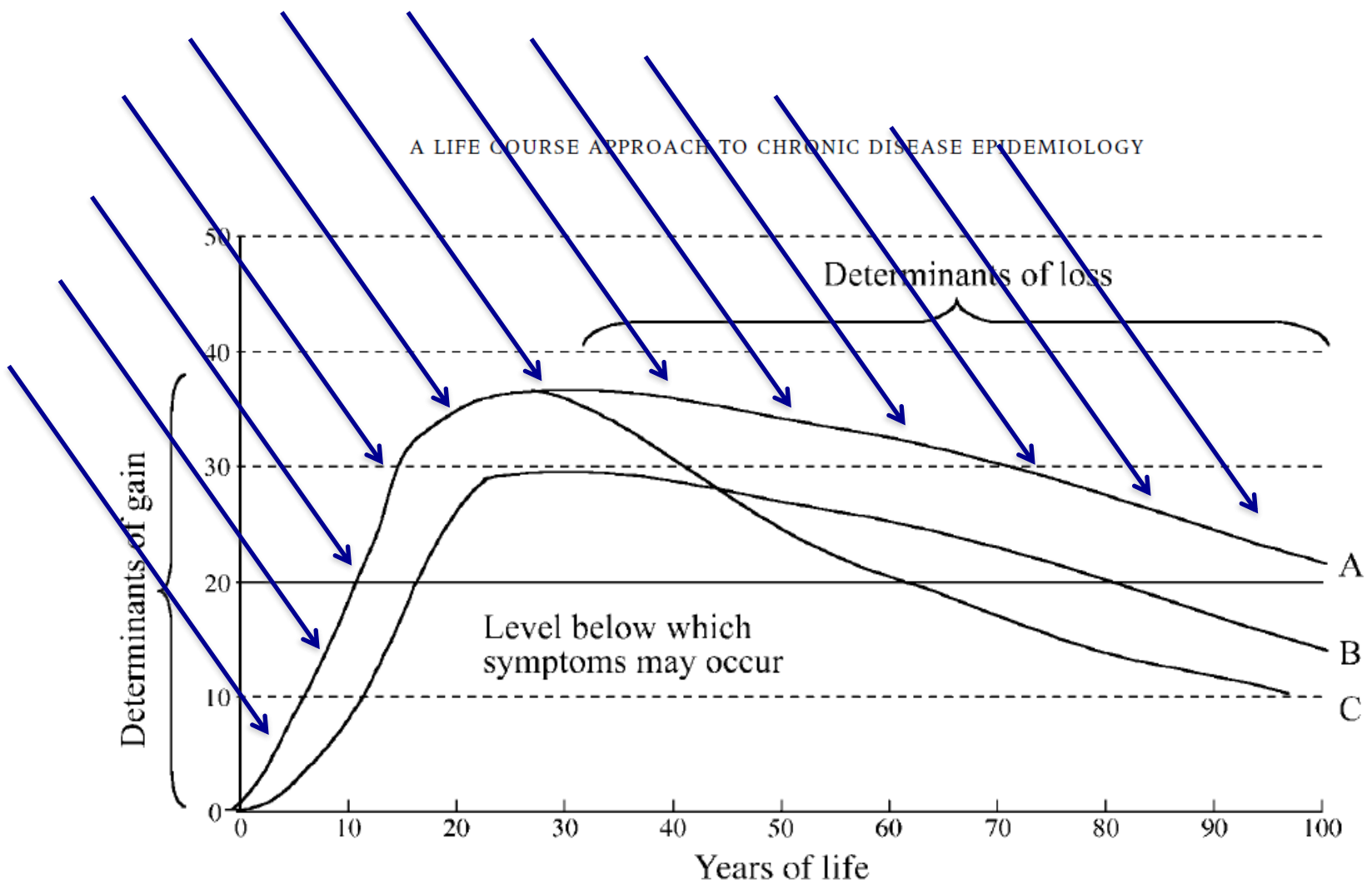


***Area deprivation across the life course & cognitive capability in mid-life: findings from the 1946 British Birth Cohort.***

