Can 100 Calories/Day Make a Meaningful Difference for Weight Control

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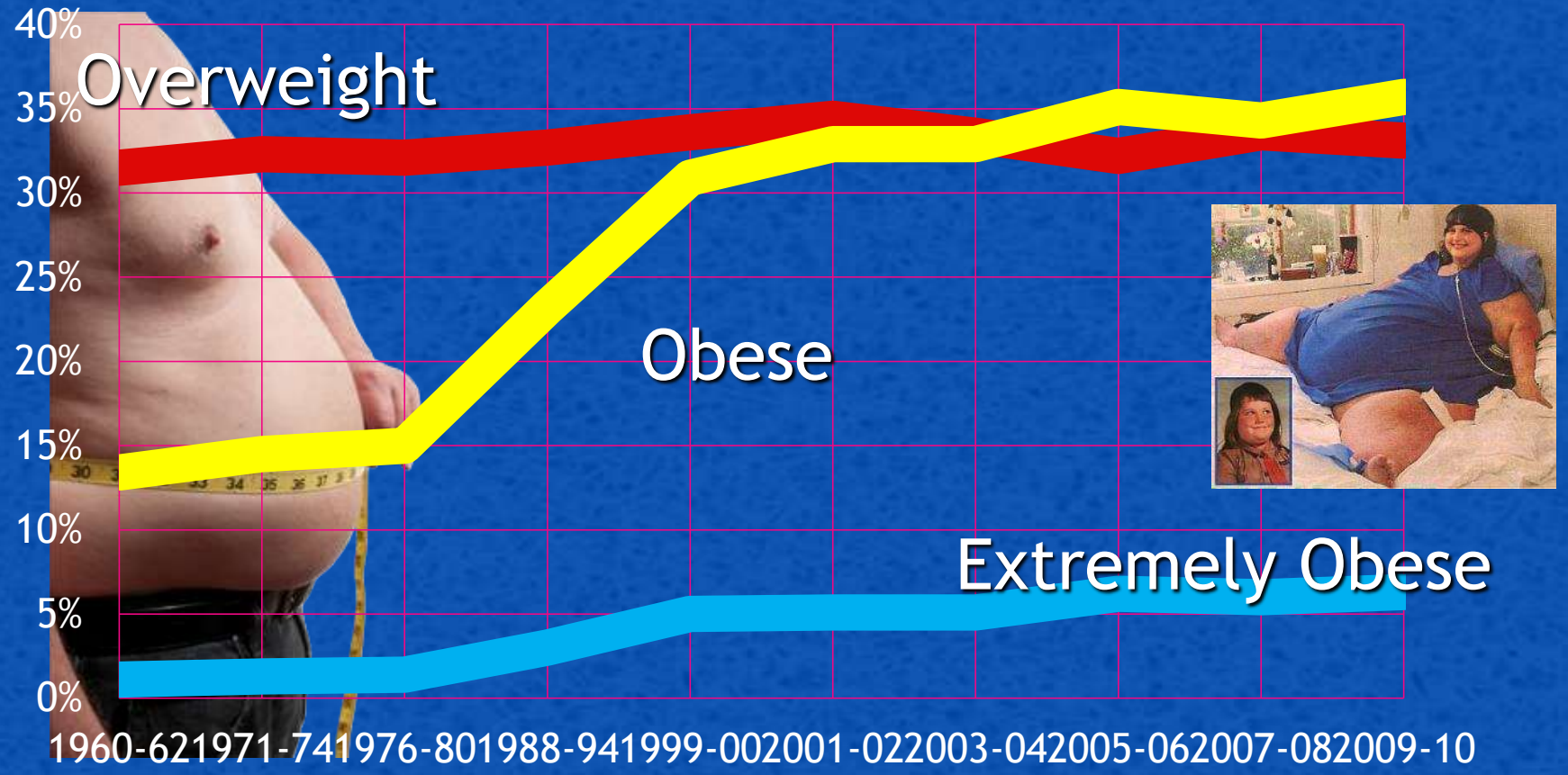
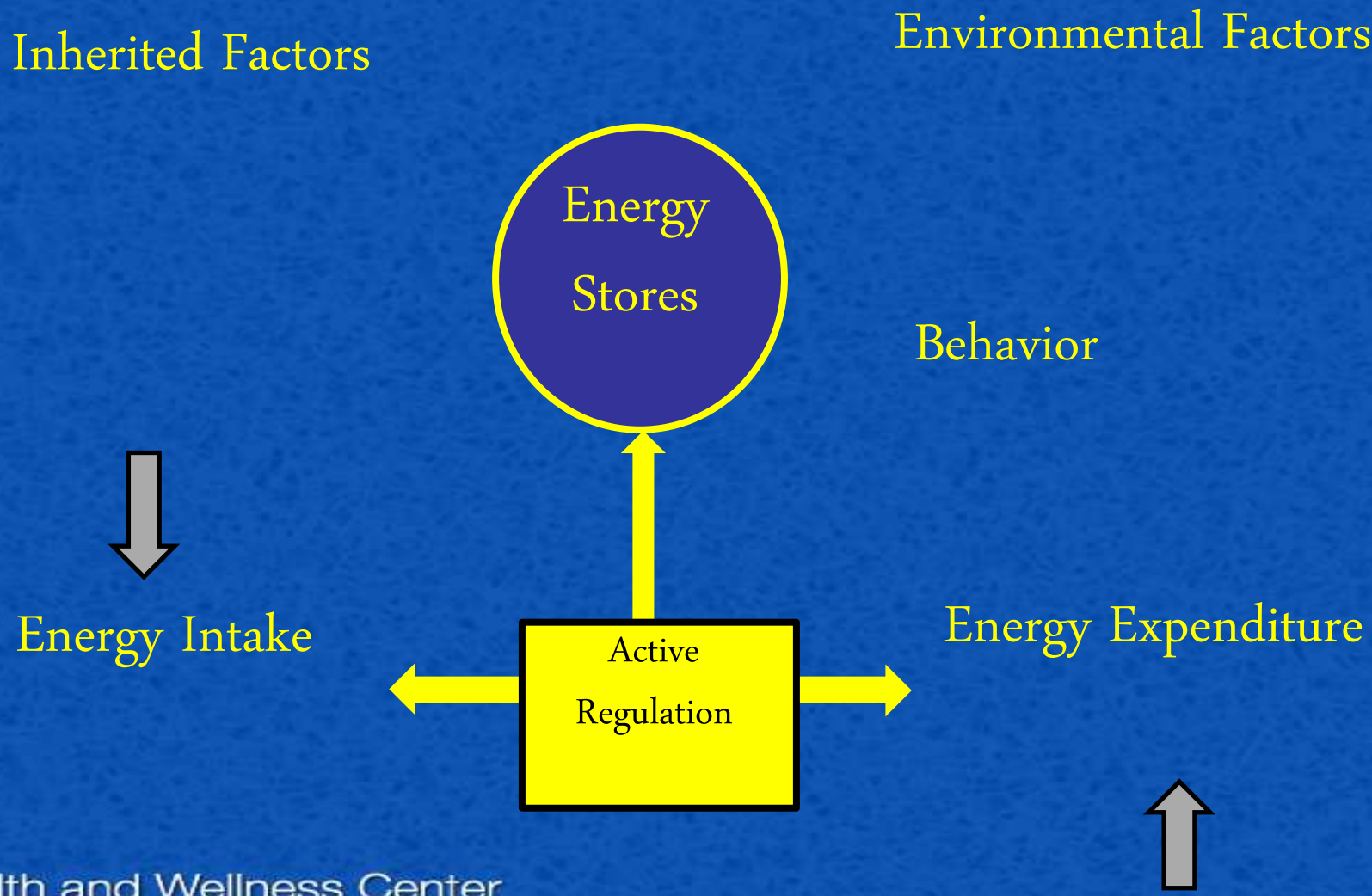
Trends in overweight, obesity and extreme obesity, ages 20-74 years



