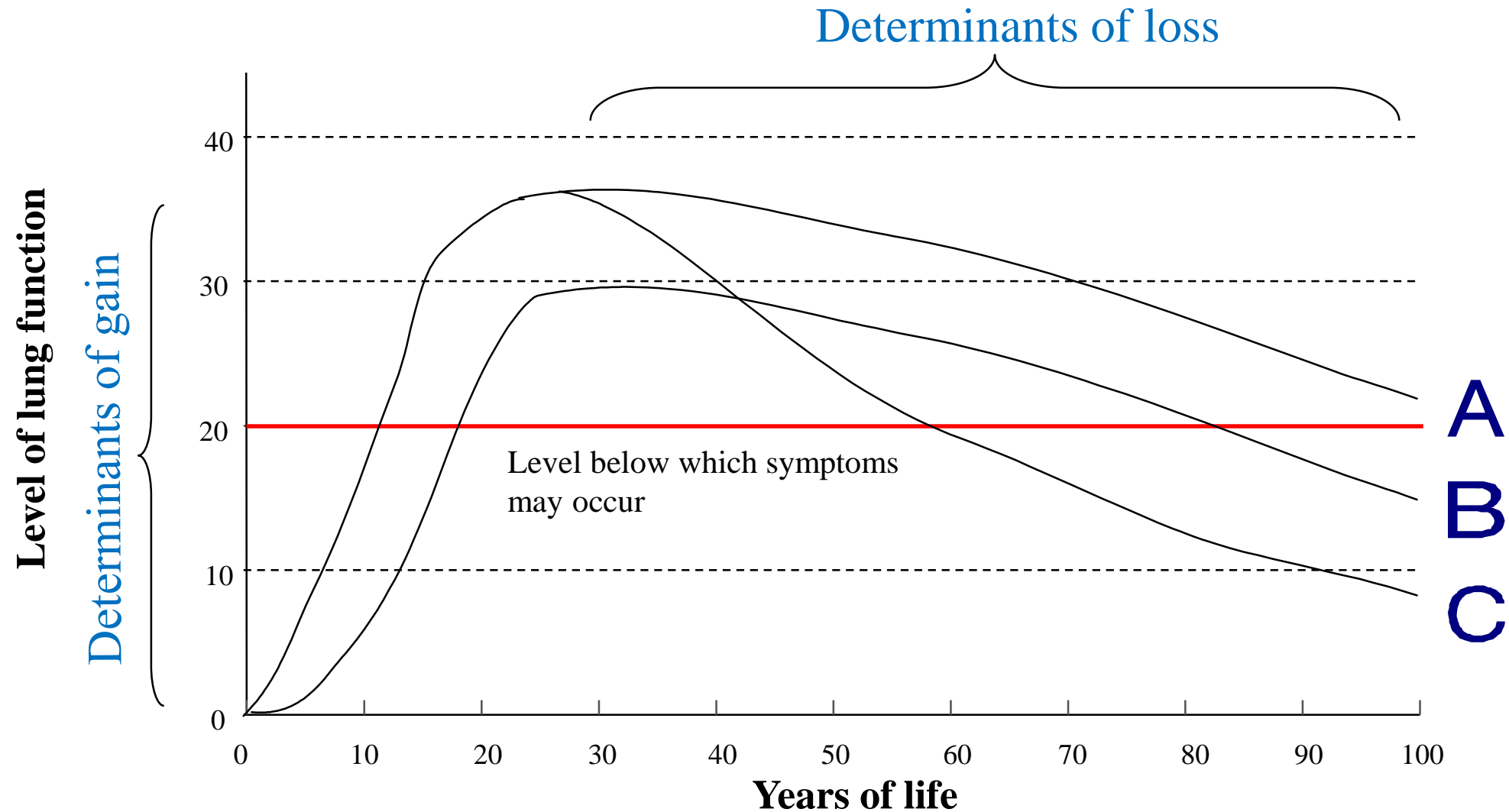
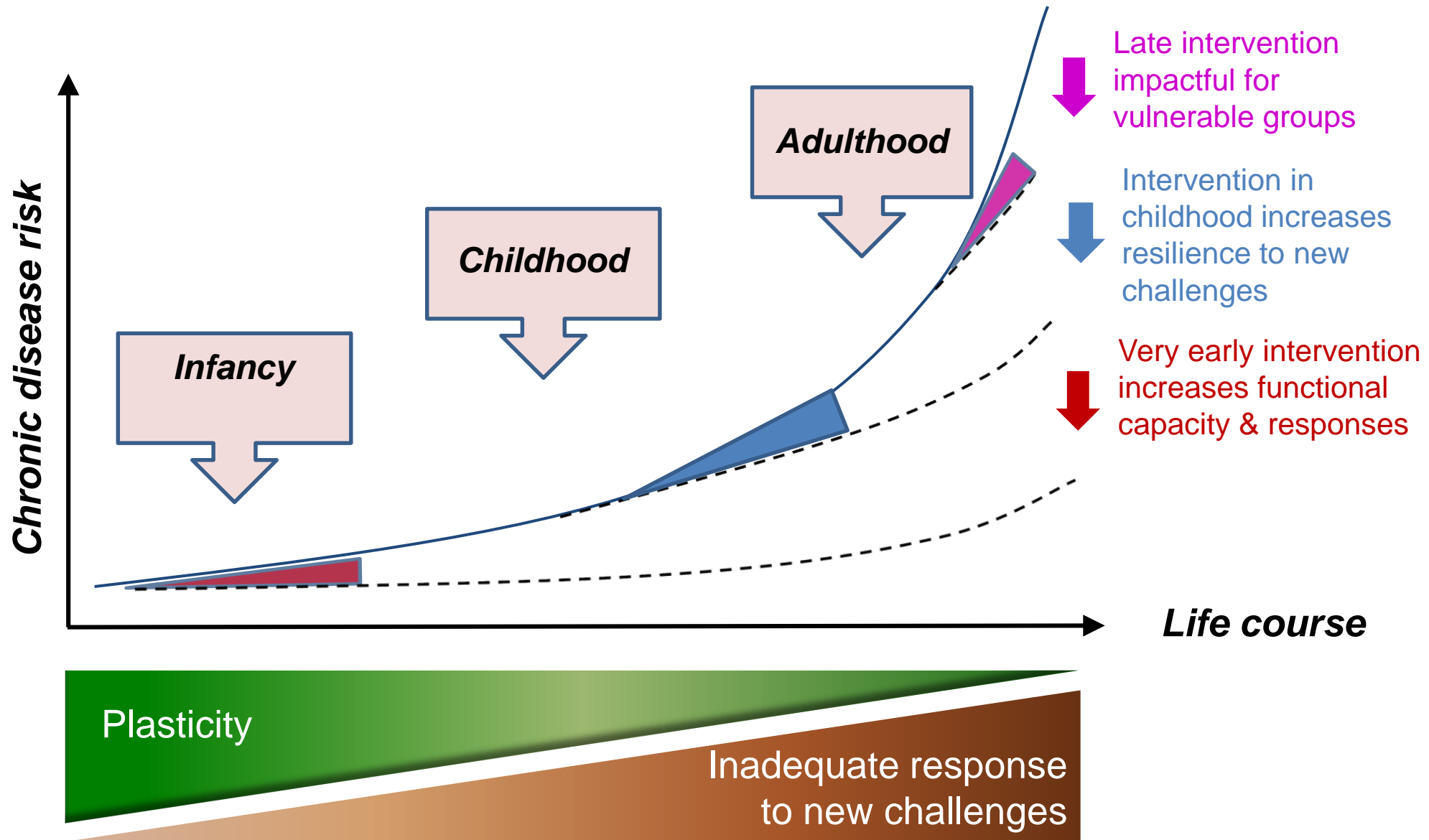


An introduction to the lifecourse

Health or Functioning Trajectories – Development & Decline



Lifecourse strategy for disease prevention



“The life course may be regarded as combining biological and social elements which interact with each other. Individuals' biological development takes place within a social context which structures their life chances, so that advantages and disadvantages tend to cluster cross-sectionally and accumulate longitudinally.”

