

Preventing Childhood Obesity: Big Picture Strategies

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Children's Hospital of Eastern Ontario Research Institute

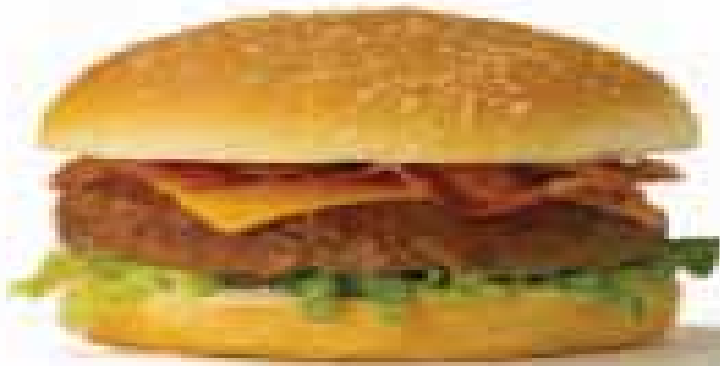
²Professor, Department of Pediatrics, University of Ottawa

³Senior Scientific Advisor on Health Measurement, *Statistics Canada*

⁴Chief Scientific Officer, *Active Healthy Kids Canada*

Presentation Overview

1. Where are we at now?
2. Vulnerable groups
3. Measurement Issues
4. Promising and practiced approaches
5. Current initiatives and support
6. Some food (low fat) for thought
 - the arrows go both ways
 - don't expect, inspect
 - sweat the small stuff
 - sweat the big stuff
 - add a touch of Amish



**Childhood
Obesity
has tripled
in Canada
since 1981**

Childhood obesity is a serious health issue. For more information visit www.peel-obesity.ca or call Health Line Peel at 905-799-7700.

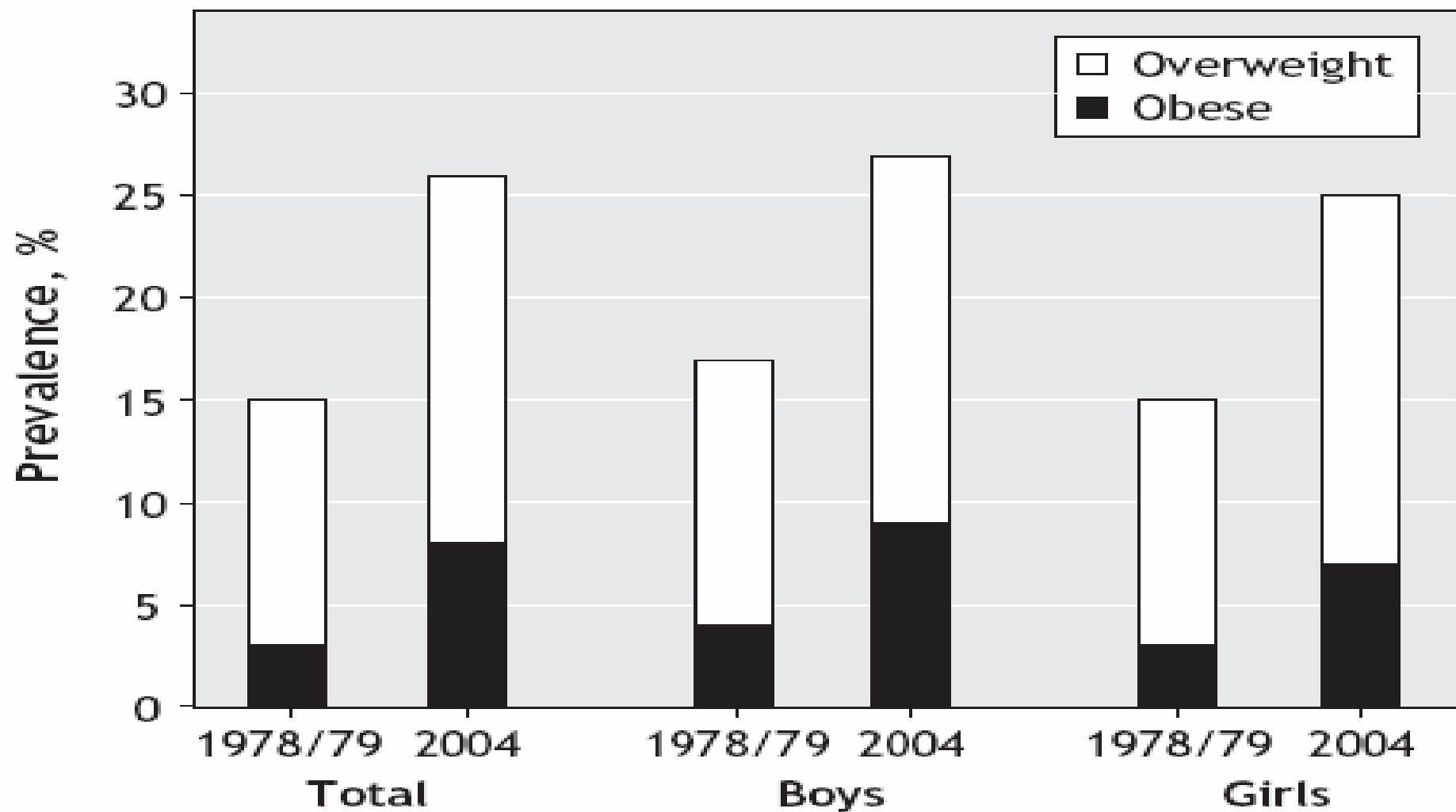
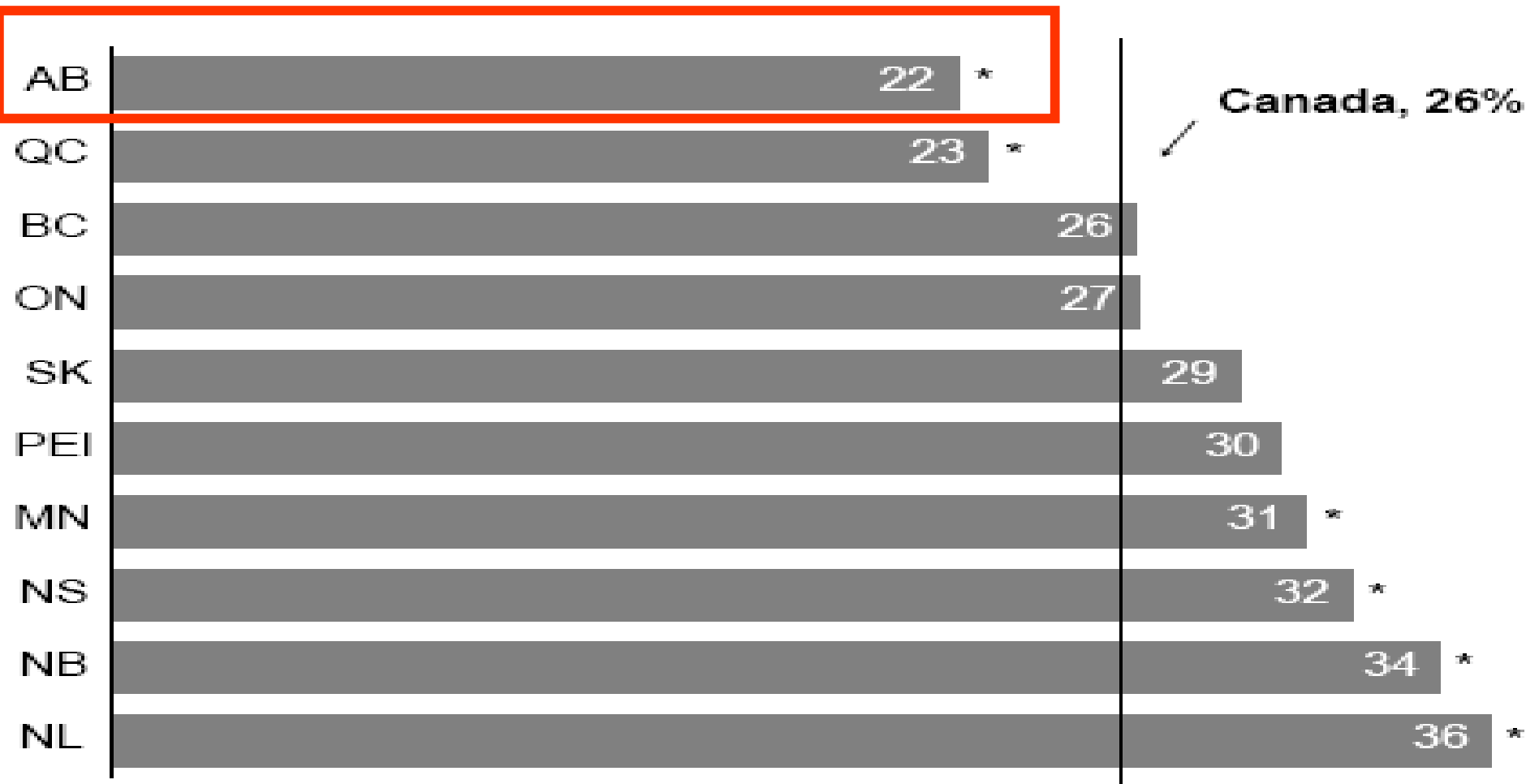


Fig. 4: Changes in the prevalence of obesity among Canadian children (aged 2–17 years), 1978/79 to 2004. Source: Adapted from Shields.⁷

Shields. Health Reports 17(3), 2006

Chart 4

Percentage obese/overweight, by province, household population aged 2 to 17, Canada excluding territories, 2004



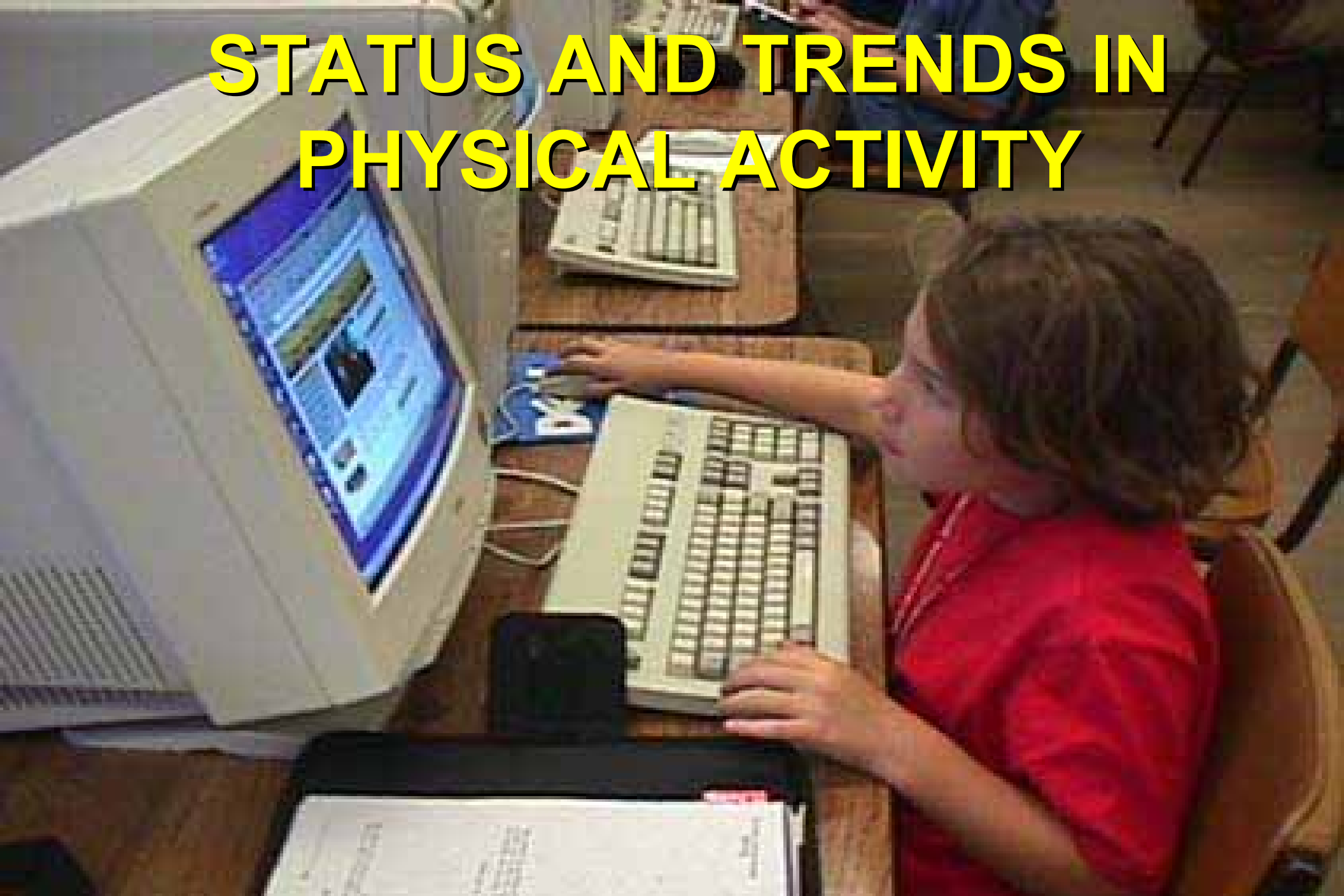
Data source: 2004 Canadian Community Health Survey: Nutrition

** Significantly different from estimate for Canada ($p < 0.05$)*



“Don’t step on it . . . it makes you cry.”

STATUS AND TRENDS IN PHYSICAL ACTIVITY



3.1 Students physically active five days or more over a typical week for a total of at least 60 minutes per day, by grade and gender (%)

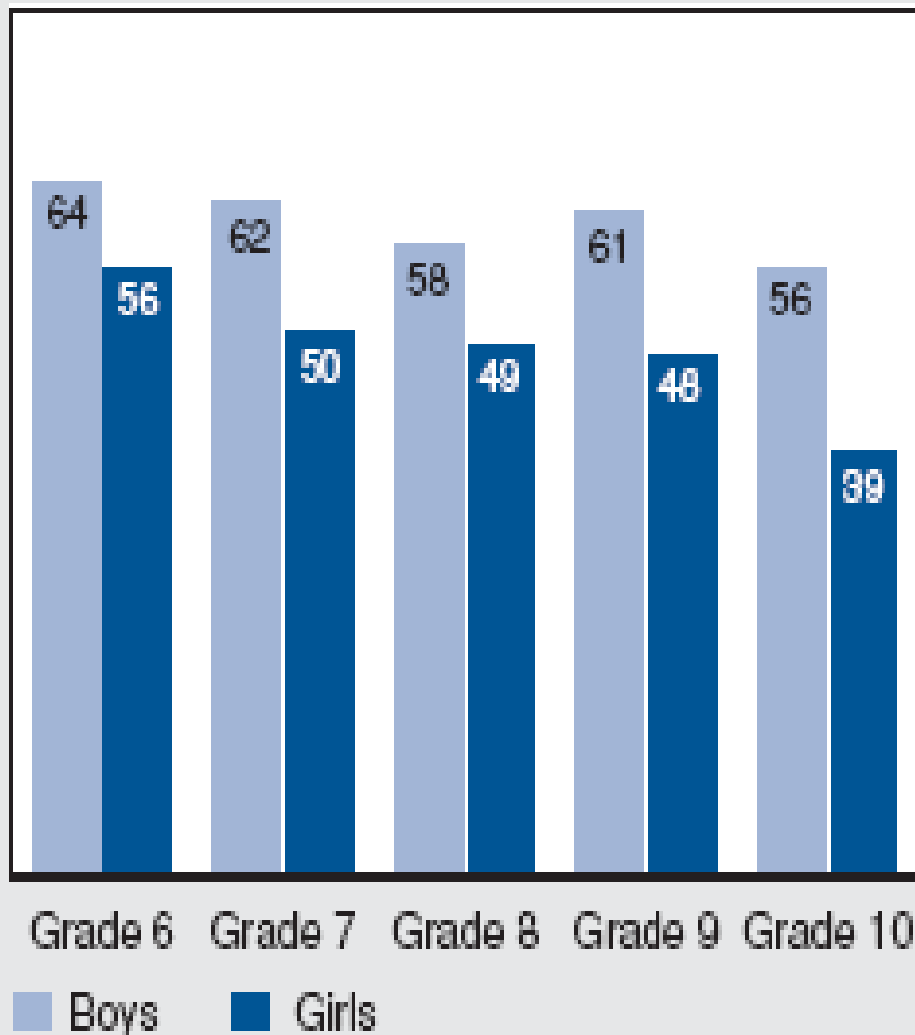
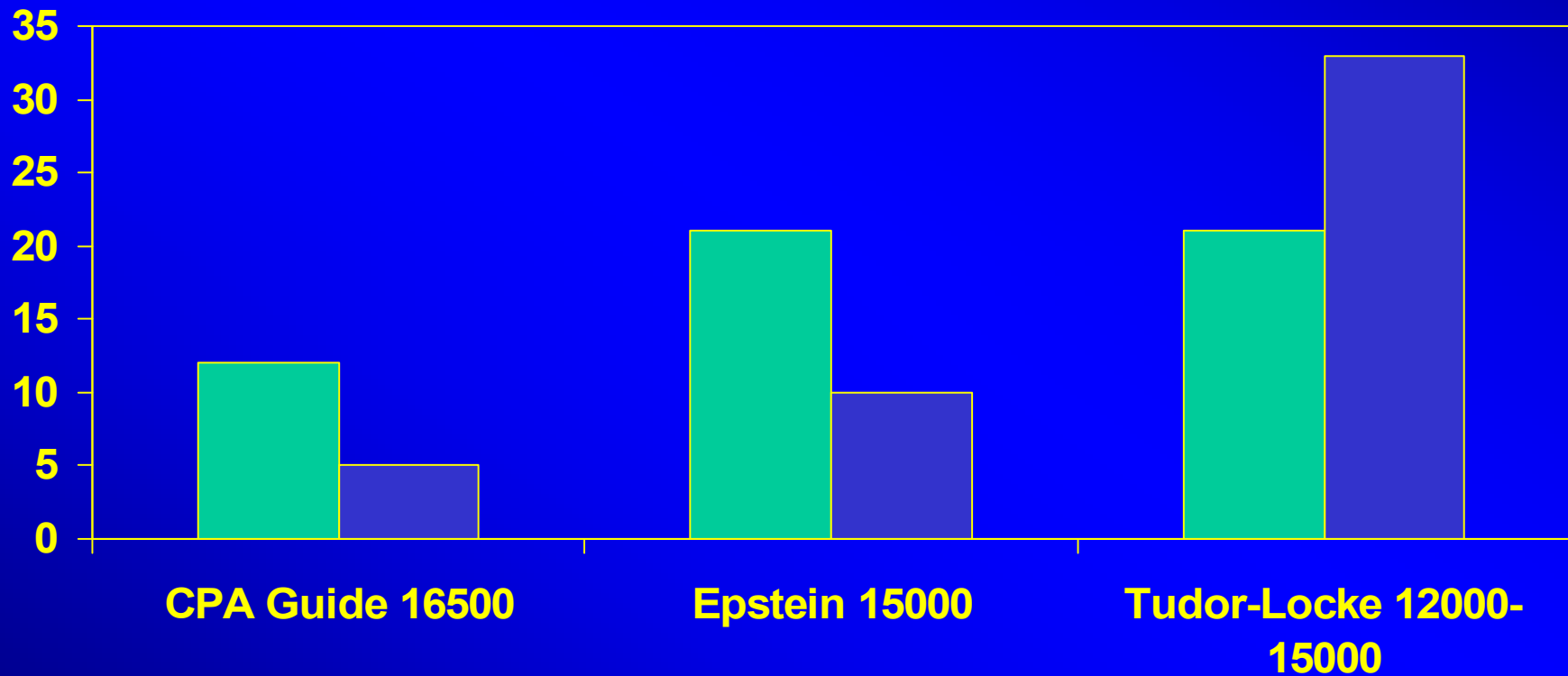
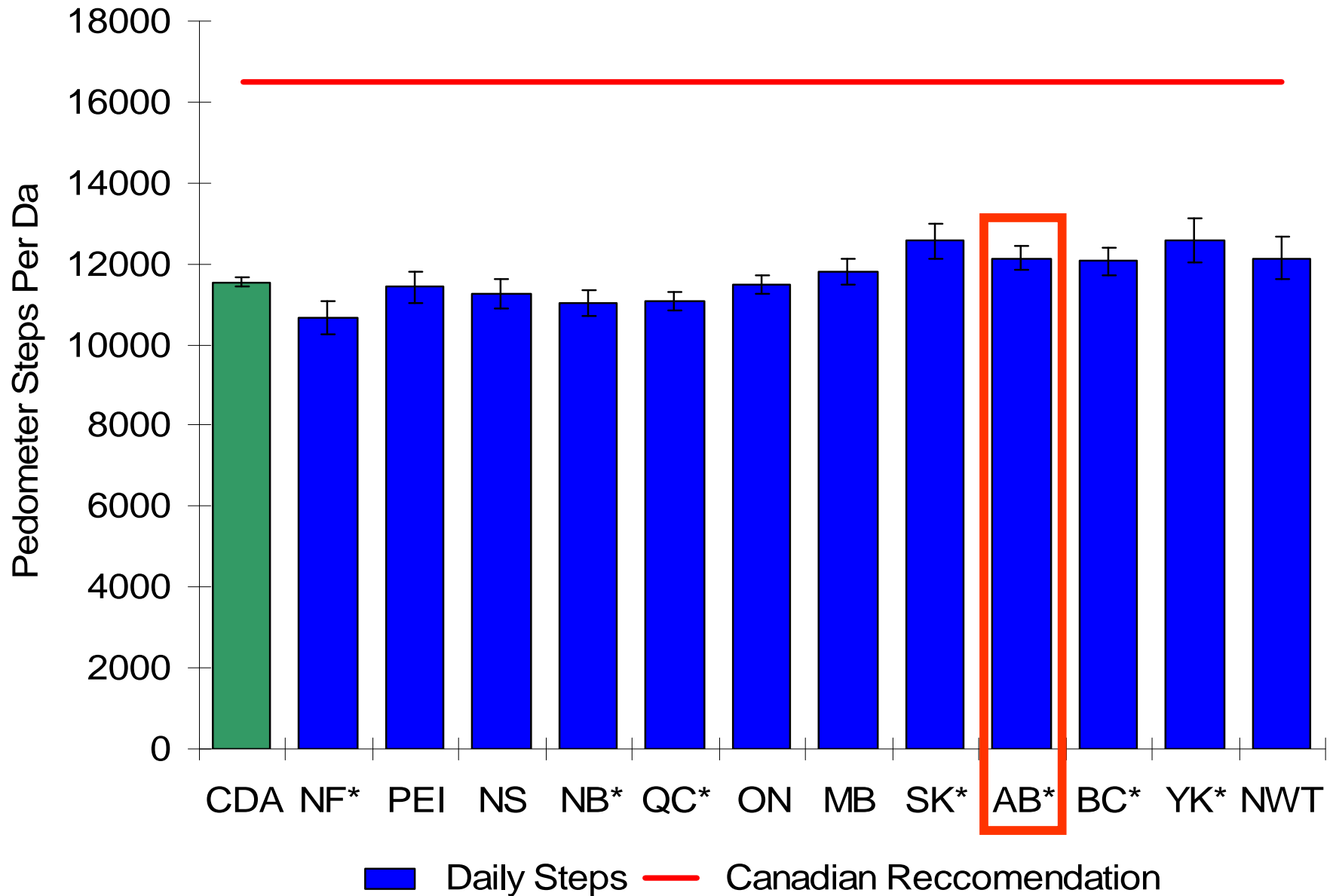


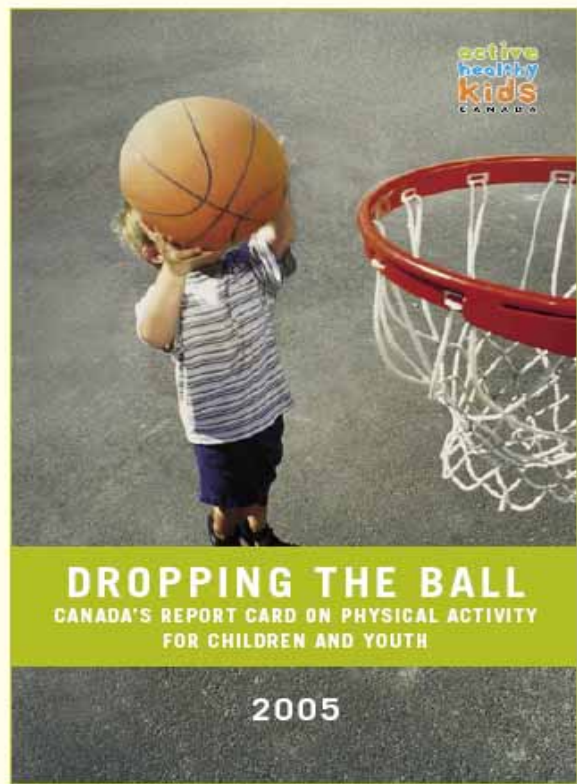
Figure 3.1 shows that between 56 and 64% of boys are physically active, while only 39 to 56% of girls are physically active. Physical activity in both boys and girls decreases from Grade 6 to Grade 10. These findings indicate that almost half of Grade 6 to 10 young people in Canada are physically inactive, with the problem being particularly worrisome in girls and older students.

