

MRC

Medical  
Research  
Council

# NATIONAL SURVEY OF HEALTH AND DEVELOPMENT **1946-2011**

Celebrating 65 years of research into  
the health and lives of British people



The Medical Research Council's pioneering National Survey of Health and Development (NSHD), also known as the 1946 birth cohort, was the first ever British birth cohort study and it is still going strong today.

Set up by Dr James Douglas in March 1946, we now celebrate the 65th birthday of the 'Douglas children', the study members who have allowed us to follow them throughout their lives in one of the longest running studies of human development in the world.



# What is a birth cohort?

A cohort is a large group of people who share certain characteristics. A birth cohort is formed of people who were born during the same time period: the National Survey of Health and Development (NSHD) study members were all born in the same week of March 1946. Similar birth cohorts were started in the UK in 1958 (the National Child Development Study), 1970 (the British Cohort Study), and 2000 (the Millennium Cohort Study). These cohort studies are invaluable to researchers and policy makers who study human development and ageing because the lives of study members are followed as they unfold from birth, through childhood, adolescence, adulthood and, for members of the NSHD, into retirement. Tracing the life course in this way means that any differences, at any stage, in the health, wealth and mental lives of people born at the same time cannot be due to differences in age. Identifying the factors that influence individual differences in quality of life is one of the most important tasks for those who help and care for people, and for those who wish to promote a flourishing society.

Birth cohorts are indispensable resources towards achieving these goals but that is not their only potential. Societies change. They change in line with global trends but also in response to new knowledge and to new policy, whether applied to the classroom, workplace, doctor's surgery or to the neighbourhood. Birth cohorts can be used to compare the effects of conditions in one era with those of another. For example, in 1947 there were 7,207 cases of polio notified in England and Wales, compared with just two in 1988. In 1972 the school-leaving age was raised from 15 to 16 years, resulting in a huge increase in the number of children with educational qualifications. Both these and other changes may have significant long-term effects on later health.





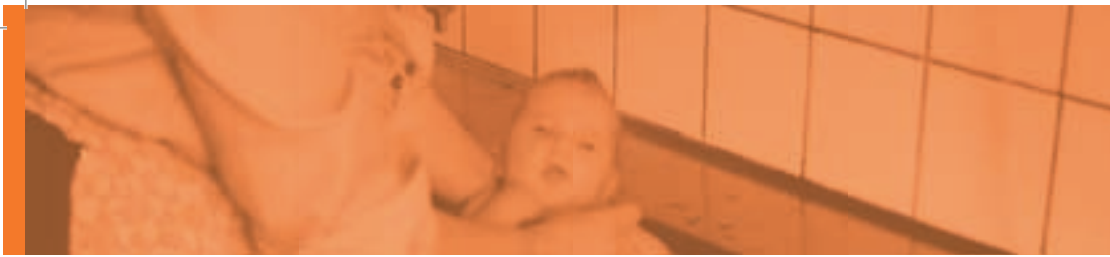
# Launching an enquiry into childbirth: the beginnings of the National Survey of Health and Development

During the Second World War, and against a background of rising concern about poverty, ill health, poor housing conditions, unemployment and a falling birth-rate, scientists from a range of disciplines formed a committee to develop a new national enquiry. Its aim was to survey existing maternity services, particularly with regard to cost and quality in relation to income. It also had the longer-term aim of recommending how these services could be reconstructed after the war. James Douglas, a physician already respected for his studies of air raid casualties, was appointed to lead this enquiry, which began in the spring of 1946, just 11 months after the end of the war in Europe. Across England, Wales and Scotland, health visitors were asked to interview the mothers of all babies born during one week in March, at their eight-week baby check-up. The task was completed in mid-June, by which time 13,687 mothers had been interviewed – 91 per cent of all who gave birth during that week, an astonishing achievement in the circumstances. The initial results of this enquiry were published as a report in 1947, and then as a book one year later: *Maternity in Great Britain*.



James Douglas





The results were striking: not only did the cost of medical care for mother and baby and baby clothes and equipment eat into a far greater proportion of a poor family's income than of those who were well-off, but the quality of care also differed too. Poorer mothers received shorter antenatal supervision and were likely to be in overcrowded conditions if they gave birth in hospital. In those pre-NHS days they were also unlikely to be able to afford a doctor if at home. As only one in five midwives was qualified to administer gas and air, just 20 per cent of women in the survey had received any kind of pain relief during childbirth. This finding led to an outcry and the study's first policy impact: a private member's bill in the House of Commons that changed regulations for the administration of anaesthesia.

This low-income disadvantage was also seen in the health of the emerging cohort itself, with less well-off mothers more likely to give birth to babies of low weight, and their babies less likely to survive than those of well-off mothers. For every thousand babies born into the poorest homes, 30 died before they were a month old, compared with 19 of those born into the richest homes. Concern over these findings led to funding to follow up 5,362 of the 13,687 infants in the original maternity survey. This sample became the National Survey of Health and Development. The participants were seen by health professionals roughly every two years through infancy, childhood and adolescence, eventually to be followed up a total of 22 times to date. Funded by the UK's Medical Research Council since 1962, the NSHD is the longest-running birth cohort study in the world.

“Present day maternity services have concentrated on one important object – to make childbirth safe. Now they need to pay more attention to the mother's feelings and her material needs.”

Daily Mirror, 1949



# Following the 1946 birth cohort

After the maternity survey, the NSHD collected information from its study members twice in the pre-school years, eight times during the school years up to age 15, seven times between then and age 30, twice in their thirties and once in each of their forties, fifties and sixties. In addition, women in the survey received annual questionnaires about their health around the time of menopause, and the first born children of study members were studied twice, when they were aged four and eight years.

## Infancy and early childhood

By modern standards, conditions in Britain were harsh during the earliest years of its first birth cohort study. Food, fuel and clothing were still under wartime rationing, almost half of families did not have running hot water or a bathroom and the kind of consumer society that we have long taken for granted was virtually non-existent. Yet rationing and the 1944 Education Act requirement for schools to provide milk and meals meant that nutritious food was more fairly available than it had ever been before, or since. Ironically, the diet of young children in the NSHD was more in line with current recommendations on healthy eating than that of their modern counterparts, containing substantially more vegetables, and less sugar than today.

