

# **Causal relationships between social and economic factors and health in New Zealand: SoFIE-Health, the Story So Far**

**Dept Public Health Seminar  
September 2013**

**Health Inequalities Research Programme  
University of Otago, Wellington, NZ**

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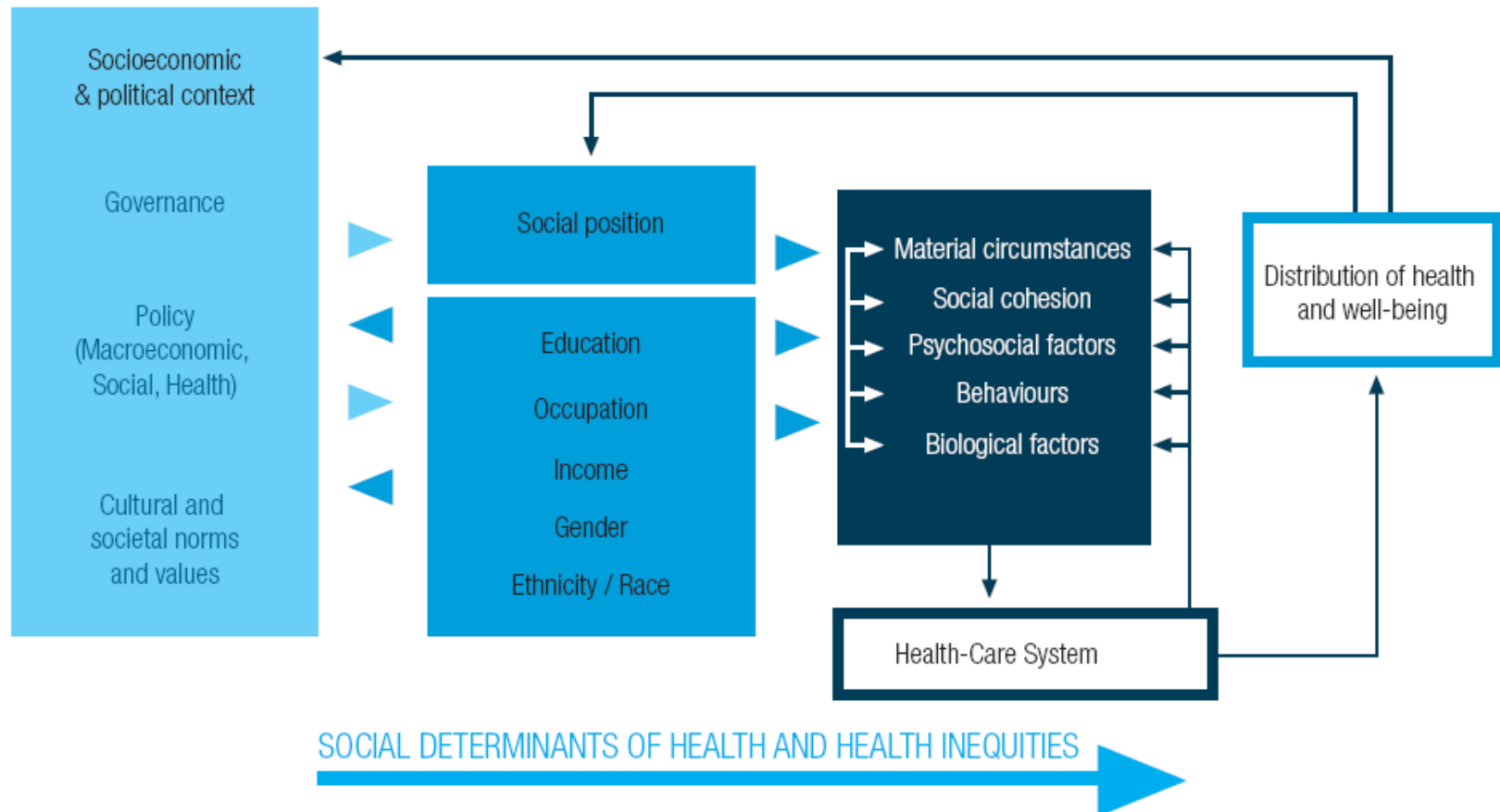


# Outline

- Social determinants of health
- Evidence and causation
- SoFIE-Health
- Some key results
- Reflections from Tony

# Social Determinants of Health

**Figure 4.1** Commission on Social Determinants of Health conceptual framework.



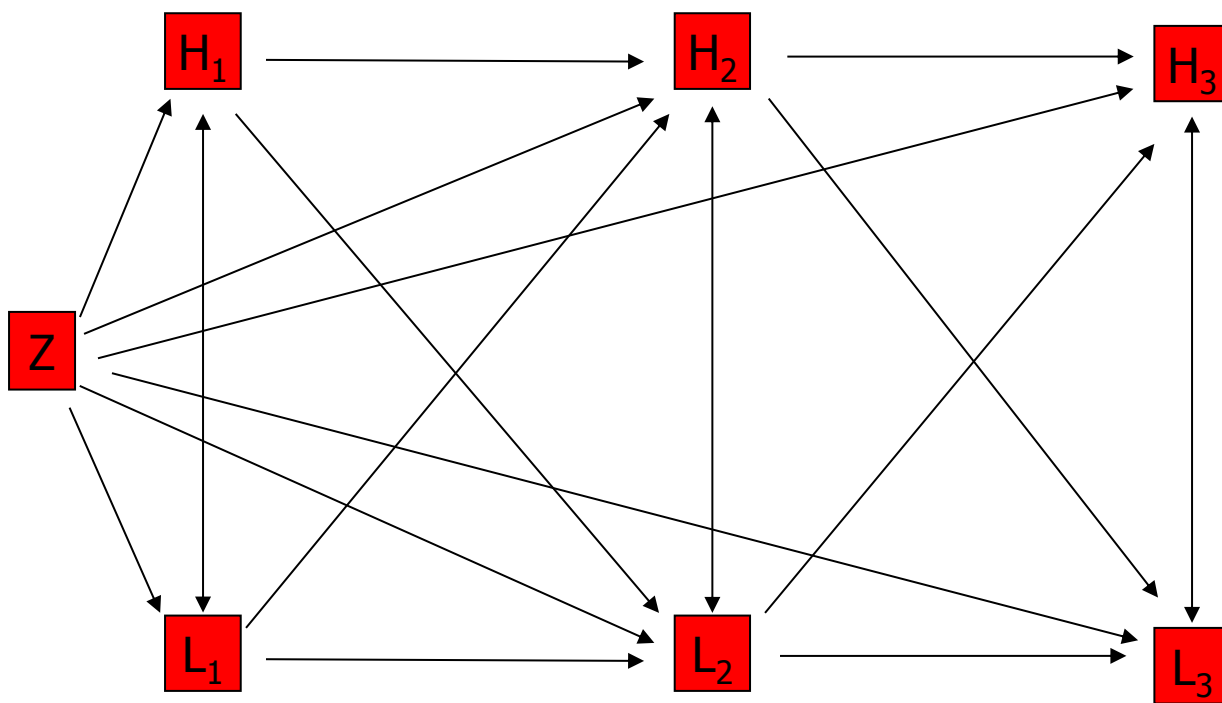
# Causation

- Association does not prove causation.
- More complex analyses are needed.
- Experiments or interventions are best for “proving” associations are causations.
- In many cases, such studies are impractical or unrealistic
- Longitudinal data is the next best thing
  - ◆ To examine the whether a change in an exposure “causes” a change in an outcome

# Longitudinal Panel Data

- Panel surveys encourage more reliable analytical techniques, to assess causal sequences
- Panel surveys follow individuals through time, and observe how their experiences and behaviours are influenced by the wider social and economic conditions in which they find themselves.
- Therefore panel surveys play a major role in understanding social change.