Emily T. Murray, MSc, PhD  
11th September 2013

A LIFE COURSE APPROACH TO CHRONIC DISEASE EPIDEMIOLOGY



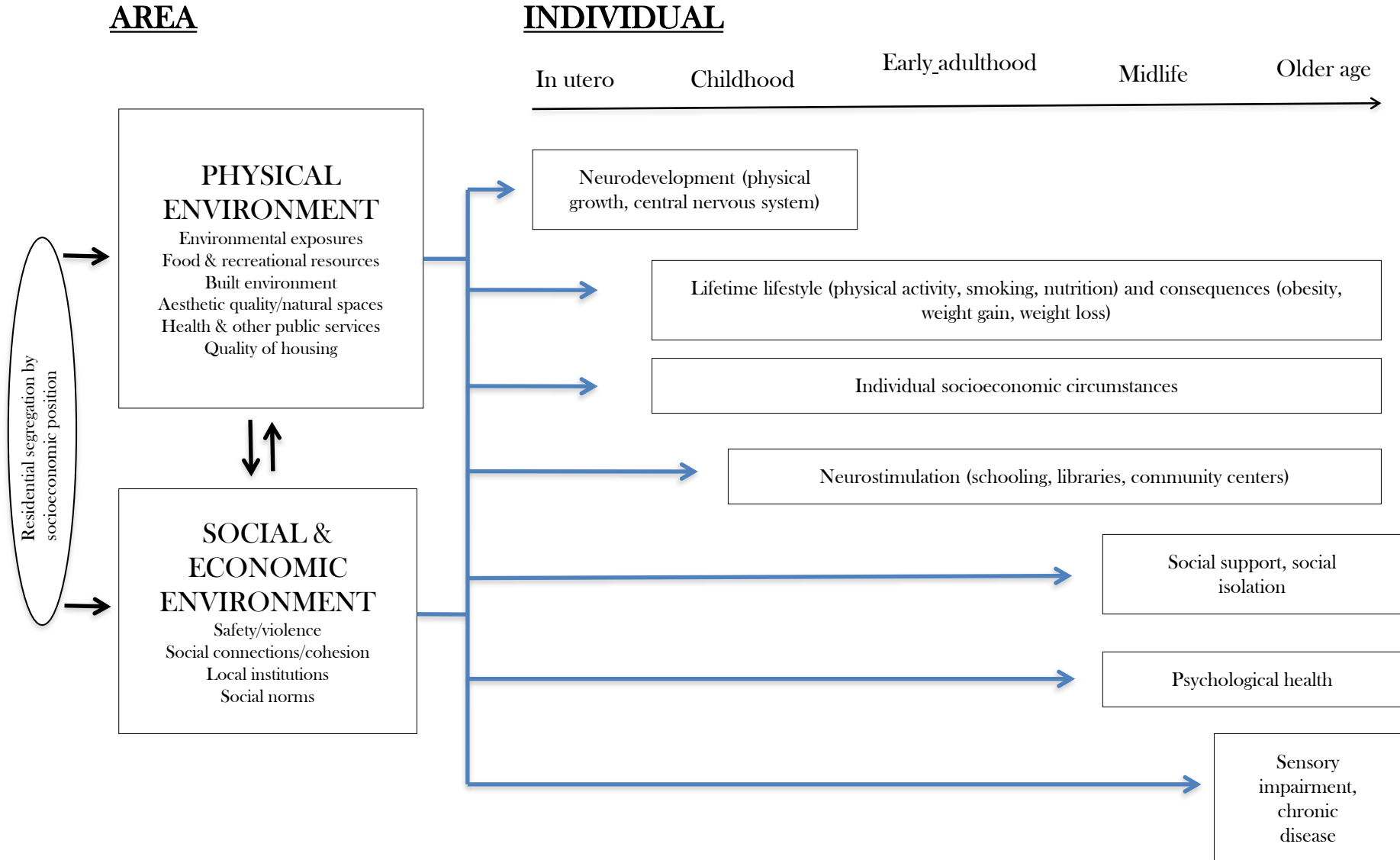
modified from Strachan D. (1997)



# BACKGROUND

- A **lower cognitive ability** in adulthood is highly related to future likelihood of developing dementia, institutionalization, and mortality
- **Elderly** fastest **growing** age group,
- **identifying factors** which can promote higher cognitive ability in adulthood or prevent decline,
- could have **large consequences** on the independence and quality of life of an ever-increasing segment of the population.

**Figure 1.** Causal diagram of how residential area over a life time may be affecting determinants of cognitive capability level and decline in older age



# What is known about neighbourhoods and cognitive capability?

Census neighbourhood deprivation



Lower MMSE & TICS scores (8 studies)

- Stronger for persons with little wealth & low educational attainment (Aneshensel CS et al 2011)
- Clarke PJ et al (2012) –
  - Whites - explained by access to institutional resources (whites)
  - Black and Hispanic - Greater institutional resources = lower cognition.
  - Physical activity explained part of association btwn institutional resources & cognition.

Census neighbourhood deprivation



Cognitive decline (2 studies)

- SALSA – baseline and 10-year decline.
- HEPESE - baseline, not decline over 5 years.

