

# Health and Cycling

Professor Bruce Lynn, UCL

Cycling, health and safety: Winning the arguments  
Cyclenation, Birmingham, 21 April 2012

SOUTHWARK

CYCLISTS



# **Outline of presentation**

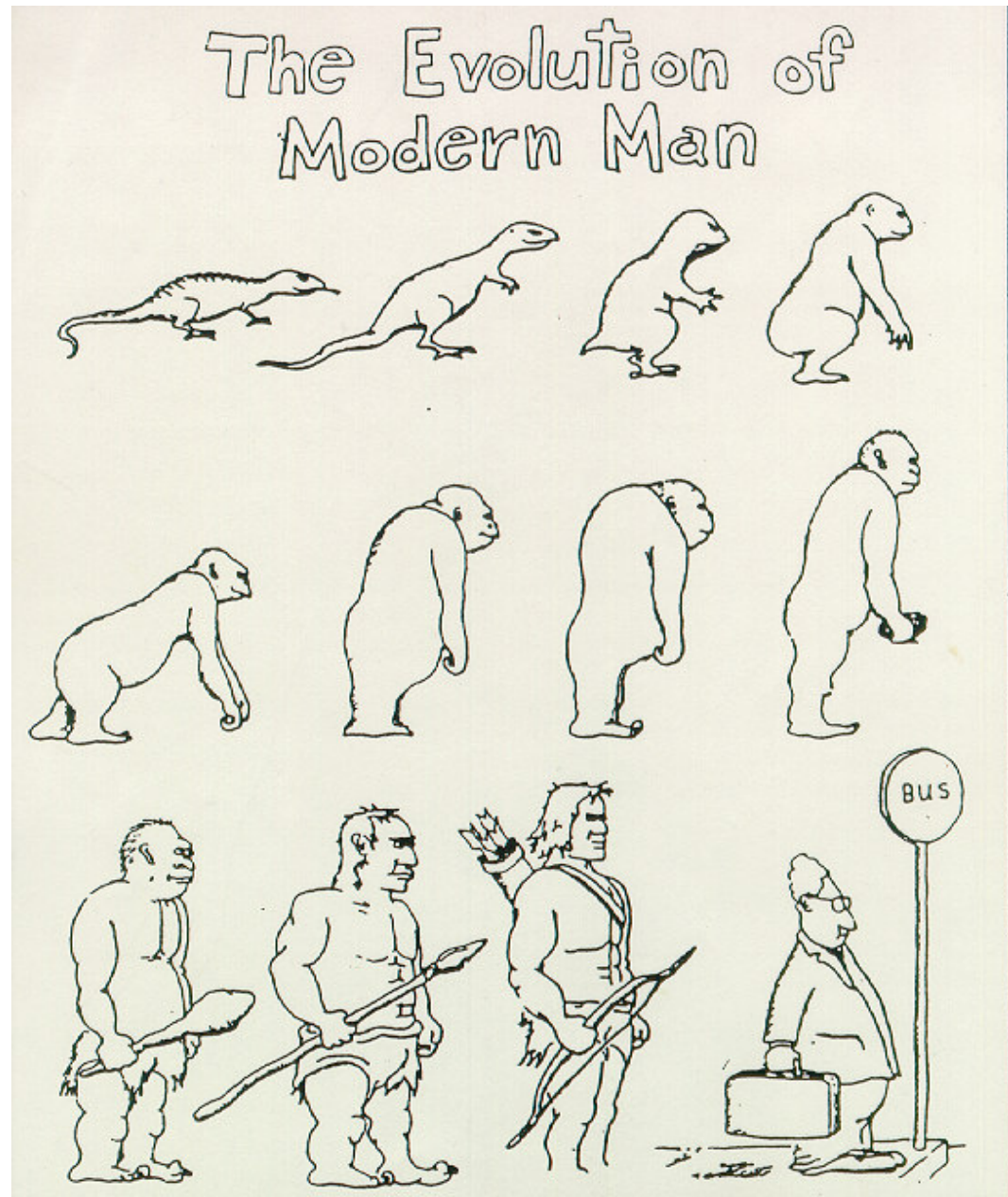
- Essential background and some key facts
- Exercise and health: the best arguments
- Cycling and health: evidence base

Physical activity



fitness and good health

We are designed to run!



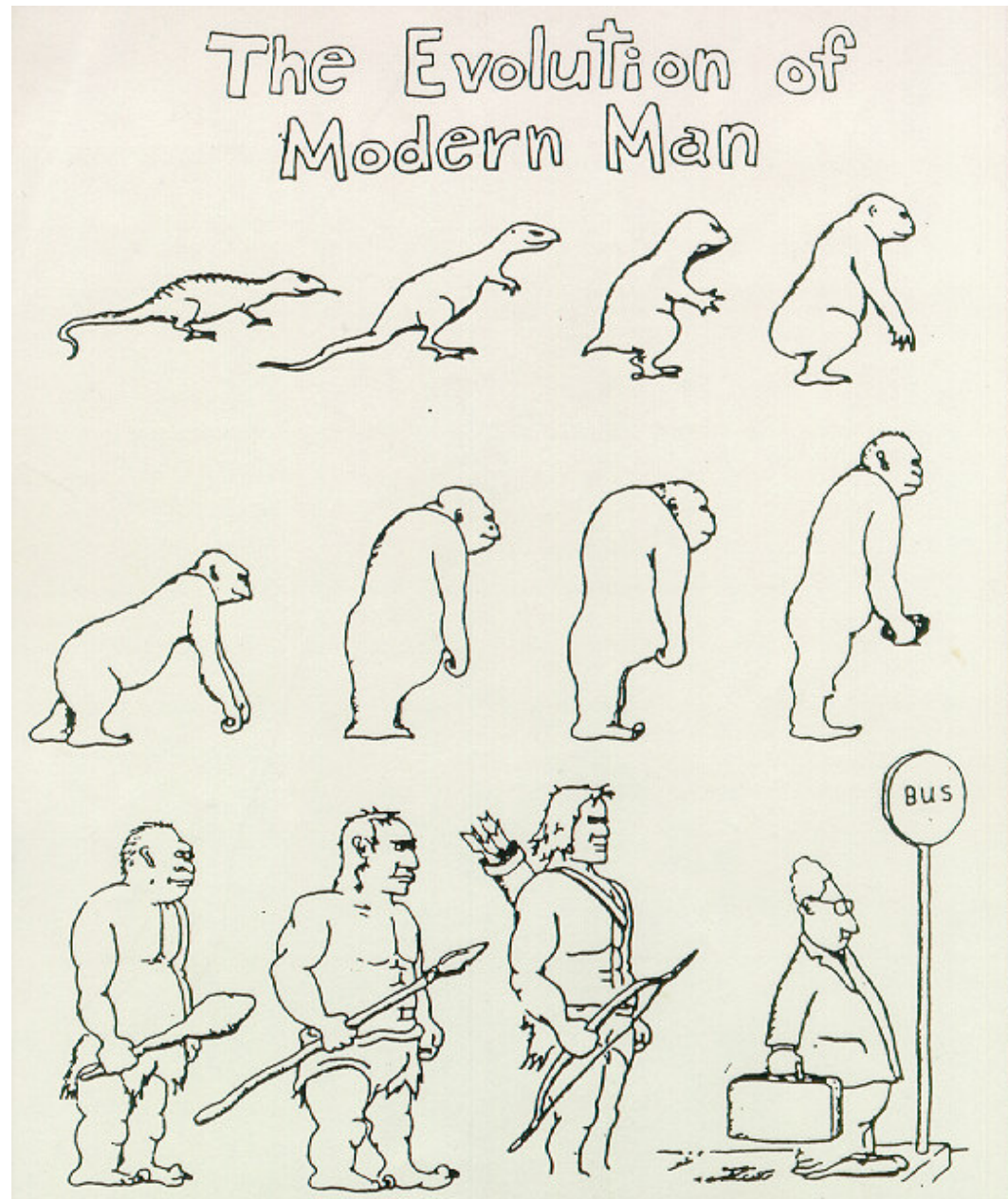
Physical activity



fitness and good health

We are designed to run!