In spite of the hardships of British post-war austerity, infant mortality rates were to fall by nearly 50 per cent between 1936 and 1952 and, indeed, local authorities were under pressure to wind down the very health visitor services that had helped bring about this reduction. But the social class differences seen in birth weight and infant survival persisted well into childhood and these findings were important in winning the argument to retain health visitor services.

Infants of low birth weight were more likely to have respiratory disease, slower height growth, later age at first walking and slower cognitive development compared with infants of birth weight within the normal range. One factor linked to low birth weight (although only realised much later) was air pollution, largely from domestic coal burning. Study members were already 10 years old by the time the Clean Air Act of 1956 was passed, four years after the Great Smog of 1952. Respiratory problems in turn, along with feared diseases such as tuberculosis and polio, resulted in long hospital stays.

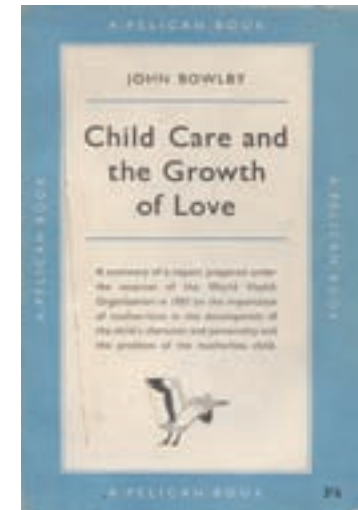


# "DRIED EGGS



Concern over the welfare of children in hospital, where the now-familiar comfort of wards that include provisions for parents were almost unknown, led to the Platt Report of 1959. This report took evidence from the NSHD and recommended greater flexibility in visiting hours and better facilities for parents to stay near their sick children. These reforms also reflected a more general shift in attitudes that was occurring during these years, as captured by the influential British child psychiatrist John Bowlby in 1953.

In this context there was concern over rates of parental divorce and separation, which had spiked in the late 1940s as a consequence of the war and, in addition to any immediate impact of distress, were to have a longer-term effect on children's achievements at school. One consequence was for the study to seek information on signs of nervousness, such as nail biting, recurrent nightmares and bouts of unexplained abdominal pain. These signs were linked to poor performance at school, especially if they were persistent.



“Mother-love in infancy is as important for mental health as are proteins and vitamins for physical health.”

John Bowlby, 1953



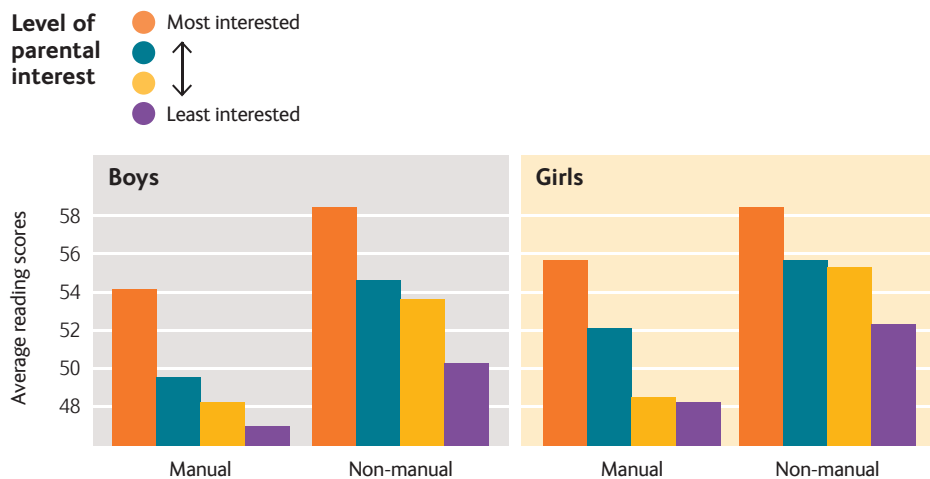




## The school years

The growth of the school system in the late 1940s and 1950s was seen by many as a golden age of school building in Britain, but the expansion of grammar schools was struggling to keep up with the post-war baby boom. As a result, the opportunity for children born in this era to gain entry into one of these schools was lower than for children born in the 1930s. One of the most prominent findings from the NSHD in this context was the discovery that children of manual working class parents were less likely to go to grammar school than children of middle class parents, even if they achieved relatively high test scores. They were also less likely to stay on after the minimum school leaving age and less likely to go on into further or higher education. This became known as the 'waste of talent' problem, and had a variety of causes, including fear of isolation from friends who would not be going to grammar school, and pressure to leave school to bring in income to the home.

It was also observed that higher test scores were achieved by children whose parents took an active interest in their schooling, regardless of social circumstances. Both sets of findings chimed with Government deliberations – which took evidence from the NSHD – over improving the quality of education, encouraging greater communication between schools and parents and, in due course, introducing comprehensive education and raising the school leaving age.



1964 – The power of encouragement: the level of interest shown by parents in their children's progress at school was important regardless of gender or social circumstances.





## Becoming an adult

The transition from childhood into adulthood began with a signal event – study members now speaking for themselves rather than study investigators sending out health visitors to interview their mothers. The Britain in which study members became adults had changed considerably from the one in which they grew up. The austere past was being replaced by optimism over high employment, high job security, good opportunities to take up employer-based apprenticeships for skilled manual occupations, and a higher number of women in paid work than ever before, with some in high-status positions. Standards of living were improving, underpinned by an unprecedented rise in purchasing power, as earnings rose and the price of many goods that were previously regarded as unattainable luxuries, such as cars, fell.

However, the decline in smokestack industries was also starting to have effect, with shrinkage in the number of jobs requiring manual work that was to continue well into the 1980s. It was also a time of social change, with a decline in religious attendance, a growing prominence of popular culture and the consumer society, the relaxation of restrictions on contraceptives, new challenges over conditions in the workplace, and friction between generations and the sexes over a multitude of values. So it was no surprise that, during their first face-to-face interview as adults in 1972, study members were asked not only about work, family and health but also about attitudes to social class, authority, political parties, voting and trade unions.



