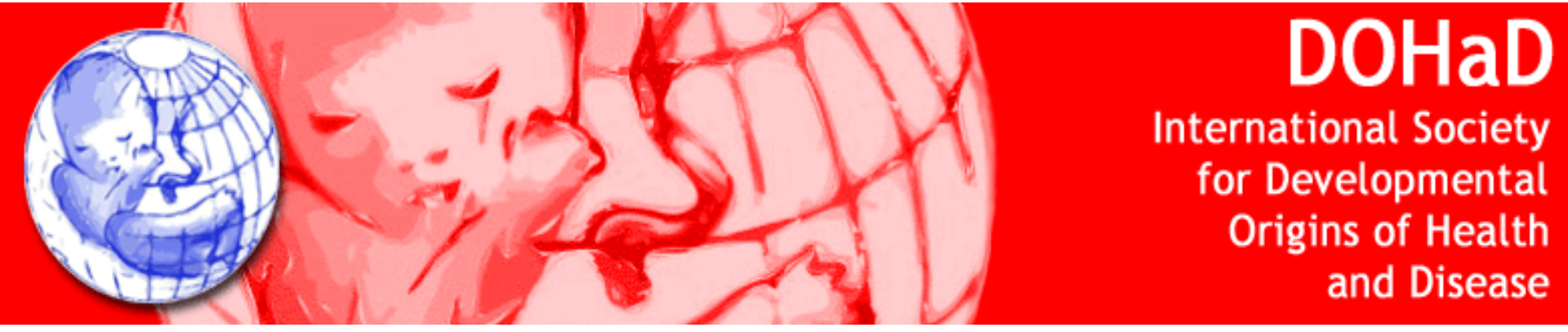
UNIVERSITY OF Southampton

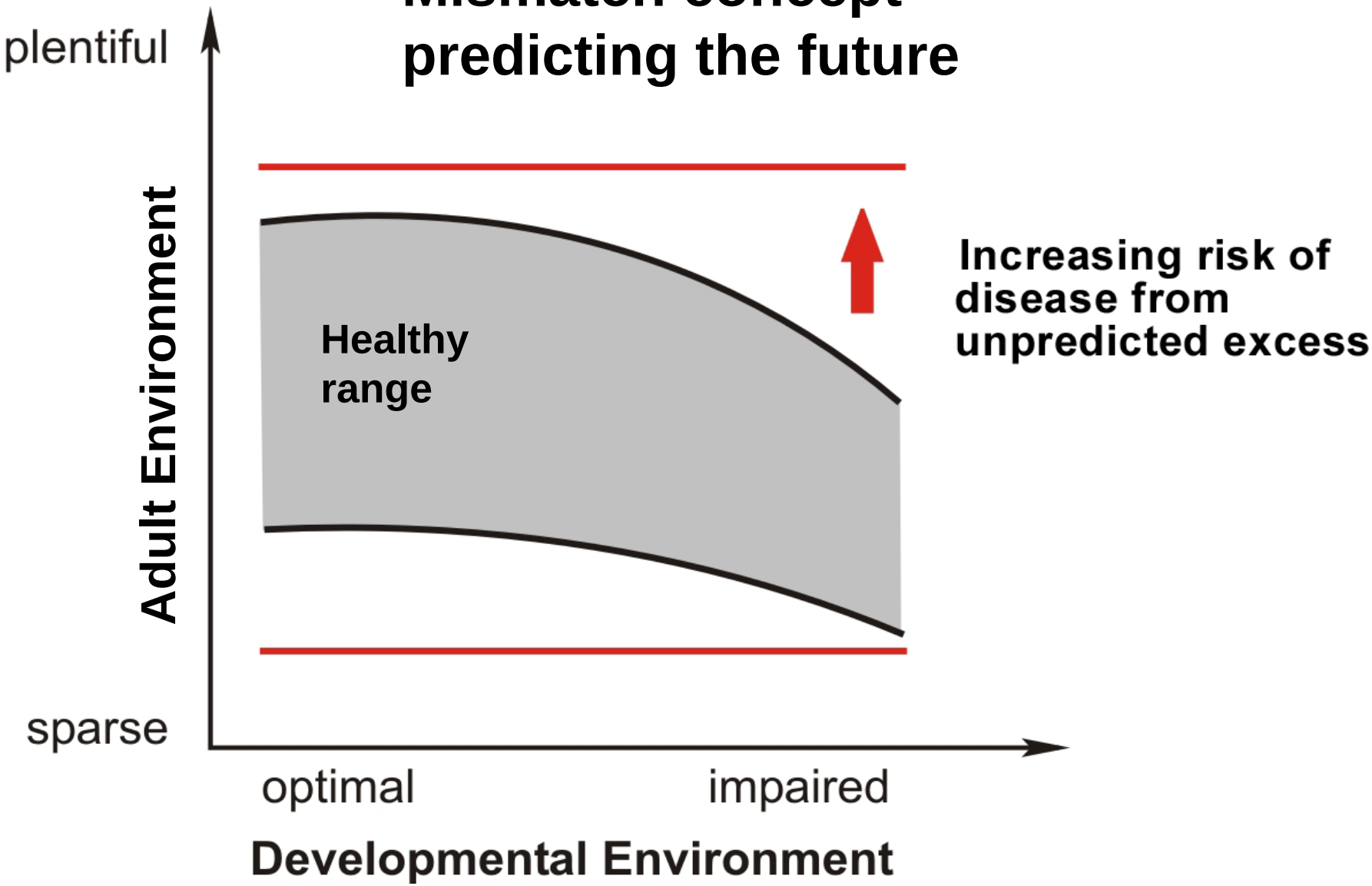
Parents-to-be: guardians of future health