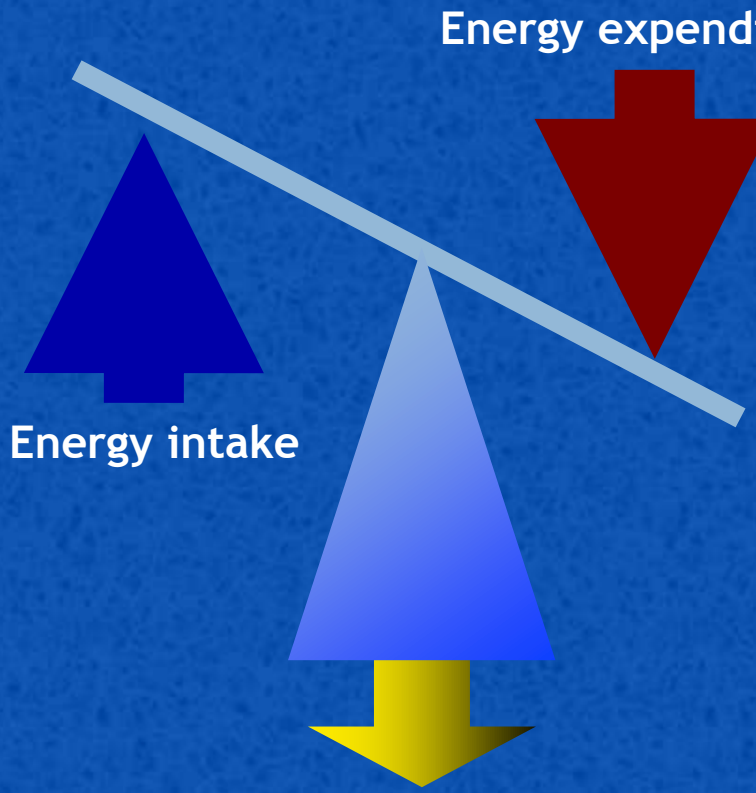
Note: Age-adjusted by the direct method to the year 2000 US Bureau of the Census using age groups 20-39, 40-59 and 60-74 years. Pregnant females excluded. Overweight defined as 24,=BMI; obesity defines as BMI>=30; Extreme obesity defines as BMI>=40.

What to do?
The Energy Balance System



Multi-factoral causes

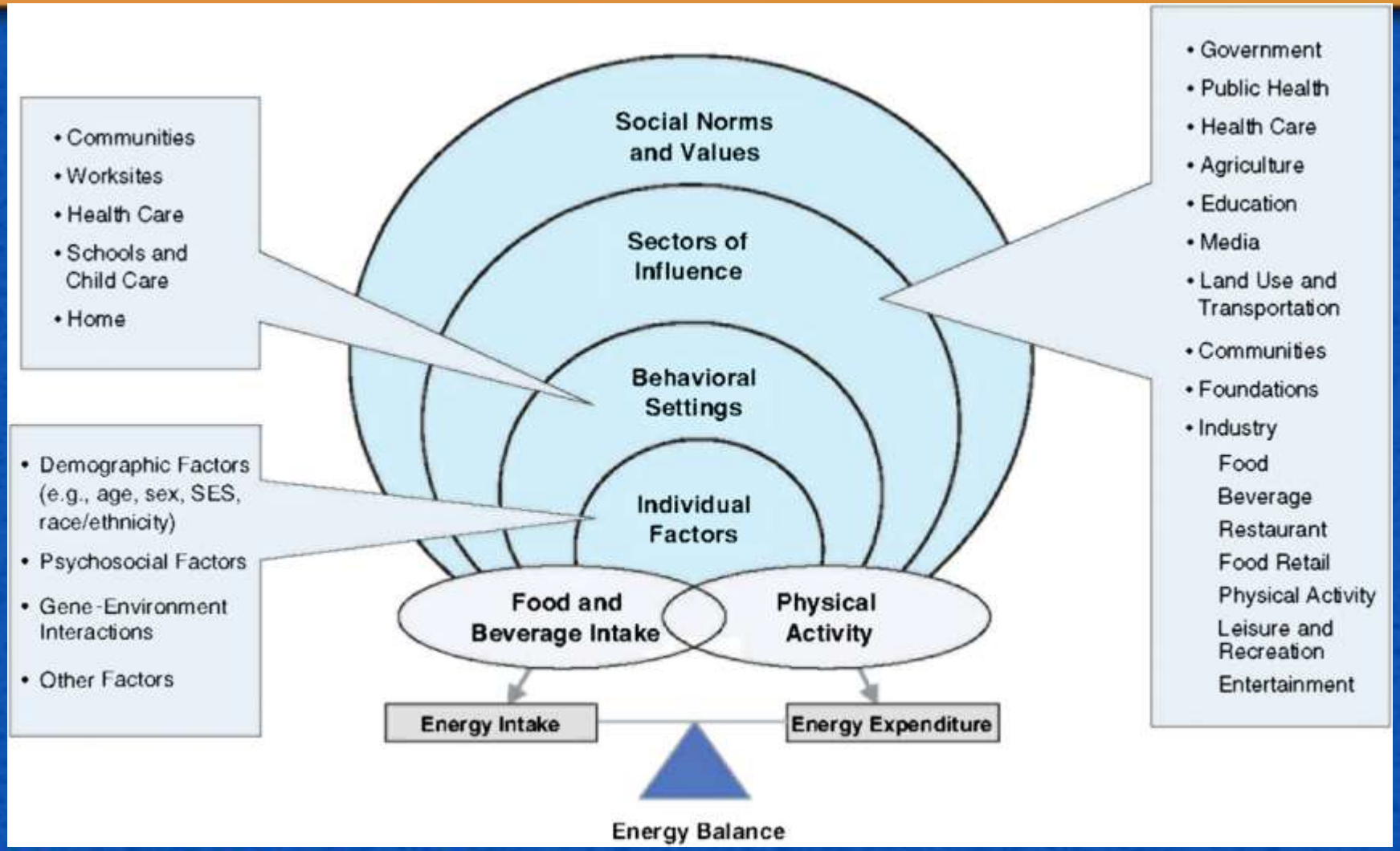
Portion size
High energy density
High glycemic index
Soft drinks/"junk food in schools
Added sugar
Easy food access
Low cost
Variety
Convenience
Great taste
Ads/marketing



