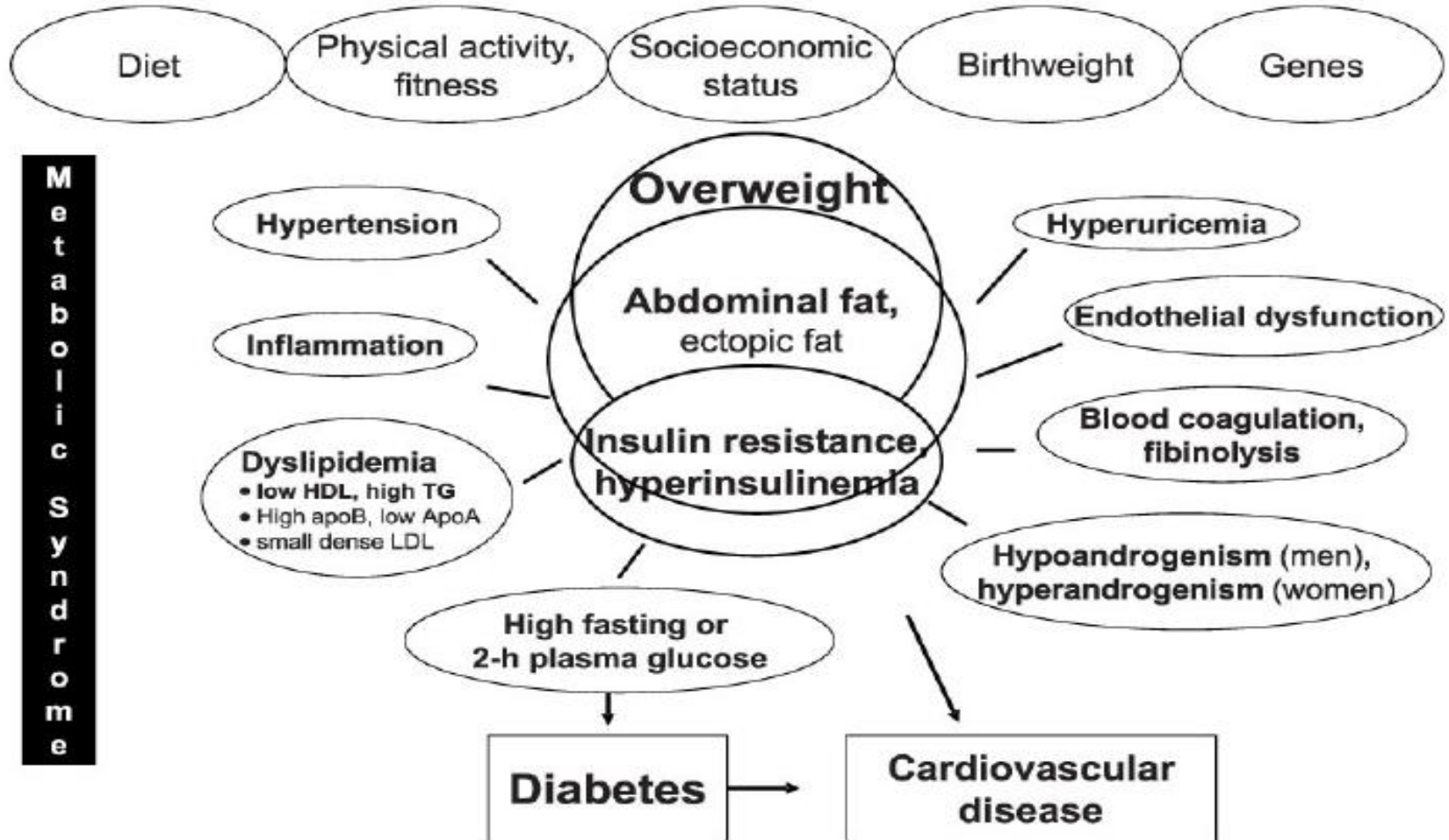
Editors
Christopher D. Byrne and Sarah H. Wild

