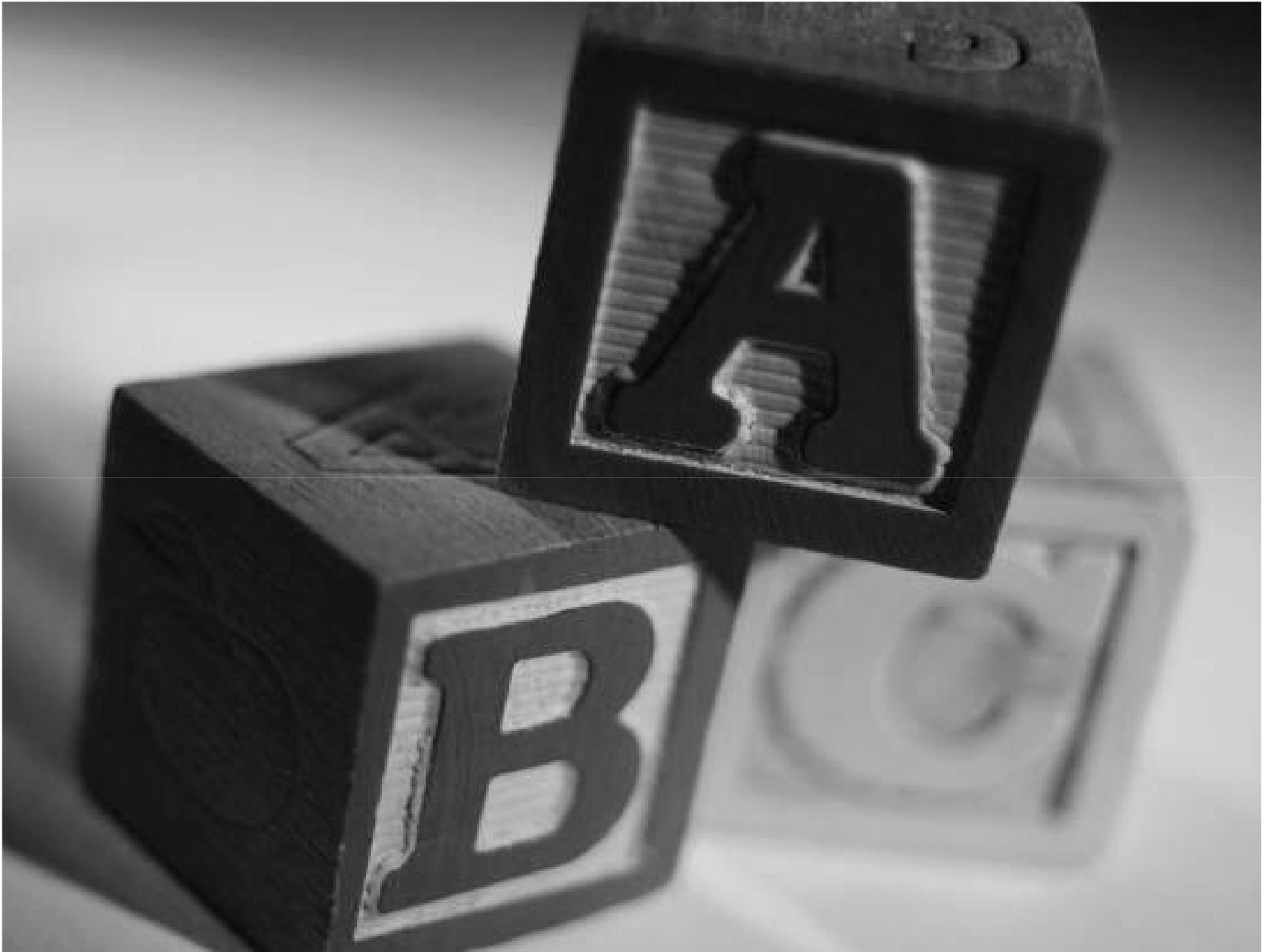


The ABC of physical activity for health:

A consensus statement from the British Association
of Sport and Exercise Sciences

Gary O' Donovan, Anthony Blazevich, Colin Boreham, Ashley Cooper, Helen Crank, Ulf Ekelund, Ken Fox, Paul Gately, Billie Giles-Corti, Jason Gill, Mark Hamer, Ian McDermott, Marie Murphy, Nanette Mutrie, John Reilly, John Saxton and Manos Stamataki

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All healthy adults

All healthy adults aged 18–65 years should aim to take part in at least 150 minutes per week of moderate-intensity aerobic activity, or at least 75 minutes of vigorous-intensity aerobic activity, or equivalent combinations of moderate- and vigorous-intensity aerobic activities.

All healthy adults should also perform muscle-strengthening activities on two or more days of the week.

Beginners

Beginners should steadily work towards meeting the physical activity levels recommended for 'all healthy adults.'

Even small increases in activity will bring some health benefits in the early stages and it is important to set achievable goals that provide success, build confidence and increase motivation.

For example, a beginner might be asked to walk an extra 10 minutes every other day for several weeks in order to slowly reach the recommended levels of activity for all healthy adults. It is also critical that beginners find activities they enjoy and gain support in becoming more active from family and friends.

Conditioned individuals

Conditioned individuals who have met the physical activity levels recommended for ‘all healthy adults’ for at least six months may obtain additional health benefits by engaging in 300 minutes or more per week of moderate-intensity aerobic activity, or 150 minutes or more per week of vigorous-intensity aerobic activity, or equivalent combinations of moderate- and vigorous-intensity aerobic activities.

Today's presentation

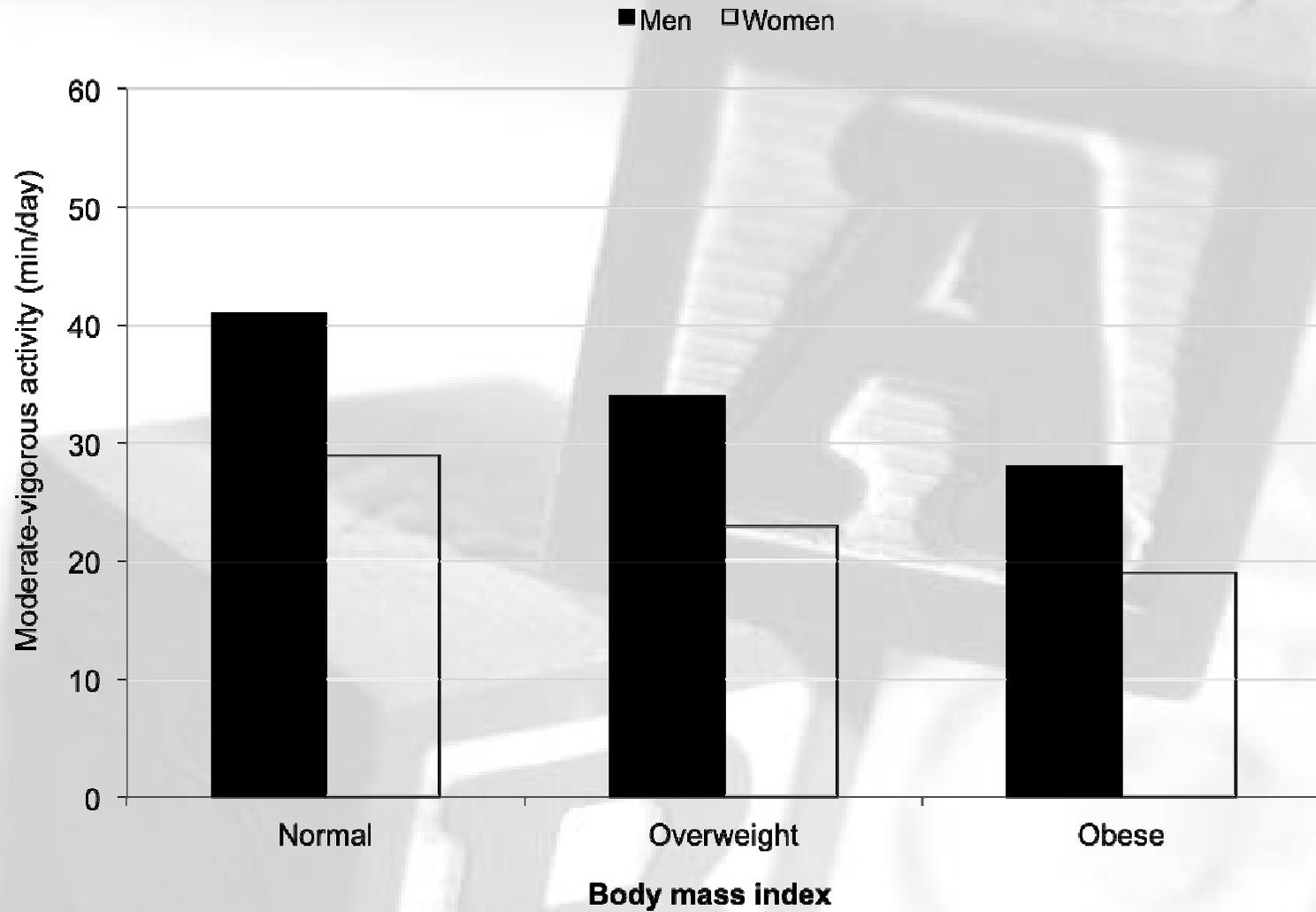
1. Rationale
2. Consensus process
3. Evidence behind the recommendations
4. Special groups
5. Defining moderate- and vigorous-intensity
6. Case study