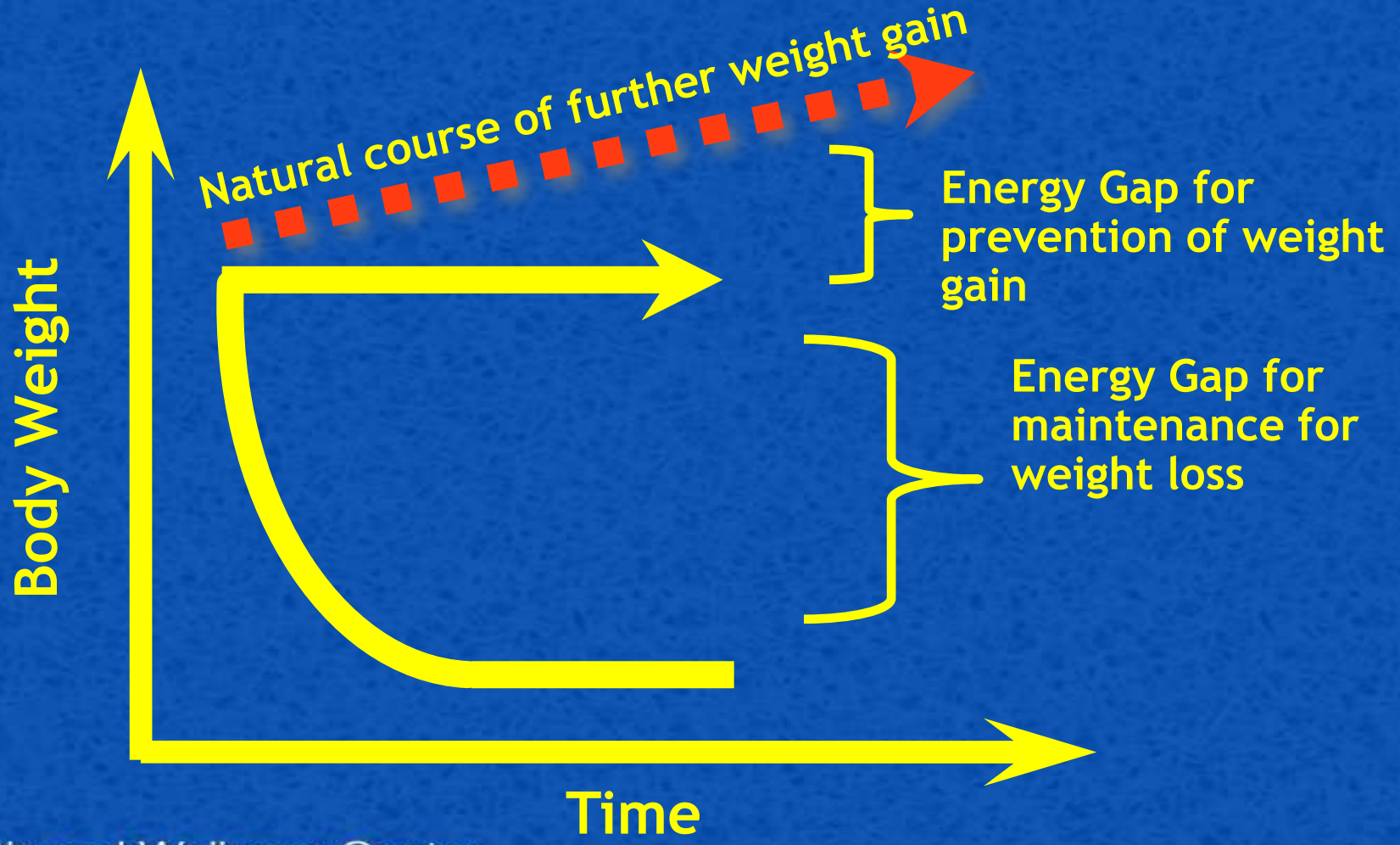
WEIGHT GAIN

Sedentary workplaces
Sedentary schools
Activity "unfriendly" community design
Automobiles
Drive-through conveniences
Elevators/escalators
Remote controls
Sedentary entertainment
Labor saving devices
Television/computer

Socioecological Models



What will it take to reduce obesity? The energy gap



Comparison of weight loss diets with different compositions of fat, protein and carbohydrates (n=811)

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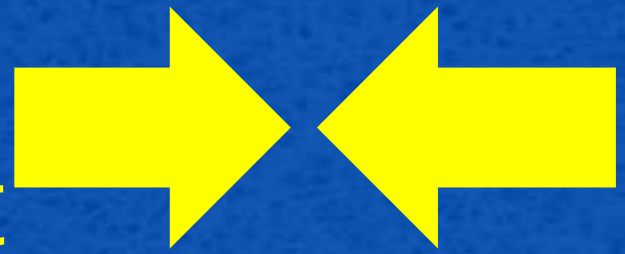
Sacks FS. et al. *NEJM* 2009;360(9) 859-873.

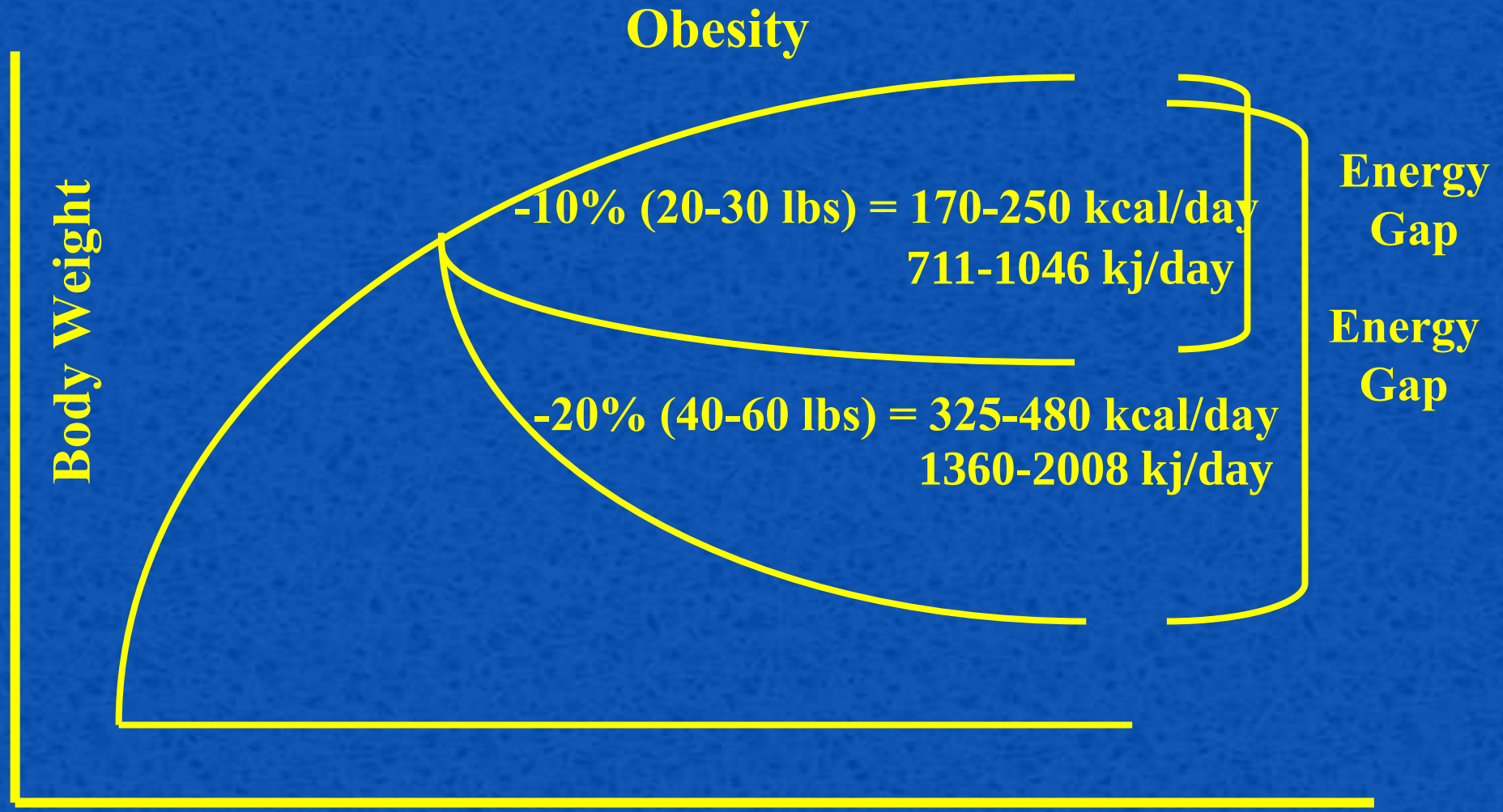
Why is Weight Loss Maintenance Hard?