-- Bartley, Blane & Montgomery *BMJ* 1997

Why is time important?

- Temporality - establishing the timing of events – before & after – in ‘causal’ associations.
- Dose/duration of ‘exposure’ may be important
- Biological development & decline – different responses depending on when events occur
- Historical - changes in social norms over time influence behaviours, social relations and psychological reactions.

Socially critical periods in human development

- Transition from primary to secondary school
- School examinations
- Entry to labour market
- Leaving parental home
- Establishing own residence
- Transition to parenthood
- Job insecurity, change, or loss
- Onset of chronic illness
- Exit from labour market

Life course epidemiology is defined as the study of long term effects on later health or disease risk of physical or social exposures during gestation, childhood, adolescence, young adulthood and later adult life.

Lifecourse epidemiological models

- Critical or sensitive periods
- Accumulation of risk
- Pathways or chains of risk

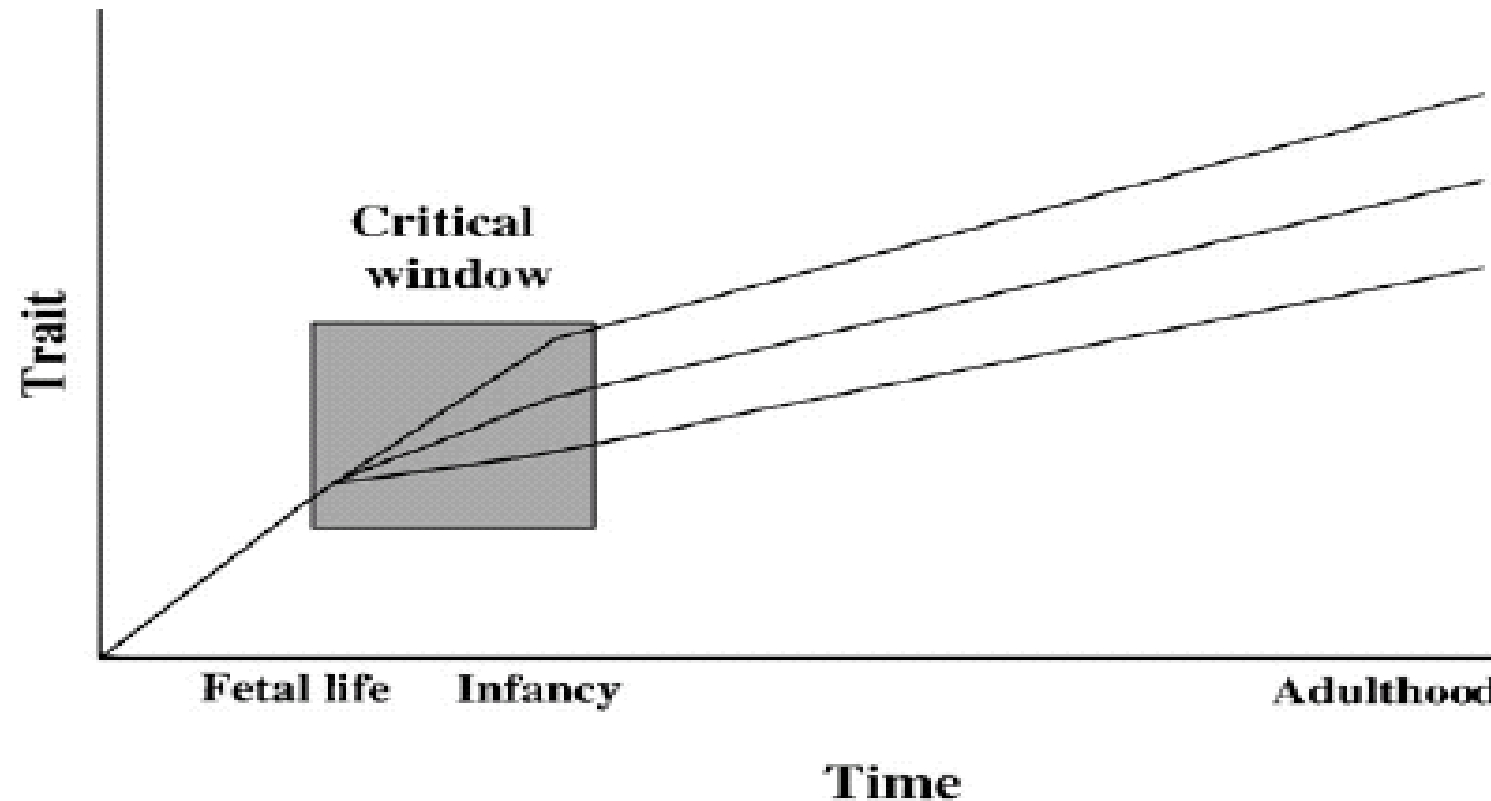


FIG. 1. Diagrammatic representation of programming. Phenotypic variation manifesting during an early window of plasticity is preserved into later life.