1. Rationale

10 leading causes of death in high-income countries in 2004
(World Health Organisation, 2009)

Risk factor	Deaths (millions)	Attributable fraction
Tobacco use	1.5	17.9
High blood pressure	1.4	16.8
Overweight and obesity	0.7	8.4
Physical inactivity	0.6	7.7
High blood glucose	0.6	7.0
High cholesterol	0.5	5.8
Low fruit and vegetable intake	0.2	2.5
Urban outdoor air pollution	0.2	2.5
Alcohol use	0.1	1.6
Occupational risks	0.1	1.1



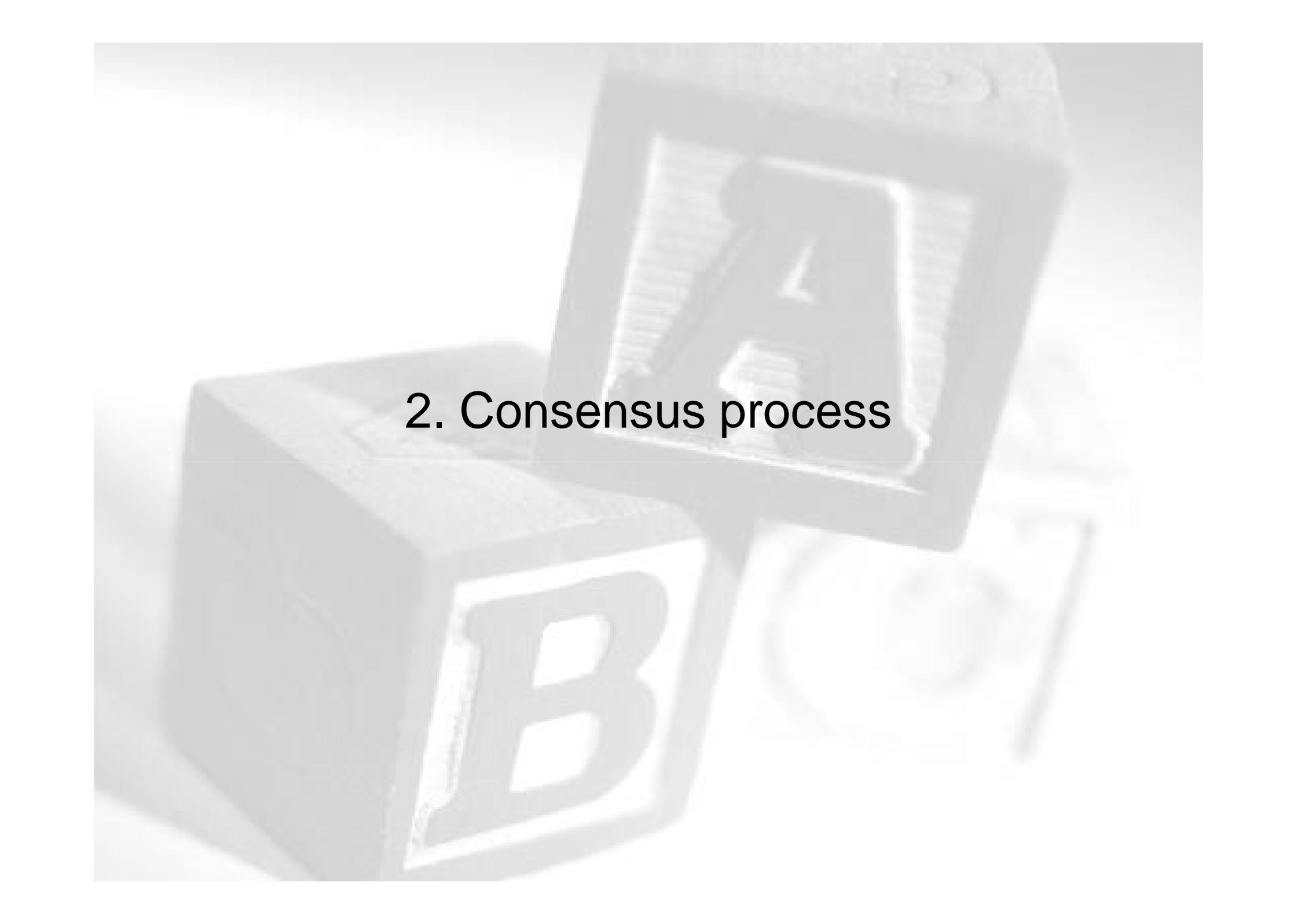
Objectively measured physical activity and body mass index in 2,134 adults in the 2008 Health Survey for England (Chaudhury and Esliger, 2010)

Rationale

Consider evidence published after the Chief Medical Officer's report (Department of Health, 2004)