Employer-based apprenticeships for skilled manual occupations provided opportunities for NSHD survey members as they entered the labour force, but by the 1980s these had mostly been replaced by the much-criticised Youth Opportunities Programme (YOP) and Youth Training Scheme (YTS).



Perhaps some of these social upheavals were more dramatised than they deserved to be at the time. In fact, the lives of the NSHD study members mostly fit conventional patterns. By their mid-thirties, 92 per cent had married, more than half of these marriages having taken place by the age of 24, and 86 per cent had become parents. There was also a tendency for study members to marry a partner of similar social background, whatever their educational qualifications. However, following a growing trend, 16 per cent had also divorced by this time.

In spite of hopes that social class differences in health – the most arresting findings of the early years of the NSHD – would diminish under the influence of the National Health Service (founded in 1948), these differences were seen to persist into adulthood, as did ill-health itself. Study members who had been seriously ill as children were also more likely to be seriously ill as young adults, and were more likely to enter the workforce at a lower level of occupation than their fathers, especially if they had grown up in a manual social class household.

## Into midlife

As the NSHD study members entered their mid mid-thirties, the study, under Michael Wadsworth's direction, took on a focus that remains to this day: health defined not just by medical problems that we either suffer or avoid, but also by more subtle functions that vary in everyone, such as blood pressure, lung function, strength, balance, mood, memory and concentration.

At ages 36, 43 and 53 years, assessments of these functions were carried out during home visits by the study's team of trained research nurses. They also updated information on the household, family and employment, and asked about spare time activities, stressful life events, smoking, drinking and exercise. Study members themselves also filled out diaries with details of their diet over the week following each of these visits.



# What are the outstanding findings of the study up until midlife?

As the oldest of the British birth cohort studies, with high response rates and a wealth of information on health and life circumstances, NSHD has been at the forefront of research into the scientific discovery of lifetime influences on ageing, a strategic priority of the Medical Research Council. Across a number of specialist areas – cardiovascular, respiratory, musculoskeletal, cognitive and reproductive function – the study has continued to contribute new insights, whether on the health impact of lifetime socioeconomic conditions, early development or cumulative psychological and behavioural attributes. Here we summarise some of the key published findings to date.

## Lifelong influences on adult physical health, ageing and survival

At the beginning of the 20th century, there was a general consensus that childhood health and the environment in which the child was raised had long-term effects on adult health. However, evidence for this was limited because no cohort study had ever followed people from birth all the way to adulthood. In the post-war period, interest in ideas about childhood influences on adult health waned as cohort studies following up people from middle age successfully revealed the importance of adult lifestyle (such as smoking) and physiology (such as high blood pressure) in the development of cardiovascular, respiratory and other chronic diseases.

However, from the late 1980s there was a revival of interest in early life factors. This time the NSHD, with long-term follow-up of study members, could provide evidence of the links between early life growth, health and environment, and adult chronic disease risk. For example, the NSHD was one of the first studies to show that infants who experienced lower respiratory illness and lived in overcrowded conditions went on to have worse respiratory health and lung function as adults. The NSHD was also one of the first studies to show that babies of lower birth weight had higher blood pressure in adult life, a finding that has since been replicated in many other studies.

The NSHD went on to show that weight at birth, the timing of height and weight gain in childhood and adolescence, and other developmental factors such as age at first standing or walking and cognitive development and the timing of puberty, are linked to many other aspects of adult health in this cohort. For example, those of the lowest birth weight who gained weight faster or had an earlier puberty have higher adult cardiovascular risk (such as abdominal obesity, diabetes and higher blood pressure) than those in the less extreme groups. For women, earlier onset of menopause was associated with a history of poorer growth and cognitive development, as well as known adult risk







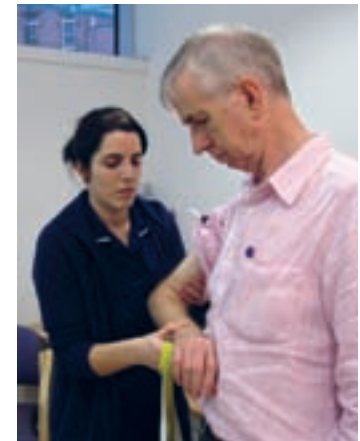
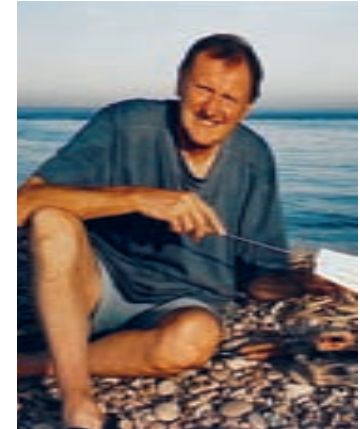
factors such as smoking. In contrast, heavier weight at birth and faster childhood growth was, in this cohort, followed by a higher risk of premenopausal breast cancer.

At the follow up at age 53, the study incorporated measures of muscle strength (hand grip strength) and physical performance (time taken to stand up from a chair and sit down again 10 times and the time able to balance on one leg with eyes closed); these simple assessments have implications for health and survival, and may be good indicators of overall ageing. Heavier birth weight was associated with greater grip strength in midlife, and pre-pubertal weight or height gain had positive effects on both muscle strength and physical performance. These findings remained, even after taking account of adult body size, chronic conditions and lifestyle factors, and may reflect the long-term impact of early muscle development. From puberty onwards, these positive effects remained for grip strength but weight gain affected physical performance adversely, particularly in women. Adult strength and performance were also related to developmental milestones and lifetime cognitive performance, which may reflect underlying neurological processes. For example, age at first standing and walking, childhood cognition and adolescent coordination were clearly linked to standing balance in midlife, as were changes in adult cognition, such as verbal memory and processing speed.

The study's interest in social inequalities has continued to this day. Findings show that the conditions in which people grew up may be as important for adult health as the conditions in which they have lived in adult life. Such findings provide clues that certain developmental experiences may trigger lifelong biological processes.