Wells (2003) *J. Theor. Biol.* **221**:143-61

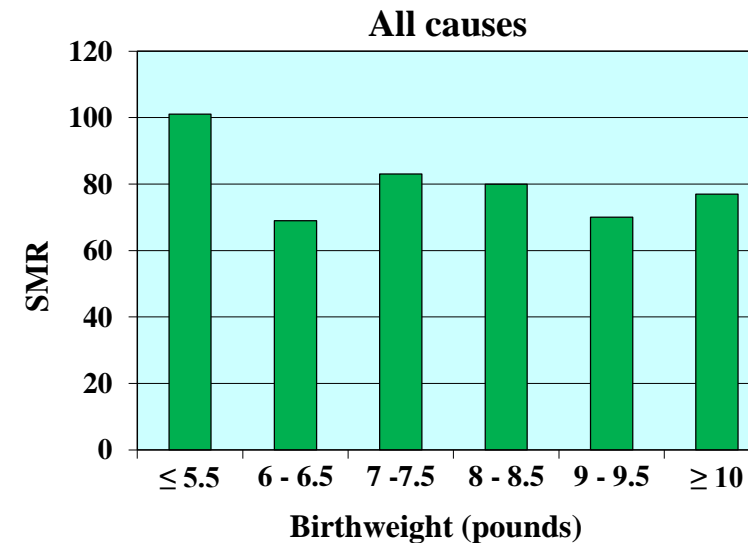
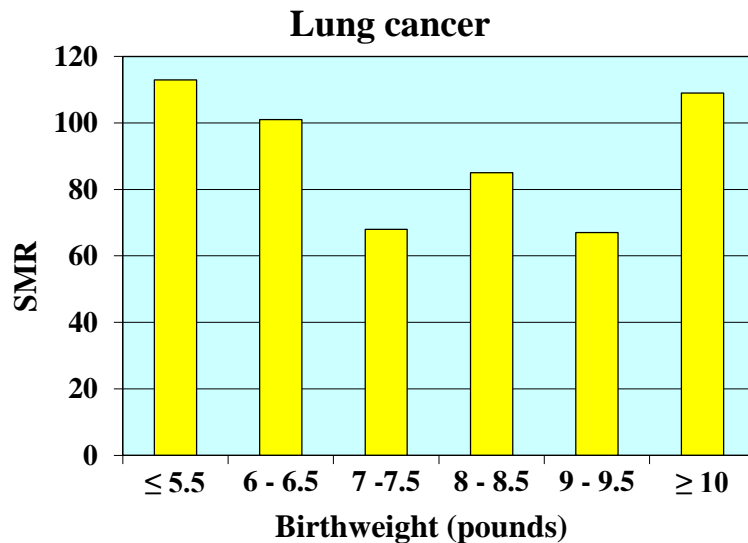
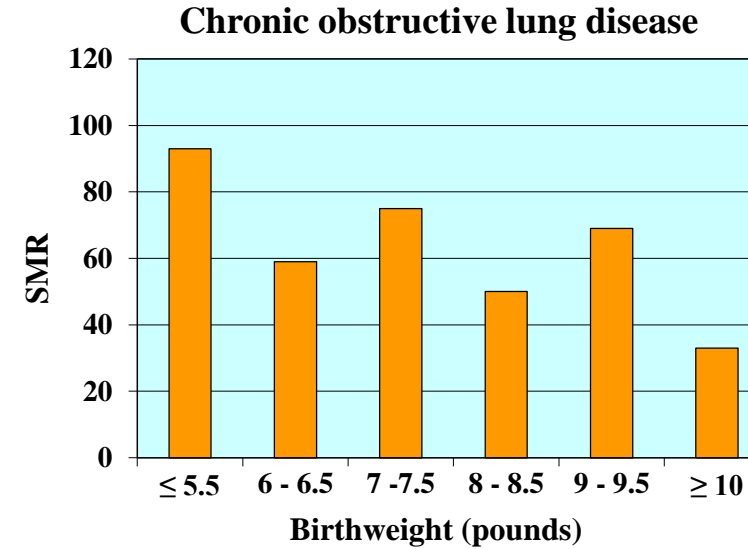
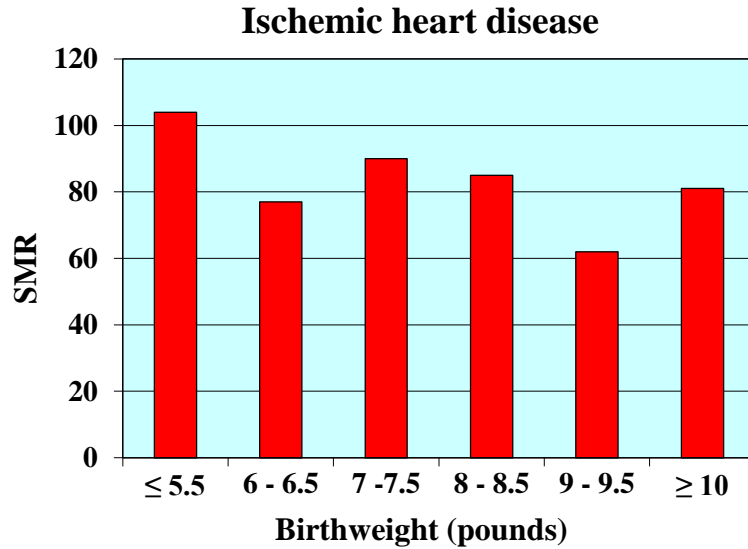
Lifecourse epidemiology: Barker's Fetal origins/biological programming hypothesis

“the process whereby a stimulus or insult during critical periods of development has lasting or lifelong effects on the structure or function of organs, tissues and body systems”

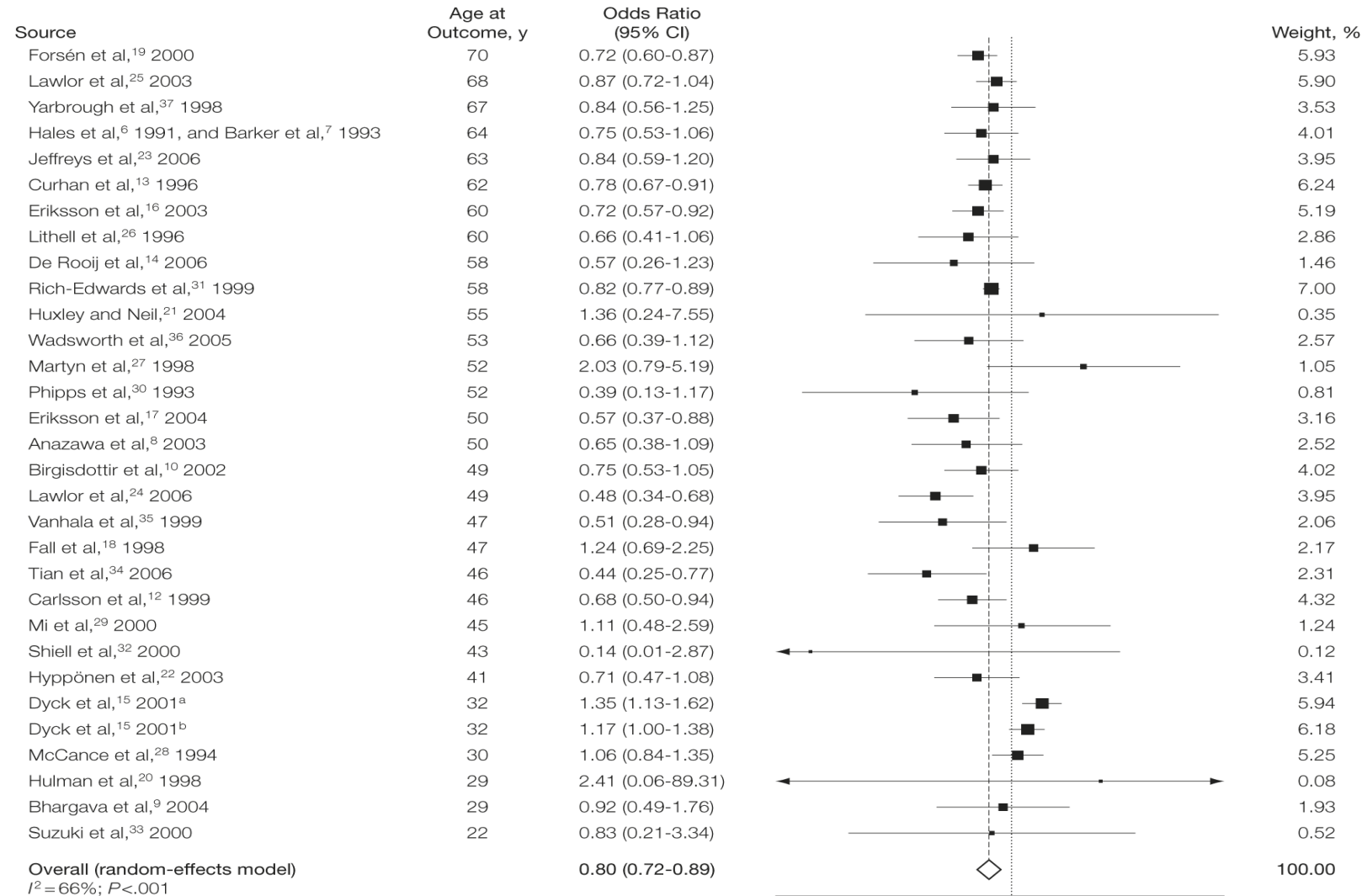
Critical period – a limited time period during which an exposure has an effect. For example:

- Thalidomide and limb abnormalities
- Birth weight & adult chronic disease?

