



Never Too Early, Never Too Late

Edited by Amanda Sacker and Mel Bartley

Never Too Early, Never Too Late: Social and Biological Influences on Health and Disease Over the Lifecourse

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Introduction

The UK is unique in having a collection of studies that have followed people throughout their lives.

There are two main types of these studies – cohort and household.

A cohort is simply a group of people who share some characteristic. We have four studies, known collectively as the British Birth Cohorts, where the shared characteristic is when they were born. The families of subjects born in 1946, 1958, 1970 and 2000 were interviewed several times throughout their offspring's childhoods, and then when they were old enough the cohort themselves answered questions from researchers. From these interviews we know a huge amount about the whole of people's lives – their families, education, work, relationships, health and well-being.

The second type of study is different. It follows all family members living in the same home that have agreed to take part, even when individual family members leave to form new households (for example, through family breakdown or children leaving home). This type of study also tends to ask the same questions at regular intervals – say, every year or every other year – so that researchers can study changes in health, attitudes and behaviour. Change can also be investigated using the birth cohort studies, but the time between interviews is often much more spread out.

In recent years, the participants in several of these studies have allowed nurses to take blood samples and measure how well their bodies are doing. This has allowed researchers like us to investigate how social circumstances and biology affect each other over our lives. This booklet summarises some of the work we and others have done and the implications that can be drawn from the research to help people have as many healthy, rewarding and disease-free years in later life as possible.

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1: Lifecourse influences on health and disease



The advantage of a lifecourse approach is that it combines social and biological explanations.

Are there long-term influences in the course of our lives that increase our risk for diseases? It is a fairly new idea. In the days when the most common deadly diseases were infections such as cholera, typhoid and plague, it was logical to think that disease struck suddenly. In many parts of the world today the most common serious conditions, such as malaria and water-borne intestinal infections, still strike quickly, and unfortunately often kill quickly as well.

But since the 20th century the pattern of disease in industrial nations has totally changed (see table). Quick-acting infections have been overtaken by what are called 'chronic diseases'. These are

the ones we think of today as the major threats to our health and life, such as heart disease, bronchitis and cancer. The main reason for this was the success of public health reforms that built sewers, ensured clean water supplies, and regulated food quality. These measures put barriers between human beings and germs. But it also seemed that people became less susceptible to infections, and more resilient when they did become ill. As wages increased, child labour ended, the length of the working day reduced and working conditions improved, people were more able to resist and survive infections.

As medicine and public health realised the importance of the new chronic diseases, efforts built up to understand where they came from and how they could be avoided. The processes that result in someone having a heart attack or cancer take place slowly, over a long period of the lifecourse. Researchers in public health began doing long-term or 'longitudinal' studies which repeatedly measured the possible causes of heart disease, such as blood pressure and blood fats. At the same time they also repeatedly measured the potential causes of rising blood pressure and blood fats, such as salt and fat in the diet. With all this longitudinal information it was possible for the first time to understand the links between diet, blood pressure and heart disease – the so-called lifecourse 'pathways' to chronic disease.

People might think that risky behaviours are more important now than they were when infectious diseases dominated. But even then, great efforts were made to reduce alcohol consumption and get people to wash more often. Can we build similar barriers between people and the current causes of disease? What is the equivalent of removing sewage from drinking water? Can we revolutionise the social environment to change risky behaviours? Does it matter when we encounter the hazards that raise the risk of disease? People born into less affluent families tend to have higher risks of heart disease. But is that risk fixed? People born around 1930 are called the 'golden cohort' because they are still alive and living longer. But they were born in a recession! This tells us that the risks are not fixed by what happens in childhood, and that it is 'never too late' to improve health.

Figure 1: Top three causes of death in England and Wales in 1900 and 2010

	1900		2010	
	Cause	%	Cause	%
1	Infections	25	Heart disease/stroke	32
2	Respiratory/pneumonia	19	Cancer	29
3	Circulatory	14	Respiratory/pneumonia	14

Source: Office of National Statistics

Implications

- It is only quite recently that we have begun to understand that chances of good or bad health are influenced by what happens to us right across our lives.
- This has been a bit like discovering that it was germs, not bad luck or bad smells, which caused infectious diseases in the 19th century.
- Good health is something that can be built up, from even before birth right into old age.
- We are now starting to have the kinds of information on environmental conditions and inner biology that can show us how best to do this.

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2: What is social-biological research?



By taking biological measures we can predict to whom, when and why diseases happen.

People experiencing different kinds of social and economic disadvantage have poorer health than people in more advantaged circumstances. Understanding when and how disadvantage has an impact on health helps policymakers to identify key stages of life, or particular population groups, to target for interventions in order to strengthen the development of health and slow the decline in health that often comes with ageing. From earliest childhood the body develops, growing in size and strength. Most people reach middle age without major diseases. But inside the body, changes take place without people necessarily being aware

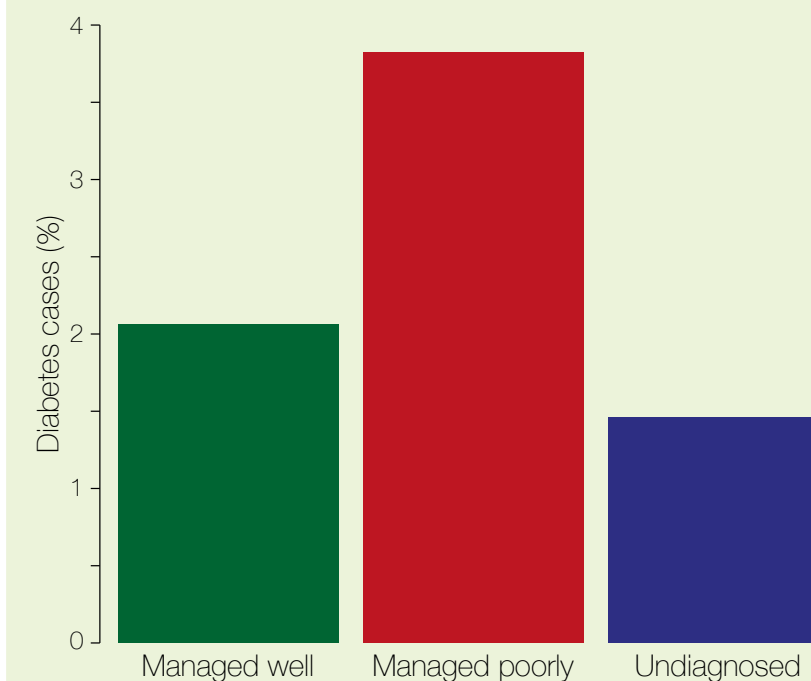
of them. So even though health can be assessed in surveys by asking about symptoms and diagnoses, we need measures called biomarkers to learn what changes are taking place within the body. Examples of biomarkers range from height, weight and blood pressure through to laboratory test results from blood and other tissues. Biomarkers are 'objective' in that they tell us about people having or being at risk of an illness before they experience any symptoms. For example, people may not recognise symptoms of diabetes to begin with, but they will have a higher risk for heart disease or stroke. Many people in surveys have diabetes that has not been diagnosed or that is not being managed