Biology
Environment



Behavior

How Much Behavior Change: Concept of Energy Gap

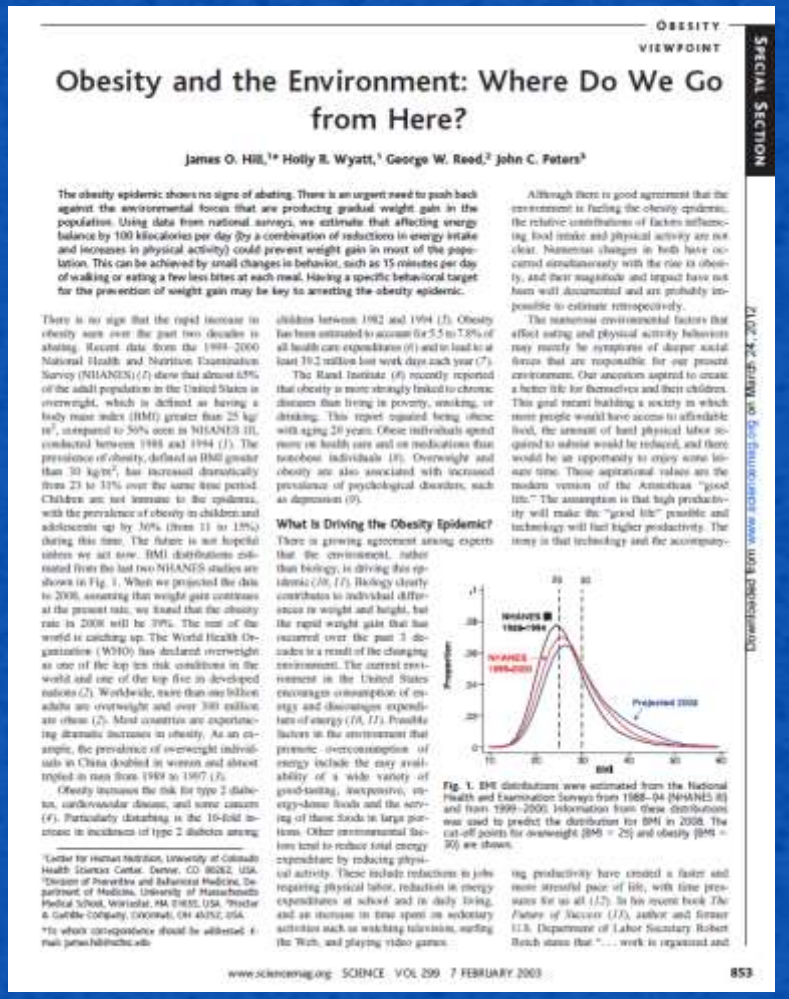


The National Weight Control Registry

What they do: Commonalities among NWCR Participants in weight maintenance

- Low fat diet, attention to calories
- Self-monitoring
- Behavioral consistency
- Dietary restraint
- Breakfast
- High levels of physical activity

The birth of small changes



OBESITY
VIEWPOINT

SPECIAL SECTION

Obesity and the Environment: Where Do We Go from Here?

James O. Hill,[1]* Holly R. Wyatt,[1] George W. Reed,[2] John C. Peters[3]

The obesity epidemic shows no signs of abating. There is an urgent need to push back against the environmental forces that are producing gradual weight gain in the population. Using data from national surveys, we estimate that affecting energy balance by 100 kilocalories per day (by a combination of reductions in energy intake and increases in physical activity) could prevent weight gain in most of the population. This can be achieved by small changes in behavior, such as 15 minutes per day of walking or eating a few less bites at each meal. Having a specific behavioral target for the prevention of weight gain may be key to arresting the obesity epidemic.

There is no sign that the rapid increase in obesity seen over the past two decades is abating. Recent data from the 1999–2000 National Health and Nutrition Examination Survey (NHANES) (*1*) show that almost 65% of the adult population in the United States is overweight, which is defined as having a body mass index (BMI) greater than 25 kg/m^2, compared to 56% seen in NHANES III, conducted between 1988 and 1994 (*1*). The prevalence of obesity, defined as BMI greater than 30 kg/m^2, has increased dramatically from 23 to 31% over the same time period. Children are not immune to the epidemic, with the prevalence of obesity in children and adolescents up by 36% (from 11 to 15%) during this time. The future is not hopeful unless we act now. BMI distributions estimated from the last two NHANES studies are shown in Fig. 1. When we projected the data to 2008, assuming that weight gain continues at the present rate, we found that the obesity rate in 2008 will be 39%. The rest of the world is catching up. The World Health Organization (WHO) has declared overweight as one of the top ten risk conditions in the world and one of the top five in developed nations (*2*). Worldwide, more than one billion adults are overweight and over 300 million are obese (*2*). Most countries are experiencing dramatic increases in obesity. As an example, the prevalence of overweight individuals in China doubled in women and almost tripled in men from 1989 to 1997 (*3*).

Obesity increases the risk for type 2 diabetes, cardiovascular disease, and some cancers (*4*). Particularly disturbing is the 10-fold increase in incidences of type 2 diabetes among children between 1982 and 1994 (*5*). Obesity has been estimated to account for 5.5 to 7.8% of all health care expenditures (*6*) and to lead to at least 39.2 million lost work days each year (*7*).

The Rand Institute (*8*) recently reported that obesity is more strongly linked to chronic diseases than living in poverty, smoking, or drinking. This report equated being obese with aging 20 years. Obese individuals spend more on health care and on medications than nonobese individuals (*8*). Overweight and obesity are also associated with increased prevalence of psychological disorders, such as depression (*9*).

What Is Driving the Obesity Epidemic?

There is growing agreement among experts that the environment, rather than biology, is driving this epidemic (*10*, *11*). Biology clearly contributes to individual differences in weight and height, but the rapid weight gain that has occurred over the past 3 decades is a result of the changing environment. The current environment in the United States encourages overconsumption of energy and discourages expenditure of energy (*10*, *11*). Possible factors in the environment that promote overconsumption of energy include the easy availability of a wide variety of good-tasting, inexpensive, energy-dense foods and the serving of these foods in large portions. Other environmental factors tend to reduce total energy expenditure by reducing physical activity. These include reductions in jobs requiring physical labor, reduction in energy expenditures at school and in daily living, and an increase in time spent on sedentary activities such as watching television, surfing the Web, and playing video games.

Although there is good agreement that the environment is fueling the obesity epidemic, the relative contributions of factors influencing food intake and physical activity are not clear. Numerous changes in both have occurred simultaneously with the rise in obesity, and their magnitude and impact have not been well documented and are probably impossible to estimate retrospectively.

The numerous environmental factors that affect eating and physical activity behaviors may merely be symptoms of deeper social forces that are responsible for our present environment. Our ancestors aspired to create a better life for themselves and their children. This goal meant building a society in which more people would have access to affordable food, the amount of hard physical labor required to subsist would be reduced, and there would be an opportunity to enjoy some leisure time. Those aspirational values are the modern version of the Aristotelian "good life." The assumption is that high productivity will make the "good life" possible and technology will fuel higher productivity. The irony is that technology and the accompanying productivity have created a faster and more stressful pace of life, with time pressures for us all (*12*). In his recent book *The Future of Success* (*13*), author and former U.S. Department of Labor Secretary Robert Reich states that "... work is organized and

Fig. 1. BMI distributions were estimated from the National Health and Examination Surveys from 1988–94 (NHANES III) and from 1999–2000. Information from these distributions was used to predict the distribution for BMI in 2008. The cut-off points for overweight (BMI = 25) and obesity (BMI = 30) are shown.

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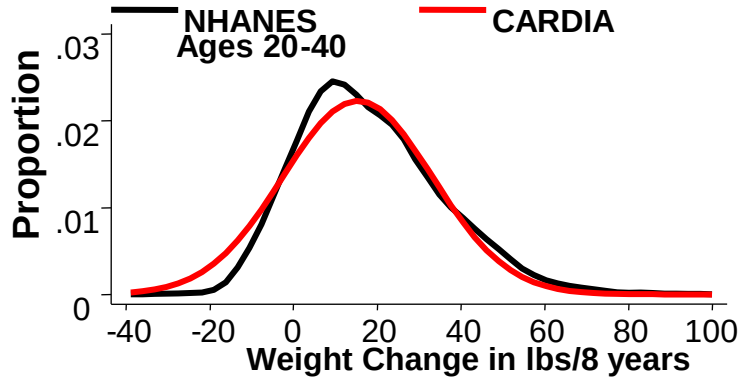
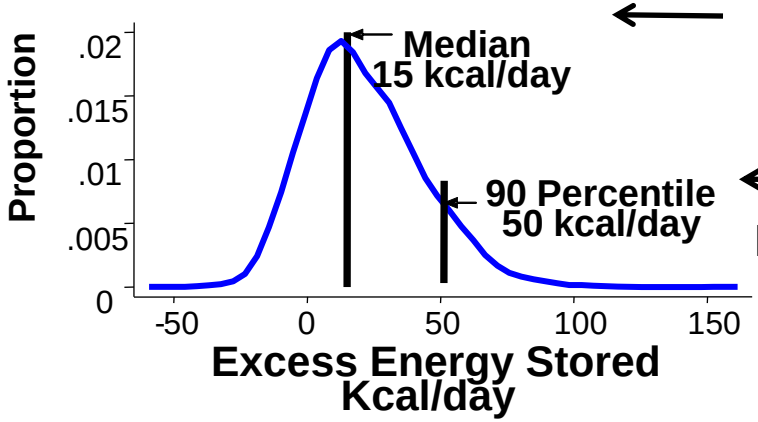
How big is the "Energy Gap" to prevent primary weight gain?



