The Prevention of Childhood and Adolescent Obesity

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Overview

• A brief update on the obesity epidemic - and it’s consequences
• What can be done with children and youth that is science-based and will make a difference (and adults too)
• The importance of a broad theoretical framework
• The most effective science-based approaches are generally ignored - a discussion of why
The Problem:

- Obesity is increasing rapidly among children, youth and adults in the US
- Increases are found in all regions of the country, urban/rural, both sexes, all ethnic groups, rich and poor
Obesity Trends* Among U.S. Adults

BRFSS, 1990

(*BMI ≥ 30, or ~ 30 lbs overweight for 5’4” woman)

Source: Mokdad AH.
Obesity Trends* Among U.S. Adults

BRFSS, 1991

(*BMI ≥ 30, or ~ 30 lbs overweight for 5’4” woman)

No Data  <10%  10%-14%  15-19%  ≥20%

Source: Mokdad AH.
Obesity Trends* Among U.S. Adults

BRFSS, 1992

(*BMI ≥ 30, or ~ 30 lbs overweight for 5’4” woman)

Source: Mokdad AH.
Obesity Trends* Among U.S. Adults
BRFSS, 1993

(*BMI ≥ 30, or ~ 30 lbs overweight for 5’4” woman)

Source: Mokdad AH.
Obesity Trends* Among U.S. Adults

BRFSS, 1994

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Obesity Trends* Among U.S. Adults

BRFSS, 1999

(*BMI ≥ 30, or ~ 30 lbs overweight for 5’4” woman)

Obesity Trends* Among U.S. Adults

BRFSS, 2000

(*BMI ≥ 30, or ~ 30 lbs overweight for 5’4” woman)

The Consequences?

• Clear evidence for increasing risk of cardiovascular disease, diabetes, adult obesity and risk.

• But we don’t really know the magnitude: never before have our children and youth been so overweight (and we don’t know consequences for adults either).


Obesity Fundamentals

- Obesity is caused by excess Energy Intake minus Energy Expenditure

- Daily imbalance is on average small: lots of small seemingly inconsequential acts add up to a difficult problem over time - the “fat ratchet”

- A Strategy: Reducing risk based on science

Social and Behavioral Risks for Obesity: Examples

• Behavioral risks for obesity are structured by social context

• Physical activity of youth is limited by a lack of school and after-school physical activities and facilities

• Limited opportunity leads to more TV viewing (low activity along with commercial reinforcement for food)

• Placement of sodas and fast-foods everywhere alters the eating habits of children and youth
The Need for A Broad-Based Society and Health Perspective

• A focus on individual level risk factors does not address the importance of social context for sustainable change

• Mediating institutions are key: households, communities, schools, work-sites, churches, health-care organizations

• Social and economic structures influence institutional and policy change
The Production of Obesity in the United States

Social and Economic Structure
Physical Environment

Mediating Institutions and Policies: Community School Worksites Church Stores Health Care etc

Psychologic and Social Pathways: Household Peers

Individual Level: Energy Balance Activity Diet Television

Obesity
Some Science-Based Strategies That Can Reduce Obesity and Impact Caloric Imbalance
Television Viewing and Energy Balance: The Science

- A relatively new construct and focus of research: Is it scientific?
- How can television viewing cause obesity?
- Evidence in support of hypothesis
Hypothesized Impact of Television Viewing on Obesity

- Television Viewing
- Dietary Intake
- Inactivity
- Obesity
Evidence for the Impact of Television Viewing on Obesity

Population-Based Epidemiological Data
Prevalence of Obesity by Hours of TV per Day; NHES Youth Aged 12-17 in 1967-70 and NLSY Youth Aged 10-15 in 1990

Prevalence (%)

Evidence for the Impact of Television Viewing on Obesity

Randomized Controlled Trials
Randomized Controlled Trials: Television and Obesity

- **School-based intervention: primary grades;** impact on mean BMI (Robinson. JAMA. 1999.)
- **Clinical Intervention:** Obese children and youth; impact of reducing inactivity on overweight (Epstein et al. Health Psychol. 1995.)
- **School-based intervention; middle school;** reduced television predicts reduced obesity among girls (Gortmaker et al. Arch Pediatr Adolesc Med. 1999)
Why Schools?