For example, experience of good childhood circumstances significantly increased the chances of being in the best of health at age 36, even after taking account of the additional effects of adult circumstances and health-related behaviours. While educational achievement and occupational mobility led to improvements in socioeconomic circumstances and were associated with better health, those with a poor start to life were not able to make up the full health deficit. Indeed, the NSHD has also shown that the chance of survival up to age 60 years was influenced by social advantage or disadvantage in childhood as well as by adult socioeconomic experience, particularly for women.

Social inequalities in health tend to be greatest in childhood and at older ages, and narrowest during the young adult years. With the benefit of repeated measures over time, the NSHD showed that the increases in obesity (from age 20 to 53), in blood pressure (from age 36 to 53) and in limitations in mobility and other aspects of daily function (between age 43 and 53) were greater in those who experienced more lifetime socioeconomic disadvantage.





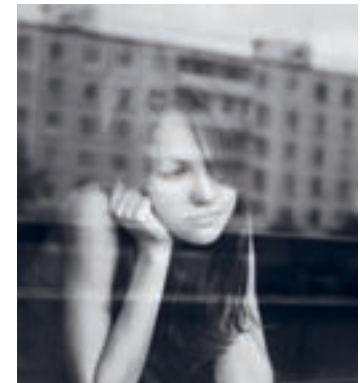
Repeating measures of health behaviours (such as smoking and exercise) at each follow-up has improved the assessment of lifetime risk. For example, lifetime smoking calculated as the number of cigarettes smoked between the ages of starting and quitting showed that cumulative exposure had a stronger association with increased mortality, reduced lung function and physical performance than using a report of smoking behaviour at just one age, which is commonly done. In another example, those engaged in frequent physical activity throughout adult life had better midlife health than those who exercised less regularly. These kinds of health behaviours explain some of the social inequalities observed in adult life, and are important ways of changing adult health risks.

## Mental health and cognition and their relationship with physical health

An interest in mental health in the 1946 cohort reflected some of the earliest concerns of James Douglas, who had noted the apprehension of children during his air-raid studies. Douglas also had a war-time colleague who was to become a leading figure in British post-war psychiatry, Professor Aubrey Lewis, who joined the NSHD Advisory Committee. During the early years of the cohort, mothers were asked about their children's habits, sleeping patterns and other signs of mental wellbeing. This was followed up in more detail during the school years, when teachers were asked about the children's behaviour and the children themselves filled in questions about their thoughts and feelings – something they were to do in detail during every interview when they were adults.

This information allowed the examination of long-term effects of early life on adult wellbeing, such as the negative impact of parents getting divorced, death of the father or temporary separation from both parents. Evidence from this study confirmed previous observations that depression in childhood tends to carry into adulthood, although it also showed that milder common mental health problems do appear and disappear over the life course. But just as mental health problems can persist, so can positive wellbeing: the NSHD children who teachers thought were happy, energetic and sociable were also likely to be socially engaged as adults.

Mental health has consequences for physical health as well. The NSHD study members who reported symptoms of psychiatric disorder in early midlife were more likely to experience back aches, chest pain, dizziness, headaches and stomach pain than those with few or none of these symptoms.



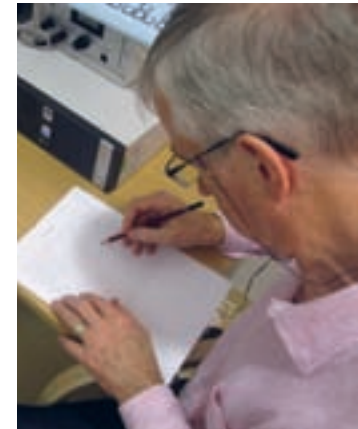
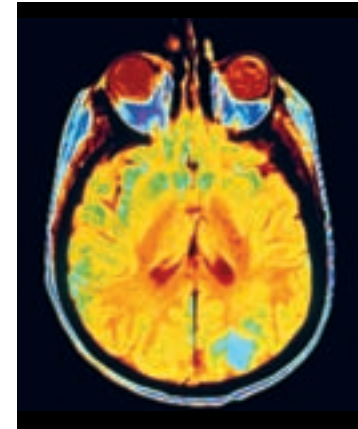


During the childhood years, the NSHD was interested in cognitive development and introduced tests of verbal skills (comprehension, vocabulary and pronunciation) and non-verbal reasoning at age eight years. Similar tests were given at ages 11 and 15 years. We previously referred to the issue of 'waste of talent' at school but the NSHD was just as interested in the relationship between cognitive development and aspects of health and function, including height growth, vision and handedness.

Interest in cognitive function gave way to other research priorities during most of the early adult years of the cohort, but at age 43 years, study members were once again tested, this time on skills that are sensitive to ageing: memory, attention, dexterity and speed. This information offers a rare and valuable opportunity for research, not only because it can be related back to patterns of childhood cognitive development, but also because it allows scientists to test the effects of life choices. For example, study members who took regular physical exercise in their thirties and forties showed slower decline in memory than those who were sedentary, whereas study members who smoked 20 cigarettes or more per day showed faster decline. Study members who undertook adult education or training were found to have improved their verbal skills in midlife. These results held up even after taking into account cognitive development, which can influence the likelihood of these choices in the first place.

An interesting example of how societal change can influence cognitive skills was discovered when midlife literacy and numeracy in the NSHD was compared with that at a similar age in the 1958 birth cohort, for whom the school leaving age was 16 years, one year older than the leaving age for the 1946 birth cohort. The beneficial influence of education on cognitive skills was significantly greater for the 1958 cohort.

Cognitive function is also of interest because of its role as a 'biomarker' – its sensitivity to the body's biology. For example, the NSHD was the first study to show in detail that girls achieving higher cognitive scores tended to have a later menopause, even after taking account of a wide range of factors that might have accounted for this, such as number of children and smoking. This raises the intriguing possibility that these test scores provide a 'window' into the body as it programmes the female reproductive system.





