



Explanations for the influence of early social conditions and gender on premature adult mortality: findings from the British 1946 birth cohort study

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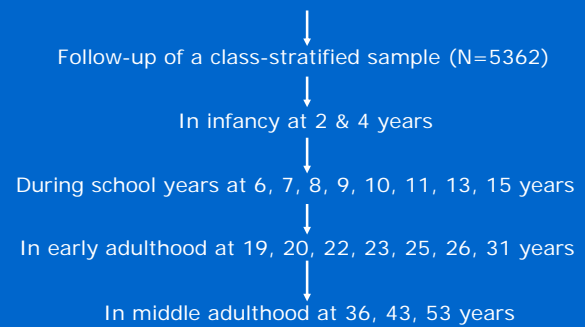
MRC National Survey of Health and Development (1946 birth cohort)

Originally the study aimed to address 2 specific issues in the years before the establishment of the NHS

- Reasons for falling fertility
- Effectiveness of obstetrics and midwifery on premature births, infant mortality, and on promotion of health of mother's and infants

Has evolved into a life course study investigating pathways to physical and cognitive ageing

Maternity study of all births in 1 week in England, Wales & Scotland in 1946



Maintaining the study's momentum

| Years | Cohort ages | National policy problems |
|-----------|------------------|---|
| 1946 | Birth | Costs of maternity, reason for falling fertility |
| 1947-1950 | 1-4 years | Social class differences in maternal and child mortality and morbidity. Value of health visitors' work. |
| 1951-1961 | 6-15 years | Increasing the national level of educational attainment. The 'waste of talent' problem. |
| 1962-1976 | 16-30 years | Outcomes of education in terms of occupational choice and skills. Delinquency. |
| 1976- | 30 years onwards | Ageing processes, self care of health, receptivity to health promotion. |

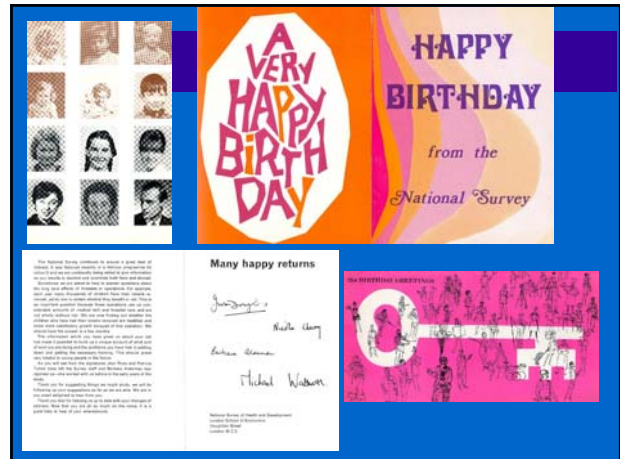
Data collections & contacts with the sample (n=5362)

| Year | Age in Years | Respondent | Data Collector | Target Sample | % achieve |
|----------------|--------------|-----------------------|--------------------|---------------|------------|
| 1946 -50 | 0-4 | Mother | HV | 4993 | 95% |
| 1951-61 | 5-15 | Mother & child | SN or SD or HV & T | 4900 | 89% |
| 1962-77 | 16-31 | All CMs | P, HV, I | 4858 | 78% |
| 1965-71 | 19-25 | Mothers of first born | RN | 1783 | 94% |
| 1982 | 36 | All CMs | RN | 4838 | 86% |
| 1989 | 43 | All CMs | RN | 4826 | 87% |
| 1993-2000 | 47-54 | Women | P | | 84-90% |
| 1999 | 53 | All CMs | RN | 3673 | 3035 (83%) |