Census neighbourhood social



Lower cognition (2 studies)

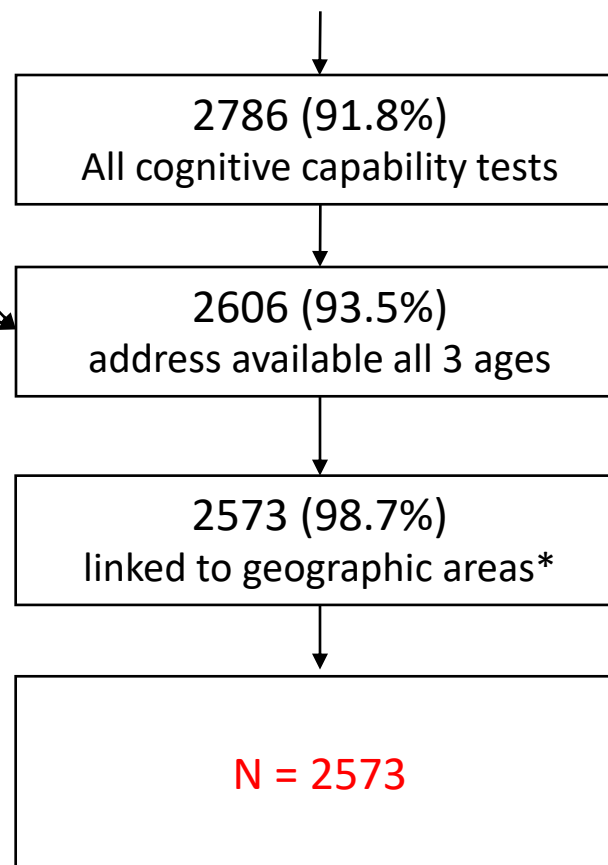
- Percentage no high school diploma = lower TICS scores (Wight RG et al, 2006)
- Higher hazard scores (12 items – social disorganization, public safety, etc) = lower processing speed and executive functioning (Lee BK et al 2011)

# OBJECTIVE

To bring a life course perspective to research into area deprivation and cognitive capability at mid-life.

## MRC National Survey of Health and Development (NSHD)

Birth (N=5362)	4 (n=4707)	26 (n=3626)	53 (n=3035)	60+
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\* Area linkage:

- local government district (LGD) England & Wales
- County level units Scotland
- See *Murray ET et al 2012 (Health and Place 18(2):366-74)* for more detailed explanation.