Standardised mortality ratios according to birthweight



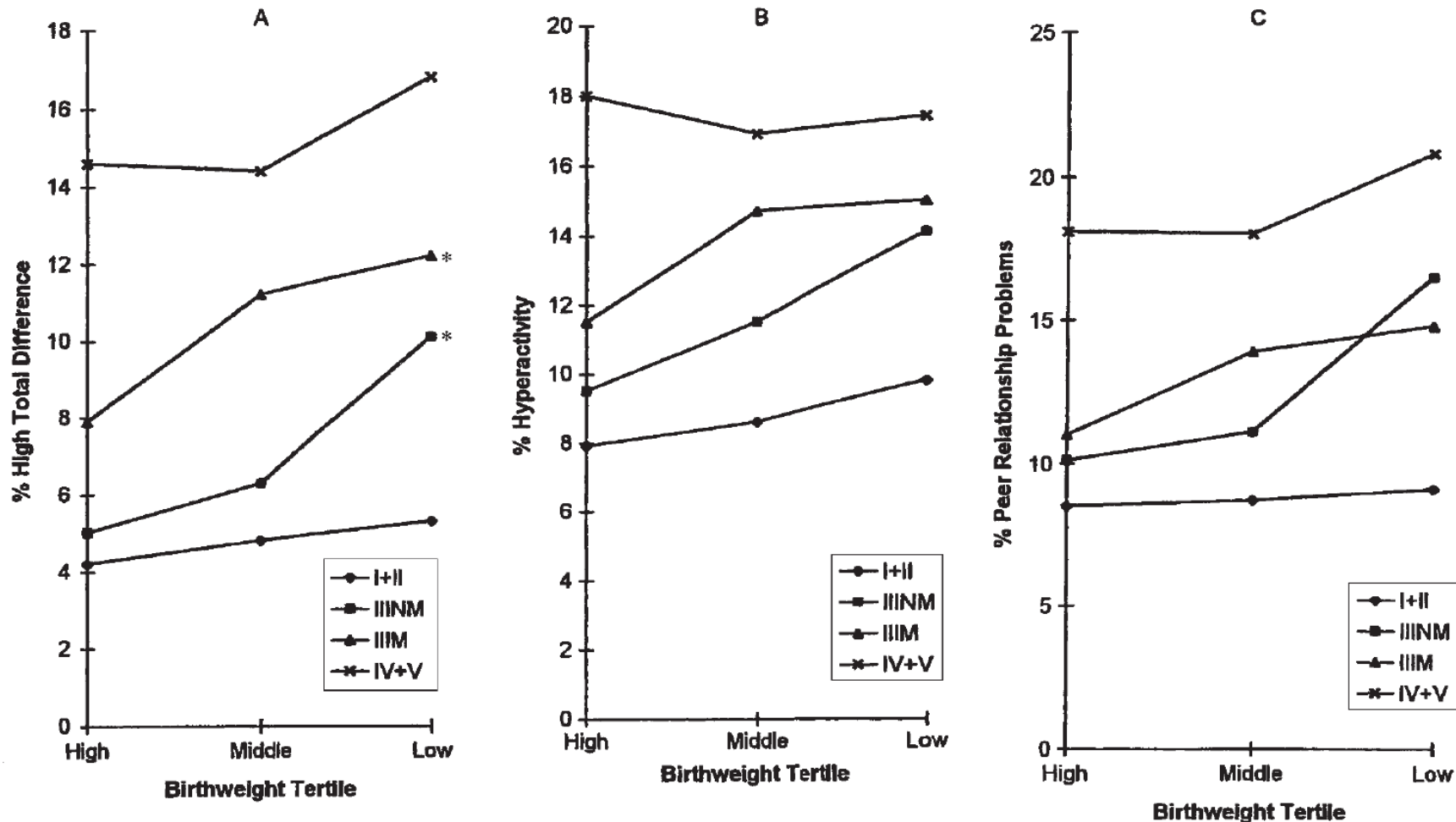
Meta-analysis: birth weight significantly inversely associated with development of type 2 diabetes, not explained by social class.



Effect modification

The 'effect' of a (early life) risk factor depends on the level of a (later life) factor e.g. social context

Prevalence of high total difficulties, hyperactivity and peer relationship problems by social class and birthweight tertile