Proportion of Canadian Children and Youth (aged 5-19) Accumulating Sufficient Steps to Meet Recommendations

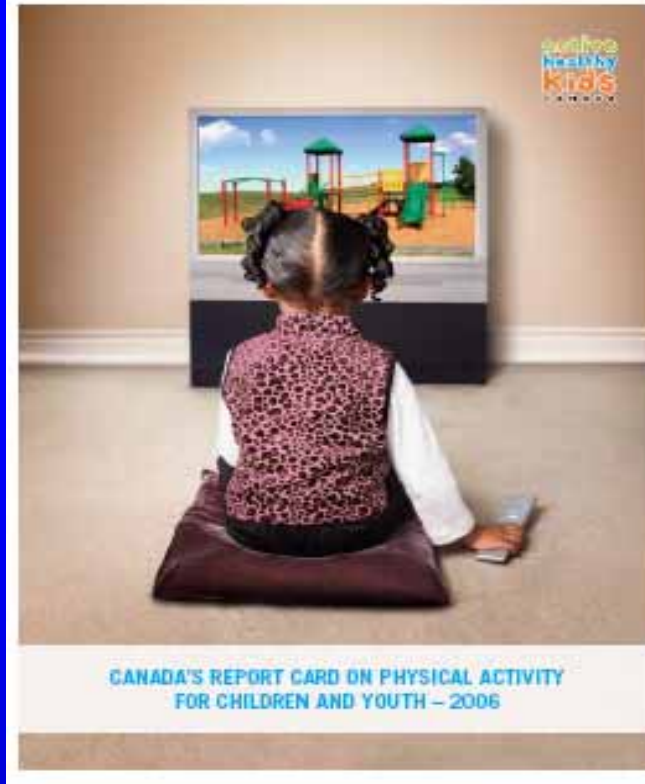




Canada is scoring poorly year after year when physical activity levels are examined in our children and youth



'D'



'D'



'F'

“Each time we measure physical activity levels among children and youth more accurately, we find that the issue of child and youth ***physical inactivity in Canada is an even larger public health concern than previously believed***”

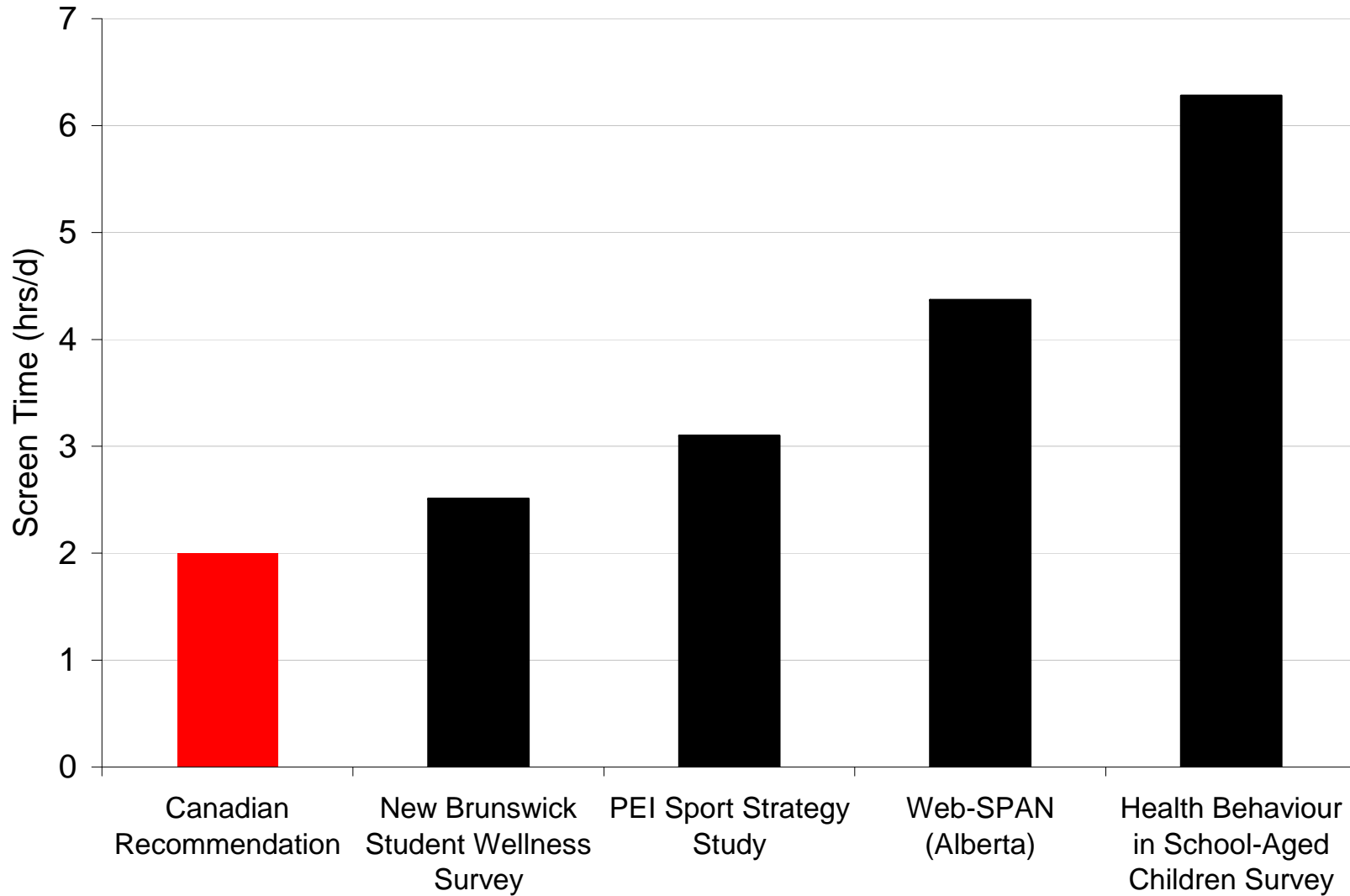
active
healthy
kids
CANADA

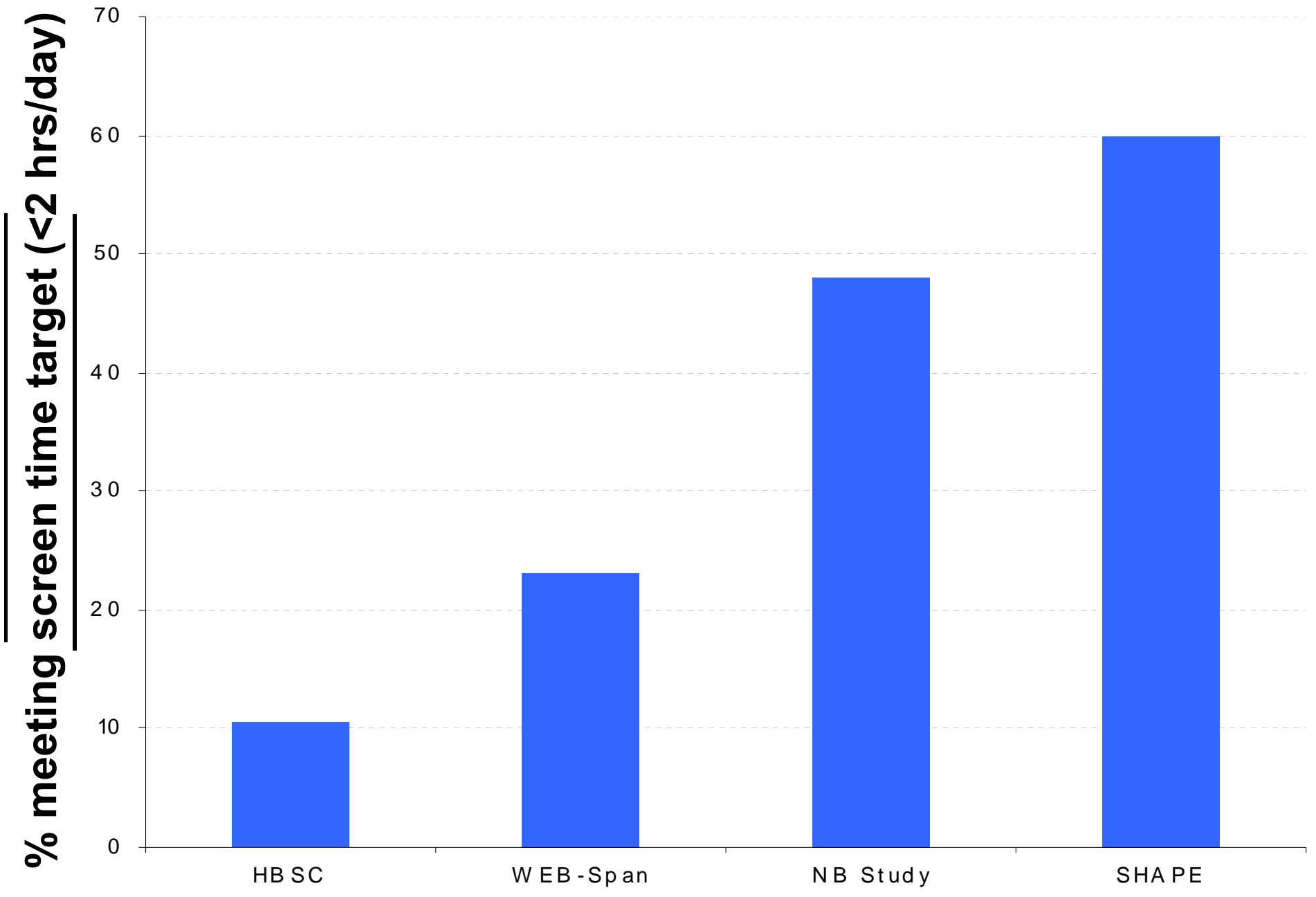
The Power to Move Kids™

WATCH FOR REPORT CARD 2008 May 27TH!!

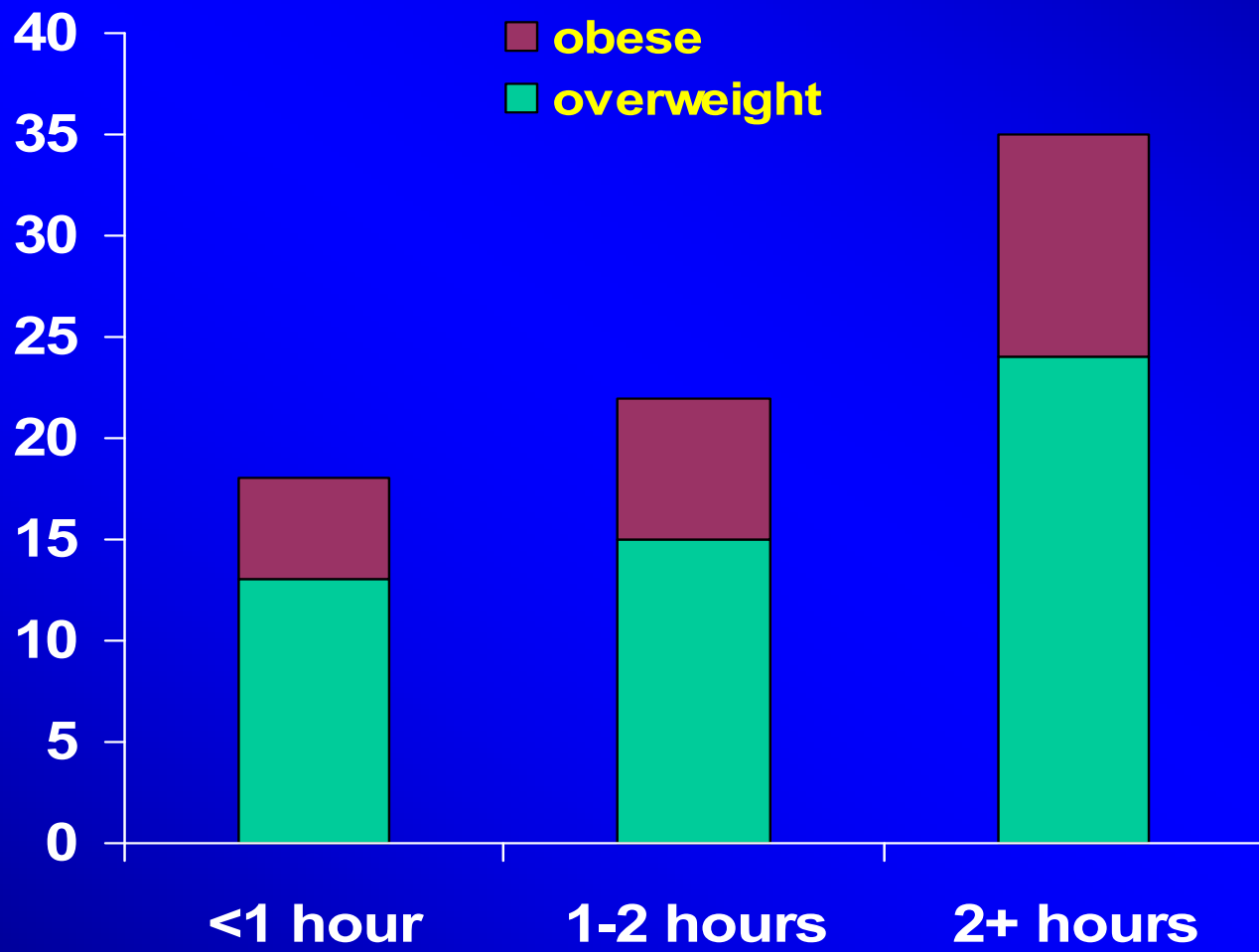
www.activehealthykids.ca

Screen time

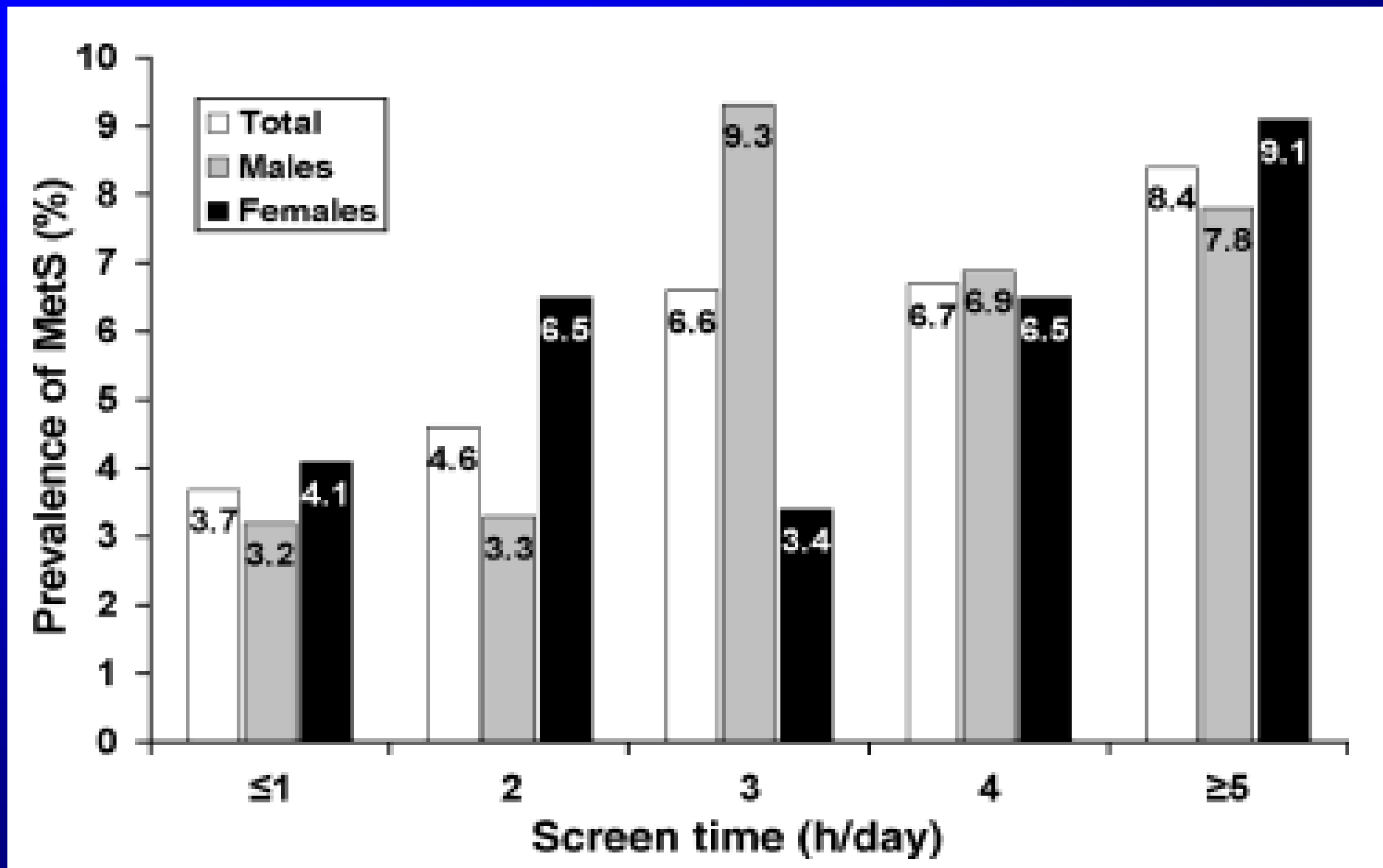




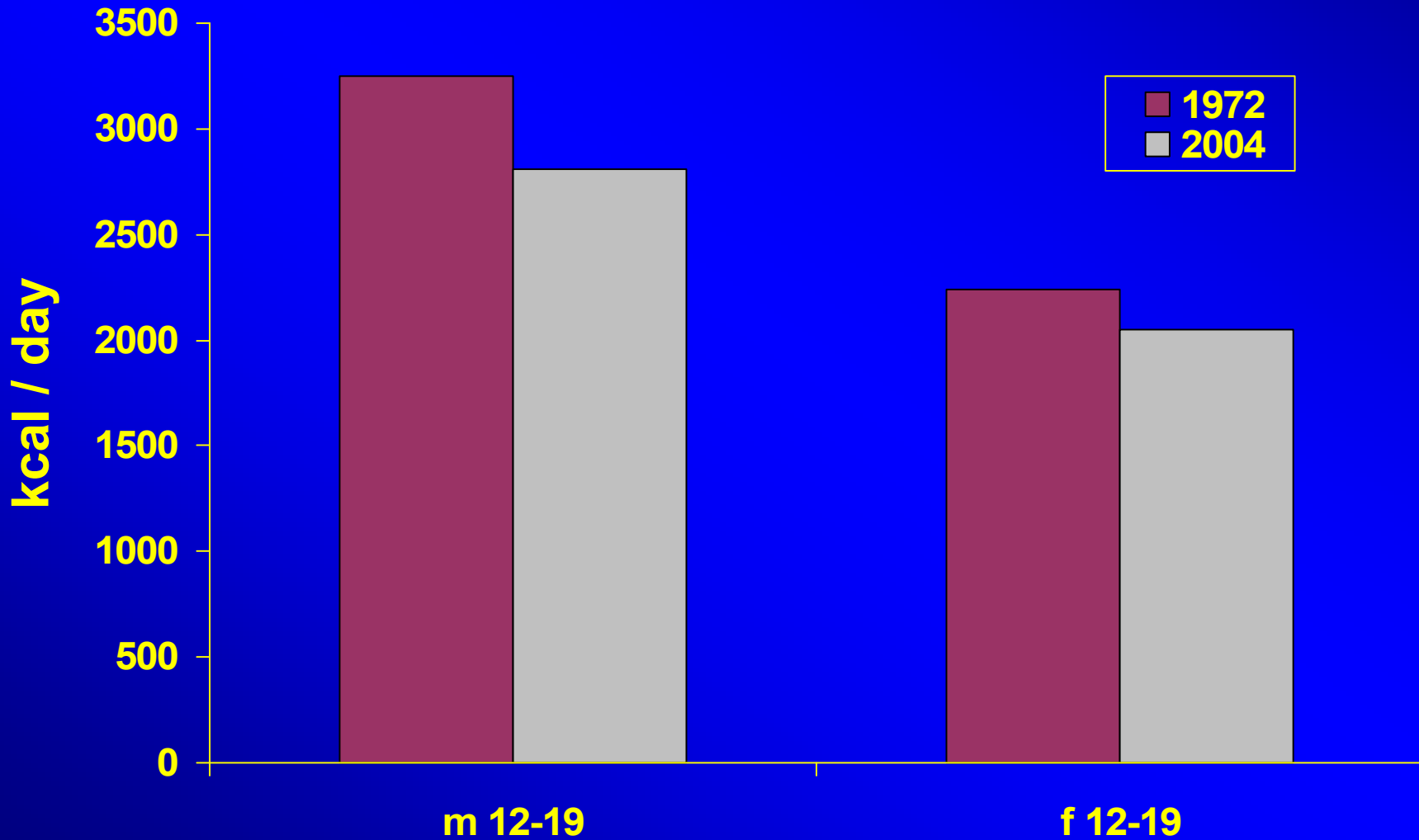
PREVALENCE OF OVERWEIGHT AND OBESITY: Effects of screen-time Canadian children (ages 2-17)



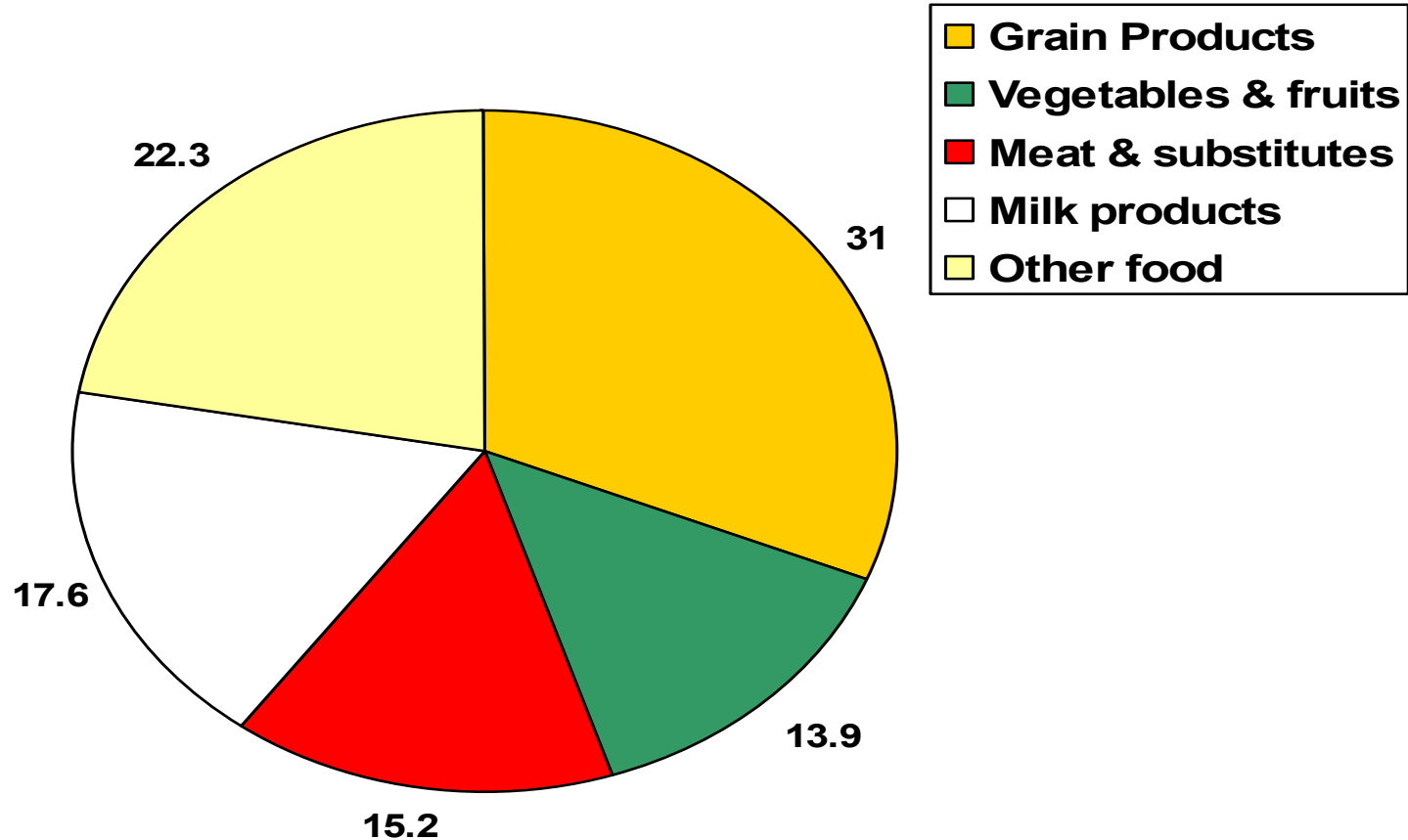
Metabolic Syndrome by Screen Time - NHANES



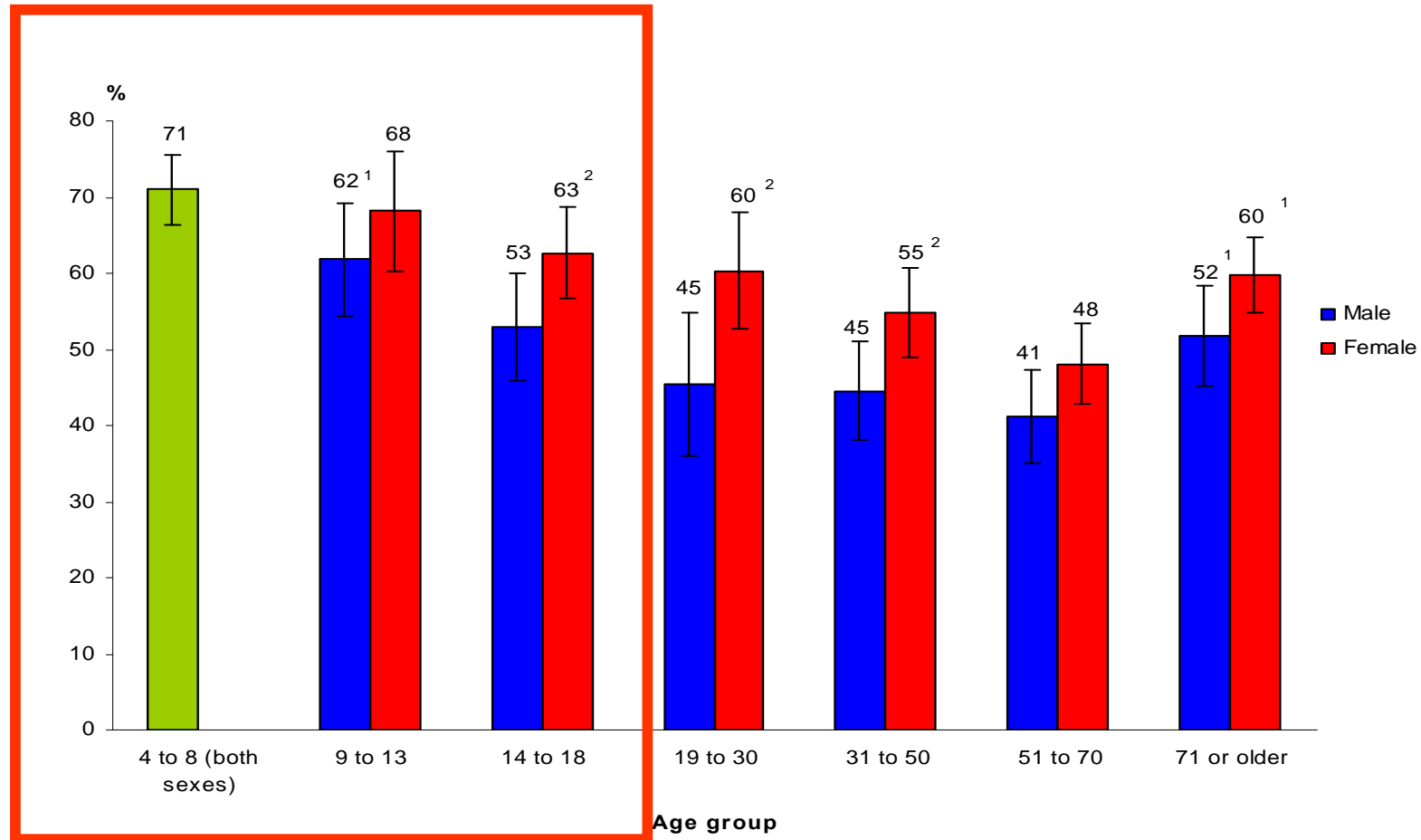
TRENDS IN CALORIE INTAKE



Percentage distribution of sources of calories, by food group and age group, household population aged 4 – 18 years, Canada excluding territories, 2004



Percentage below recommended minimum number of servings of vegetables and fruit, by age group and sex, household population aged 4 or older, Canada excluding territories, 2004



Percentage of children *with usual sodium intake above the UL*, by age group and sex, household population aged 1-18 years, Canada excluding territories, 2004

Dietary Reference intake groups		% above UL
Age group	Sex	
1 to 3	Both	77.1
4 to 8	Both	92.7 *
9 to 13	Male	96.9
	Female	83.0 †
14 to 18	Male	97.1
	Female	82.0 †

*Significantly different from estimate for preceding age group of same sex (P<0.05)

†Significantly different from estimate for males in same age group (P<0.05)