well (see figure). Biomarkers give an indication of the body's health irrespective of how the person feels.

For a long time, doctors have used biomarkers to help with diagnosis and treatment. Now, by introducing biomarkers into longitudinal studies, we can look at people's circumstances, today and in the past, to predict why things such as high blood pressure, bronchitis, adult diabetes and other diseases happen. Policymakers can then develop approaches to prevent these conditions, or to support people to manage their conditions better. Biomarkers have helped us to understand the mechanisms or pathways that lead from social and economic problems – such as living in poor housing or becoming unemployed – to biological changes in the body. These pathways tend to be of two types: direct physical effects, and effects that involve feelings. One example of a direct effect is lung damage from repeated infections due to damp and overcrowded housing or exposure to harmful fumes and dust. An indirect effect would be the 'broken heart' of people who lose their spouse.

Societal factors such as poor working conditions, and interpersonal factors such as a lack of social support, can all influence health. One example of how this works is inflammation. Inflammation is a protective response by the body to irritation, infection and injury, and is usually confined to a small area such as the site of a wasp sting. We can measure inflammation by assessing levels of biomarkers in the blood. Breathing in pollution might irritate the lungs, which can increase levels of biomarkers that reflect inflammation. Inflammation is intended to promote healing and then to die down – that wasp sting is not red and itchy forever! But factors such as chronic stress can make the body lose its capacity to damp down the inflammation once its job is done. Under these circumstances, inflammation can stay consistently high. Because inflammation plays a role in diseases such as heart disease, stroke and cancer, this might suggest how stress affects the risk of these diseases.

Figure 2: Well-managed, poorly managed and undiagnosed cases of diabetes



If diabetes is managed well, people have received a diagnosis of diabetes from their doctor, and their biomarker values are below the diagnosis threshold for diabetes. If it is managed poorly, people have received a diagnosis of diabetes from their doctor, and yet their biomarker values are above the diagnosis threshold for diabetes. Undiagnosed cases are where people have not received a diagnosis of diabetes from their doctor when their biomarker values are above the diagnosis threshold for diabetes.

Source: Understanding Society, the UK Household Longitudinal Study

Implications

- The combination of questionnaire and biological information in surveys is a powerful tool for researchers.
- Objective measures of people's biology, or biomarkers, can tell us who is at risk of an illness before they are aware of any problems.
- Our biology is affected by the social, physical and psychological circumstances of life.

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3: Mental health and life chances



Reducing stress from as early as infancy can reduce mental health problems in later life.

We have found that the frequency of emotional disorders has increased over time, particularly among young women. Work at the International Centre for Lifecourse Studies has identified that stressors such as poor parenting, racism, limited material resources, poor working conditions and social exclusion are closely associated with mental health, and has found a link between early life stressors and cortisol (the hormone released in response to stressors) in adulthood.

Stressors are likely to come along in combinations. Parental separation, which is one of childhood's possible

adversities, has an effect on subsequent material disadvantages and educational attainment, which in turn lead to poor mental health in adulthood. This can raise inflammatory levels (proteins in the body in response to stressors). The imaginary life history of Paul and Peter, identical twins separated at birth, illustrates how differences in upbringing may affect mental health differently, even when individuals share the same genes.

After his adoption, Paul's adoptive parents separated when he was one year old. Suffering from depression due to the marriage breakdown, Paul's adopted mother was unable to be attentive to his needs during his early childhood. The

couple who adopted Peter, on the other hand, were committed to each other, and he was raised without difficulties. According to the findings from our work, Paul is more likely to have emotional disturbances or behavioural problems during his childhood.

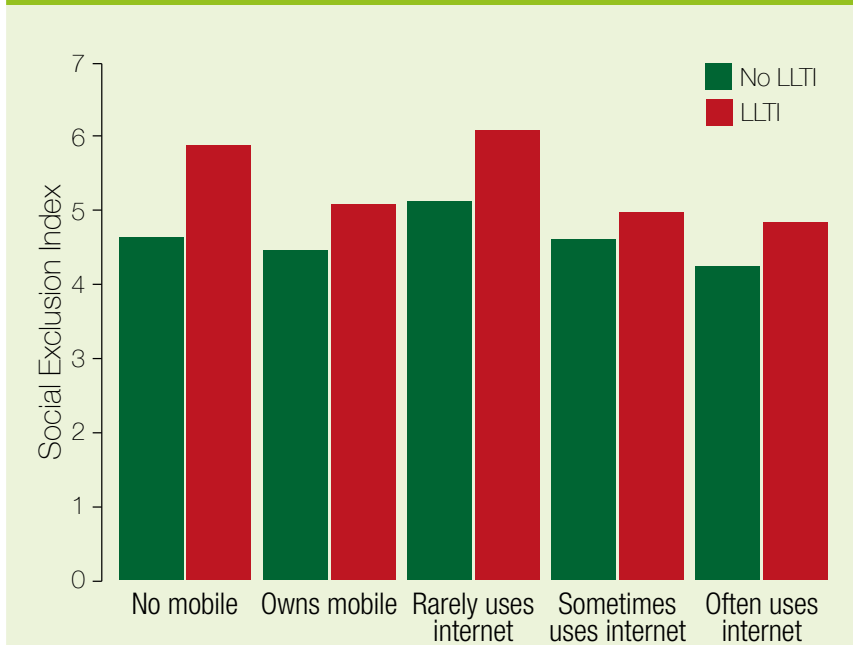
Despite their different upbringings, both had a fair life during their young adulthood. Paul ran away from home with no qualifications, but made his debut as a talented interior designer through a documentary TV programme. Peter's career path was more conventional: he obtained a university degree and started a career as an accountant.