*But remember we have also evolved to be as energy efficient as possible – and ingrained behaviour patterns reflect this.*



Our heart, muscles, vascular system are designed for serious levels of physical activity.

During hominid evolution survival depended on physical activity for obtaining food, for establishing territory, and so for success in procreation.

But when possible, even Stone Age Man needed to rest. And when food was available, they needed to eat enough to lay down storage fat in case of future lack of success in hunting, or a drought.

So our brains are programmed appropriately.

**When possible be sedentary – rest.**

**When there is food – eat it!**

This is the problem in the modern environment

Our body needs to exercise to stay healthy.

But our brain says

- Be lazy
- And eat enough to ensure you can outlast the next famine

And of course this is why exercise promotion is such a tough business

And the consequence:

Non-communicable disease is now the principle cause of death and chronic illness – more people die from cardiovascular disease, cancer, stroke and other NCDs than from infectious disease (malaria, cholera, AIDS etc) or from trauma (accidents, warfare)

## **How important is exercise?**

What about smoking, poor diet, lousy air quality?

Smoking provides about the same risk of early death as low physical fitness. But affects many fewer people – so the population risk is less than half.

High blood pressure, also confers about the same risk as sedentary living. But, due to changes in diet and effective medication, now affects many fewer people.

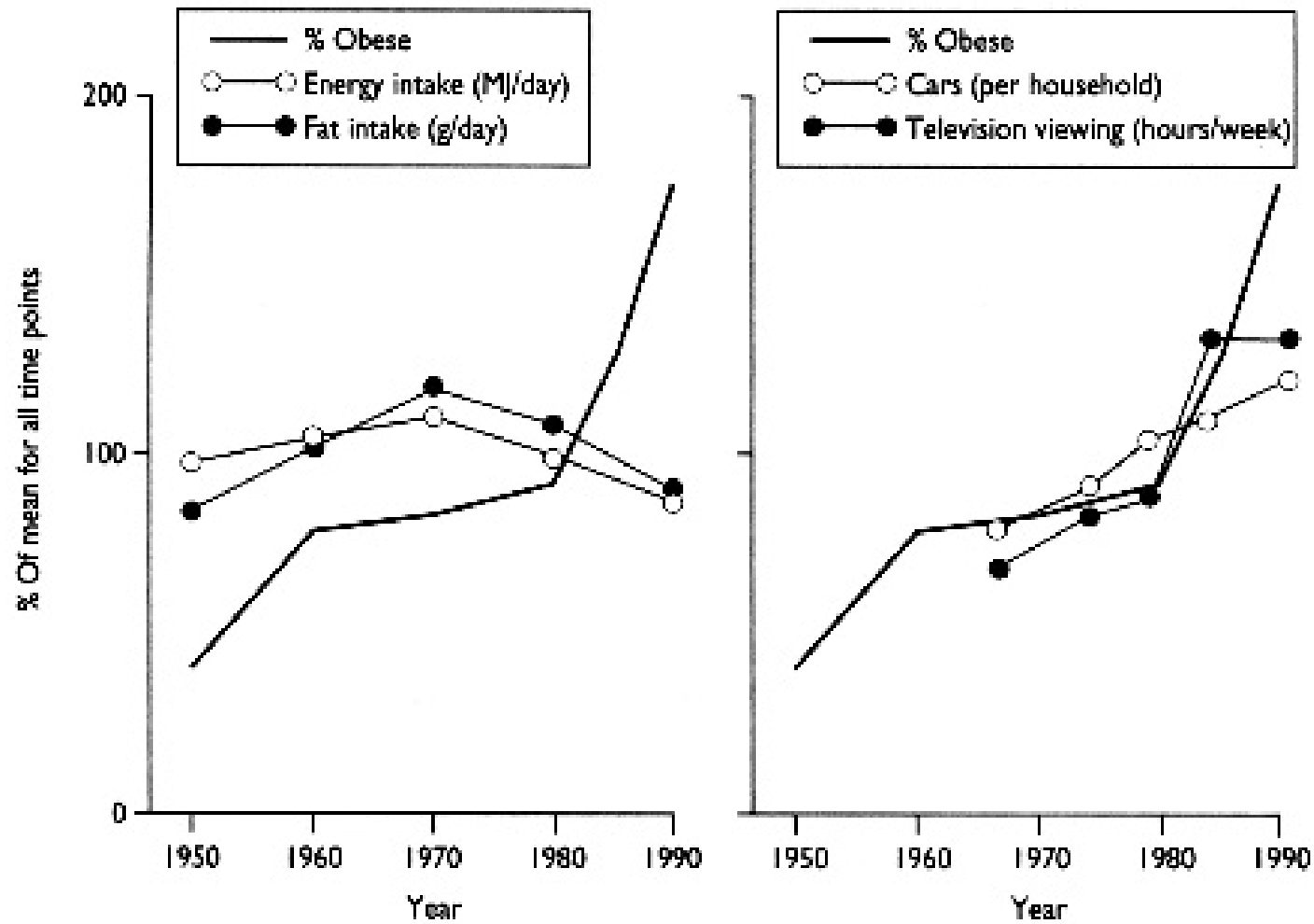


**How important is exercise?**

What about over-eating - obesity?

Excessive eating – too many calories. Turns out, surprisingly, to be not an issue at all! We eat the same number of calories as our neanderthal ancestors.

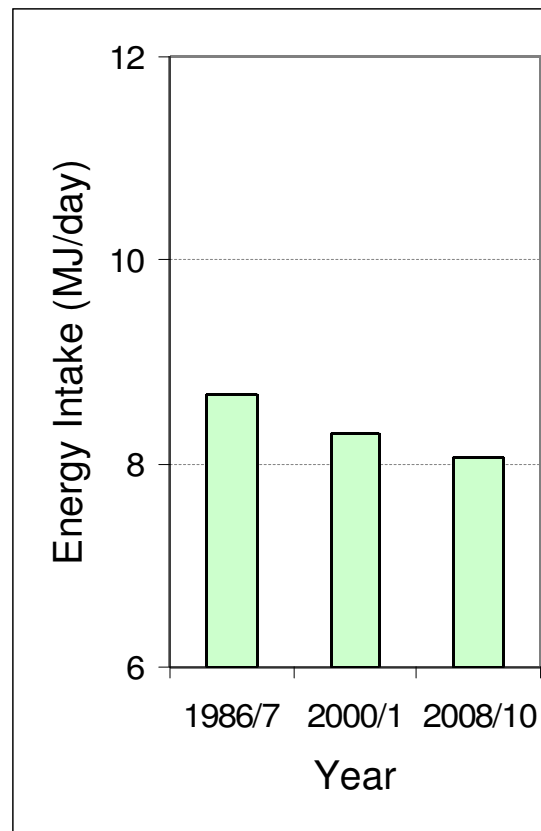
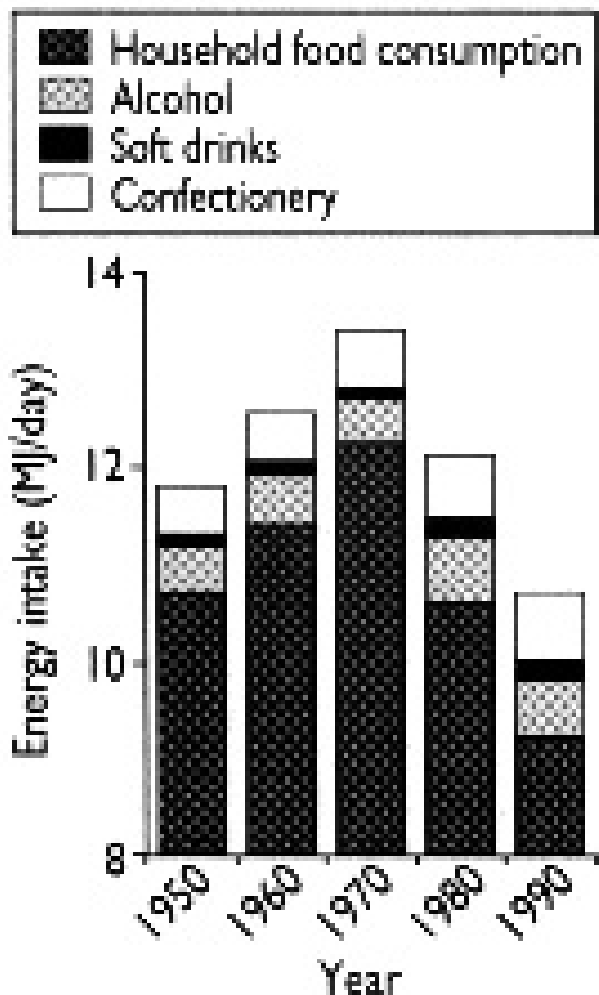
Secular trends in diet (left) and activity (right) in relation to obesity in Britain.