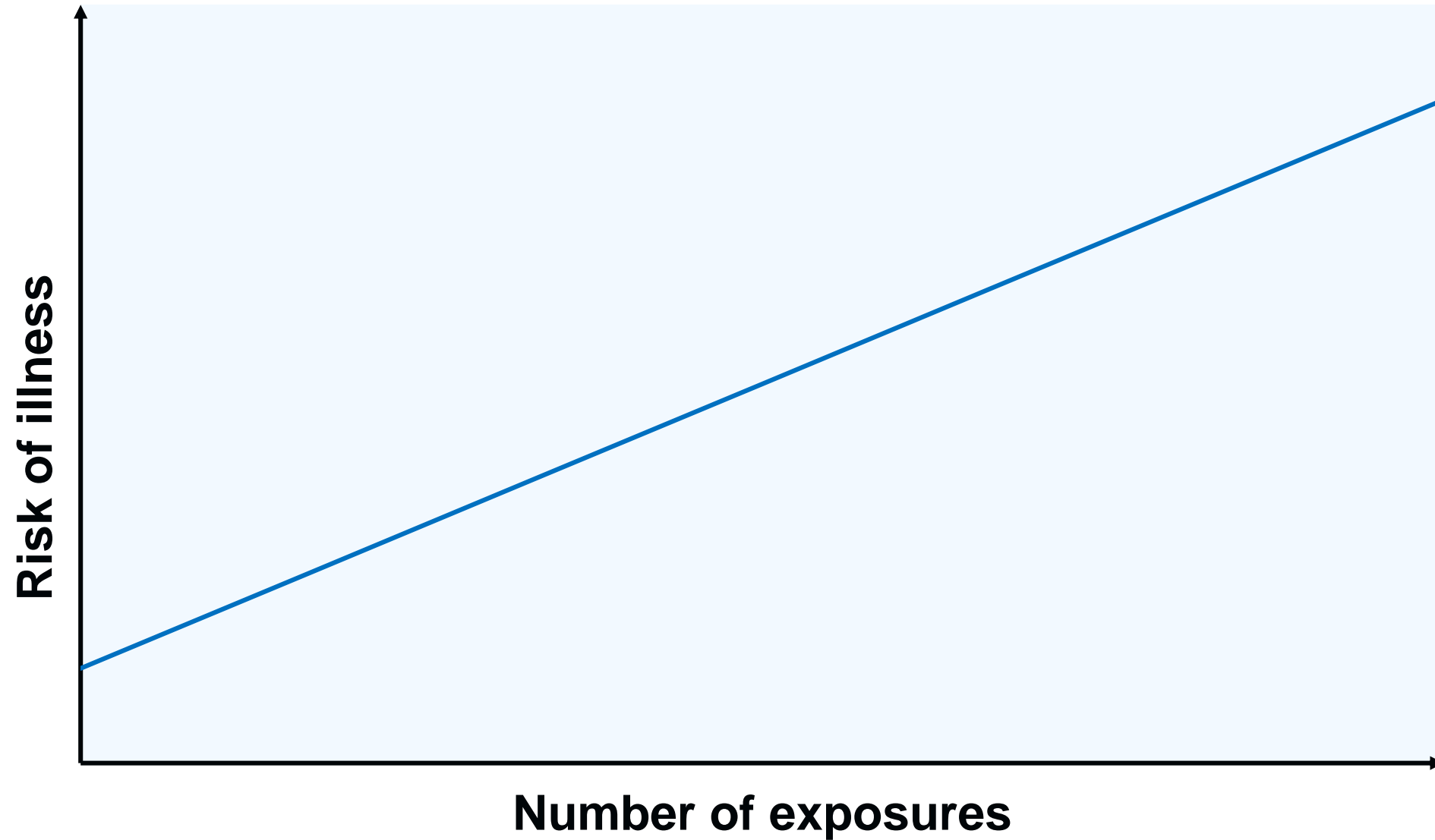


Accumulation of risk

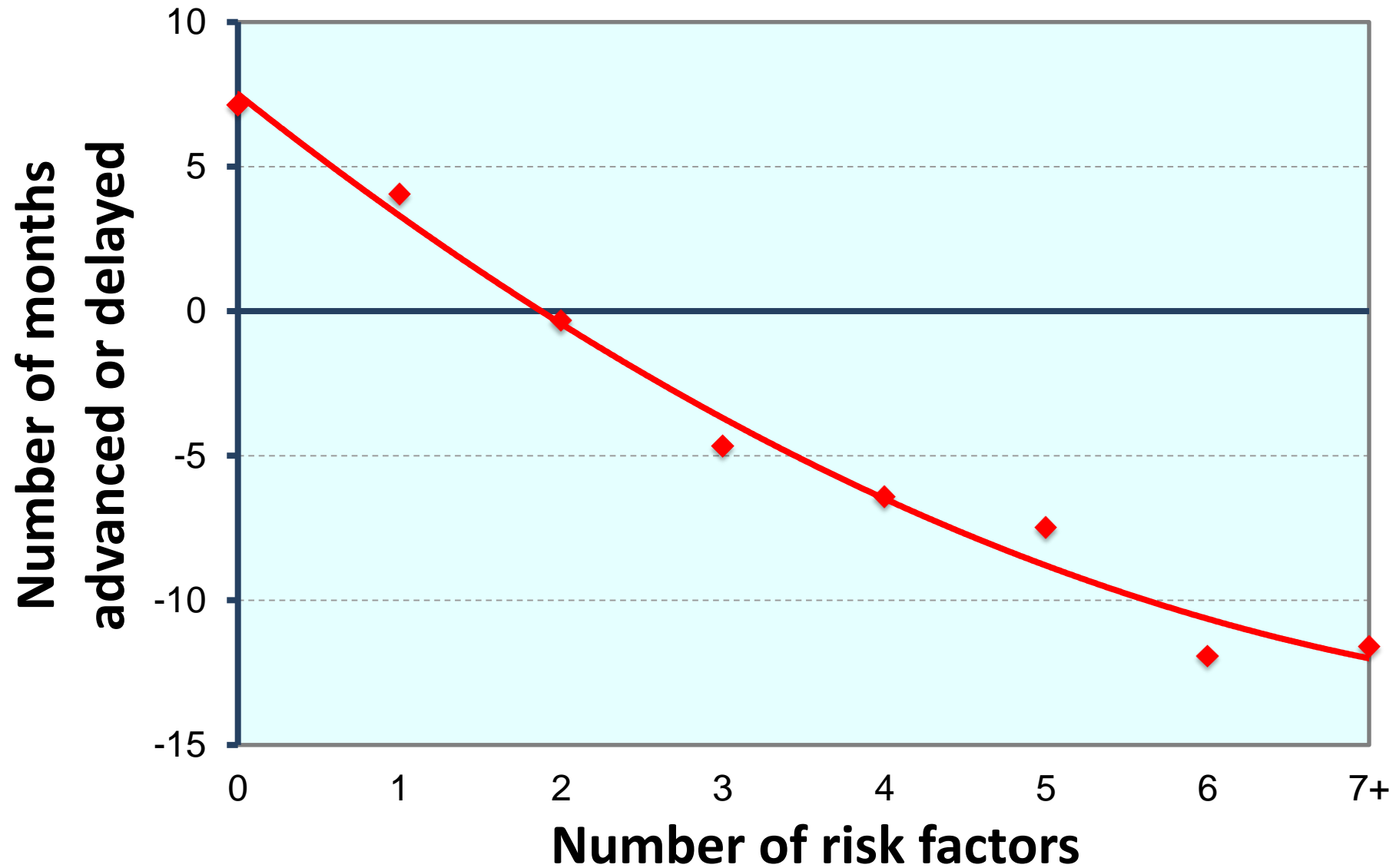
Life course exposures or insults gradually accumulate through episodes of illness and injury, adverse environmental conditions and health damaging behaviour

Kuh et al *JECH* (2003)