Clarify the dose-response relationship between physical activity and health

Identify various ways of meeting physical activity goals



2. Consensus process

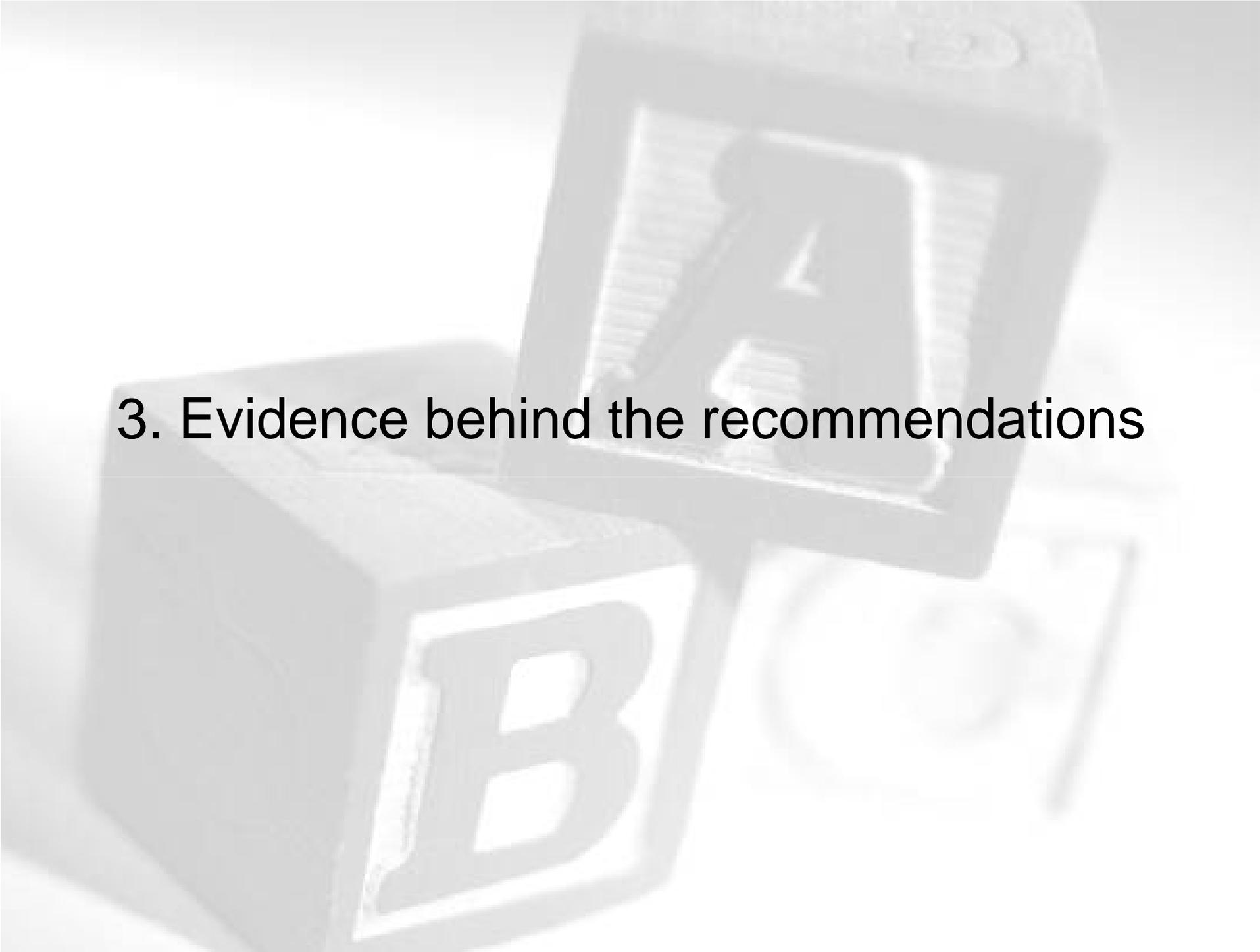
Consensus process

Literature reviews and evidence statements

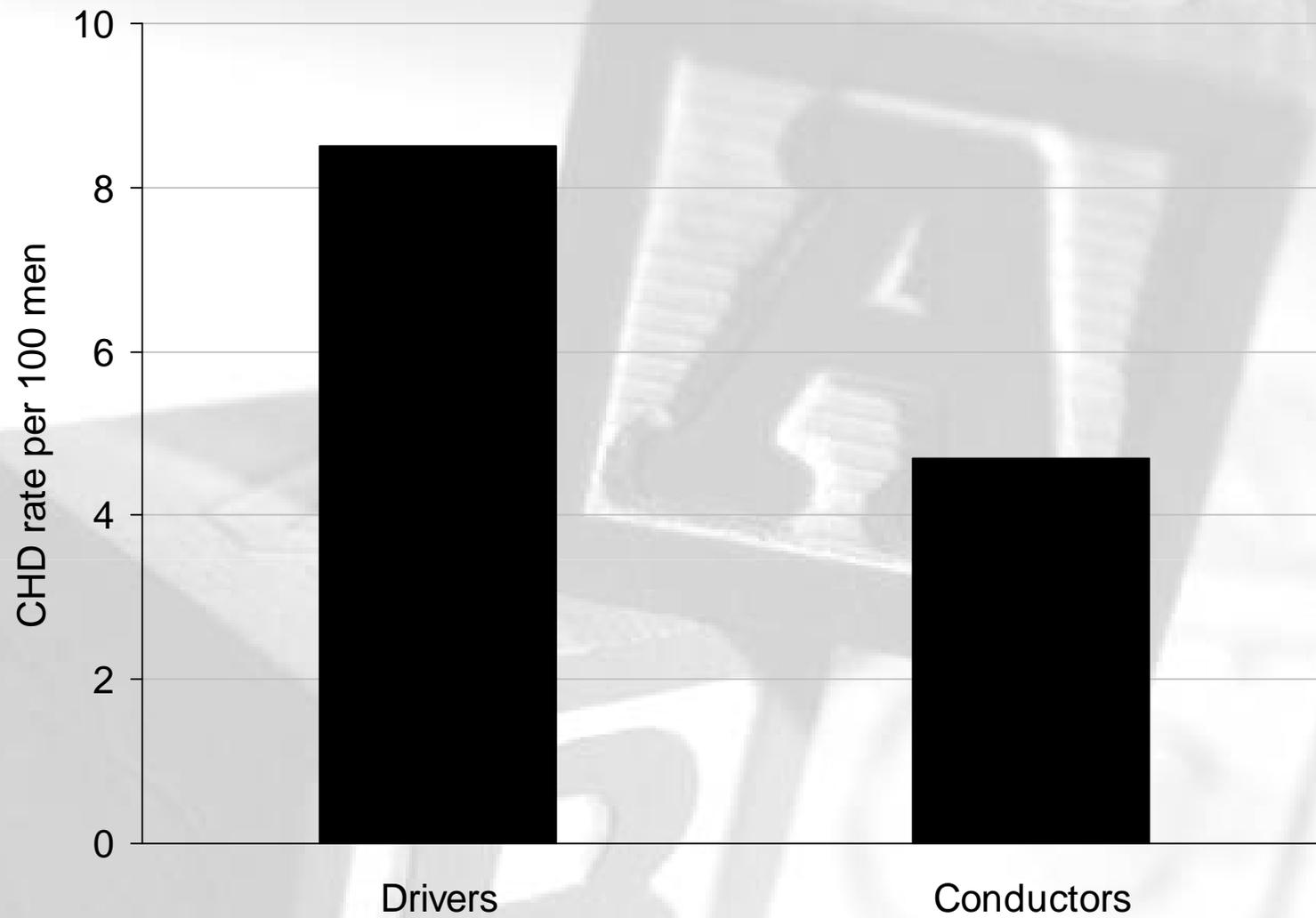
Summary reviews

Independent reviews

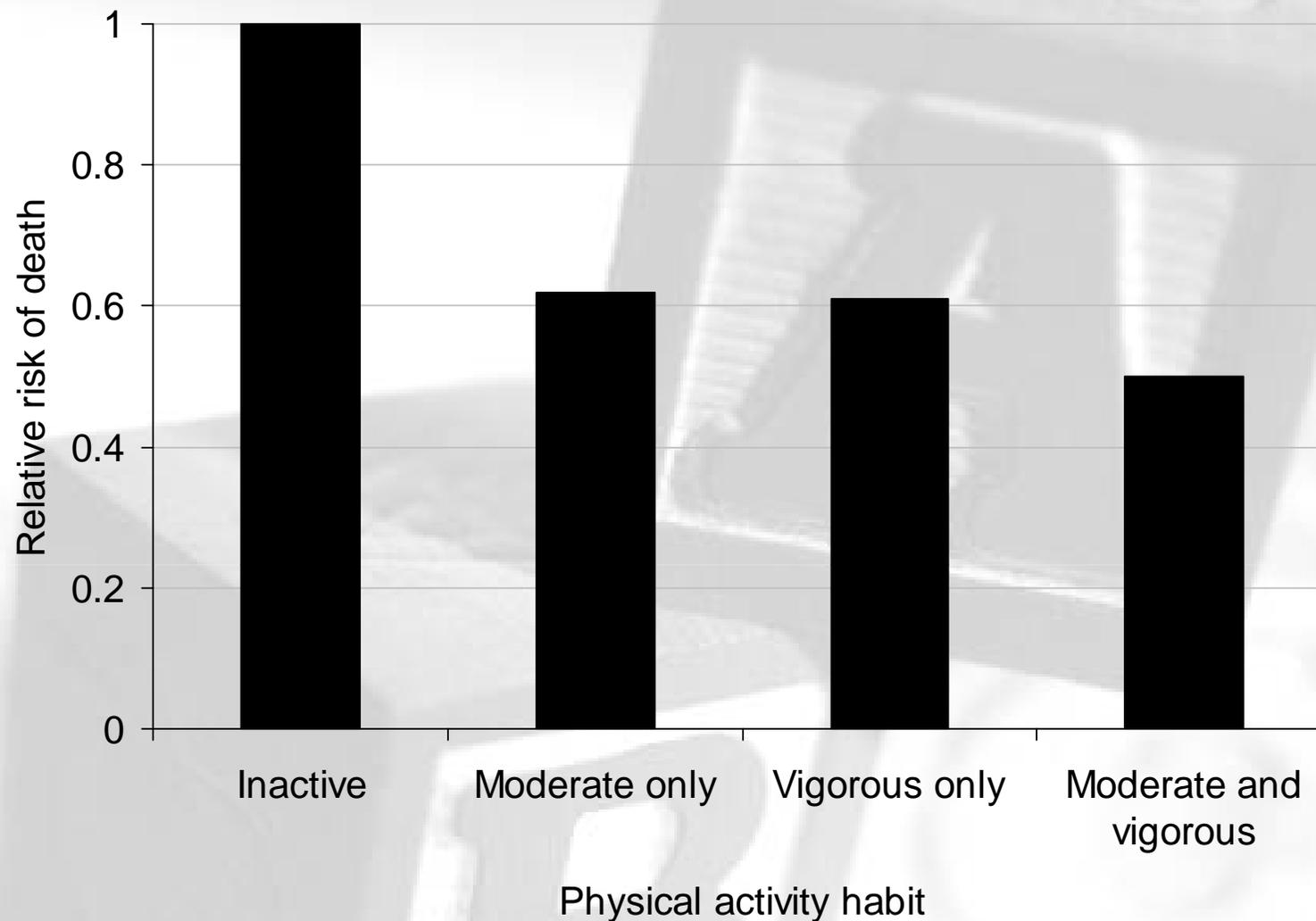




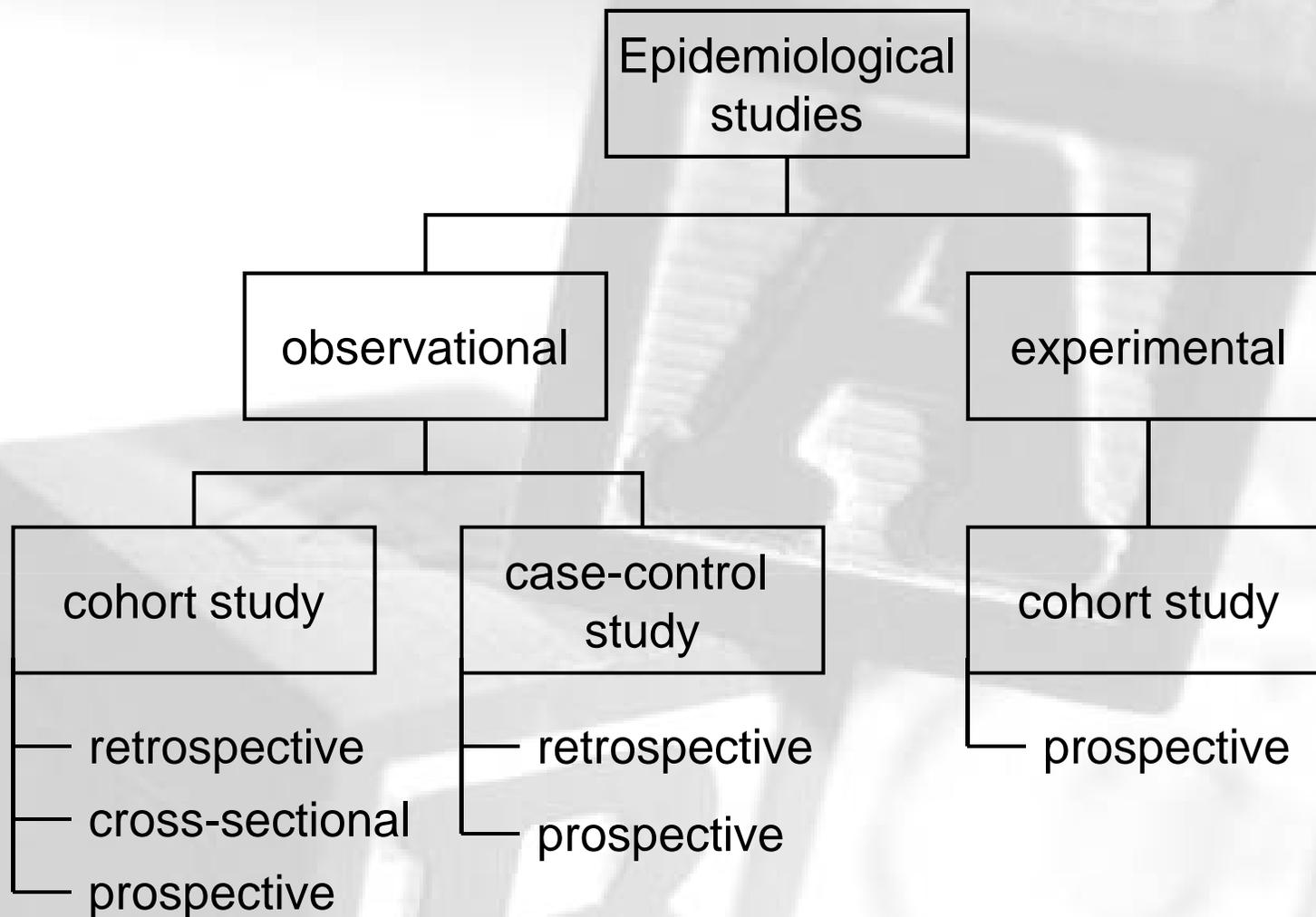
3. Evidence behind the recommendations



Five-year coronary heart disease incidence in
667 London bus drivers and conductors (Morris *et al.*, 1966)



Physical activity habit and risk of death in 252,925 adults controlling for age, sex, BMI, smoking habit, race/ethnicity, education, marital status, family history of cancer, menopausal hormone therapy, aspirin use, diet and alcohol (Leitzmann *et al.*, 2007).



Different epidemiological study designs (Twisk, 2003)

Evidence for a causal relationship between physical activity and reduced risk of chronic diseases or conditions

Strength of association	Consistency	Temporal sequence	Biological plausibility	Experimental evidence	Dose-response
<i>Cardiovascular disease</i>					
✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
<i>Type 2 diabetes</i>					
✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
<i>Overweight and obesity</i>					
✓✓✓	✓✓	✓	✓✓✓	✓	✓

