

**Obesity in the 21st-century: It's more than just behavior.**

# **Obesity: A multifactorial disease**

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# Disclosures

**Martin Binks PhD., FTOS** has financial or other relationship(s) with the following companies and or organizations:

- Takeda Pharmaceutical (Speaker)
- Novo Nordisk (Speaker)
- WorldCare International Inc. (Consultant)
- International Food Information Council (Non-profit; Scientific Advisory Board)
- Coca Cola Company (Received 5K in Student Travel Grants)
- Binks Health (Consultant - Proprietor)
- Nestle Health Science (Research Grant)
- The Obesity Society (Secretary Treasurer-Development Chair)



# Objectives:

- Provide an overview of the disease of obesity.
- Address public and professional misperceptions surrounding the causes, maintaining factors and remedies for obesity.
- Summarize future directions and encourage fresh perspectives and inclusive approaches.



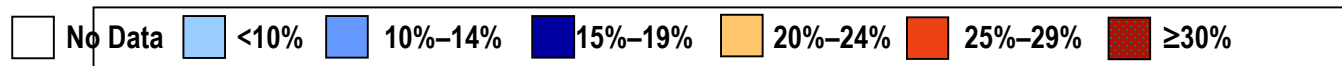
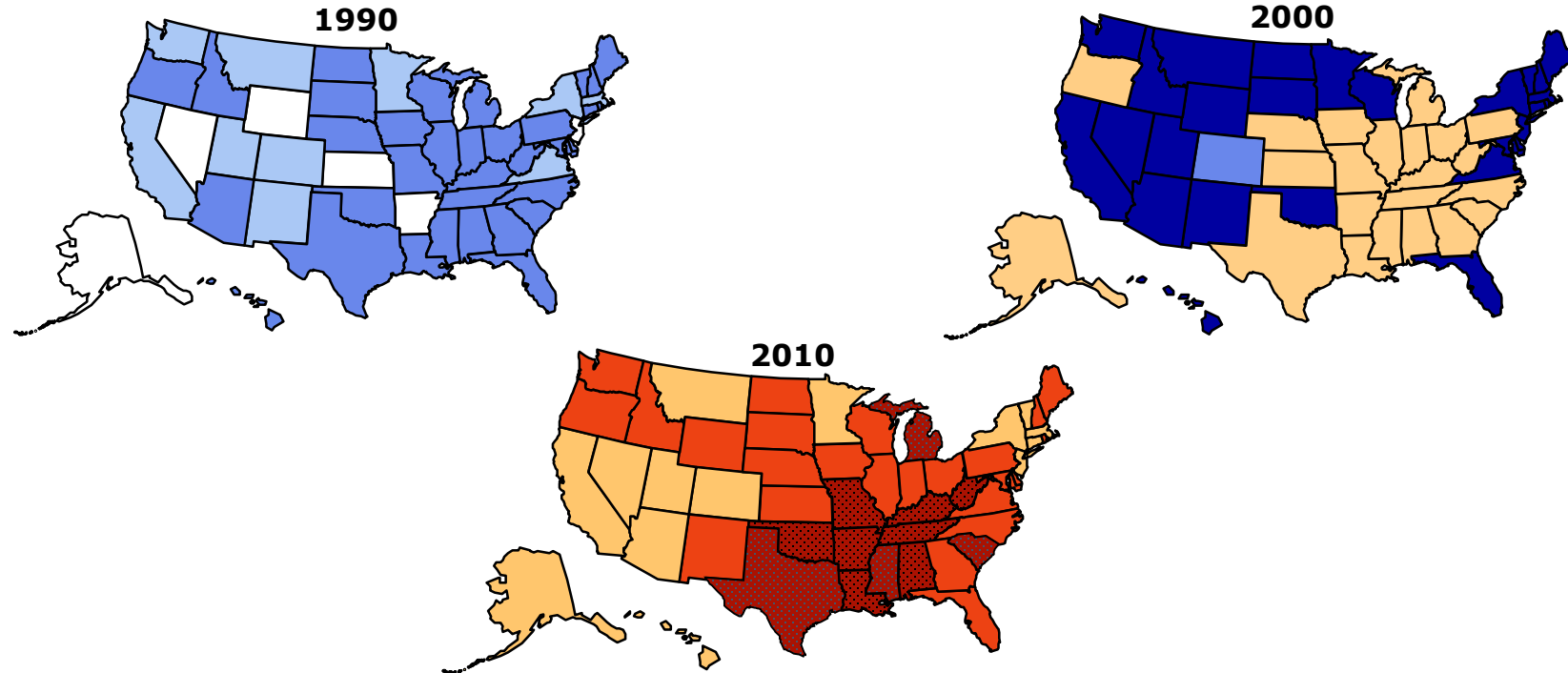
# **PREVALENCE OF OBESITY**



# Obesity Trends\* Among U.S. Adults

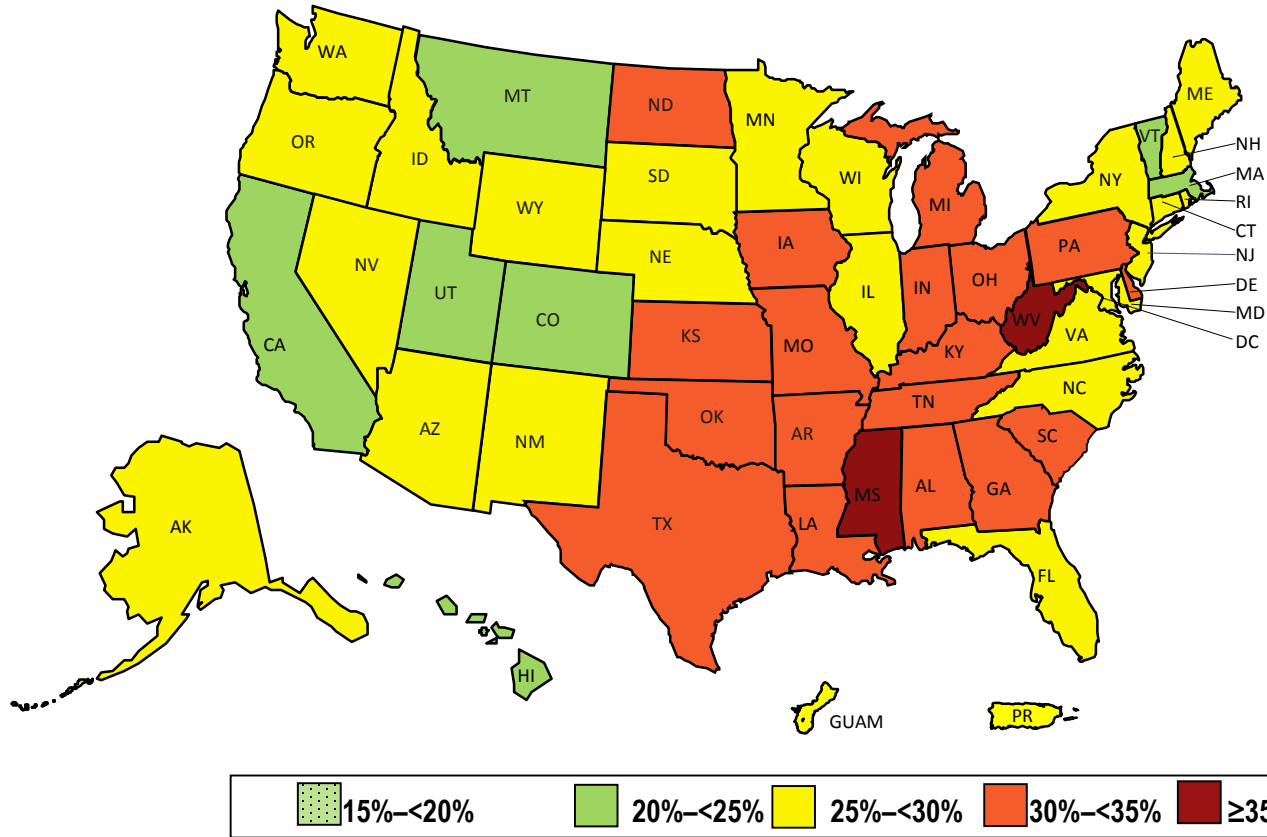
## BRFSS, 1990, 2000, 2010

(\*BMI  $\geq 30$ , or about 30 lbs. overweight for 5'4" person)