# The potential of the NSHD to understand health and ageing in later life

Ageing is a significant challenge facing society. The proportion of the UK population aged 65 years and over was 16 per cent in 2008 and is expected to reach 23 per cent by 2033; and more than one in five may survive to celebrate their 100th birthday by 2066. The main aim of the study now is to understand better how ageing in later life is influenced by the experiences of the study members and their parents throughout life. Such understanding will indicate the periods in life when interventions may have their greatest chance of improving the quality, as well as the length, of life in this ageing world. The new clinical data collection, completed as study members approached their 65th birthday, provides unrivalled opportunities over the coming years to extend the findings into the seventh decade.

## What information was collected at the latest visit and what will it tell us?

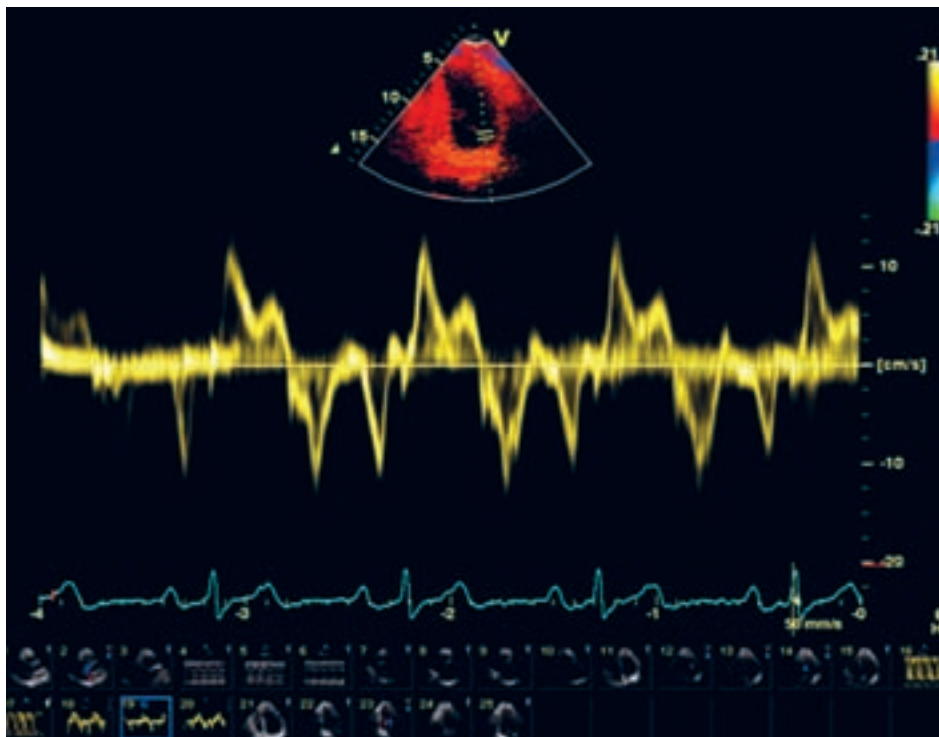
The ageing outcomes measured in the latest NSHD follow-up were chosen because they are markers of potentially modifiable health problems for the older individual and for society, and because there is growing evidence that their origins lie in earlier life. The study focuses on physical and cognitive capability, namely the capacity to undertake the physical and mental tasks of daily living, as measured by physical and cognitive performance tests, and reports of everyday function. These tests reflect underlying ageing processes, measure functions that are the foundation for continued independence and quality of life as we grow older, and predict future health and survival. The NSHD has also assessed the structure and function of musculoskeletal and cardiovascular body systems because age-related changes in these systems threaten capability and account for a major proportion of the disease burden in the ageing population. Further detail on the measures of structure and function of the heart, blood vessels, bone and muscles, and the other tests and topic areas can be downloaded from the *International Journal of Epidemiology*, 2011;e1-9. doi:10.1093/ije/dyq231.





Researchers can now investigate how these new ageing outcome measures relate to previously collected information on early development, lifetime socioeconomic conditions and education, cumulative psychological and behavioural attributes, prior health and reproductive function. They can also relate them to indicators of underlying hormonal, inflammatory and other biological processes using the fasting blood, urine and saliva samples. Of particular interest is how childhood and adult life exposures and risks impact independently or jointly on these aspects of ageing.

As an example, in the box below, we show a cardiac scan, illustrating the kind of information that can be measured and what this may tell us about the ageing heart.



Ultrasound scans of the heart (echocardiograms) have been carried out in all study members who attended a clinic in the latest round of data collection. Ultrasound allows us to see the structure of the heart and to watch it beating and pumping blood into the circulation.

A series of different images of the heart are taken using ultrasound. The example shows a type of imaging ('tissue Doppler echocardiography') that measures the speed at which the wall of the heart moves. The heart itself is shown in the upper panel and the middle panel shows a tracing of the speed of the heart wall. The lower trace in green is the electrocardiogram (ECG). The speed of the heart wall can be used as a measure of heart function during ejection and filling.

We aim to use the cardiac measures to look at how lifetime factors such as blood pressure, weight gain and diabetes affect the heart in later life.



## Study members today

Of the original cohort of 5,362 selected for follow-up, the study team contacted just over 3,000 (58 per cent) to take part in the latest data collection. The rest had either previously withdrawn from the study (13 per cent), were living abroad (11 per cent), had died (13 per cent) or had been lost to follow-up before the last data collection in 1999 (5 per cent) and remained untraced in 2006 when the latest assessment began.

This latest assessment started with a postal questionnaire which was completed by 80 per cent of the sample contacted. About 2,800 study members with a known current address were invited to attend a clinic in Manchester, Edinburgh, Birmingham, Cardiff or London. By the time the data collection is complete in March 2011, as study members reach their 65th birthday, 80 per cent will have either visited the clinic or been seen by the clinic nurse at home.

With the information still being collected and processed from these clinic and home visits, it is only possible to provide a taste of the kind of information that will be forthcoming. From the postal questionnaire, which was completed at an average age of 62 years, 29 per cent of the cohort were still in full-time work, 21 per cent were in part-time work and 48 per cent had already retired. 83 per cent were living with a spouse or partner and 14 per cent lived alone. Almost one in ten gave special help to someone living with them who was sick, infirm or had a disability. Almost two thirds already had grandchildren and a quarter had as many as four or more.