 WILEY

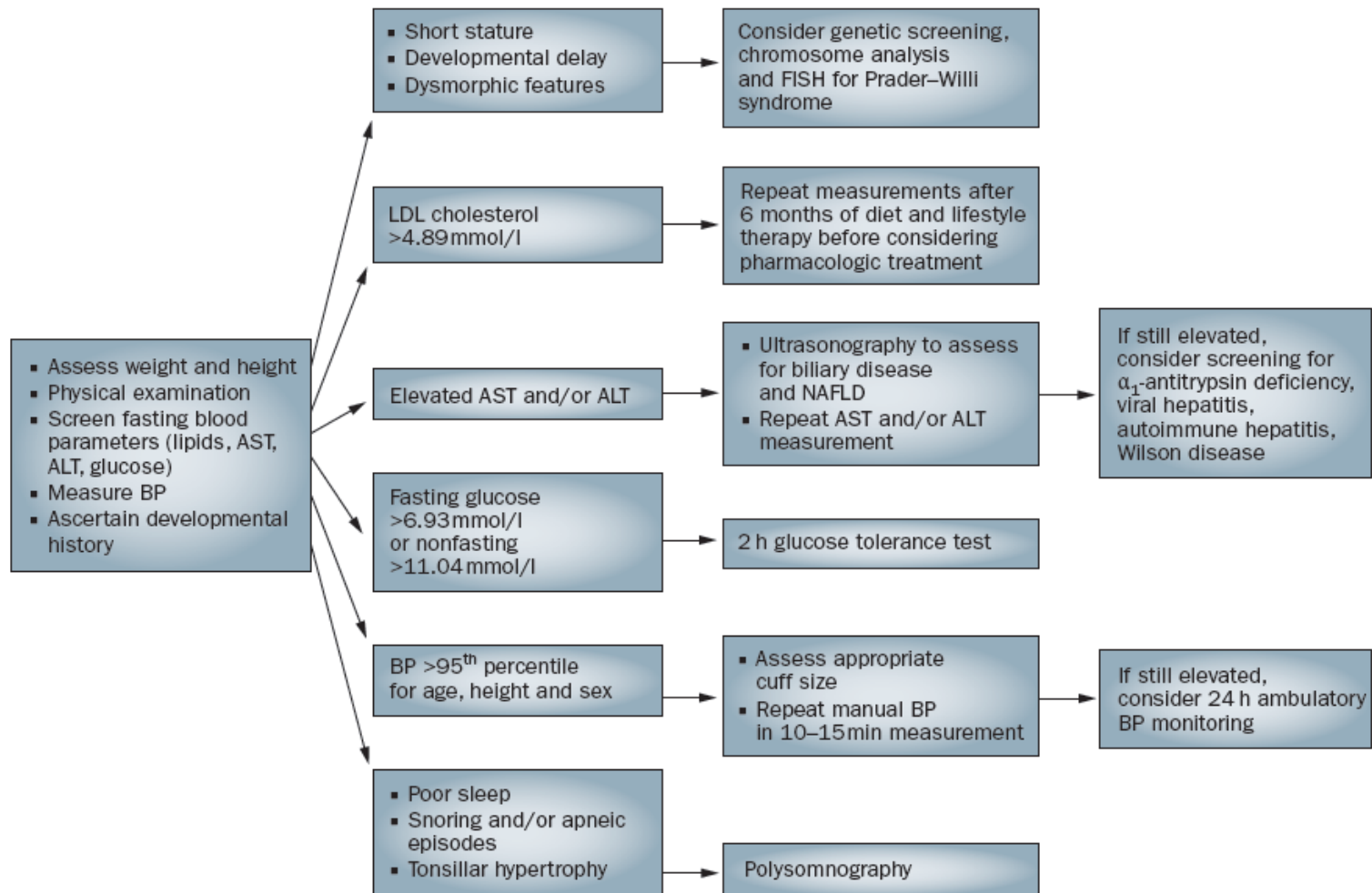
**Are We Only
Seeing the Tip
of The
Iceberg??**