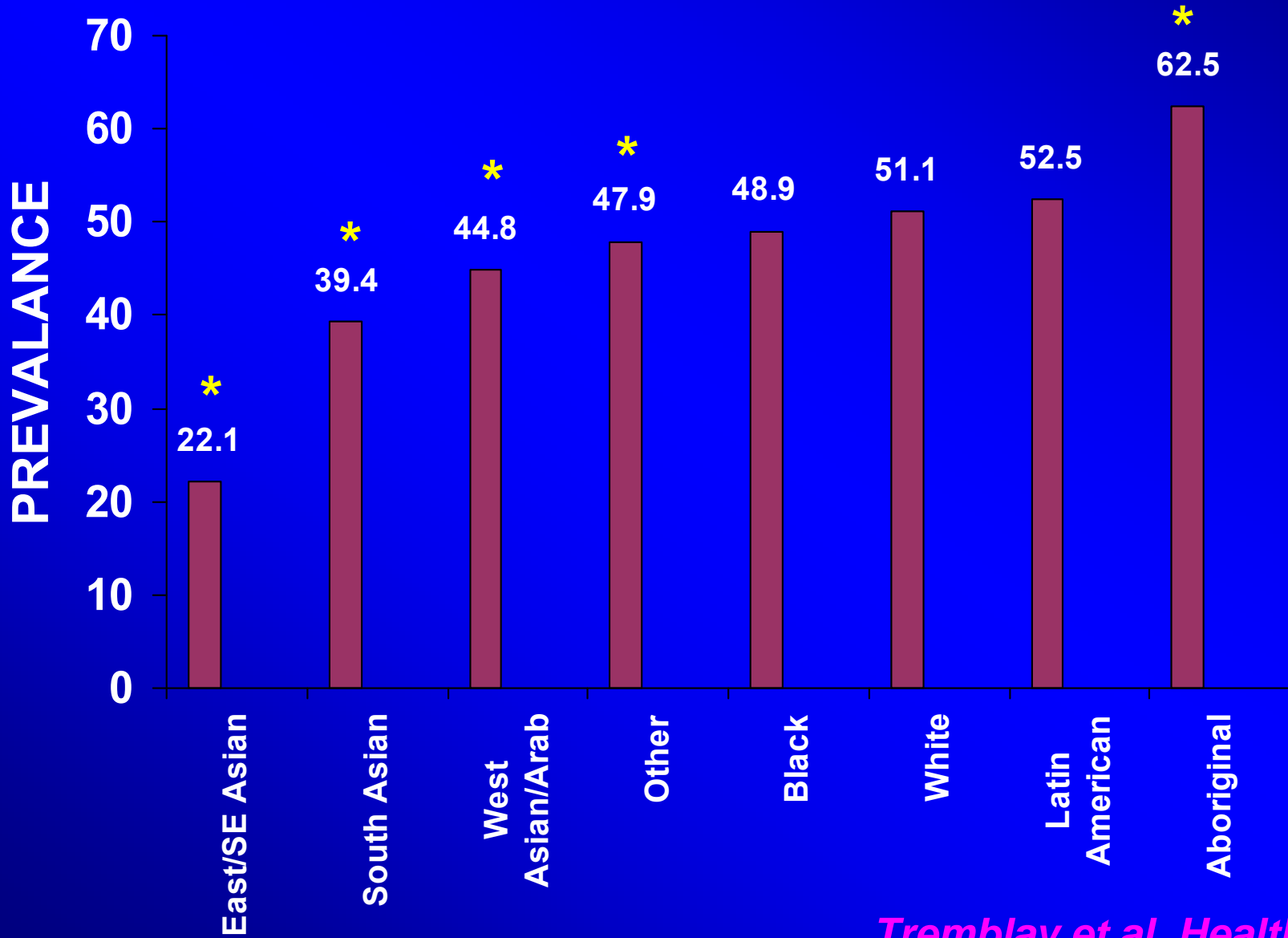
Note: Excludes salt added at table or while cooking

Source: 2004 Canadian Community Health Survey - Nutrition

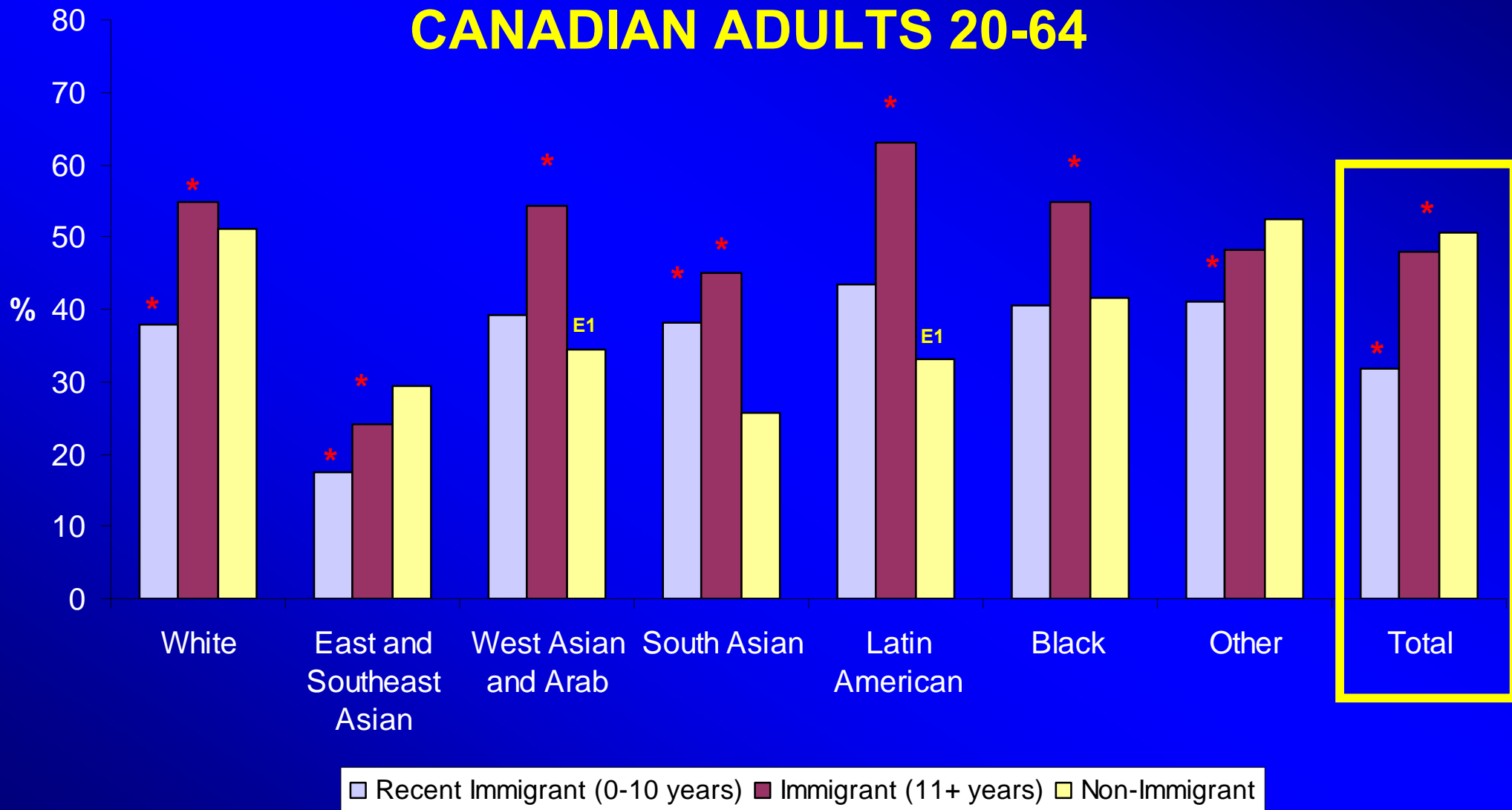
Vulnerable Groups

- **The exception is the rule**
- **To big to manage**
- **Need to empower, not dis-empower**
- **Basic principles and approaches apply**
- **Clarity**
 - **Lowering the bar (↓ obesity prevalence)**
 - **Levelling the bar (reduce disparities)**

ETHNIC DIFFERENCES IN PREVALENCE OF OVERWEIGHT CANADIAN ADULTS AGED 20-64



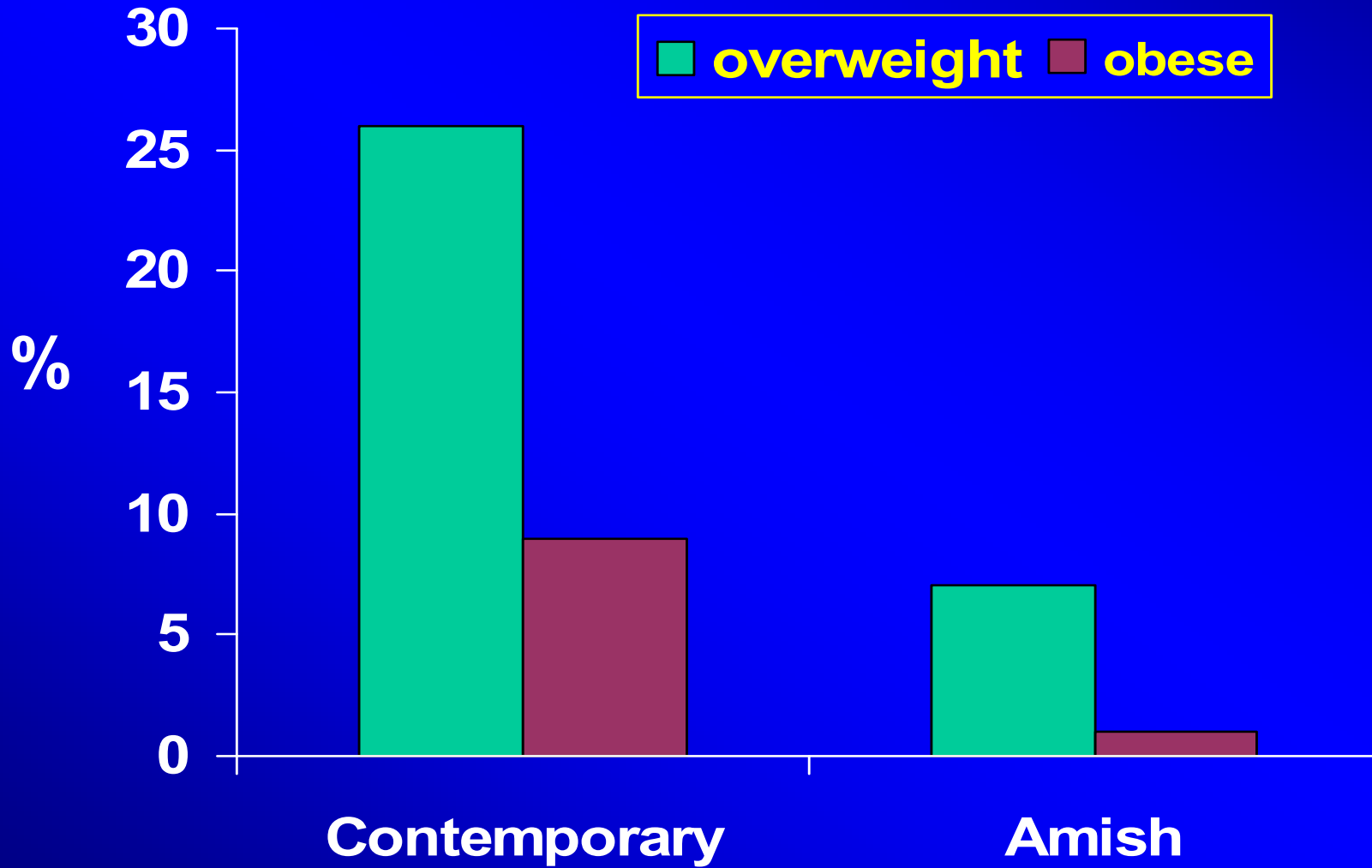
PREVALENCE OF OVERWEIGHT BY ETHNICITY AND TIME SINCE IMMIRATION CANADIAN ADULTS 20-64



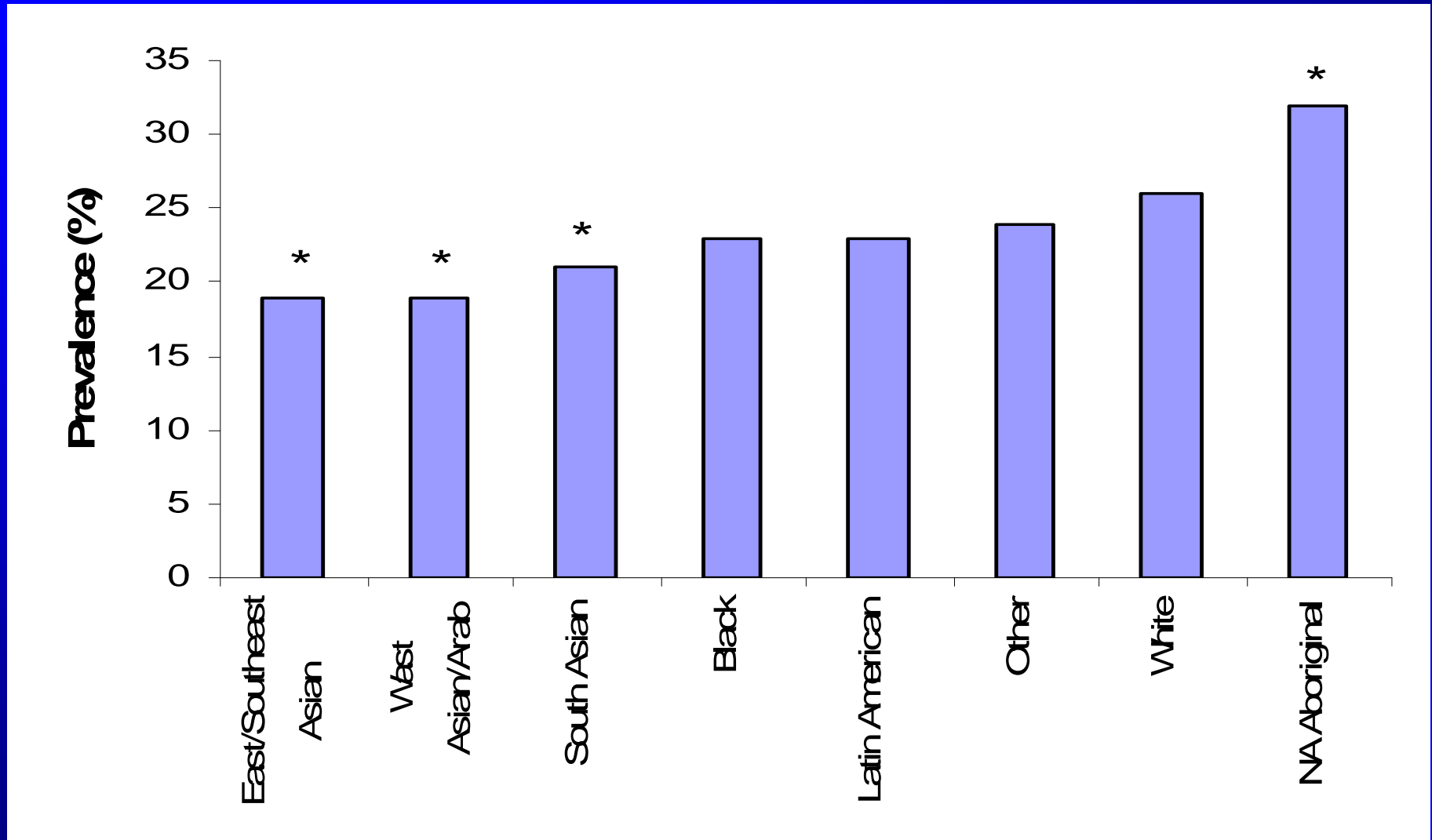
Notes: E1 Coefficient of variation falls between 16.6% and 25.0%

* Significantly different from estimate for "non-immigrant" group ($p < 0.05$).

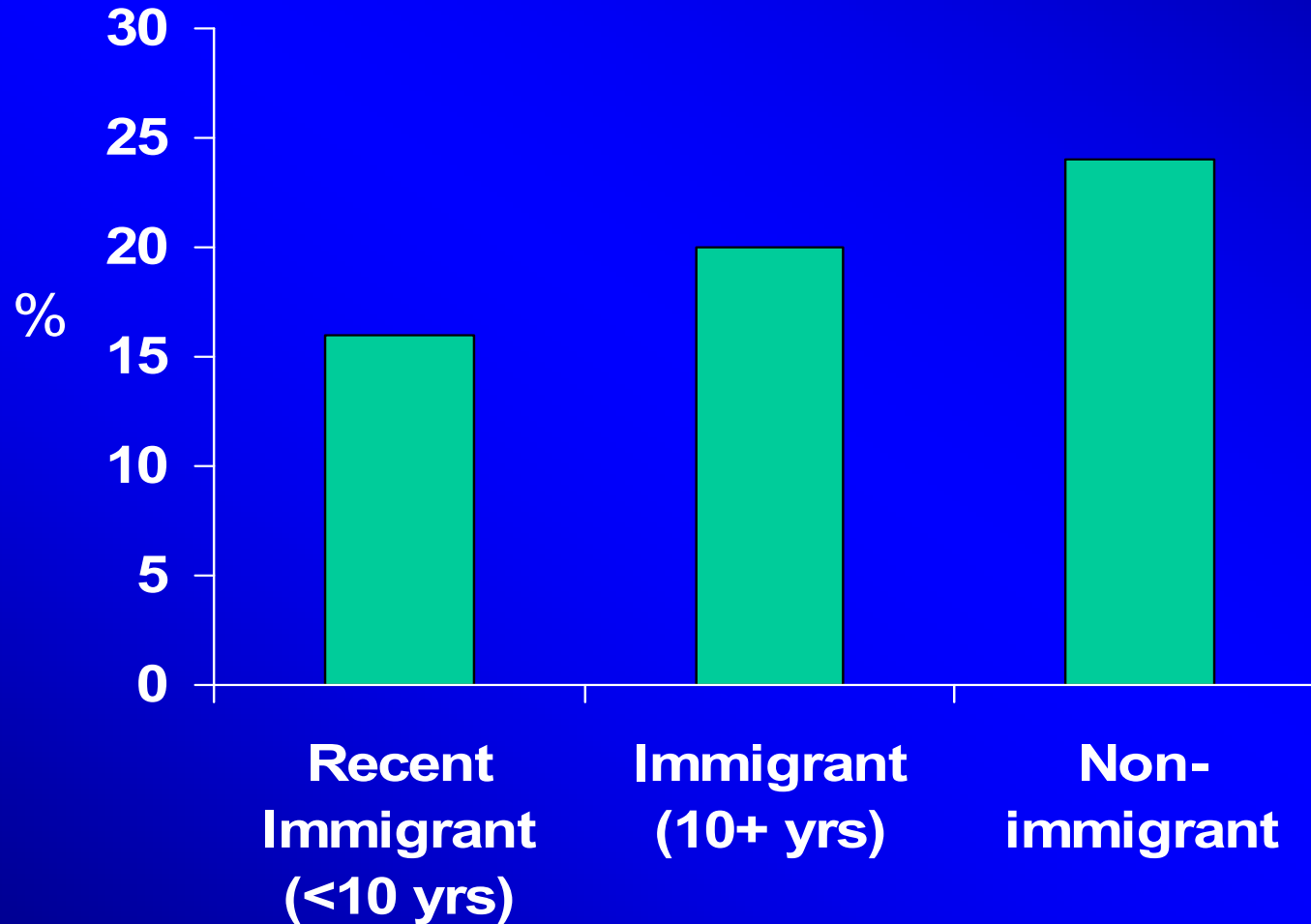
Tremblay et al. Health Rep, 2005



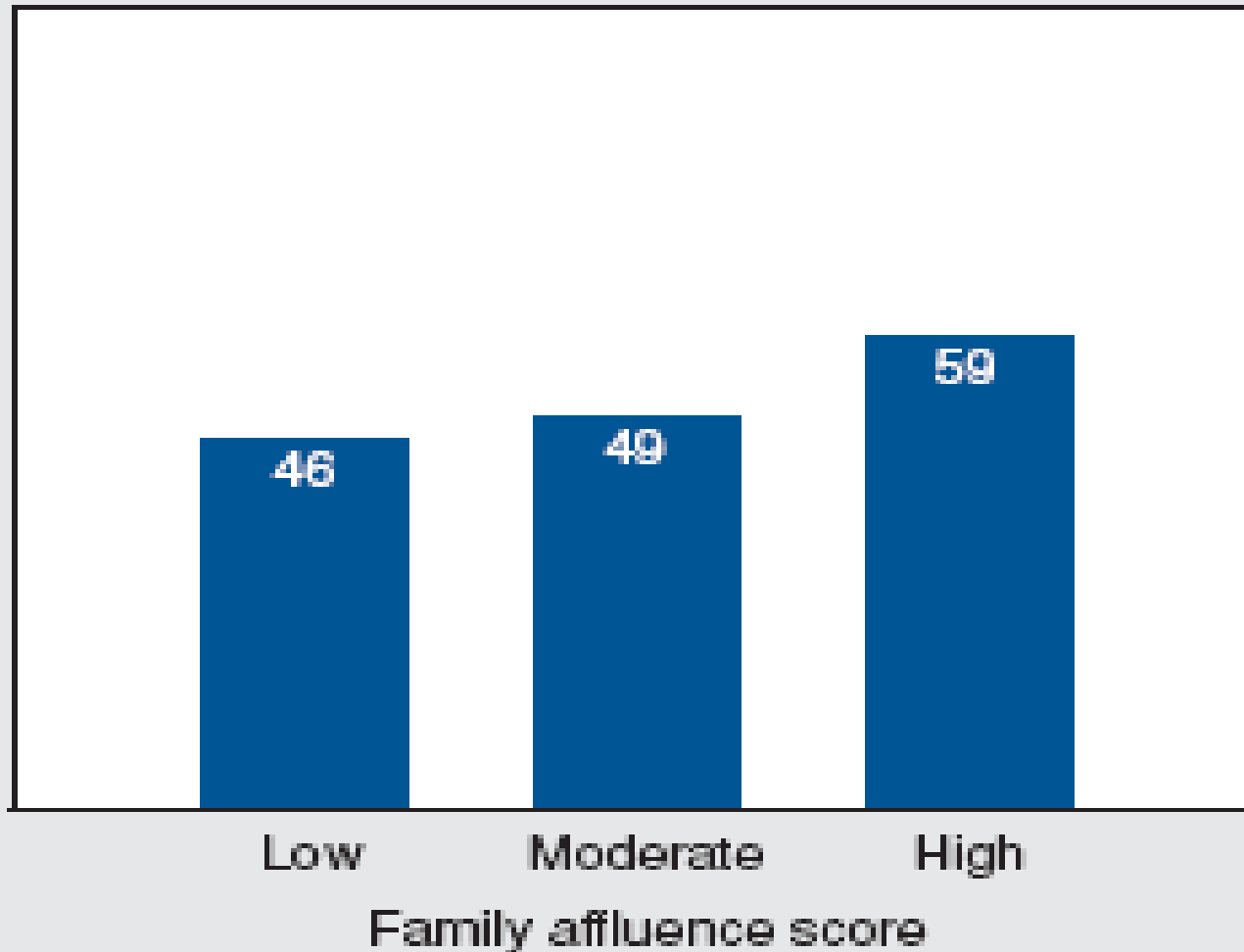
ETHNIC DIFFERENCES IN PREVALENCE OF PHYSICAL ACTIVITY (≥ 3 kkd) CANADIAN MALES AGED 20-64



DIFFERENCES IN PREVALENCE OF PHYSICAL ACTIVITY BY IMMIGRANT STATUS ADULTS AGED 20-64

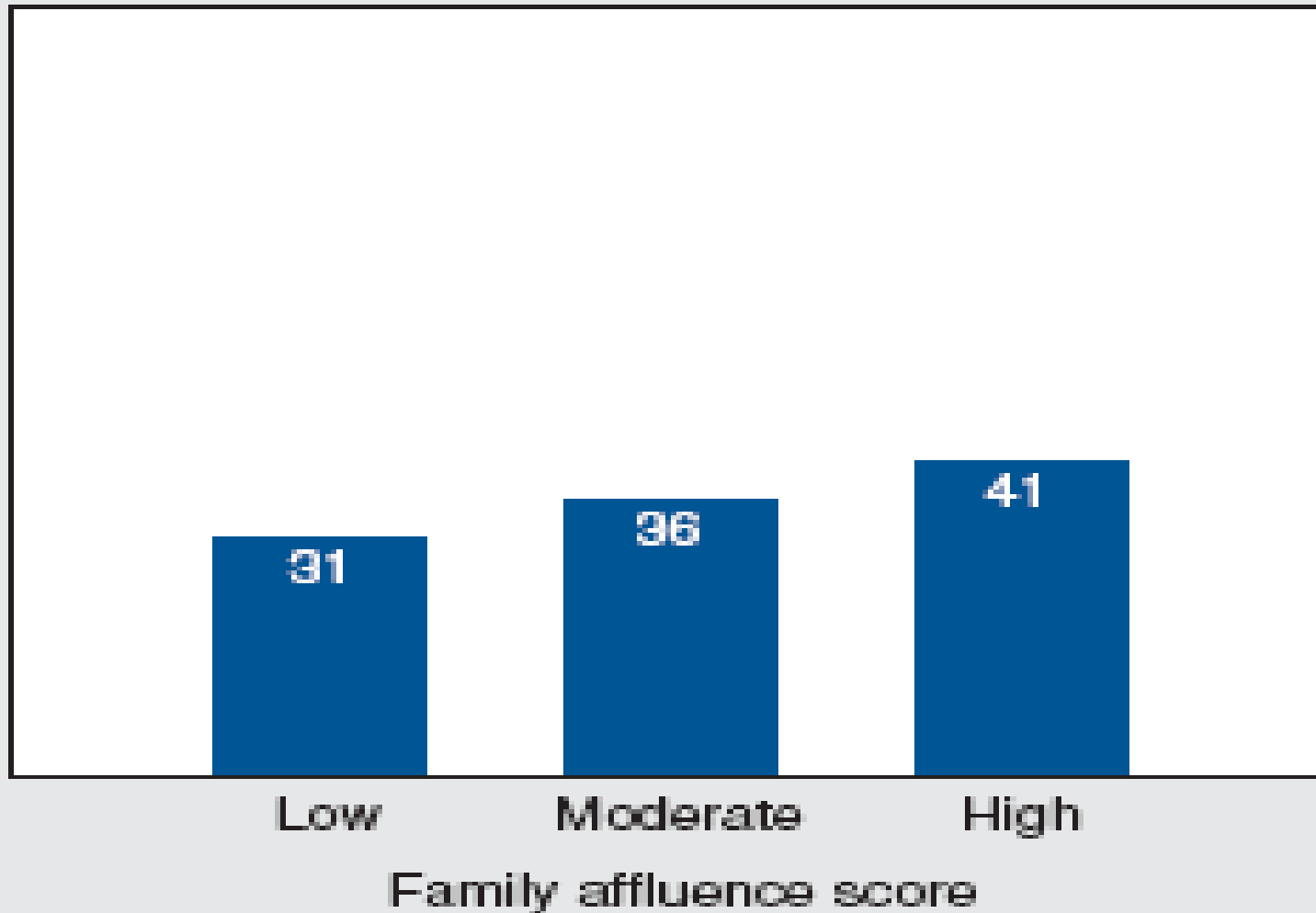


3.22 Students active for five days or more over a typical week for a total of at least 60 minutes per day and family affluence (%)