Prentice A M , Jebb S A BMJ 1995;311:437-439



# Changes in average energy intake in Britain over 60 years.



Prentice A M , Jebb S A BMJ 1995;311:437-439

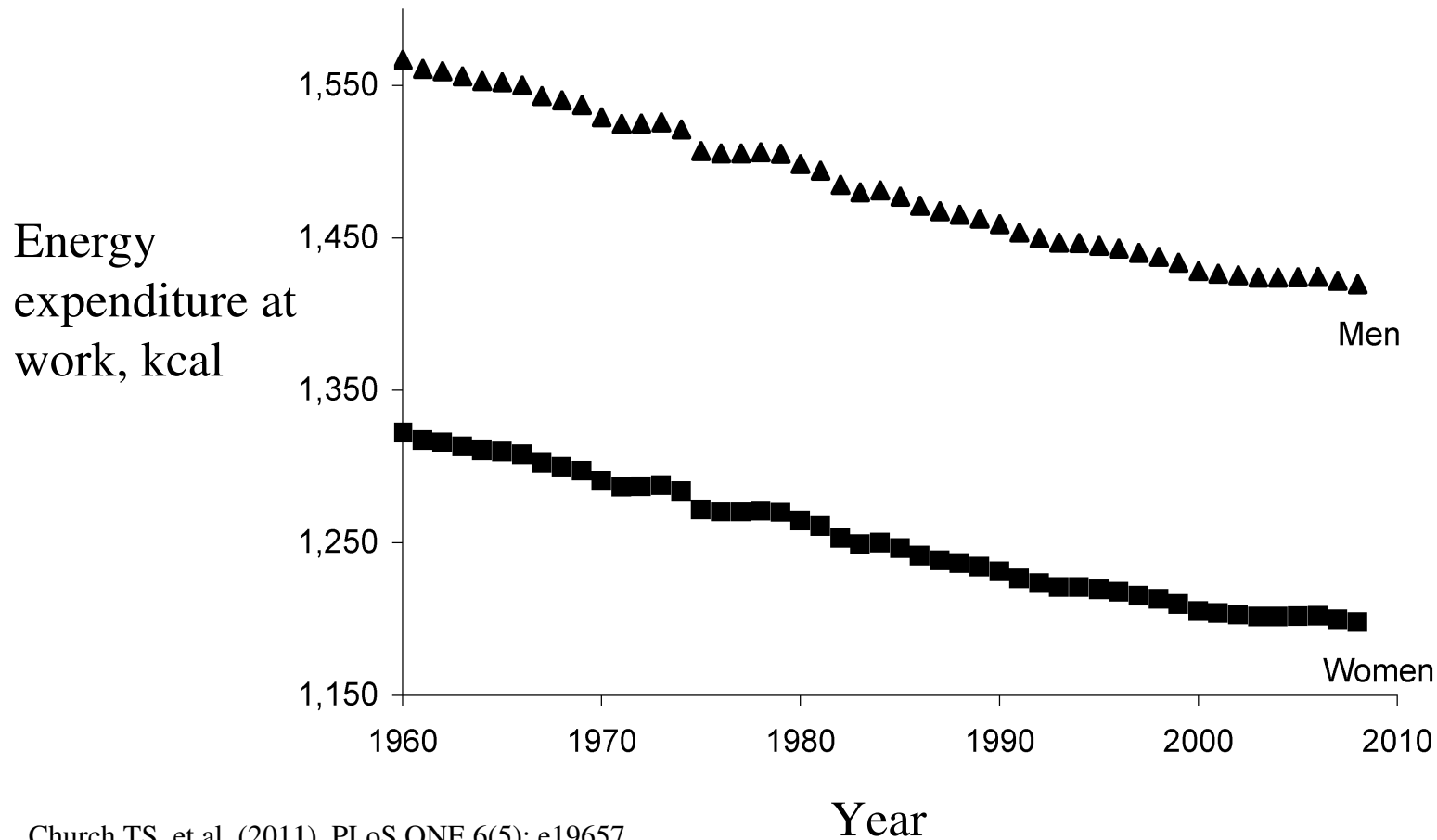


Data from UK National Diet and Nutrition Surveys

Energy expenditure has been falling

This fall in US energy expenditure is enough to account for the increase in body weight seen over the same period.

This energy needs to be put back into everyday life, e.g. by cycling more



**How important is exercise?**

What about over-eating - obesity?

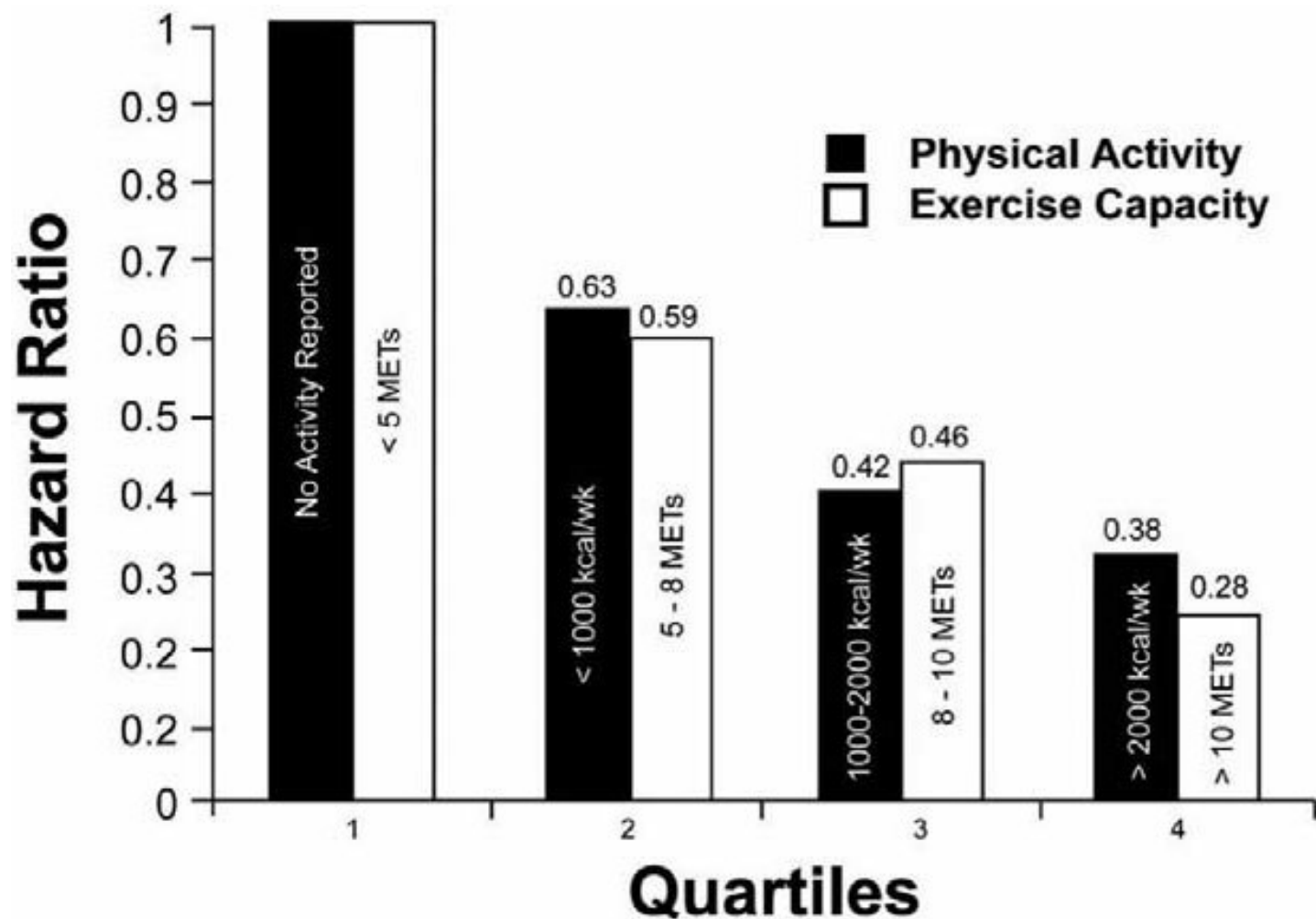
The reason we get fat is that we do not exercise.