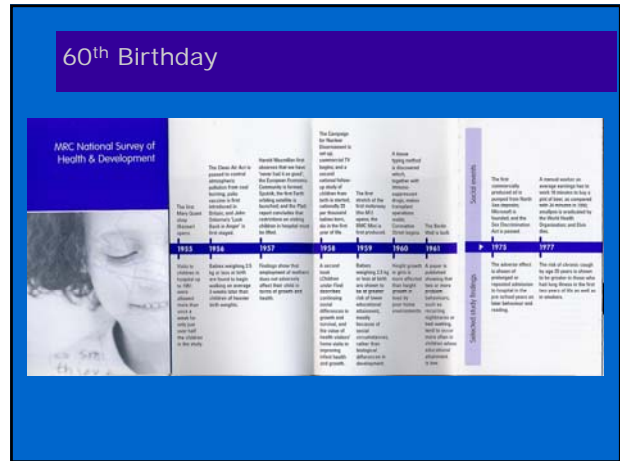
CM cohort member, HV health visitor, SN school nurse, SD school doctors, T teacher, I interview, RN research nurse, P postal

Birthday cards

- Birthday cards were introduced at age 16 years to encourage response after leaving school, which requests notification of changes of name and/or address
- They have been continued ever since but now include details of recent work, with references to recent publications



60th Birthday



MRC National Survey of Health & Development (1946 Birth cohort)

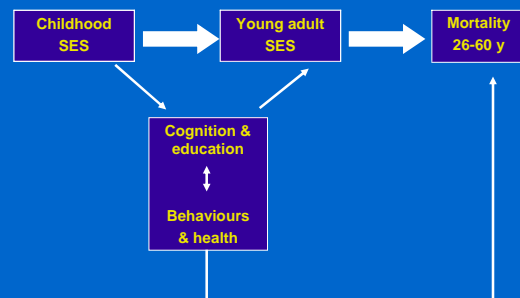
Cohort of 5362 men and women born in England, Scotland and Wales in one week in March 1946 and followed up ever since

Childhood and adolescence- every 2 years
physical growth and menarche, cognitive and motor development, early temperament and behaviour, socioeconomic environment

Adulthood – main contacts at 26, 36, 43, 53 yrs
blood pressure, lung function, mental health, cognition, musculoskeletal function, parity, morbidity, health behaviours
socioeconomic environment, educational attainment

Follow-up of mortality and cancer registrations. 619 deaths by age 60 yrs
332 deaths 26-60 years (137 women and 195 men)

Possible pathways between childhood social conditions and adult premature mortality



Aim

Poor childhood and adult socio-economic conditions, lower childhood cognitive ability and cigarette smoking are all associated with adult mortality risk.

To what extent these risk factors are part of the same pathway linking childhood experience to adult survival?

Do the effects of these risk factors vary by gender?

Socioeconomic indicators

AGE 4 YEARS

1. Father's social class (*non manual/manual*)
2. Care of house and child rated by health visitor (*very clean house & child, adequate shoes and clothes, mother coped well*)
3. Housing quality (*dwelling in good repair, built since 1919, no overcrowding*)
4. Parental education

ADULT

1. Household social class (*non manual/manual*)
2. Ownership of home at age 26 years

Hazard ratios (95% confidence intervals) for all cause mortality (26-60 y) by childhood SEP

| | Total sample available | | |
|----------------------------------|------------------------|----------|--|
| | Sex adjusted | <i>p</i> | |
| Father's social class | | | |
| N=4112 | | <.001 | |
| Non- manual | 1.0 | | |
| Manual | 1.6 1.2,2.0 | | |
| Housing quality | | | |
| N=4123 | | .001 | |
| Good | 1.0 | | |
| Intermediate | 1.3 1.0,1.7 | | |
| Worst | 1.6 1.3,2.2 | | |
| Care of house & child | | | |
| N=3843 | | .012 | |
| Best | 1.3 0.95,1.7 | | |
| Intermediate | 1.5 1.2,2.1 | | |
| Worst | | | |

p-value = .012 for interaction between father's social class and sex.