Three quarters of study members described their health as good. In the previous ten years, almost one in ten had been diagnosed with a heart problem, or had a suspected heart problem, and one in three had a doctor-diagnosed problem with blood pressure, with more than one in five taking hypertensive medication. During this period, 14 per cent received one or more investigative tests in hospital for cardiovascular disease, and over a quarter had been admitted to hospital for other reasons. The number reported being diagnosed with diabetes had doubled in the previous 10 years.







These self reports are being confirmed by tests taken at the clinic and from reports from general practitioners (GPs). Preliminary results from the tests undertaken to date suggest that by aged 64:

- One in five has a clinical indication of diabetes or impaired fasting glycaemia (high risk for diabetes).
- Almost one in two had high blood pressure when measured in the clinic.
- One in three has high total cholesterol.
- One in three has at least one abnormal liver function test.
- One in ten has impaired thyroid function.
- One in ten has osteoporosis (thinning of the bones) and one in two needs to consider lifestyle changes to help prevent future osteoporosis.
- One in five has reduced muscle mass, and one in 15 men and one in five women has reduced muscle strength.
- Four out of ten are overweight and more than one in four are obese.

Once we have all the information from the data collection we will be able to provide prevalence figures for these health problems in this British cohort at, or close to, retirement. One of the first questions to ask will be whether these problems cluster together in a minority of study members, or whether most have at least one health condition. We will also be able to identify those in the best of health – without any of these clinically relevant problems – and study how their life experiences differ from those of their less fortunate peers.



# Generalisability of the study

Increasingly, researchers working on the NSHD have joined forces with other researchers to investigate scientific questions across a number of cohort studies and provide more rounded answers. For example, studies of how genetic variations relate to aspects of lifelong health and ageing require very large samples. In recent years, the NSHD has been part of large research groups that have identified genetic factors that influence blood pressure, lung function and body size. The NSHD is also contributing to a European study that needs large samples to investigate how cumulative exposure to air pollution throughout adult life affects respiratory function and disease.

If relationships between risk factors and later health and ageing are consistent across a large number of studies, involving study members with very different life experiences, then it suggests these relationships are universal. Such evidence is more generalisable than evidence from a single study and is therefore of particular relevance to policy-makers.

But societies also change, so each cohort has a different set of experiences which may affect their health. For example, few members of the 1946 cohort were overweight or obese as children, and some were underweight, but those who were both heaviest and lightest had poorer health than other study members. The 1946 cohort faced the obesity epidemic from their mid thirties, whereas later cohorts have seen increased obesity at much younger ages. In the NSHD, early age of onset and duration of obesity affects later health such as higher blood pressure because the people who gained weight earlier continued, on average, to be heavier than their peers and very few managed to lose weight and then maintain lower weight.

The NSHD is part of a new cross-cohort programme called 'Healthy Ageing across the Life Course' (HALCyon) that is led by the MRC Unit for Lifelong Health and Ageing. For the first time, it brings together nine UK cohorts involving 30,000 men and women born from 1918 to 1958. They represent the full spectrum of the older population, from the oldest old to the post-war baby boomers. The HALCyon programme studies factors across life that influence the capacity to undertake the physical and mental tasks of daily living, and how we feel and how we function socially in everyday life. These are important aspects of ageing because they have such an impact on the quality of life, as well as subsequent length of life.

For example, increasing weight, adjusting for height, was related to poorer physical performance (in regard to walking speed, chair rises and standing balance) across the HALCyon cohorts, especially for women. Better strength and performance (in terms of grip strength, chair rise and standing balance times and walking speed) were associated with a better chance of survival during subsequent follow-up across all available studies after accounting for differences in age and body size. Also, in





most of the studies, childhood socioeconomic conditions were related to walking speed and chair rise time, even after taking account of later life experiences, suggesting that the factors operating in early life have long-term effects on these aspects of ageing.

Cross-cohort comparisons are, however, restricted by limitations in comparability of data across studies and by the lack of studies with detailed information on risk factors across life. Only studies like the NSHD can carry out in-depth analyses to identify the biological, social and psychological pathways linking earlier life experience to lifelong health and ageing.





# Overall impact of the study

The NSHD can contribute to both scientific and policy research because of its size and national representativeness. The study's findings have also been written up for a wider audience and may have a direct impact on members of the general public who take an interest in such research. This includes many of the study members who express an interest in the findings, summarised as part of regular feedback with their NSHD birthday card every year.

## Scientific impact

The NSHD stimulated subsequent large-scale national British studies of general populations from the earliest possible time in life, and inspired comparable studies in Finland (the North Finland birth cohort studies of 1966 and 1986) and New Zealand (the Dunedin study of 1972).

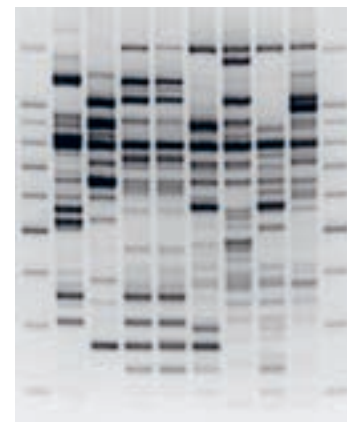
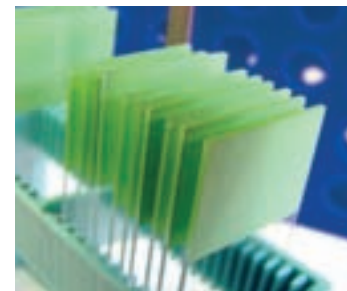
The NSHD led the way in achieving repeated measures of cognitive development in large-scale population-based studies in childhood and adolescence. These measures were of exceptional value in developmental studies and, together with repeated measures of cognitive function in adulthood, are proving to be of equal value in current studies of cognitive ageing.

The study's repeated measures of physical growth from early life throughout childhood and adolescence, and measures of physical and emotional function and their change during adulthood, provide unique information on development and ageing, which makes it possible to study lifelong processes of vulnerability and robustness to disease and mortality. Together with the NSHD's DNA resources, and lifetime information on the environment and on physical and mental health and their treatment, health-related habits and exposure to stress, these measures give an unrivalled perspective on lifelong health.