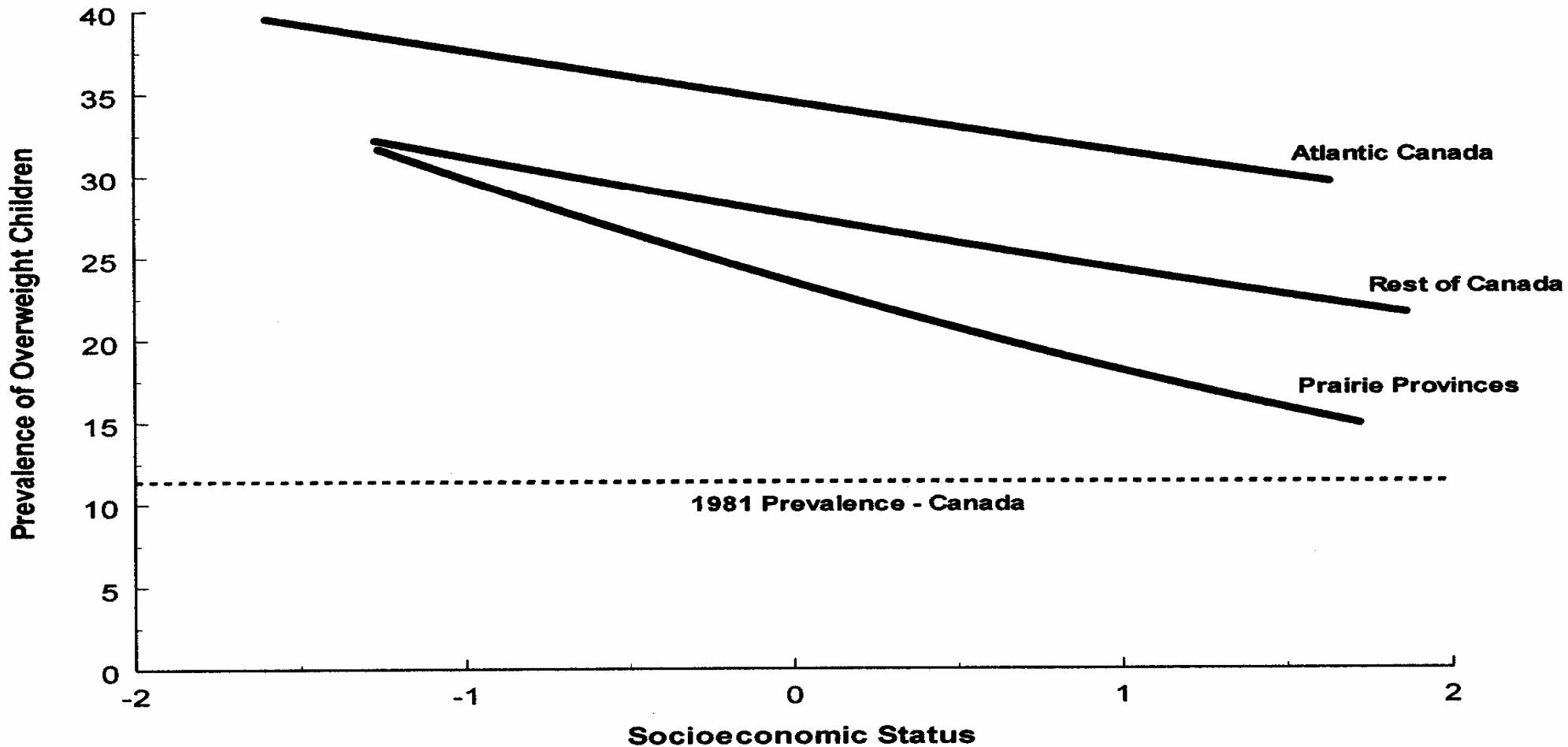


3.23

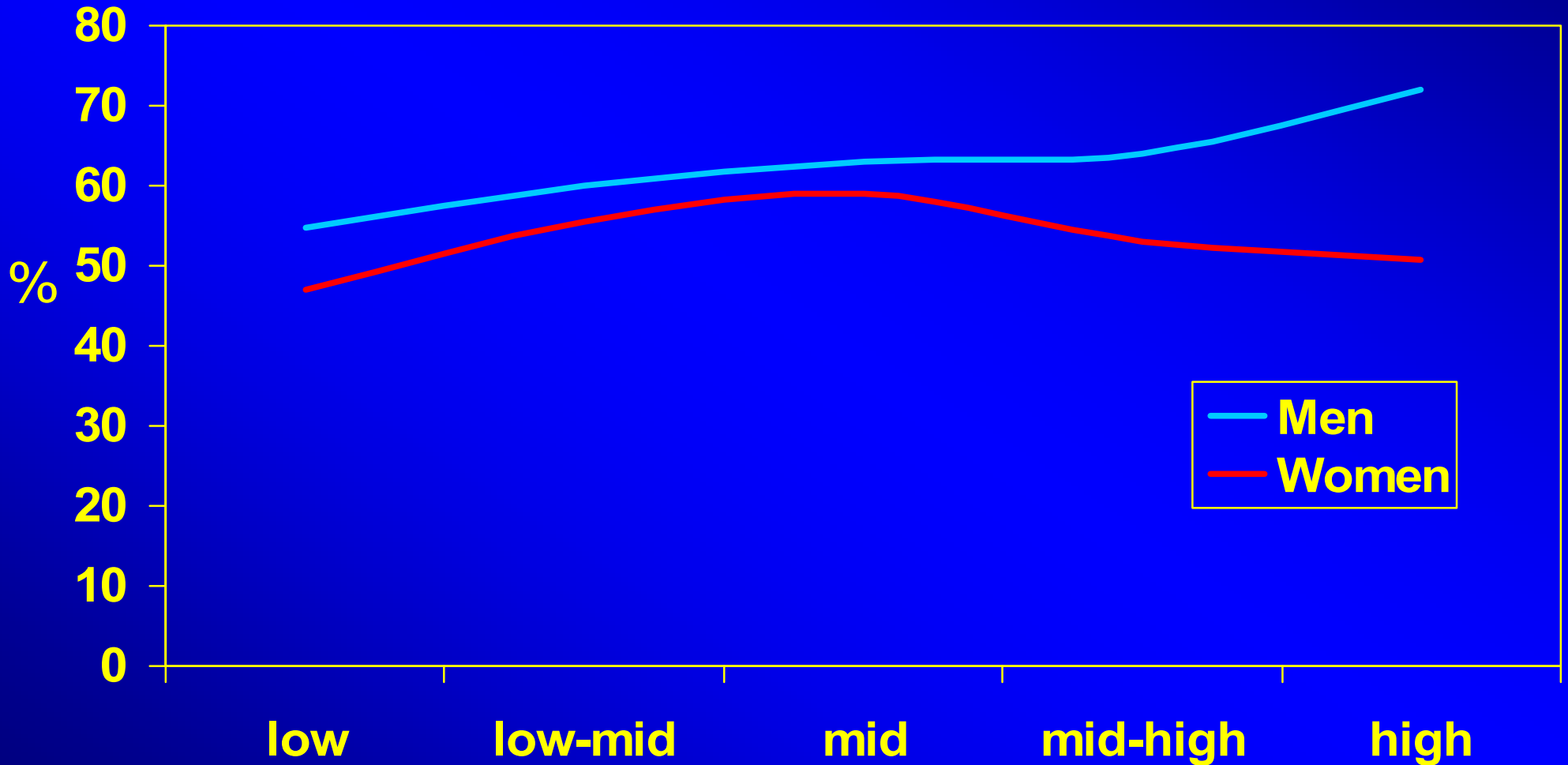
Eating fruits once per day or more often and family affluence (%)



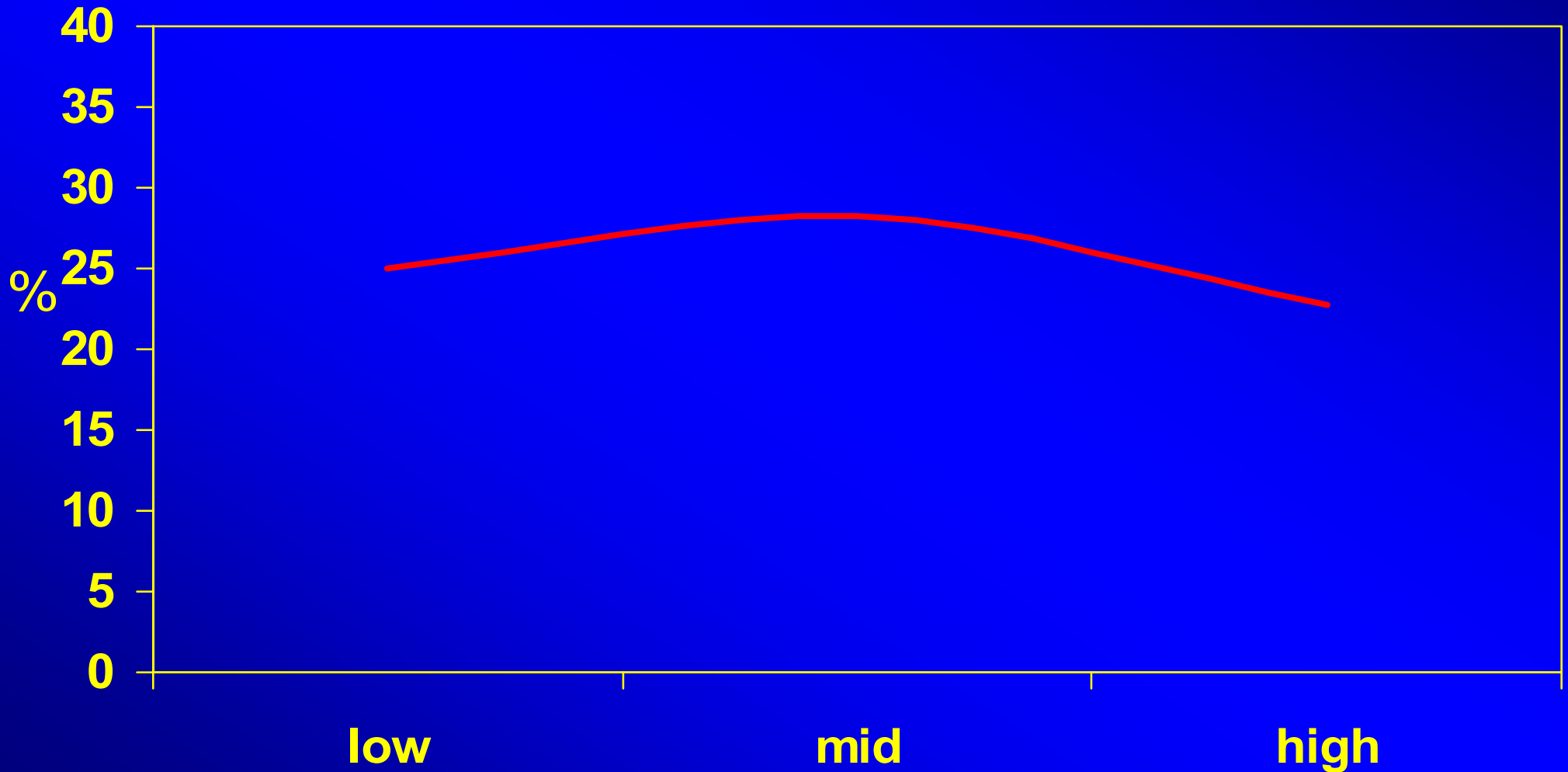
VARIATION IN CHILDHOOD OBESITY



Overweight + Obesity by Income

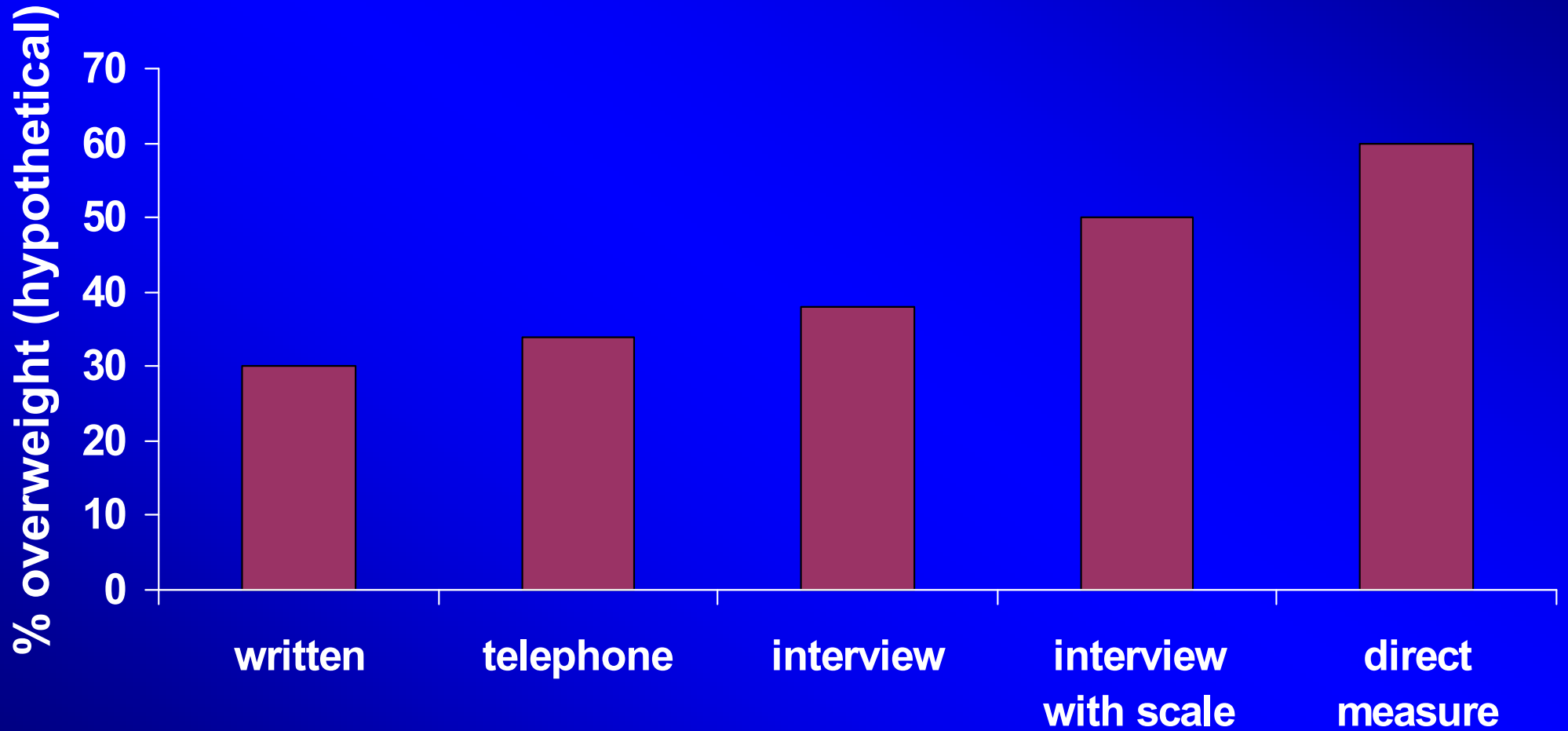


Overweight + Obesity by Income aged 2-17



Measurement Issues

BMI ACCURACY GRADIENT



Forest plot of systematic review: BMI self-report - measured

Mean time lag > 1 month

Hill, 1998 (2258)

Bostrom, 1997 (3208)

Mean time lag ≤ 1 month

Klag, 1993 (78)

Allison, 1998 (104)

Doll, 1998 Bulimic (102)

Healthy

Alvarez-Torices, 1993 (572)

Quiles, 1996 (1387)

Stewart, 1987 (1523)

Avila-Funes, 2004 (1707)

Nieto-Garcia, 1990 (7455)

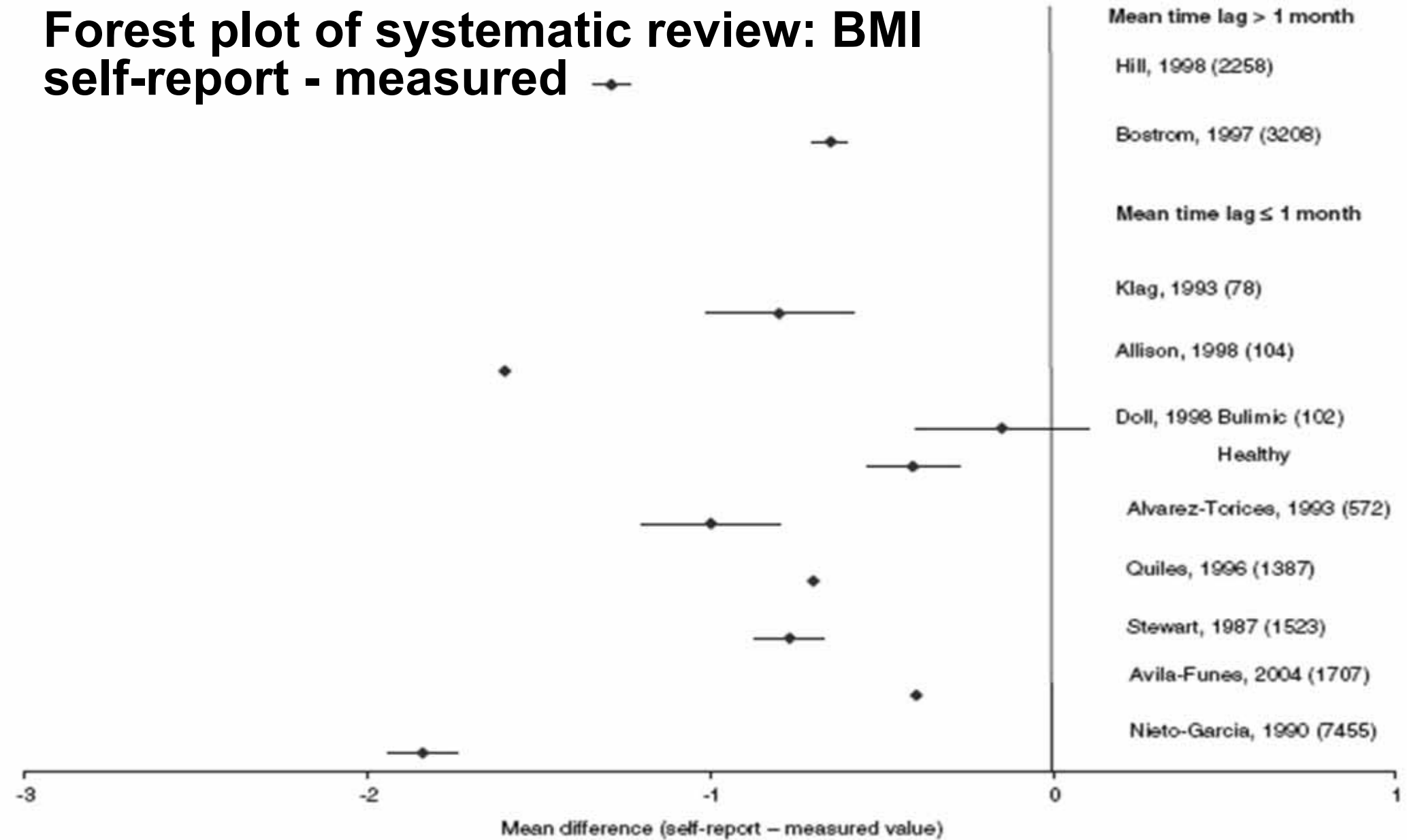
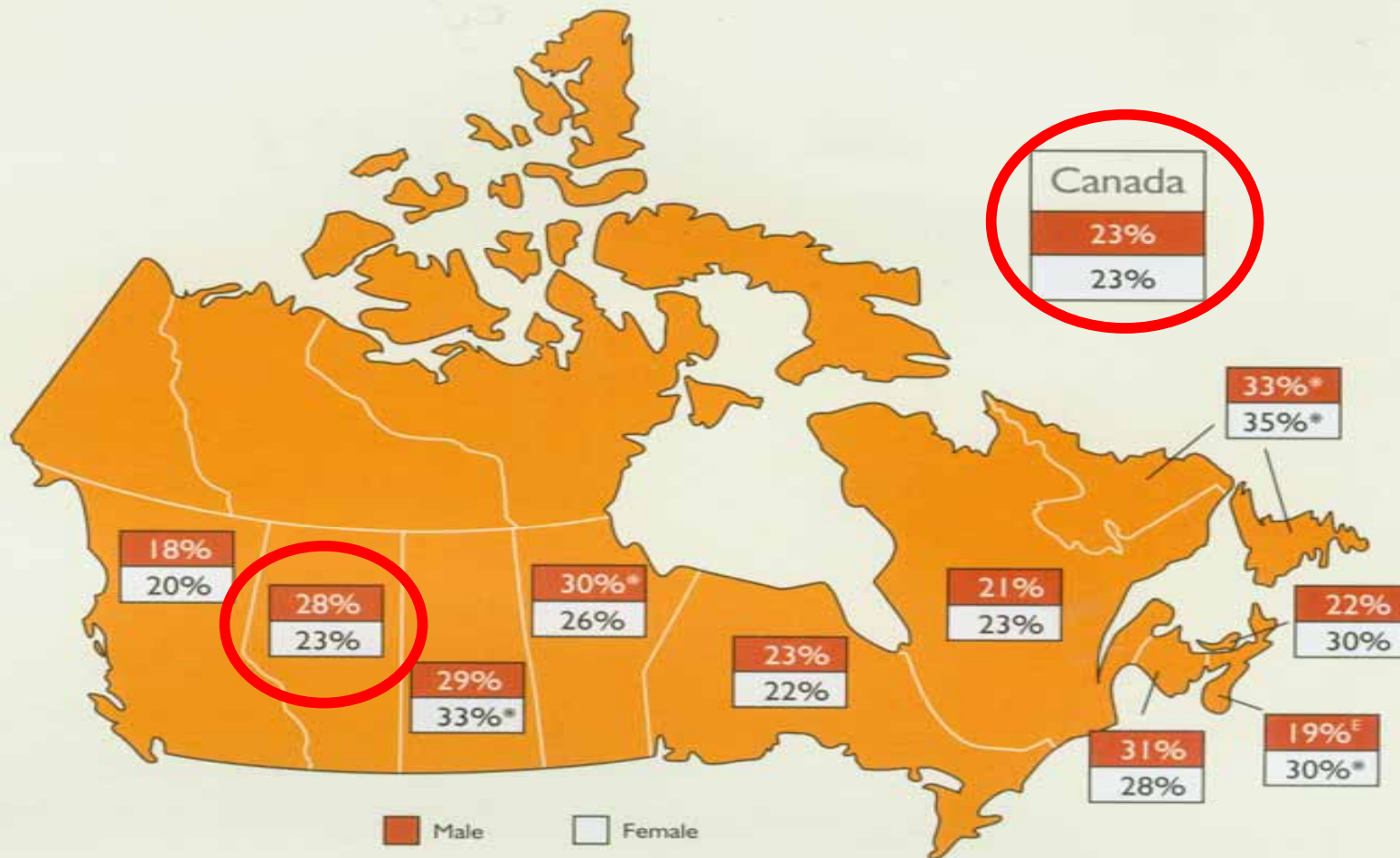


Figure 4 Mean differences in BMI for studies with available data on the total sample, in ascending order by sample size.

Measured Obesity Among Adults 18+

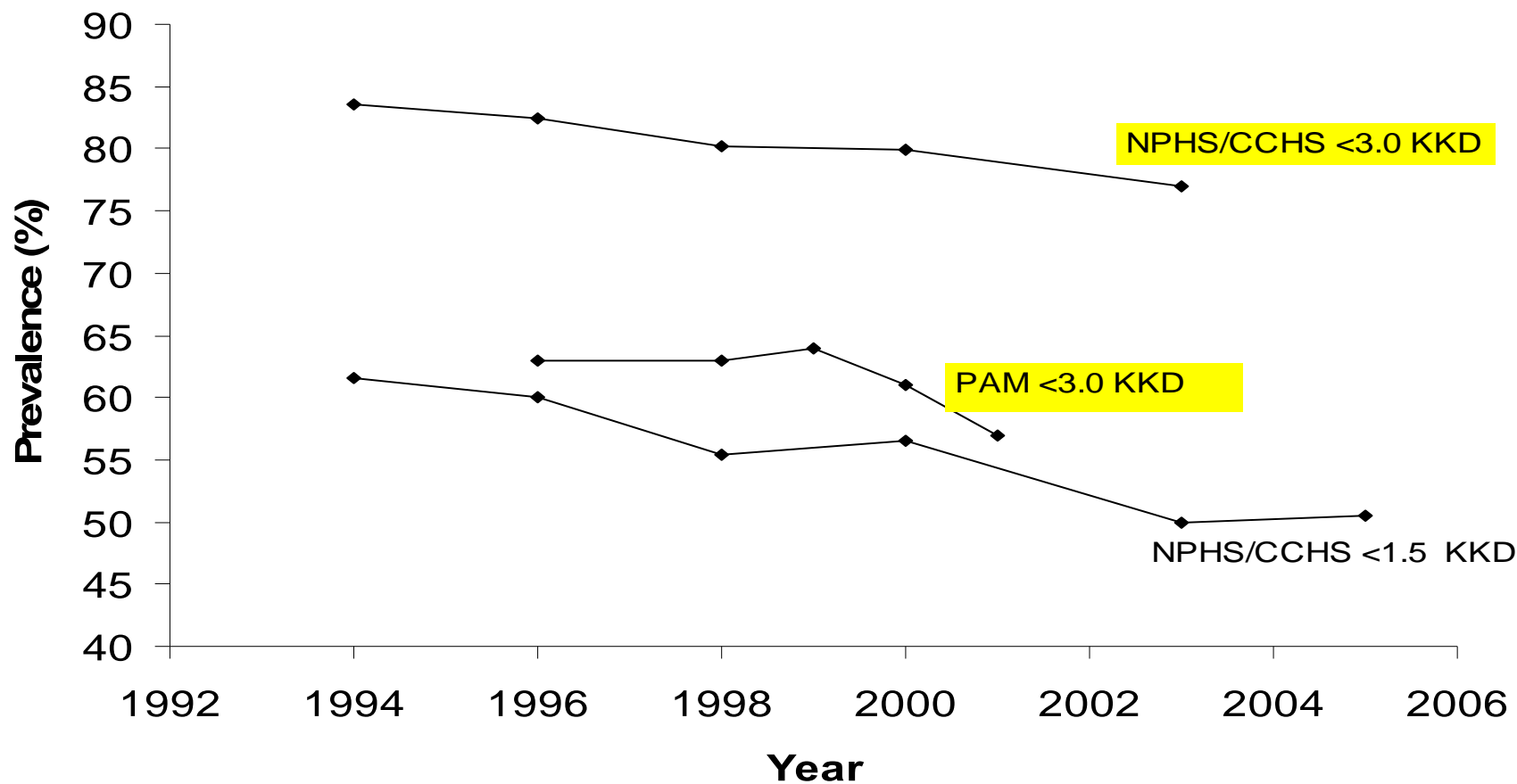


Source: CCHS 2.2 (2004), Statistics Canada.²

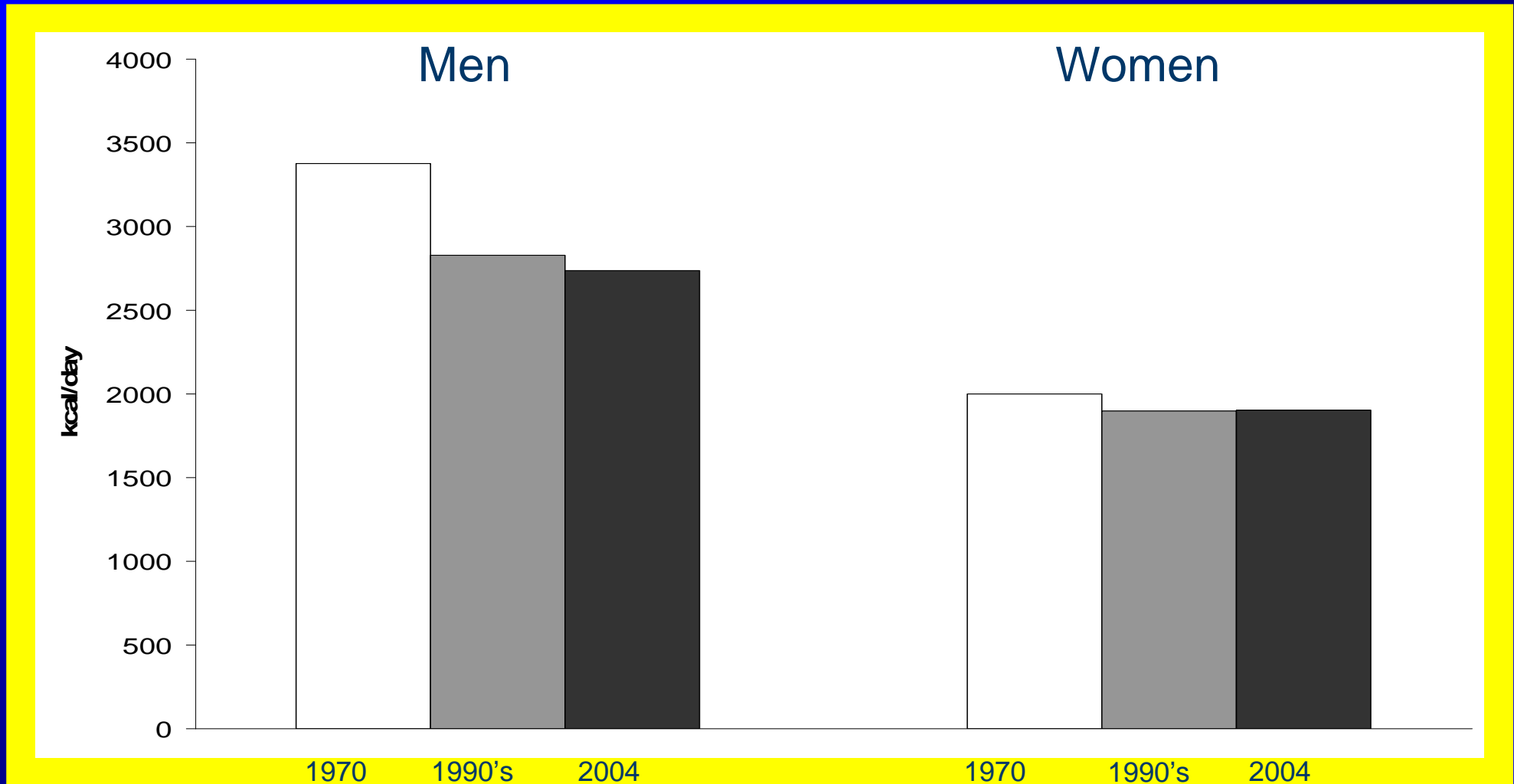
* Significantly different from the Canadian average, $p < .05$.