Hazard ratios (95% confidence intervals) for all cause mortality (26-60 y) by childhood SEP

| | Total sample available | | Women |
|----------------------------------|------------------------|----------|-------------|
| | Sex adjusted | <i>p</i> | Unadjusted |
| Father's social class | | | |
| N=4112 | | <.001 | |
| Non- manual | 1.0 | | 1.0 |
| Manual | 1.6 1.2,2.0 | | 2.2 1.5,3.4 |
| Housing quality | | | |
| N=4123 | | .001 | |
| Good | 1.0 | | 1.0 |
| Intermediate | 1.3 1.0,1.7 | | 1.2 0.8,1.9 |
| Worst | 1.6 1.3,2.2 | | 2.1 1.4,3.1 |
| Care of house & child | | | |
| N=3843 | | .012 | |
| Best | 1.0 | | 1.0 |
| Intermediate | 1.3 0.95,1.7 | | 1.5 0.9,2.4 |
| Worst | 1.5 1.2,2.1 | | 1.8 1.2,2.7 |

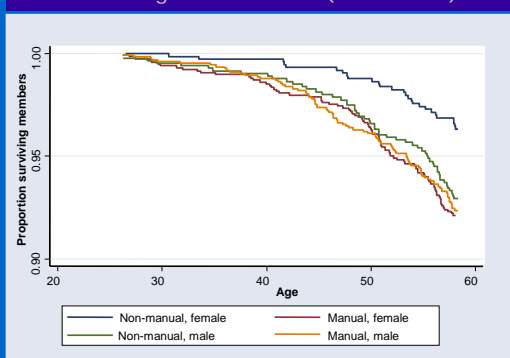
p-value = .012 for interaction between father's social class and sex.

Hazard ratios (95% confidence intervals) for all cause mortality (26-60 y) by childhood SEP

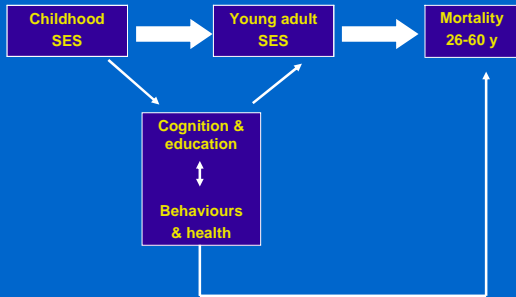
| | Total sample available | | Women | Men |
|----------------------------------|------------------------|----------|-------------|--------------|
| | Sex adjusted | <i>p</i> | Unadjusted | Unadjusted |
| Father's social class | | | | |
| N=4112 | | <.001 | | |
| Non- manual | 1.0 | | 1.0 | 1.0 |
| Manual | 1.6 1.2,2.0 | | 2.2 1.5,3.4 | 1.2 0.9,1.7 |
| Housing quality | | | | |
| N=4123 | | .001 | | |
| Good | 1.0 | | 1.0 | 1.0 |
| Intermediate | 1.3 1.0,1.7 | | 1.2 0.8,1.9 | 1.4 0.98,2.0 |
| Worst | 1.6 1.3,2.2 | | 2.1 1.4,3.1 | 1.4 0.96,2.0 |
| Care of house & child | | | | |
| N=3843 | | .012 | | |
| Best | 1.0 | | 1.0 | 1.0 |
| Intermediate | 1.3 0.95,1.7 | | 1.5 0.9,2.4 | 1.1 0.77,1.7 |
| Worst | 1.5 1.2,2.1 | | 1.8 1.2,2.7 | 1.4 0.95,1.9 |

p-value = .012 for interaction between father's social class and sex.

Cumulative death rates (26-60 y) by father's social class & gender N=4112 (332 deaths)



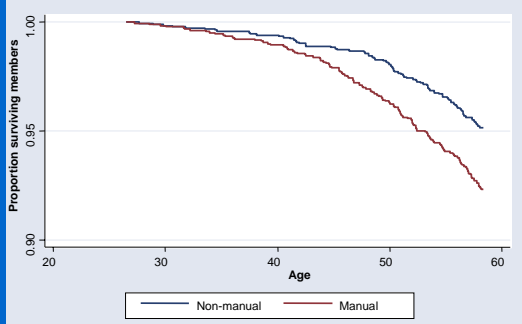
Possible pathways between childhood social conditions and adult premature mortality