# Prevalence\* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

**\*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.**



# Prevalence\* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

## Summary

- No state had a prevalence of obesity less than 20%.
- 7 states and the District of Columbia had a prevalence of obesity between 20% and <25%.
- 23 states had a prevalence of obesity between 25% and <30%.
- 18 states had a prevalence of obesity between 30% and <35%.
- 2 states (Mississippi and West Virginia) had a prevalence of obesity of 35% or greater.
- The prevalence of obesity was 27.0% in Guam and 27.9% in Puerto Rico.<sup>+</sup>

<http://www.cdc.gov/obesity/data/prevalence-maps.html>

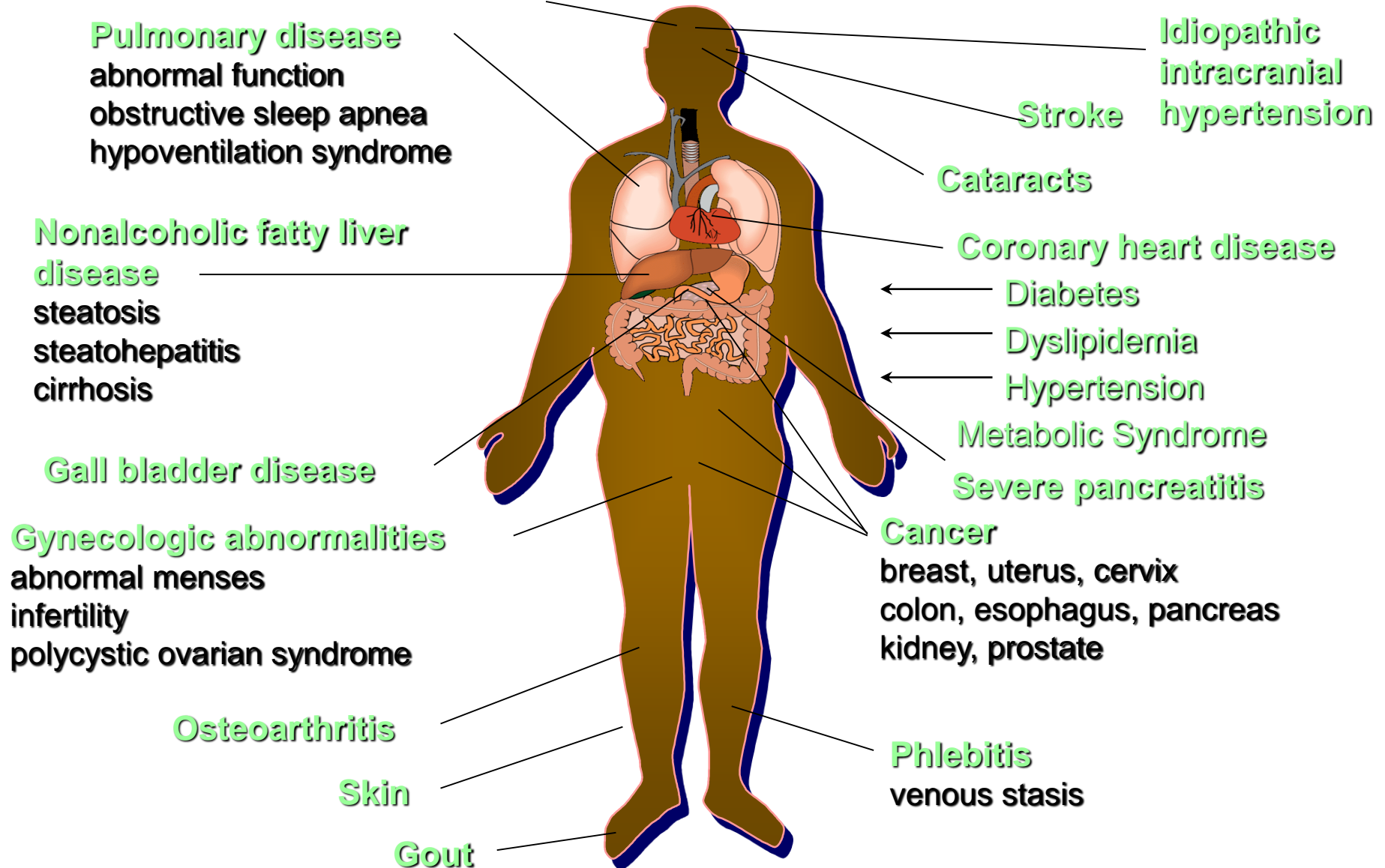
\*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

<sup>+</sup>Guam and Puerto Rico were the only US territories with obesity data available on the 2013 BRFSS.