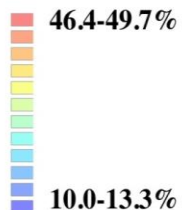


HALCyon

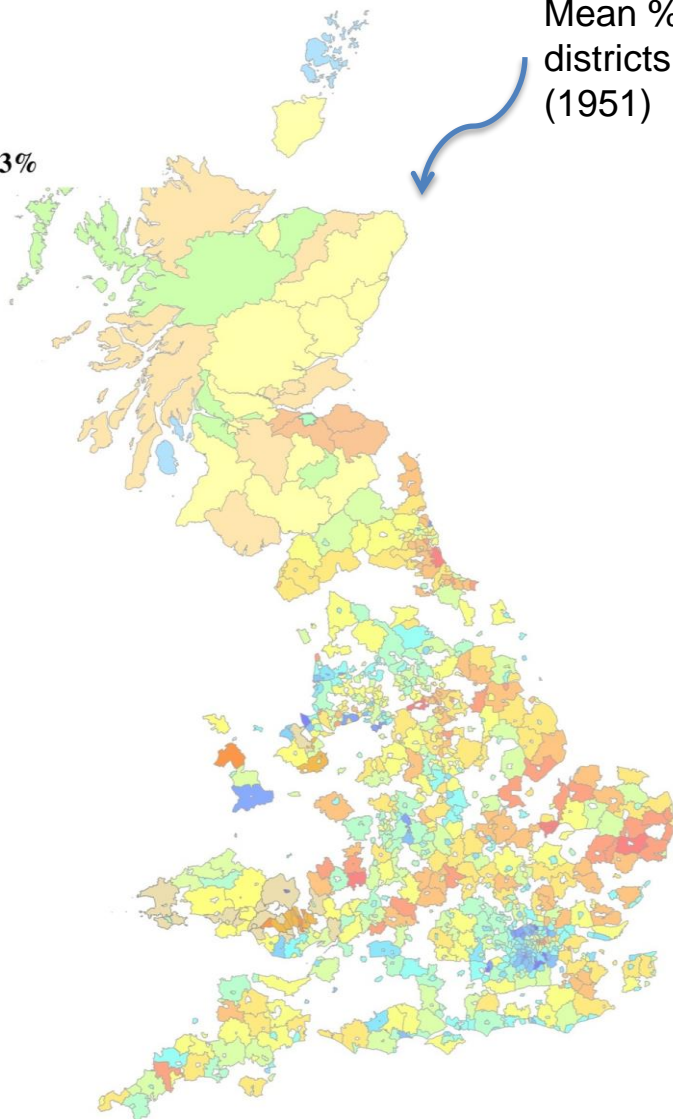
Healthy Ageing across the Life Course

MRC

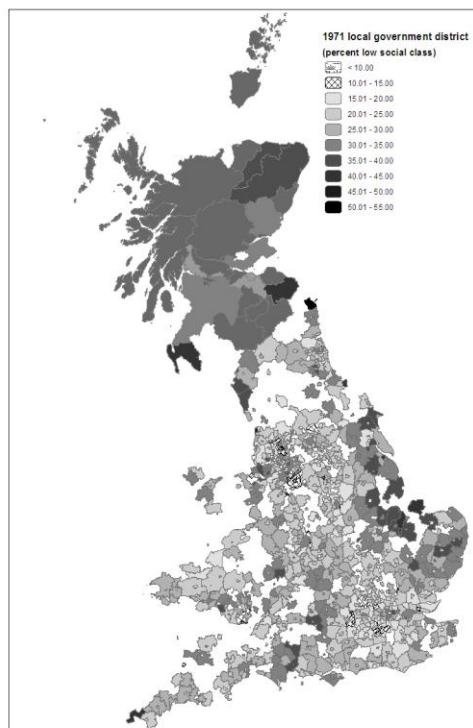
Unit for Lifelong Health and Ageing



Mean % area low social class for local government districts in which cohort members lived: aged 4 years (1951)



1971



2001





# Cognitive Capability

## National Adult Reading Test (NART)

- |               |               |
|---------------|---------------|
| 1. CHORD      | 31. FACADE    |
| 2. ACHE       | 32. ZEALOT    |
| 3. DEPOT      | 33. DRACHM    |
| 4. AISLE      | 34. AEON      |
| 5. BOUQUET    | 35. PLACEBO   |
| 15. CATACOMB  | 45. PRELATE   |
| 16. GAOLED    | 46. SIDEREAL  |
| 17. THYME     | 47. DEMESNE   |
| 18. HEIR      | 48. SYNCOPE   |
| 19. RADIX     | 49. LABILE    |
| 20. ASSIGNATE | 50. CAMPANILE |

## Word Learning (Memory)

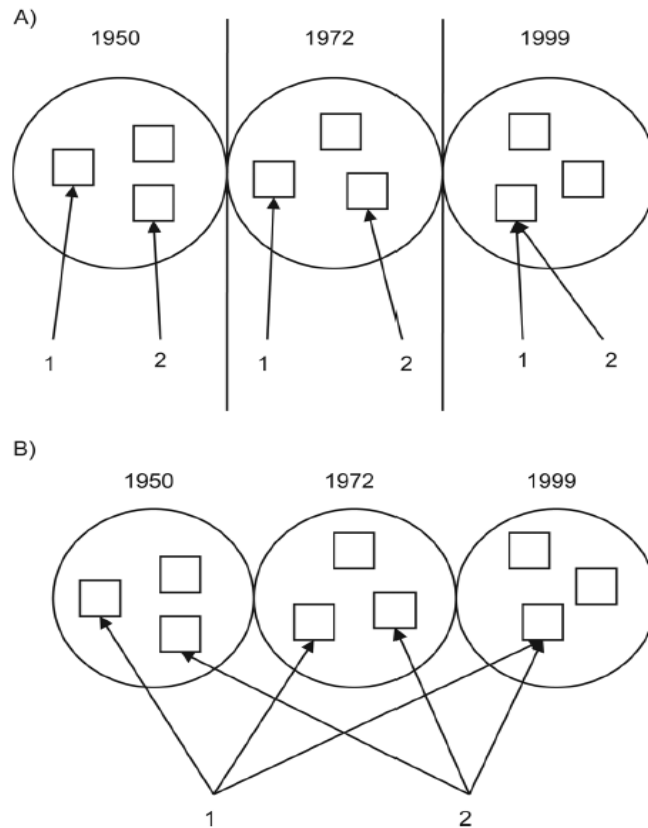


## Cancellation Speed

A U X C S H S P N K A A K  
M Z T Y M F Y D U P U U O  
V D C H H X W A F A A M R  
Q X R U Q E K I E M V C W  
L I H F Y K P Z X W J M C  
E J A V K E J M S Y H G Y  
R Y N K T U D L H M F T V  
E A T V H L I W G V T H B  
S T D G X Z D H C A N U W

# Statistical Analysis

**Cross-level models** (two-level multilevel models of individuals nested within an area, with the addition of random level components for area at each year.)