Mark Hanson



DOHaD
International Society for Developmental Origins of Health and Disease

Mismatch concept – predicting the future



Modified from Gluckman PD, Hanson MA (2004) *Science* 305 (5691):1733-6

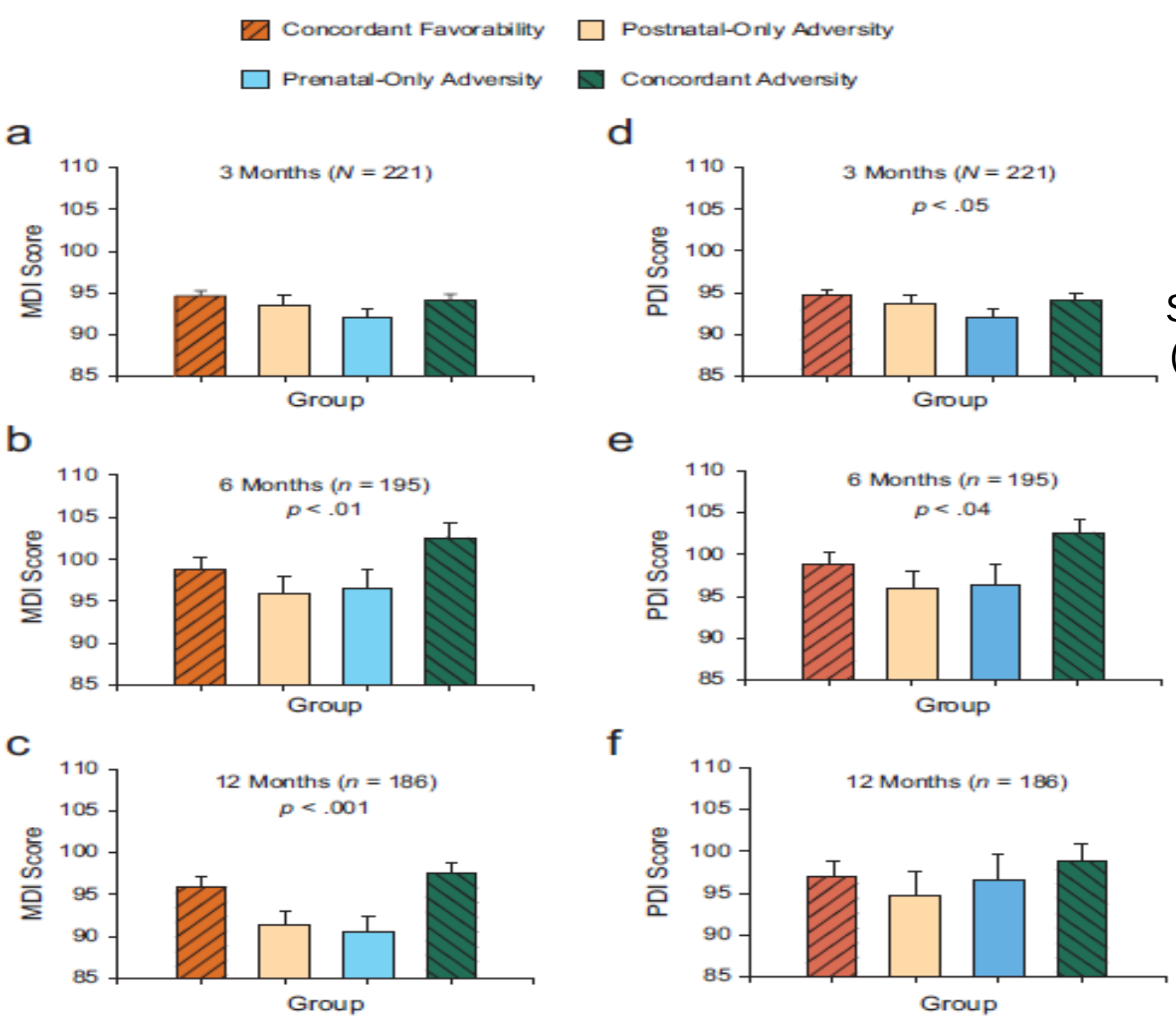


Fig. 1. Mean scores on the Mental Developmental Index (MDI) and Psychomotor Developmental Index (PDI) of the Bayley Scales of Infant Development (Bayley, 1993) for infants in the concordant-favorability, postnatal-only-adversity, prenatal-only-adversity, and concordant-adversity groups. The three panels on the left present the mean MDI scores for (a) 3-month-old, (b) 6-month-old, and (c) 12-month-old infants, and the three panels on the right present the mean PDI scores for (d) 3-month-old, (e) 6-month-old, and (f) 12-month-old infants. The *p* values indicate significant differences between the concordant and the discrepant groups. Error bars indicate standard errors of the mean.

Prescient human fetuses thrive.

Sandman CA et al (2012) Psych Sci. 23: 93-100

A poor start to life is associated with effects on structure and function of a range of multiple organs and control systems in the offspring

- Fat
- Muscle
- Bone
- Cardiovascular, respiratory and renal systems
- Stress responses
- Mood and behaviour
- Cognitive function
- Timing of puberty, reproductive function
- Immune responses
- These effects can be subtle, so they don't immediately signal danger. But they have lifelong effects. They do not **cause** NCD but they alter how a person responds to their lifestyle later, and so their **risk** of NCDs

Why are we losing the war against obesity? Because we intervene too late

Gluckman, Hanson, Zimmet and Forrester (2011)
Science *Translational Medicine* 3(93):1–4