Consequently, the study has been at the forefront in showing:

- The extent of the impact of early life experience on health and ageing throughout life.
- That research into lifelong health and ageing must go beyond the study of disease to include investigation of physical, cognitive and emotional function in the whole population.

With the new clinical data collection, the NSHD continues to be pioneering, showing how the maturing British birth cohort studies can develop into interdisciplinary life course studies of ageing, and being the first of these to collect such a range of clinical ageing outcomes.





## Policy impact

As the first of the British birth cohort studies – having begun at the inception of the welfare state, witnessed significant change in education policy and extensive improvements in living standards and in healthcare – the NSHD provides a benchmark against which to measure change. There have been two kinds of policy impact.

First is the direct impact, when evidence has been requested or picked up by a policy committee. For example, findings from the maternity study influenced the introduction of the Analgesia in Childbirth bill to the House of Commons in 1949 to increase training for midwives to give gas and air analgesia to all mothers in labour. During the second reading, Lady Tweedsmuir, the member for Aberdeen South, noted the relevance and value of the *Maternity in Great Britain* book, “which all of us seem to have been perusing before this debate”. (Hansard vol 462, 743).

Other policy investigations that directly used study findings included the Platt Committee (*The welfare of children in hospital*, 1959), the Plowden Committee (*Children and their primary schools*, 1967), the Finer Committee (*Report of the committee on one parent families*, 1974), the Acheson Committee (*Independent inquiry into inequalities in health*, 1998) and the Marmot Review (*Fair society, healthy lives*, 2010). The study’s repeated measures of cognitive development undertaken in large-scale, population-based studies in childhood and adolescence before and after an educational transition (the 11+ examination for entry into selective secondary school) newly-instituted by the 1944 Education Act, were of unique value in policy studies.

The second kind of impact of study findings on policy is indirect, through their influence on popular thinking. Evidence for that can be found in the following examples:

- Press reports that followed the publication of *Maternity in Great Britain* (1948), which were concerned with the ‘Need for Better Care and Lower Costs’ (*The Times*), are likely to have influenced the arguments for improvements in the care of mothers and babies.
- *The Home and the School* (1964) had a great impact, as the press reports and its publication history shows (it was reprinted three times and then reissued as a paperback which was reprinted five times): it preceded the Plowden report by three years and was probably so popular because it provided the first hard evidence that parents and preschool circumstances had a significant impact on ability and attainment at age eight, and so showed that preschool development and experience formed the bedrock on which primary schooling was built.





- The study's finding (published in *All our Future* in 1968) of the extent and inequity of the 'waste of talent' – in terms of high ability children who did not continue into further or higher education – added to arguments for improving opportunities for, and expectations of, children from poorer families.
- The 1999 paper comparing children's diet in 1950 with that in the 1990s ('Food and nutrient intake of a national sample of four-year-old children in 1950: comparison with the 1990s', *Public Health Nutrition*) had an impact because of its evidence that the quality and nutrient value of infant and childhood diet had declined between 1950 and 1990.
- The study's findings of the continuing effect of early life growth and development added to the arguments for early intervention of the kind provided by the national SureStart programme, and for continuing and expanding research into lifelong health and ageing.

The extensive new data that have just been collected will be of particular interest to policy-makers concerned about the challenges of an ageing society. By showing the extent of good health – and the extent of health problems – in a representative cohort approaching retirement, and the proportion already diagnosed and treated, the NSHD can provide the information needed to assess the likely future costs of health and social care as the baby boomers age. By showing the links between earlier life experience and ageing outcomes, this study can highlight the importance of early interventions to prevent later life frailty and disability. By showing whether these links are stronger in some people than others, or whether simple assessments can identify those most vulnerable to accelerated ageing or risk of future disease, this study can highlight the types of individuals who may benefit most from early intervention.

We may also be able to recommend changes to health screening tools so that they provide better information about future health risk. Finally, studies involving the NSHD that reveal the links between genetic factors and markers of future disease risk have great potential for disease prevention. They can lead to new drug treatments and therapies capable of targeting underlying biological pathways before the disease is diagnosed.





## General impact

Our findings can best serve older people if they are reported through a range of channels and are put in the context of other scientific research. The NSHD findings, reported fairly and carefully, may help older people decide what scientific evidence to take notice of and what to ignore. These findings may also encourage older people to adopt preventive activities such as exercise or moderating their diet, and to seek help earlier if they notice changes in their physical and mental performance or in their level of wellbeing; this could facilitate timely intervention for those assessed to be most at risk before the onset of serious disease. By showing that ageing takes place across the life course, not just at older ages, the NSHD may also encourage younger people to take up healthy activities before chronic problems develop.





# Giving the last word to study members

Study members have been participating in the NSHD all their lives. It is their information, freely given, that provides the material on which the study's findings are based, findings that impact on scientists, policy-makers, practitioners and the general public in the ways we have described.

We would like to thank study members for their lifelong commitment to, and continuing support for, the study which has allowed the NSHD to flourish. As study members turn 65 years old and we celebrate their birthday, it is appropriate to ask what impact being in the study has had on them. Over the last year, a number of study members kindly agreed to take part in in-depth interviews, to tell their own life stories and provide their own perspectives on health and ageing. Others have sent written memories as part of the birthday celebrations. It is fitting to end with some of their memories of being in the study over all these years.

**Some study members remembered the data collections in childhood, especially when it disrupted their school work:**

I used to be hauled out of class every so often. My schoolmates would say “Oh, aren't you lucky, you got out of school work for a couple of hours.”

All the way through primary school, I would get hauled out the class, put in a wee room and [asked to do] questionnaires, diagrams, intelligence tests, triangles and squares and things like that. I always recognised that I was special, because there was nobody else.

**Many enjoyed the experience, being part of what one called “the chosen few”, and felt pride in being in the study:**

I'm always proud to say that I was part of it, yes. As a child I was not at all happy about being part of this cohort, but now feel it has been a privilege to be a part of it.

