

WHAT IS ALREADY KNOWN ON THIS TOPIC

Laboratory and epidemiological evidence suggests that aspirin and other anti-inflammatory drugs may be protective against dementia

Data from randomised studies to date have been inconclusive

WHAT THIS STUDY ADDS

Low dose aspirin did not provide overall cognitive benefits in generally healthy ageing women participating in a large, long term randomised trial

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Social inequalities in self reported health in early old age: follow-up of prospective cohort study

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ABSTRACT

Objective To describe differences in trajectories of self reported health in an ageing cohort according to occupational grade.

Design Prospective cohort study of office based British civil servants (1985-2004).

Participants 10 308 men and women aged 35-55 at baseline, employed in 20 London civil service departments (the Whitehall II study); follow-up was an average of 18 years.

Main outcome measures Physical component and mental component scores on SR-36 measured on five occasions.

Results Physical health deteriorated more rapidly with age among men and women from the lower occupational grades. The average gap in physical component scores between a high and low grade civil servant at age 56 was 1.60 and this gap increased by 1 over 20 years. The average physical health of a 70 year old man or woman who was in a high grade position was similar to the physical health of a person from a low grade around eight

years younger. In mid-life, this gap was only 4.5 years. Although mental health improved with age, the rate of improvement is slower for men and women in the lower grades.

Conclusions Social inequalities in self reported health increase in early old age. People from lower occupational grades age faster in terms of a quicker deterioration in physical health compared with people from higher grades. This widening gap suggests that health inequalities will become an increasingly important public health issue, especially as the population ages.

INTRODUCTION

Health in general tends to deteriorate as people get older. There may, however, be social inequalities in the trajectories of age related health decline. Cross sectional evidence suggests that the prevalence of ill health in people aged 50-59 from routine and manual social classes is greater than among older people from professional and managerial social classes.¹ If people

from disadvantaged social classes age faster in terms of declining health, this would result in widening health inequalities in later life.

Most cross sectional studies show converging relative health inequalities among the oldest age groups.²³ Evidence from longitudinal studies is conflicting; some show decreasing health inequalities with age,^{4,7} while others find persisting or even widening inequalities.⁸⁻¹⁰ Most longitudinal analyses examined mortality as the outcome,^{4,6,7,10} a few examined morbidity^{5,8,9} and only one separated out age and period or cohort effects.¹¹

Earlier evidence suggested that women tend to report greater morbidity and poorer functioning than men, and this sex difference may increase as they age. In addition, women from disadvantaged classes may experience greater health declines with age than men from a similar class. As people from disadvantaged social classes are more likely to retire for health reasons,¹² retirement may also exacerbate health inequalities if their health continues to decline more quickly in retirement.

We examined whether people in lower occupational classes age faster in terms of a quicker decline in self reported health compared with those belonging to more advantaged classes and whether the effect of occupational class on these trajectories varies by sex and retirement status.

METHODS

Data—The Whitehall II study is an ongoing longitudinal study of 10 308 male and female civil servants (initially aged 35-55) based in London and set up in 1985.¹³ We analysed the third (1991-3, n=8637), fourth (1995-6, n=8629), fifth (1997-9, n=7830), sixth (2001,

n=7344), and seventh (2002-4, n=6914) phases of the study.

Variables—The United Kingdom standard version of the SF-36 questionnaire was administered on five occasions (phases 3 to 7). This 36 item questionnaire covers issues relating to physical, psychological, and social functioning and can be summarised into physical and mental health components.¹⁴ Occupational class was measured as the participant's civil service employment grade at each phase, which could vary over time. Participants were also asked at each phase to classify their employment status, with "retired" as an option. Thus employment/retirement status could also vary over time. Age was centred at 56, the mean age across all phases.

Analysis—We used growth curve modelling to separate the effects of ageing and period or cohort and used these models to look at socioeconomic position as an exposure that varies as people age. We included sex and retirement status at each phase in the models. Two way interaction terms between time specific employment grade and the age terms estimated whether grade effects on health differ as the cohort gets older. We tested further two way interaction effects to examine if the effect of age was modified by sex or retirement. Three way interaction effects were also examined to see if occupational class trajectories of health were modified by age or sex. See bmj.com for details.

RESULTS

Physical health deteriorated for all occupational groups at older ages, while mental health tended to improve with age (fig 1). This change in SF-36 scores may be an ageing effect. Alternatively, the change may be caused by cohort effects (the oldest cohort member was born in 1930, the youngest in 1952) or period effects (such as retirement at any of the measurement phases).

The tables on bmj.com show the mean SF-36 physical and mental component scores at each phase of data collection by age group, employment grade, retirement status, and sex. The physical component scores for men at phase 3 show that older men have poorer (lower) physical health. Comparing phase 3 with later phases, in each age group men from later phases also have poorer physical health.