Assuming 50% storage efficiency



Energy gap = 30 kcal/d

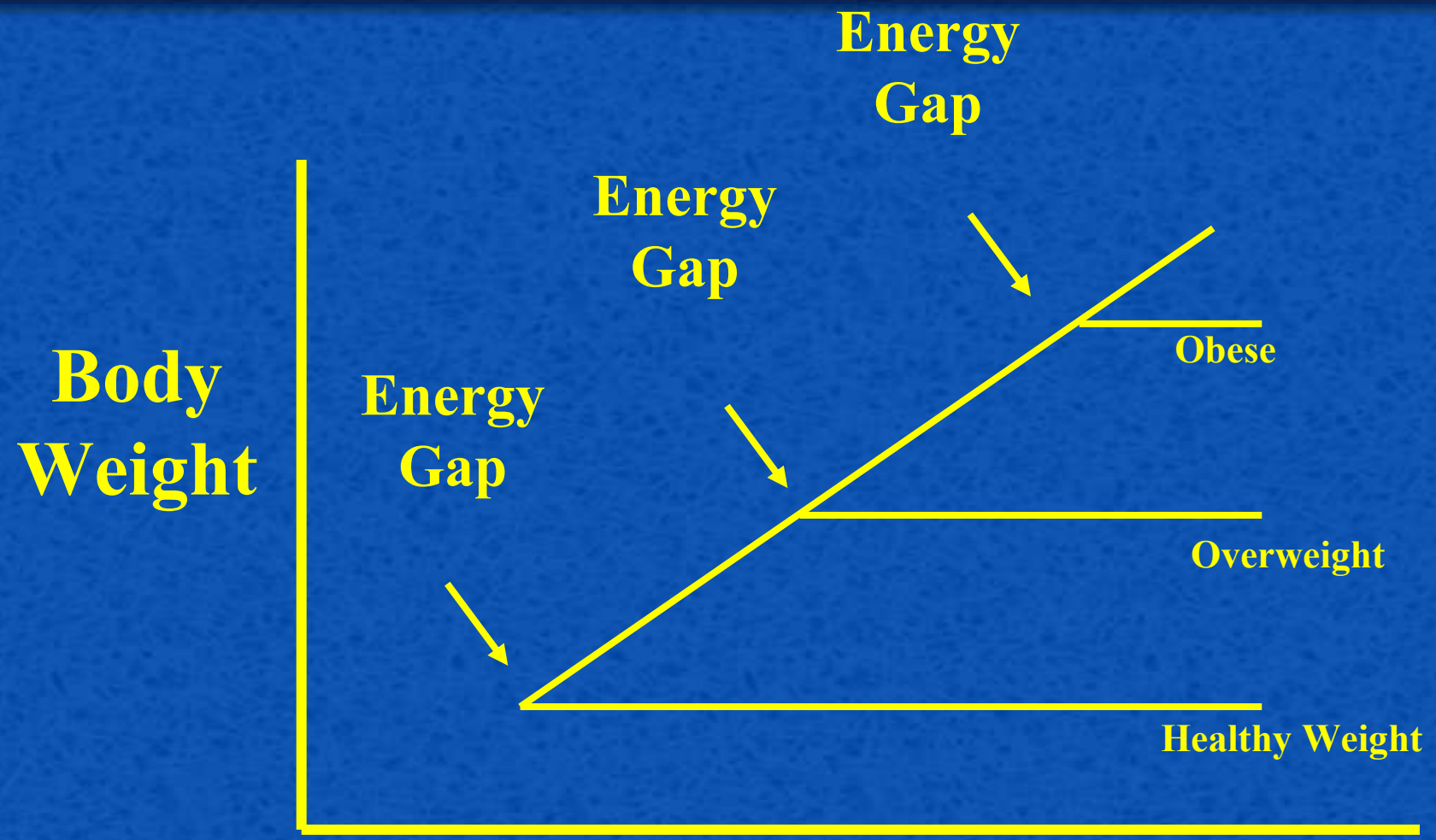
Energy gap = 100 kcal/d

Hill et al., Science 299:853, 2003

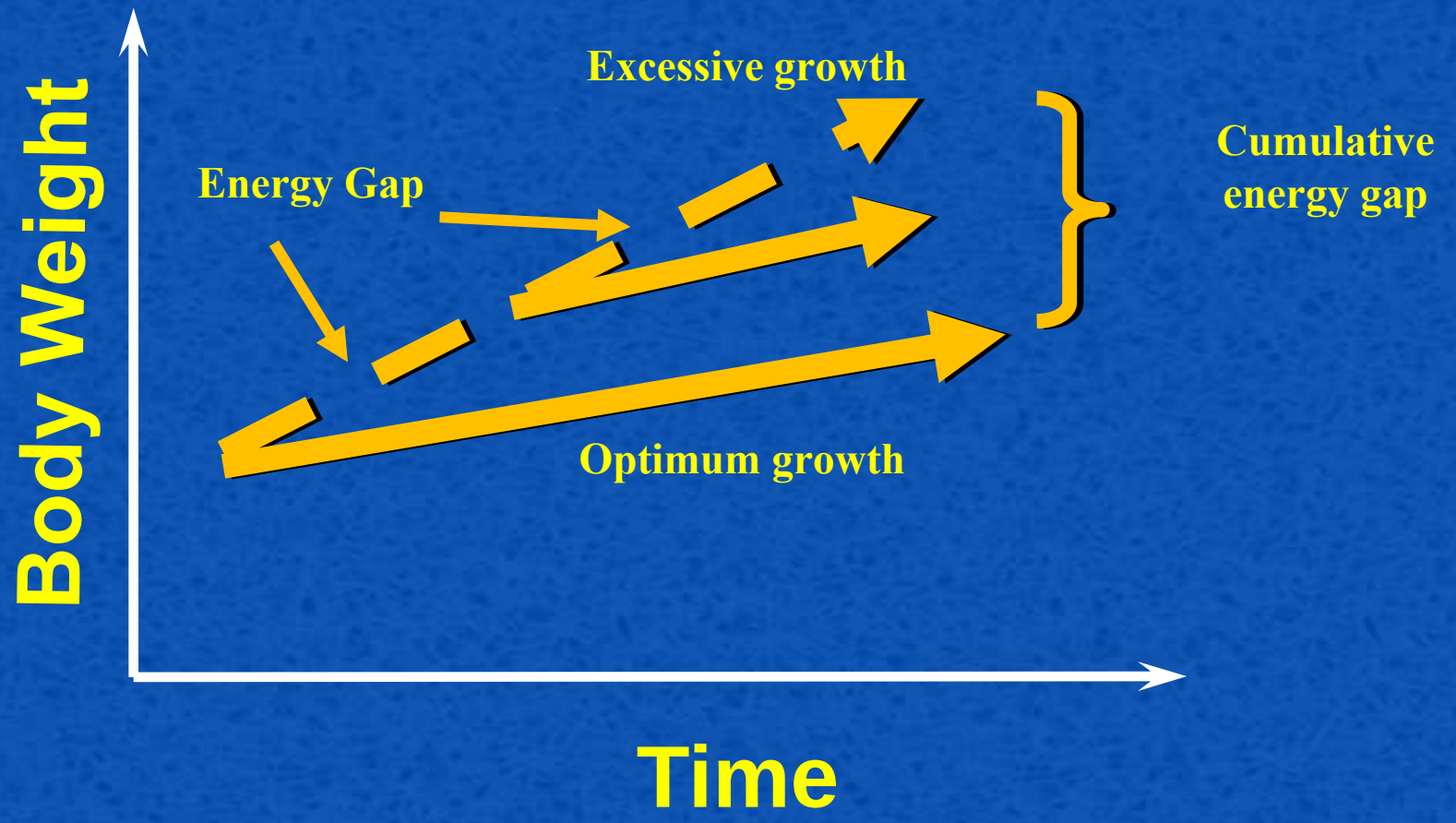
A very small error in energy balance can explain most weight gain

- The median weight gain among American adults during the rise in obesity was 1.8 pounds per year (0.82 kg) – imbalance is much smaller in most countries
- This represents an excess energy intake of 30 kcal/d (126 kJ).
- Assuming average energy intake of 2400 kcal/d (10,000 kJ) this is only a ***1.2% error***.