# Longitudinal Causal Inference



Does a change in H cause a change in L  
or vice versa?

# Longitudinal Fixed Effect Models

- Handles both within-person correlated-error and unobserved heterogeneity (between-person variability)

$$y_{it} = x_{it}\beta + \alpha_i + \varepsilon_{it}$$

- $\alpha_i$  are fixed parameters (fixed effects) to be estimated or differenced/conditioned out
- $\varepsilon_i \sim N(0, \sigma^2 I)$ , iid (a disturbance/shock to  $y$ )
- $\alpha_i$ , can be correlated with  $\varepsilon_{it}$

# SoFIE-Health

**Goal 1: Determining the impact of labour market factors, asset wealth, income and family dynamics on health**

*Δ Social factors → Δ health:* What is the association of *changes in* family circumstances, labour force status, benefit receipt and income with *changes in* health status and behaviour?

**Goal 2: Determining the impact of health status on labour market factors, income trajectories, asset wealth and family dynamics**

*Illness → Δ social factors:* What is the impact of cancer diagnosis and hospitalisations for major illness on income and asset trajectories, labour force status and family circumstances?

**Goal 3: Determining the contribution of access, continuity and co-ordination of primary health care to health status and to social inequalities in health**



# SoFIE-Health Team



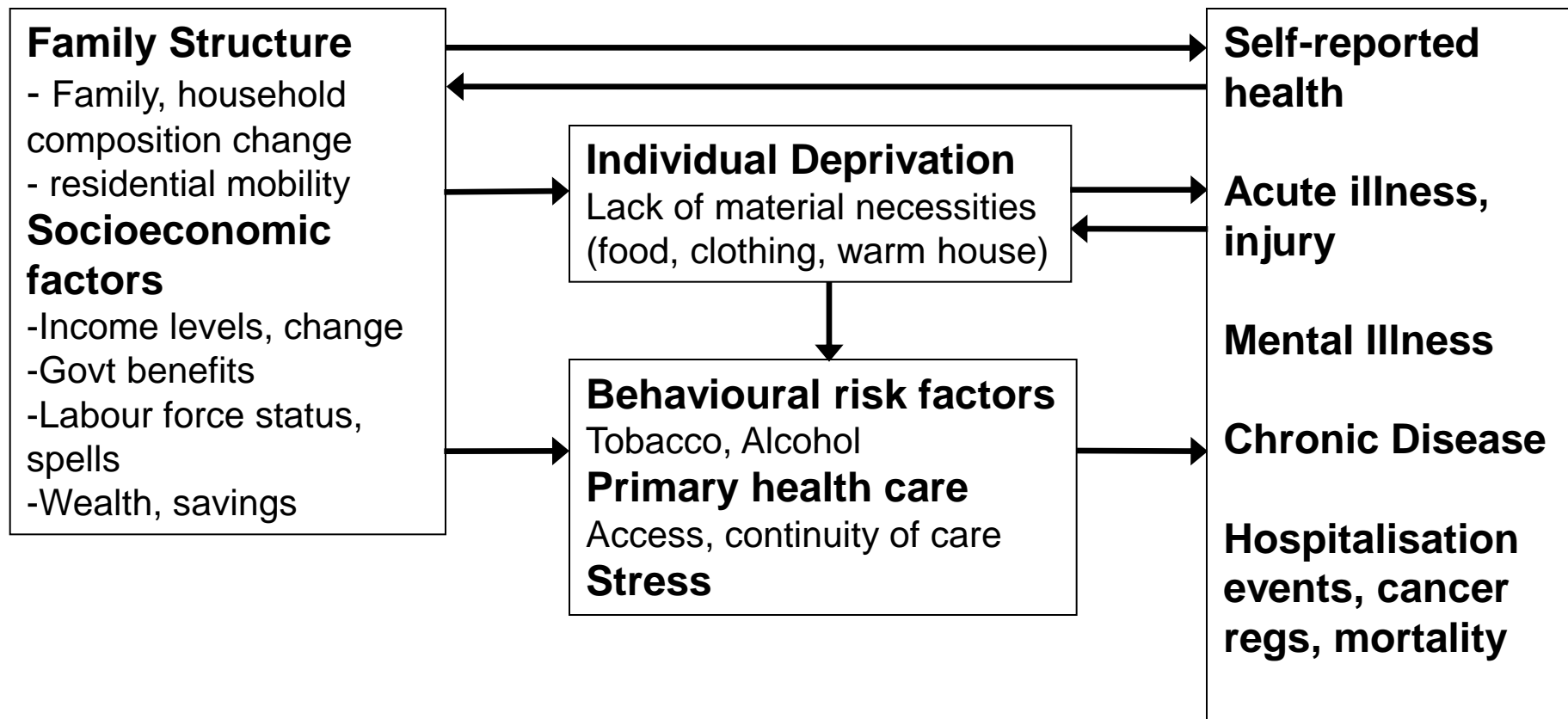
# Survey of Family, Income and Employment - “SoFIE”

- Statistics New Zealand
- 8-year longitudinal
- First wave, 1 October 2002
- Collects annual information on demographics, income, labour force participation, education, household and family structure.
- Assets and liabilities - waves 2, 4, 6, and 8.
- Health - waves 3, 5, and 7.

# SoFIE-Health Module

- 20 minutes of health-related questions
  - ◆ health-related quality of life (SF-36),
  - ◆ mental health (Kessler-10),
  - ◆ perceived stress (PSS-4),
  - ◆ chronic diseases,
  - ◆ smoking,
  - ◆ alcohol intake and
  - ◆ primary health care usage
- Consent to record linkage of hospitalisation, cancer registration and mortality data.