There was an economic crisis and both lost their jobs. Peter found a similar job immediately, while Paul struggled to find a stable job because he had no qualifications. We predict from our work that Paul's mental health is likely to suffer from his multiple spells of unemployment. Even if he gets back into the labour market eventually, his mental and physical health will further deteriorate unless his new work conditions are less stressful.

In contrast, Peter's mental health is likely to remain good, thanks to his conventional career path and generous pension scheme. Even after exiting the labour market he is able to enjoy a high quality of life. As for Paul, he develops osteoarthritis in his older age; he risks becoming more isolated, and that can have an impact on his mental health. If Paul's access to technologies can be guaranteed, we think he might still be connected to society and be mentally well despite his arthritis (see figure).

The social-biological link to mental health is complex. Good sleep can refresh Paul's mind when he is not depressed, but it may not help when he is depressed. According to our evidence, tackling stressors around early childhood can reduce mental health problems in later life. Nevertheless, we need to take a whole-life approach, because stressors can be encountered at any point during a lifetime.

Figure 3: Technology can reduce social exclusion among older people with health problems



Having a limiting long-term illness (LLTI) increases the social exclusion index, but a) owning a mobile phone or b) having access to the internet can reduce the index.

Source: Understanding Society, the UK Household Longitudinal Study

Implications

- Stressors that affect our mental health are likely to be related to one another across our lifecourse.
- Continuous investment to reduce stressors in earlier life can ease the mental health problems that we are facing today.
- Despite the importance of early life, policies aimed at mitigating stressful events and their impact (e.g. unemployment, social exclusion in older age) should be applied across the lifecourse.
- Mental health can have an impact on physical health and vice versa. Greater parity in spending on mental health is a moral imperative, and is likely to be cost-effective in the long term.

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4: Cancer risk across the lifecourse



Understanding the reporting of risk can help us to be more informed about cancer.

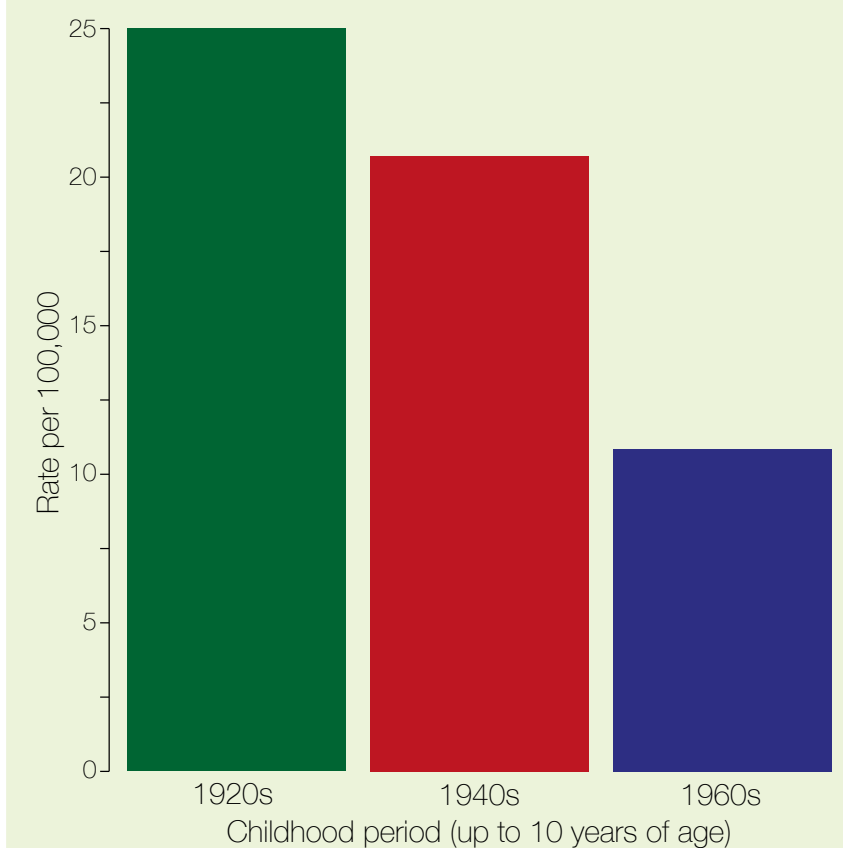
Our research is concerned with the ways in which many diseases are the result of very long-term processes that sometimes take the whole of the lifecourse to make someone ill. This knowledge can greatly increase opportunities to prevent disease. The father of the British NHS, Aneurin Bevan, was killed by a cancer that probably started when he worked in a coal mine as a young man and swallowed cancer-generating chemicals in the dusty air of the mines. By the time he was diagnosed, even the Royal Family's doctor could not save him. But simple health and safety rules 50 years earlier could have prevented his stomach cancer.

As we gather more information about risks through life, new health and safety rules should emerge. If new prevention policies are applied at the right time, fewer people need become ill. An example is when standards of hygiene in housing were tightened up during the 1950s and 1960s, and stomach cancer went from being a common, dreaded disease to being very unusual (see figure). It did not need to be cured; it just hardly happens any more. One reason for this is thought to be that fewer children swallow a germ called *H pylori* in unhygienic homes.