Why exercise and diet are not enough

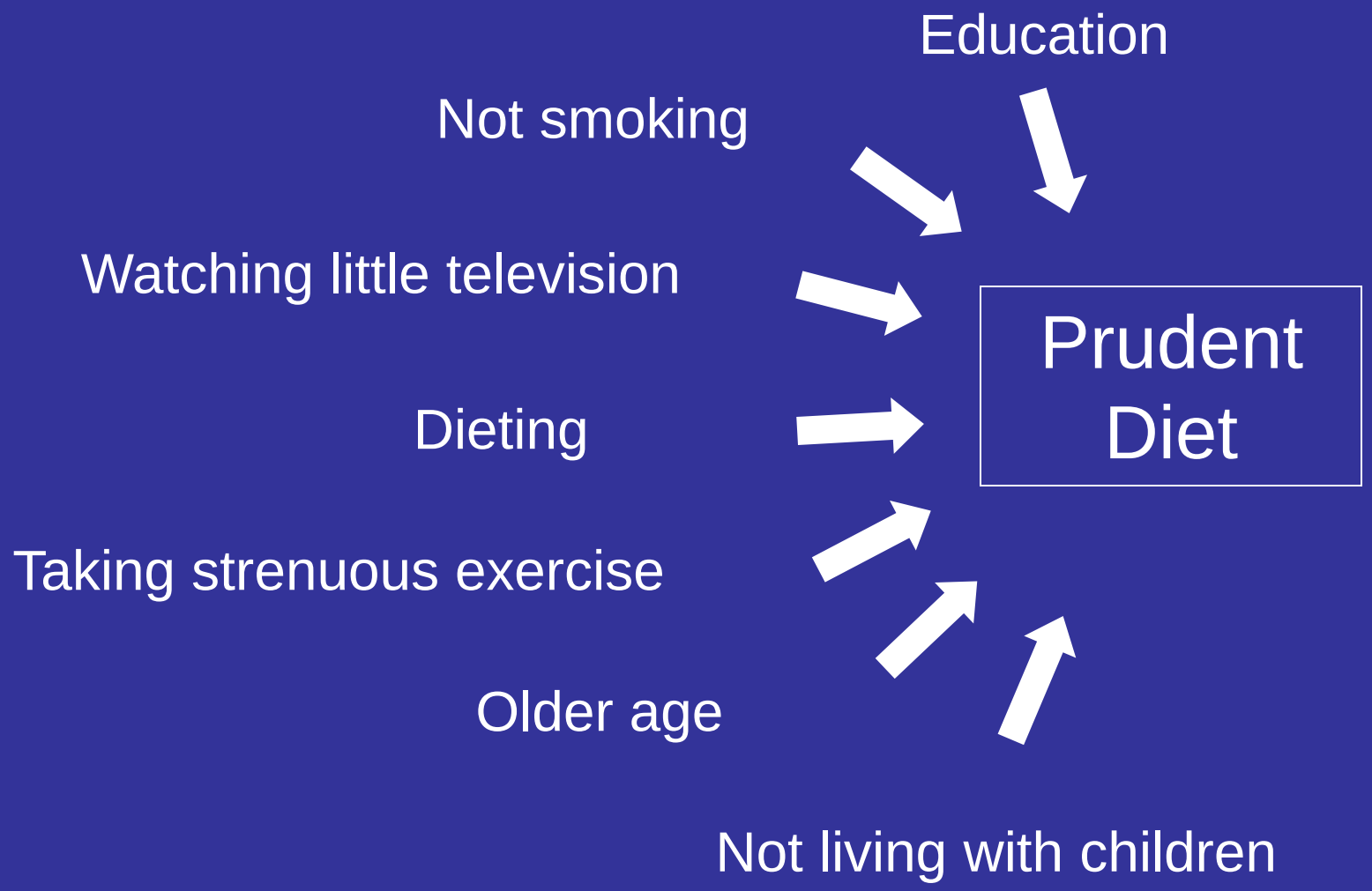
FAT FATE & DISEASE

PETER GLUCKMAN
AND MARK HANSON

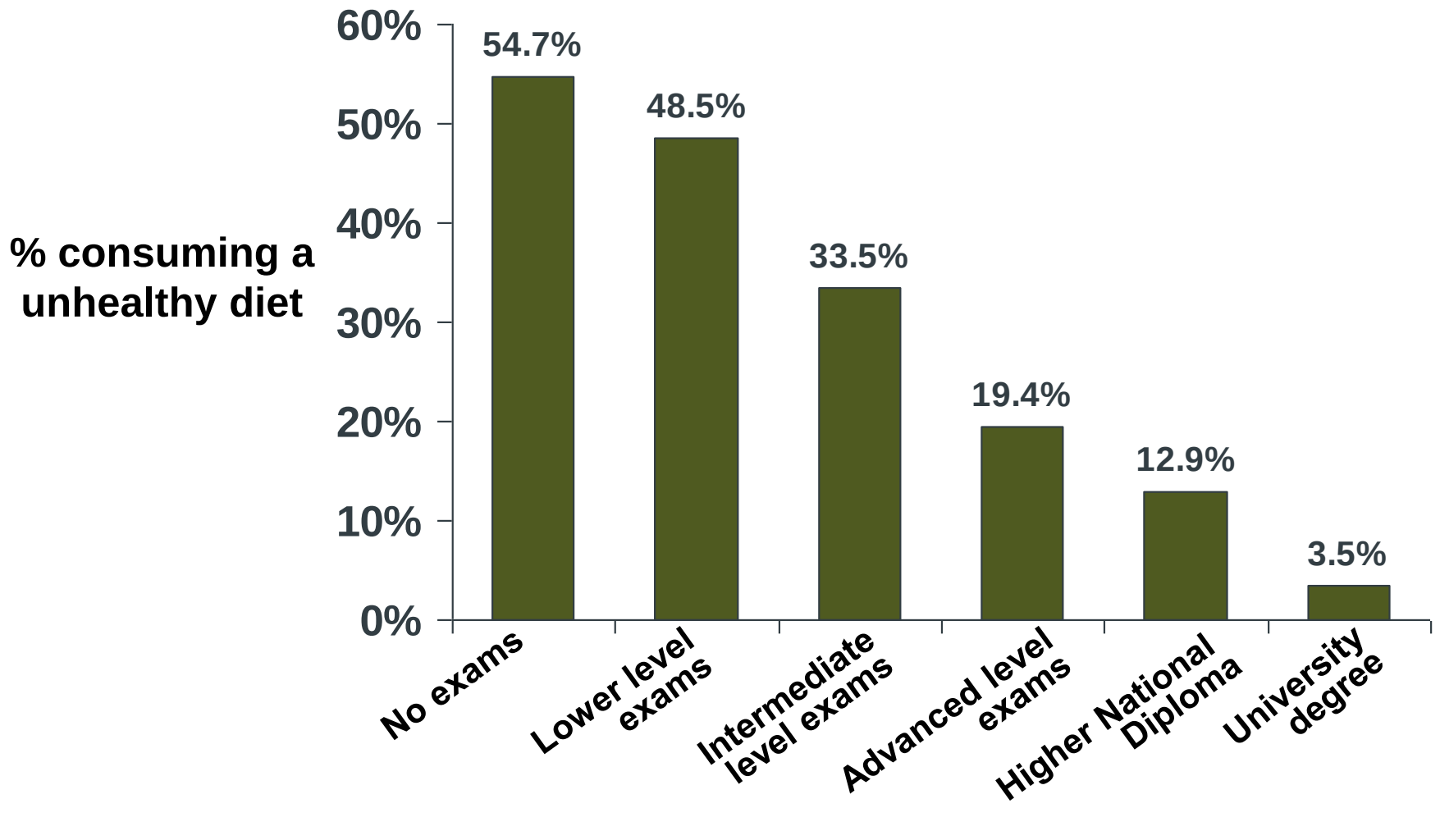
Current focus of action on obesity and NCDs

- Target adult lifestyle, especially physical exercise, diet (reduce sugar, salt, fat), alcohol abuse
- Target multinational food industry
- Make individuals responsible for what they eat and how much they exercise
- It's all about choice
- Make us all feel guilty for "gluttony" and "sloth" - even children
- If that doesn't work, there's always surgery or drug therapy!