# Domains of SoFIE-Health

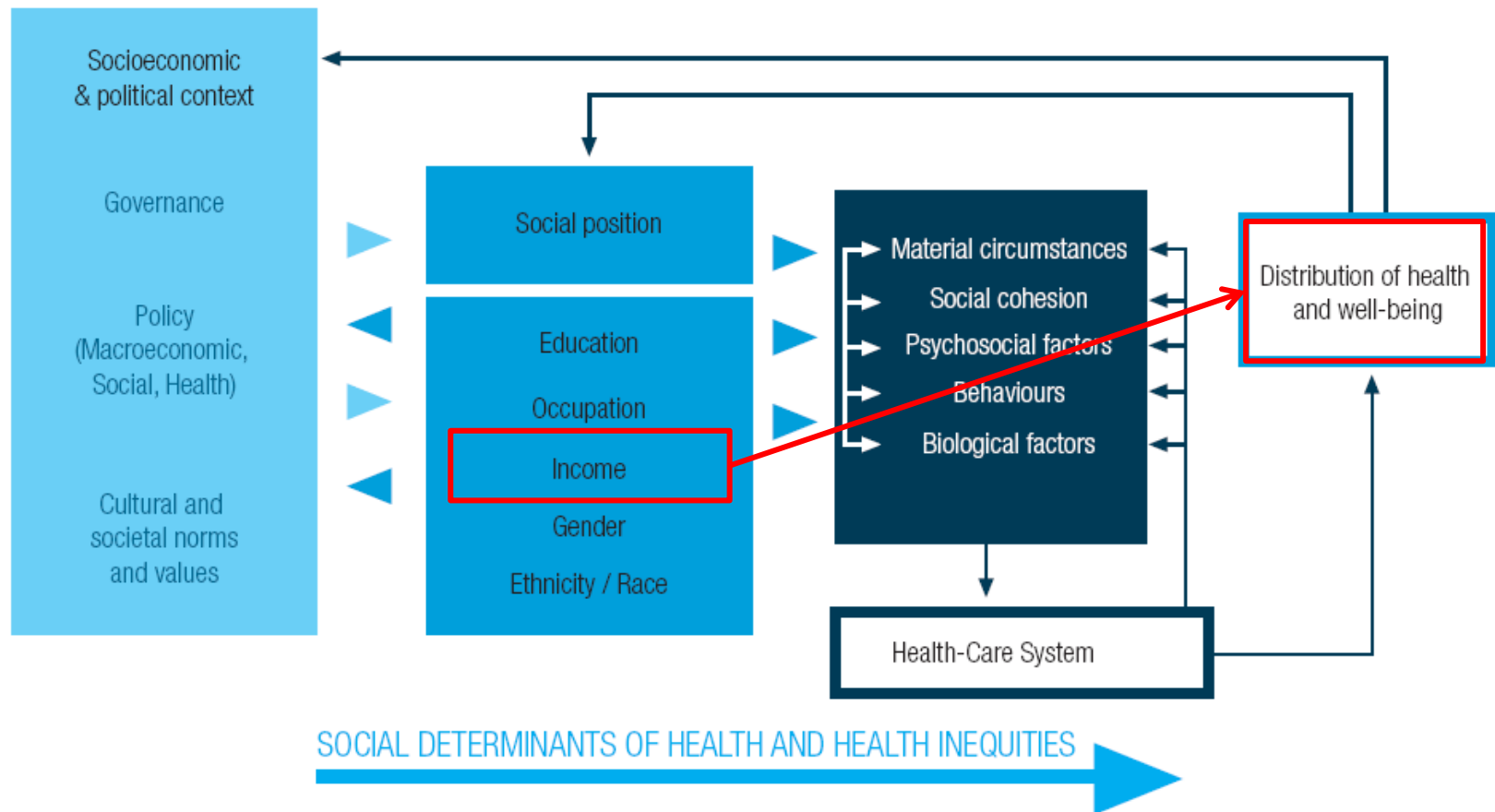


# Goal 1: $\Delta$ *Social factors* $\rightarrow$ $\Delta$ *health*

- **Determining the impact of labour market factors, asset wealth, income and family dynamics on health**
  - ◆ Do *labour market factors* such as hours of work and job separations influence subsequent health status?
  - ◆ Does *change in income* predict *change in self-rated health*?
  - ◆ How do labour market factors, family structure, asset wealth and income trajectories relate to health risk factors and health status?

# Does *change* in income predict *change* in self-rated health?

**Figure 4.1** Commission on Social Determinants of Health conceptual framework.



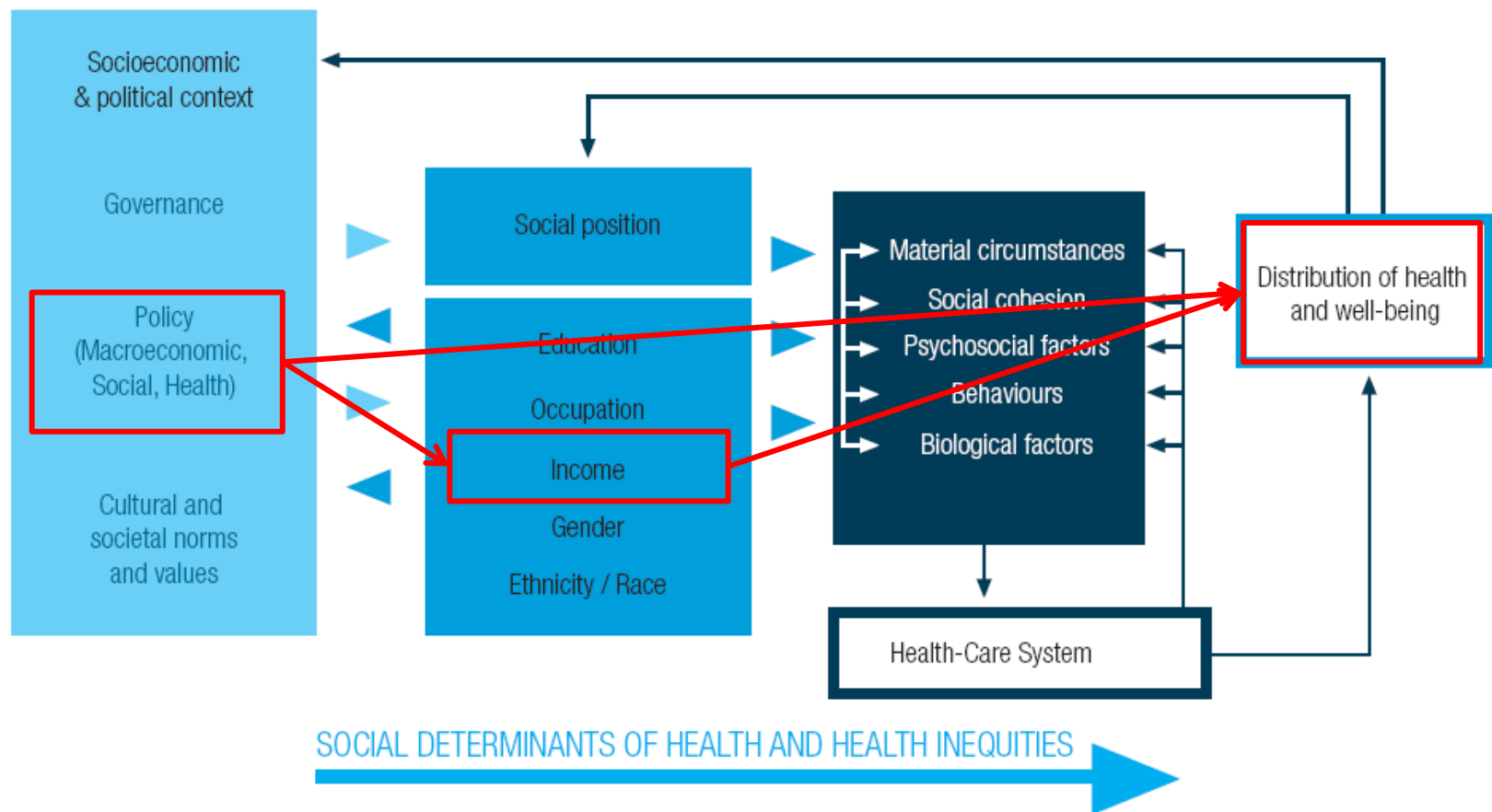
# Does *change* in income predict *change* in self-rated health? No