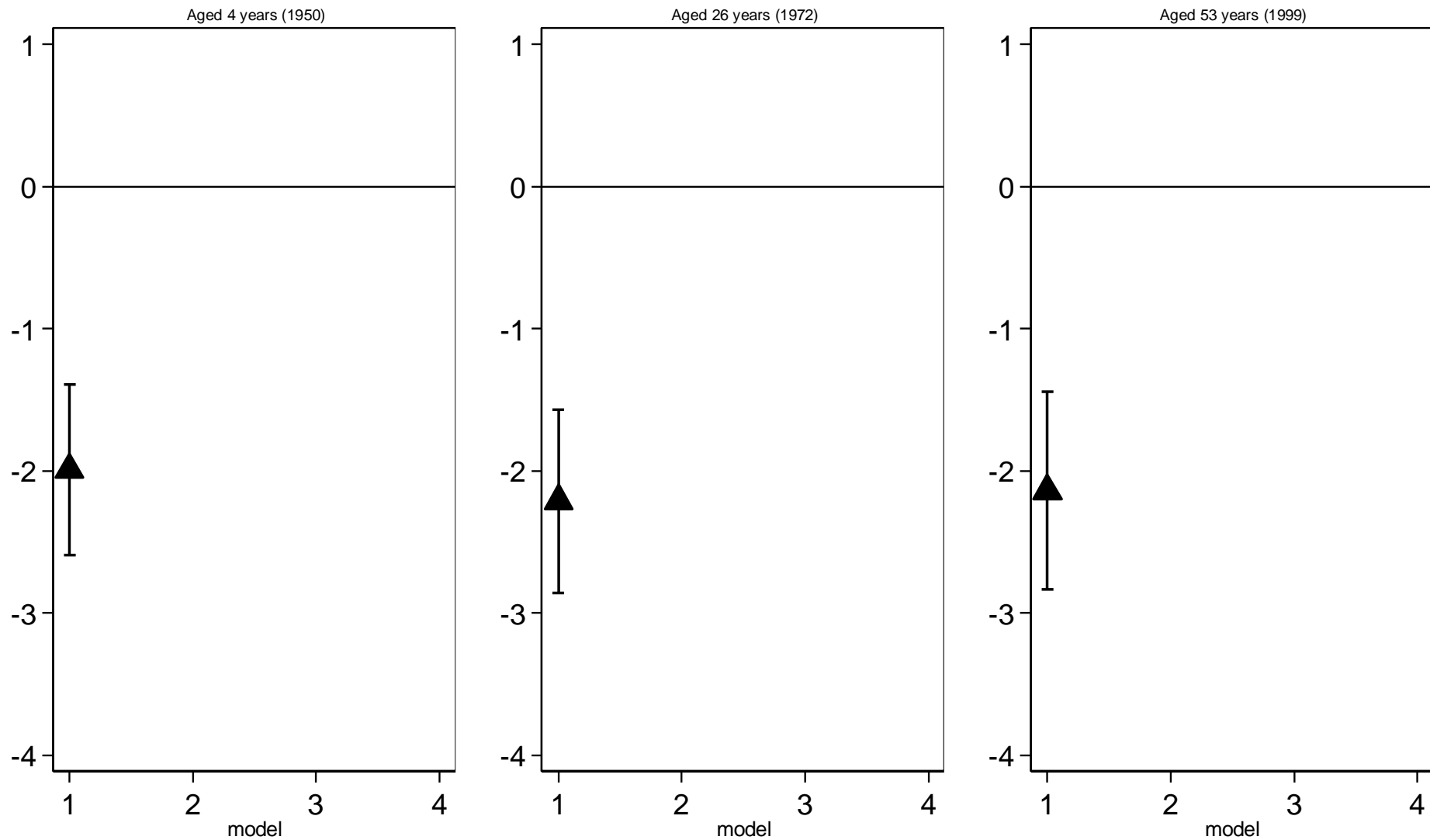


# Statistical Analysis

Mean difference in cognitive capability measures per 1-SD increase in area deprivation (standardised to mean of 100 and SD of 15)

- Model 1. Unadjusted
- Model 2. Adjusted for current individual SEP (contextual)
- Model 3. Adjusted for prior area deprivation (tracking)
- Model 4. Full model – Prior area deprivation + individual SEP at all 3 ages