Taking all types of cancer together, it has overtaken heart disease to become the commonest cause of death in the UK today. But this is because other diseases, especially heart disease and stroke, have greatly reduced. People who were born in the mid-1930s are known as the 'golden cohort' because they have remained so healthy. No one is quite sure why, as these people were born in a recession and were children in a world war. But it may be because of post-war full employment, the NHS and the welfare state when they were coming of age, along with great improvements in housing. Lung cancer went against the declining trend of most diseases until people started to give up cigarettes. Since then lung cancer has become far less common. Even breast and prostate cancer are killing fewer people now than 20 years ago, although from the newspapers you would not think so.

Another problem when trying to understand the risk of cancer is the confusing way in which statistics are presented. If you were obese as an adolescent, then your risk of getting colon cancer is 238% more than for someone who was in the normal weight range. This is the relative risk of getting cancer of the colon compared to someone who was normal weight in adolescence. But for a more realistic idea of a person's risk of getting this cancer, we need another statistic called the absolute risk too. This statistic tells us that out of 1,000 adolescents of normal weight, fewer than four will ever develop colon cancer, and just above four per 1,000 adolescents who were obese will get colon cancer. So there is a higher risk for those who were seriously overweight, but it is small in absolute terms. One should handle this information thoughtfully, weighing absolute and relative risks against each other and against the risk from other factors.

Figure 4: Death due to stomach cancer at ages 50 to 59 years has declined over time



Source: www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/stomach-cancer/mortality

Implications

- Lifecourse events such as gaining weight in adolescence can increase the risk of cancer in adulthood.
- Identifying such risks helps to establish points for public health intervention, and to increase individuals' awareness of potential threats.
- However, an informed approach is required in interpreting these risks, keeping in mind the distinction between different risk measures, such as relative and absolute risks, reported in scientific literature and the media.

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5: Disadvantage and lung disease



Improving living conditions from the start of life is beneficial for lung health in the middle and later years.

This chapter is about diseases of the lung, such as bronchitis and asthma. Lung cancer has different origins. The lungs are a place where the outside world comes directly into contact with the inside of the body. They are where oxygen is absorbed into the blood from the air we breathe. Oxygen is then transported around the body to supply many biological processes that are essential for survival. But along with the vital oxygen, the air we breathe can bring a large number of harmful substances directly into contact with the lungs. These include all kinds of pollutants and, of course, the poisons present in tobacco smoke.

We have known for a long time that people's lungs are affected by conditions right across the lifecourse. But only recently have we had studies that allow these conditions to be investigated properly. We know that if you grew up in a less prosperous household, you have a higher risk of an early death from lung disease. But why should this be?

The graph shows what happened for survey respondents whose parents reported that they had some financial difficulty when the respondents were seven, 11 or 16 years old. Most families had no difficulties, but a fair number reported financial difficulties on at least one occasion. FEV₁ is a measure of how

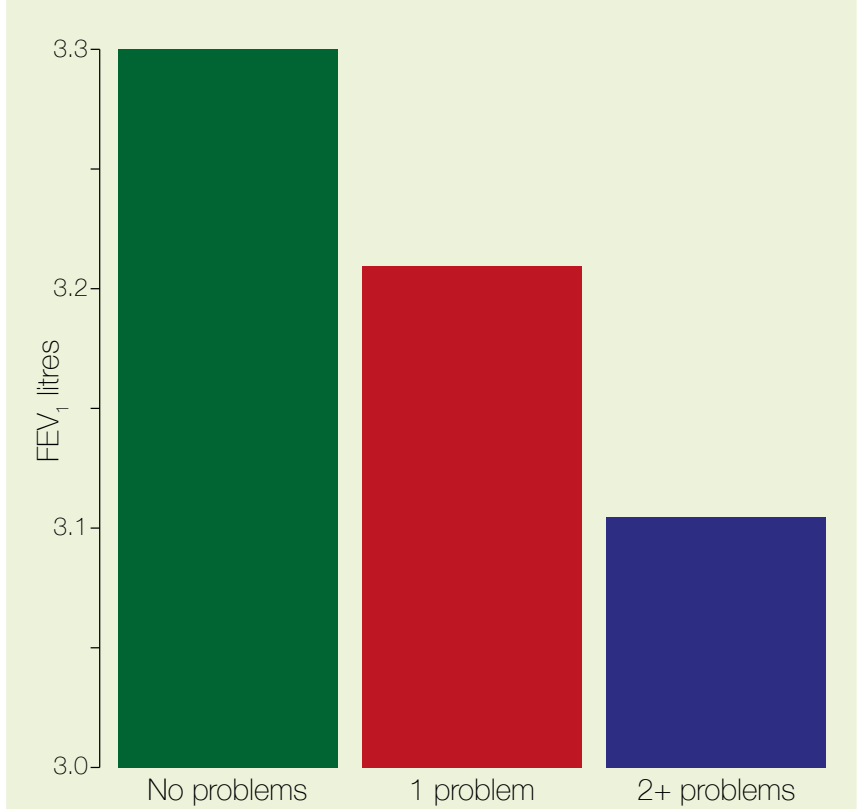
much air a person can blow out in one second, so the higher it is the better. People whose families reported financial difficulties on two or more occasions could blow out around 200 millilitres less than those reporting none. This is roughly the difference between being able to walk quickly up a gentle hill without getting breathless and not. The mid-40s is quite a young age to be that breathless.

Lifecourse research allows us to see the way that this kind of disadvantaged start in life unfolds over time to influence lung health in the middle and later years. People on low incomes tend to have housing that is colder, damper and more crowded. Children who live in poorer and more overcrowded housing get more lung infections and recover more slowly. As a result, many miss out on school, or are not healthy enough to take full advantage of their lessons. This in turn often results in them failing exams and ending up in lower-paid jobs, often with higher exposure to fumes, dusts, cold and damp. Alongside these social and economic problems, people with this kind of lifecourse find smoking more tempting and harder to give up.

Children in families where wages are lower are also at a higher risk of becoming asthmatic. This is partly because those who cannot afford high rent or house prices end up in worse housing conditions, often nearer to roads and other sources of pollution. But some research has indicated that stress may also play a role.