- Most children and youth are in schools
- Schools are major settings for learning, physical activity, dietary intake
- A caveat: strategies must be compatible with the primary educational aims of schools
Planet Health

- Steven Gortmaker, PhD  PI
- Karen Peterson, RD, ScD  Co-PI
- Jean Wiecha, PhD  Project Director
- Nan Laird, PhD Co-Investigator

- Funding NICHD HD 30780
Interdisciplinary Curriculum

• A strategy in which health promotion materials are incorporated into existing school structure and core curricula, such as math, social studies, science, language arts and physical education.

• Emphasizes participation by regular classroom teachers.

Clark DC, Clark SN. Interdisciplinary curriculum: meeting the needs of young adolescents. Schools in the Middle. 1994;3:4-7.

Planet Health

- 6th-8th grade students in 10 ethnically diverse public schools, Boston MA metropolitan area
- Schools randomly assigned; 5 Intervention, 5 control
- Primary endpoint: obesity.
Summary

• Obesity among females in intervention schools was reduced compared to controls (OR 0.48; P=0.03)
• Reductions in TV; both boys & girls
• Among girls, each hour of TV => reduced obesity (OR 0.86/hour; P=0.02)
• Increases in fruit and vegetable intake and less increment in total energy intake among girls (P=0.003 and P=0.05)

Conclusion: There is clear evidence for television viewing as a cause of obesity

Less clear evidence on relative importance of mediating mechanisms (diet, activity, fat-free mass)

TV viewing is a measurable construct, and appears to be a direct indicator of the imbalance of dietary intake and expenditure that causes obesity
“Every few years, Gordon and the TV get a couple of inches wider.”
Points of Intervention: Television Viewing and Obesity

• **UPSTREAM**
  - Causes of TV Viewing
    • Individual
    • Institutional
    • Societal
  - Altering TV programming
    • Altering advertising
    • Programming that induces activity

• **DOWNSTREAM**
  - Television Reduction Interventions
  - Resisting Advertising Influence
    • Educational
    • Technical (e.g. VCR)
  - Being Active While Watching
    • Educational
    • Technical
The Important Forces:

- **Food producers and the "Fast Food" industry** - if they’re successful, we all eat more

- **Advertisers for food and video/film industries** - if they’re successful, we all buy more

- **Television and video/film production and distribution industry** - if they’re successful we all watch more
Some Other Science-Based Strategies
Eliminate Sugar-Sweetened Beverage and Candy Machines at School

- Studies document impact on energy intake and obesity

- No nutritional value beyond calories


Some Science-Based Strategies That Can Improve Physical Activity Levels via Changed Environments
Implement More Physical Education in Schools & More Active PE

• **Randomized controlled trials indicate effectiveness in increasing activity levels in Physical Education (PE) classes**

• **Randomized controlled trial indicates no negative test score impact of active PE**


Implement Policies and Environmental Programs to Encourage Play & Walking

- Make streets, playgrounds, intersections, local environments, safer
- Parent involvement is key: walking to school, organizing sports means time with children
- Expand Opportunities! Programs!

A Broad Range of Strategies:

- Families
- School programs
- After-school care programs
- Youth sports and recreation programs
- Improve community structural environment
Relationship of School Safety and Children Watching 5+ Hours/Day*

Percent Watching 5+ Hours/Day

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<td>45</td>
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P<0.001

*NLSY, 1992 US survey of 1,513 youth ages 10-15

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Tritrac R3D Activity Monitors

- Monitors provide estimates of movement in 3-planes using minute intervals - signals processed and stored read every minute
- Random sample of 139 7th-8th grade students from 5 schools in Massachusetts
- Wore monitors on waist (like "Walkman") for four days each
- Results based on 1,017,421 person/minutes of observation
Figure 1: Percent of Half-Hour Weekday Time Periods With Tritrac Vector Magnitude <250 (~1.5 MET); N=139; 1,017,421 person/minutes
Figure 2: Percent of Half-Hour Weekday Time Periods With Tritrac Vector Magnitude >1000 (~3.0 MET); N=139; 1,017,421 person/minutes
Note the two “high” points of inactivity and moderate/vigorous activity on weekdays:

1) after school at 2 PM

2) before school at 7:30 am
Time spent at $\geq 3.0$ METS

1) averages 1.1 hours/day for males, 0.9 hours/day for females

2) Most bouts of activity are of short duration
Time spent at $\leq 1.5$ MET during waking hours:

1) averages 11 hours/day

2) Television viewing about 30% of this time
The Importance of Surveillance: Communities Must See There is a Problem If They are to Begin to Address the Problem

- No State at this point can tell you rates of obesity among children

- Yet school nurses collect massive amounts of weight and height data that are never tabulated

- This is an opportunity to do less and do better!