✓ = moderate evidence. ✓✓ = strong evidence. ✓✓✓ = very strong evidence.

‘Very strong’ strength of association refers to a two-fold increase in risk associated with inactivity after adjustment for confounding variables.

Evidence for a causal relationship between physical activity and reduced risk of chronic diseases or conditions

Strength of association	Consistency	Temporal sequence	Biological plausibility	Experimental evidence	Dose-response
<i>Post-menopausal breast cancer</i>					
✓✓	✓✓	✓✓	✓		✓
<i>Colon cancer</i>					
✓	✓✓	✓✓	✓		✓
<i>Prostate cancer*</i>					
✓	✓	✓			

✓ = moderate evidence. ✓✓ = strong evidence. ✓✓✓ = very strong evidence.

‘Very strong’ strength of association refers to a two-fold increase in risk associated with inactivity after adjustment for confounding variables. *Evidence refers to the incidence of advanced prostate cancer observed in large cohort studies.

Evidence for a causal relationship between physical activity and reduced risk of chronic diseases or conditions

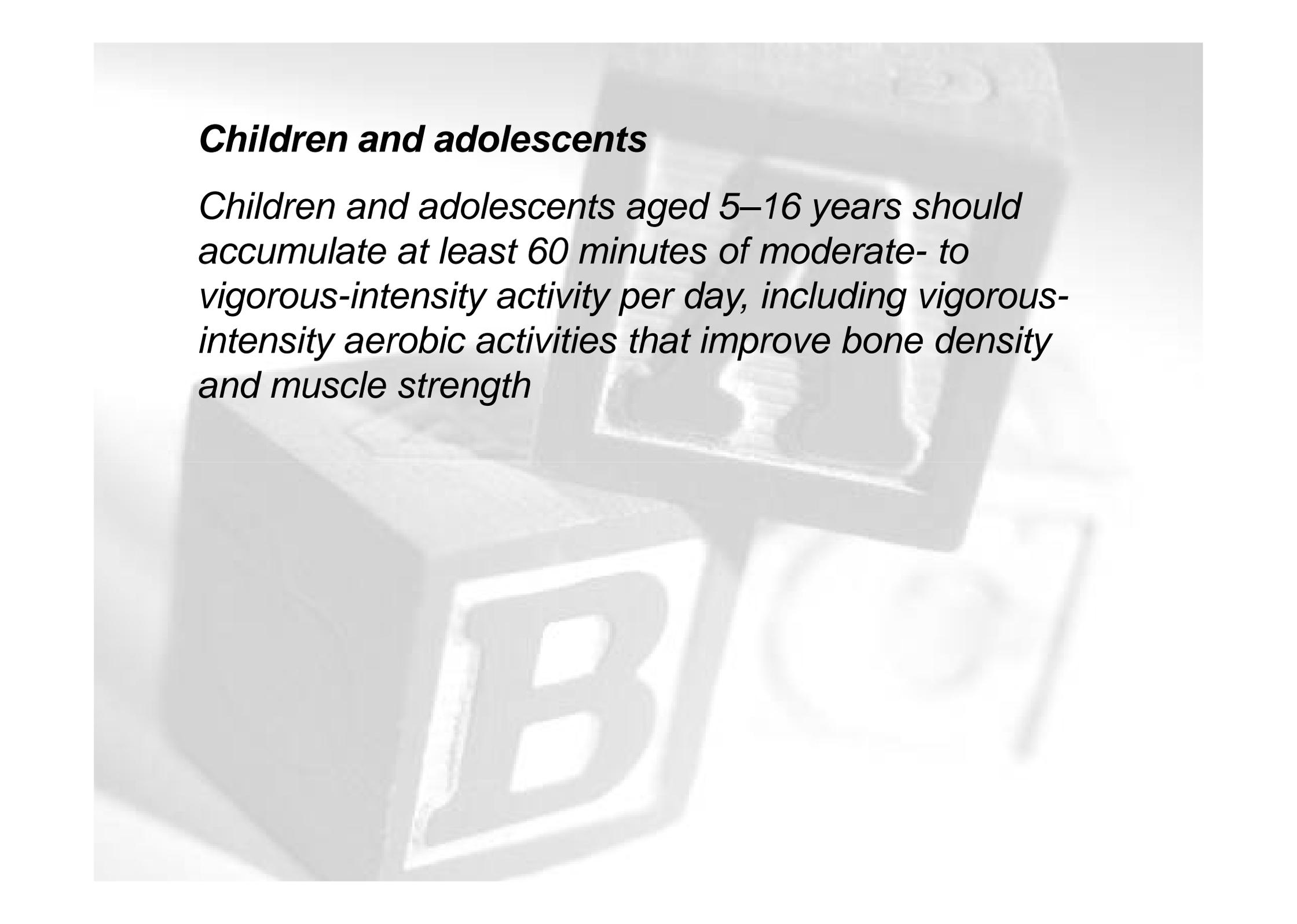
Strength of association	Consistency	Temporal sequence	Biological plausibility	Experimental evidence	Dose-response
<i>Psychological well-being</i>					
✓	✓		✓		✓
<i>Clinical depression</i>					
✓ ✓	✓	✓			✓
<i>Cognitive impairment</i>					
✓	✓ ✓	✓			

✓ = moderate evidence. ✓✓ = strong evidence. ✓✓✓ = very strong evidence.