# Medical & Psychosocial Consequences of Obesity

**Depression, low self esteem, stigmatization, body image issues, reduced quality of life**



# **POTENTIAL CONTRIBUTORS TO OBESITY**

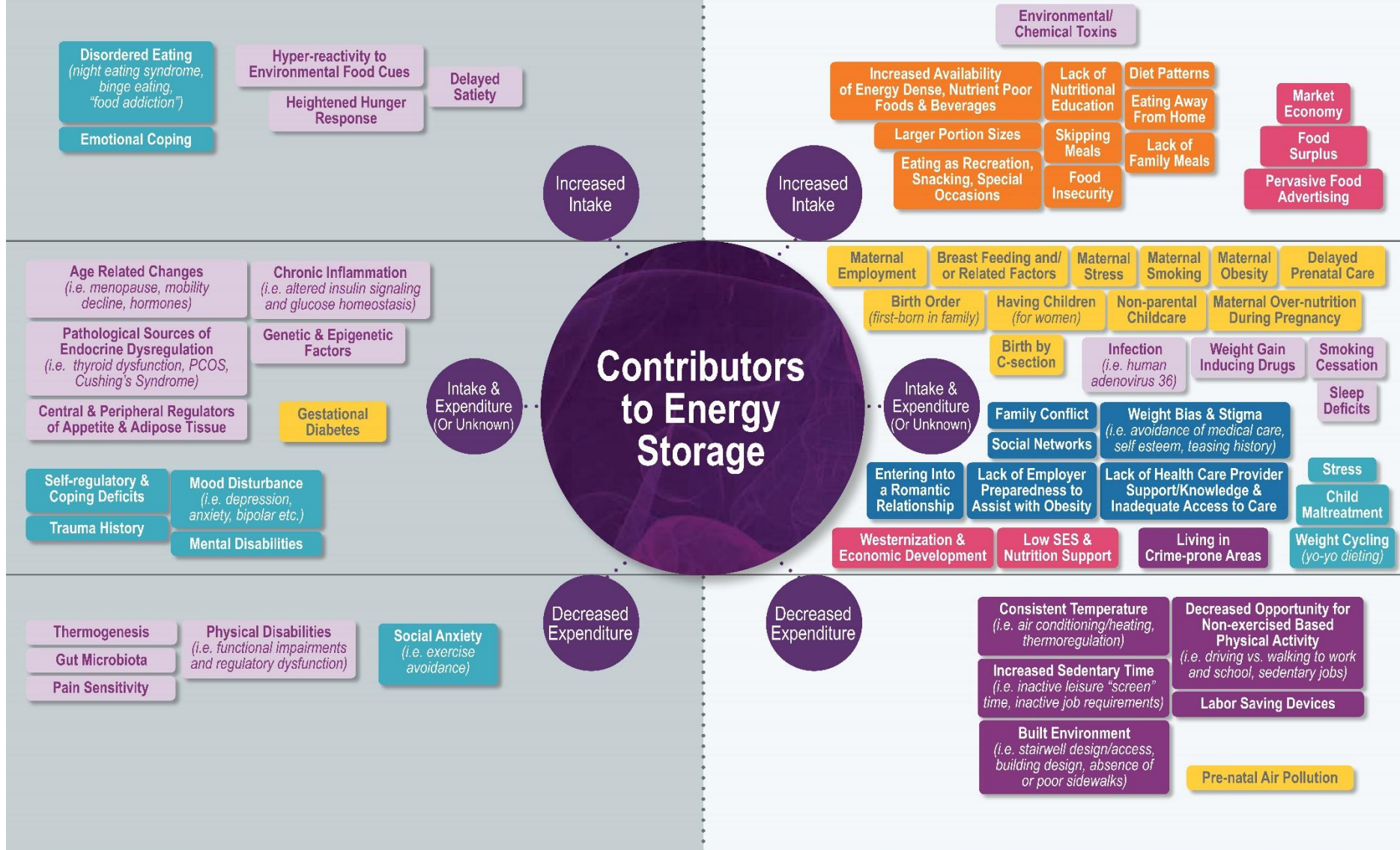


# POTENTIAL\* CONTRIBUTORS TO OBESITY

2015

## Inside the Person

## Outside the Person

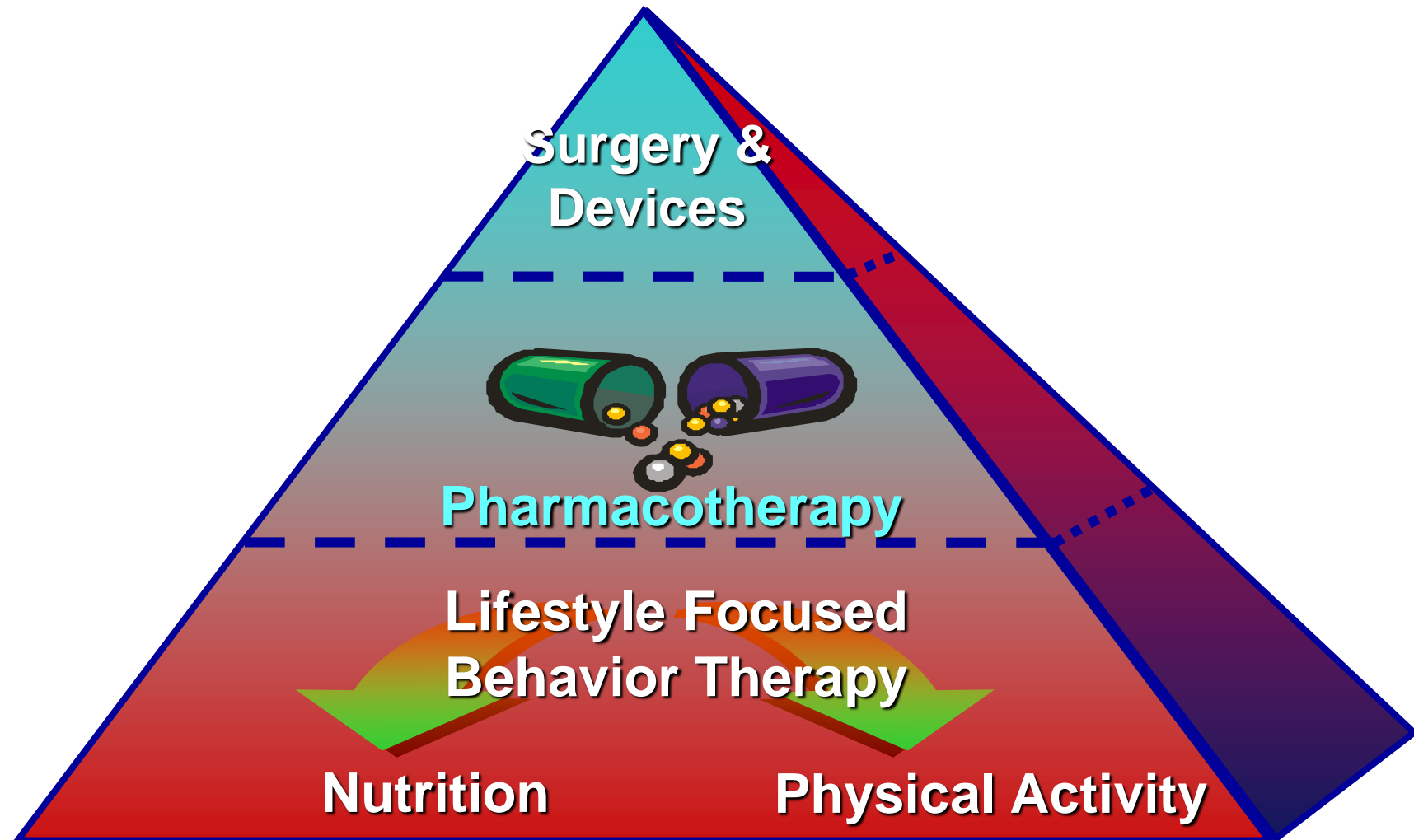


# **INTERVENTIONS**



# Treatment options

## Obesity Treatment Pyramid



# Comparison of Intervention Types

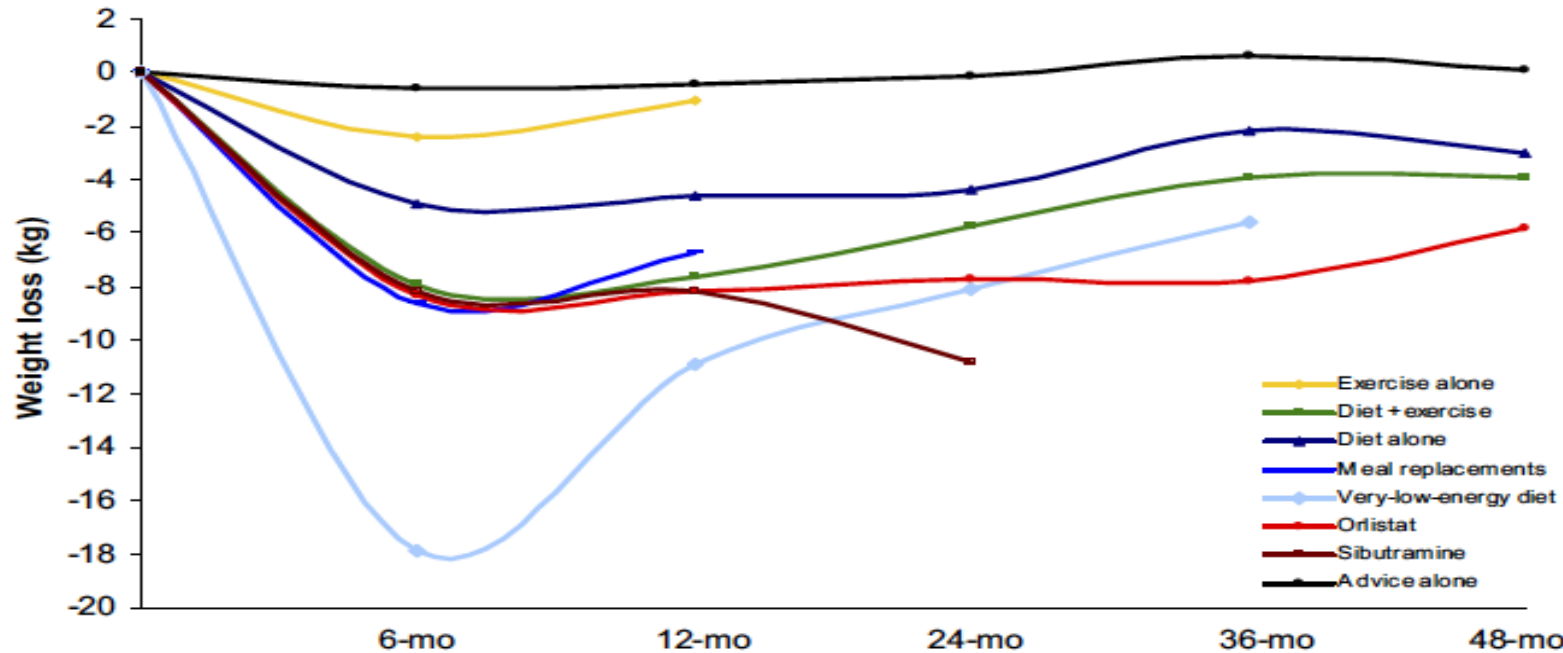


Figure 1. Average weight loss of subjects completing a minimum 1-year weight-management intervention; based on review of 80 studies (N=26,455; 18,199 completers [69%]).