^E Coefficient of variation between 16.6% and 33.3% (interpret with caution)

Trends in Self-reported Physical (In)Activity Levels



Trends in Diet: Canada, 1970-2004

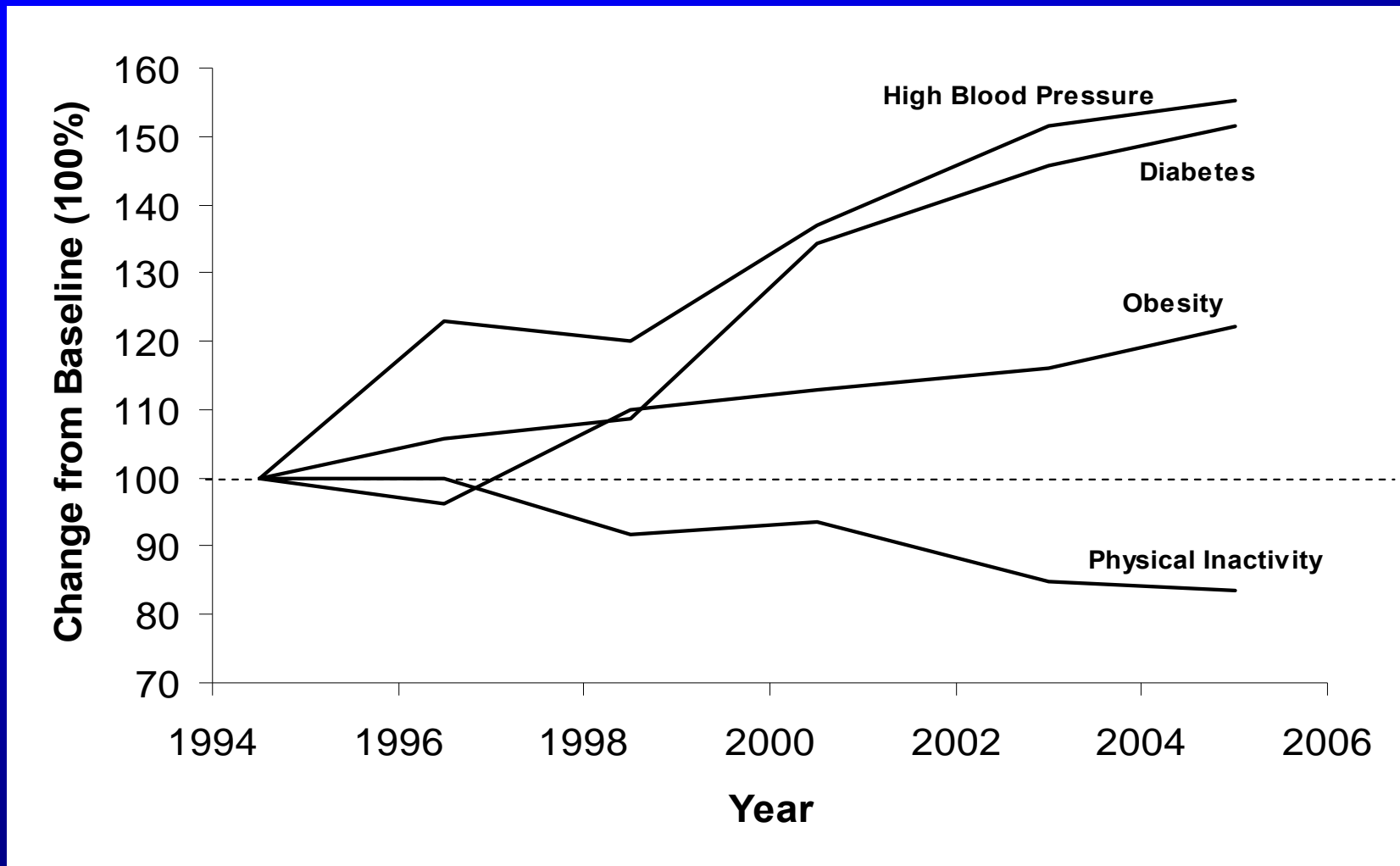


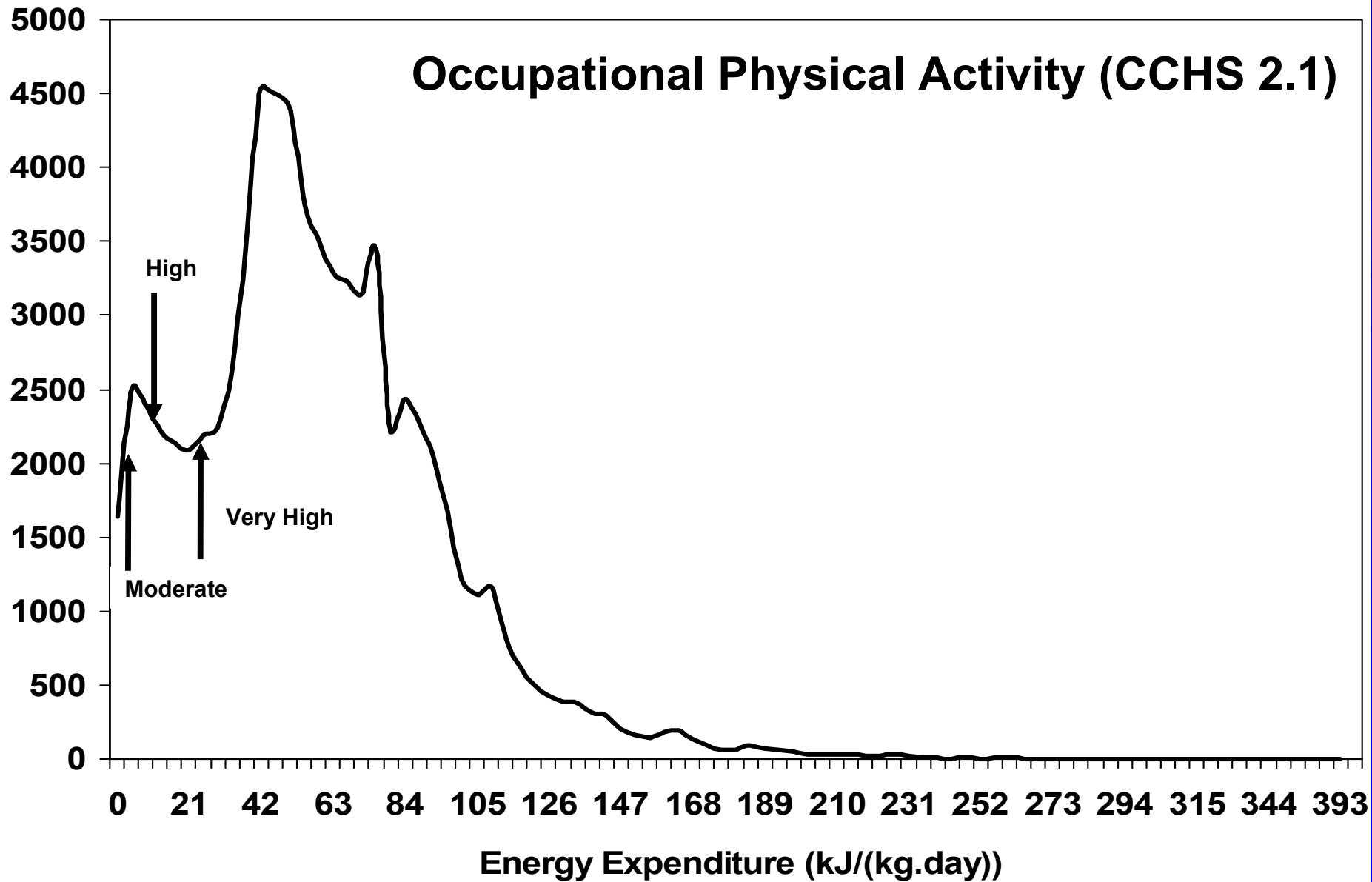
1970: Gray-Donald. *Can J Public Health* 2000: 20-39 y.

1990's: Dolega-Cieszkowski et al. *Appl Physiol Nutr Metab* 2006: 18-34 y.

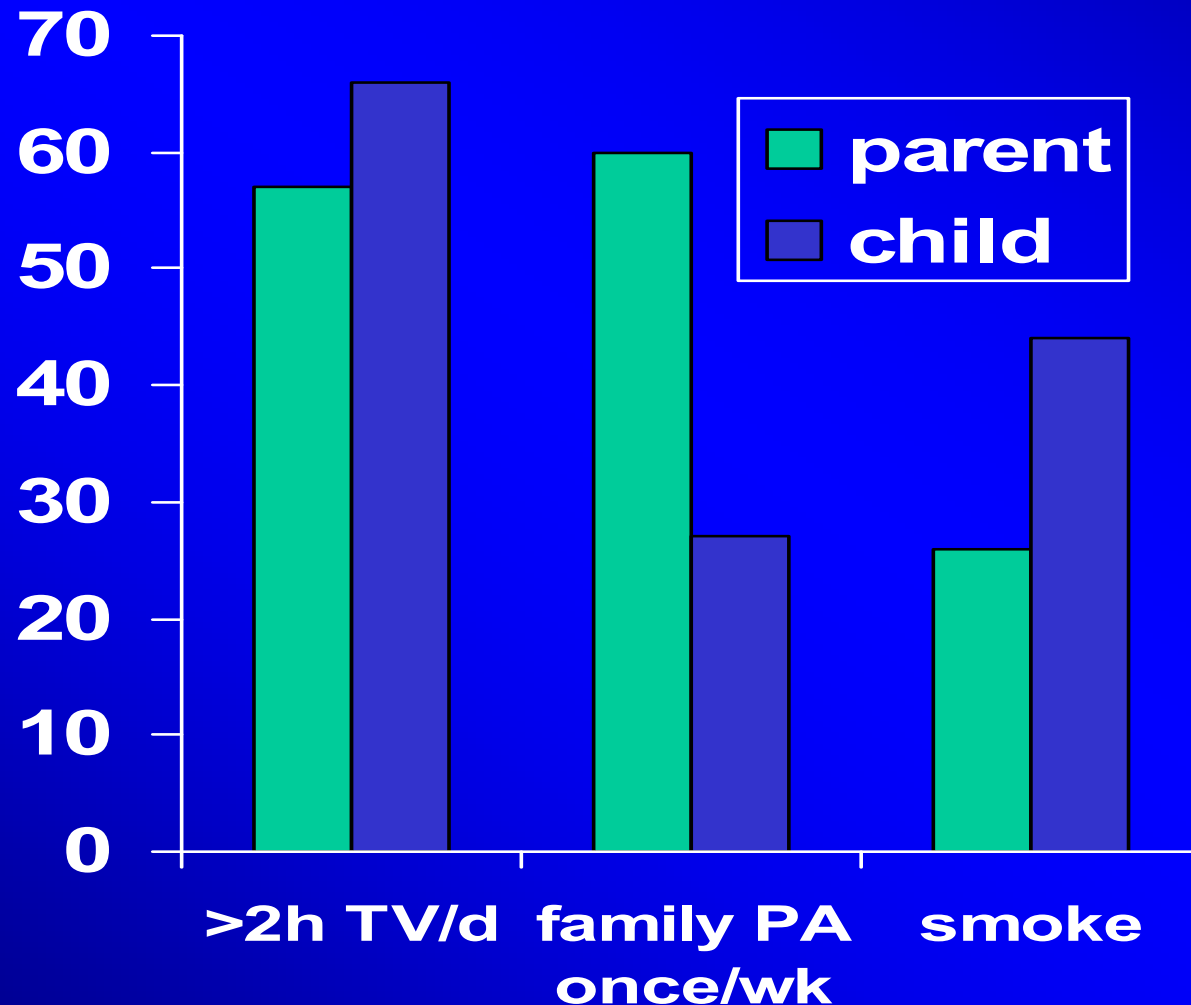
2004: CCHS, Cycle 2.2, *Nutrition* 2004: 19-30 y.

Trends in Self-reported Conditions and Physical Inactivity Levels



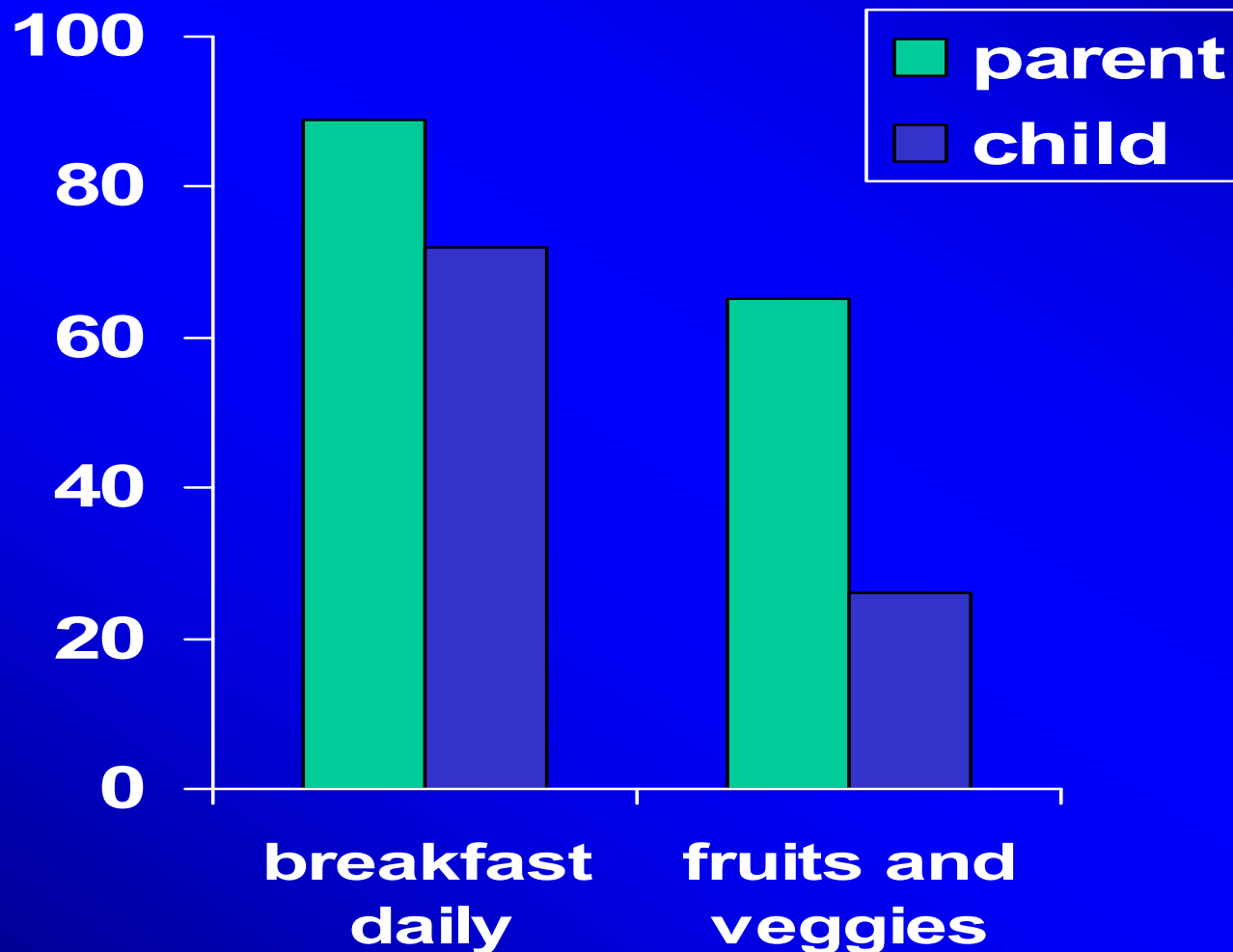


Incongruence in reported measures of adults behaviours



Ipsos Reid survey, March-April, 2007

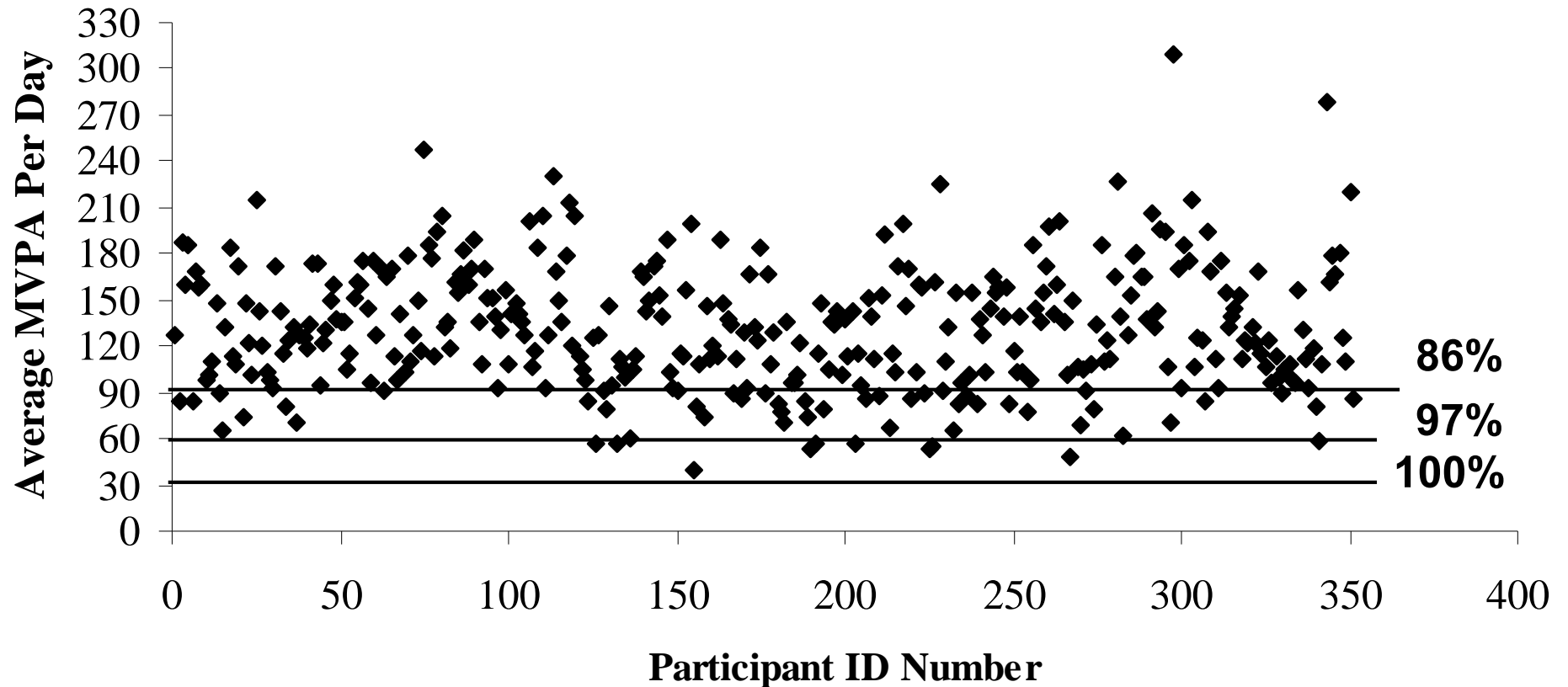
Incongruence in reported measures of child behaviours



Ipsos Reid survey, March-April, 2007

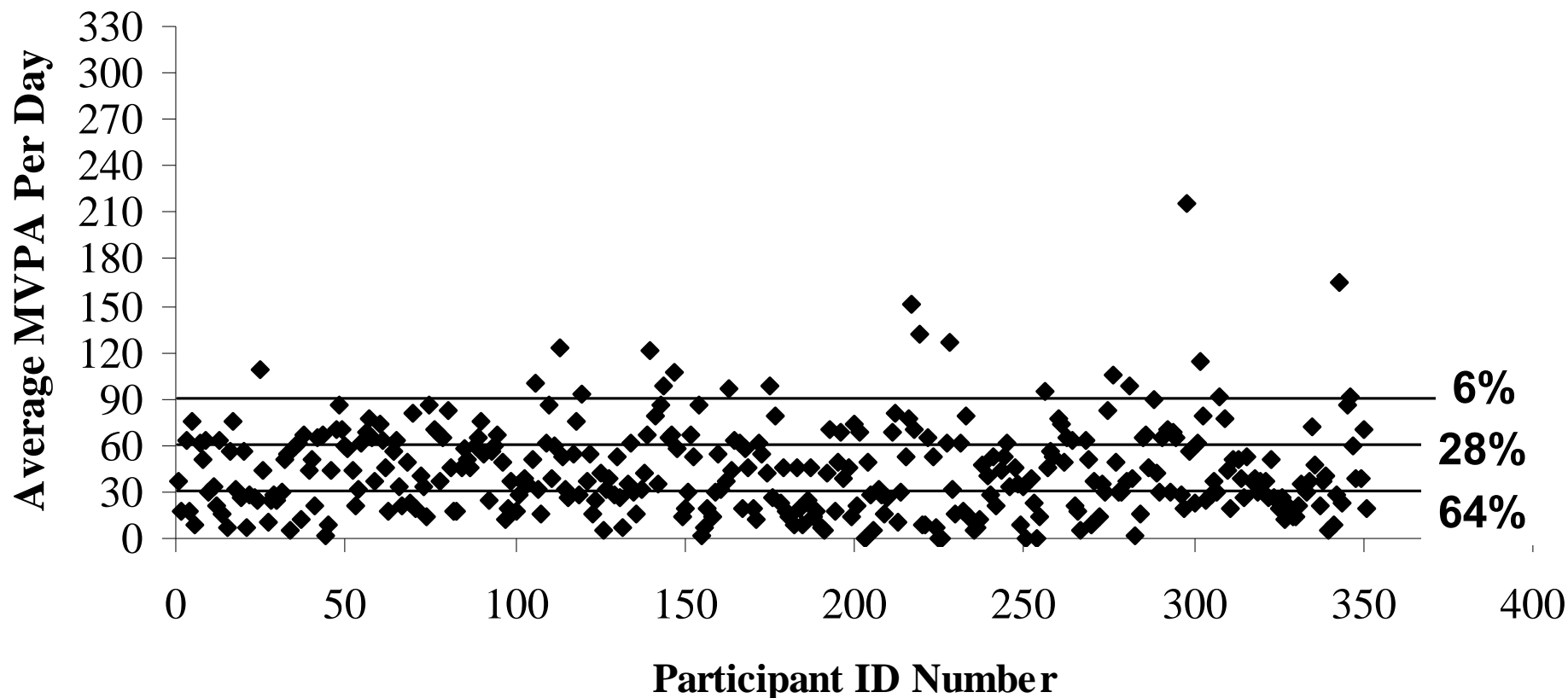
CHILDREN 8-13 yrs MEETING PHYSICAL ACTIVITY GUIDELINES – AVERAGE DAY