‘Very strong’ strength of association refers to a two-fold increase in risk associated with inactivity after adjustment for confounding variables.



4. Special groups



Children and adolescents

Children and adolescents aged 5–16 years should accumulate at least 60 minutes of moderate- to vigorous-intensity activity per day, including vigorous-intensity aerobic activities that improve bone density and muscle strength

Adults struggling to maintain normal weight

Adults who find it difficult to maintain a normal weight may need to reduce energy intake, minimise sedentary time and may need to go beyond the levels of activity recommended for 'all healthy adults' and gradually progress towards meeting the recommendations for 'conditioned individuals' in order to prevent overweight and obesity

Adults with increased risk of chronic disease

Adults with increased risk of cardiovascular disease or type 2 diabetes may particularly benefit from going beyond the levels of activity recommended for ‘all healthy adults’ and gradually progressing towards meeting the recommendations for ‘conditioned individuals’.

There is insufficient evidence to identify doses of activity that might be particularly beneficial in those with a family history of breast cancer, colon cancer or prostate cancer.



5. Defining moderate- and vigorous-intensity

Age-related classifications of exercise intensity. Adapted from ACSM (1998).

	Moderate-intensity		
	Young (20–29 y)	Middle-aged (40–64 y)	Old (65–79 y)
<i>Endurance training</i>			
% VO ₂ max	40–59	40–59	40–59
% HR max	55–69	55–69	55–69
RPE	12–13	12–13	12–13
METs	4.8–7.1	4.0–5.9	3.2–4.7
Talk test*	It is possible to speak comfortably		
<i>Resistance training</i>			
%MVC	50–69	50–69	50–69

*The 'talk test' is described by Persinger *et al.* (2004).

Age-related classifications of exercise intensity. Adapted from ACSM (1998).

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%MVC	50–69	50–69	50–69

*The ‘talk test’ is described by Persinger *et al.* (2004).

Age-related classifications of exercise intensity. Adapted from ACSM (1998).

	Vigorous or 'hard'		
	Young (20–29 y)	Middle-aged (40–64 y)	Old (65–79 y)
<i>Endurance training</i>			
% VO ₂ max	60–84	60–84	60–84
% HR max	70–89	70–89	70–89
RPE	14–16	14–16	14–16
METs	7.2–10.1	6.0–8.4	4.8–6.7
Talk test*	Conversation is difficult, but not uncomfortable		
<i>Resistance training</i>			
%MVC	70–84	70–84	70–84

*The 'talk test' is described online: <http://www.myexerciseplan.com/assessment/>

Age-related classifications of exercise intensity. Adapted from ACSM (1998).

	Vigorous or 'hard'		
	Young (20–29 y)	Middle-aged (40–64 y)	Old (65–79 y)
<i>Endurance training</i>			
% VO ₂ max	60–84	60–84	60–84
% HR max	70–89	70–89	70–89
RPE	14–16	14–16	14–16
METs	7.2–10.1	6.0–8.4	4.8–6.7
Talk test*	Conversation is difficult, but not uncomfortable		
<i>Resistance training</i>			
%MVC	70–84	70–84	70–84

*The 'talk test' is described online: <http://www.myexerciseplan.com/assessment/>

Perception of effort for various physical activities in men aged 20–29 years of different aerobic fitness levels

Activity (MET costs)	Aerobic fitness levels (METs)*				
	Well below average (10.1)	Below average (11.5)	Average (12.5)	Above average (13.8)	Well above average (15.4)
Vacuuming or mopping (3.5)	Light	Light	Light	Light	Light
Brisk walking (3.8)	Light	Light	Light	Light	Light
Cycling at <10 mph (4)	Moderate	Light	Light	Light	Light
Mowing lawn with power mower (4.5)	Moderate	Light	Light	Light	Light
Tennis, doubles (6)	Moderate	Moderate	Moderate	Moderate	Light
Badminton, competitive (7)	Hard	Hard	Moderate	Moderate	Moderate
Circuit training or jogging at 5 mph (8)	Hard	Hard	Hard	Moderate	Moderate
Cycling at 14.0-15.9 mph (10)	Maximal	Very hard	Hard	Hard	Hard
Running at 8 mph (13.5)	Impossible	Impossible	Impossible	Maximal	Very hard

*Fitness levels provided courtesy of The Cooper Institute, Dallas, Texas, USA.

Perception of effort for various physical activities in men aged 20–29 years of different aerobic fitness levels

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Mowing lawn with power mower (4.5)	Moderate	Light	Light	Light	Light
Tennis, doubles (6)	Moderate	Moderate	Moderate	Moderate	Light
Badminton, competitive (7)	Hard	Hard	Moderate	Moderate	Moderate
Circuit training or jogging at 5 mph (8)	Hard	Hard	Hard	Moderate	Moderate
Cycling at 14.0-15.9 mph (10)	Maximal	Very hard	Hard	Hard	Hard
Running at 8 mph (13.5)	Impossible	Impossible	Impossible	Maximal	Very hard

*Fitness levels provided courtesy of The Cooper Institute, Dallas, Texas, USA.

Perception of effort for various physical activities in men aged 60–69 years of different aerobic fitness levels

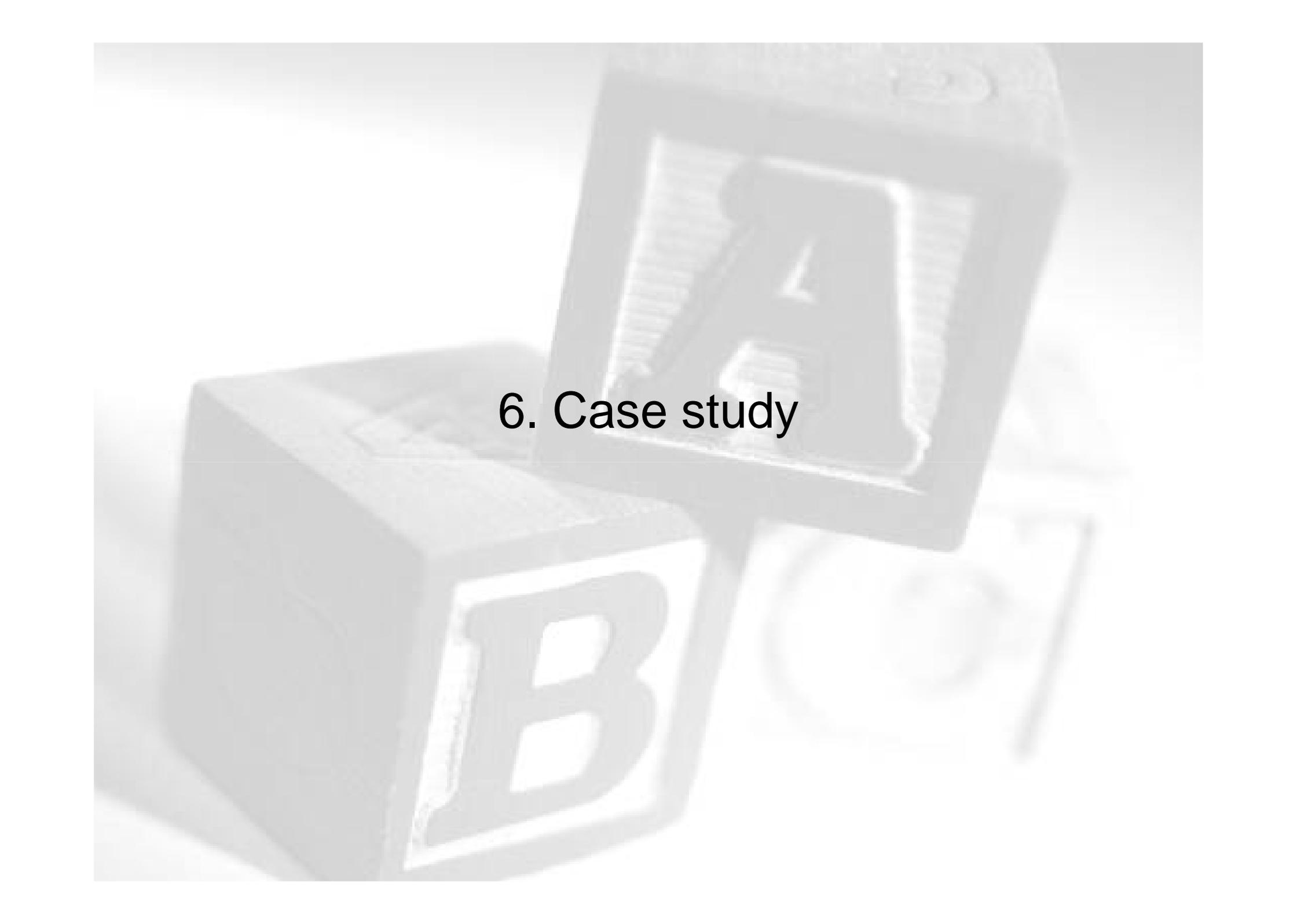
Activity (MET costs)	Aerobic fitness levels (METs)*				
	Well below average (10.1)	Below average (11.5)	Average (12.5)	Above average (13.8)	Well above average (15.4)
Vacuuming or mopping (3.5)	Moderate	Moderate	Light	Light	Light
Brisk walking (3.8)	Moderate	Moderate	Moderate	Light	Light
Cycling at <10 mph (4)	Moderate	Moderate	Moderate	Light	Light
Mowing lawn with power mower (4.5)	Hard	Moderate	Moderate	Moderate	Light
Tennis, doubles (6)	Very hard	Hard	Hard	Moderate	Moderate
Badminton, competitive (7)	Impossible	Hard	Hard	Hard	Moderate
Circuit training or jogging at 5 mph (8)	Impossible	Very hard	Very hard	Hard	Hard
Cycling at 14.0-15.9 mph (10)	Impossible	Impossible	Impossible	Very hard	Hard
Running at 8 mph (13.5)	Impossible	Impossible	Impossible	Impossible	Impossible