## Exercise Plus Diet:

7.9 kg at 6 months maintained about half (3.9 kg) at 3 and 4 years

## Exercise Alone:

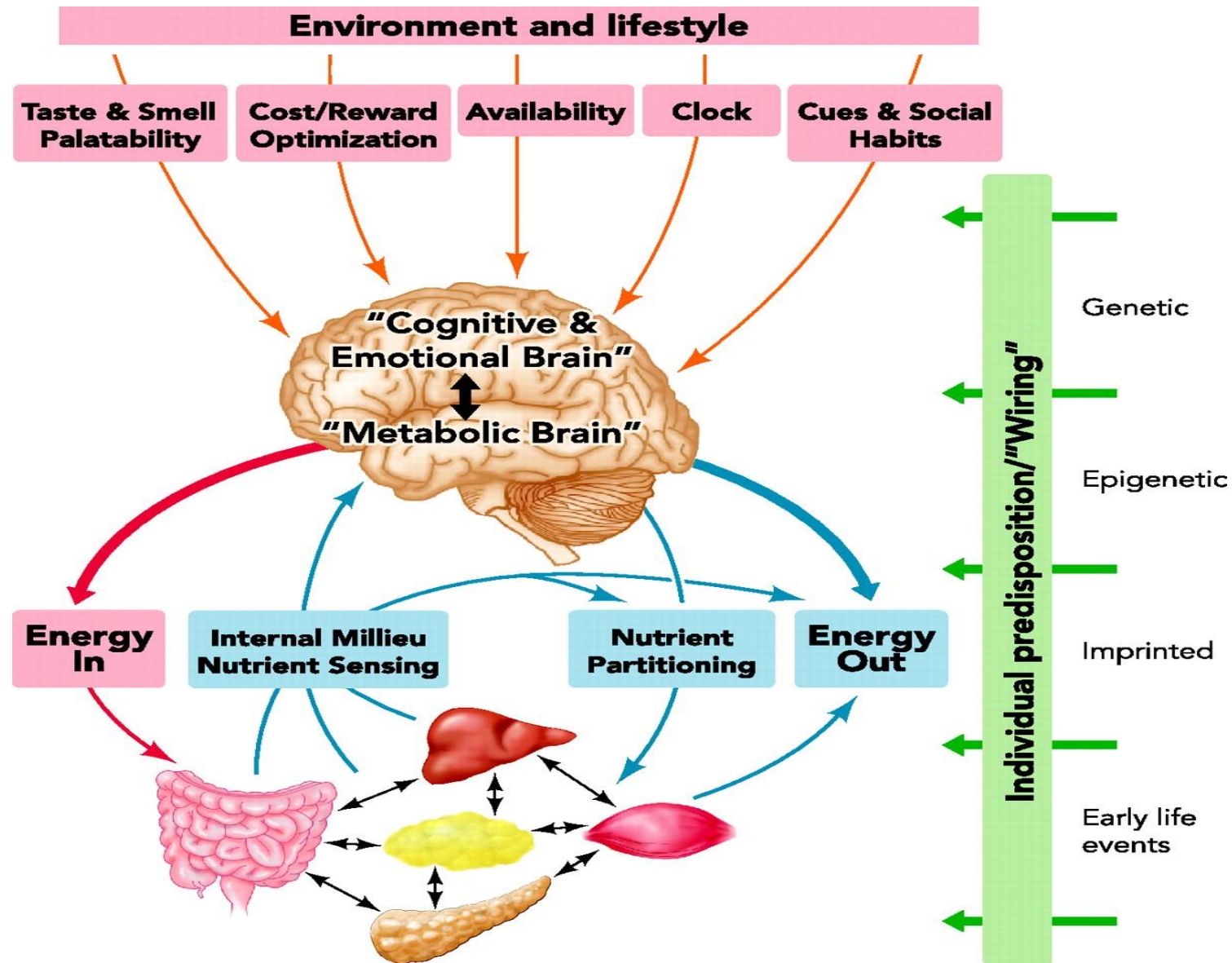
2.4 kg at 6 months, maintained about half (1.0 kg) at 24 months



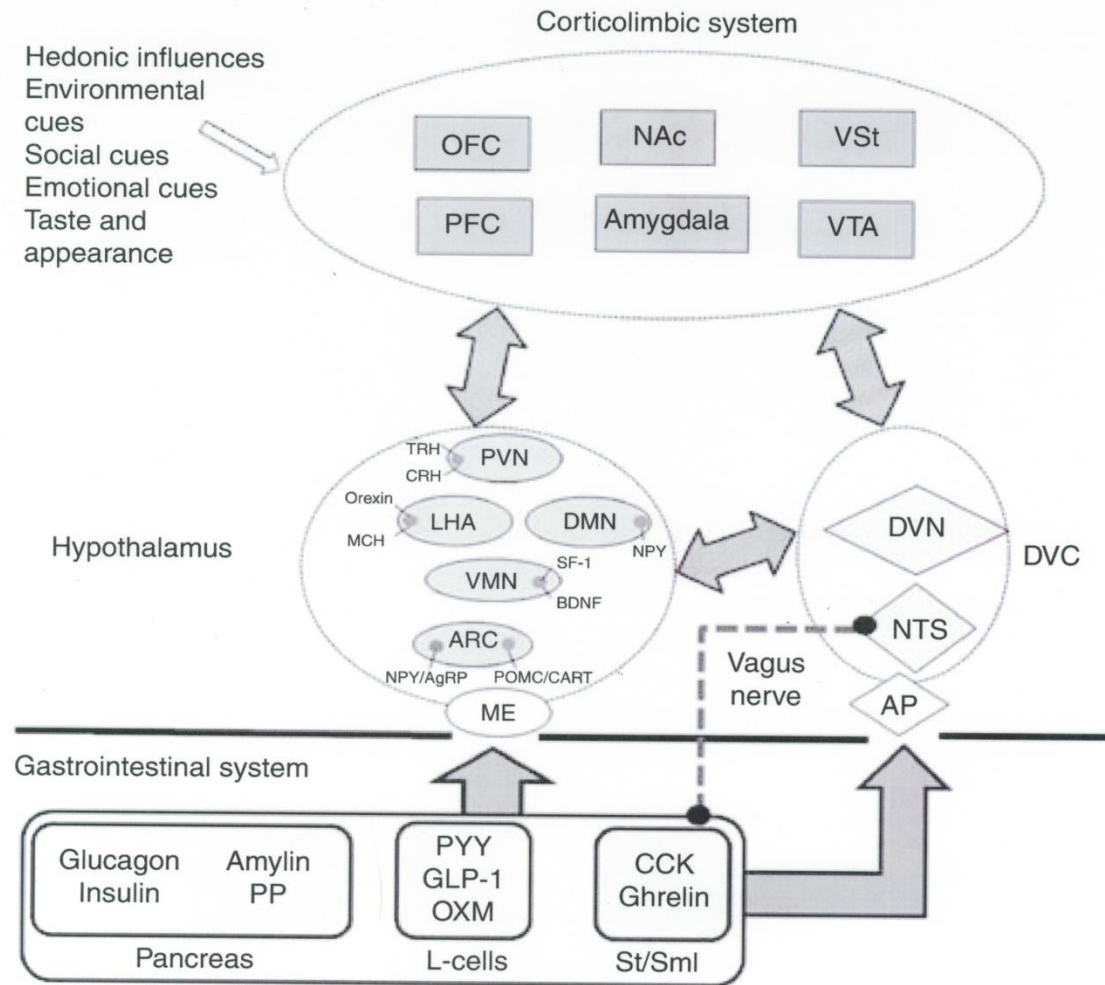
**POSITIVE ENERGY BALANCE:  
INGESTION**