A

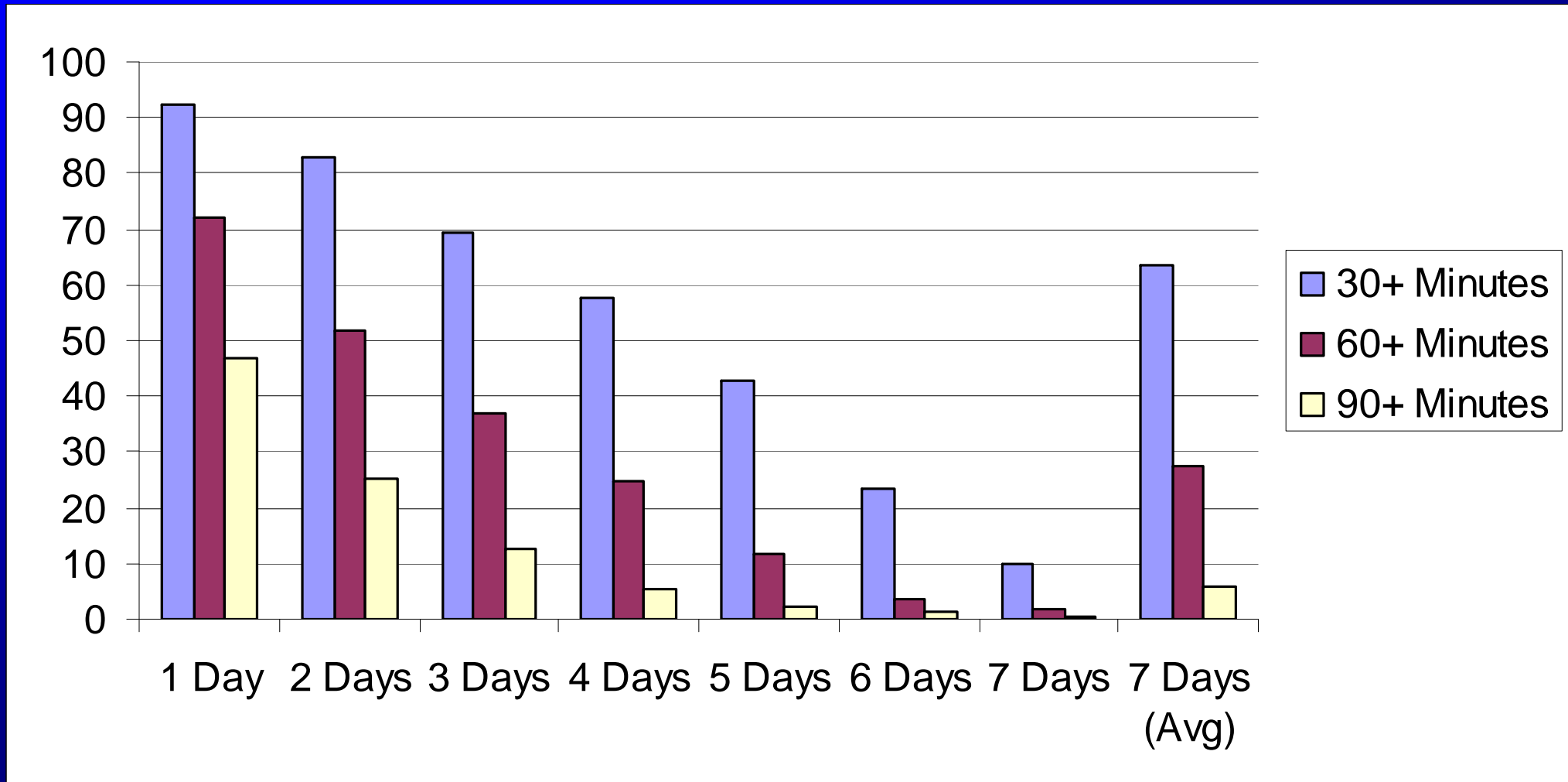


CHILDREN 8-13 yrs MEETING PHYSICAL ACTIVITY GUIDELINES – AVERAGE DAY BOUTS ONLY

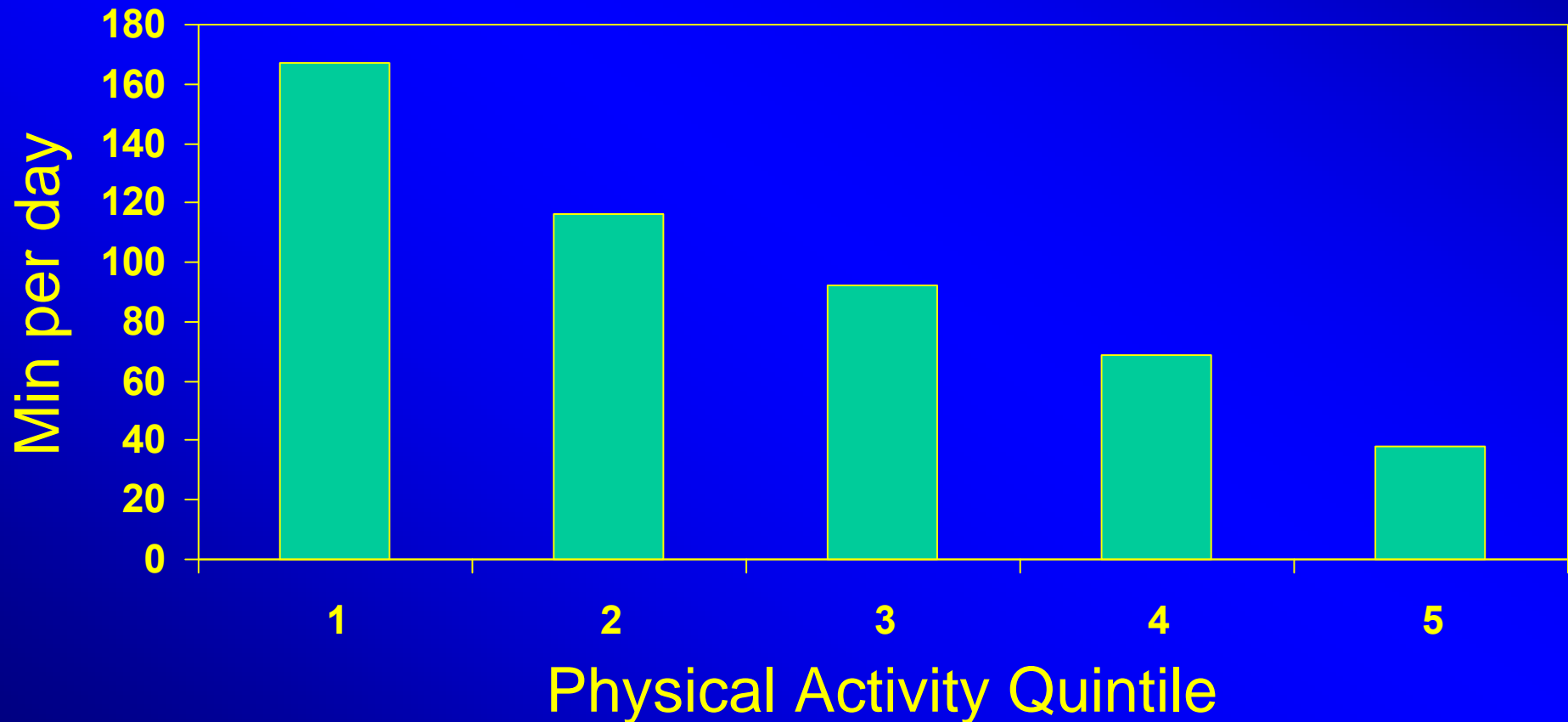
A



PROPORTION OF CHILDREN 8-13 yrs MEETING PHYSICAL ACTIVITY GUIDELINES – DAYS/WEEK BOUTS ONLY

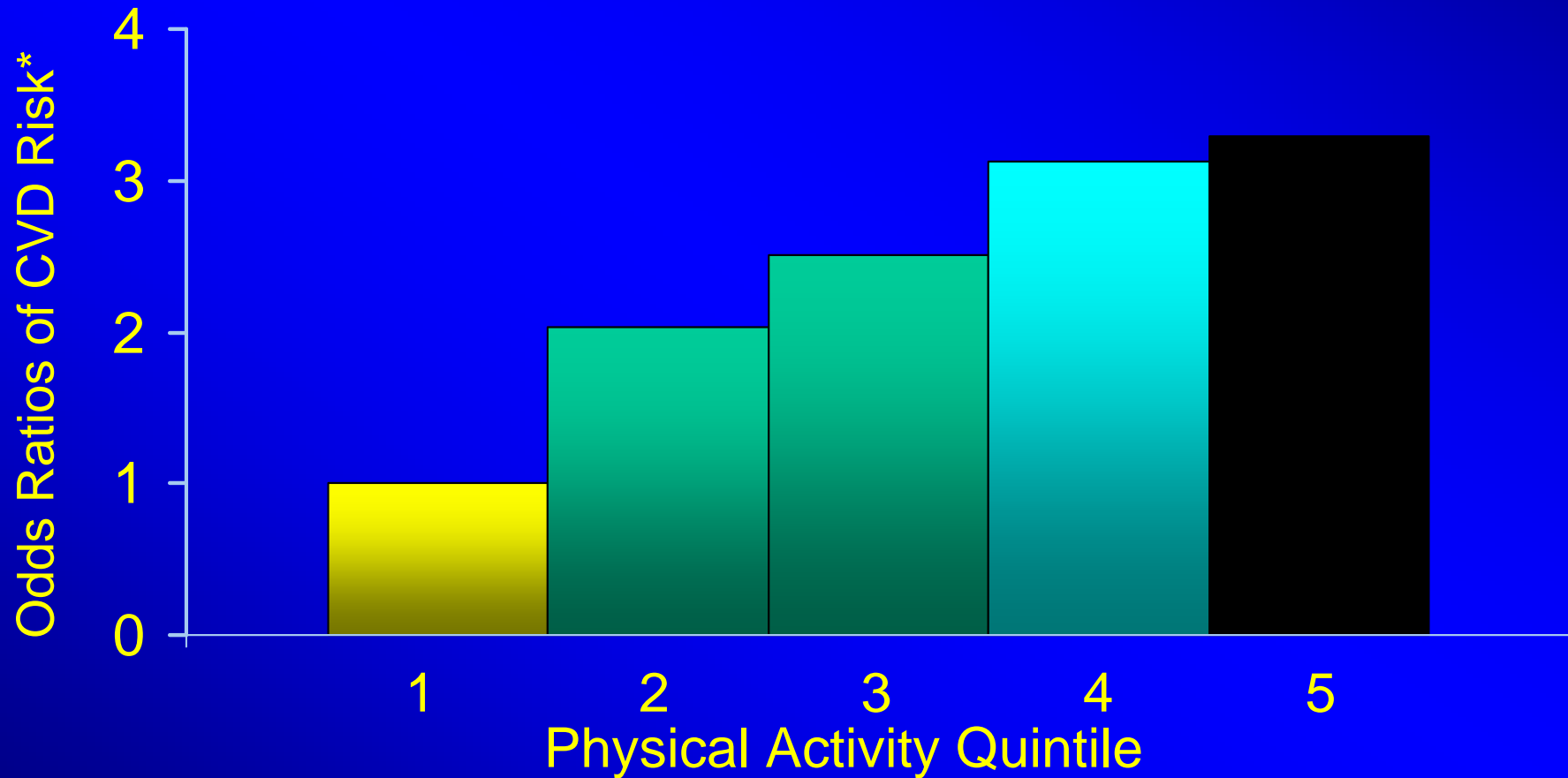


Time spent per day at PA above 2000 cpm (9 year-olds)



Andersen et al. Lancet 368:299-304, 2006.

Physical Activity and Clustered Cardiovascular Risk in Children



*Composite risk factor score: SBP, triglyceride, TC/HDL, insulin resistance, SO4S, aerobic fitness

Andersen et al. Lancet 368:299-304, 2006.

Adjusted Odds Ratio of Obesity (BMI z-score>0.85) for Insulin Resistance Syndrome Components Among Adolescents (NHANES III)

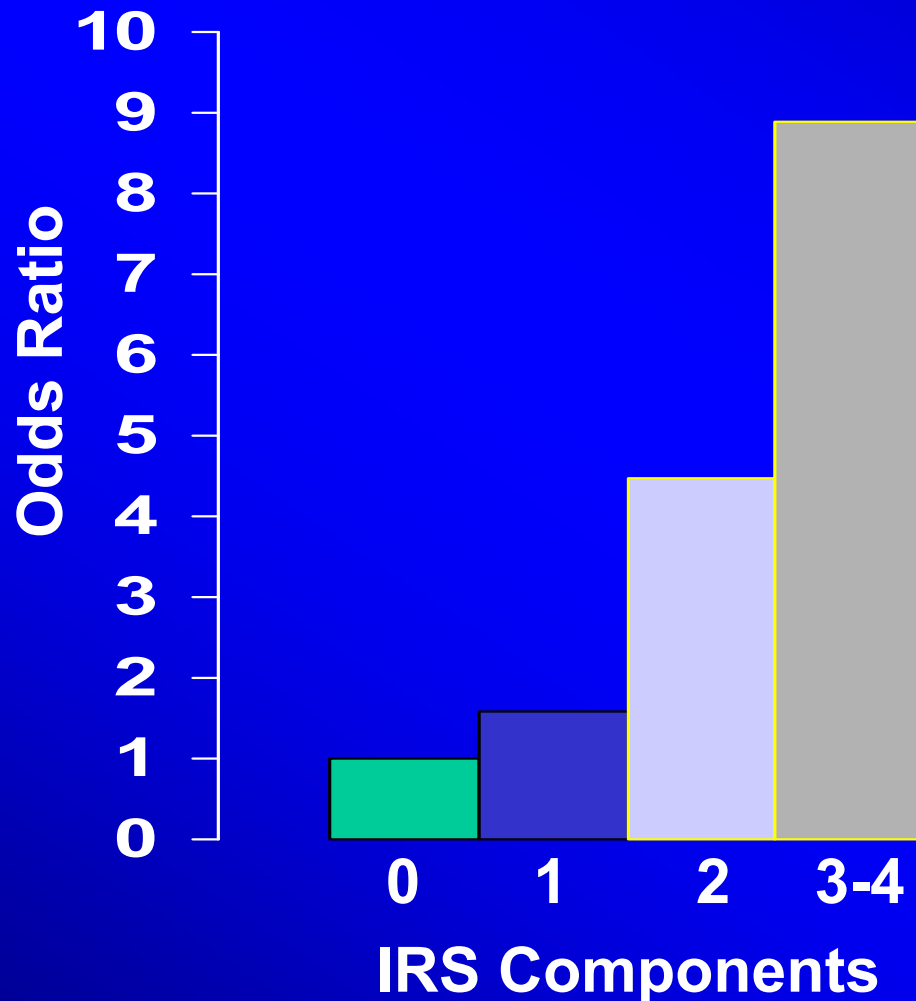
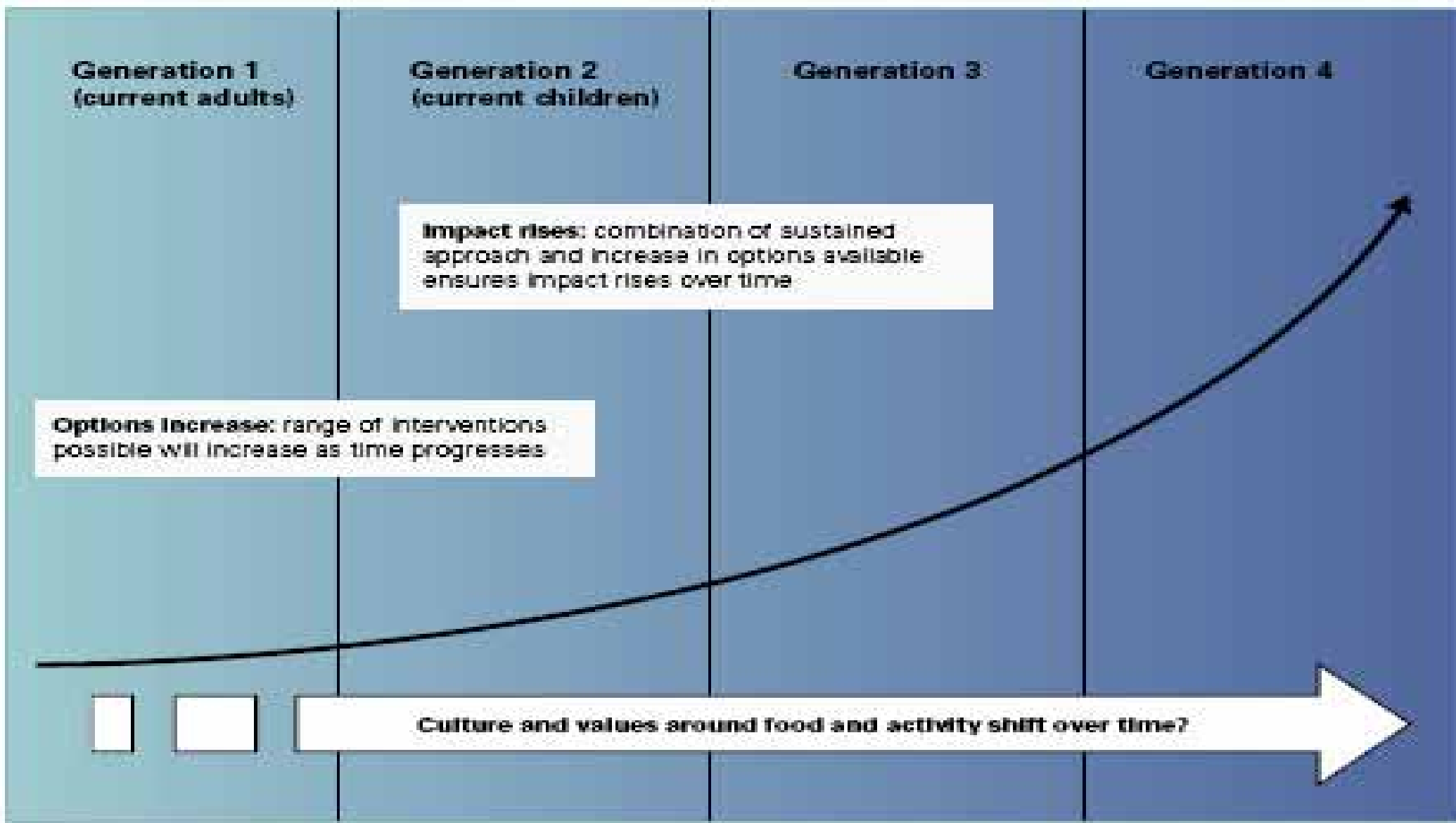


Figure 8.5: Intervention options and impact will increase over generations.

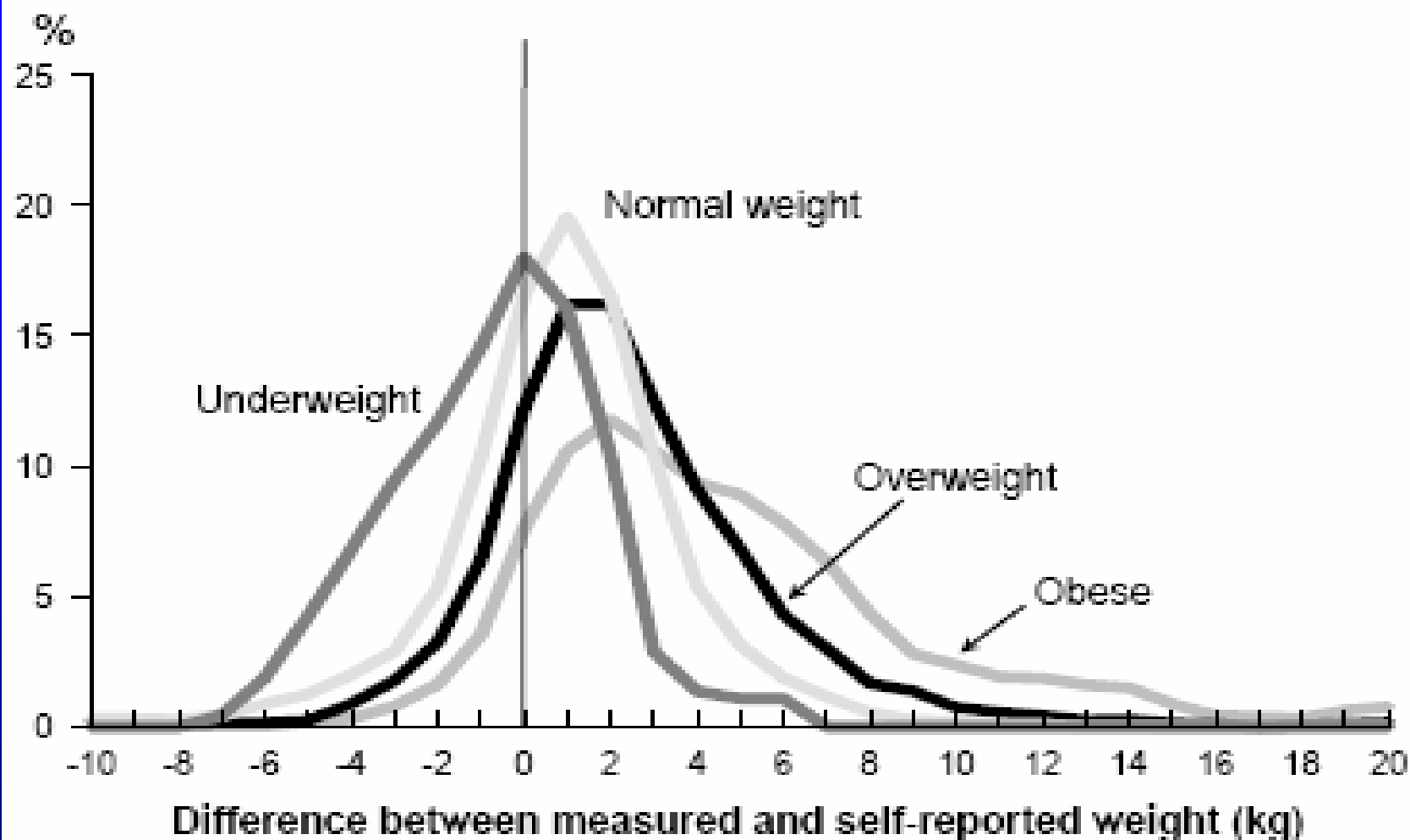


Papers published today

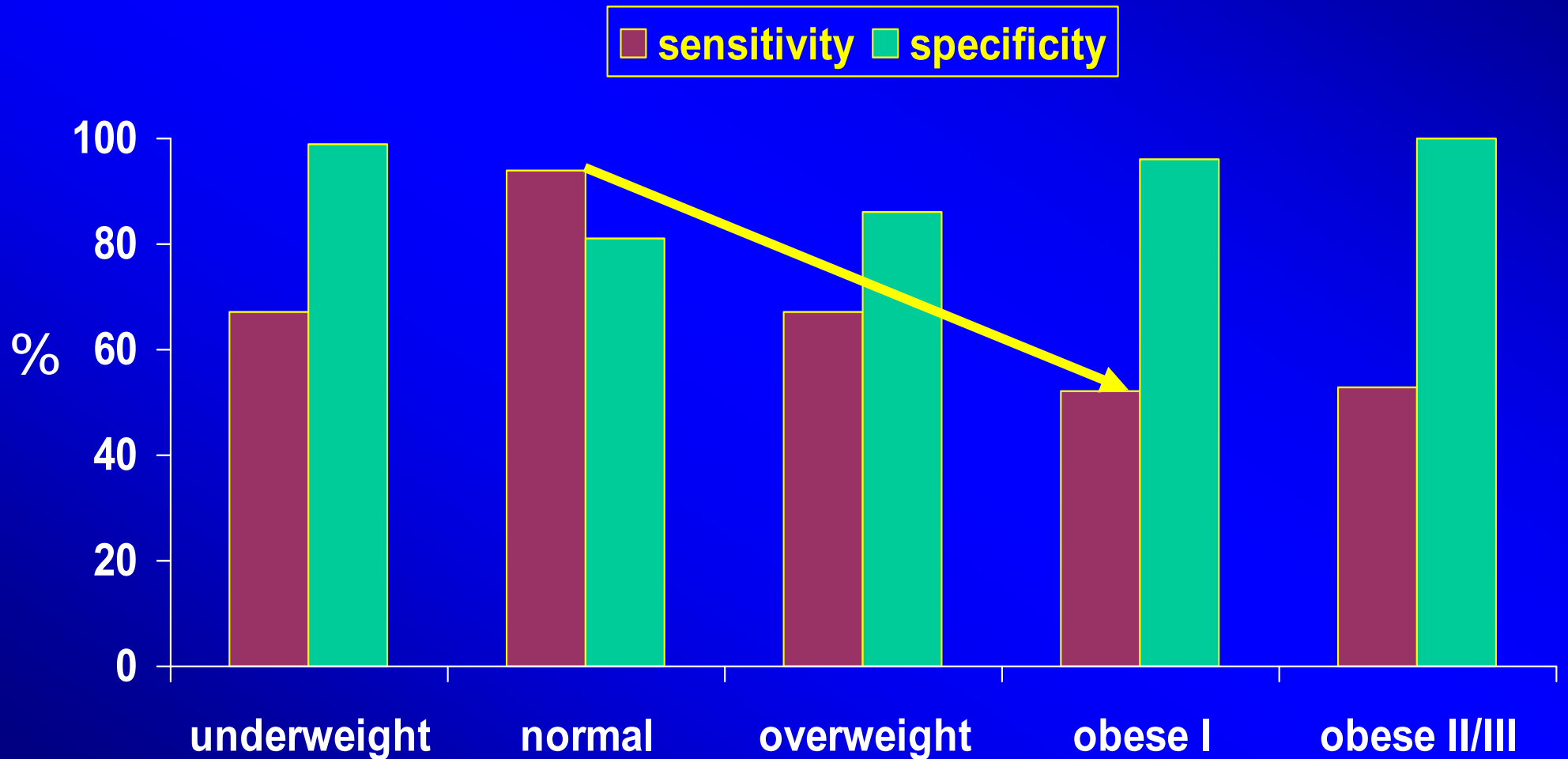
- **Shields, Connor Gorber, Tremblay**
 1. **Estimates of obesity based on self-report versus direct measures. *Health Reports 19(2), 2008***
 2. **Effects of measurement on obesity and morbidity. *Health Reports 19(2), 2007***