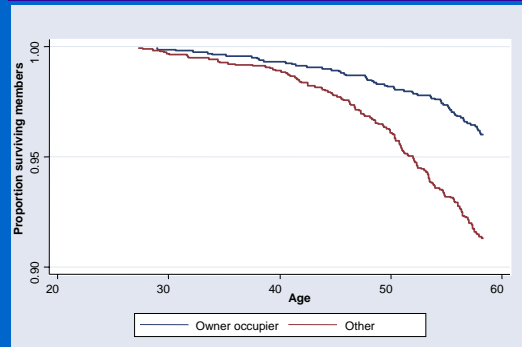
Hazard ratios (95% confidence intervals) for all cause mortality (26-60 y) by young adult SEP

| | Total sample Sex adjusted | p | Women | Men |
|---|------------------------------|--------|-------------|-------------|
| Household social class N=3773 | | < .001 | | |
| Non-manual | 1.0 | | 1.0 | 1.0 |
| Manual | 1.6 1.3,2.1 | | 1.6 1.1,2.3 | 1.7 1.2,2.3 |
| Housing tenure N=3658 | | < .001 | | |
| Owner occupier | 1.0 | | 1.0 | 1.0 |
| Other | 2.8 2.2,3.5 | | 3.1 2.1,4.4 | 2.6 1.9,3.5 |

Cumulative death rates (26-60 y) by household social class at 26y N=4112 (332 deaths)



Cumulative death rates (26-60 y) by housing tenure at 26 y N=4112 (332 deaths)



Hazard ratios (95% confidence intervals) for all cause mortality (26-60 y) by lifetime SEP

| | Unadjusted | p | Adjusted | p |
|---|-------------|--------|--------------|--------|
| Father's social class & gender | | < .001 | | .009 |
| Non-manual, women | 1.0 | | 1.0 | |
| Manual, women | 2.2 1.5,3.4 | | 1.9 1.2,2.8 | |
| Non-manual, men | 2.0 1.3,3.2 | | 2.0 1.3,3.0 | |
| Manual, men | 2.5 1.5,4.1 | | 2.0 1.3,3.0 | |
| Household social class | | < .001 | | .07 |
| Non-manual | 1.0 | | 1.0 | |
| Manual | 1.7 1.3,2.1 | | 1.3 0.98,1.6 | |
| Housing tenure at 26 | | < .001 | | < .001 |
| Owner occupier | 1.0 | | 1.0 | |
| Other | 2.8 2.2,3.6 | | 2.4 1.9,3.1 | |

Assessing early cognitive ability in the 1946 cohort

AT 8, 11, 15 YEARS

- Verbal comprehension; Pronunciation,
- Vocabulary; Non-verbal reasoning
- Mathematics (at 15 years only)

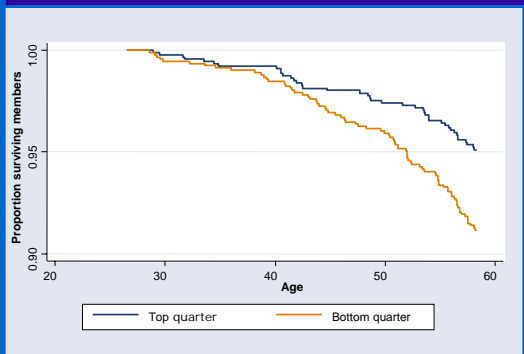
FOR ANALYSIS

- At each age, standardised scores added together

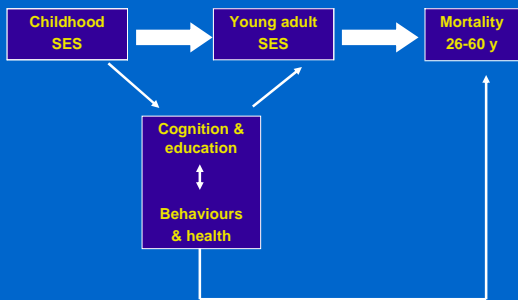
Hazard ratios (95% CI) for mortality (26-60 y) by childhood cognitive ability & educational attainment