The research highlights the importance of good quality housing being available to everyone, regardless of income. This would be an effective way to interrupt the vicious cycle that leads from early social and economic disadvantage to worse lung health in later years.

Figure 5: Lung strength is lower in adulthood if there are financial problems in childhood



Lung strength as measured by forced expiratory volume in one second (FEV₁, litres) at age 45–46 years.

Source: National Child Development Study, the 1958 British Birth Cohort

Implications

- Economic conditions early in life have long-lasting effects on later lung disease.
- There are many mechanisms explaining the links between disadvantage and lung disease, including physical, behavioural, educational and employment pathways.
- Good quality housing for all may be one of the most effective ways of combating lung disease.

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6: Cardiovascular disease



Since cardiovascular risk builds up over a lifecourse that features social and economic disadvantage, preventative policies also need to cover the lifecourse.

Lots of studies tell us that heart disease is susceptible to effects from the social environment, but it is not clear why or when the environment matters for the processes that lead to disease. Measuring biomarkers can help us to understand the pathways between disadvantage and biological changes in the body that can lead to heart disease. One example of a biological pathway between social circumstances and heart disease is inflammation. In Chapter 2 we saw that inflammation can be influenced by long-term stress. From a lot of research we also know that it is related to the development of heart disease, perhaps through the development of atherosclerosis (when

deposits of fatty material build up on the arteries' walls). Inflammation can be measured by a number of biological markers. One of these is C-reactive protein (CRP), which reflects inflammatory load and chronic stress in the body.

Events that happen in childhood can influence cardiovascular risk factors in adulthood by setting people onto a lifecourse characterised by socio-economic disadvantage. For example, our research has shown that children who experience the divorce or separation of their parents are more likely to live in financial hardship, which leads to lower educational achievement on average.

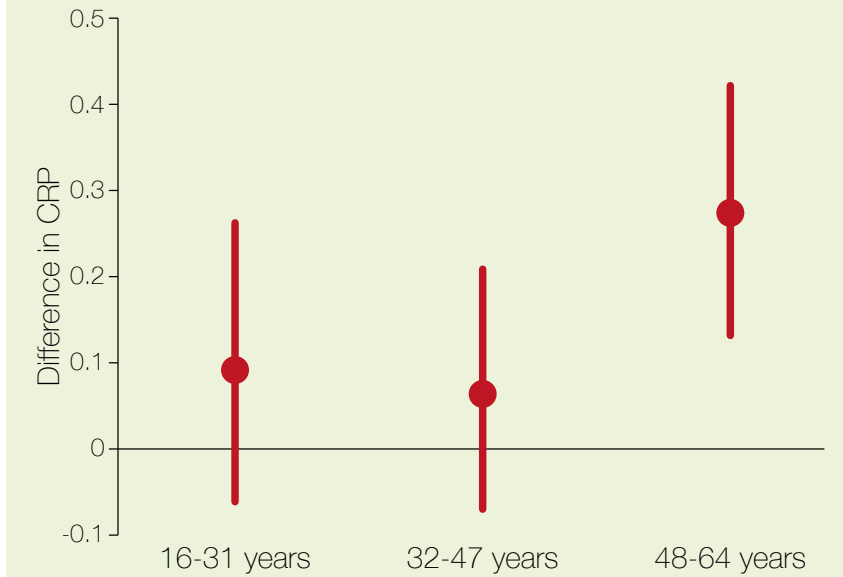
People with lower levels of education tend to have higher levels of inflammation in mid-adulthood as measured by CRP. This is only partly because of risky behaviour such as smoking, which in any case is also related to stress.

Our work has also shown that among working-age adults living in England and Scotland, unemployed people often have higher levels of inflammation. The relationship between unemployment and raised levels of inflammation was stronger among individuals aged 48–64 when compared with those aged 16–31 (see figure). The relationship was also stronger among individuals living in Scotland when compared with those living in England. These findings may be due to differences in the lifetime exposure to unemployment across age groups and countries. Older individuals are likely to have experienced more unemployment than their younger counterparts. Higher unemployment rates in Scotland, both at the time of the research and now, mean that individuals living in Scotland are likely to experience more unemployment than those in England.

In addition to higher levels of inflammatory markers in unemployed people, we also observe that aspects of work and family life might relate to higher levels of CRP. For example, our research shows that men and women who report conflict between work and family domains have higher levels of CRP.

Diabetes is a risk factor for cardiovascular disease, and levels of diabetes are higher in socially and economically disadvantaged groups. Researchers have investigated inflammation and diabetes depending on social circumstances in both childhood and adulthood. For people aged 50 and older, inflammation explained a substantial amount of the difference in diabetes levels associated with social class measured across life. By studying inflammatory processes over the lifecourse, we have gained valuable insights into how stress in the social environment influences cardiovascular disease.

Figure 6: Differences in C-reactive protein for unemployed and employed people are greatest in the oldest age group



The figure shows the difference (in milligrams per litre) in C-reactive protein (CRP) for the unemployed compared with the employed. Vertical lines represent how 'good' the estimates are: we can be confident that the differences are 'real' if the vertical lines do not cross the horizontal line at zero.

Source: Health Survey for England and the Scottish Health Survey, 1998–2010

Implications

- Cardiovascular disease is influenced by the social environment, but it is not clear exactly how.
- Markers of inflammation in the body are linked with cardiovascular disease, and are also influenced by stress in the social environment.
- Inflammation may provide insight into how stress in the social environment influences cardiovascular disease.

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7: Body weight and health over the lifecourse



Simple measures in childhood can help prevent obesity later in life.

We know that being overweight can lead to poor health. Obesity is one of the leading causes of death and disease globally. While rates of some health risk factors, such as smoking, have been in decline, rates of obesity have increased remarkably over recent years. High levels of overweight and obesity among children are of particular concern, because those who are obese as children are more likely to remain overweight or obese through adulthood. We also know that being obese in early life is linked with health problems later in life, and obesity influences children's and adolescents' mental health and how they

feel about themselves as they grow into adulthood. For example, our research has shown that children who are obese at age 11 are also more likely to have behavioural difficulties and low self-esteem, and are less happy than children in the healthy weight range.