*Fitness levels provided courtesy of The Cooper Institute, Dallas, Texas, USA.

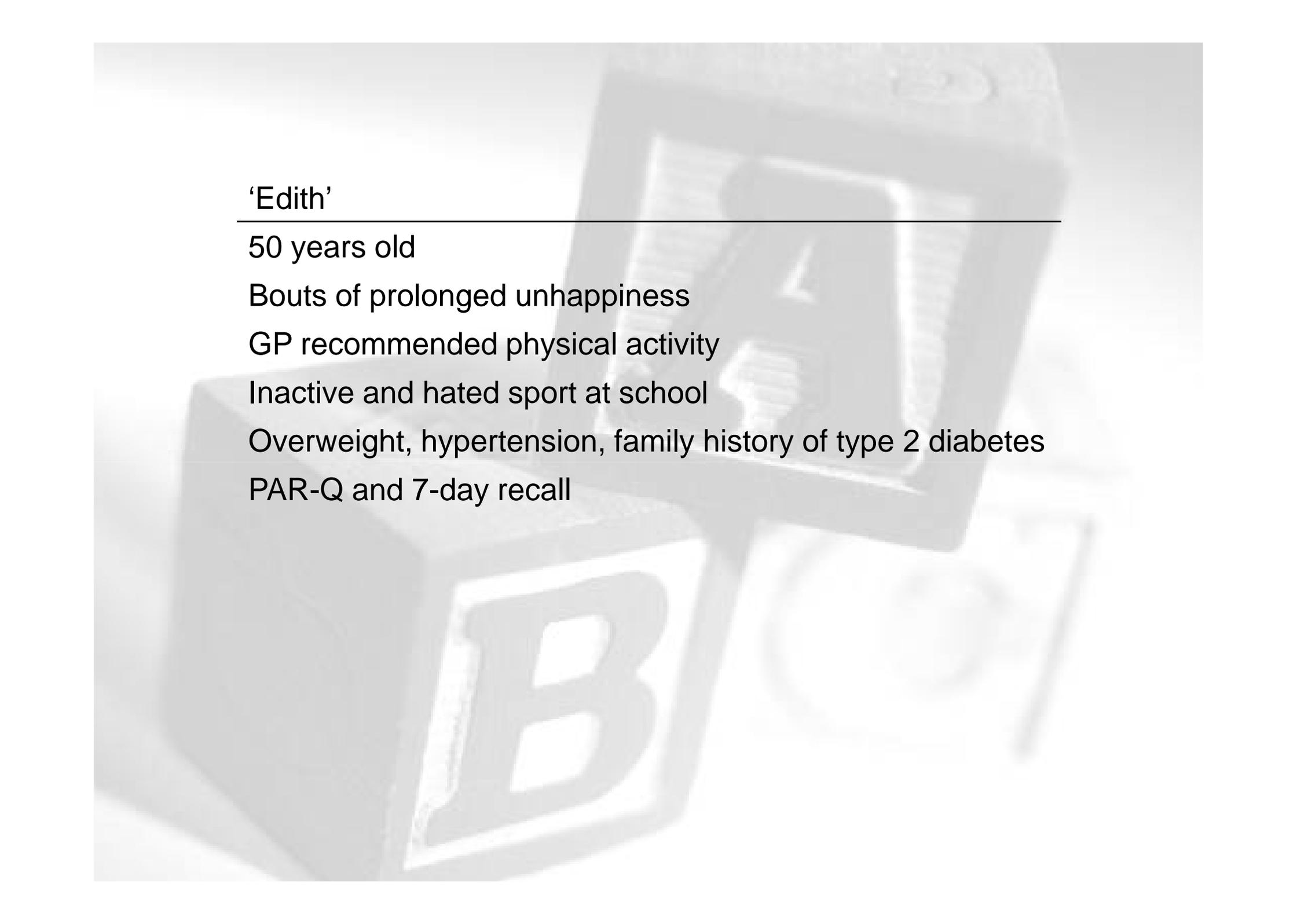
Perception of effort for various physical activities in men aged 60–69 years of different aerobic fitness levels

Activity (MET costs)	Aerobic fitness levels (METs)*				
	Well below average (10.1)	Below average (11.5)	Average (12.5)	Above average (13.8)	Well above average (15.4)
Vacuuming or mopping (3.5)	Moderate	Moderate	Light	Light	Light
Brisk walking (3.8)	Moderate	Moderate	Moderate	Light	Light
Cycling at <10 mph (4)	Moderate	Moderate	Moderate	Light	Light
Mowing lawn with power mower (4.5)	Hard	Moderate	Moderate	Moderate	Light
Tennis, doubles (6)	Very hard	Hard	Hard	Moderate	Moderate
Badminton, competitive (7)	Impossible	Hard	Hard	Hard	Moderate
Circuit training or jogging at 5 mph (8)	Impossible	Very hard	Very hard	Hard	Hard
Cycling at 14.0-15.9 mph (10)	Impossible	Impossible	Impossible	Very hard	Hard
Running at 8 mph (13.5)	Impossible	Impossible	Impossible	Impossible	Impossible

*Fitness levels provided courtesy of The Cooper Institute, Dallas, Texas, USA.

A photograph of several wooden alphabet blocks. The block in the foreground is in sharp focus and shows the letter 'B'. Behind it, another block shows the letter 'A', and a third block shows the letter 'C'. The blocks are arranged on a light-colored surface, and the background is softly blurred.

6. Case study

The background of the slide features a soft-focus image of several wooden blocks with letters. The most prominent block in the foreground is the letter 'B'. Above it, another block with the letter 'A' is visible, and to the right, a block with the letter 'C' is partially seen. The blocks are arranged in a way that suggests they are being played with, creating a sense of childhood and learning.