Influences on diet

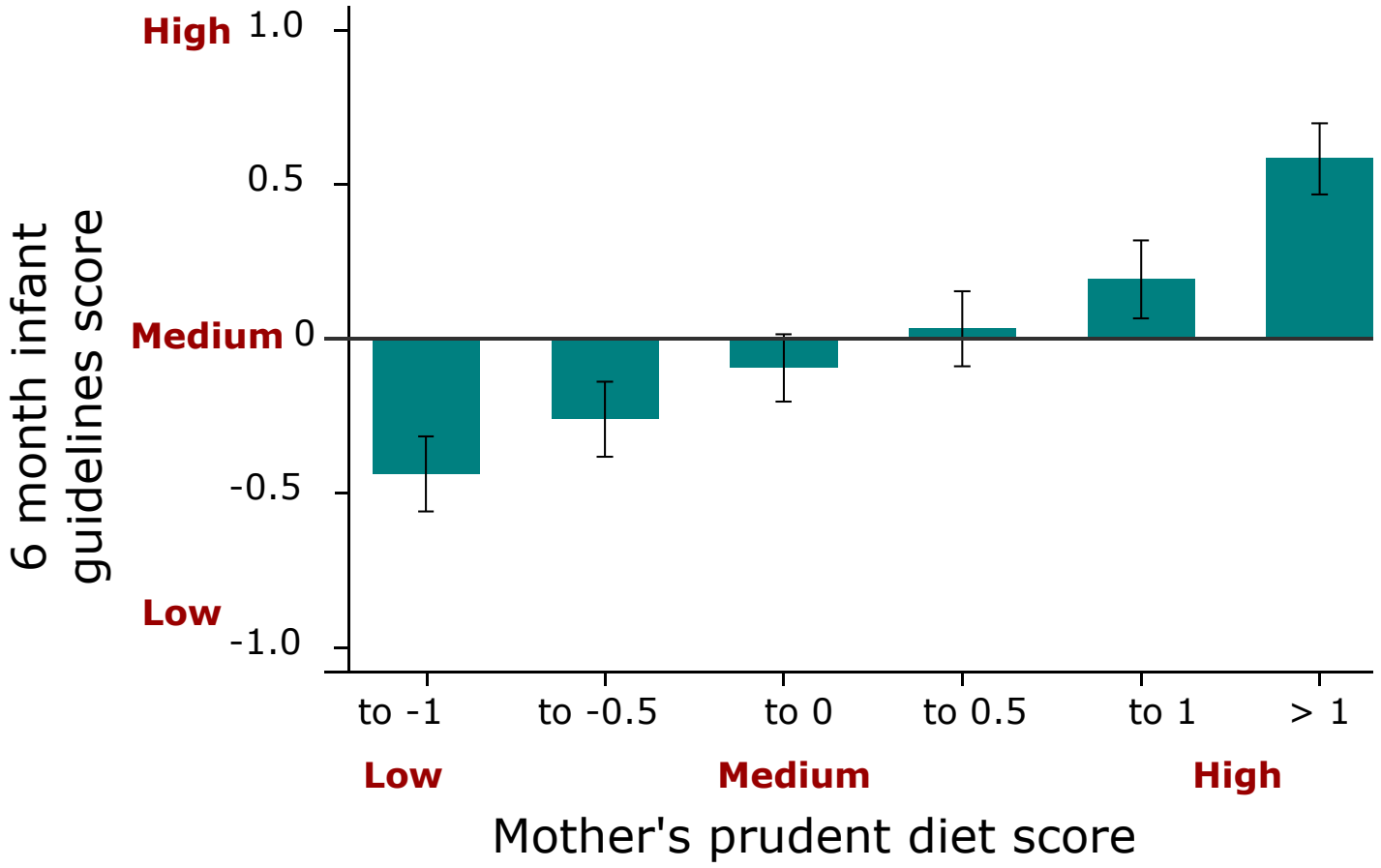


Southampton Women's Survey. Following Southampton families. Young women with a lower level of educational attainment are more likely to eat an unbalanced diet



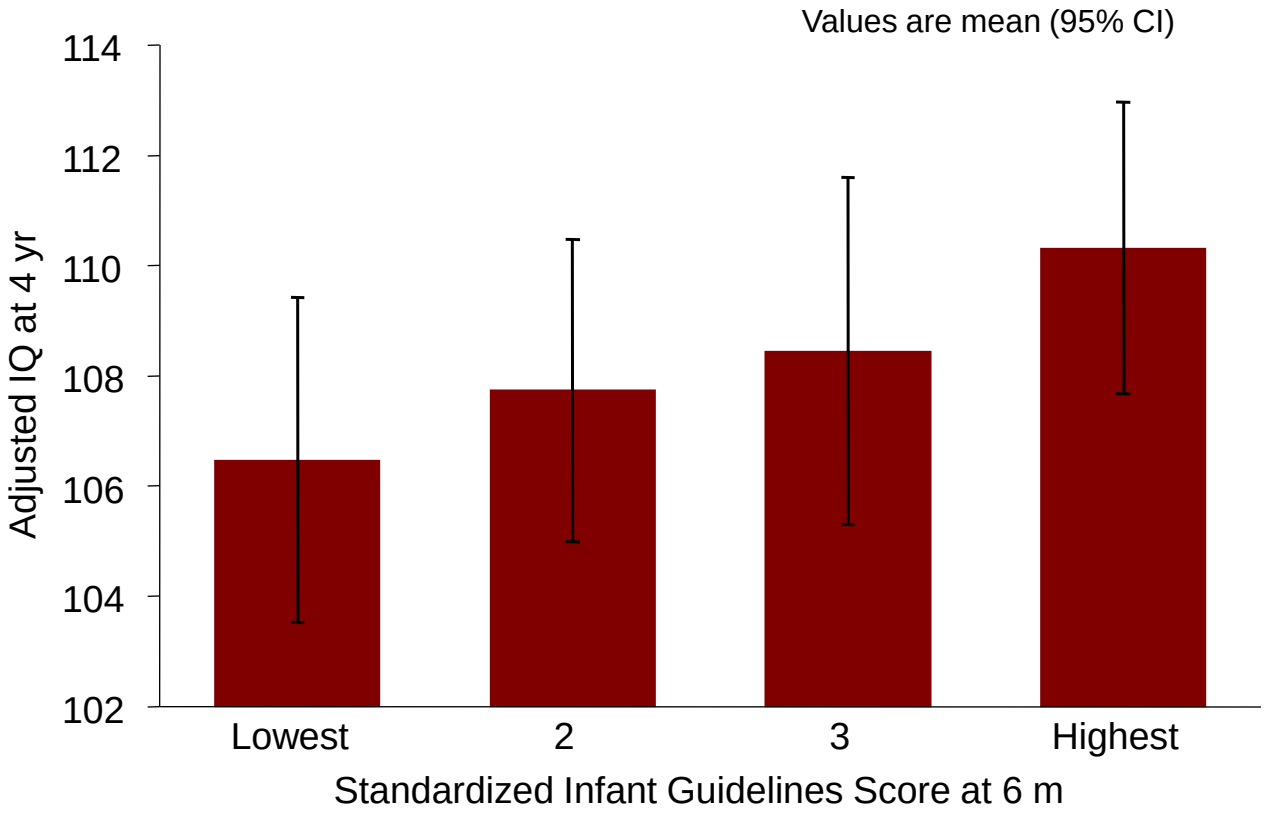
Robinson et al EJCN 2004; 58:1174-80

Infant guidelines pattern score according to prudent diet score of the mother



Robinson et al. Br J Nutr. 2007

IQ at 4 years of age in relation to infant guidelines score



IQ adjusted for sex, birth order, gestational age, birth weight, maternal age, IQ, social class, education and HOME score