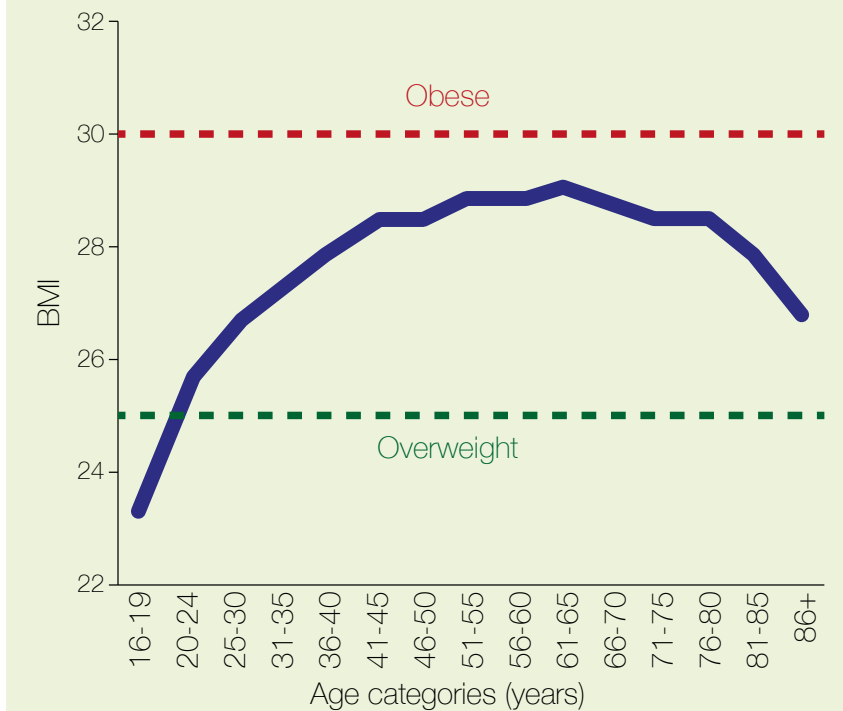
While obesity is a major health concern globally, not everyone is affected equally. People who live in disadvantaged social or economic circumstances, such as those on a low income, are more likely to be overweight or obese. Our work has also shown that the inequality in obesity seen in childhood increases as children grow. We found that the difference in

rates of obesity by levels of household income when children were five years old widened by the time they were 11. At age five, children in the poorest households were twice as likely as children from the best-off households to be obese. By age 11 they were three times more likely. We also found that 11-year-old boys whose parents are under financial strain are more likely to be obese than 11-year-old boys whose parents are not experiencing financial strain.

Children from certain ethnic groups, such as Black African, Black Caribbean and South Asian households, are also more likely than White British children to be overweight or obese. However, our research has shown that these higher levels of obesity are largely because they are more likely to live in disadvantaged, low-income households. Why is it that children living in disadvantaged social or economic circumstances are more likely to be at risk of obesity? There are many aspects of the home, school and neighbourhood environments that influence weight gain. For example, our research has shown that getting enough sleep and eating enough fruit helps to prevent five-year-old children from becoming overweight or obese, while mothers' smoking during pregnancy and the early introduction of solid foods are linked with an increased risk of children becoming overweight or obese.

At the other end of the lifecourse, we know that on average weight declines in later life (see figure), so both obesity and underweight can be important health problems for the elderly. Underweight is linked with an increased likelihood of dying in the elderly, although underweight is sometimes caused by underlying health problems.

Figure 7: Average Body Mass Index by age



The figure shows average Body Mass Index (BMI) in kilograms per square metre (kg/m²) by age (16–99 years). BMI (a measure of healthy weight) for men and women combined is in the overweight range (more than 25 kg/m²) throughout adulthood, and close to the obese range (more than 30 kg/m²) from midlife to early old age.

Source: Understanding Society, the UK Household Longitudinal Study

Implications

- Obesity is one of the leading causes of death and disease globally, and rates of obesity have increased remarkably over recent years.
- Obesity in childhood is of particular concern, because those who are obese as children are more likely to remain obese through adulthood.
- Not everyone is affected equally. People who live in disadvantaged social or economic circumstances, such as those on a low income, are more likely to be overweight or obese.

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8: Developing well and stemming decline



Setting the foundations for and maintaining good cognitive function is key to living an independent and fulfilling life.

The ability to learn is affected very early in life by social and environmental factors. Our research has shown that by the age of three, the more problems we have experienced in our families such as shortage of money and parental arguments, the harder it is to develop skills. This means that children with less favourable home environments know fewer words, and find it harder to do puzzles. Once at school, disadvantaged children learn reading and numbers more slowly. As time goes on, the differences in skills continue to increase between children with more and fewer problems in their lives.