Unscrambling the risk of fatness from the risk of under-exercising is tricky. But much evidence indicates that not exercising is much worse for us than being overweight.

Lets look at the relation of fitness to health in more detail.

The fitter you are, the healthier you are.

Steep relation between health measures and measures of fitness or physical activity



Risk of death. Age-adjusted hazard ratios versus exercise capacity and adulthood recreational activity, expressed in quartiles, with the least fit or least active group as the reference group (quartile 1). MET metabolic equivalent. N=6200. Av age 59. Av follow-up, 7 years. *Myers, J. et al Am J Med. 2004;117:912-918*

Note, these are huge differences in risk of death.

If you are pretty fit at 60, your chance of dying in the next 7 years is only 25% of someone in the least fit quarter of the population.

And the risks are substantial.

After 6 years 25% of the lowest fitness group were dead. But only 7% of the highest fitness group.

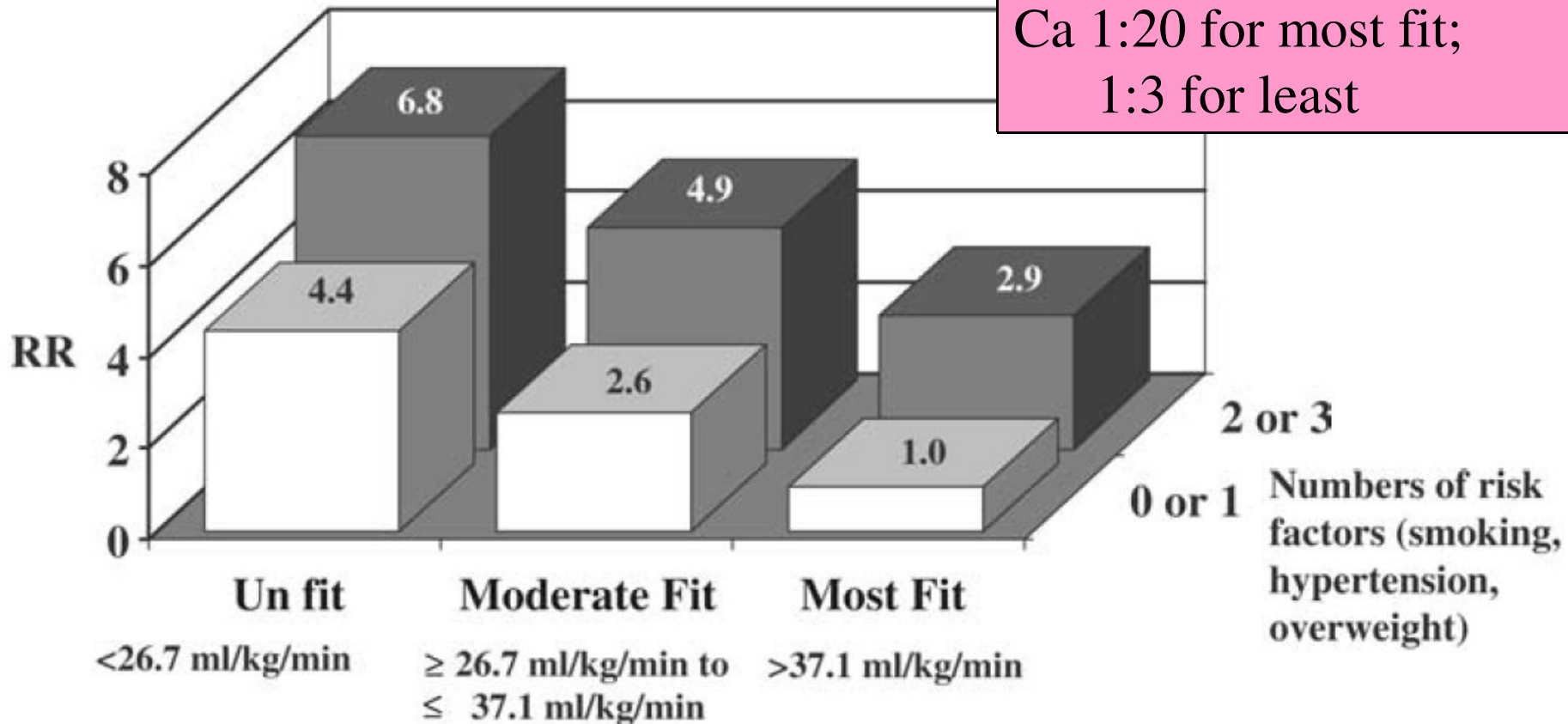
I know which group I want to be in!!



## Relative risk of death versus aerobic fitness

Data from Kuopio Ischaemic Heart Disease Risk Factor Study. The study population is a representative sample of Finnish men who were 42–60 years of age at baseline examination between 1984 and 1989. 1294 healthy men, med

Note these are large risks  
Ca 1:20 for most fit;  
1:3 for least



Jari A. Laukkanen et al. European Heart Journal (2004) 25, 1428–1437

# How much exercise do we need?

## New UK 2011 guidelines:

1. Adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes of moderate intensity activity in bouts of 10 minutes or more. *Moderate = up to 11 mph cycling*
2. Alternatively, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or combinations of moderate and vigorous intensity activity. *Vigorous = more than 11 mph cycling*
3. Adults should also undertake physical activity to improve muscle strength on at least two days a week. *So up some steep hills or a bit of mountain biking!*

Children 300 min/wk

But remember this is the level that gets you SOME benefit, not the level that gives you optimal fitness and health

Note how low the guideline is.

150 min/wk is 30 min per working day.

A 15 min ride to work and home again is enough!

Neanderthal man did rather more than this, and in consequence probably had a rather healthier cardiovascular system!