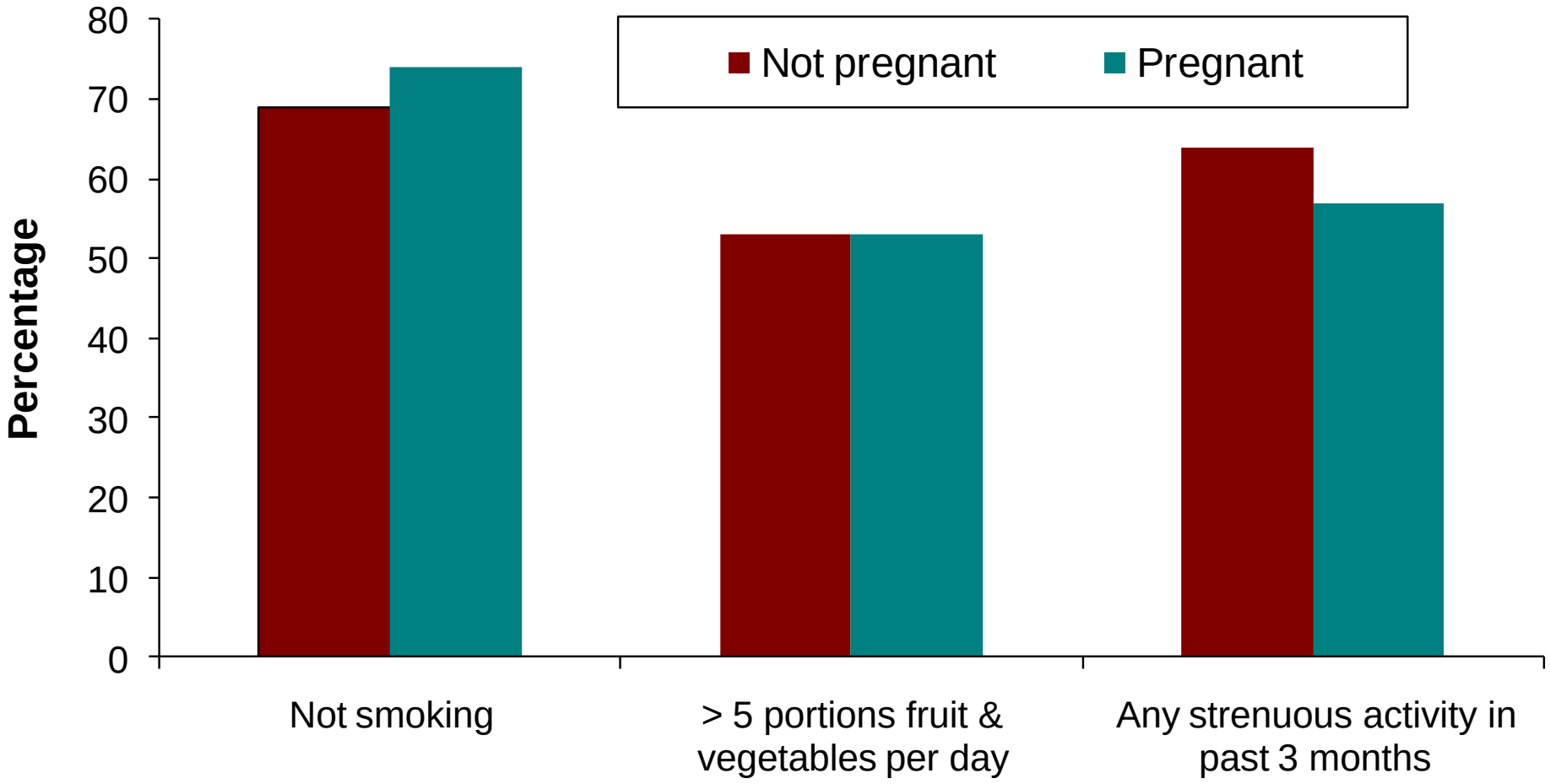
Gale et al. J Child Psychol Psychiatry. 2009

Women's compliance with nutrition and lifestyle recommendations before pregnancy: general population cohort study.
Inskip et al. *BMJ.* 2009 Feb 12;338:b481

Conclusion: Only a small proportion of women *planning* a pregnancy in UK follow the recommendations for nutrition and lifestyle (folic acid supplement intake, alcohol consumption, smoking, diet, and physical activity)

and the unplanned pregnancies……?

Lifestyles of SWS women who did and did not become pregnant within 3 months of interview



Inskip et al. BMJ 2009

Poor educational attainment
Poor diet
Take less exercise
Obese

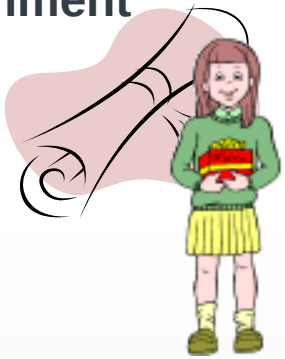
Ill-prepared for pregnancy.

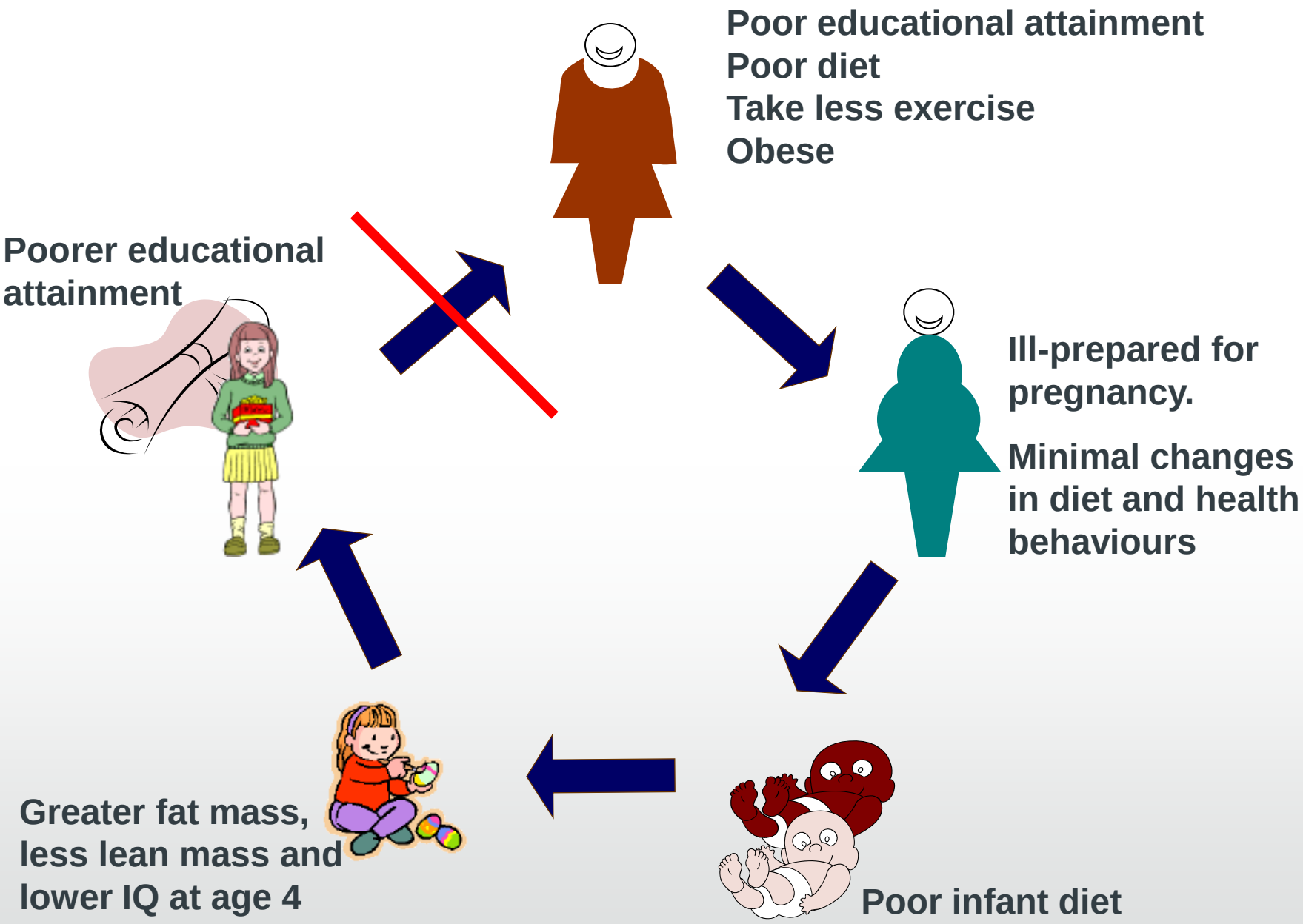
Minimal changes in diet and health behaviours