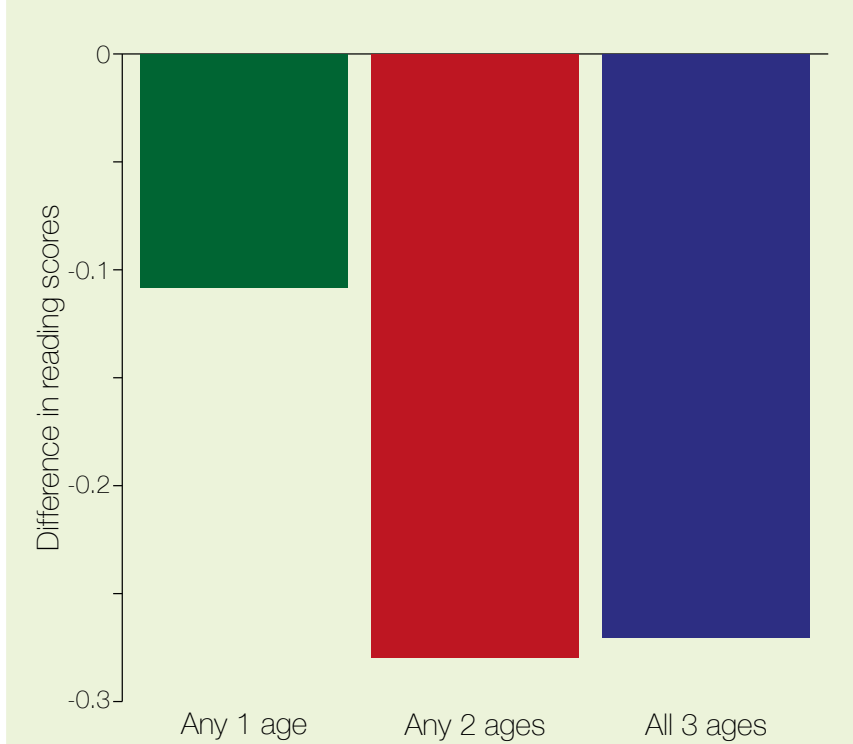
Problems can start even before birth. If mothers-to-be are stressed, drinking large quantities of alcohol and smoking, their baby's brain development in the womb is less favourable, potentially affecting learning. However, there are some experiences during the early years that can have a positive bearing. A wealth of evidence shows that breastfeeding has benefits for the development of skills (or 'cognition') throughout childhood. Recent work found that adults who had been breastfed as babies were more likely to get higher-paid jobs with better working conditions than their parents, and were less likely to slip into worse jobs. This is thought to be because of the benefits

of breastfeeding for learning throughout childhood and adolescence. Other things that go on in the home, such as having books, a quiet place to read and study, good family relationships and routines, are important too. Being read to and told stories, and having sufficient sleep and regular bedtimes, are linked to better development of reading skills (see figure). In turn, the faster children learn their letters and numbers, the easier it is for them to do well at school. Getting qualifications has two important effects on health in adult life. They allow people to get higher-paid jobs with better working conditions, job security and chances of promotion, all of which are known to improve health. But our qualifications are also strongly related to our lifestyles in adulthood. Both having a good job and leading a healthier lifestyle seem to have important effects on how long we can maintain our mental functions as we age.

While some losses in mental powers ('cognitive decline') occur as a normal part of ageing, they are not inevitable, and the rate of cognitive decline varies between people. The speed of decline is associated with many influences taking place across the lifecourse. Lifestyle behaviours, such as smoking and drinking alcohol, are damaging for cognitive function in later life, while taking exercise is beneficial. Having an interesting job encourages people to 'use it' (their brain) rather than 'lose it'. Employment also provides opportunities for friendship and social support. These findings are important, as cognitive decline has been linked to the onset of dementia.

Good early development of mental skills leads to more educational opportunities, and being well educated and having a good quality job has social and health benefits. As cognitive decline is a risk factor for dementia, the factors that influence both cognitive development in childhood and maintenance into later life are important for our ageing society.

Figure 8: The cumulative negative effects of non-regular bedtimes on reading scores



Differences in reading scores compared with regular bedtimes throughout early childhood. Bedtimes measured at ages three, five and seven years.

Source: The Millennium Cohort Study

Implications

- Being breastfed and read to, and having sufficient sleep and regular bedtimes, in the early years of childhood promotes better cognitive performance.
- Taking exercise and not drinking excessively could help to protect against cognitive decline in later life.

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9: Predictors of good physical capability in later life



Healthy spaces and places help to maintain physical capability in older age.

Maintaining the ability to get out and about ('physical capability') in older age is important for health and quality of life. Most people's physical strength declines with increasing age, but not everyone declines at the same rate. Our research has uncovered a number of social and lifestyle factors in both earlier and later life that can be changed to reduce the rate of decline in physical capability.

Like most important influences on lifelong health and well-being, the development of physical strength begins even before birth. Babies born with higher birthweight have stronger grip strength than smaller

babies, and those with more advantaged family backgrounds have better strength and balance in older age than their more disadvantaged peers. At the other end of life, wealthier older people maintain their physical capability for longer than those who are less well off.

Loss of physical capability can stop people being able to participate in normal activities. Pedestrian crossings in the UK require people to walk at 1.2 metres per second in order to cross in time, but most older people do not walk this fast: by the age of 60 even the richest older people with no health problems have an average walking speed that is too slow, and the

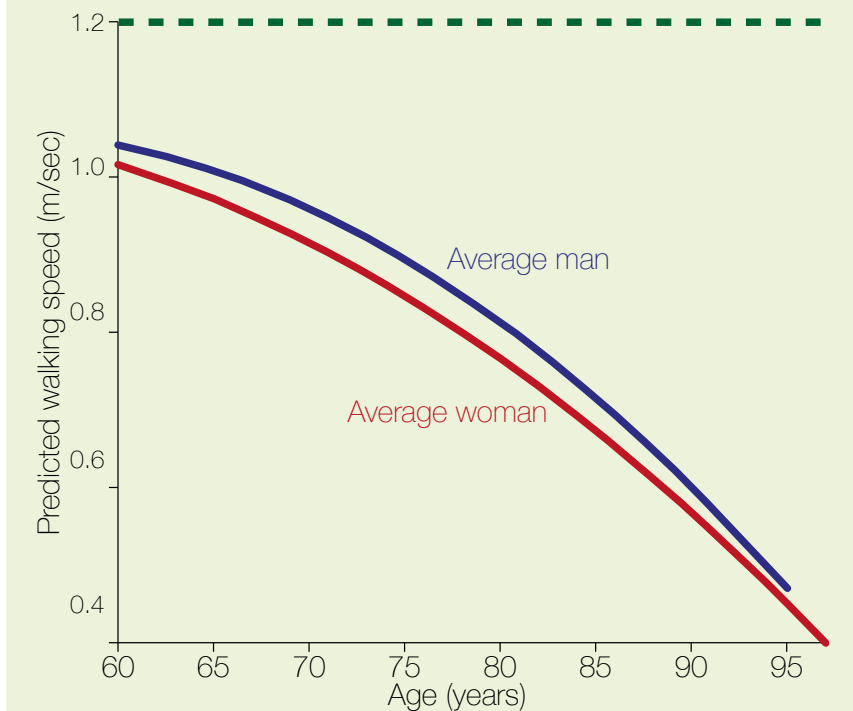
disabled poor are much slower. By 85, the average older person needs more than twice as long to cross the road safely as a pedestrian crossing allows (see figure).