| | Total sample Sex adjusted | <i>p</i> | Women Unadjusted | Men Unadjusted |
|---|------------------------------|----------|---------------------|-------------------|
| Childhood cognitive ability | | 0.004 | | |
| Highest quarter | 1.0 | | 1.0 | 1.0 |
| 2 | 1.2 0.80,1.8 | | 1.5 0.77,2.7 | 1.1 0.62,1.8 |
| 3 | 1.4 0.91,2.0 | | 1.7 0.91,3.1 | 1.2 0.68,1.9 |
| Lowest quarter | 1.8 1.3,2.7 | | 2.1 1.2,3.8 | 1.7 1.0,2.7 |
| Educational qualifications by 26 y | | 0.004 | | |
| Advanced | 1.0 | | 1.0 | 1.0 |
| Ordinary level | 1.3 0.90,1.9 | | 1.4 0.76,2.6 | 1.3 0.81,2.2 |
| None | 1.7 1.2,2.3 | | 2.0 1.2,3.4 | 1.5 1.0,2.2 |

Cumulative death rates (26-60 y) by quartiles of cognitive function at 15 years



Possible pathways between childhood social conditions and adult premature mortality



Hazard ratios (95% CI) for mortality by cog. ability, lifetime SEP, smoking N=2136 women, 137 deaths

| | Unadjusted | Adjusted | Adjusted |
|------------------------------------|---------------|--------------|---------------|
| Father's social class | | <0.01 | .002 |
| Non-manual | 1.0 | 1.0 | 1.0 |
| Manual | 2.2 1.5, 3.4 | 2.0 1.3, 3.1 | 1.9 1.2, 3.0 |
| Childhood cognitive ability | | .53 | 0.9 |
| lowest quarter | 1.0 | 1.0 | 1.0 |
| 2 | 0.82 0.53,1.3 | 1.0 0.63,1.6 | 1.0 0.63,1.6 |
| 3 | 0.78 0.48,1.3 | 1.0 0.63,1.7 | 1.0 0.63,1.7 |
| Highest quarter | 0.68 0.39,1.2 | 1.0 0.56,1.8 | 1.0 0.56,1.8 |
| Adult social class | | | 0.54 |
| Non-manual | | | 1.0 |
| Manual | | | 1.1 0.77, 1.7 |
| Housing tenure at age 26 | | | <.001 |
| Owner occupier | | | 1.0 |
| Other | | | 2.6 1.8, 3.9 |
| Smoking behaviour | | | |
| Non-smoker | | | |
| smoker | | | |

Hazard ratios (95% CI) for mortality by cog. ability, lifetime SEP, smoking N=2136 women, 137 deaths

| | Adjusted | <i>p</i> |
|------------------------------------|---------------|----------|
| Father's social class | 1.0 | 0.009 |
| Non-manual | 1.8 1.2, 2.9 | |
| Manual | | |
| Childhood Cognitive ability | | 0.96 |
| lowest quarter | 1.0 | |
| 2 | 1.0 0.66, 1.7 | |
| 3 | 1.1 0.69, 1.9 | |
| Highest quarter | 1.1 0.61, 2.0 | |
| Adult social class | | 0.97 |
| Non-manual | 1.0 | |
| Manual | 1.0 0.68, 1.5 | |
| Housing tenure at age 26 | | <.001 |
| Owner occupier | 1.0 | |
| Other | 2.2 1.5, 3.3 | |
| Smoking behaviour | | <.001 |
| Non-smoker | 1.0 | |
| smoker | 2.4 1.6, 3.5 | |

Hazard ratios (95% CI) for mortality by cog. ability & lifetime SEP, smoking N=2325 men, 195 deaths

| | Unadjusted | Adjusted | Adjusted |
|------------------------------------|---------------|---------------|---------------|
| Father's social class | | 0.2 | 0.6 |
| Non-manual | 1.0 | 1.0 | 1.0 |
| Manual | 1.2 0.9,1.7 | 1.1 0.8,1.5 | 0.98 0.7,1.4 |
| Childhood Cognitive ability | | 0.03 | 0.56 |
| lowest quarter | 1.0 | 1.0 | 1.0 |
| 2 | 0.68 0.5,1.0 | 0.80 0.54,1.2 | 0.80 0.54,1.2 |
| 3 | 0.56 0.4,0.9 | 0.75 0.48,1.2 | 0.75 0.48,1.2 |
| Highest quarter | 0.61 0.4,0.95 | 0.89 0.55,1.4 | 0.89 0.55,1.4 |
| Adult social class | | | 0.14 |
| Non-manual | | | 1.0 |
| Manual | | | 1.3 0.92, 1.9 |
| Housing tenure at age 26 | | | <0.001 |
| Owner occupier | | | 1.0 |
| Other | | | 2.2 1.6, 3.1 |
| Smoking behaviour | | | |
| Non-smoker | | | |
| smoker | | | |