# Exercise and health: the best arguments

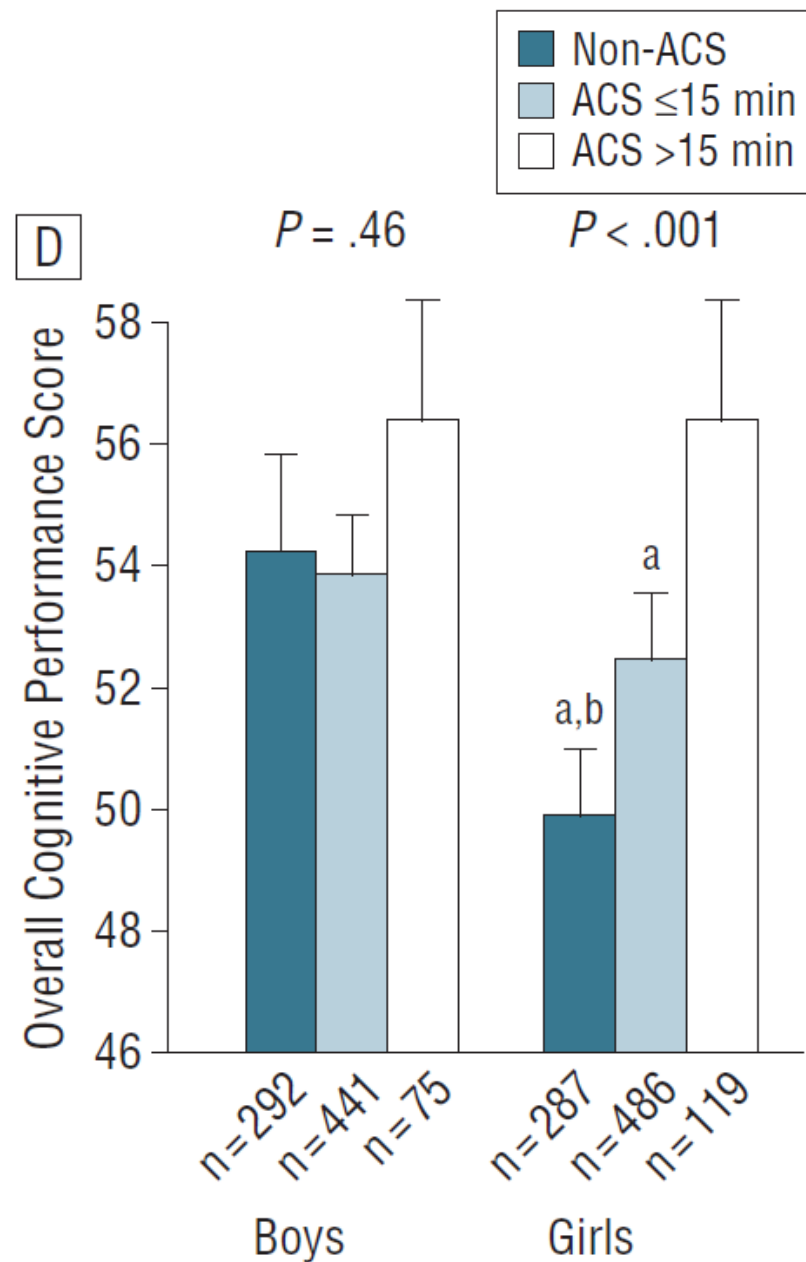
First, general arguments regarding exercise and health

Children: Health arguments not useful. Key here is independence/enjoyment

Maybe can also suggest they will find school work easier.

Cognitive function in adolescents is higher, at least in girls, if you walk or cycle to school

**Participants:** A total of 1700 adolescents (892 girls) aged 13 to 18.5 years.



Martinez-Gomez, D. et al Arch Pediatr Adolesc Med.

Published online December 6, 2010.

# Exercise and health: the best arguments

Adults (18-50). Again, stressing risk of early, lingering, death does not work. People still think they are immortal.

Better to stress (health-related) quality of life.

## **Adult quality of life arguments**

Can fully participate in activities involving physical exertion such as dancing, charity runs.

Feel better – less depression etc.

Look better!

Better sex life

Longitudinal study in California

Initial random sample of 8023 recruited in 1965

As many as could be found re-examined in 1974 and 1983

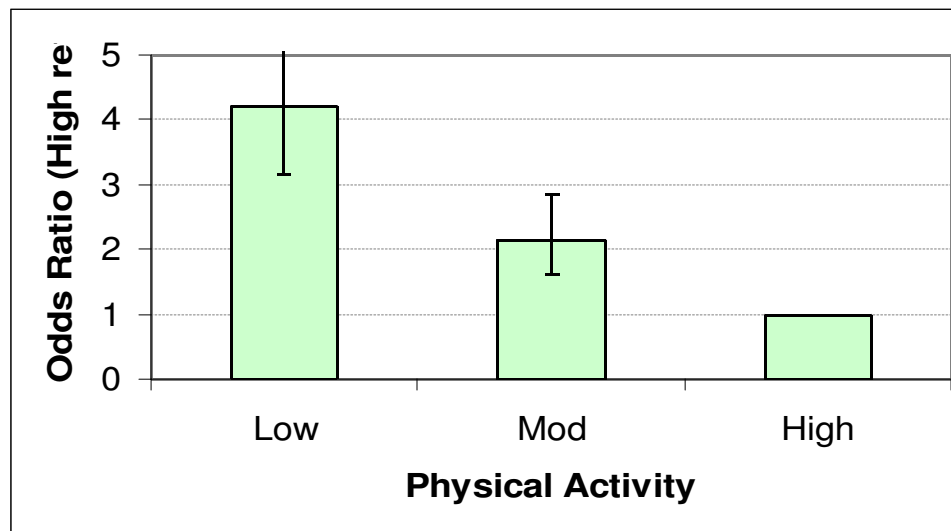
Symptoms of depression from questionnaire

Odds ratio (proportion with symptoms compared with proportion in high activity group).

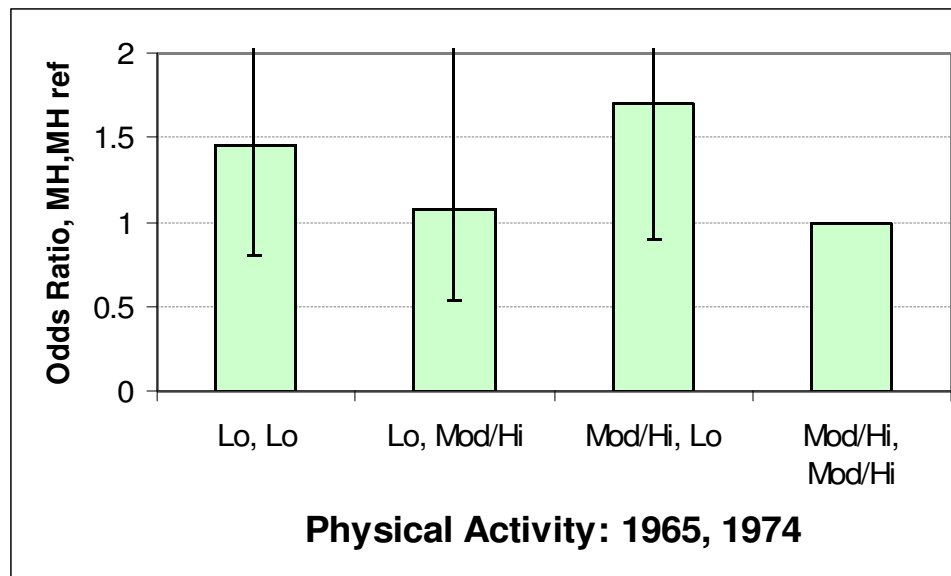
At much more depression in low than high activity groups

Changes in activity levels were a strong indicator of future depression.