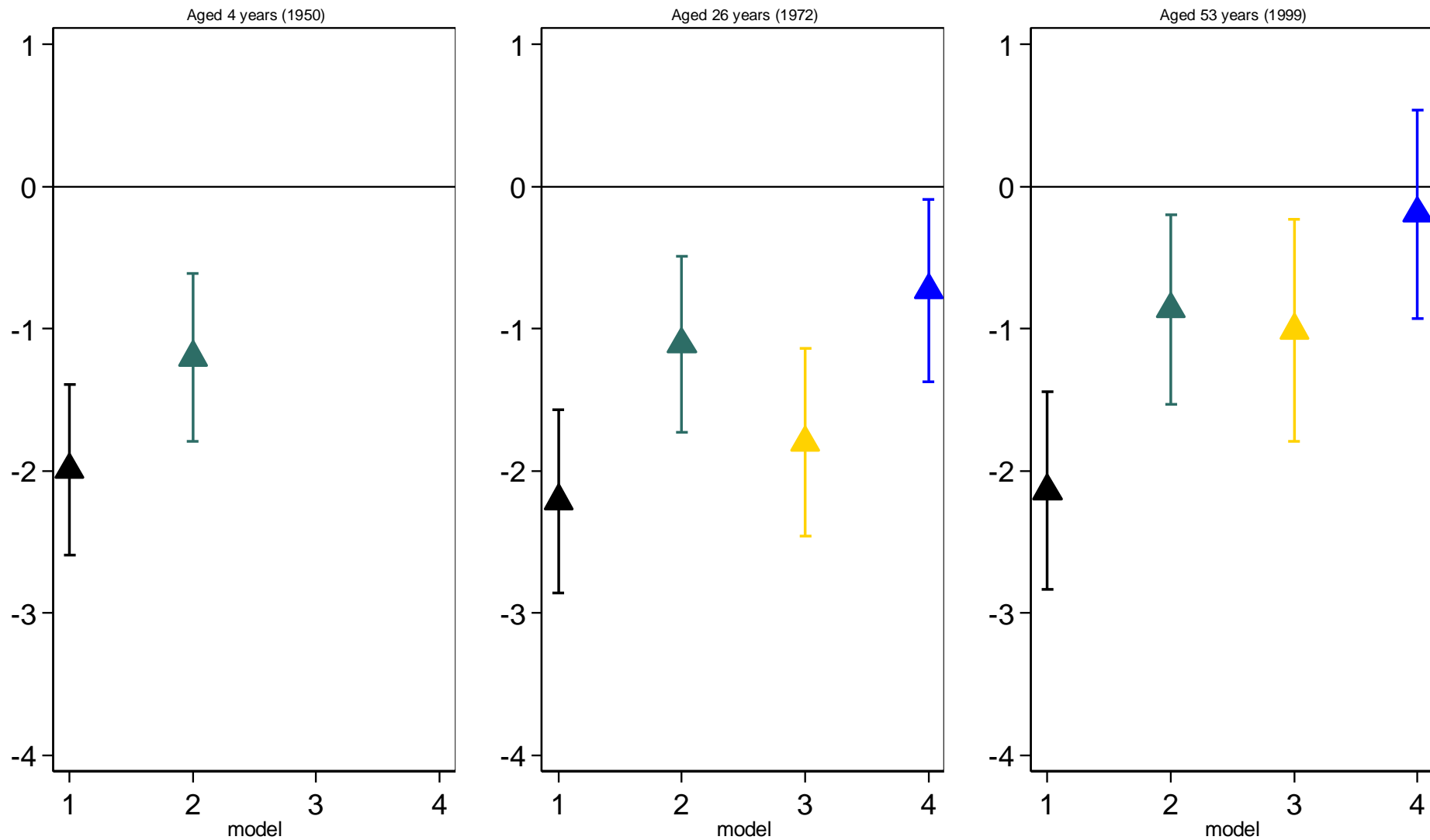
Mean Difference (95% CI) in **National Adult Reading Test (NART)** at age 53 years for 1-SD increase in area low social class (n=2573).



Model 1: Unadjusted (Black)  
Model 2: Adjusted cross-sectional SEP (green)  
Model 3: Adjusted prior area deprivation (gold)  
Model 4: Adjusted prior area deprivation, prior SEP and current SEP (blue)