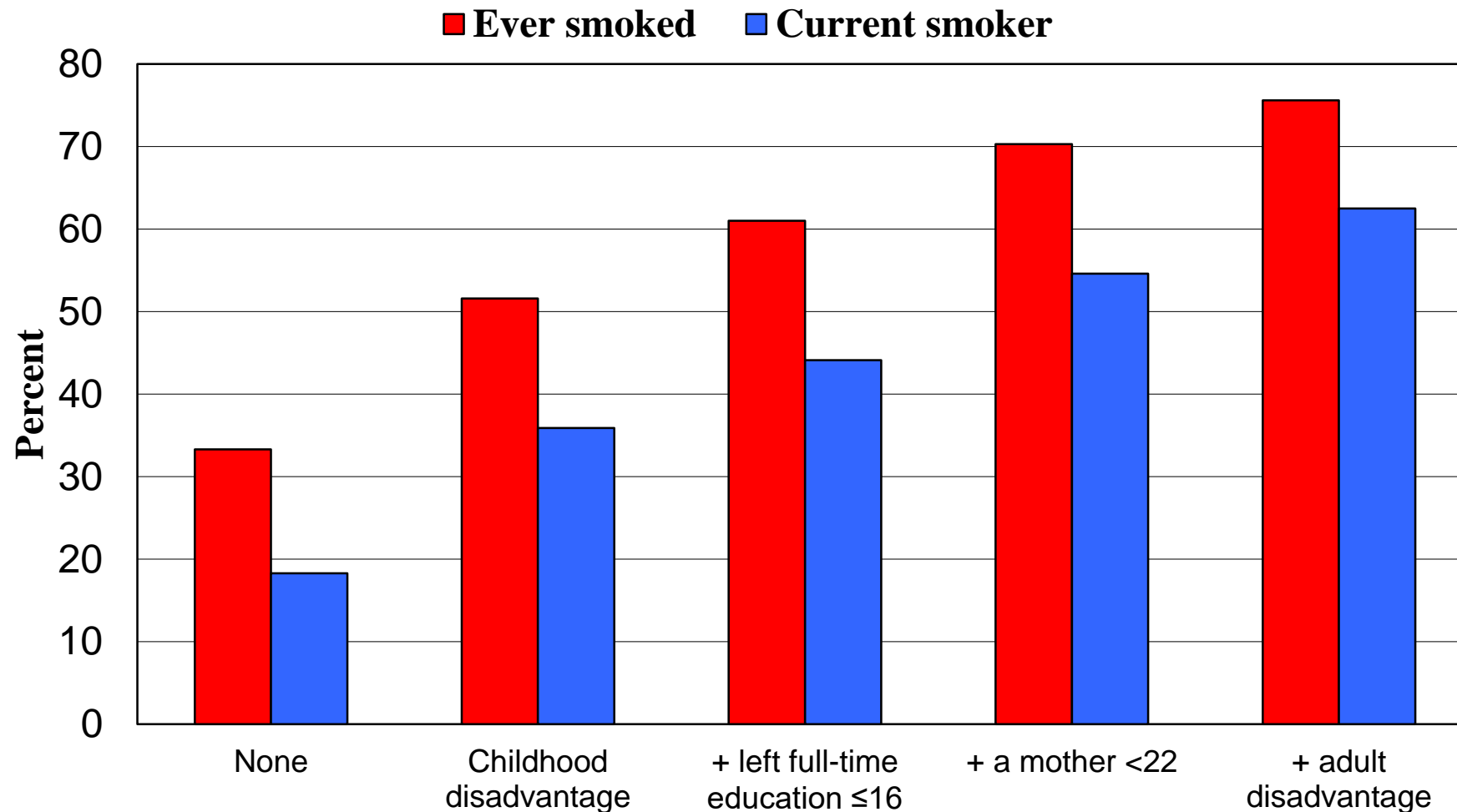
Accumulation



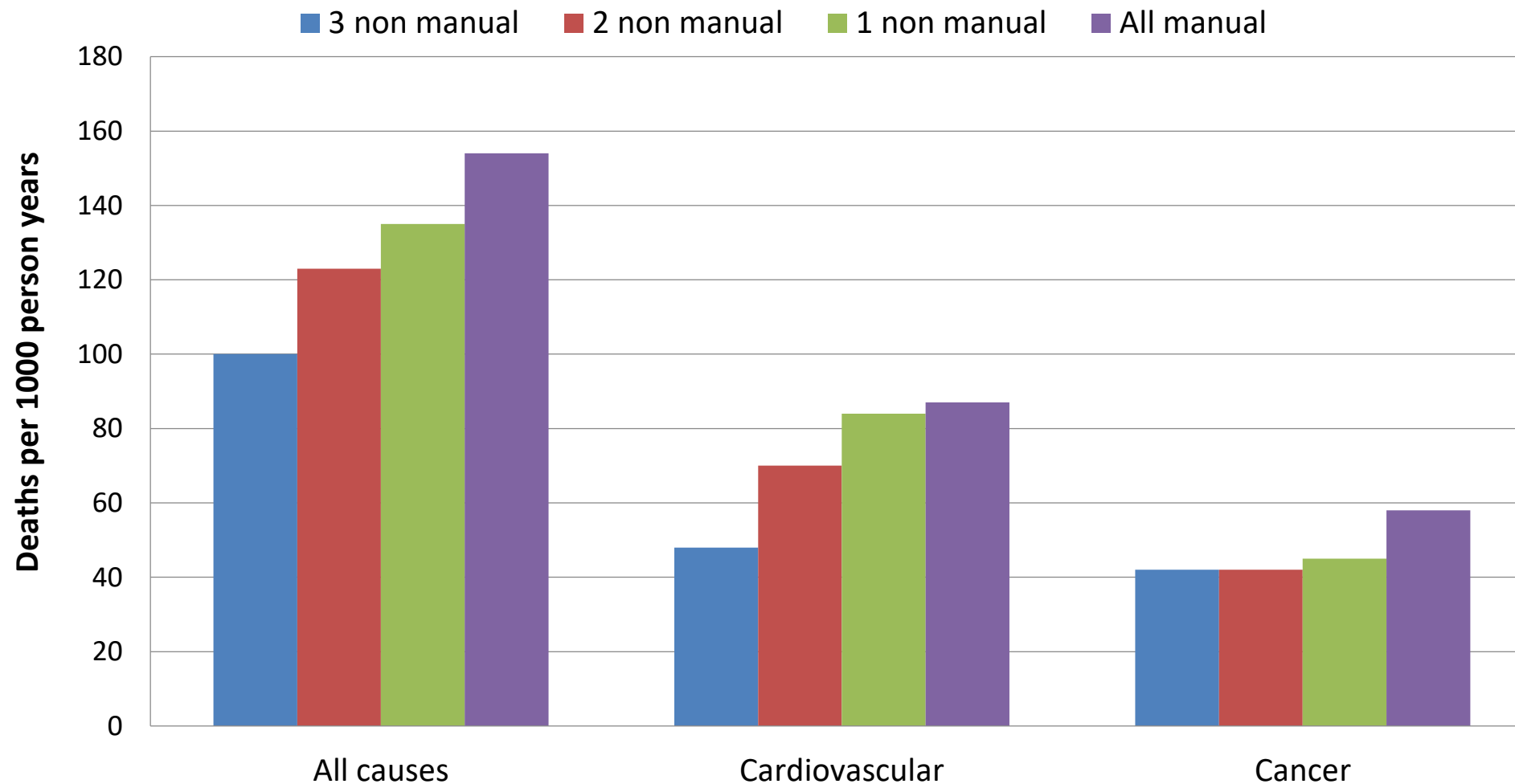
Verbal months ahead or behind at age 3 by number of risk factors



Disadvantaged trajectories and smoking status of women aged 22-34, England, 1998-2002



Mortality by occupation of father and own occupation at 2 time points in adulthood