1965 Baseline situation



PA changes 1965-74, symptoms in 1983





**From the Serpentine Running Club website**

[http://www.serpentine.org.uk/pages/beginners\\_bettersex.html](http://www.serpentine.org.uk/pages/beginners_bettersex.html)

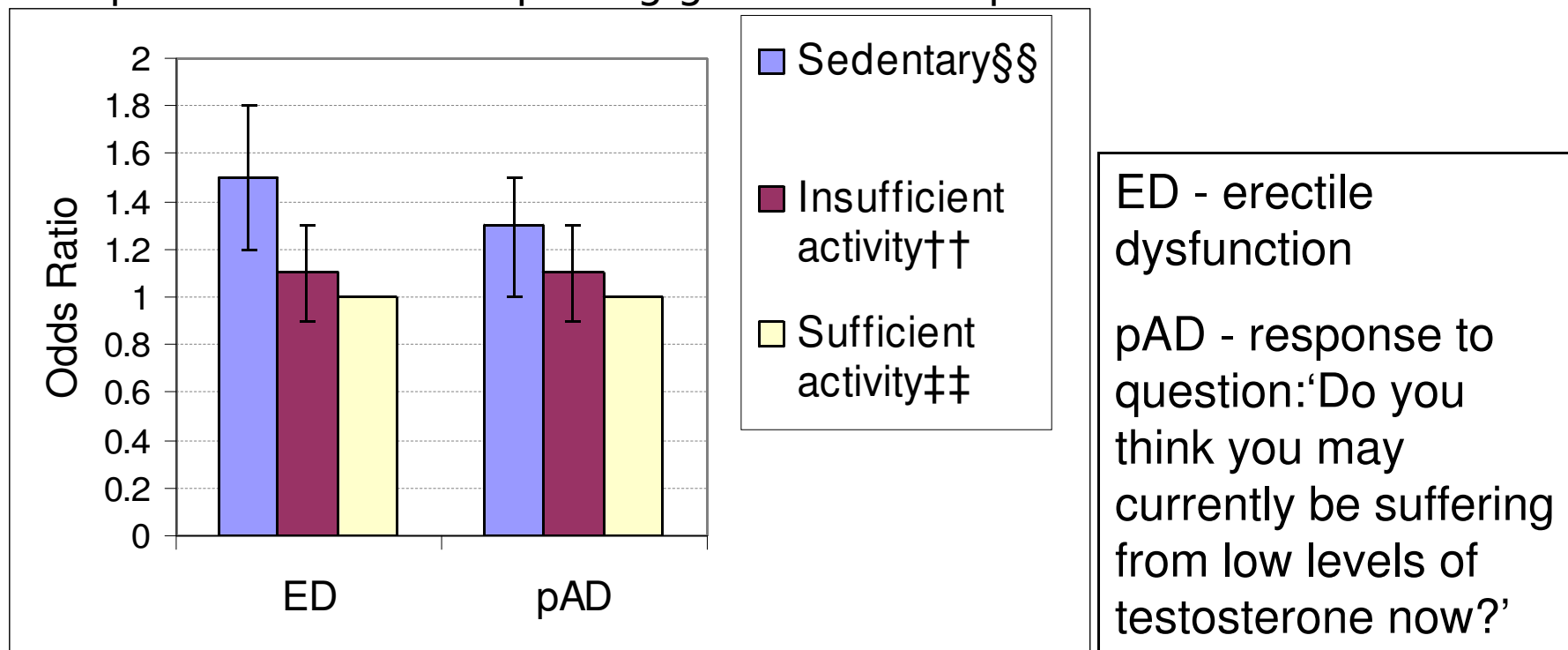
**SERPENTINE**

## **Runners have Better Sex**

- **A Sunday Times survey** confirmed that runners have better sex; it also showed that runners who have sex the night before the London Marathon do better, on average, than those who do not
- **Runners are better lovers**, says Dr Michael Cohen
- A Harvard study found the sex lives of women and men over 40 who exercised regularly were similar to those of many people in their late 20s and 30s

But actually the evidence is that all forms of exercise are good for your sex life, not just running.

A representative sample (n = 5990) of Australian men aged 40+ years, stratified by age and State, was contacted by random selection of households, with an individual response rate of 78%. All men participated in a 20-minute computer-assisted telephone interview exploring general and reproductive health.



§§ No participation in physical activity;

†† Some physical activity reported but not meeting 'sufficient' criteria;

‡‡ At least five separate sessions of vigorous intensity activity

Holden et al. BMC Public Health 2010, 10:96.  
<http://www.biomedcentral.com/1471-2458/10/96>

## **The over 50s**

Here the health arguments start to be effective.

We know too many people who have had heart problems.  
Some close friends/relatives are developing chronic illnesses.  
May be visiting people in nursing homes.

This area is well-researched.

Risk of early death is roughly doubled if you are sedentary

Risk of cardiovascular disease, several common forms of cancer, diabetes and approx 40 other conditions all linked to low physical activity. Typically increased risk of developing a problem is 50-100%.

"Most people in modern life just don't have the time in our lives to spend several hours a day exercising." Prof Terence Stephenson, Academy of Medical Royal Colleges (AoMRC), launching campaign on rising levels of obesity, 15 April 2012.

<http://www.aomrc.org.uk/item/medical-profession-united-in-fight-to-defuse-obesity-time-bomb.html>

Yet...

UK viewers notched up an average of four hours and two minutes a day watching TV in 2011

## **Cycling and Health: key evidence**

Cohort studies – seeing who dies

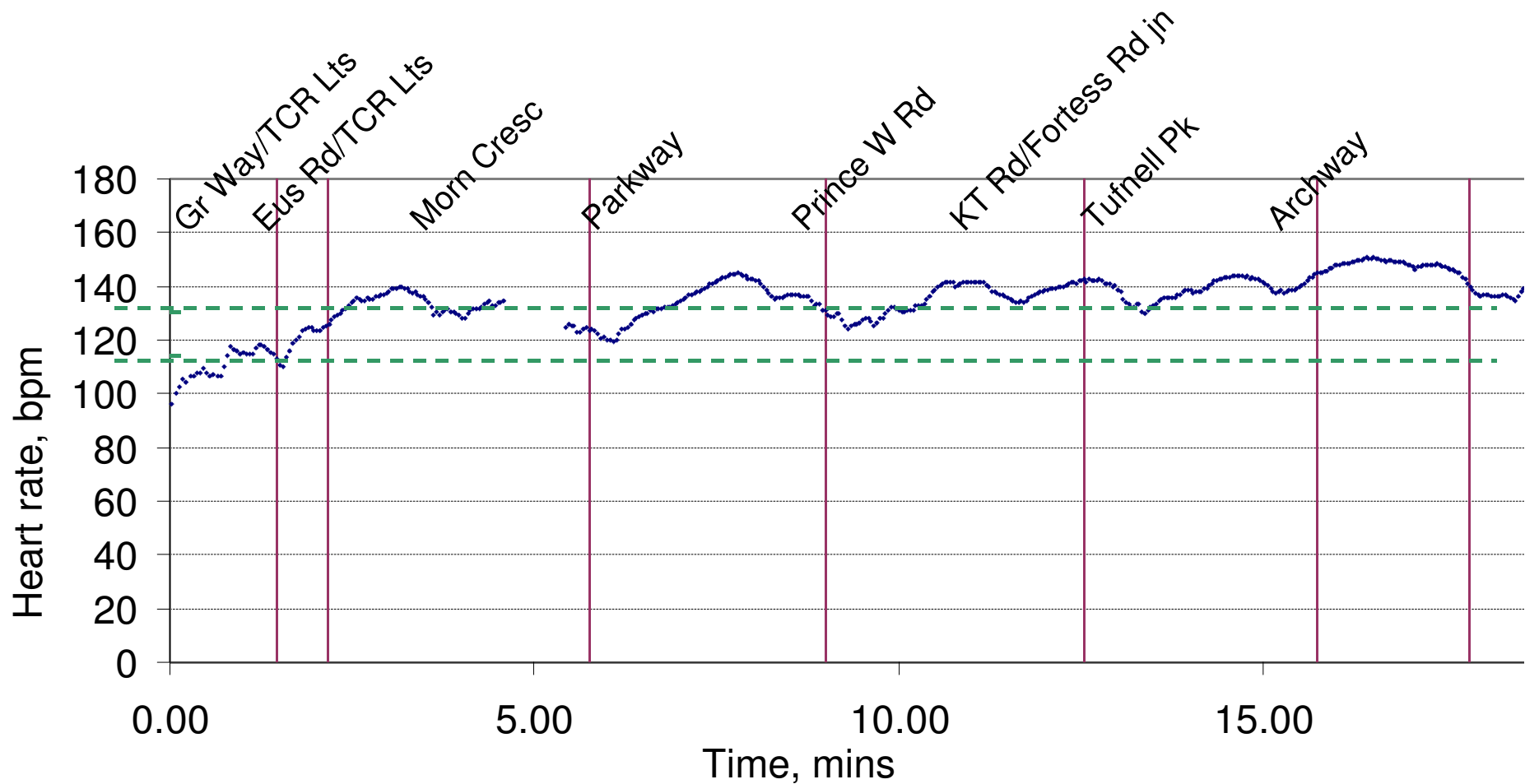
Experimental – looking at health effects of starting cycling