1. CHORD	31. FACADE
2. ACHE	32. ZEALOT
3. DEPOT	33. DRACHM
4. AISLE	34. AEDN
5. BOUQUET	35. PLACEBO
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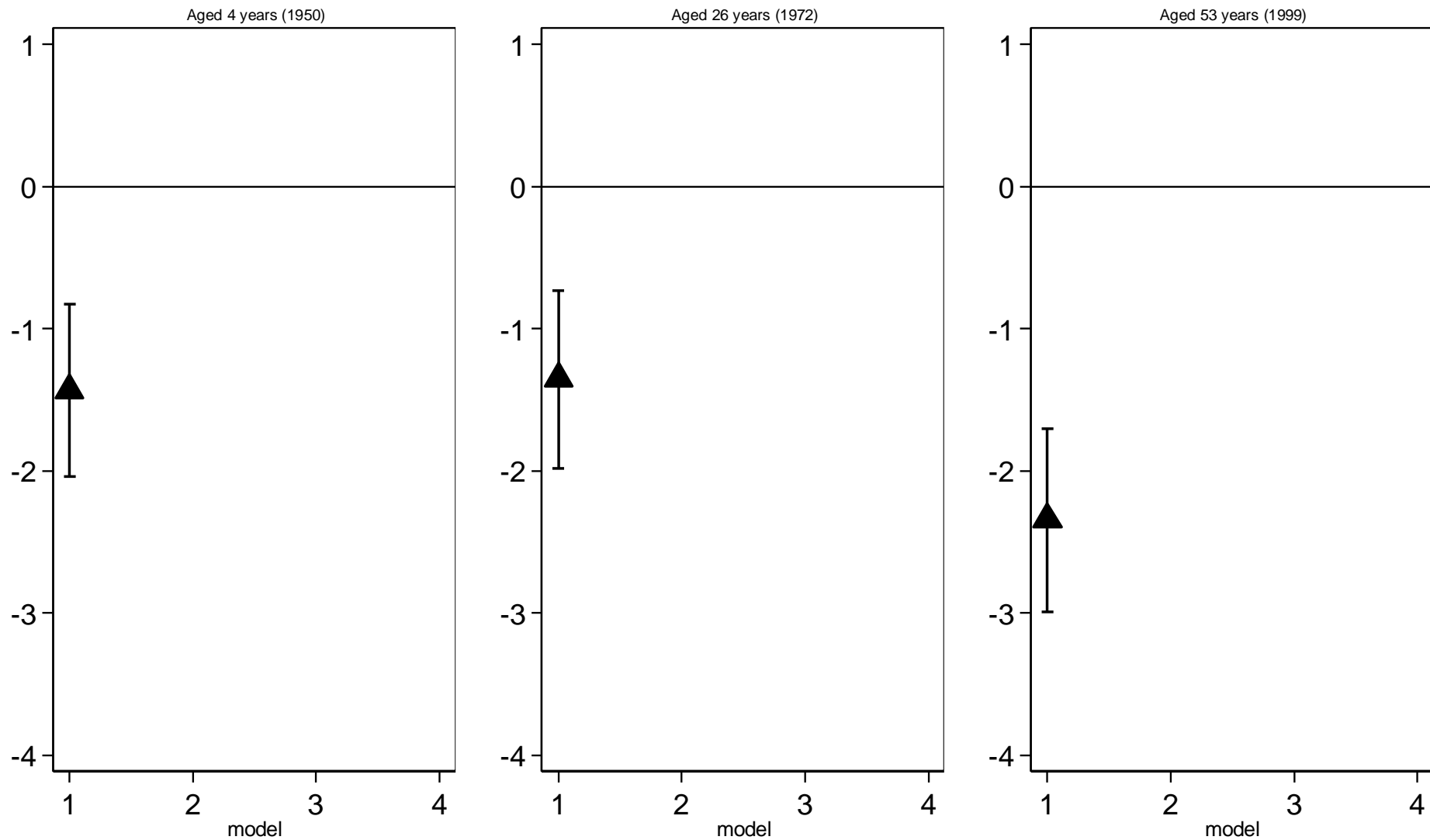
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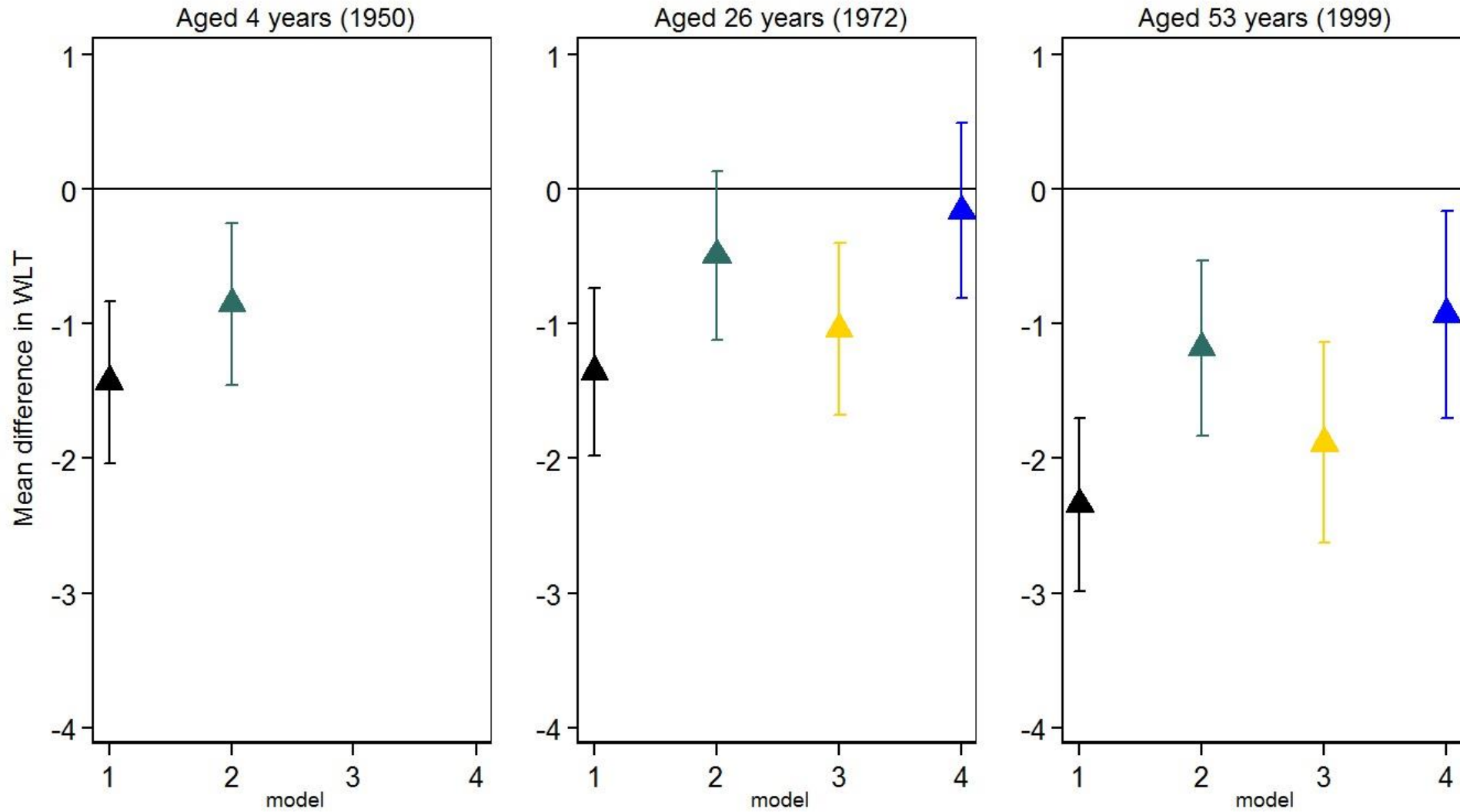
Mean Difference (95% CI) in **Word Learning Test (Memory)** at age 53 years for 1-SD increase in area low social class (n=2573).