Pathogenesis of MetS

Metabolic syndrome

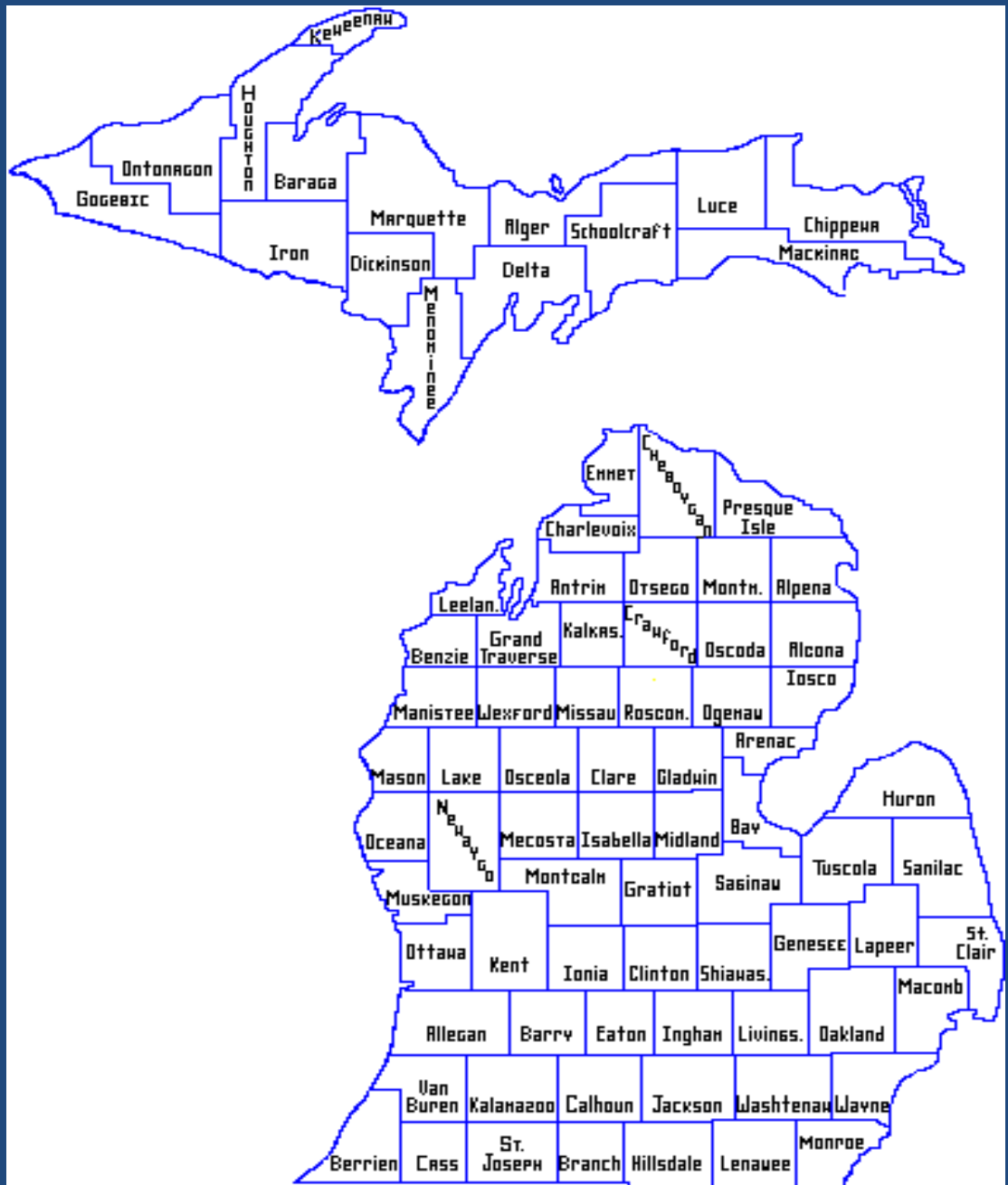


Screening Algorithm for Obesity and MetS



School Based Interventions for Obesity





School Interventions Are Popular

- Schools typically provide health education and healthy environment as part of their mission
- Inherently expose children to dietary and physical activity factors
 - School children consume one to two meals a day at a school
 - Involved in physical activity programs
- School environment powerful network of teachers, health care providers , etc.