Hazard ratios (95% CI) for mortality by cog. ability & lifetime SEP, smoking N=2325 men & 195 deaths

| | Adjusted | P |
|------------------------------------|----------------|-------|
| Father's social class | | |
| Non-manual | 1.0 | 0.86 |
| Manual | 0.97 0.69, 1.4 | |
| Childhood Cognitive ability | | 0.53 |
| lowest quarter | 1.0 | |
| 2 | 0.79 0.53, 1.2 | |
| 3 | 0.77 0.49, 1.2 | |
| Highest quarter | 0.92 0.57, 1.5 | |
| Adult social class | | 0.22 |
| Non-manual | 1.0 | |
| Manual | 1.3 0.87, 1.8 | |
| Housing tenure at age 26 | | <.001 |
| Owner occupier | 1.0 | |
| Other | 2.0 1.4, 2.8 | |
| Smoking behaviour | | .007 |
| Non-smoker | 1.0 | |
| smoker | 1.6 1.1, 2.1 | |

Hazard ratios (95% CI) for mortality by cog. ability, lifetime SEP, smoking by sex

| | Women Adj. | p | Men Adj. | P |
|------------------------------------|---------------|-------|----------------|-------|
| Father's social class | | | | |
| Non-manual | 1.0 | 0.009 | 1.0 | 0.9 |
| Manual | 1.8 1.2, 2.9 | | 0.97 0.69, 1.4 | |
| Childhood Cognitive ability | | 0.9 | | 0.5 |
| lowest quarter | 1.0 | | 1.0 | |
| 2 | 1.0 0.66, 1.7 | | 0.79 0.53, 1.2 | |
| 3 | 1.1 0.69, 1.9 | | 0.77 0.49, 1.2 | |
| Highest quarter | 1.1 0.61, 2.0 | | 0.92 0.57, 1.5 | |
| Adult social class | | 0.9 | | 0.2 |
| Non-manual | 1.0 | | 1.0 | |
| Manual | 1.0 0.68, 1.5 | | 1.3 0.87, 1.8 | |
| Housing tenure at age 26 | | <.001 | | <.001 |
| Owner occupier | 1.0 | | 1.0 | |
| Other | 2.2 1.5, 3.3 | | 2.0 1.4, 2.8 | |
| Smoking behaviour | | <.001 | | .007 |
| Non-smoker | 1.0 | | 1.0 | |
| smoker | 2.4 1.6, 3.5 | | 1.6 1.1, 2.1 | |

Summary of findings (1)

Women only

- In this cohort, early socio-economic differences in all-cause mortality were striking women but not in men.
 - Women from non-manual origins have lower adult premature mortality than those from manual origins.
 - These differences were not fully explained by childhood cognitive ability, adult socio-economic conditions, or smoking.
- #### Men and women
- The strongest adult socio-economic indicator of mortality was home ownership.
 - Those not owning their own home were over twice as likely to have died by aged 60 compared with home owners.
 - Smokers had a higher rate of all cause mortality than non-smokers. The effect of smoking was stronger for women (HR 2.4 vs 1.6).

Summary of findings (2)

- The effect of childhood cognitive ability on premature mortality was strongly attenuated when home ownership was added to the model suggesting that higher childhood cognitive ability increased survival chances by securing better adult socio-economic conditions, such as home ownership.
- Better conditions were associated with a lower risk of smoking and this also improved survival, and partly explained socio-economic differences in mortality.
- These findings were similar for cardiovascular and cancer mortality.

Future directions

- How emotional health influences physical health and mortality
- Consider indicators of early body size and physical health