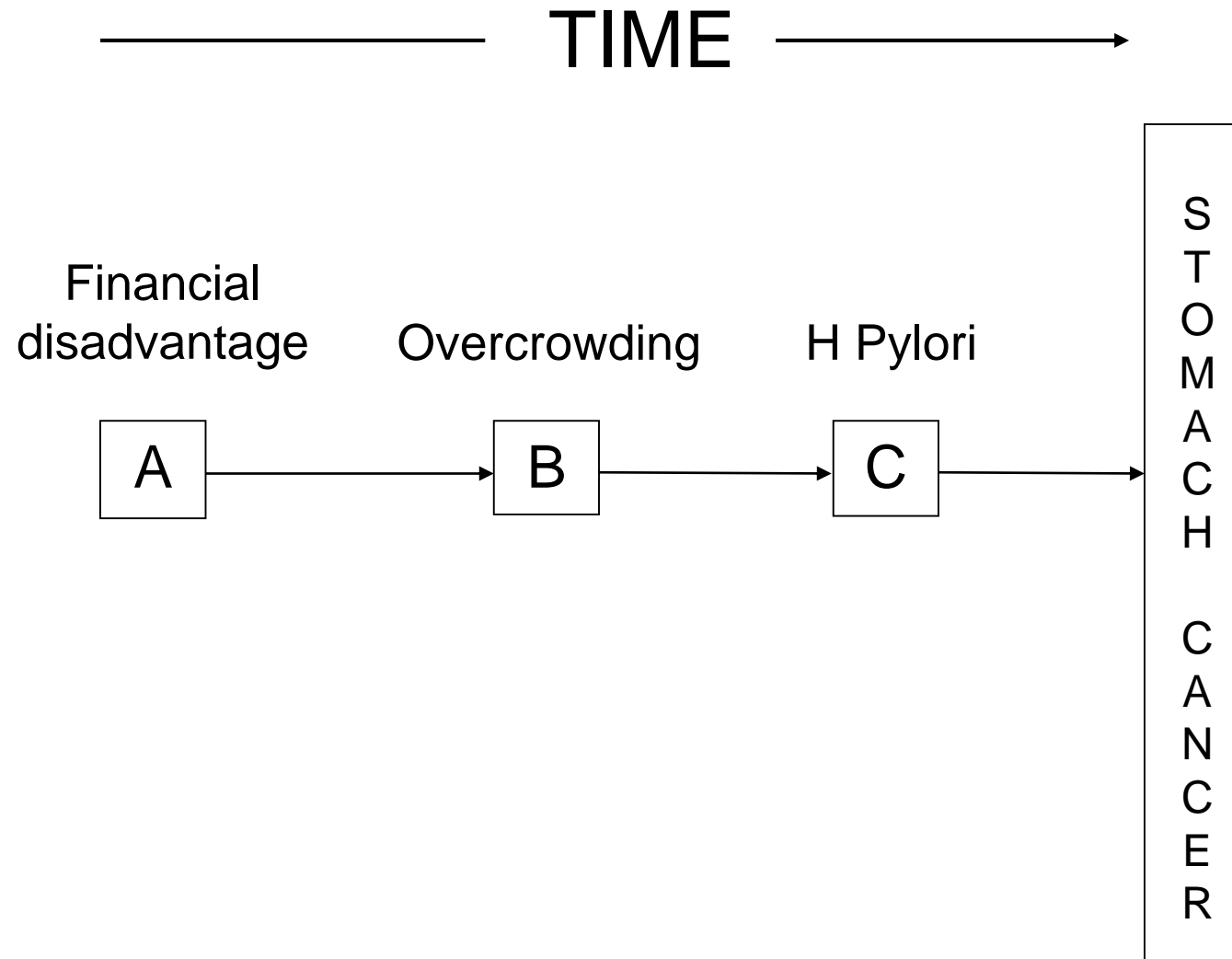


Pathways/chains of risk

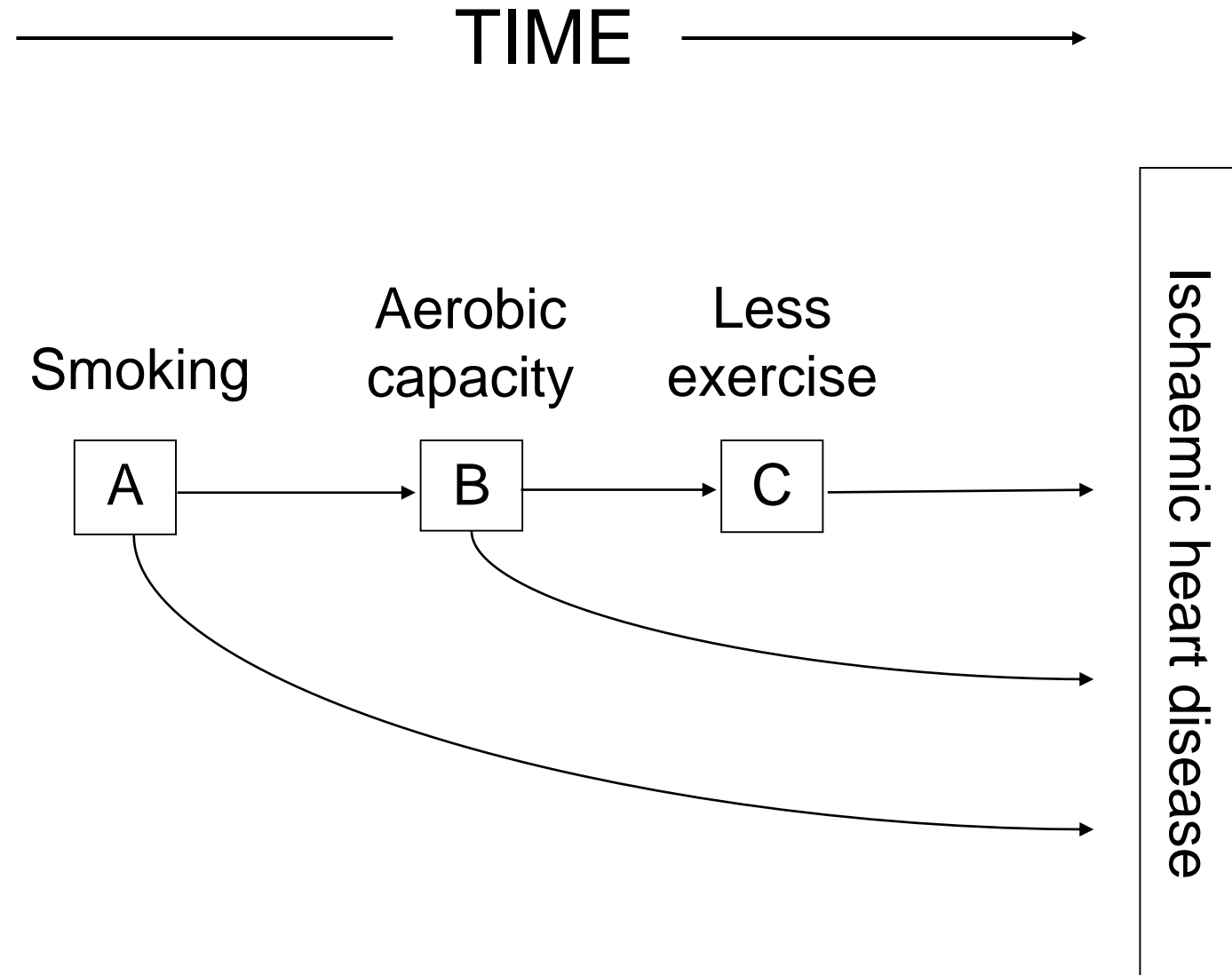
“The impact of some factor in childhood may lie less in the immediate behavioural change it brings about than in the fact it sets into motion a chain reaction in which one ‘bad’ thing leads to another, or, conversely, that a good experience makes it more likely that another one will be encountered.”