Variables	Odds ratio	95% confidence interval	
Amalgamated conditional logit regression model†			
Household annual income*	1.009	0.995	1.023
Hybrid proportional odds model†			
Household annual income*	1.006	0.997	1.015

- Supported by international literature –
  - ◆ Imlach Gunasekara Soc Sci Med 2011

# Does *change* in income from tax credits predict *change* in health?

**Figure 4.1** Commission on Social Determinants of Health conceptual framework.



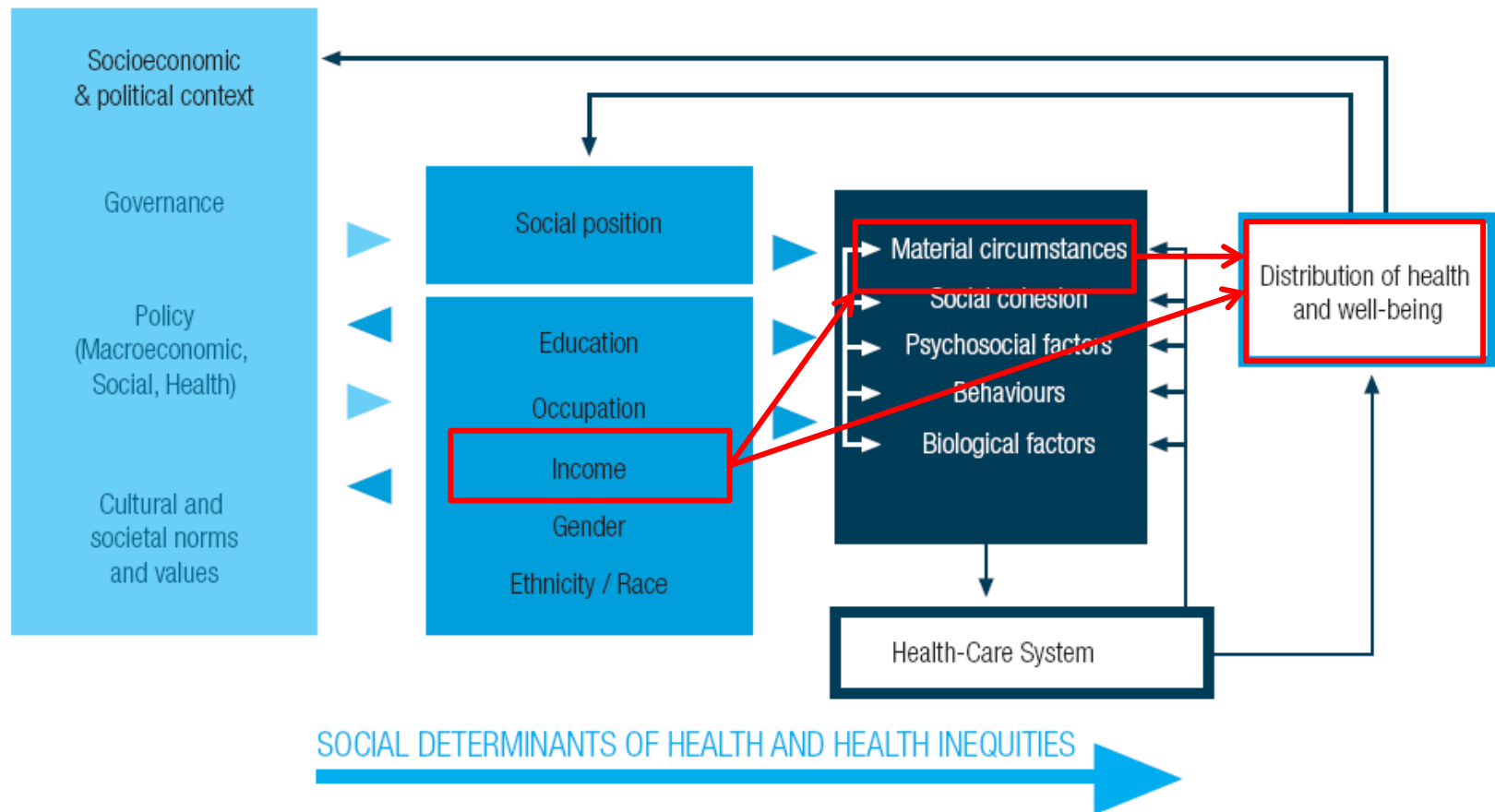


# Does *change* in income from tax credits predict *change* in health? No

- This study found that becoming eligible for IWTC or a substantial (\$1,000) increase in the IWTC amount was not associated with any detectable difference in SRH over the short term.
- Supported by international literature
  - ◆ Pega Cochrane Review 2013

# Does moving into “income poverty” impact health?

**Figure 4.1** Commission on Social Determinants of Health conceptual framework.



# Does moving into “income poverty” impact health? Yes, BUT

- Increasing numbers of years in low income leads to worsening health
- Increasing numbers of years in deprivation leads to worsening health
- Deprivation has a stronger impact on health than low income