Cross sectional – health status of cyclists in one-off surveys

# Bicycling from Bloomsbury to the Archway Campus

## Heart rate recording

*At or above the “training zone” for 18 min – big contribution to fitness.*



# Cyclists live longer

Study of random sample of 6954 subjects in Copenhagen.

Looked at physical activity, smoking, BMI, blood lipids (cholesterol etc), blood pressure.

Followed for 15 years.

Found usual increased mortality in those with low physical activity, who smoked, had high BP etc.

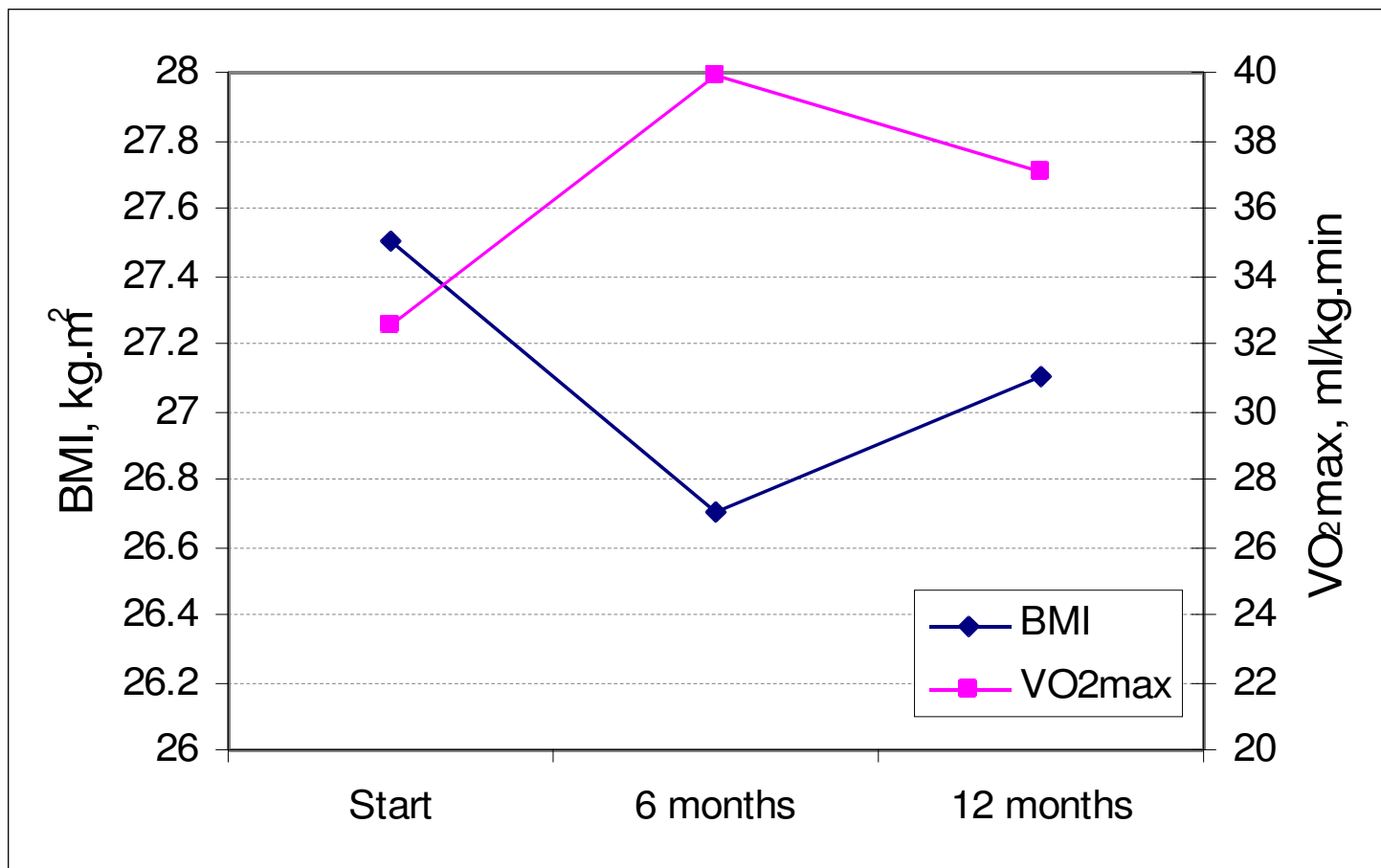
Looked at those who cycled (or had cycled) to work and those who did not.

Concluded: “Those who used the bicycle as transportation to work experienced a lower mortality rate even after adjustment for leisure time physical activity”

“Even after adjustment for other risk factors, including leisure time physical activity, those who did not cycle to work experienced a 39% higher mortality rate than those who did.”

*Lars Bo Andersen et al., Arch Intern Med. 2000;160:1621-1628*

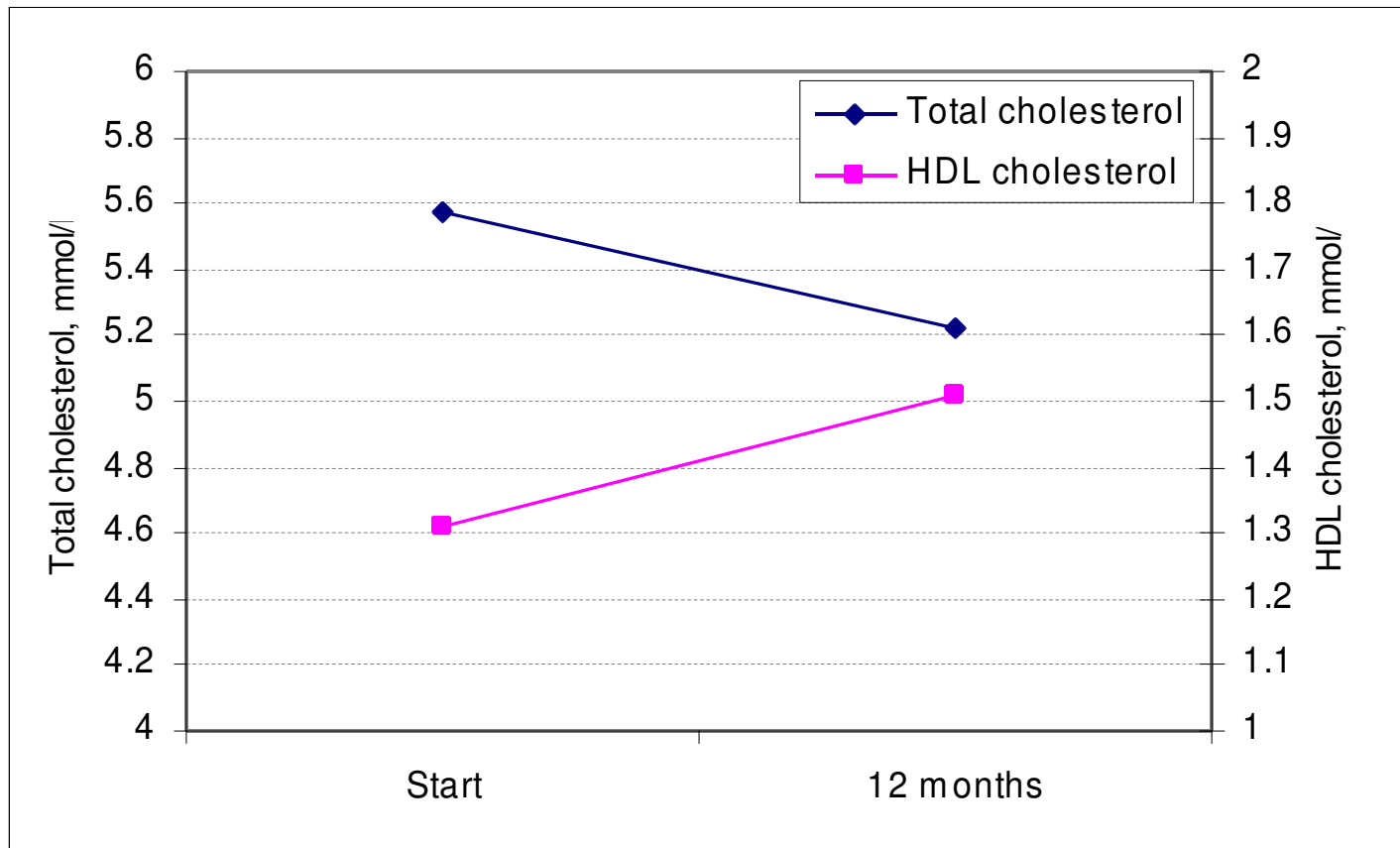
Recruited 25 non-cyclist, non-exercisers. Cycled >5km to and from work for a year. First 6 months, May-Oct, average exercise 200 min/wk; 2<sup>nd</sup> 6 months, Nov-April, 145 min/wk. Stavanger, Norway. **Given a free bike!**