Figure 1

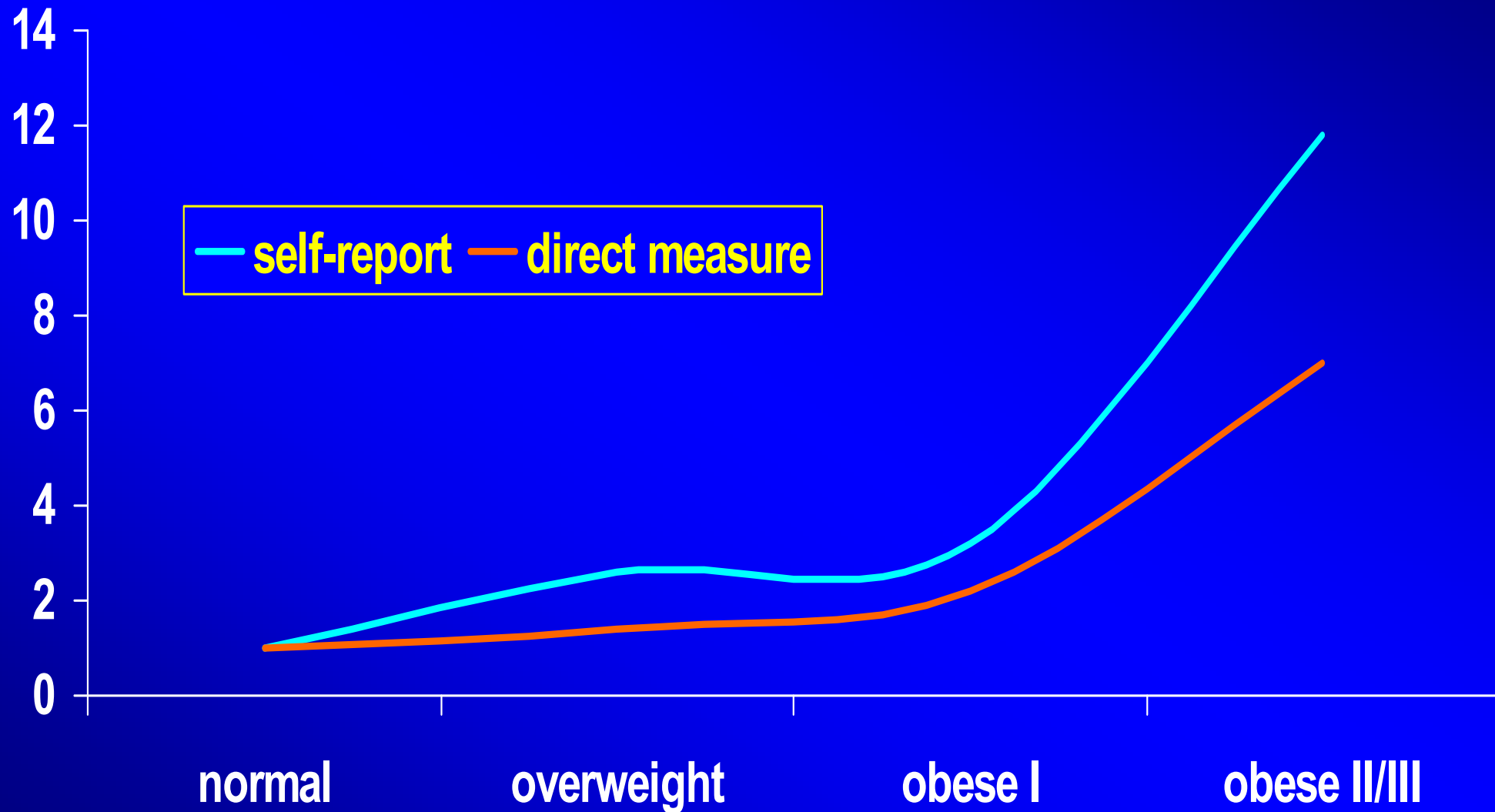
Percentage distribution of difference[†] between measured and self-reported weight (kg), by measured BMI category, household population aged 12 years or older, Canada excluding territories, 2005



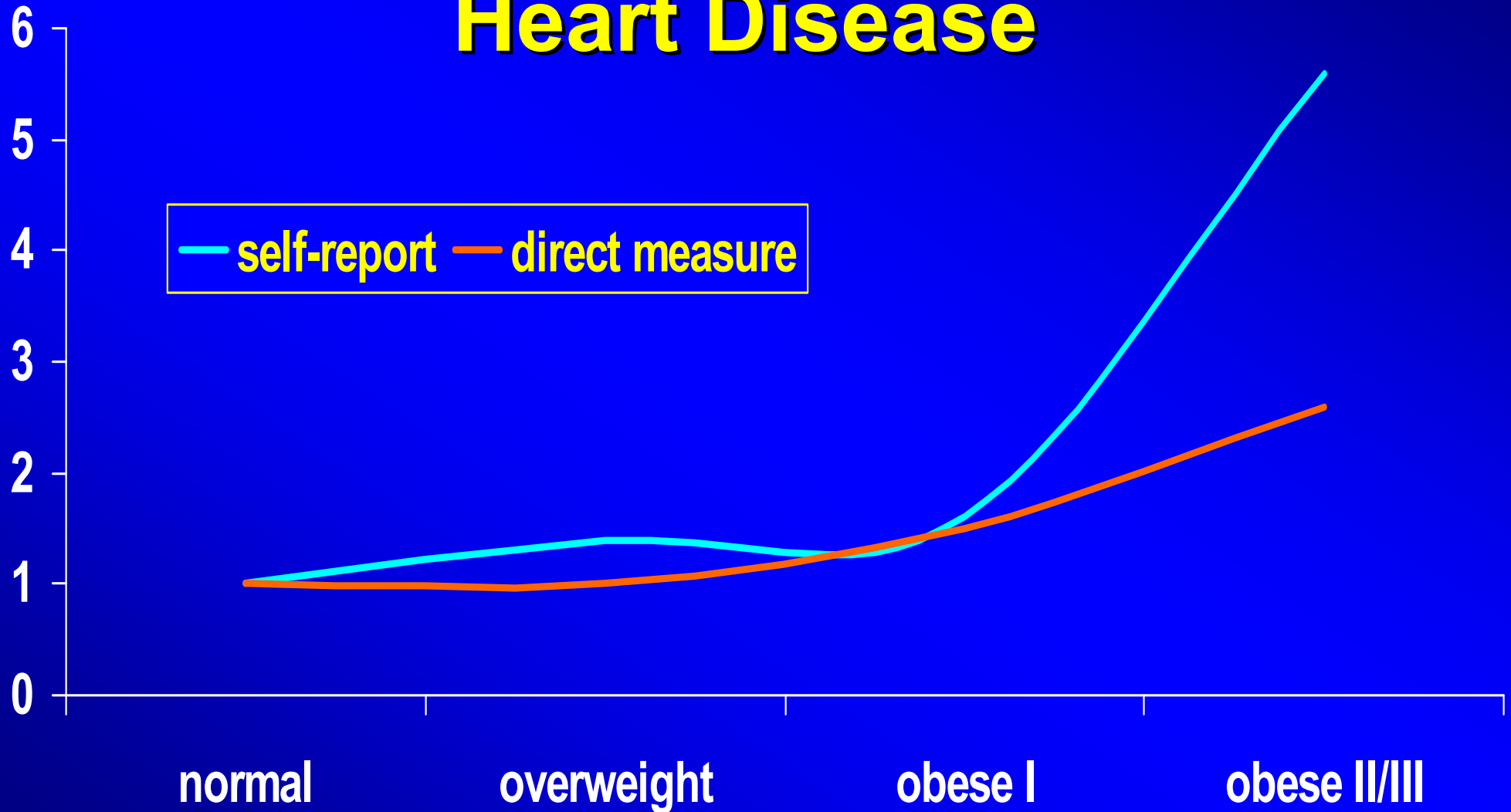
Reporting Bias: self-report vs direct measure



Odds Ratios Relating BMI to Diabetes



Odds Ratios Relating BMI to Heart Disease



Odds Ratios Relating BMI to Poor/Fair Self-perceived Health

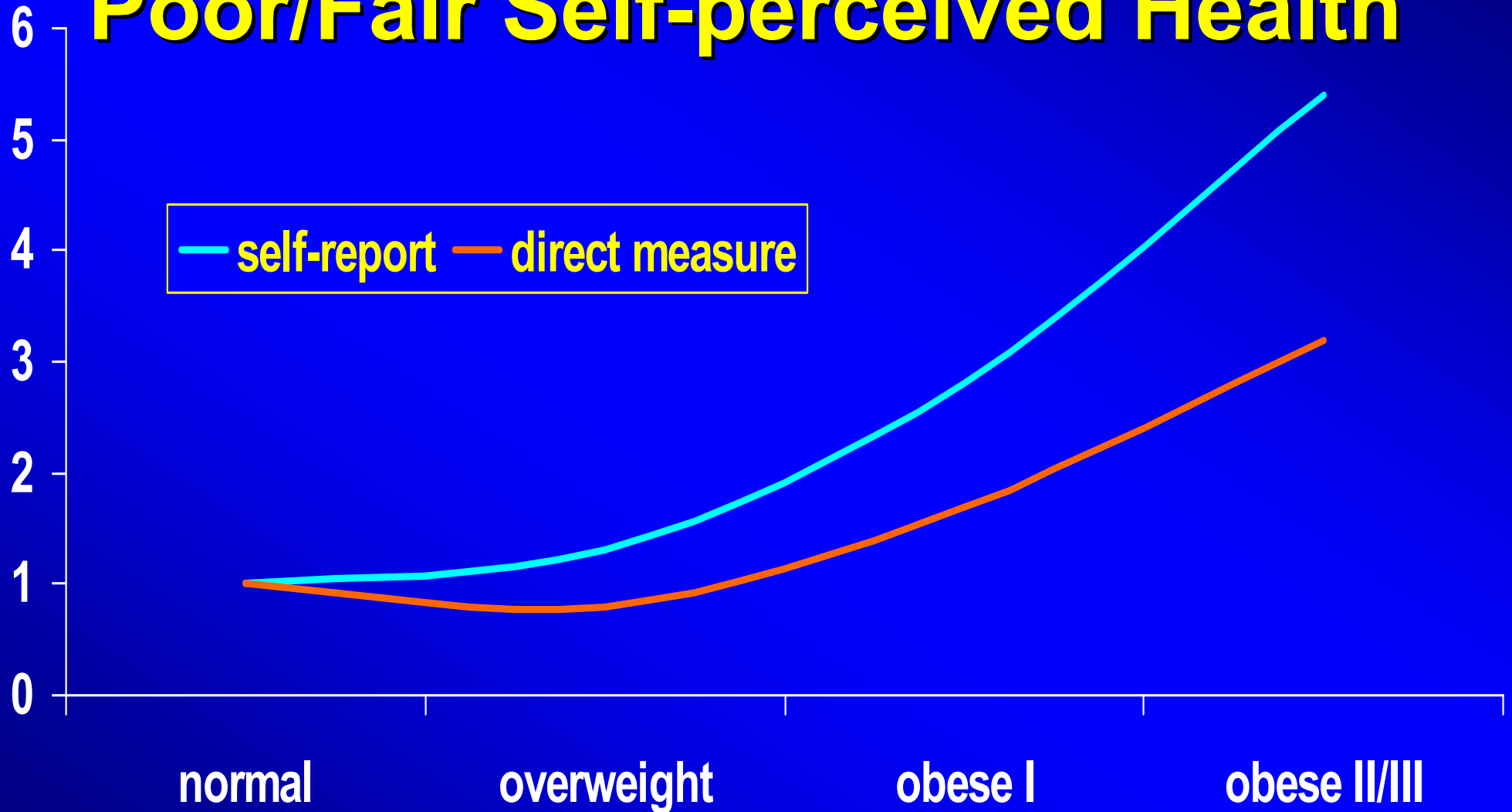


Table 4

Mean measured weight (kg) and mean measured body mass index (BMI kg/m²), by BMI category based on measured and on self-reported values, household population aged 40 years or older, Canada excluding territories, 2005

	%	Mean measured weight (kg)	Mean measured BMI (kg/m ²)
BMI category (range kg/m²) based on measured values			
Normal weight (18.5 to 24.9)	30.3	63.3	22.6
Overweight (25.0 to 29.9)	39.6	77.4	27.3
Obese class I (30.0 to 34.9)	22.0	90.8	31.9
Obese class II/III (35.0 or more)	7.2	106.1	39.6
BMI category (range kg/m²) based on self-reported values			
Normal weight (18.5 to 24.9)	39.8*	65.8*	23.6*
Overweight (25.0 to 29.9)	39.8	81.4*	28.6*
Obese class I (30.0 to 34.9)	15.4*	94.5*	33.3*
Obese class II/III (35.0 or more)	3.6*	112.8*	42.3*

* significantly different from estimate for corresponding BMI category based on measured values ($p < 0.05$)

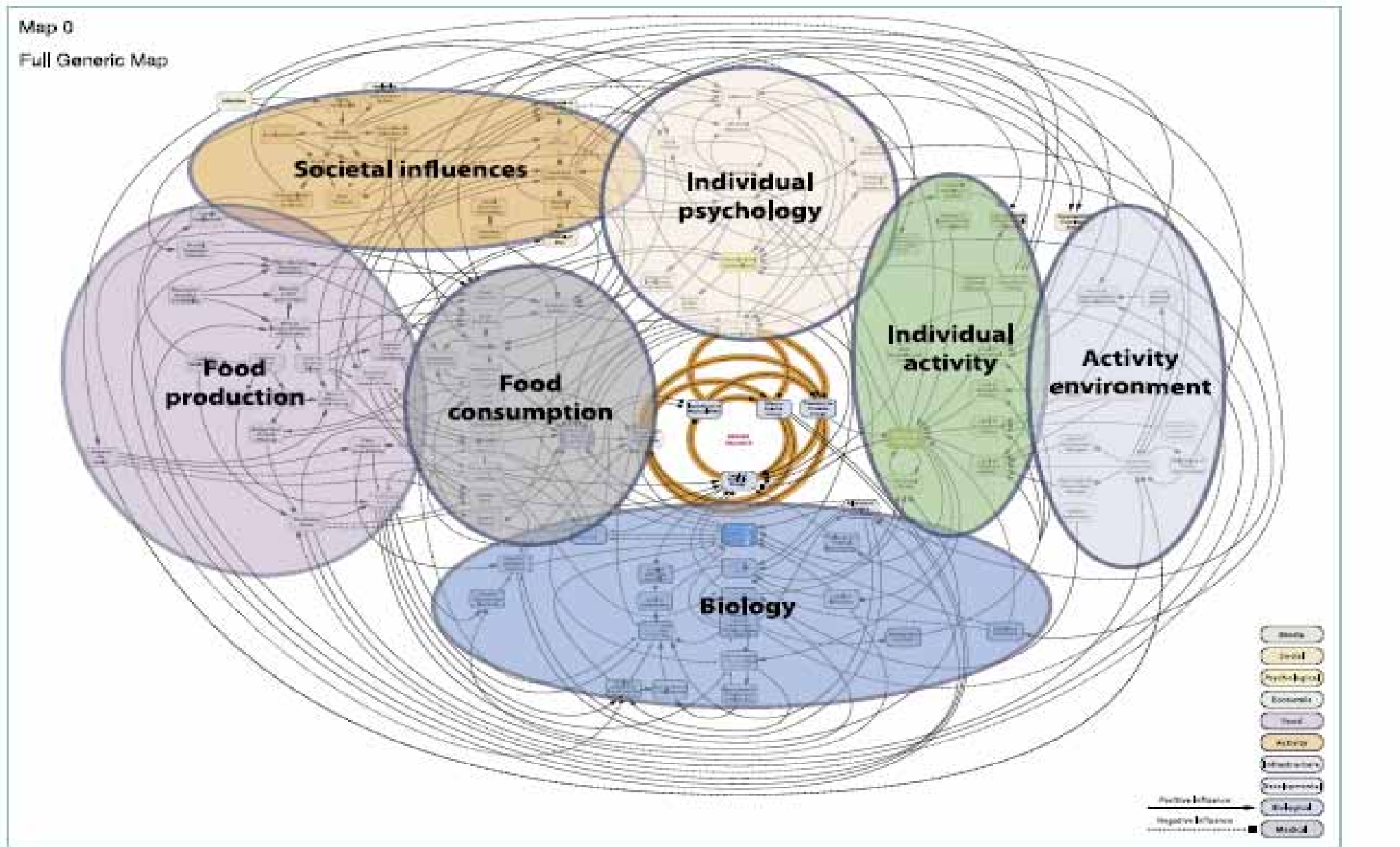
Source: 2005 Canadian Community Health Survey (sub-sample 2).

Promising and Practiced Approaches

“The pace of the technological revolution is outstripping human evolution and...weight gain is the inevitable - and largely involuntary – consequence of exposure to a modern lifestyle. This is not to dismiss personal responsibility altogether, but to highlight a reality: that forces that drive obesity are, for many people, overwhelming. Although what we identify in this report as ‘passive obesity’ occurs across all population groups, the socially and economically disadvantaged and some ethnic minorities are more vulnerable.”

***FORESIGHT – Tackling Obesity: Future Choices – Project Report
2nd Edition. Government Office for Science, U.K. 2007***

Figure 8.1: The full obesity system map with thematic clusters (see Section 4 for discussion). Figure highlights broader determinants of health such as drivers of food production and components of the physical activity environment.



Policy Options

- Built environment
- Transportation
- Health
- Research
- Fiscal incentives
- Education
- Regulation
- Social structure
- Family

PREVENTING CHILDHOOD OBESITY: HEALTH IN THE BALANCE

- 1. National Priority**
- 2. Industry**
- 3. Nutrition Labelling**
- 4. Advertising and Marketing**
- 5. Media and Public Relations Campaign**
- 6. Community Programs**
- 7. Built Environment**
- 8. Health Care**
- 9. Schools**
- 10. Home**

Preventing Childhood Obesity: health care providers

- **Patient-level interventions**
 - Limit sugar sweetened beverages
 - Get recommended fruits and vegetables
 - <2hrs screen time per day
 - No TVs / computers in bedrooms
 - Eat breakfast
 - Limit restaurant (fast food) meals
 - Eat at home together as a family
 - Limit / control portion sizes
- **Family-level counseling**
 - Eat diet rich in calcium
 - Eat diet high in fiber
 - Eat diet with balanced macronutrients
 - Initiate and maintain breastfeeding
 - 60 minutes of moderate to vigorous physical activity
 - Limit consumption of energy-dense foods

Preventing Childhood Obesity: health care providers

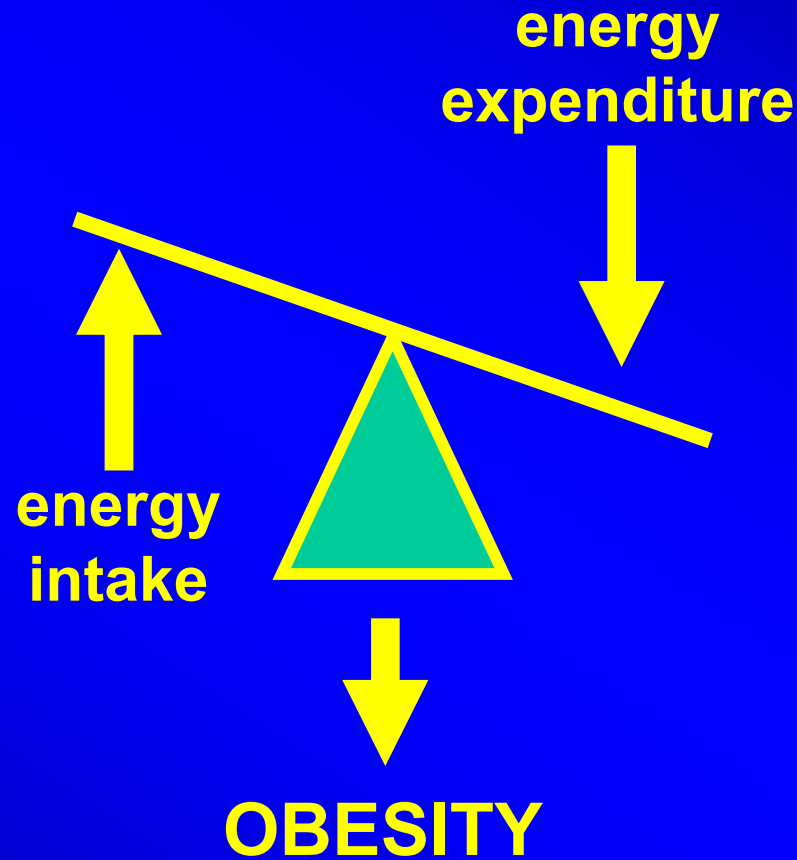
- **Community / Practice-level interventions**
 - Advocate for school-based physical activity K-12
 - Support efforts to preserve and enhance parks
 - Promote the development and use of trails/paths
 - Be aware of and promote local activity options
 - Encourage authoritative parenting style
 - Encourage parents to model healthy living
 - Promote physical activity at school and child care

Effective Interventions for Physical Activity

(Guide to Community Preventive Services)

- **Informational interventions**
 - Point of decision prompts
 - Community-wide campaigns
- **Behavioural / social interventions**
 - School-based physical education
 - Social support in community settings
 - Individual behaviour change
- **Environmental / Policy intervention**
 - Enhanced access to PA opportunities with outreach

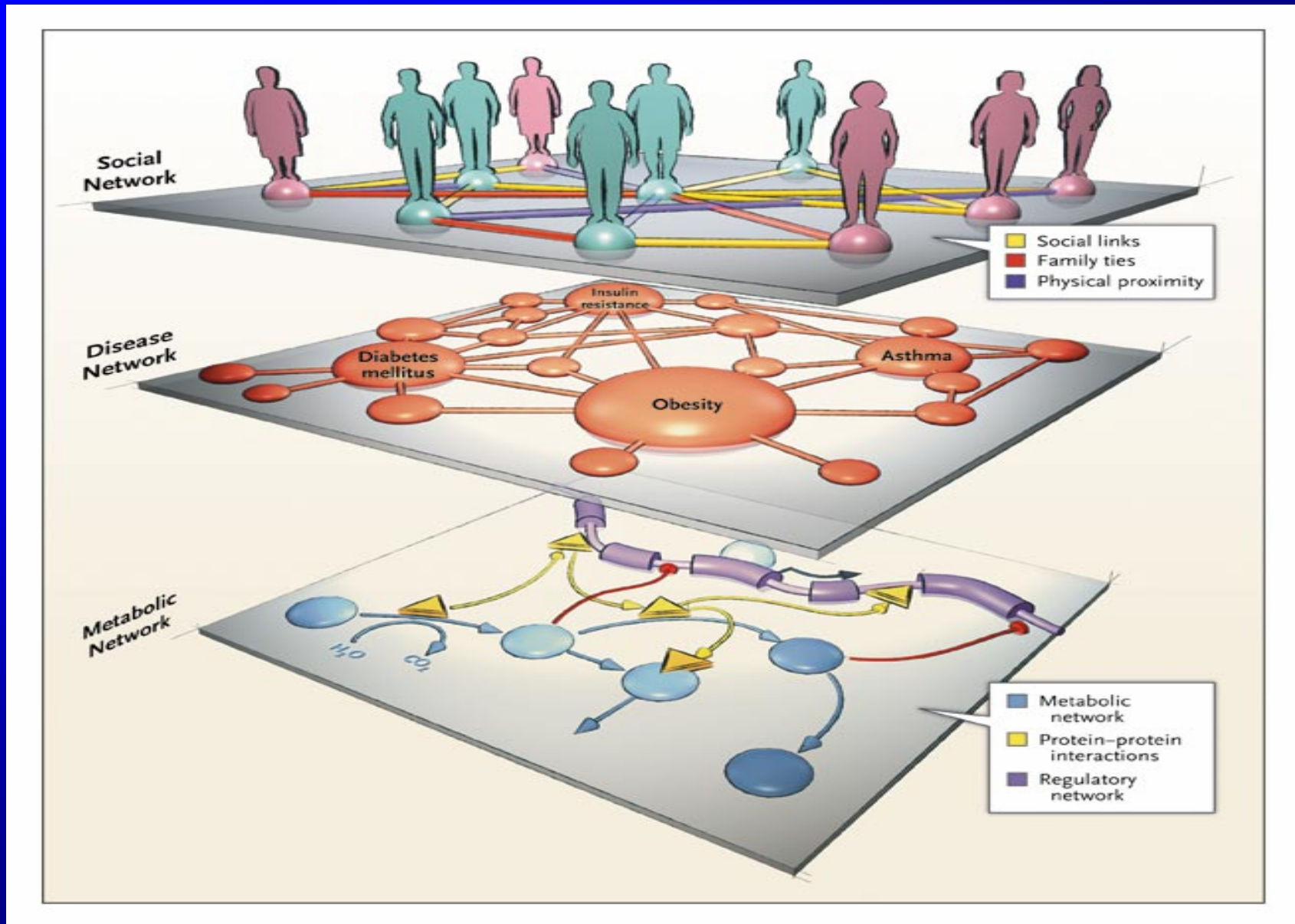
Portion Size
High Energy Density
High Glycemic Index
Soft Drinks
Junk Food
Added Sugar
Easy Food Access
Low Cost
Variety
Convenience
Great Taste
Ads/Marketing



Sedentary Workplaces
Sedentary Schools
Activity Unfriendly
Community Design
Automobiles
Drive-through
Conveniences
Elevators/escalators
Remote Controls
Sedentary
Entertainment
Labour Saving Devices

From: J.C. Peters. Exerc. Sport Sci. Rev. 34:4-9, 2006.

Complex networks of direct relevance to network medicine



Best Practice?

- **Reduced per capita daily energy intake from 2,899 calories to 1,863 calories**
- **Proportion of physically active adults increased from 30% to 67%**
- **Prevalence of obesity declined from 14% to 7%**
- **Resulted in declines in deaths attributed to diabetes (51%), coronary heart disease (35%), stroke (20%), and all causes (18%)**

Cuba



Current Initiatives and Support

- **Nationally**
 - **Standing Committee on Health Report**
 - **Child Tax Credit**
 - **ICPAOC**
 - **Reach for the Top**
 - **ParticipACTION**
 - **Food Guides**
 - **Physical Activity Guides**
 - **CDPAC Consensus Conference**
 - **Long-term Athlete Development Program**
 - **Active Healthy Kids Canada Report Card**
 - **Canadian Health Measures Survey**
 - **Canadian Clinical Practice Guidelines**

The Active Healthy Kids Canada Report Card serves as...