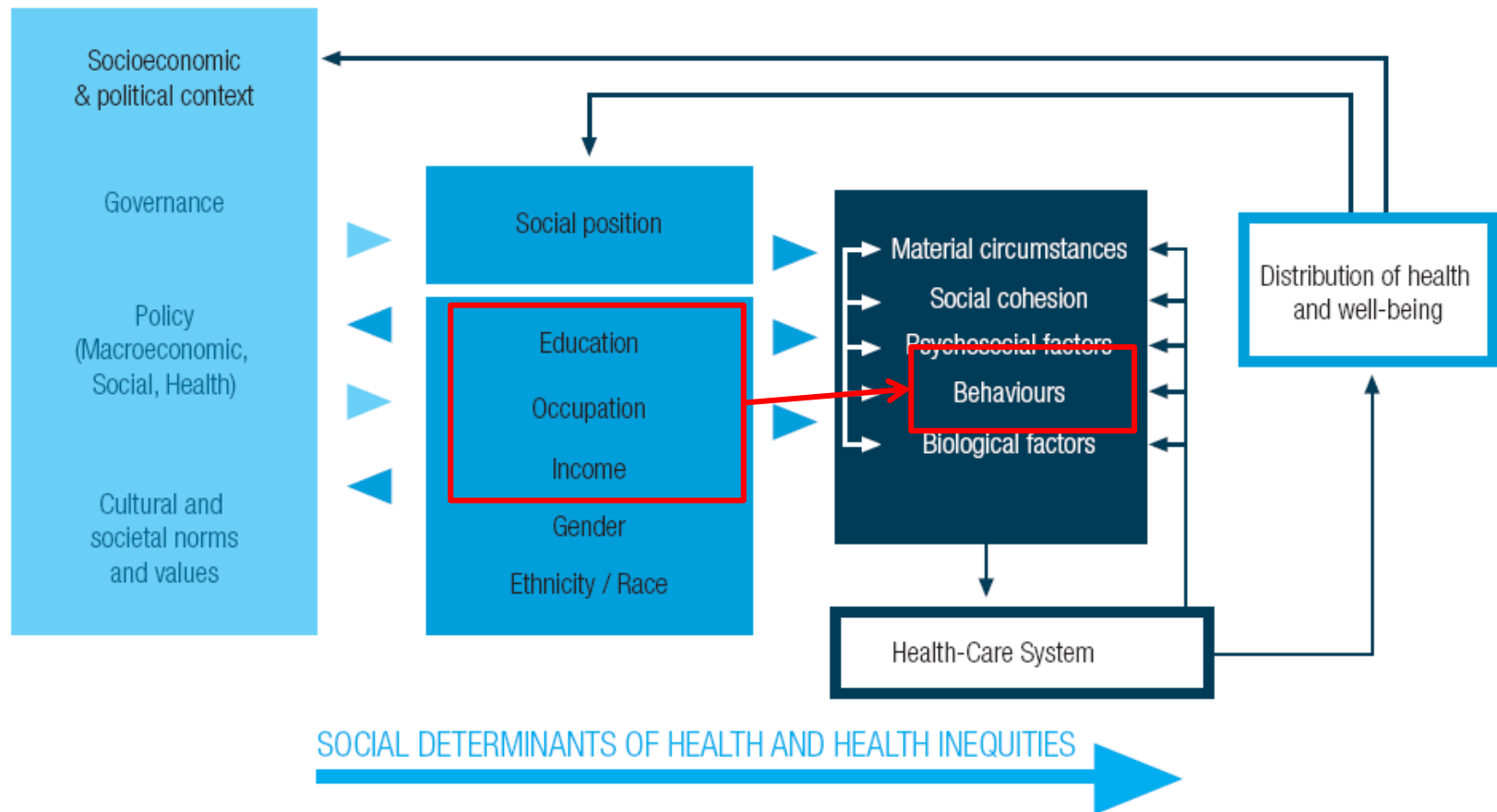
# Does becoming a parent impact mental health? Yes

- Becoming a parent *Having first baby* aids mental health
- Having a second child *aids mental health* less of an impact
- Perhaps counter-intuitive results

**First-time parenting may help mental health**

# Do changes in economic factors impact smoking?

**Figure 4.1** Commission on Social Determinants of Health conceptual framework.



# Do changes in economic factors impact smoking? Sort of

- Increasing personal income in youth increased the odds of smoking (OR 1.42: 95%CI 1.16 to 1.74)
  - ◆ Contradicts 'simple' social determinants theory that improving social circumstances → ↑health/behaviour
- Increasing neighbourhood deprivation increased smoking (OR 1.83: 95%CI 1.18 to 2.83)
  - ◆ Consistent with 'simple' social determinants theory – and strong!
- Increasing individual deprivation increased smoking

# Do changes in smoking impact mental health? Yes

- Smoking uptake leads associated with increased psychological distress ( $\beta$  0.22: 95%CI 0.01 to 0.43)
- Increased psychological distress if tried (but failed) to quit - but non-significant
- Increasing individual deprivation increased smoking

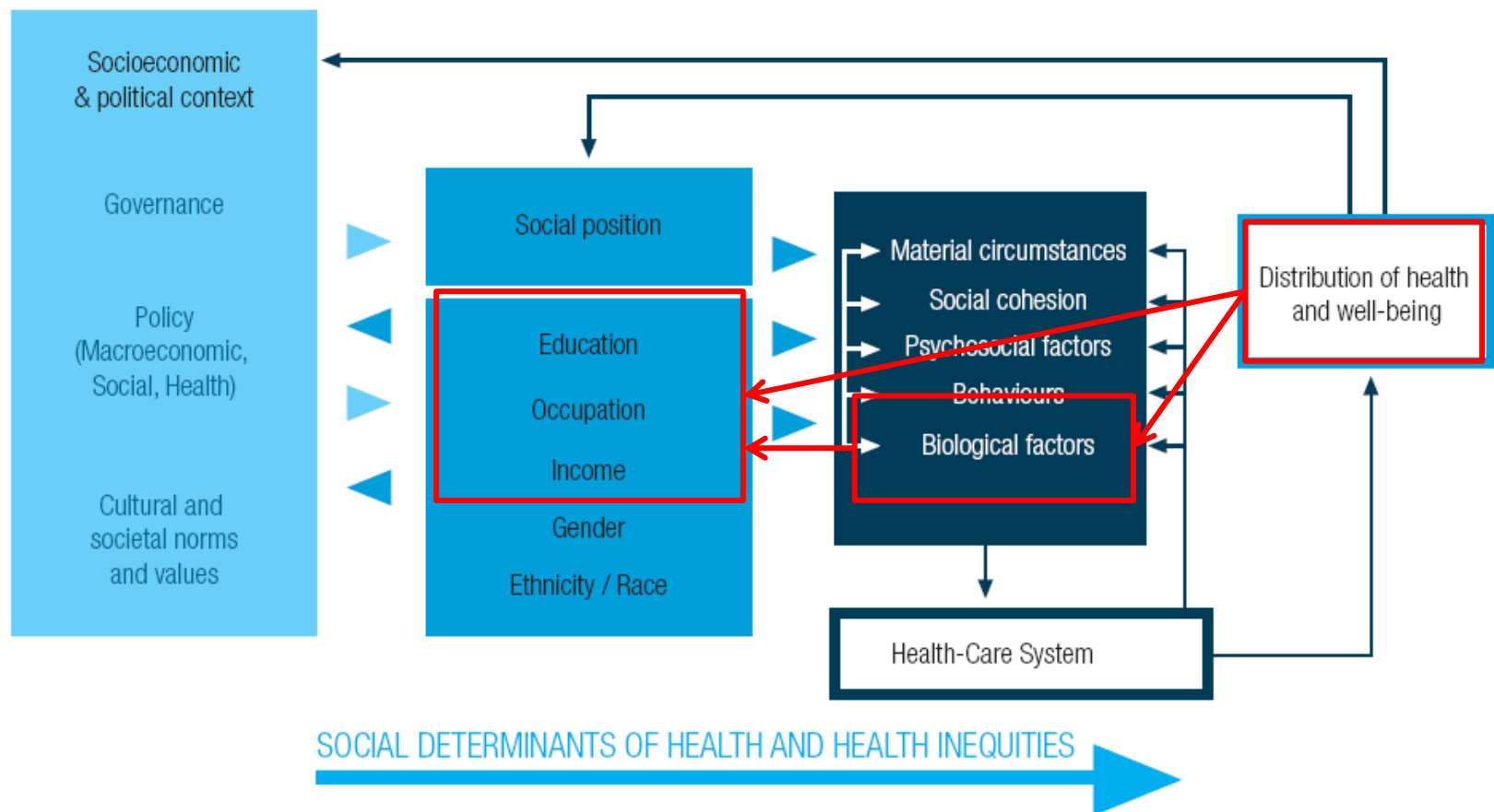
# Goal 2: *Illness* → $\Delta$ *social factors*