25% increase in aerobic fitness (VO<sub>2</sub>max).  
Small but significant reduction in BMI



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Significant fall in total cholesterol.  
Marked rise in HDL, the “good” cholesterol

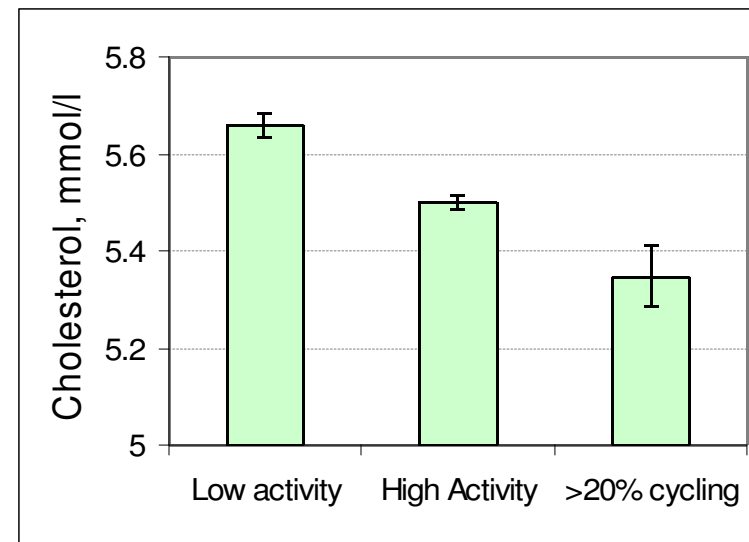
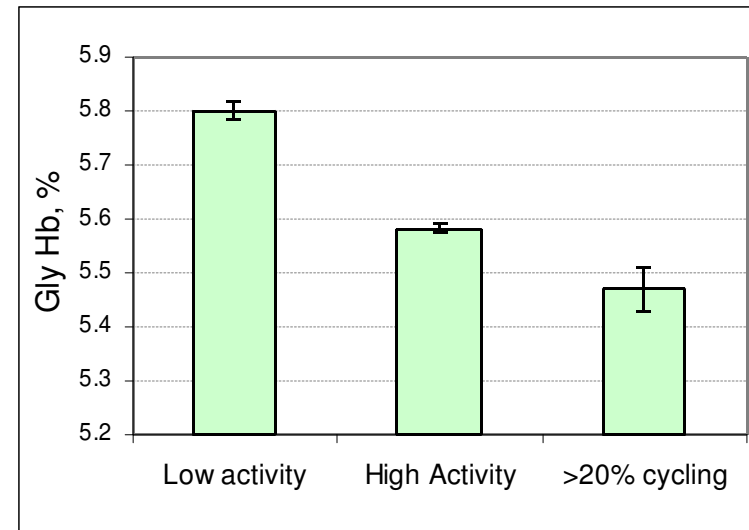
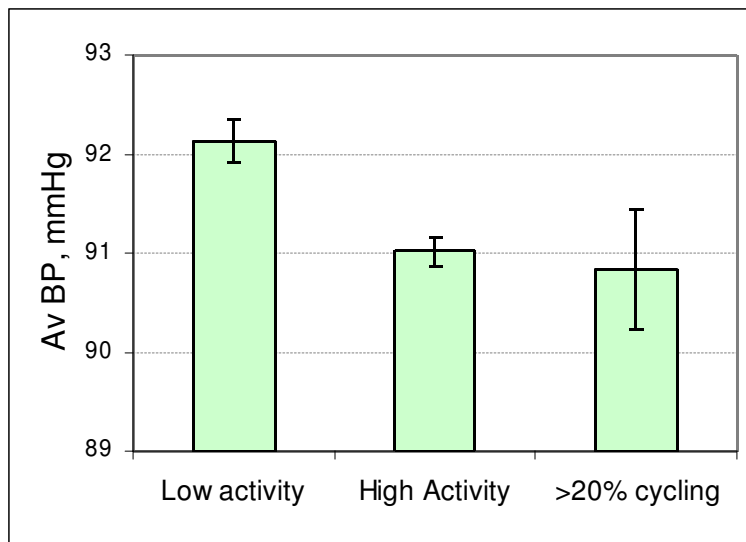
# Health indicators in cyclists

Low activity < 1 hr/week, N=4743

High Activity  $\geq$  1 hr/week, N=9772

>20% cycling group: High activity where cycling is >20% of all activity, N=536.

Data from Health Survey of England, 2008



## SUMMARY

- Lack of exercise is a significant risk factor for 40+ diseases and for early death.
- Lack of exercise affects more people than other risk factors such as smoking and high blood pressure
- You do not have to do huge amounts of exercise to get benefits – 30min/day is enough (but more is better!)
- Cycling is an effective form of exercise
- Cycling improves health indices, e.g lowers cholesterol, lowers blood pressure
- For older people, health arguments are powerful
- For younger people, probably most effective to stress quality of life, including sex life!

## Cycling, Exercise and Health – Useful sources of information

### **General Exercise and health**

Physical activity to reduce cardiovascular risk. British Heart Foundation. Factfile No 5, Sept 2008.  
<http://www.bhf.org.uk/publications/view-publication.aspx?ps=1000639>

Start Active, Stay Active: A report on physical activity from the four home countries' Chief Medical Officers. Dept of Health, 2011. [http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/documents/digitalasset/dh\\_128210.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_128210.pdf)

Physical Activity and Health. The evidence explained. A.E.Hardman & D.J.Stensil. Routledge, 2009. 340pp.

### **Cycling specific**

Cycling and Health. What's the evidence. N.Cavill & A.Davis. 2007. Cycling England.  
<http://www.ecf.com/wp-content/uploads/2011/10/Cycling-and-health-Whats-the-evidence.pdf>

Oja P et al (2011) Health benefits of cycling: a systematic review. Scand J Med Sci Sports 21, 496-509