- An accountability index for all Canadians**
- A surveillance synthesis mechanism**
- An advocacy tool for PA leaders and orgs**
- A policy driver**
- A process for identifying research and surveillance needs**
- A challenge to other countries and jurisdictions to implement similar processes to allow comparisons and facilitate improvements**
- And has been very successful with over 170,000,000 media impressions in first 3 year (ad value estimated at \$2,000,000)**

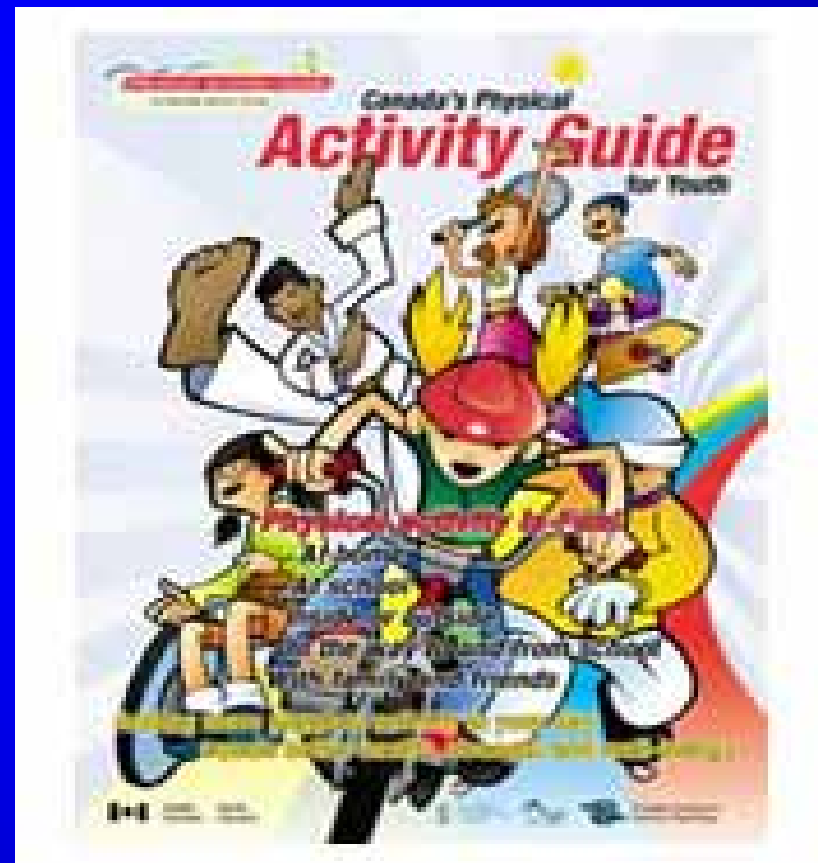
“Advancing the Future of Physical Activity Measurement and Guidelines”



Public Health
Agency of Canada

Agence de la santé
publique du Canada

Canada's Physical Activity Guides For Children and Youth (2002)



BRITISH JOURNAL OF
**PUBLIC
HEALTH**

**APPLIED PHYSIOLOGY,
NUTRITION AND METABOLISM**
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*Advancing physical activity measurement and guidelines in Canada:
a scientific review and evidence-based foundation for the future
of Canadian physical activity guidelines.*

In cooperation with/ En concours avec:



National Research
Council Canada

Conseil national
de recherches Canada



**Advancing physical activity
measurement and guidelines
in Canada: a scientific
review and evidence-based
foundation for the future of
Canadian physical activity
guidelines.**

Combined issue of APNM and CJPH

CANADIAN HEALTH MEASURES SURVEY, 2007-2009



Statistics Canada

Background Papers

- 5 papers outlining the CHMS rationale, operations, ethical and methodological issues and pre-test results
- Published in Health Reports Fall 2007
- Summary paper in CJPH to promote the papers and the survey





PARTICIPACTION

REACHING FOR THE TOP

A Report by the Advisor on
Healthy Children
& Youth Dr. K. Kellie Leitch



Core Principles:

1. Parents are primary influencers
2. Prevention must be the focus
3. Leverage what exists
4. Time to act is now!

Key Recommendations:

1. Develop injury prevention strategy
2. Establish a Centre of Excellence on Childhood Obesity
3. Improve mental health services
4. Create Longitudinal cohort study
5. Establish National Office of Child and Youth Health

Some Food (low fat) for Thought

← the arrows go both ways →

INTERNATIONAL FACTORS

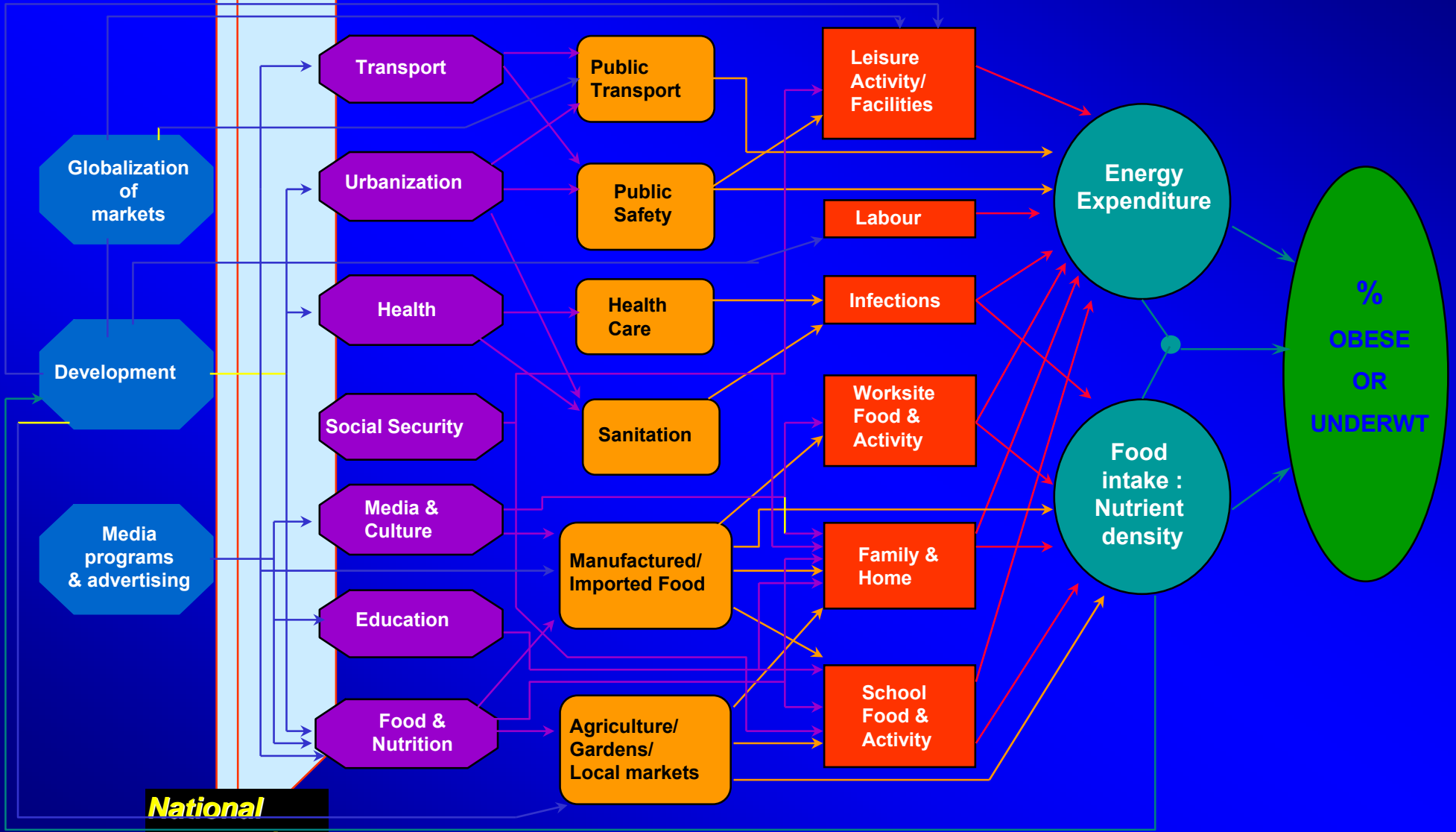
NATIONAL/ REGIONAL

COMMUNITY LOCALITY

WORK/ SCHOOL/ HOME

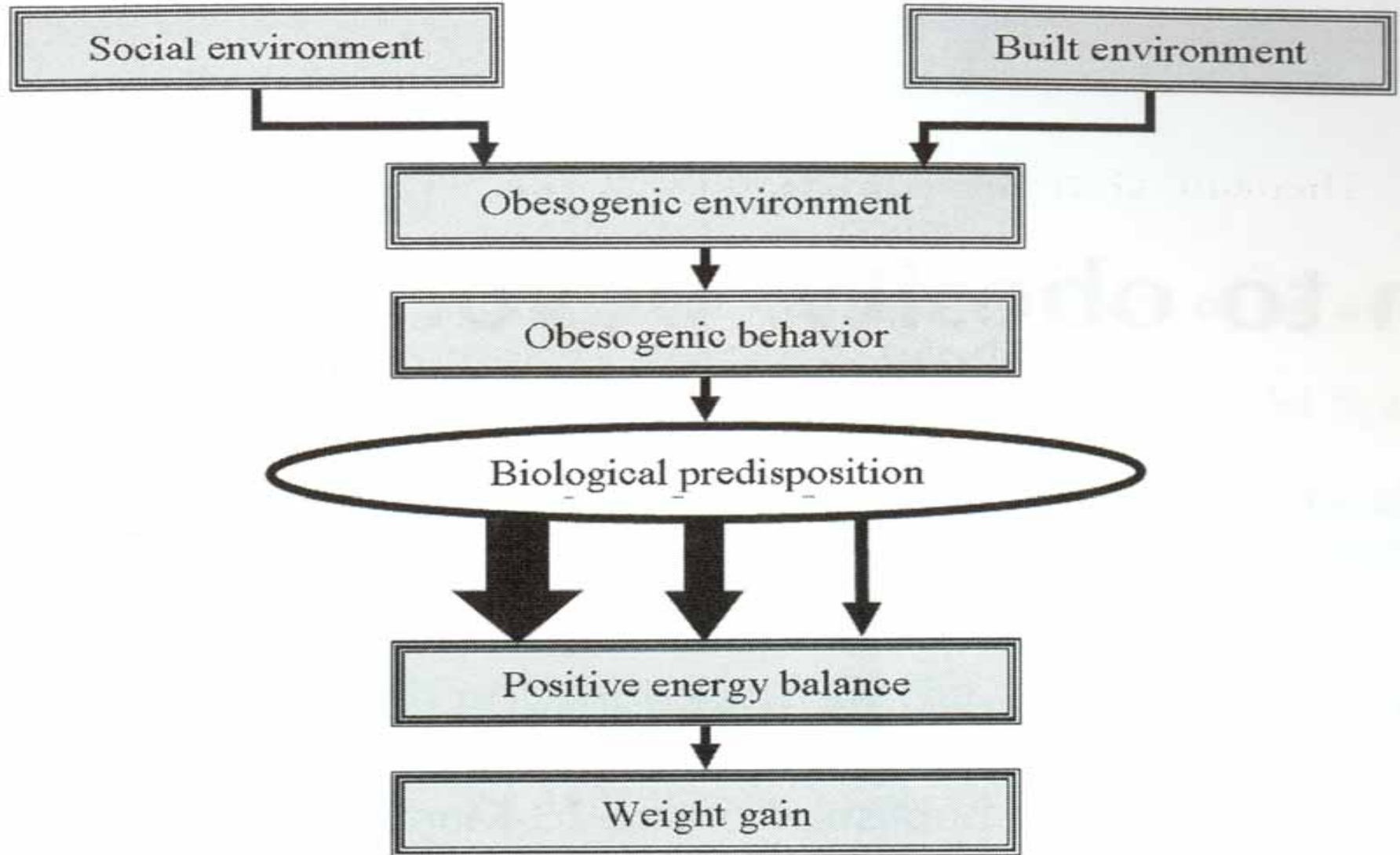
INDIVIDUAL

POPULATION

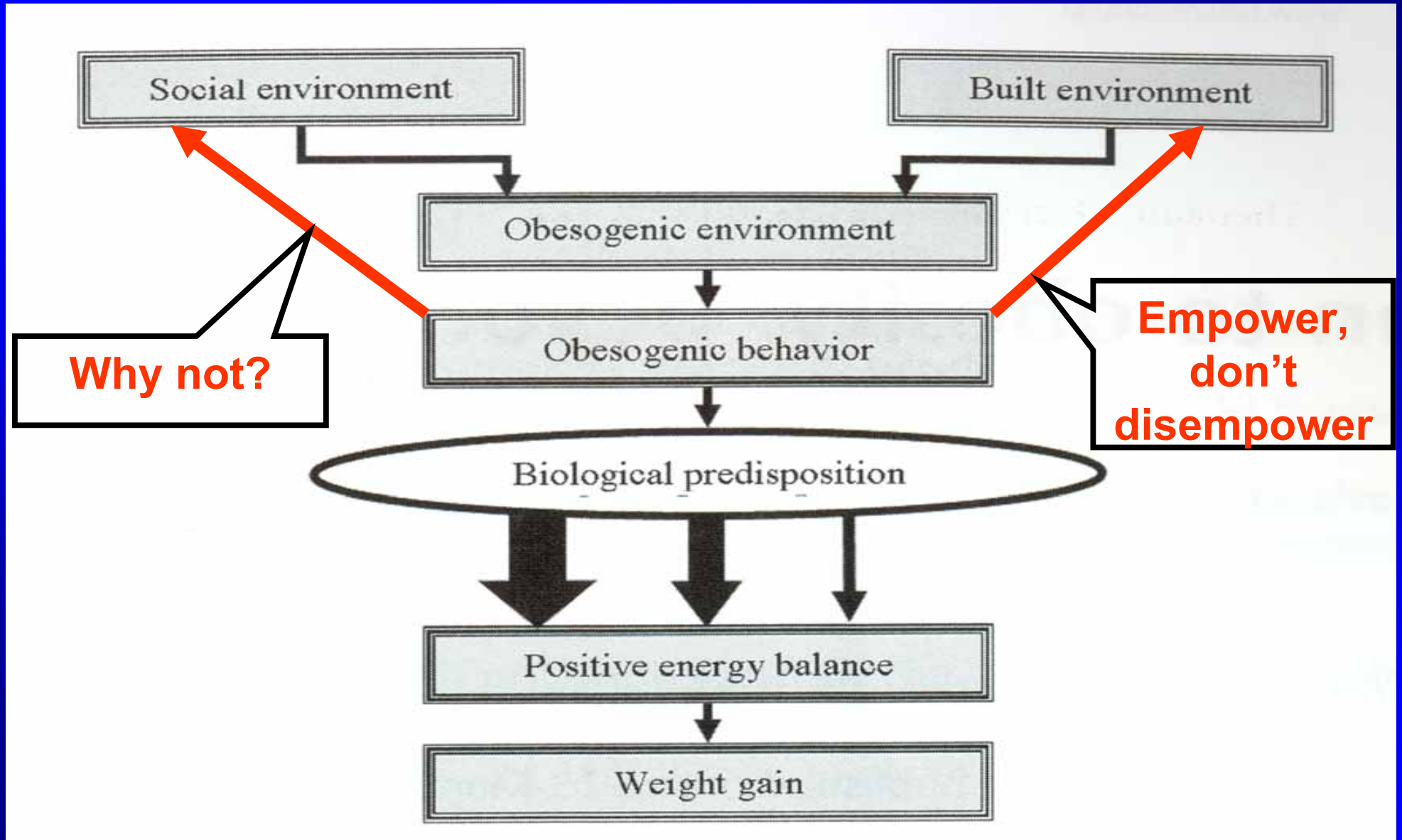


National perspective

Hierarchical Model of Determinants of Energy Balance



Hierarchical Model of Determinants of Energy Balance



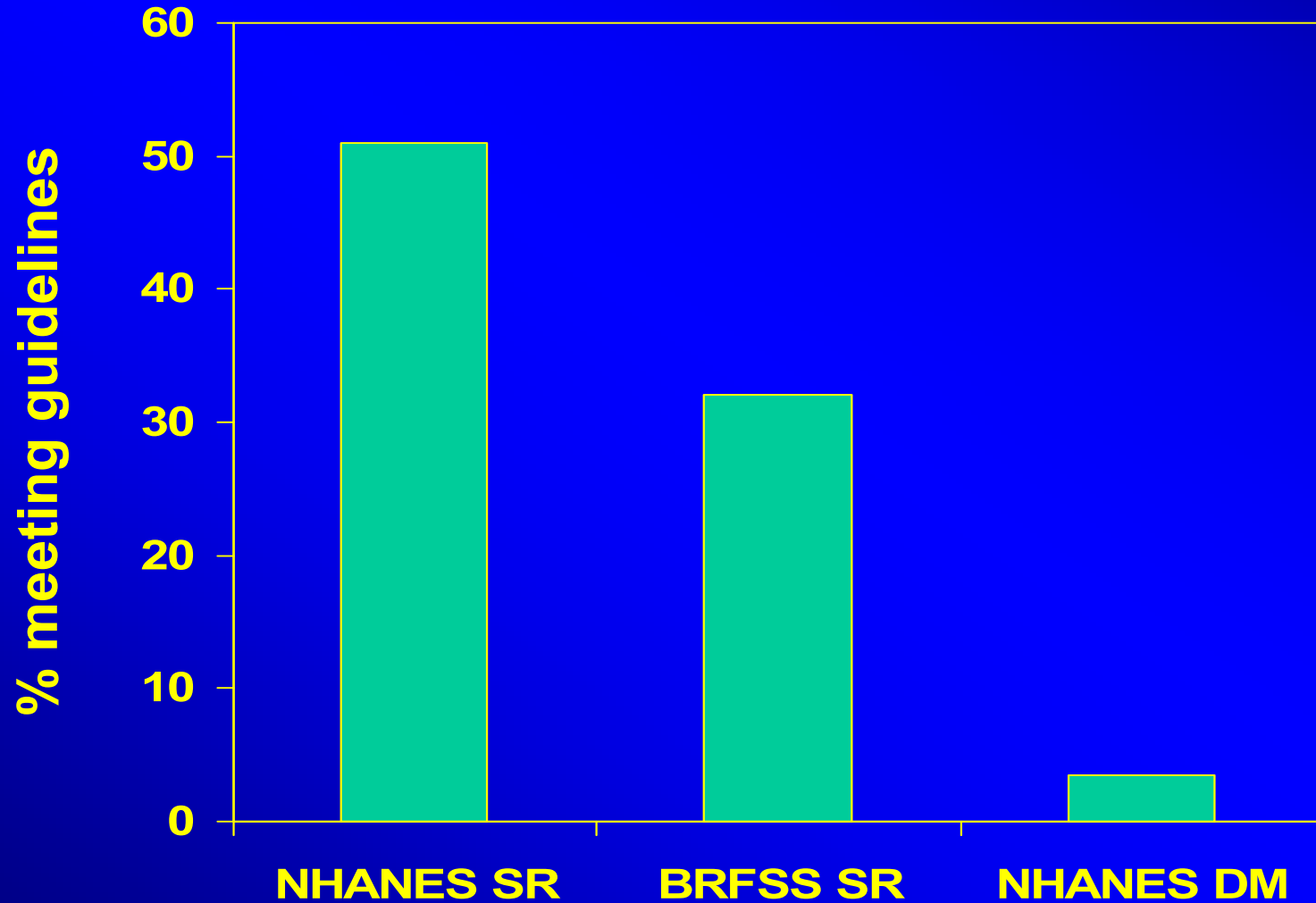
don't expect, inspect

Systematic Reviews

Comparison of Self Report and Direct Measures of Health Indicators

- **Height, Weight and Body Mass Index (published)**
- **Blood Pressure and Hypertension (published)**
- **Smoking / Cotinine (in press)**
- **Physical Activity adults (under review)**
- **Physical Activity children (under review)**

Direct Measure vs Self-report Physical Activity



sweat the small stuff

IS OUR FRAME OF REFERENCE CHANGING?





SCREEN INVASION



NATURE-DEFICIT DISORDER

“I like to play indoors better
'cause that's where all the
electrical outlets are.”

A Fourth-Grader in San Diego

From R. Louv. Last Child in the Woods. 2005

Leave no child inside movement in U.S.

HOW DO YOU AND YOUR FRIENDS FEEL ABOUT GLOBAL CLIMATE CHANGE?

WE'RE GOOD WITH IT

HOW CAN YOU BE GOOD WITH IT?!

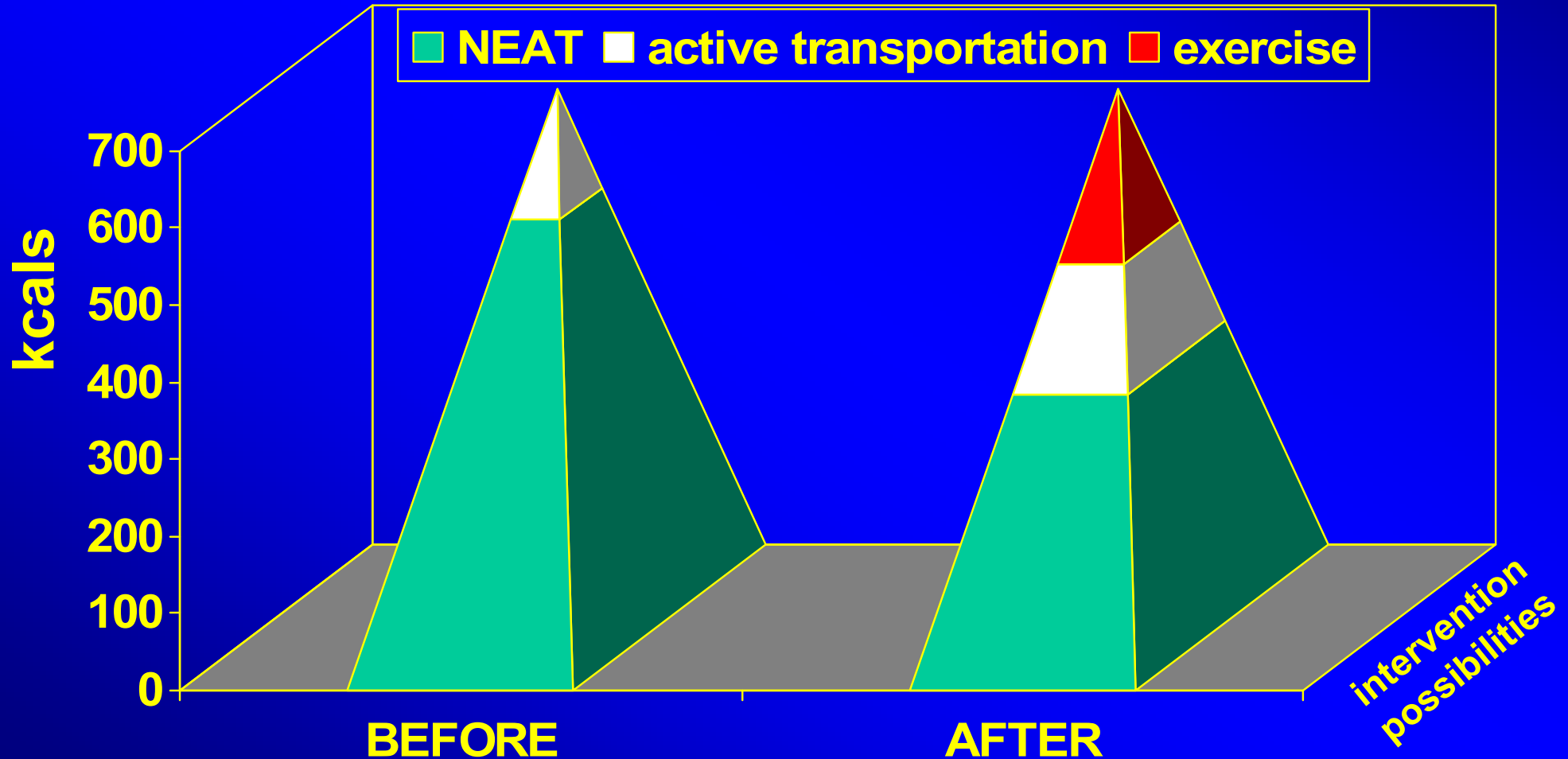
MOST OF US DON'T LIKE TO GO OUTSIDE ANYWAY

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www.comics.com

Delaney & Raabenstein

Intervention Potential of Non-exercise Activity Thermogenesis (NEAT)



sweat the big stuff

- Physical education
- Community design
- Built environment
- Social environment
- Population disparities
 - Age, sex, geography, ethnicity, SES, etc.
- Deferred maintenance
- Policy, legislation, litigation, regulation
- ***SHIFT IN SOCIAL NORMS IS REQUIRED
ALL HANDS ON DECK***

add a touch of Amish

LIFESTYLE

Traditional

Contemporary



Commuting



Chores



Sports



Free Time



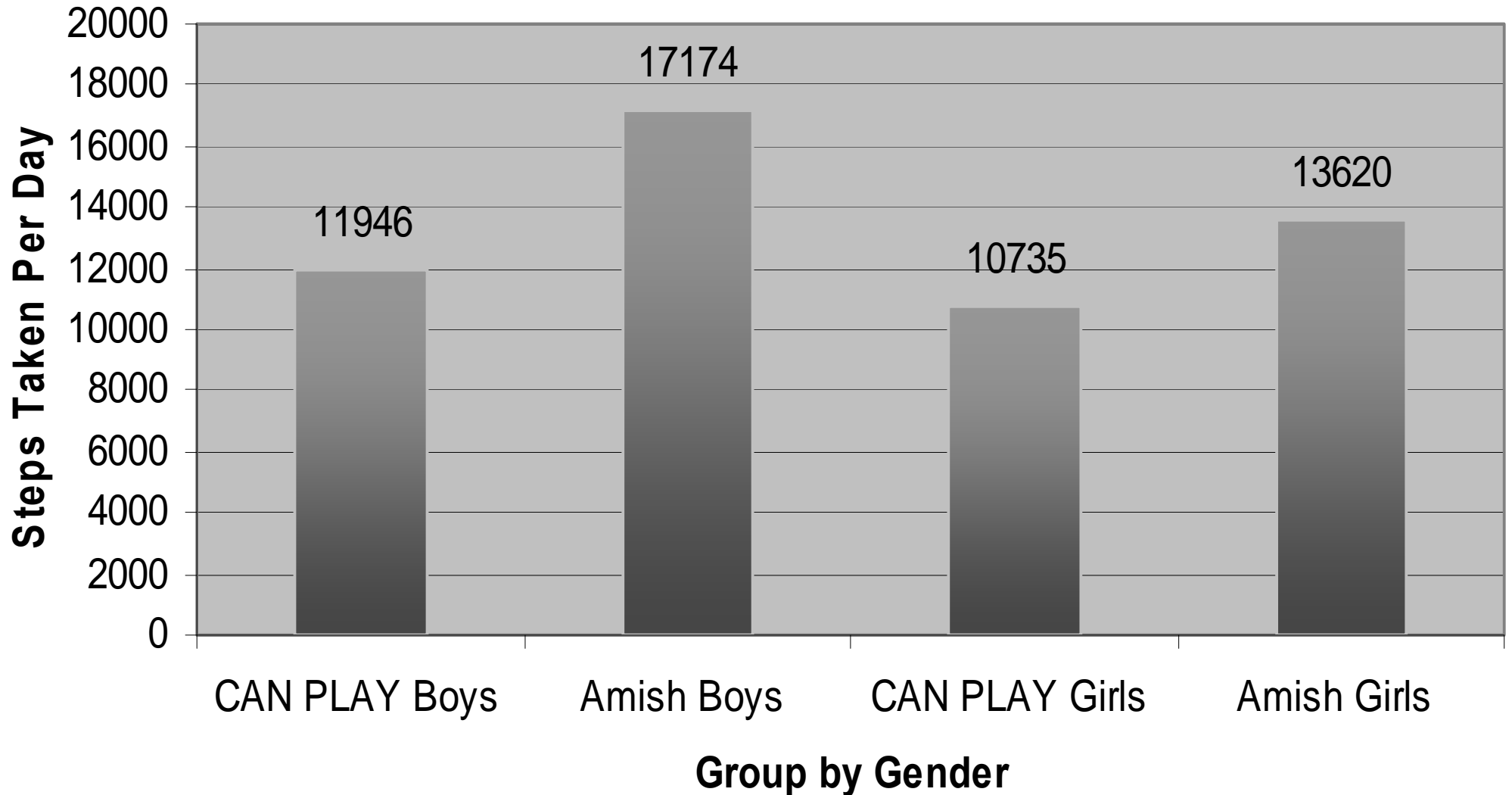
RESULTS

Directly Measured Physical Activity

- Old Order Mennonites
 - ↑ average movement counts per day
 - ↑ minutes of moderate physical activity (3-6 METS)
 - ↑ minutes of MVPA (3+ METS)
 - ↑ total daily energy expenditure

Tremblay et al., MSSE, 2005

Average Steps Taken Per Day



Despite having no physical education, no institutionalized sport, and low socioeconomic status, Old Order Mennonite and Amish children are more active and less obese than children living a contemporary Canadian lifestyle.

Tremblay et al., MSSE, 2005
Bassett et al., MSSE, 2007

**Ask not why you didn't
take the easy way,
but rather why you didn't
take the hard way**

**Reposition movement as an
opportunity, not an
inconvenience.**

**Encourage people to add a
“touch of Amish”
and a
“dash of inconvenience”
to their lifestyle!**

YOU TOO!

CONCLUSIONS

1. Our children are getting fatter, and their health is suffering, because they are eating poorer and moving less
2. Vulnerable groups are at increased risk but majority of the population is “infected” with passive obesity agents
3. We must measure better to understand what works and how
4. Promising approaches AT ALL LEVELS require increased and sustained support
5. Unprecedented activity is currently underway, but MUCH MORE needs to be done
6. Sweat the big and small stuff – attack from all sides
7. Experimental, observational, descriptive, surveillance, ecological and intuitive evidence collectively supports the need for action, *more action* – now