Energy Gap for Prevention of Weight Gain <100 kcal/day (<418 kj/day)

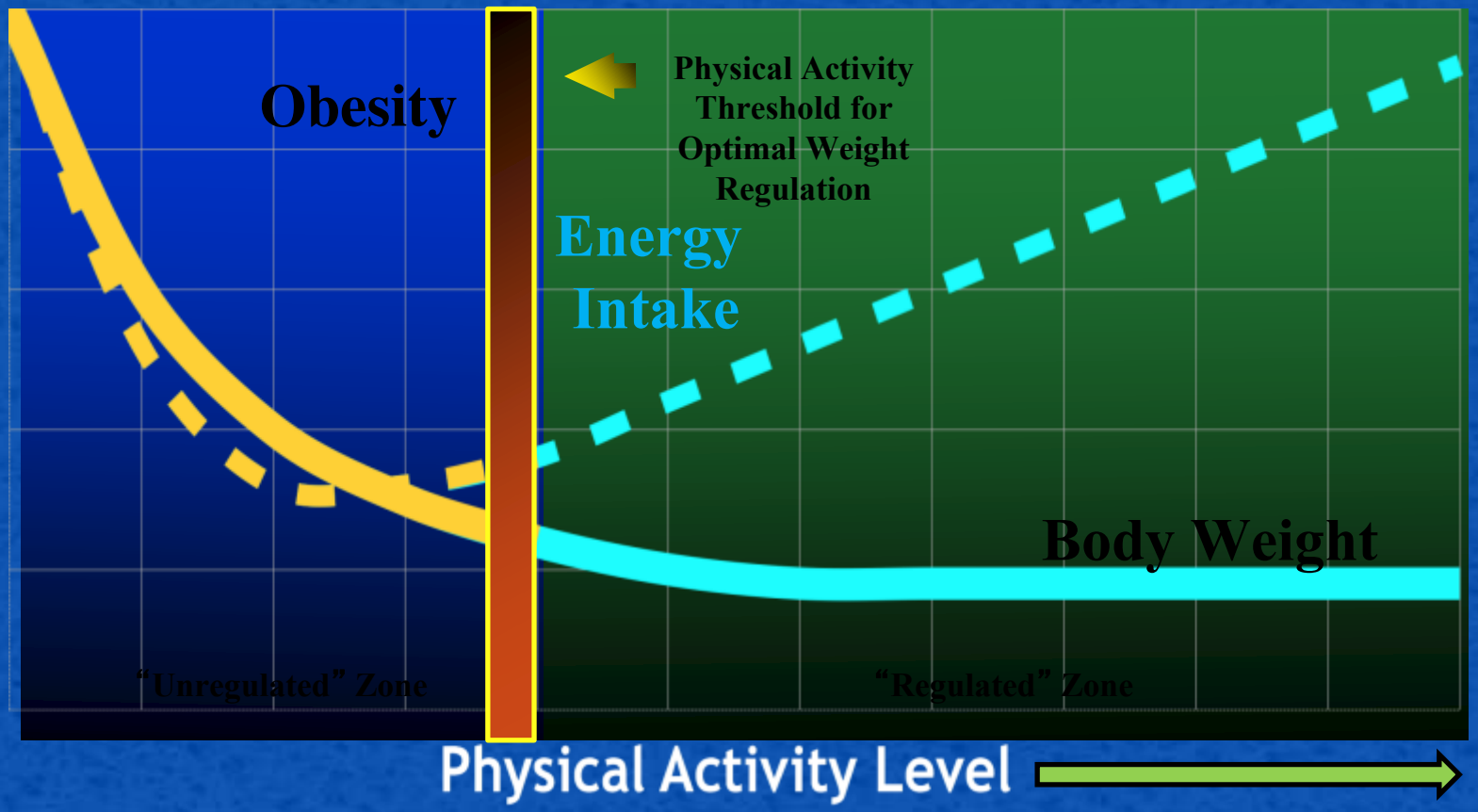


Energy Gap for Children (~150 kcal or 630 kj/day)



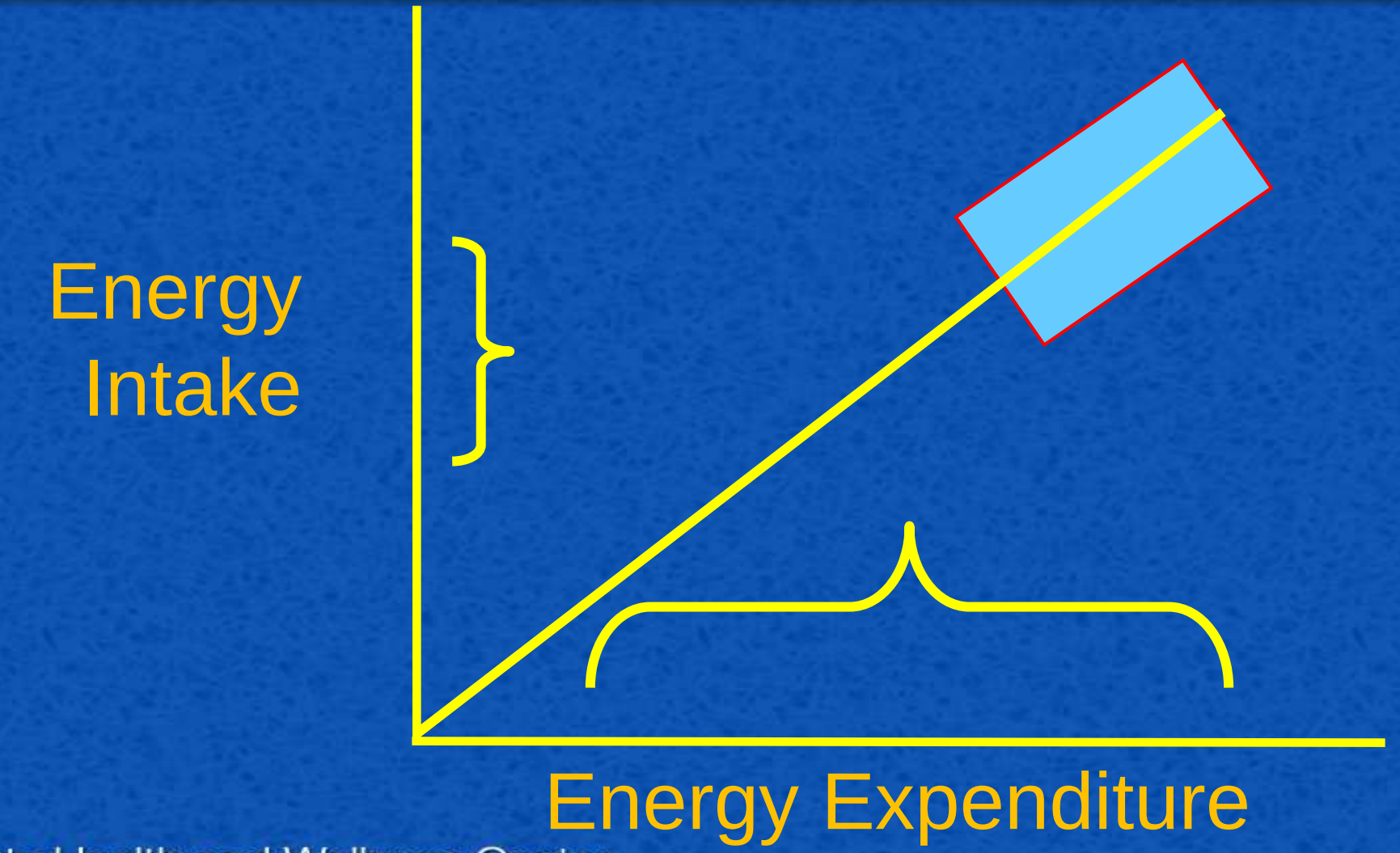
Where should we focus? Food *OR* Physical Activity?