So What is Working??

- Because of mixed results generalizable solutions remain elusive
- Question whether wise to allocate scarce resources to school based interventions
- Inconsistent findings has led to multiple systemic reviews

School Interventions... More than a free lunch!



SCHOOL LUNCHES

- What do you know?
- Are your patients eating breakfast and lunch at school?

RECENT STUDIES

- No evidence that either the school breakfast or lunch program contributing to ↑ BMI
- School Breakfast Program participation may be protective factor Gleason et al JADA, Feb; 109(2 Suppl):S118-28
- In children, evidence of + relationship between BMI and observed energy intake at school meals Baxter et al Int J Behav Nut Phys Act. 2010 Mar 24;7:24
- To promote eating behaviors consistent with the Dietary Guidelines, future policy, practice, and research should focus on reducing levels of fat and sodium and increasing fiber
- Crepinsek et al JADA Feb;109(2 Suppl):S31-43

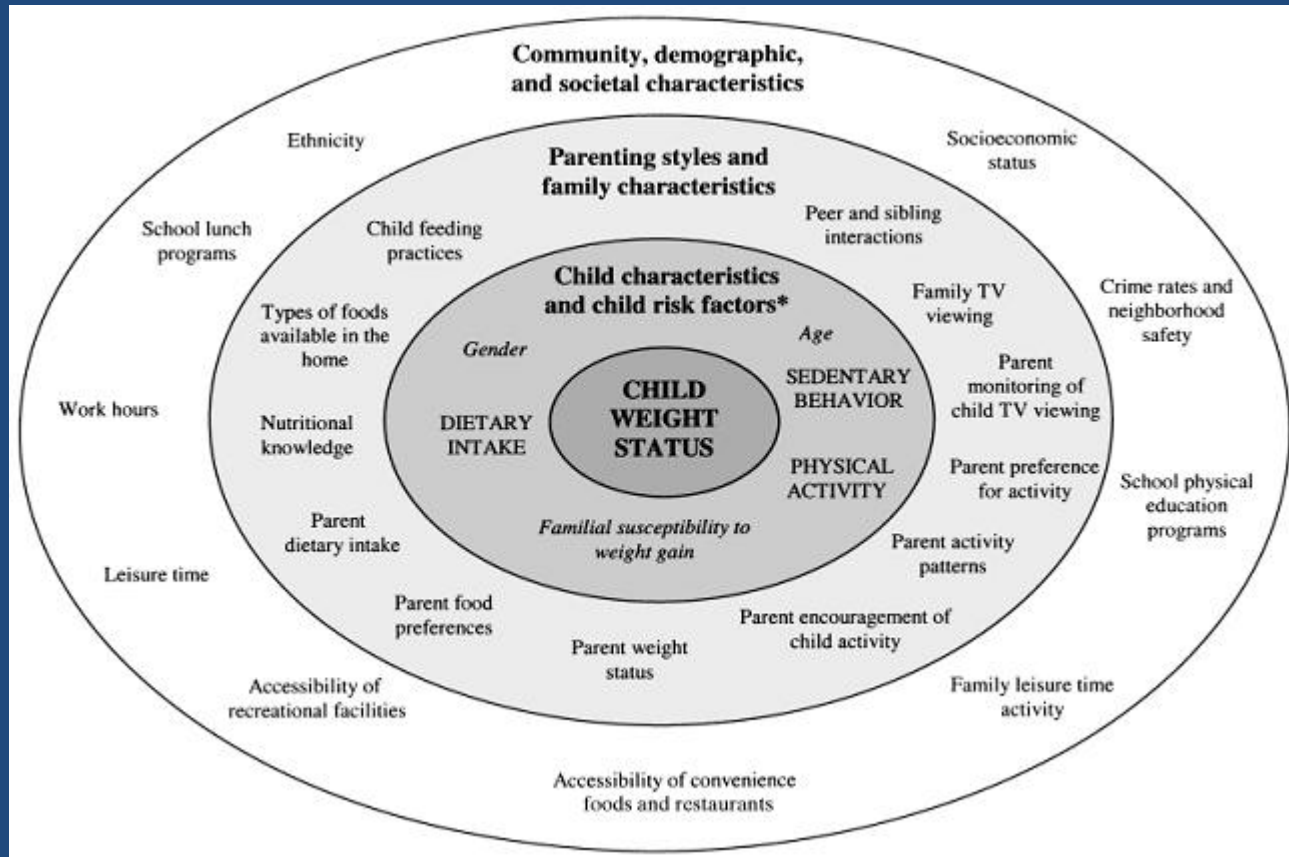
State of School Lunches

- Elementary School:
 - French fries and similar potato products and/or desserts in subsidized school meals > 1x/week- associated with a significantly higher likelihood of obesity.
- MS/HS Adolescents :
 - Low-nutrient, energy-dense foods in vending machines
 - Consumption of sugar-sweetened beverages has been associated with decreased consumption of milk and 100% fruit juices
 - Both associated with a higher BMI z score

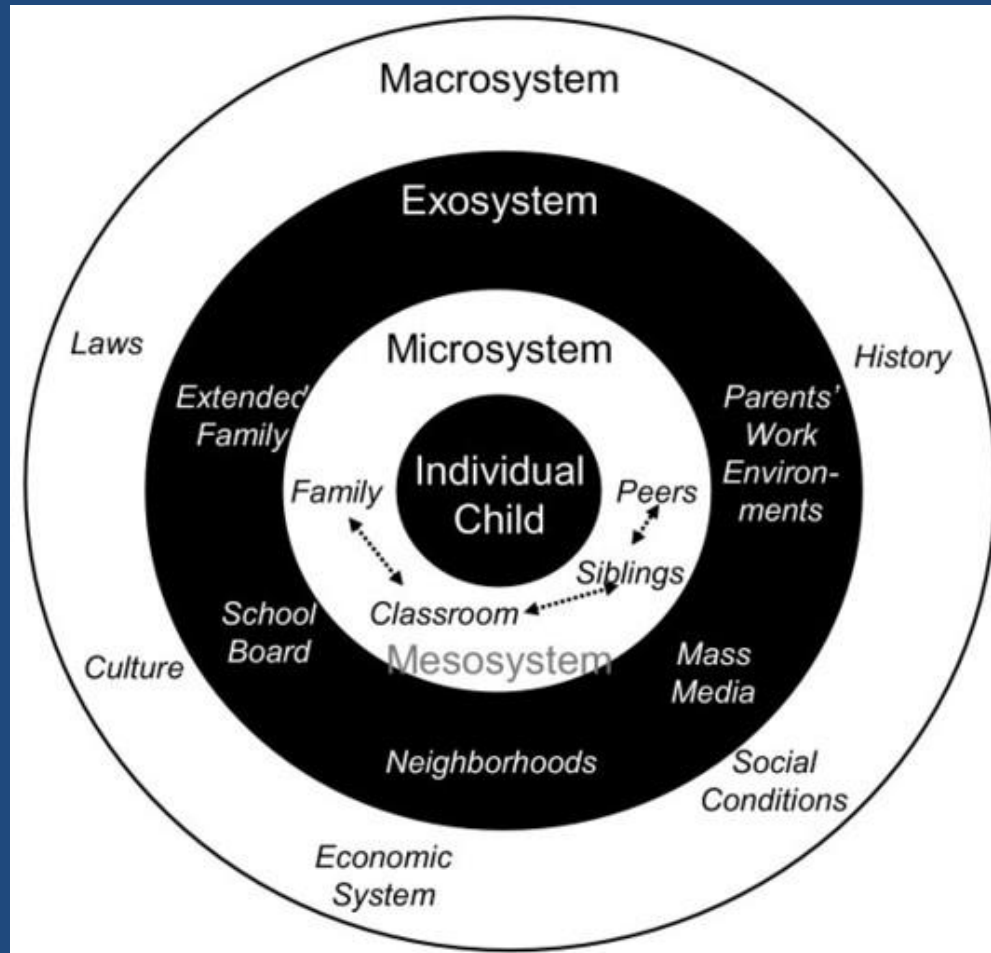
Best Practices for School Based Interventions



Model for Change



Another Perspective



Purpose/Implementation

- What is your purpose?