I suppose when I first learnt it was a survey I felt quite proud, that I was selected to be Mr Average in a way.

**Some appreciated the study's interest in them and said that their parents still enjoyed reading about the study and its work:**

It's the only organisation that's ever shown any interest from when I was a kid all the way through to my age now, which is quite something actually.

It was only me. And of course, I've had a birthday card every year. They've never forgotten, they've kept track of us for all these years.





**Some valued the study because it gave them a new perspective on their lives:**

It does bring things back to mind and I do remember things, certain things that perhaps if I never had to reflect on them I wouldn't remember them now. It's funny how it often brings things back to your memory.

**Others like the opportunity the study gives to talk:**

I like talking about myself. Who doesn't?

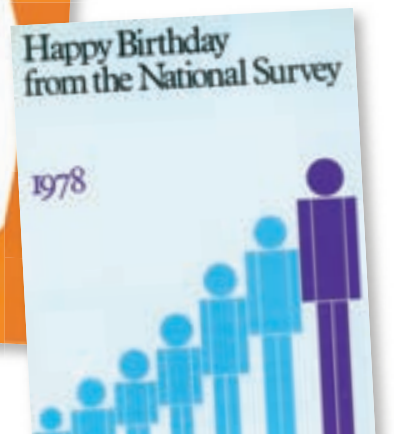
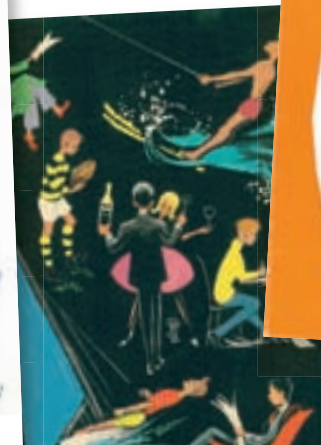
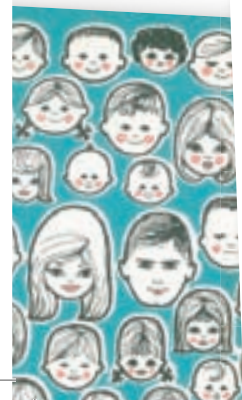
**Others value the NSHD for the information it provides about their own health**

It's been useful to have some of the medical monitoring, especially the last one in Edinburgh, when I had bone scans. I mean you have to pay a lot of money for that, and I was really very grateful to have that kind of opportunity.

**Some are simply pleased to be part of the study:**

Obviously it's a worthy cause. I mean, it's groundbreaking stuff, it's pre-NHS, for heaven's sake.

I feel quite privileged to be part of it, although it's a pain giving up a morning to talk to you when I could be doing something else.





**Most of those who gave opinions felt positively about the experience:**

It's been marvellous. It certainly gives you the feeling that people have an interest in you, and that can't be a bad thing.

**Others remember how pleased their parents were to be part of the study:**

I remember that my mother was very committed to the study because she felt that anything which helped to improve pre- and post-natal provision was worthwhile. Also coming from a not 'well-off' council house environment, she appreciated the immense value of improving the health and educational opportunities for all post-war children. It was her enthusiasm that encouraged me to follow through.

My mother remembers her first contact with the study when they came and asked her questions about how much she spent on buying a pram and nappies. She didn't understand what it was all about at that time, but now, in her nineties, she is amazed at the study's longevity and is proud to have been part of such a significant piece of research.

**For some, the study holds has a special place in their lives:**

The study has been a silent partner in my life, always there, a shadow. Sometimes a friend... Sometimes an intruder... But somehow it has strengthened my awareness and knowledge and spun off in so many different ways. My family and children have been excited by the cards, surveys and questions... In short a privilege to belong to this group of people... I hope and know some good will have come from being a member of a band of people born in March 1946.

**IMAGE CREDITS**

Front cover: Trinity Mirror/Mirrorpix/Alamy; iStockphoto. P4: BillFromSpokane. P5: YlvaS; The Glass Beehive. P7: Nesster. P8: Christchurch City Libraries. P9: Interfoto/Alamy. P10: Affendaddy. P12: iStockphoto. P13: nicksarebi; iStockphoto. P14: iStockphoto. P17: iStockphoto. P18: iStockphoto. P20: iStockphoto. P21: Fotolia; iStockphoto. P22: Christchurch City Libraries. P23: Xerones. P24: iStockphoto; Fotolia.

We would like to thank all those who made this brochure possible, including the study members and the staff at the MRC Unit for Lifelong Health and Ageing and MRC Corporate Communications.

James Douglas directed the National Survey of Health and Development (NSHD) from 1946 until retirement in 1979. From 1979 until 1985 John Colley directed the NSHD and Michael Wadsworth, who had worked in James Douglas's team since 1968, led the MRC team. Michael Wadsworth then directed the NSHD from 1985 until retirement in 2006. Diana Kuh, who had worked in Michael Wadsworth's team since 1987, has directed the NSHD since 2007. Diana has also directed the MRC Unit for Lifelong Health and Ageing, which is responsible for the NSHD, since the launch of the Unit in 2008. The Unit is affiliated to the Division of Population Health, UCL School of Life and Medical Sciences. [www.ucl.ac.uk](http://www.ucl.ac.uk)



To find out more about the National Survey of Health and Development and the research carried out by the Unit, please visit the website [www.nshd.mrc.ac.uk](http://www.nshd.mrc.ac.uk) or contact Diana Kuh at 33 Bedford Place, London WC1B 5JU. Telephone: 0207 670 5700. Email: [d.kuh@nshd.mrc.ac.uk](mailto:d.kuh@nshd.mrc.ac.uk).



MRC

National Survey of  
Health and Development

MRC Unit for Lifelong Health and Ageing  
33 Bedford Place  
London WC1B 5JU

Tel: 020 7670 5700

[www.nshd.mrc.ac.uk](http://www.nshd.mrc.ac.uk)

Published February 2011  
© Medical Research Council 2011



Printed on 100%  
recycled paper



FSC® C007915  
The mark of  
responsible  
forestry  
[www.fsc.org](http://www.fsc.org)