Model 1: Unadjusted (Black)  
Model 2: Adjusted cross-sectional SEP (green)  
Model 3: Adjusted prior area deprivation (gold)  
Model 4: Adjusted prior area deprivation, prior SEP and current SEP (blue)



Figure 2. Mean Difference (95% CI) in Word Learning Test (WLT) scores at age 53 years for 1-SD increase in area low social class in 1950 and 1972, before and after adjustment for area tracking\*(n=2573).



Model 1: Unadjusted (black)  
Model 2: Adjusted cross-sectional SEP (green)  
Model 3: Adjusted prior area deprivation (gold)  
Model 4: Adjusted prior area deprivation, prior SEP and current SEP (blue)



# Summary

- Residence in deprived areas across the life course was associated with lower cognitive capability in mid-life.
- BUT heterogeneity by cognitive test
  - The NART reflects how well an individual pronounces words, is closely linked to education, and not vulnerable to decline until the very late stages of dementia.
  - Unlike the NART, memory has been shown to decline with age and be vulnerable to detrimental disease and lifestyle factors





# Advantages of HALCyon

- Prospectively collected residential address data during childhood, early adulthood and midlife.
- Large variation in individual and area socioeconomic characteristics and high level of residential mobility.
- Able to document that no selection bias occurred by area socioeconomic status in 1950 or 1972.



# Challenges of HALCyon

- Inconsistent collection of historical area socioeconomic characteristics by the census.
- Boundary changes of areas over time.
- Large cultural changes altering what 'deprived' may mean.
- How to model life course area effects.



# Conclusion

- **Prevention** of cognitive deficits = **individual** + **residential** environments.
- **Interventions** for cognitive ability = socioeconomic environment in which a person **grows up** + where they reside in **mid-life**, to have the most impact.



# Huge thank you!



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