# Neural Systems Controlling the Drive to Eat: Mind Versus Metabolism



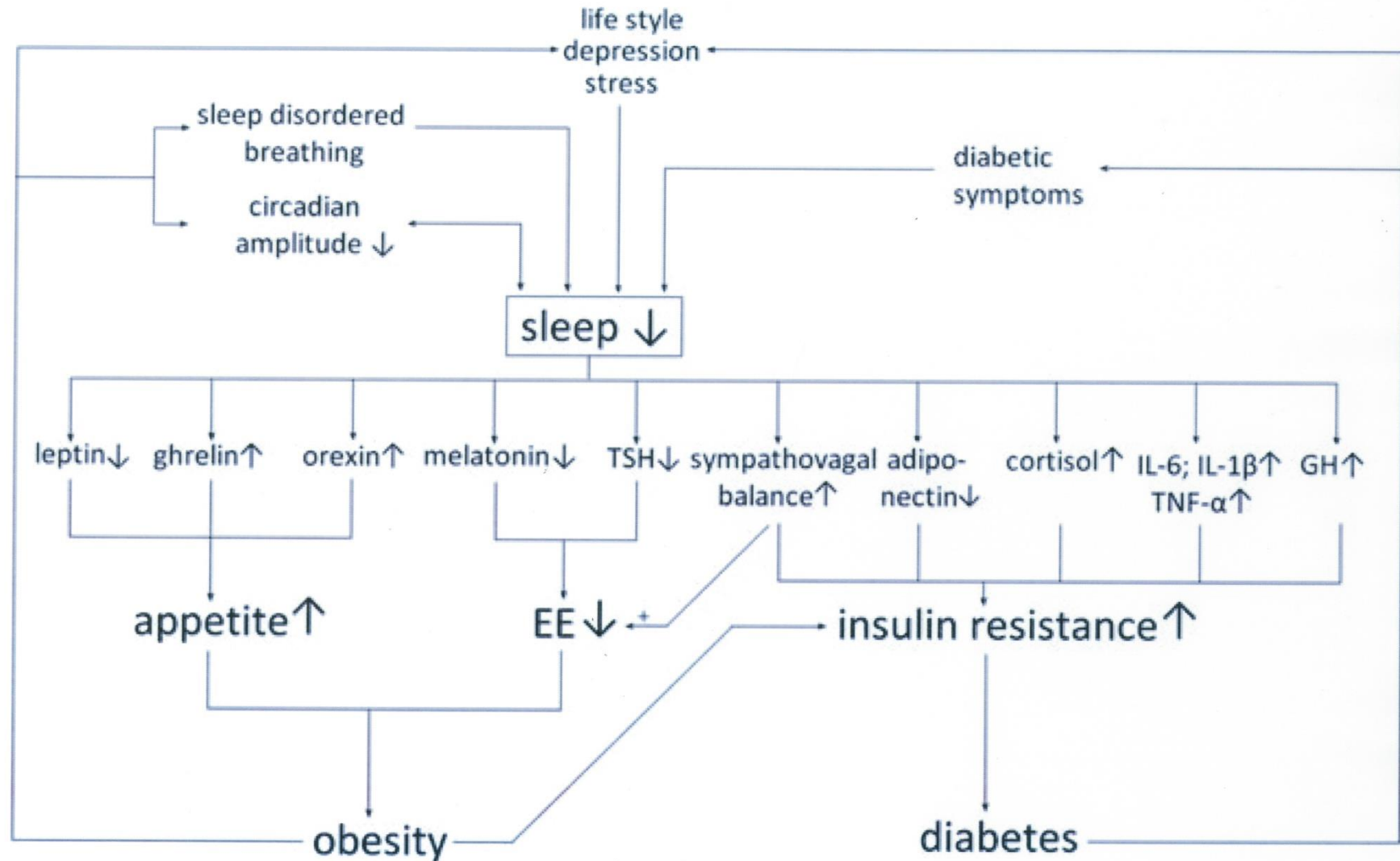
# The gut-brain axis...



**Figure 1.** A gut-brain axis controls food intake and appetite in response to homeostatic and non-homeostatic signals. The



# Sleep: Relationships to appetite, obesity and insulin resistance.



# **RESISTANCE AND ADAPTATION TO NEGATIVE ENERGY BALANCE**



# Energy expenditure increased with weight gain, decreased with weight loss

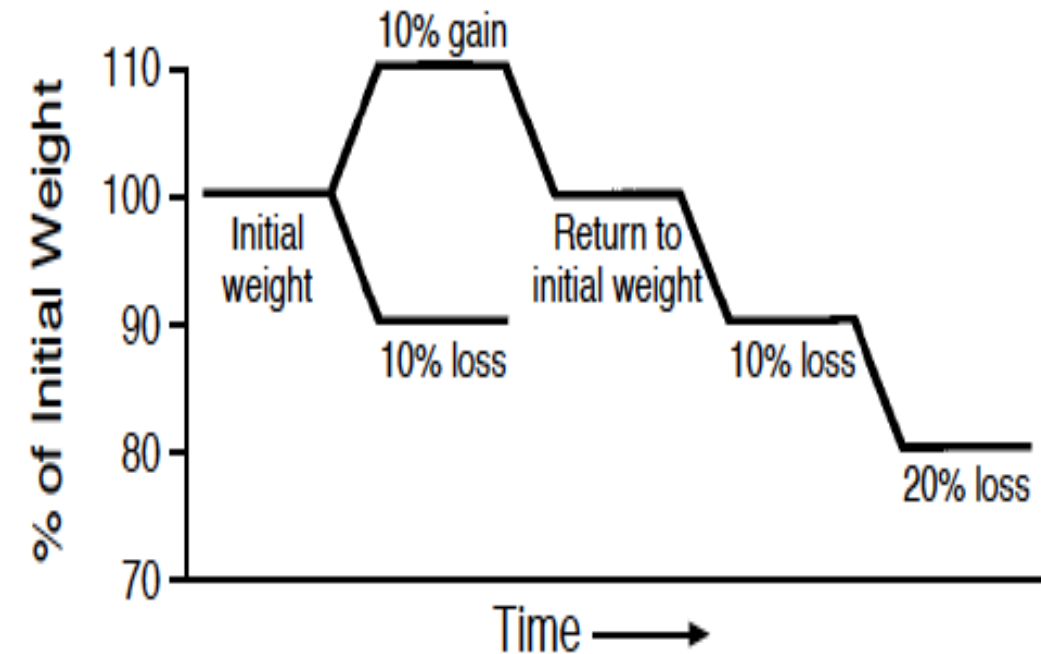
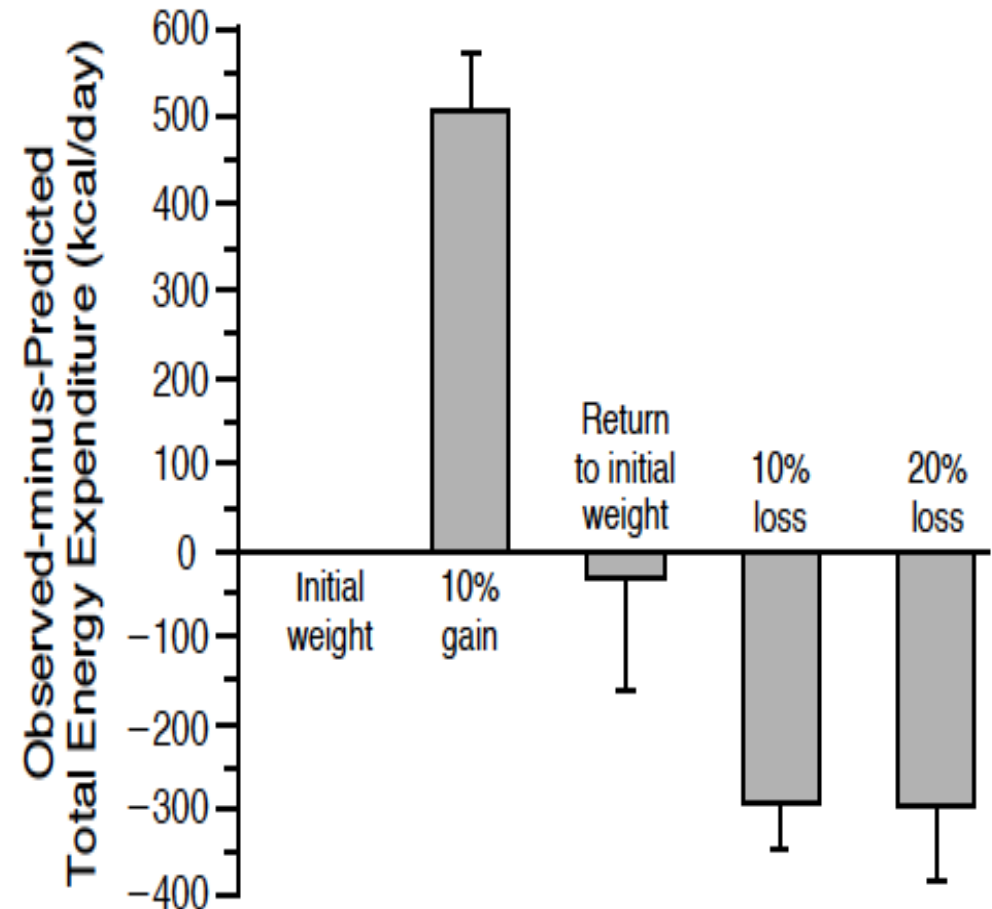


Figure 1. Study Design.