'Edith'

50 years old

Bouts of prolonged unhappiness

GP recommended physical activity

Inactive and hated sport at school

Overweight, hypertension, family history of type 2 diabetes

PAR-Q and 7-day recall

Person-centred physical activity programme

Discuss history and likes and dislikes

<10 min of activity per day

Does not enjoy team games

Not confident about joining a group

Pros and cons about becoming more active

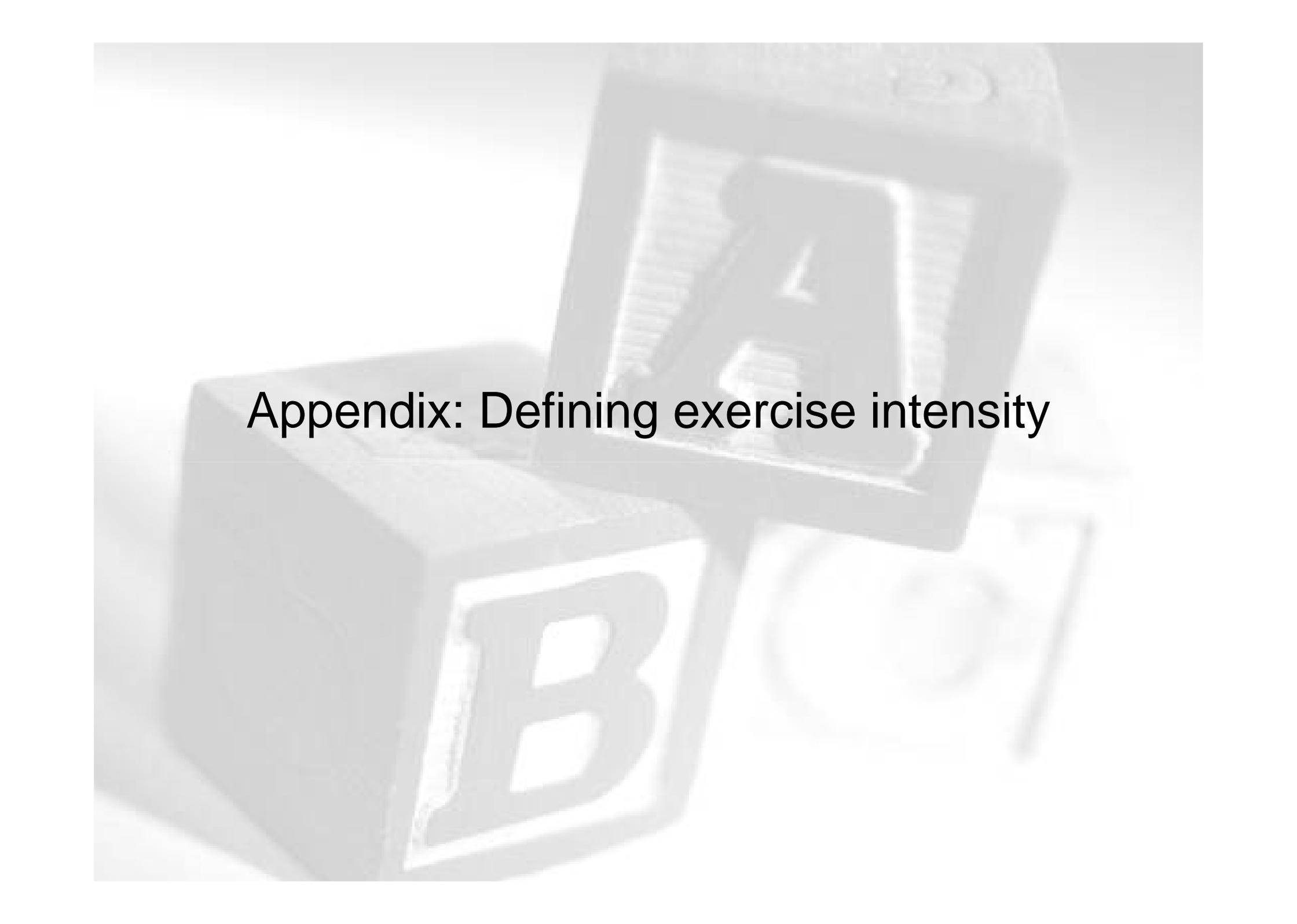
Important for physical health and mental wellbeing

May help reduce blood pressure and loose weight

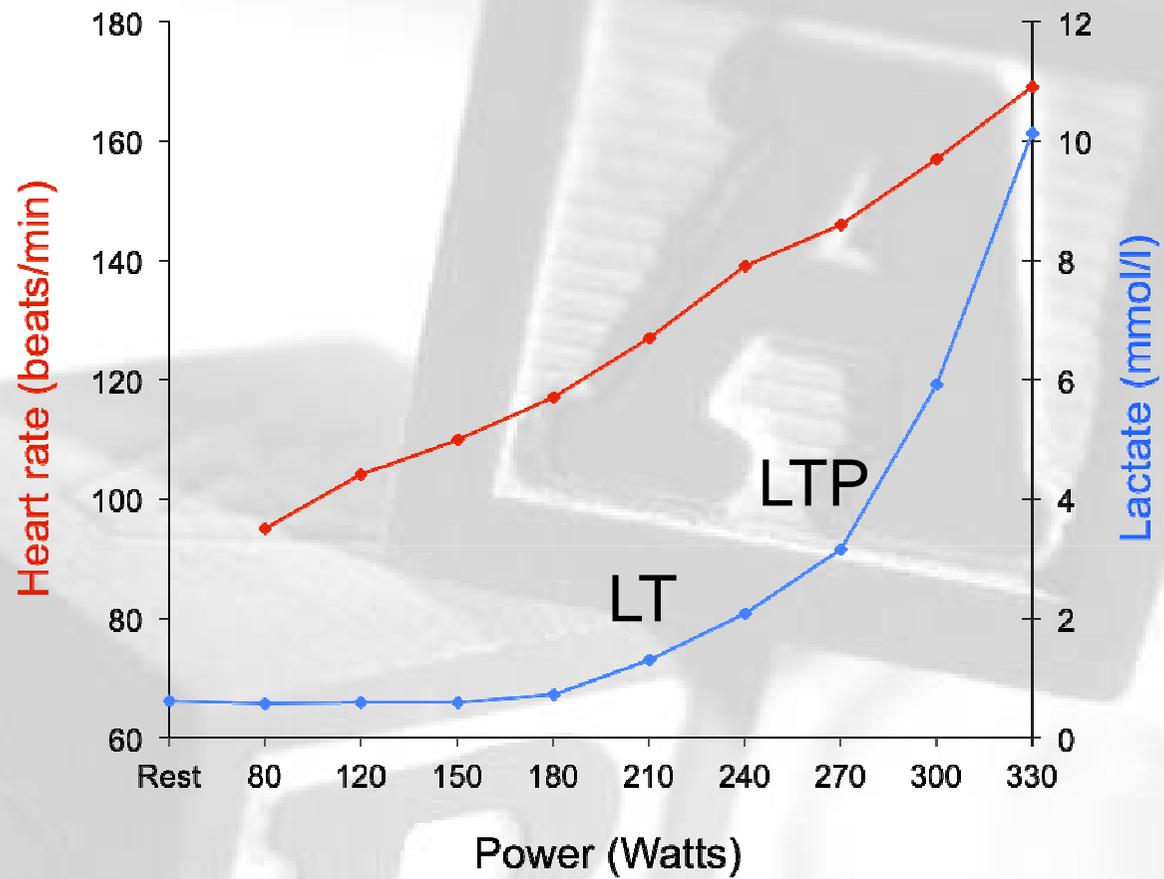
Not very sporty and doesn't know where to start