Poor infant diet

Greater fat mass, less lean mass and lower IQ at age 4

Poorer educational attainment

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Poorer educational attainment

The Human Cost

•Undernutrition is an underlying cause of 3.5 million maternal and child deaths each year.

•Without proper nutrition, 200 million children never reach their growth and development potential.

The Economic Cost

The effects of undernutrition result in:

• An annual loss of $20 to $30 billion in global economic development.

• Up to half of individuals' lifetime earnings.

• Lifelong economic opportunities are impaired by poor cognitive development and reduced educational achievement.

www.thousanddays.org

Tobias DK et al (2012) Pre-pregnancy adherence to dietary patterns and lower risk of gestational diabetes mellitus Am J Clin Nut: 96 289-95

Quartiles of prepregnancy dietary pattern adherence scores and GDM risk[1]

	Q1[2]	Q2	Q3	Q4	*P*-trend
aMED					
GDM/pregnancies	221/4601	321/7366	147/4134	183/5275	
Model 1	1.0	0.87 (0.73, 1.03)[3]	0.66 (0.53, 0.82)	0.61 (0.49, 0.75)	<0.0001
Model 2	1.0	0.89 (0.74, 1.06)	0.70 (0.57, 0.88)	0.67 (0.54, 0.84)	0.0001
Model 3	1.0	0.95 (0.79, 1.14)	0.76 (0.60, 0.95)	0.76 (0.60, 0.95)	0.004
DASH					
GDM/pregnancies	232/4213	220/5573	227/5806	193/5784	
Model 1	1.0	0.69 (0.57, 0.83)	0.66 (0.54, 0.79)	0.52 (0.42, 0.64)	<0.0001
Model 2	1.0	0.75 (0.61, 0.90)	0.74 (0.61, 0.90)	0.61 (0.49, 0.76)	<0.0001
Model 3	1.0	0.77 (0.63, 0.93)	0.78 (0.64, 0.95)	0.66 (0.53, 0.82)	0.0005
aHEI					
GDM/pregnancies	242/4661	252/5261	203/5313	175/6141	
Model 1	1.0	0.86 (0.72, 1.04)	0.64 (0.53, 0.79)	0.44 (0.36, 0.54)	<0.0001
Model 2	1.0	0.90 (0.74, 1.08)	0.67 (0.55, 0.81)	0.46 (0.37, 0.57)	<0.0001
Model 3	1.0	0.96 (0.79, 1.15)	0.75 (0.61, 0.91)	0.54 (0.43, 0.68)	<0.0001

UNIVERSITY OF Southampton
School of Medicine

Kain J et al (inc Simon Murphy, Cardiff Institute of Society and Health)
Obesity Prevention in Primary School Settings: evidence from intervention studies
***In* Preventing Childhood Obesity. BMJ Books 2010.**

"Interventions struggle to achieve changes in BMI despite finding effectiveness on behavioural and other outcomes……The school setting is subject to a number of barriers in implementing sustainable obesity prevention programs, requiring infrastructure and resources that may well not exist in poor schools……Many interventions have been criticised for focusing on the most accessible setting and groups and for conceptualising setting as a **channel of delivery rather than a dynamic context that both shapes and is shaped by those within it".**

Health Literacy (Nutbeam, D. 2000)