All subjects were studied at their initial weight and after at least one change in weight.

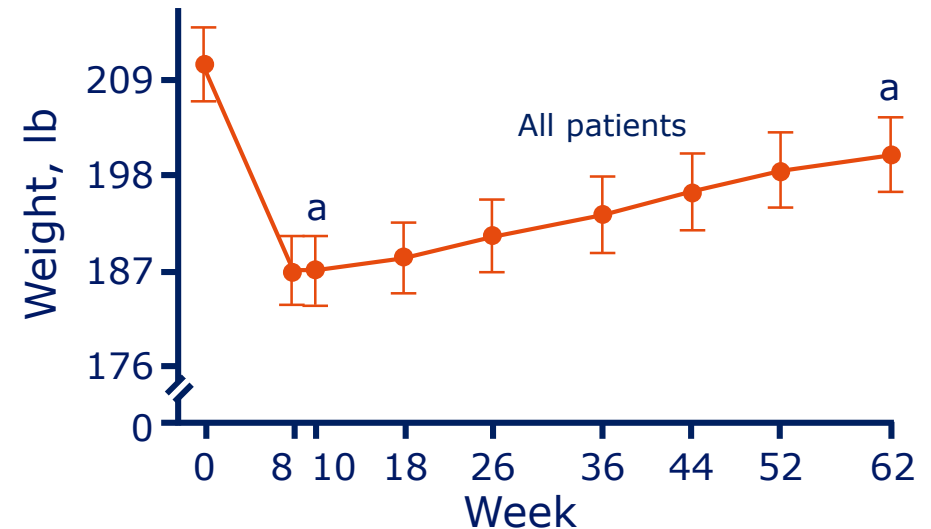


ORIGINAL ARTICLE

## Long-Term Persistence of Hormonal Adaptations to Weight Loss

Priya Sumithran, M.B., B.S., Luke A. Prendergast, Ph.D.,  
Elizabeth Delbridge, Ph.D., Katrina Purcell, B.Sc., Arthur Shulkes, Sc.D.,  
Adamandia Kriketos, Ph.D., and Joseph Proietto, M.B., B.S., Ph.D.

- Weight loss induced after 10 weeks:
  - 13.5 kg, 14% of initial weight
- Weight maintenance at end of week 10:
  - Individual counseling
  - Written advice from Registered Dietitian
  - Visit clinic every 2 months
  - Receive telephone dietary counseling
- Follow up at 62 weeks



Weight Loss → Hunger hormone response becomes amplified...

Change from baseline to week 10:  
Increase in levels of ghrelin  
( $P < 0.001$ )

Change from baseline to week 62:  
Ghrelin remained significantly higher  
( $P < 0.001$ )

Weight Loss → Satiety hormone response is blunted ...

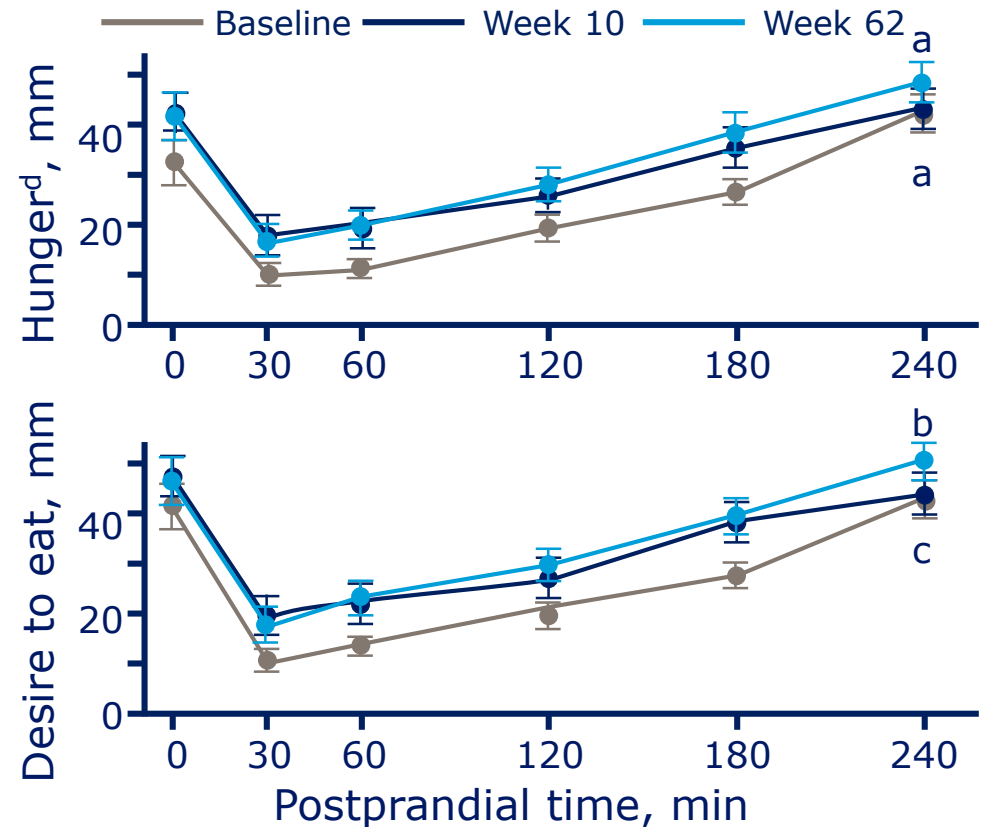
PYY lower at week 10 and 62  
than baseline ( $P < 0.001$ )

PYY lower at week 62 than week 10  
( $P < 0.004$ )

Sumithran P et al. *N Engl J Med*. 2011;365:1597–1604.

# Weight loss increased subjective feelings of hunger and drive to eat ...

- a. Don't feel as full
- b. Stronger hunger urges
- c. Harder to say "no more"



<sup>a</sup> $P < 0.001$ , <sup>b</sup> $P = 0.09$ , <sup>c</sup> $P = 0.008$  vs mean at baseline (week 0). <sup>d</sup>Ratings were based on a visual-analogue scale ranging from 0 to 100 mm. Higher numbers indicate greater hunger or desire.

# **PHYSICAL INACTIVITY**



AN EVERYDAY HEALTH INFOGRAM

# CHILDHOOD OBESITY BY THE NUMBERS

Many U.S. kids are overweight or obese, and most don't exercise.