Brisk walking

Specific, measurable, agreed, realistic and time-phased

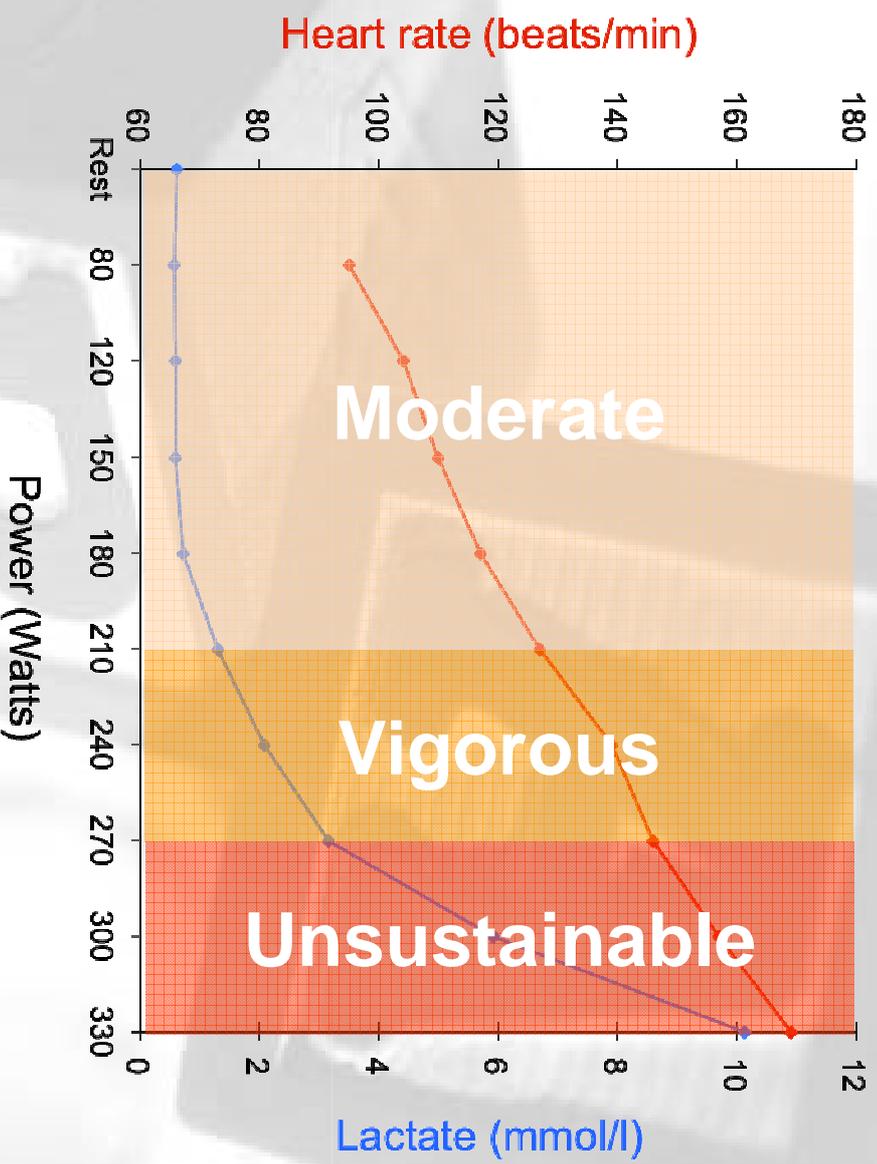


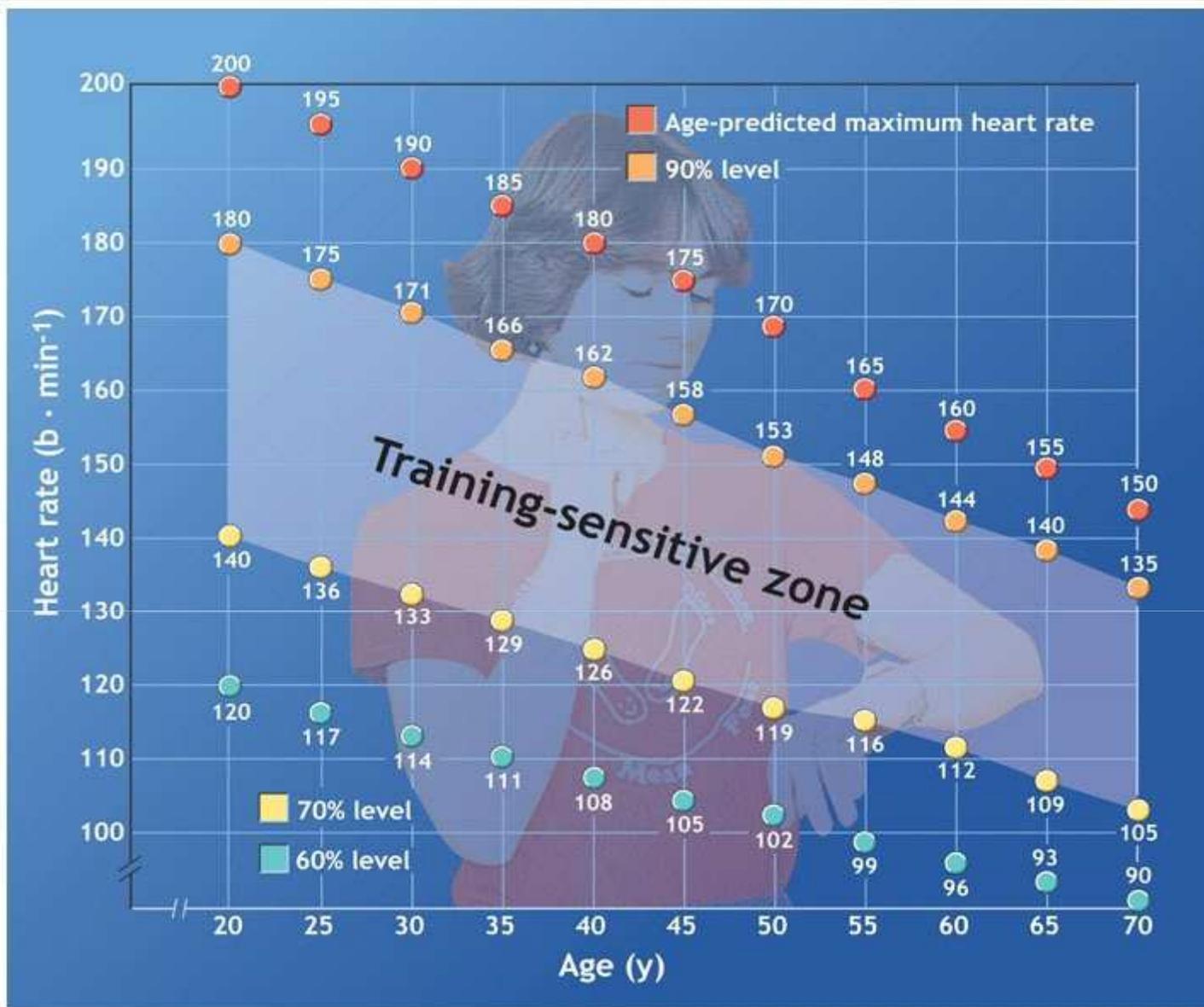
Appendix: Defining exercise intensity



HR and lactate in incremental exercise

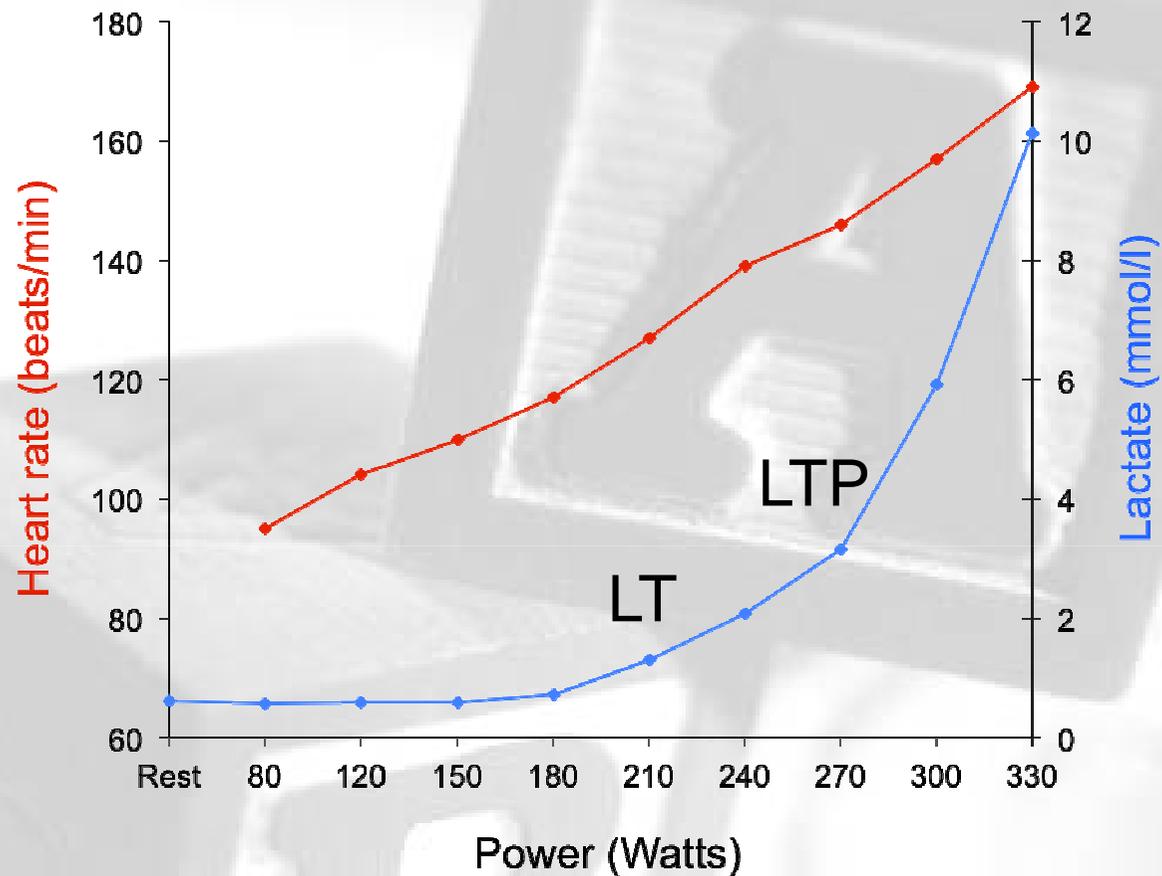
HR and lactate in incremental exercise





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Lactate turnpoint (or 'anaerobic threshold') occurs at 40–85% VO_2 max (50–90% HR max) (Jones and Ehrsam, 1982)



RPE = 11–12 at lactate threshold (LT)
RPE = 13–14 at lactate turnpoint (LTP)

(Mahon *et al.* 1997; Demello *et al.*, 1987; Prusaczyk *et al.*, 1992)