We found similar patterns of age and period related declines in physical component scores among women, although the mean levels tended to be lower than in men. In contrast, older men and women have better mean mental component scores than younger men and women. At later periods there was a small increase in mental health scores for the older age groups. There was a social gradient in physical health at phase 3, which tended to widen considerably among women, but less so among men. There was not much of a social gradient in mental health among men and women at phase 3. By phase 7, however, people from higher employment grades had better mental health than those from lower grades.

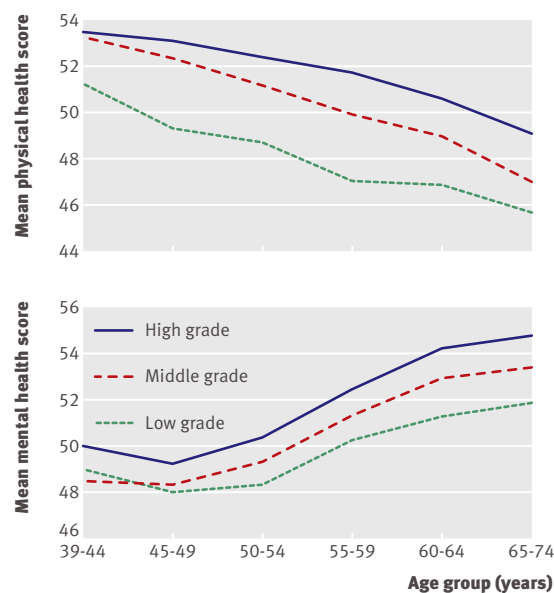


Fig 1 | Mean SF-36 physical component scores and mental component scores by age group: Whitehall II respondents from phases 3-7

The table shows the estimated coefficients from fitting growth curve models to the data on *bmj.com*. For the physical component score in model I, the constant term refers to the mean physical health (52.97) for the reference group: high grade, non-retired men aged 56 in 1991-3. A quadratic growth model (with age and age² terms) was specified with a single year increase in age resulting in poorer physical health (a decrease of 0.03 from age 56 to 57). This negative effect of age on physical health was curtailed as respondents got older. A lower employment grade was associated with poorer physical health; at age 56, the gap between high and low grades was 1.60. The interaction between age and grade was negative; those in the middle grades aged 57 had a lower physical component score (-0.06) than when they were aged 56. There was a similar effect for the lowest grades (-0.05). This significant interaction term between age and grade indicates that health inequalities increase as this cohort got older. Over 20 years, the gap between high and low grades increased by 1 (20×-0.05). The trajectory of health decline for higher grades is not as steep as for those in middle and lower grades (fig 2).

The mean physical component score for an average high grade retired man aged 70 in 2002-4 can be calculated from model I in the table as 47.8. This is around the same mean physical component score for a low grade retired man from the same period aged 62. There was a similar 8 year gap between high and low grades among women. In comparison, a high grade man aged 45 in 1991-2 had an estimated physical component score of 53.8, which is around the same as for a low grade man who was 4.5 years younger. So the age gap in physical health between employment grades widens from 4.5 to 8 years from mid-life to early old age.

Model II adjusts for confounders. The widening gap in health inequalities with age was not explained by the inclusion of these other interaction effects in the model. See *bmj.com*.

Estimates (standard errors) of physical and mental functioning, growth curve models fitted to Whitehall II men and women

Fixed effects	Physical component scores		Mental component scores	
	Model I*	Model II†	Model I*	Model II†
Constant	52.97 (0.14)	52.98 (0.15)	52.22 (0.16)	52.09 (0.17)
Current age (mean centred at age 56)	-0.03 (0.01)	-0.01 (0.01)	0.16 (0.02)	0.13 (0.02)
Age ²	0.004 (0.001)	0.003 (0.001)	0.003 (0.001)	0.002 (0.001)
Employment grade:				
High grade	0.00	0.00	0.00	0.00
Middle grade	-0.78 (0.13)	-0.79 (0.16)	-0.86 (0.15)	-0.70 (0.18)
Low grade	-1.60 (0.20)	-1.48 (0.31)	-1.35 (0.22)	-1.81 (0.35)
Interaction of age and grade:				
Age×middle grade	-0.06 (0.01)	-0.07 (0.01)	0.00 (0.01)	0.02 (0.02)
Age×low grade	-0.05 (0.02)	-0.07 (0.02)	-0.07 (0.02)	0.00 (0.02)

*Adjusts for age, period, employment grade, sex, and retirement effects, and interaction effects between age×period, and age×employment grade.
 †Additionally adjusts for interaction effects between employment grade×sex, employment grade×retirement, and retirement×sex.