**1 in 3**  
children and teens age 2 to 19 are considered overweight or obese



**2 out of 3**  
don't get any daily physical activity



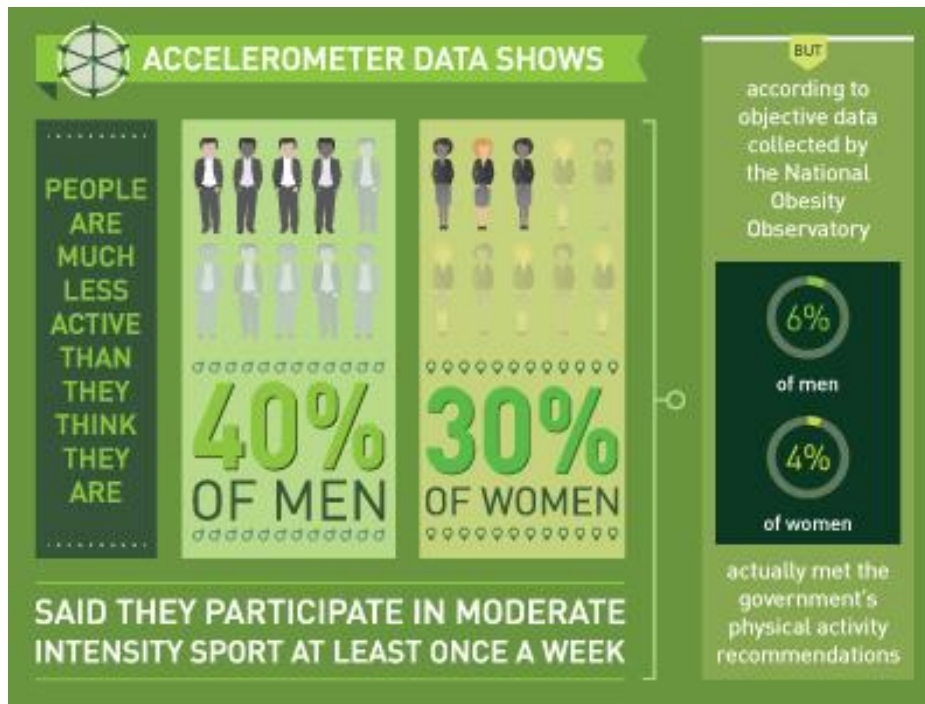
**96 %**  
of elementary schools offer no physical education classes

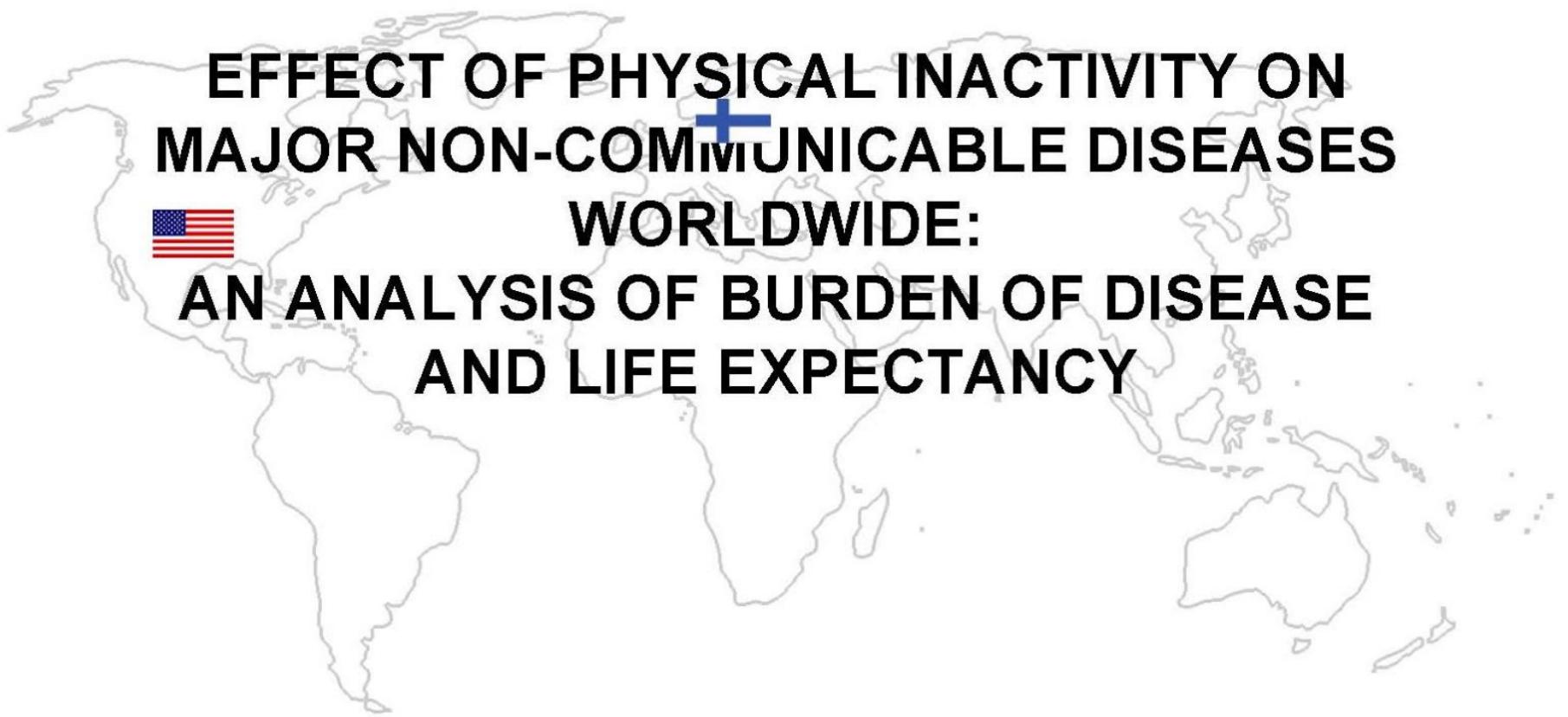


**7 hours**  
is the amount of time kids spend in front of TV or computer screens daily

Source: CDC

everyday HEALTH





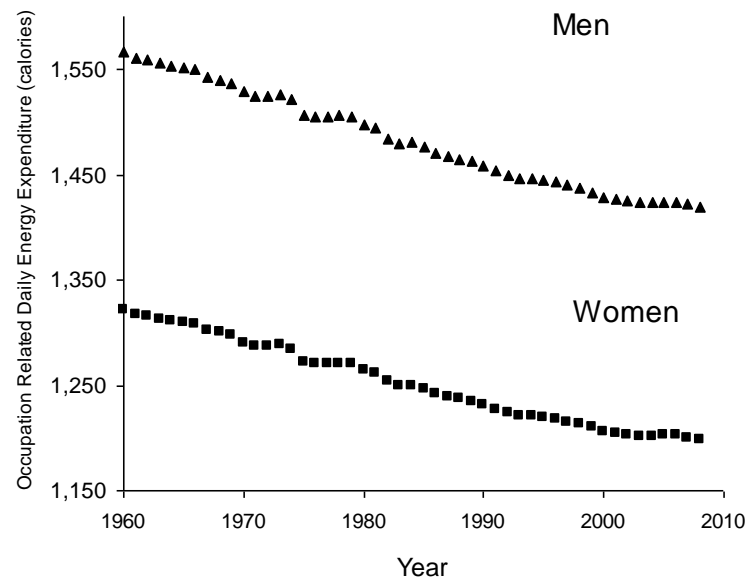
**EFFECT OF PHYSICAL INACTIVITY ON  
MAJOR NON-COMMUNICABLE DISEASES  
WORLDWIDE:  
AN ANALYSIS OF BURDEN OF DISEASE  
AND LIFE EXPECTANCY**

**I-Min Lee**, Eric J Shiroma, Felipe Lobelo,  
Pekka Puska, Steven N Blair, Peter T Katzmarzyk, for  
the Lancet Physical Activity Series Working Group