Rutter 1988

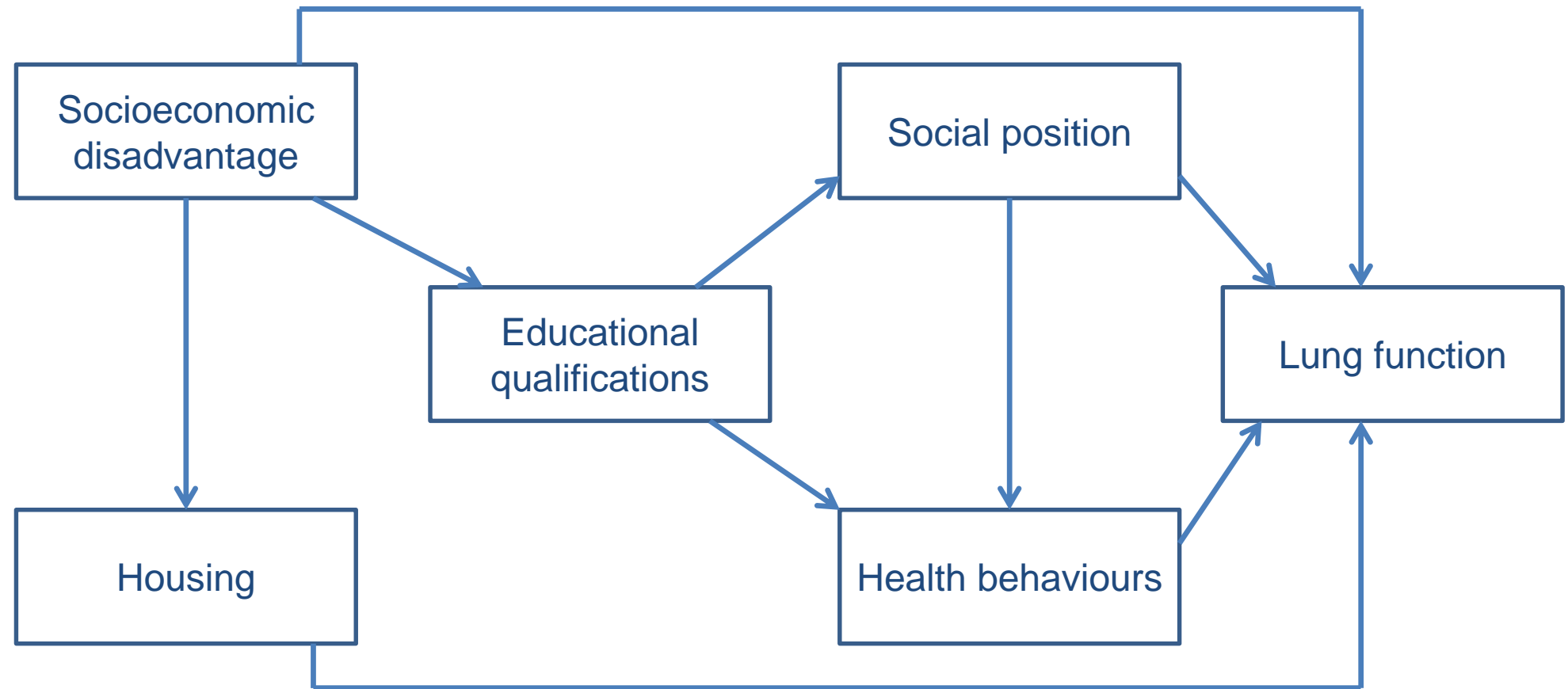
Chains of risk model



Chains of risk model



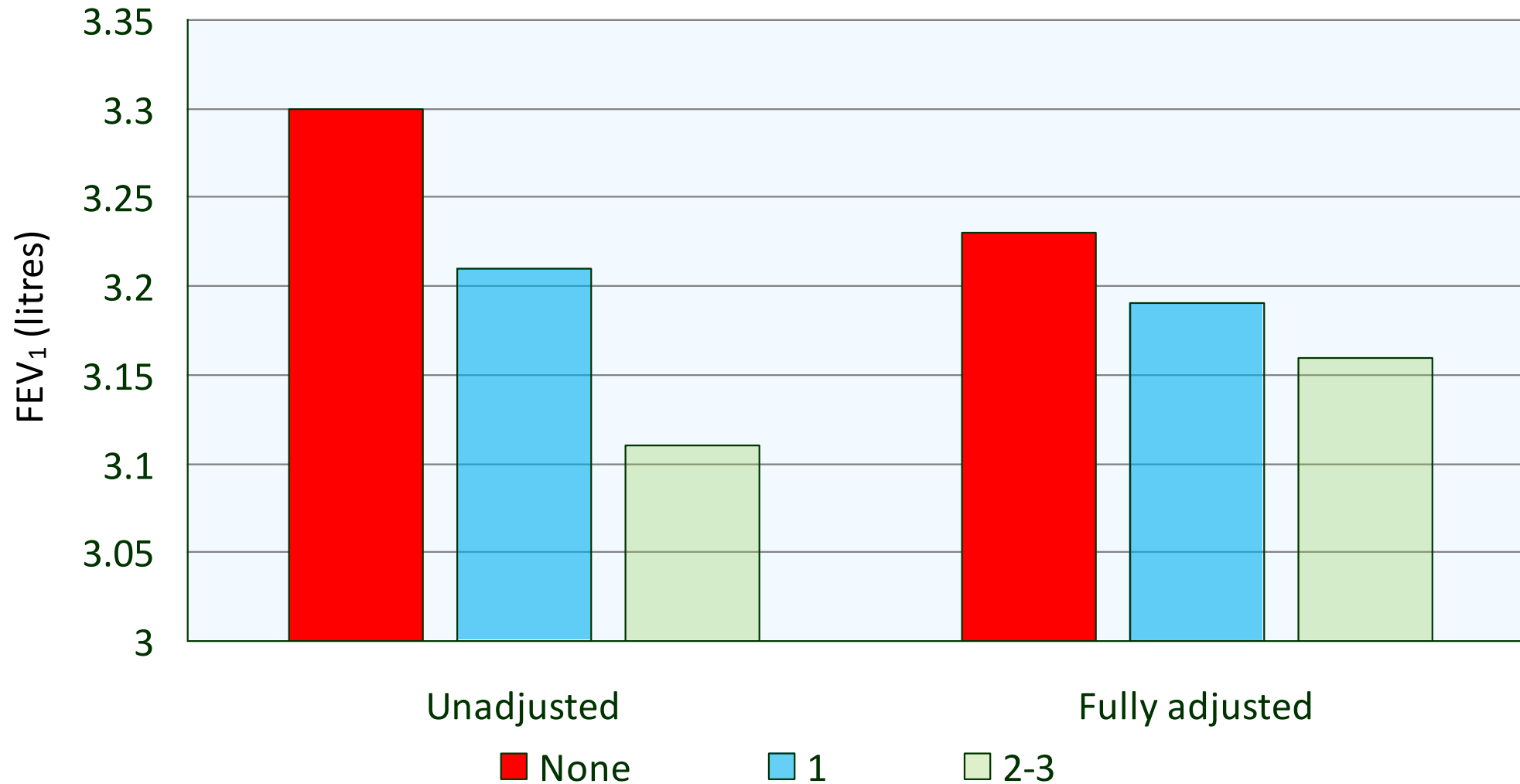
Pathways model, using the example of the influence of childhood disadvantage on adult lung function



Childhood

Adulthood

Mean FEV₁ in men and women in the 1958 cohort study by childhood financial adversity score



The UK is world-leading in its wealth of data sources that follow people over their lives.

Birth Cohort Studies:

National Survey of Health & Development (born in 1946) www.nshd.mrc.ac.uk/nshd_65.aspx

National Child Development Study (born in 1958)

www.cls.ioe.ac.uk/page.aspx?&siteid=724&siteidtitle=National+Child+Development+Study

British Cohort Study born in 1970

[www.cls.ioe.ac.uk/page.aspx?&siteid=795&siteidtitle=Welcome+to+the+1970+British+Cohort+Study+\(BCS70\)](http://www.cls.ioe.ac.uk/page.aspx?&siteid=795&siteidtitle=Welcome+to+the+1970+British+Cohort+Study+(BCS70))

Millennium Cohort Study born in 2000-2001 www.cls.ioe.ac.uk/page.aspx?&siteid=851&siteidtitle=Welcome+to+the+Millennium+Cohort+Study

Panel Studies:

Understanding Society <https://www.understandingsociety.ac.uk/>

British Household Panel Study <https://www.iser.essex.ac.uk/bhps>

English Longitudinal Study of Ageing (ELSA) www.elsa-project.ac.uk/

Health, Alcohol and Psychosocial factors in Eastern Europe (HAPIEE) Study www.ucl.ac.uk/easteurope/hapiee.html

Occupational cohorts: Whitehall II (Stress and Health Study) www.ucl.ac.uk/whitehallII

Twin studies: Gemini: Health and Development in Twins www.geministudy.co.uk/

Regional: Southall and Brent Revisited (SABRE) <http://www.sabrestudy.org/?cat=11>

ONS Longitudinal Study <http://www.ucl.ac.uk/celsius/about-the-ls>

Challenges in lifecourse research

- Requires information on same individuals (and their families) from across the whole lifecourse – expensive: time and money.
- Missing data – attrition can cause study to be biased or under-powered
- Measurement: changes over time; error/imprecision; unmeasured factors
- Conceptualising temporal relationships explicitly
- Modelling the reality of lifecourse complexity – how best to deal with repeat observations of dependent/outcome and independent/explanatory exposure measures & potential multiple interactive effects over time.
- Mixed methods can help to understand detail and motivation of processes.

Summary

- Time is key to understanding association between social & biological constructs & direction of association
- Age effects: development and decline
- Historical period effects → cohort differences.
- Life course models
 - sensitive or critical periods;
 - accumulation: dose and duration;
 - pathways and chains of risk
- Plausibility - understanding how the social becomes biological.
- Complexity