What Components Work best?

Physical Activity Recommendations



Physical Activity Patterns in Children

Current recommendations

- For all ages > than 2 years: 60 minutes of moderate-vigorous physical activity/day

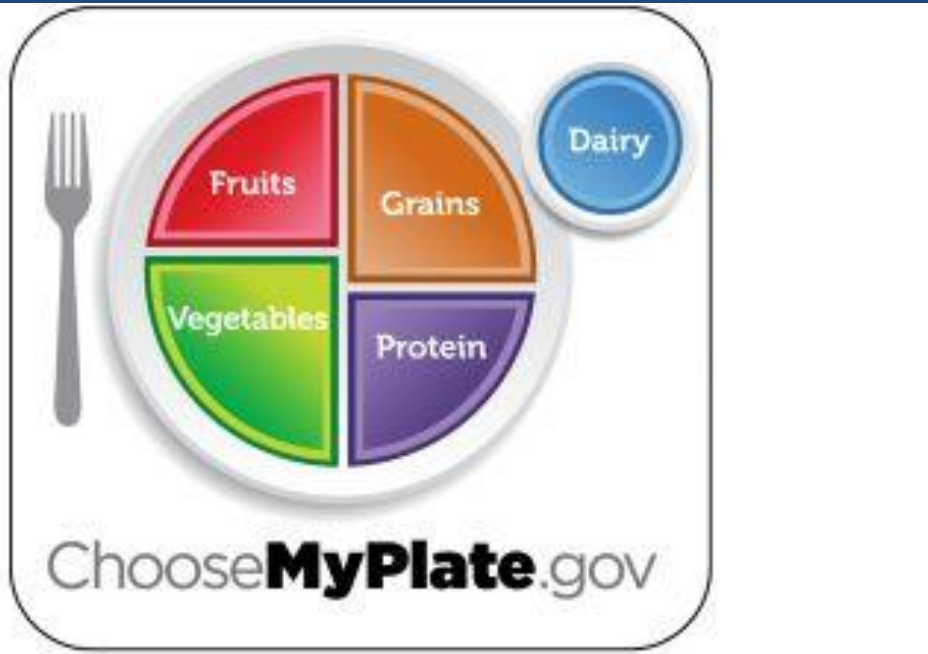
In School:

- 150 minutes of PhysEd/week for children in elementary school
- 225 minutes /week PhysEd middle school and high school.
 - 50% of class time should be spent in moderate to vigorous physical activity.



- <http://www.letsmove.org>

NEW FOOD PYRAMID



Balancing Calories

- Enjoy your food, but eat less.
- Avoid oversized portions.

Foods to Increase

- Make half your plate fruits and vegetables.
- Make at least half your grains whole grains.
- Switch to fat-free or low-fat (1%) milk.

Foods to Reduce

- Compare sodium in foods like soup, bread, and frozen meals — and choose the foods with lower numbers.
- Drink water instead of sugary drinks

Additional Components

Is There a “Best Age” Group?

Boy versus Girls

What about Race Ethnicity and SES?

How does Culture Fit into a School Based intervention?

Who Should Be involved?

Who Should Be involved?

- Parents or Caregivers

Who Should Be involved?

- Community-Based Interventions

Correct Outcome Measures?

- Are you evaluating incidence and prevalence of overweight and obesity?

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Future Research

- Deeper understanding of socio-cultural context of obesity
- Deeper understanding of psycho-social aspects
- Effectiveness of BMI notification- connecting the dots
- Clear measurable multiple outcomes- increased rigor!!
- Engaging all levels for change!!

Thank You!!! Questions?