Our biology works best at high level of physical activity



Adapted from Mayer et. al., 1956

Why Restriction is not the Answer



The launch of America on the Move

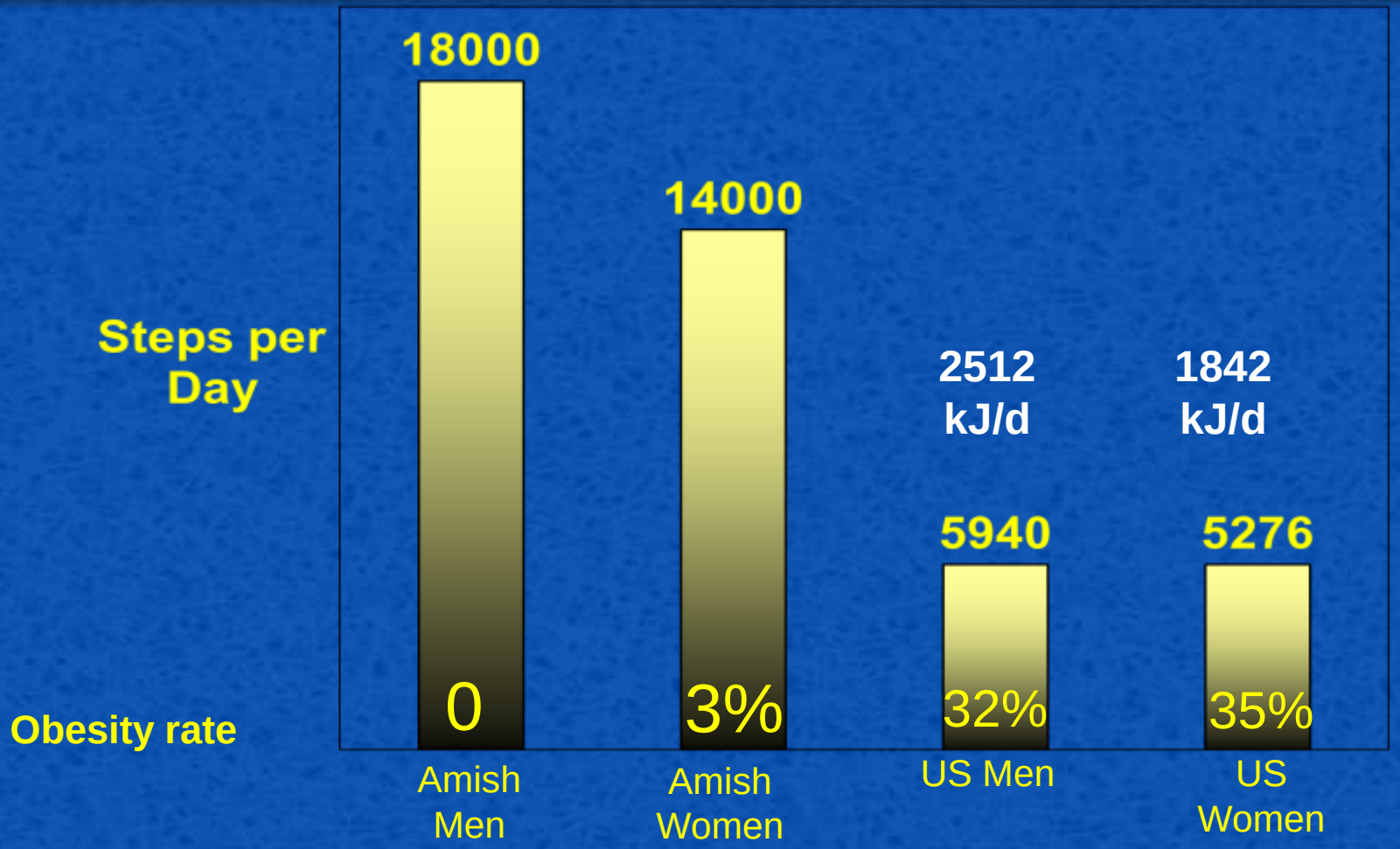
www.americaonthemove.org

What is America On the Move?

- A social movement – sparked by collaborative grassroots community effort
- A variety of ways for people of all ages to become more physically active and eat more healthfully
- A fun, easy approach to take control of yearly weight gain, that easily integrates into busy daily lives
- About healthy living and prevention of weight gain
- A tested program with proven, evidence-based results

SIMPLE • FUN • FLEXIBLE • EFFECTIVE

Walking: Old Order Amish vs. Current Population



From Bassett et.al., Med. And Sci. in Sports and Exer., 2004

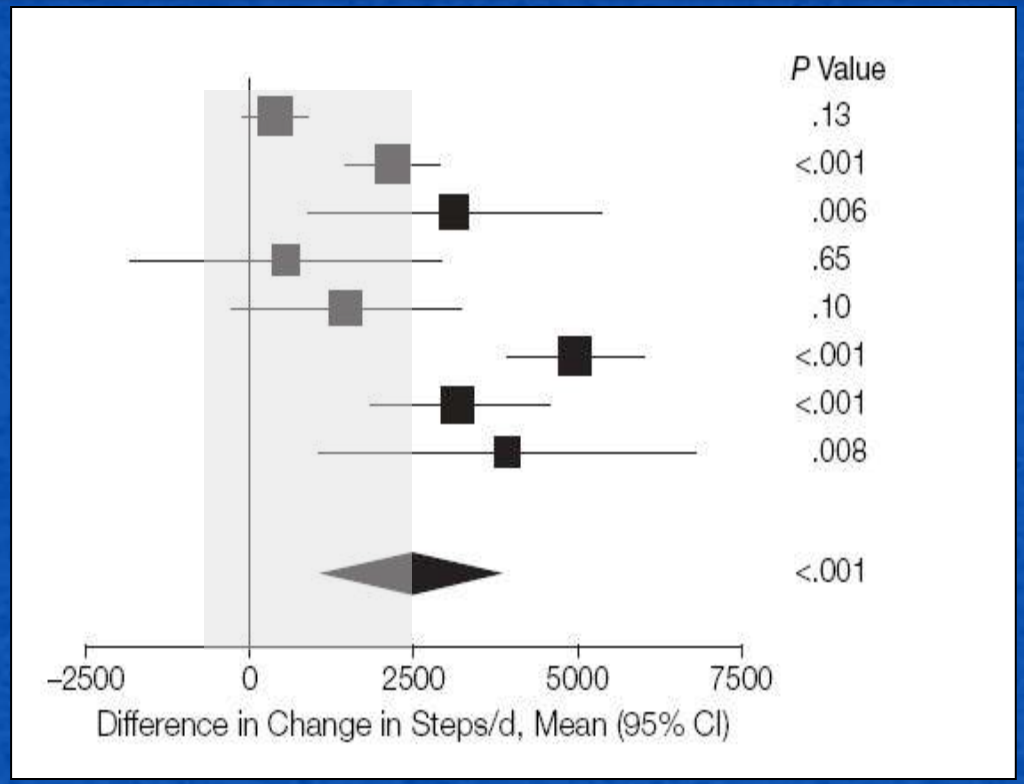
National Surveys

- National Step Survey, Harris 2003
- State Surveys in Colorado, Tennessee and Arkansas, 2003-2006

Average Steps/Day in 4 Surveys

	Men	*Women*	*Average*	*% Obese*
U.S.	**5940**	**5276**	**5608**	**22.8**
Colorado	**6733**	**6384**	**6558**	**16.0**
Tennessee	**4547**	**4730**	**4638**	**25.0**
Arkansas	**5143**	**4822**	**4982**	**26.5**