The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions

1. Basic or functional health literacy

2. Communicative or interactive health literacy

3. Critical health literacy (autonomy and personal empowerment)

UNIVERSITY OF Southampton

Lessons for Life

LIFELAB

UNIVERSITY OF Southampton
School of Education

SOUTHAMPTON LIFELAB

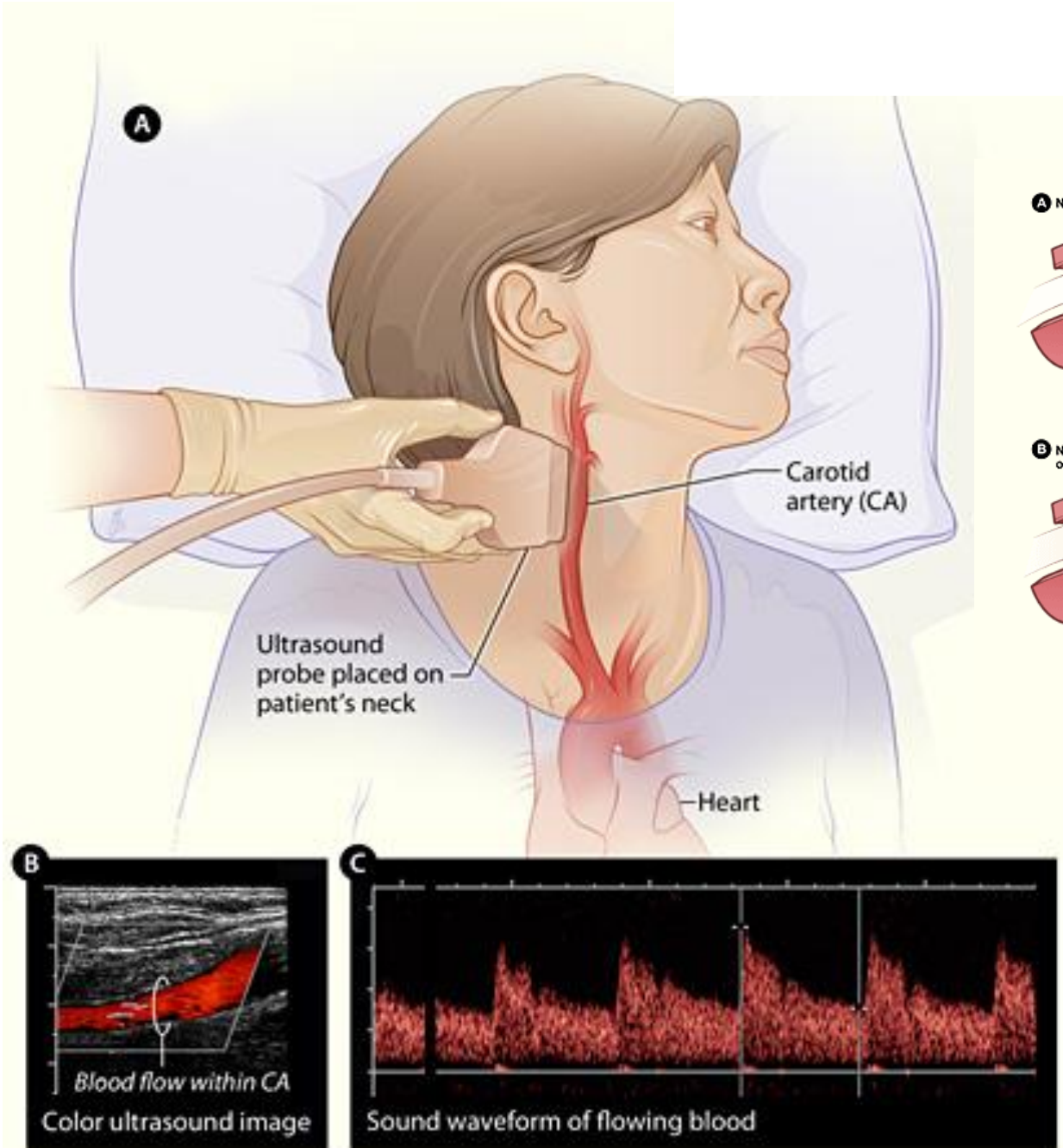
Hospital-based classroom

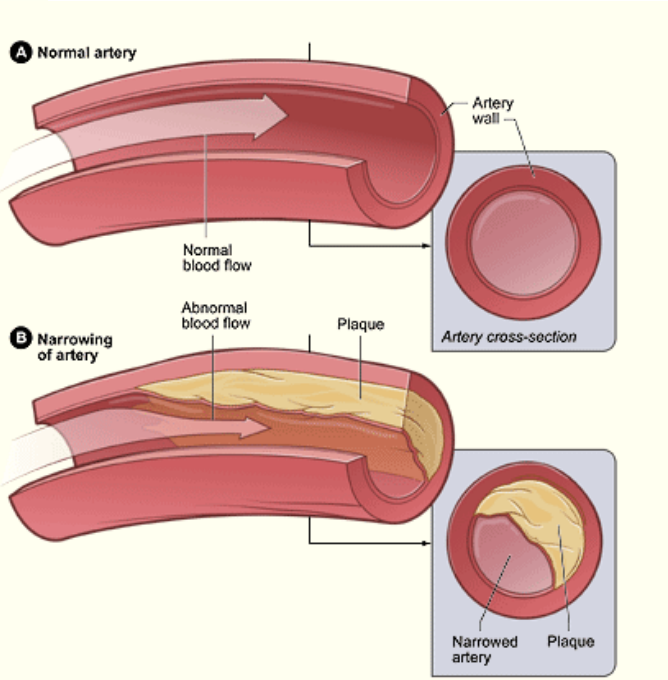
Help teachers with lesson content
Hands-on activities in hospital
Follow up lessons in school

Me,
my health
and my children's health

What do the students do?

How healthy are my arteri





The carotid artery

How does my lifestyle affect my DNA?

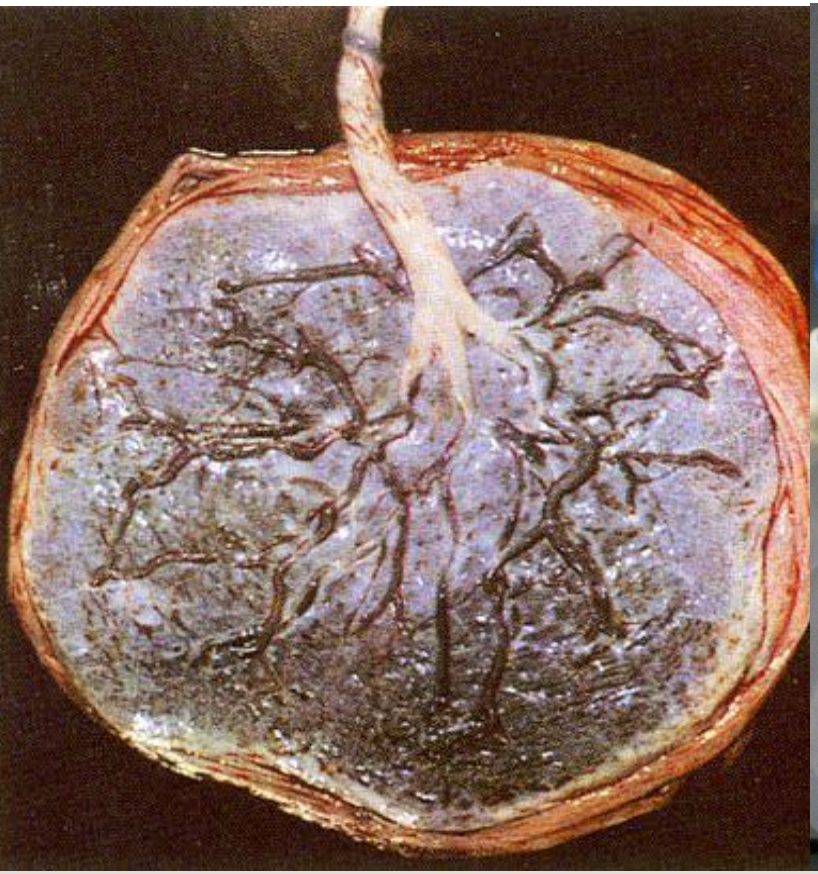
LIFELAB

How healthy are my muscles and bones?

School students take accurate measurements to decide how healthy they are.