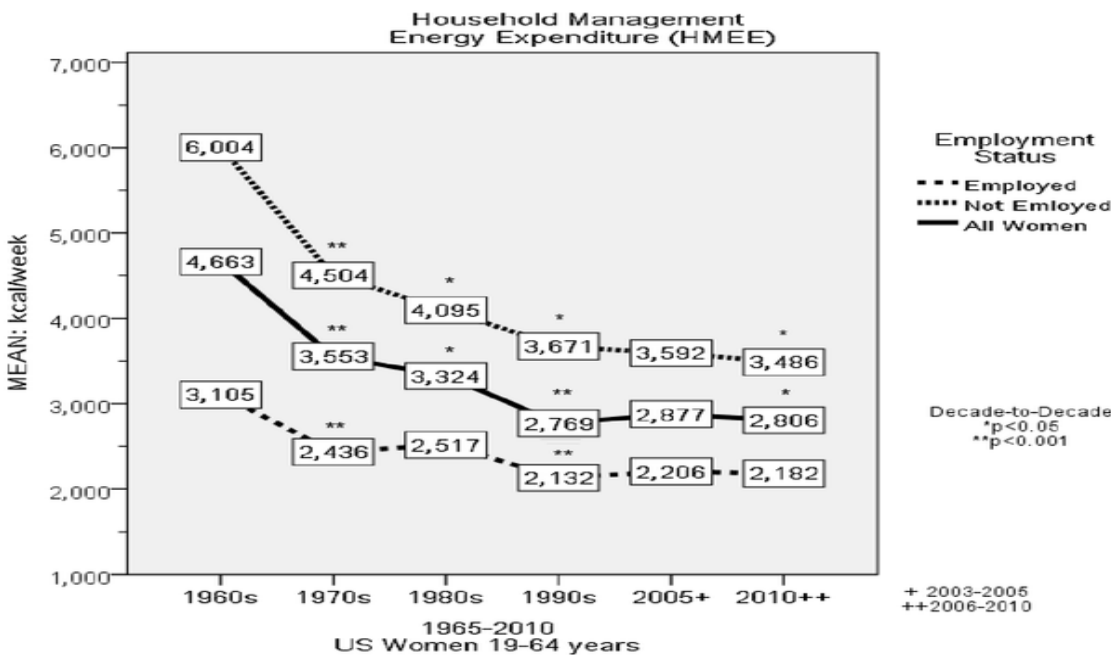
# Findings

- **Between 6-10% of the world's major NCD is attributable to inactivity**
- **By eliminating inactivity, >5.3 M deaths/year may be prevented**
- **(For perspective: Smoking causes 5 M deaths/y worldwide)**

# Daily Occupational Caloric Expenditure

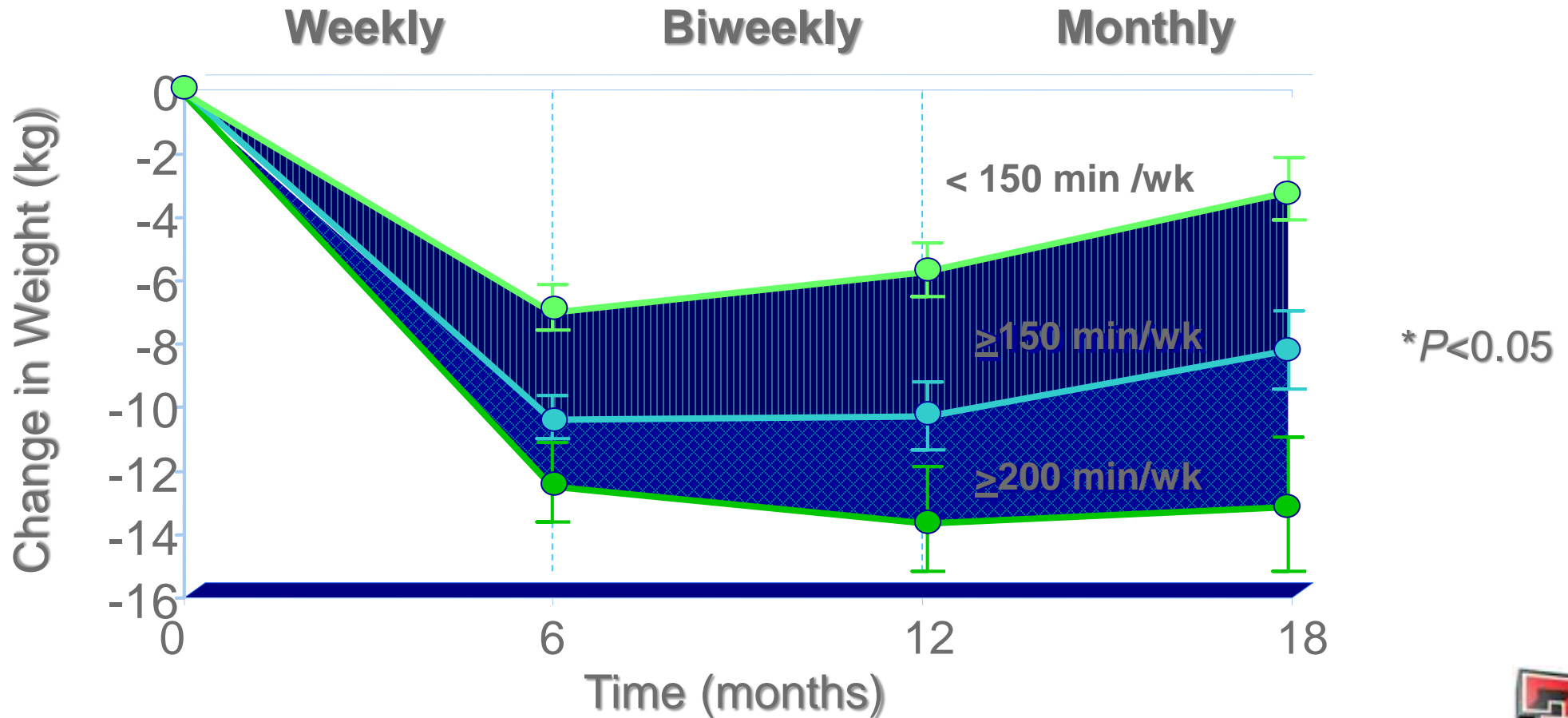


# Household Management Energy Expenditure/Week (Female)



# Physical Activity Necessary for Weight Loss Maintenance

## Concomitant Behavior Therapy



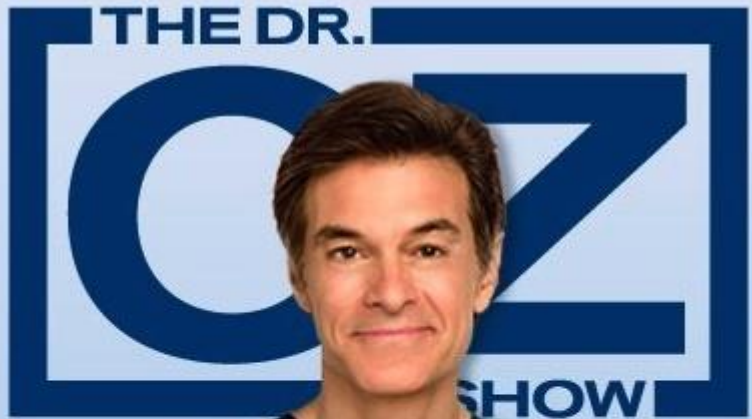
Jakicic et al. *JAMA* 1999;282:1554.



# **PUBLIC PERCEPTIONS**



# “Trusted Doctors” give weight loss advice.



<https://youtu.be/mTtCXHbLPUM>



# Politicians Enact Solutions to the “Obesity Epidemic”

Fail to account for the complexity of the issue.



Firehouse Subs®  
Serving the Best Subs, Sandwiches & Salads in Town. Order Online Now.

U.S.

## In South Los Angeles, New Fast-Food Spots Get a ‘No, Thanks’

By JENNIFER MEDINA JAN. 15, 2011



The city is effectively banning new fast-food places in South Los Angeles, which has much higher rates of poverty and obesity than other areas. Michal Czerwonia for The New York Times

Today's Mortgage Rate

3.13%  
APR 5/1 ARM

30-Year Fixed	3.38%	3.45% APR
15-Year Fixed	2.75%	2.75% APR
5/1 ARM	2.63%	3.13% APR
Refinance	\$225,000 ARM	\$904/mo
Purchase	\$350,000 ARM	\$1,294/mo



# Partnering to get it right



**Personal  
Responsibility for  
diet and exercise.**



Addressing  
obesity from  
myopic  
unidimensional  
perspectives is  
**simply not  
working.**

**Multiple  
perspectives;  
various stages of  
knowledge – Little  
communication.**



**Technological and scientific  
advances – Scientists still  
not communicating across  
disciplines.**



Silos are for Corn... (not scientists)



Daniel Vasconcellos