- **Determining the impact of health status on labour market factors, income trajectories, asset wealth and family dynamics**
  - ◆ Does pre-existing health status predict labour market, income and family mobility?
  - ◆ Do sex, ethnicity, and socio-economic position buffer the impact of pre-existing health status on subsequent labour market, income and family mobility?
  - ◆ Does pre-existing health status predict job separations for respondent-reported reasons other than “health status”?



# Illness $\rightarrow$ $\Delta$ social factors

Figure 4.1 Commission on Social Determinants of Health conceptual framework.

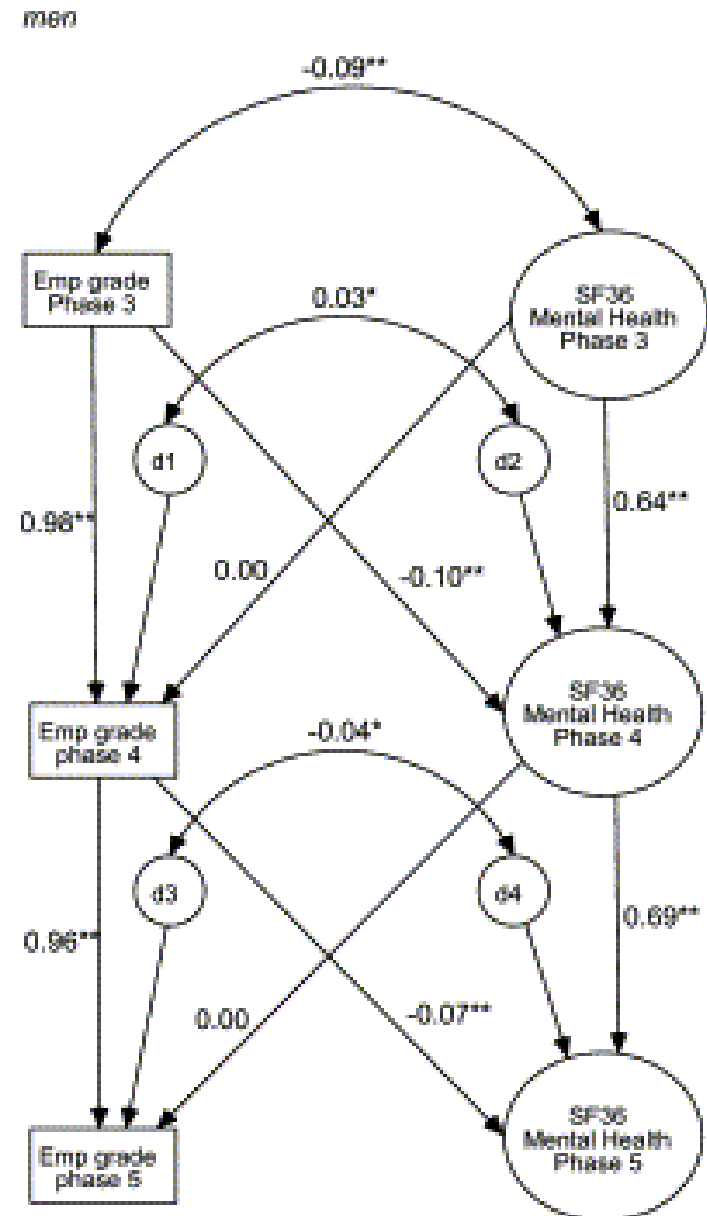


# Does a health shock impact employment? Yes

- A health shock was associated with a significantly increased risk of subsequent non-participation in the labour force
- The association was largest in younger men and women (but not significantly different)

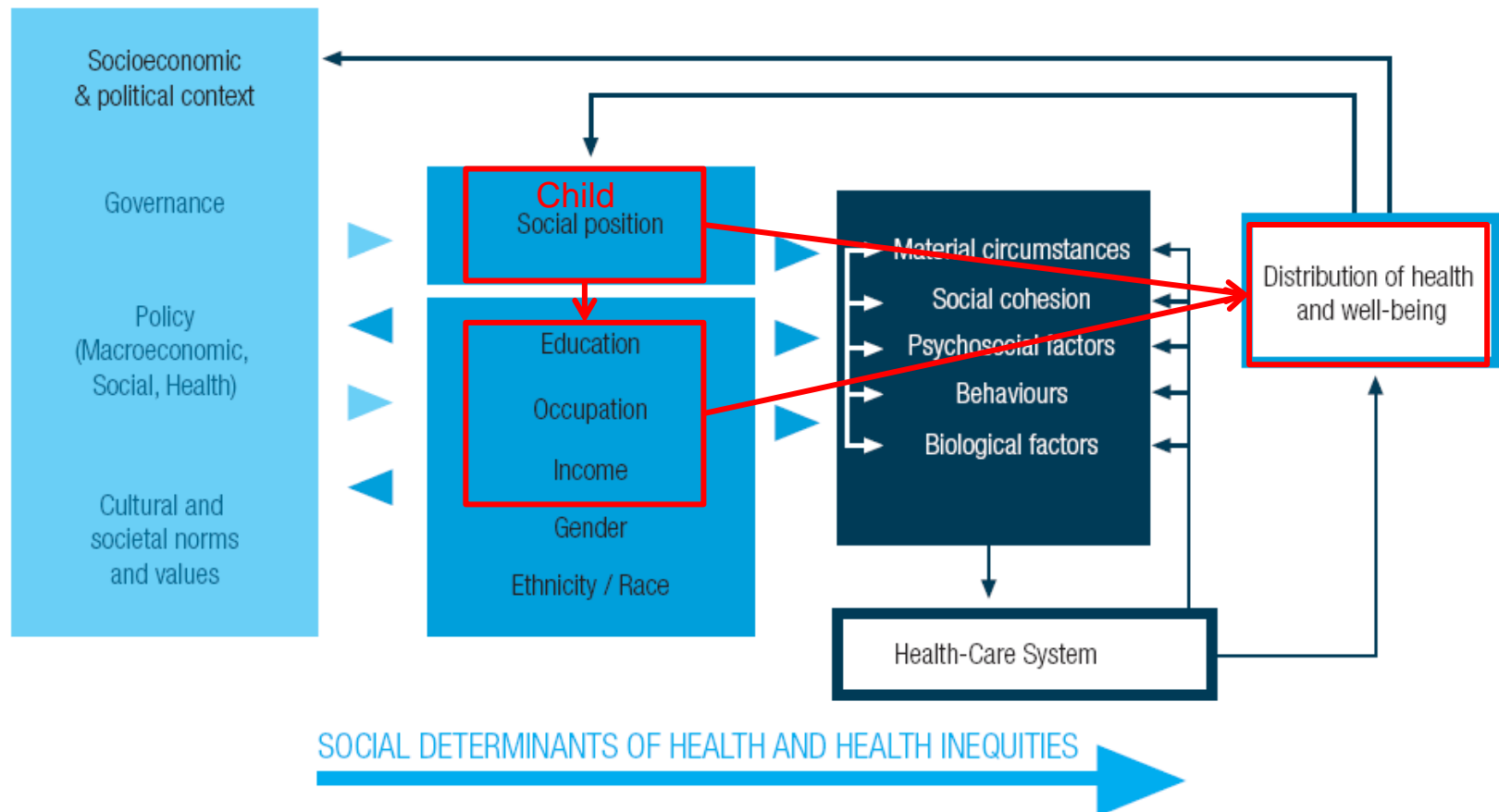
# Is it: social causation? or health selection?