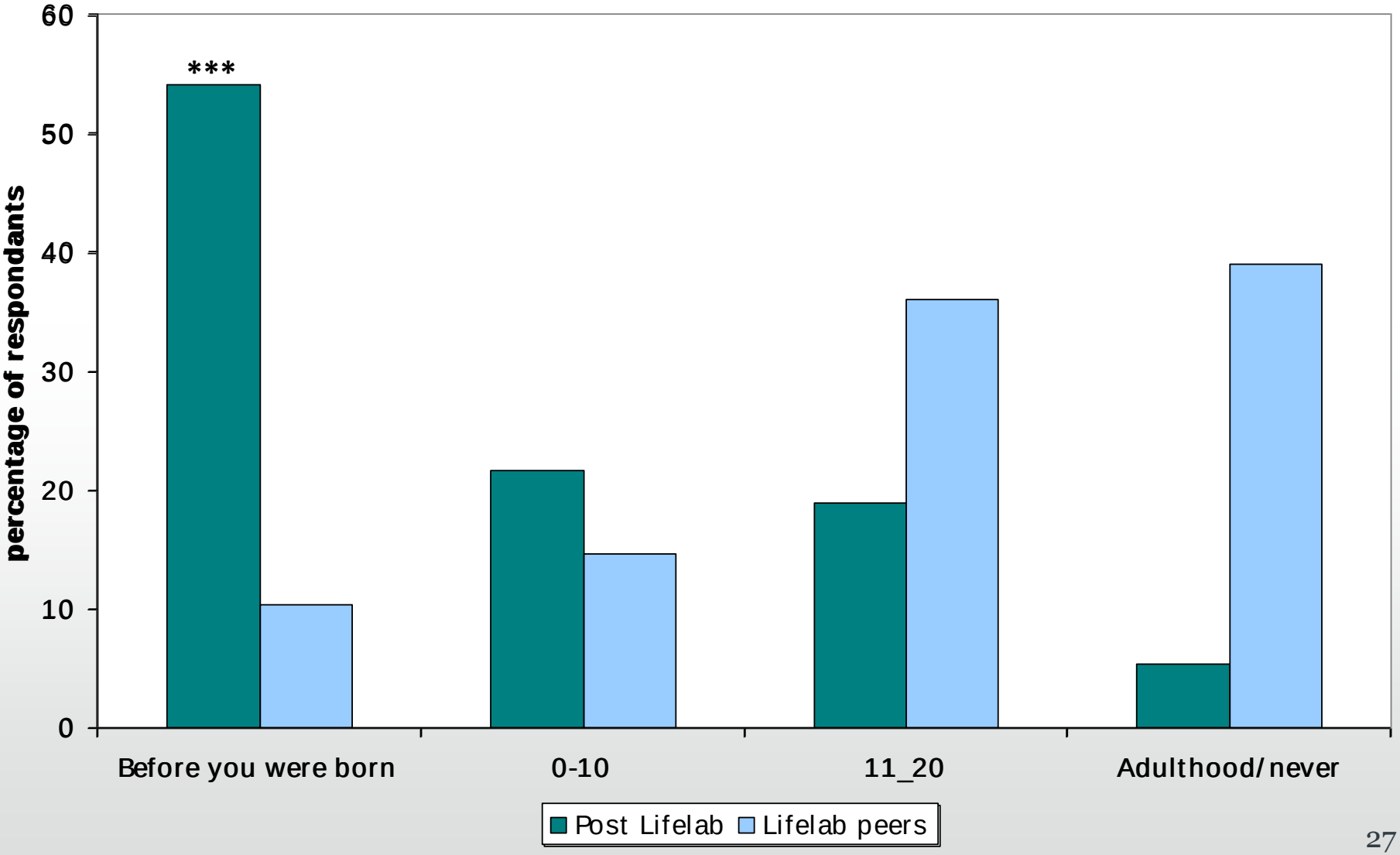
How was I nourished before I was born?

Measure transport of calcium and glucose across the placenta



At what age do you think your diet starts to affect your future health?

UNIVERSITY OF Southampton
School of Education



Grace et al, Health Education, Vol. 112 Iss: 6 (Date online 12/9/2012)

Meet the scientist

“A particularly successful workshop, ‘LifeLab Southampton, is based at the local hospital and is making an important contribution to students’ understanding of the need to adopt healthy lifestyles.”

OFSTED 2009

“the impact of Life Lab on students’ learning and enthusiasm for science [was judged] to be ‘Outstanding’

Senior Secondary Inspector, Southampton City Council

- Make health promotion concepts and behaviours culturally relevant and part of child's environment
- Capabilities develop earlier than often thought
- Children themselves can become agents of change
- Focus not so much on ability to read a health text but on health literacy itself
- Can empower vulnerable and marginalised groups

From *Borzekowski DLG, 2009.* Considering children and health literacy: a theorectical approach. Pediatrics 124:S282-288.

The Lancet Series on Adolescent Health 1-4. Vol **379**: 1630-75. May 2012

- **Headline – "The proposed investments in adolescent health will become investments not only in economic productivity and effective social functioning, but also in worldwide population health. Our young people, and all of us, will benefit"**
- 1.8 billion people aged 10-24 yr make up >25% of world's population
- Health of adolescents has improved far less than that of younger children over last 50 yr.
- Adolescence is a second sensitive developmental period in which puberty and brain maturation lead to new sets of behaviours and capacities. These modify trajectories towards health and wellbeing
- Adolescents can be powerful agents of personal change and community action
- Strongest determinants of adolescent health are national wealth, income inequality and access to education

- There is sufficient evidence from controlled trials that carefully designed preventive interventions can improve adolescent health
- A programme of public intervention is need to ensure that policy makers, practitioners, scientists and the general public are made aware of the health, social benefits and cost savings from evidence-based preventive interventions
- Research is needed on how best to take such evidence-based preventive interventions to scale (to build community capacity, identify local need, match to need, support and sustain interventions, adapt to specific settings)
- Future initiatives in tackling NCDs, mental health, sexual and reproductive health and injuries should have explicit measurement strategies for adolescents

World Health Organization

SIXTY-FIFTH WORLD HEALTH ASSEMBLY
Provisional agenda item 13.3

A65/12
16 March 2012

Nutrition

Nutrition of women in the preconception period, during pregnancy and the breastfeeding period

Report by the Secretariat

- There is a need to take a life-cycle approach and recognize the importance of optimal nutrition for women before they become pregnant
- About 468 million women aged 15 to 49 years (30% of all women) are thought to be anaemic, at least half because of iron deficiency
- Iodine and folic acid deficiencies in the periconceptional period (three months before and after conception) are associated with a higher prevalence of birth defects and mental retardation.
- Low body mass index (<18.5 kg/m2) and/or short stature (height <145 cm) are common in women in low-income countries
- Conversely, about 35% of adult women worldwide are estimated to be overweight (body mass index ≥25 kg/m2), a third of whom (297 million) are obese (body mass index ≥30 kg/m2).
- More women enter pregnancy with a body mass index >30 kg/m2, leading to an increased risk of complications during pregnancy and delivery. Their infants tend to be born larger and are at greater risk of becoming obese and developing type 2 diabetes as children and adolescents. These women also tend to retain more weight after birth.
- In pregnant adolescents growth of the mother competes with that of the fetus, and the child's birth weight is on average 200g lighter than that of children born to older mothers
- Adolescent pregnancies represent up to 40% of first pregnancies in most countries

Welcome to DOHaD 2013