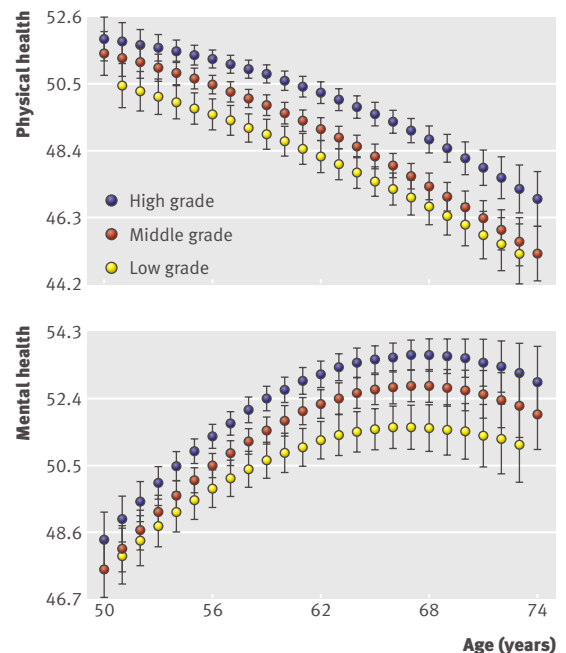


Fig 2 | Trajectories of age related increase in SF-36 physical component and mental component scores by employment grade; Whitehall II phase 7 (estimated from model I, table)

For the mental component scores in model I (table 1), the constant refers to the mean mental health (52.22) for the reference group: high grade, non-retired men aged 56 in 1991-3. Ageing by one year was associated with better mental health (an increase of 0.16 in mental component score). A lower employment grade was associated with poorer mental health. Furthermore, the interaction between age and low grade was negative. Low grade men and women aged 57 years had a mental component score 0.07 lower than when they were 56 years old, indicating health inequalities increased with age. Figure 2 shows this for the latest period. At age 50, there was little social inequality in mental health, but a gap opened up as the cohort got older, with low grade older people not attaining the same high mental health as high grade older people.

In model II, neither sex nor retirement modified the effect of age, indicating that the trajectories of mental health did not differ by sex or retirement status. The widening gap in mental health with age is mainly because of the increase in mental component scores among the retired high grades. See *bmj.com*.

DISCUSSION

The trajectories for physical health differ between occupational grades. We found that a 70 year old person who worked in a high grade civil service job had similar physical health to a 62 year old person from the lowest grade. This gap was smaller in mid-life. We found no significant differences in these trajectories by sex and retirement status, although women from

WHAT IS ALREADY KNOWN ON THIS TOPIC

Although absolute differences in health between socioeconomic groups increase in older age groups, there is some debate about whether relative health inequalities converge, persist, or increase in later life

WHAT THIS STUDY ADDS

Relative social inequalities in physical and mental health increase between middle age and early old age

Occupational class continues to affect the self reported health of older people well into their retirement

People from lower occupational grades age faster in terms of a quicker decline in physical health than people from higher grades

lower grades and retired women reported poorer physical health than men from the same grades and retirement status.

Mental health seems to improve with age for all occupational groups, although this improvement is slower for lower occupational grades, resulting in widening health inequalities in early old age. This widening gap was not a result of differing trajectories by sex or retirement status. Rather it was explained by the better mental health attained by the higher occupational grades after retirement. Retirement was not associated with a similar improvement in mental health for the lower grades. Other studies that have found positive effects of retirement on mental health may not have been able to investigate such interactions between social class and retirement.^{15 16}

These results from the Whitehall II study may seem to contradict results from other longitudinal studies, which show converging relative health inequalities in later life.^{4 6 7} Previous studies only analysed mortality as the health outcome. Few studies take into account the trajectories of health decline with ageing, as well as the different effects of social position on health as people age, for which more than two waves of morbidity data are needed. The one exception restricted analysis to working life.¹¹

Limitations

The cohort comprised mainly office based civil servants, thus limiting inferences about the general working population. However, it is highly likely that health inequalities will also increase in a more general population containing greater numbers of people from routine and manual occupations. Another potential limitation of the analyses is selective dropout from the cohort. Those from lower grades are more likely to drop out or have missing data at later periods. This has the potential to result in further underestimation of our observed inequalities in health and also result in low power to detect significant three way interaction effects on whether the occupational grade trajectories of health differ by sex or retirement status. Finally, self reported measures of health are subject to biases that may underestimate or overestimate health inequalities,

although not observed for more objective measures like ischaemia confirmed by electrocardiography in the Whitehall II study.

Social inequalities in reported health increase from mid-life to early old age. Helping people from disadvantaged social classes to achieve the good health that is attained by more advantaged groups would help to reduce need and prevent the growing crisis in healthcare inequalities among elderly people as the population ages.

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