- Social Causation
- Commonly found by international literature

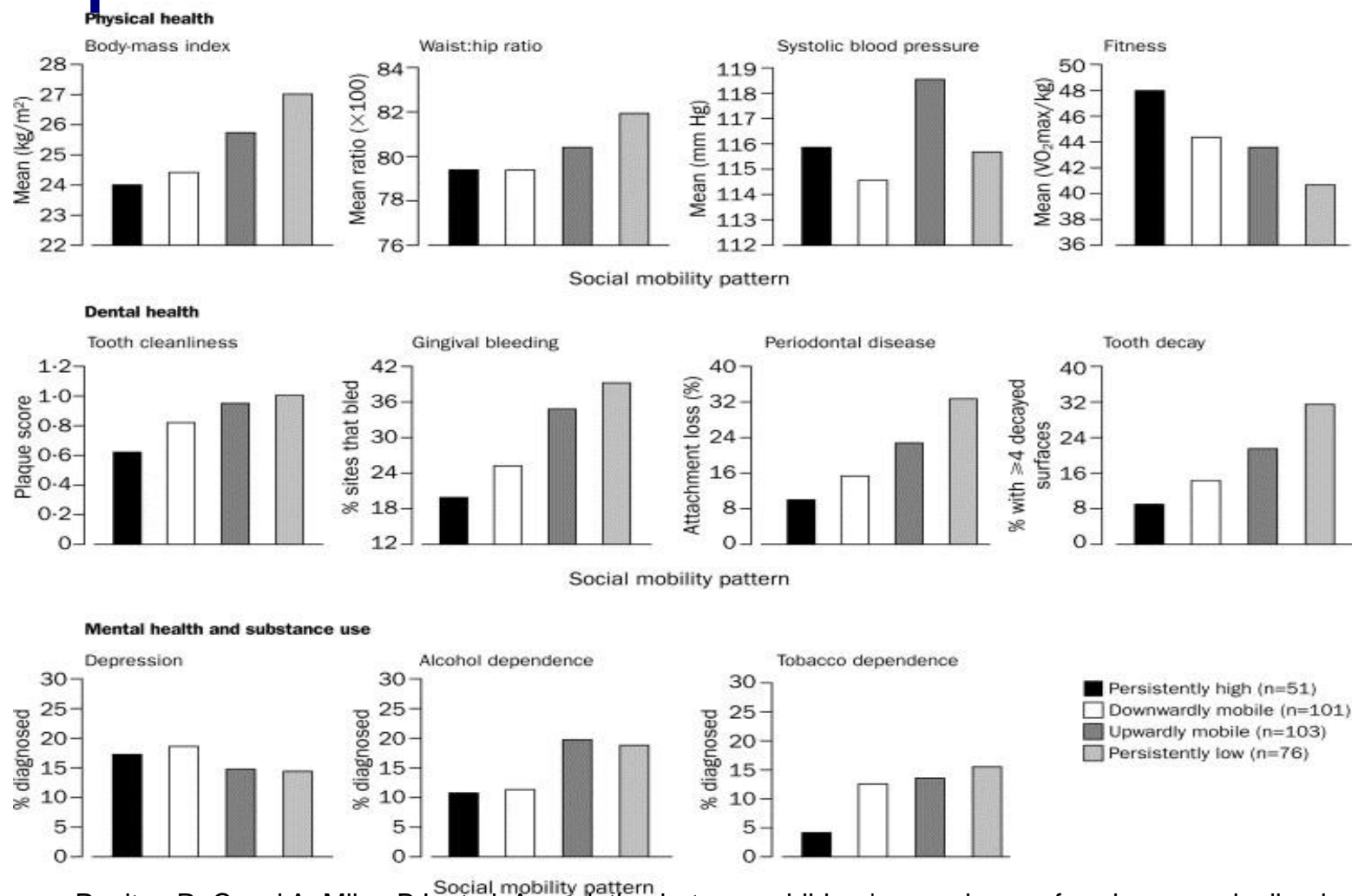


# Does childhood social position impact adult health?

**Figure 4.1** Commission on Social Determinants of Health conceptual framework.

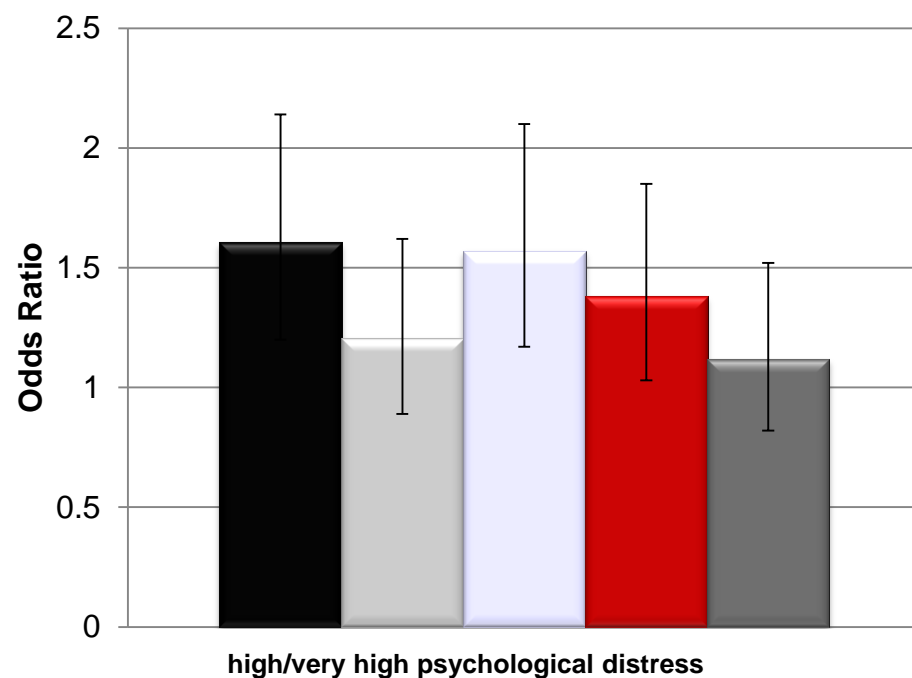
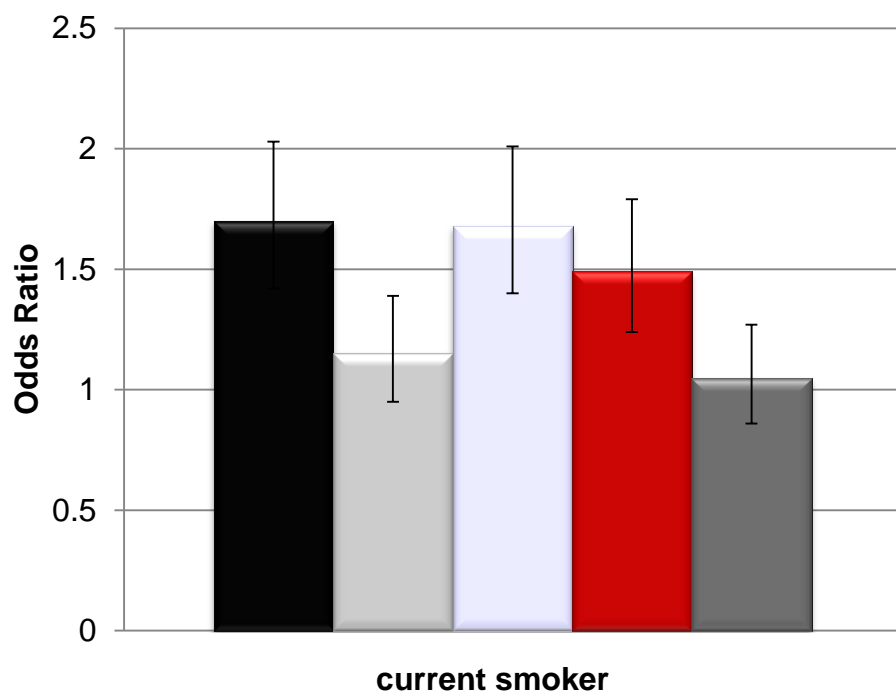


# Does childhood social position impact adult health?



Reference: Poulton R, Caspi A, Milne BJ, et al. Association between children's experience of socioeconomic disadvantage and adult health: a life-course study. *Lancet* 2002;**360**(9346): 1640-5.

# Does childhood social position impact adult health?



## Odds of childhood SEP (low v high) on health

Model 1: adjusted for age, sex and ethnicity

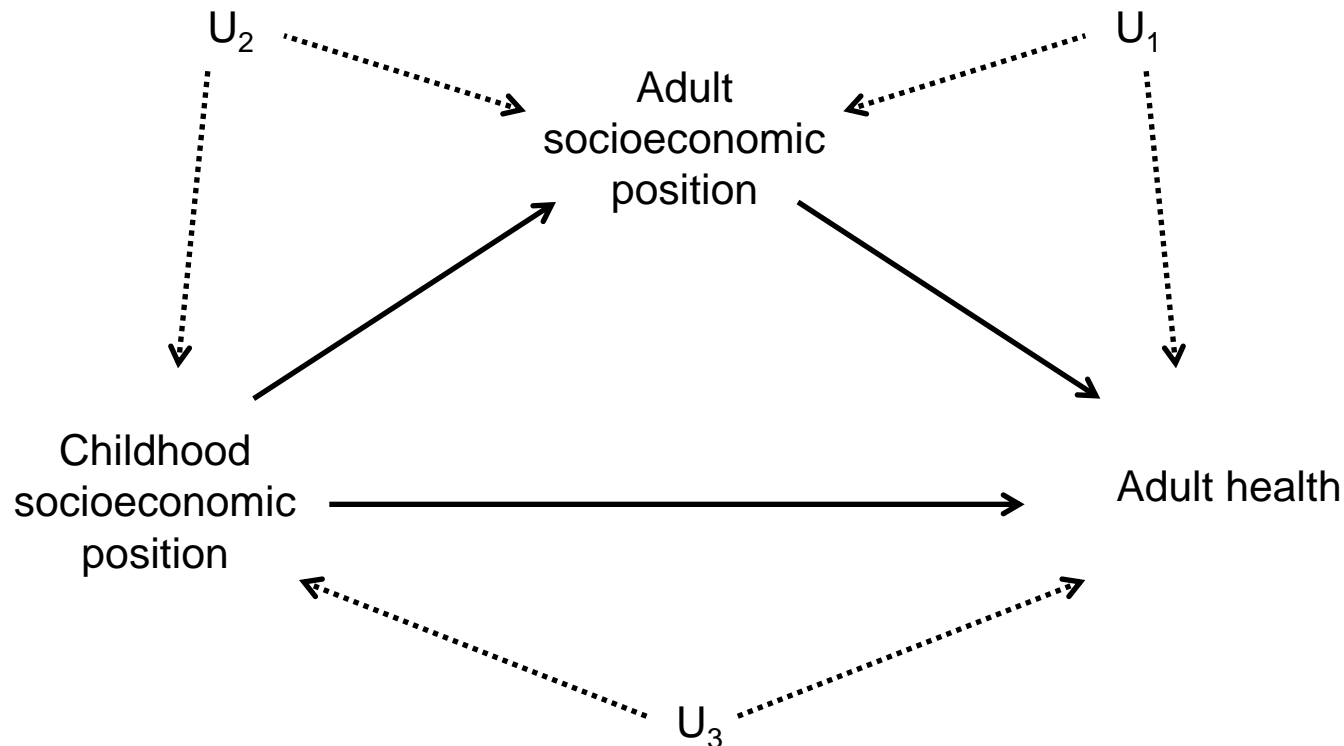
Model 2: M1 + Education

Model 4: M1 + Household Income

Model 3: M1 + Labour Market Activity

Model 5: M1 + NZ Area Deprivation

# Does childhood social position impact adult health?



# Fixed Effect Model Reflections

- Handles both within-person correlated-error and unobserved heterogeneity (between-person variability)
- Evidence of an effect is strong causal inference
- Does not control for unobserved time-varying confounding
- Limited precision – need “enough” change
- Doesn't control for reverse causation or simultaneity



Kristie Carter

**SO WHAT?**

Tony Blakely

**SO WHAT?**

# Disclaimer and data access

- Access to the data used in this presentation was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975
- The results presented are the work of the researchers, not Statistics New Zealand
- We take full responsibility for the results, and Statistics New Zealand will not be held accountable for any error or inaccurate findings within this presentation
- All figures and graphs are based on numbers rounded to base five

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