Having access to good and affordable public transport can actually help people to maintain their fitness. Our research has suggested that having an older person's bus pass, which provides free bus travel for people over the state pension age in the UK, is associated with older women being more likely to be physically active. This might be because using the bus usually requires walking to the bus stop, whereas most people's alternative, using a car, doesn't require much physical activity at all. Possibly because of this, women who have bus passes are able to walk faster and are slimmer than those who do not.

How long and how well you sleep is also important for maintaining good physical capability as you get older. Older adults who sleep less than seven hours per day or who have poor quality sleep are less likely to exercise. Even though sleep quality tends to worsen with increasing age, if older adults manage to maintain good sleep quality it can reduce health risks in later life.

Finally, marriage is supposed to be good for health and physical functioning, especially for men, but what about remarriage later in life? Our research suggests that remarriage does not necessarily translate into better physical functioning in later life. Men who are stronger may be more likely to become married in the first instance, and if they are then divorced or widowed they are also more likely to remarry. Single women are just as physically strong as married women. Marriage in later life may not be a useful strategy for maintaining good physical capability!

Figure 9: Walking speed declines with age



Predicted change in walking speed by age for average older men and women. The horizontal line at 1.2 metres per second highlights the walking speed required to cross the road in time.

Source: English Longitudinal Study of Ageing

Implications

- Physical capability is influenced by circumstances, from those occurring very early in life right through to older age.
- Physical capability declines in older age, and declines faster for more disadvantaged older people.
- Physical activity at older ages may help to maintain physical capability, in turn helping older people to stay independent for longer.

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Conclusions

The promise of lifecourse research is that disability and disease can be delayed or even prevented altogether if the circumstances in which we live and the behaviours we adopt are changed for the better.

In this booklet we have given a taste of the latest research on the social and biological changes over the lifecourse that influence how likely it is that various diseases will arise in later life. Many of these influences are out of our control – we can't help it if we are born into poverty, or if a recession happens just as we are trying to get our first job, or if we have inherited genes that predispose us to cancer. People may argue that our behaviours are under our own control, so that victims of ill health risk being blamed for their poor habits. But if lifecourse research tells us anything, it is that life is more complex than that. Risky health behaviours are so much more common among people who experience harder lives that one cannot just call it a matter of free choice. Biological, social, economic and psychological factors influence each other right across life.

Inflammation and inflammatory biomarkers feature in much of the work described in this booklet. They are a good example of how complicated the relationships are between our social and material world and our inner (biological) world. Well before a doctor can tell that a person has a certain chronic disease,

the wear and tear on our bodies from a lifetime of disadvantage can be measured by biomarkers. For example, inflammatory biomarkers tell us something about the build-up of emotionally and physically stressful experiences over lifecourses that place our body systems under stress.

The promise of social-biological research is that we are beginning to see that many diseases of ageing – such as heart disease, cancer and dementia – have some of their roots very early in life, so that it is never too early to intervene. If support for new parents were offered, good housing and schooling were provided, and all homes and neighbourhoods were clean and safe, most of our children might have a chance of a healthy old age. And if we change the environments in which we live by reducing the number of polluting cars and allowing people time to cross roads safely, older people will also have more chance of a fulfilling and independent life. By looking across the whole of the lifecourse at how social circumstances and individuals' biology interact, we can see that it is never too late to change the course of people's lives for the better.

Feedback

The findings we present here are only steps in what will no doubt be a long journey of discussion and debate. WE encourage anyone reading this booklet to send us feedback either by email (icls@ucl.ac.uk) or by completing a short survey: <http://bit.ly/Lifecourse-pub>



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Resources

Blogs

The Child of our Time blog is about the health and happiness of children living in the UK. By tracking many thousands of children's lives, ICLS researchers and others ask important questions based on existing and emerging evidence in a bid to enable better lives for young people.

<http://childofourtimeblog.org.uk>

Twitter: @childofourtime

WorkLife is a blog about the relationship between people's work, health and well-being, whether they are preparing for working life, managing their work-life balance or preparing for retirement and beyond.

<http://worklife-blog.org>

Twitter: @WorkLife_blog

Podcasts

The ICLS podcast series aims to introduce ICLS research findings to audiences outside academic and research-based institutions.

<https://www.ucl.ac.uk/icls/podcasts>

Twitter: @icls_info

Booklets

Bartley, M. (2012) ed. *Life Gets Under Your Skin*

ISBN: 978-0-9527377-8-0

<https://www.ucl.ac.uk/icls/publications/booklets>

Bartley, M. (2006) ed. *Capability and Resilience: Beating the Odds*

ISBN 0-9527377-9-5 ISBN 978-0-9527377-9-7

<https://www.ucl.ac.uk/icls/publications/booklets>

Studies: Birth Cohort

Millennium Cohort Study

<http://bit.ly/2dML1XU>

1970 British Cohort Study

<http://bit.ly/2dTUoq3>

National Child Development Study

(1958 Birth Cohort Study)

<http://bit.ly/2dl5kjr>

National Survey of Health and Development

Cohort (1946 Birth Cohort Study)

<http://bit.ly/2dheBVS>

Studies: Household Panel

British Household Panel Survey

<https://www.iser.essex.ac.uk/bhps>

Understanding Society

– The UK Household Longitudinal Study

<https://www.understandingsociety.ac.uk>

Studies: Other

English Longitudinal Study of Ageing

<http://www.elsa-project.ac.uk>

Health Survey for England

<http://bit.ly/2dheQ38>

Scottish Health Survey

<http://bit.ly/2dsMh04>



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