Pedometers To Increase Activity



Source: D.M. Bravata et.al., JAMA 298: 2296-2304, 2007

AOM Research

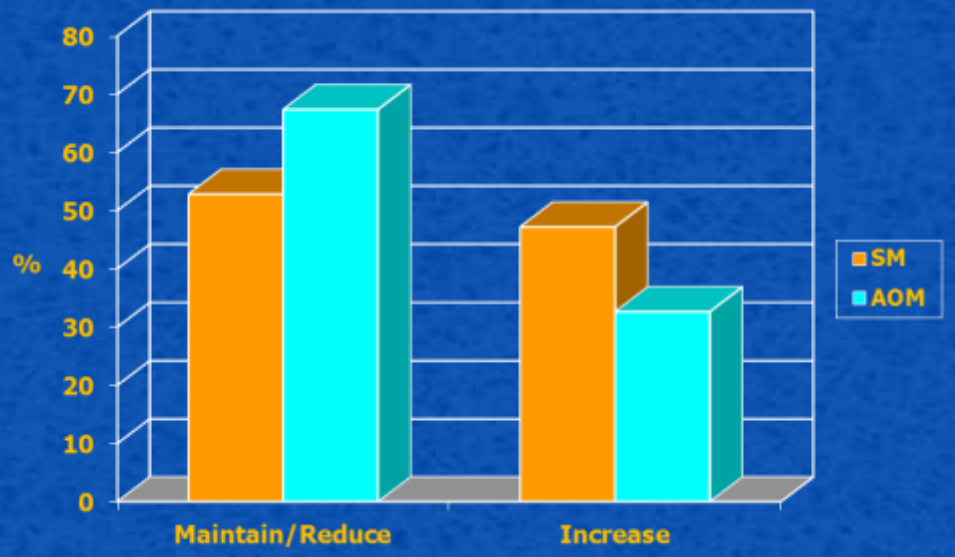
- 2000 steps message increases phys act - published
- -100 kcal message decreases energy intake - published
- Colorado state survey – phys act & diet - published
- Surveys in U.S., Tennessee, Arkansas - published
- Family intervention 1 – published
- Family intervention 2 - published
- AOM and small changes in school lunches – published
- Physical activity in Colorado kids – published
- AOM in college students – ongoing study

Small change research

America On the Move Family Studies:

Reduced weight gain in overweight children and parents over 16 weeks – *Obesity 2006*

Reduced weight gain in overweight children over 6 months – *Pediatrics 2007*



What role can small changes play if we need bigger systemic change?

Set the table for bigger change… have to start somewhere…

Any change… ing some risk…

There… things we can do NOW that may slip by unnoticed…

Stealth Health

A better approach: Healthy Defaults

- Disney parks
  - Kid's meals come with low fat milk and fruit
- Starbucks
  - Drinks made with low fat milk
- Portion sizes/energy density
  - Would anyone notice a 5% reduction?
- School drop offs
  - Buses and cars drop kids off 500 steps from school

Small Change: Use of low calorie sweeteners (LCS)

Replacing food/beverages containing caloric sweeteners (e.g. sugar) with LCS will reduce total energy intake unless:

- Complete compensation for the caloric reduction produced
- “trick the brain” so more calories are consumed

COMMENTARY

Artificially Sweetened Beverages
Cause for Concern

David S. Ludwig, MD, PhD

"Even if diet drinks produce long-term weight loss when substituted for sugar-sweetened beverages, they might cause weight gain when consumed instead of unsweetened drinks."

Ludwig. JAMA Dec 9, 2009;302(22):2477-8.

Low Calorie Sweeteners (LCS) in NWCR

- <10% consume sugar sweetened beverages
- 53% consume LCS
- NWCR participants consumer 3x more LCS than normal weight controls

LCS use in NWCR

Reasons for Consumption

- Taste
- Satisfy thirst
- Control calories eaten

Reasons for Non Consumption

- Concern over safety
- Concern over impact on weight

Specific Aim:

1. To test the hypothesis that the amount of weight lost and maintained over time in an intensive behavioral weight management program will be equivalent in subjects consuming soda containing non-nutritive sweeteners (NNS) compared to water beverages.

Design

- Randomized controlled “equivalence” trial at two study sites: Univ. Colorado, Temple U.
- Parallel treatment groups: NNS, water
- One year treatment: 3 months weight loss, 9 months weight maintenance
- 300 total subjects—150 per site
- Men and women ages 21-65, BMI 27-40
- Regular NNS beverage drinkers: >3X/wk
- Cognitive Behavior Therapy, group based, weight loss method

First Publication

Obesity – May 2014

Results embargoed until May 28, 2014

Press release from The Obesity Society on May 28, 2014

Creating Healthy Environments

Supply

Demand

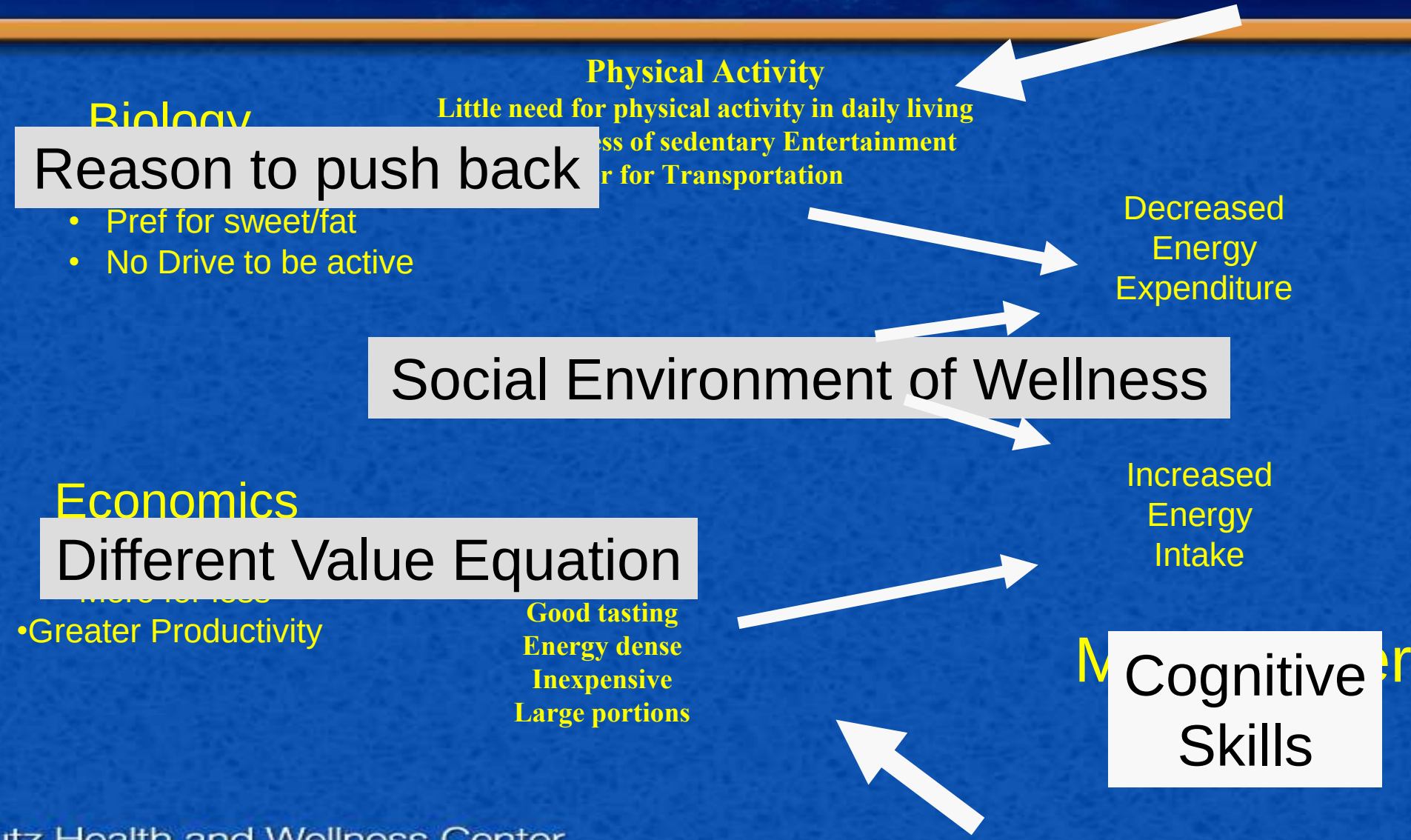
Access
Affordability
Marketing
Urban Design

ns

Available

Desire for Healthy Options

Biology, Behavior & Environment



Summary

- Small changes can have a big impact on body weight
- Works with behavior and the environment
- Sustainability a challenge even with small changes – need a powerful “why”

We do not yet know to produce meaningful reductions in obesity rates in the population

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