

# SCIENCE & WELLBEING



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# BABY BOOM OR BUST?

*Professor John MacInnes looks at the history of the family in the last century, and how economic factors influence when or whether people have children >*

**L**ast year in Britain just under 800,000 children were born – the highest number for 40 years. But the number of births will almost certainly fall over the next few years because of the impact of the recession. In a tougher economic climate younger people take longer to form partnerships and couples may postpone having children till they feel they can afford it. We can already see this effect: while fertility has been falling for mothers in their twenties since 2008, it is still rising for older mothers.

Economists and sociologists have long been interested in the link between fertility and what is happening in the economy. Adam Smith, the founder of modern economics, was one of the first to argue that rising prosperity might lead to fewer births in *The Wealth of Nations* published in 1776: ‘...barrenness, so frequent among women of fashion, is very rare among those of inferior station. Luxury in the fair sex, while it enflames perhaps the passion for enjoyment, seems always to weaken, and frequently to destroy altogether, the powers of generation.’

Smith’s observations were prescient. Once the industrial revolution raised living standards and made it possible for couples to have realistic aspirations for a better life for their children, they began to plan their fertility so as to concentrate their efforts on fewer of them. Often this happened first among the wealthier or professional groups, and then spread to others. From the beginning of the 20th century in Britain, large families became much less common and two or three children became the norm. This process has become global over the last 40 years, so that sub-Saharan Africa is now the only region of the world where high fertility remains common.

#### A WOMAN’S DUTY?

At first, governments, churches and others were alarmed by fertility decline, and reacted by banning contraception, encouraging large families or restricting women’s employment. First-wave feminism was often demonised for turning women away from their patriotic duty of bearing children. These policies were seldom well thought through and it’s doubtful if they had much impact beyond the rhetorical one of reinforcing the idea that women’s first duty was to marriage and motherhood rather than training, employment or a career.

But by the second half of the 20th century it became clear that dramatic rises in life expectancy, which more than doubled in the course of the century, meant that the size of populations continued to grow even with much lower fertility. Instead, unprecedented global population growth became the prime concern.

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COUPLES  
POSTPONE  
HAVING  
CHILDREN  
UNTIL  
THEY HAVE  
ESTABLISHED  
THEIR CAREERS



European governments have sometimes become concerned about relatively low fertility: in many countries the number of children born each year is insufficient to maintain the population at its existing level in the long term. In June 2012, the *Economist* warned of a ‘crisis’ of fertility. Governments have worried whether there will be enough people of working age to pay the taxes and national insurance contributions necessary to pay for the health and social services needed by a population with more older and retired people.

But while long-term economic growth continues (which will of course require recovery from the worst recession since the 1930s) and as long as older people continue to be healthier and more active than their counterparts in earlier times, there is no reason to think that longer lives – surely one of the greatest achievements of modern times – will create insurmountable economic problems.

This raises two questions – the first is intergenerational social and economic justice. The costs and benefits of the welfare state, the state of the labour market or the housing market, have different implications for successive generations. David Willetts recently showed in his book *The Pinch* that the baby boomer generation born in the 1950s and 1960s has been remarkably fortunate, especially in comparison to

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the generation entering the labour market and setting up home this century. Should there be an obligation for this generation to share some of its good fortune with others, for example through higher inheritance taxes?

The second question is whether governments should try to encourage people to have children, in order to avoid the baby boom of the 1960s turning into a future 'baby bust'. Some observers have worried that modern affluence will, to use Smith's words, 'destroy the powers of generation' unless government intervenes to support families. These fears have largely proved groundless. All European governments support families to some extent, through providing health services, education, child benefits and public childcare, or providing for 'family friendly' or 'work-life balance' employment policies. It has proved very difficult for researchers to measure the impact of such policies.

### THE MODERN FAMILY

But we do know that the family has been transformed over the last half century. The roles of men and women have become much more similar. Instead of a 'male breadwinner' and housewife, both parents usually work and people tell researchers that caring for children ought to be the equal responsibility of both fathers and mothers, although their behaviour does not always match up to this aspiration.

Couples postpone having children until they have established their careers. Marriage has become a consequence of having children, rather than a precursor to pregnancy, so that a half of first-born children now have unmarried mothers, most of whom are cohabiting. Single parenthood has increased, and divorce has become more common. We also know that the family is more popular than ever before.



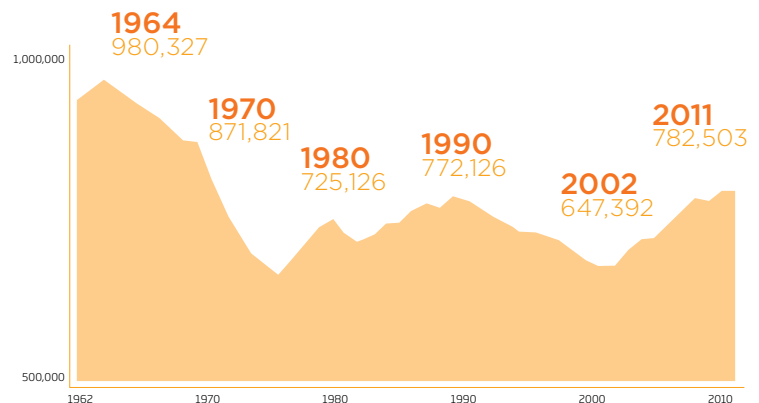
The ESRC, in partnership with government and other stakeholders, has ensured that the UK has a world-leading series of birth cohort studies. The research these have made possible means we now know far more about the circumstances within which children grow up, the impact of poverty, changes in family circumstances, such as divorce, or of different educational opportunities on their development. And they will also allow us to understand how the family and fertility develop over the next century in Britain. ■

*Professor John MacInnes, of the School of Social and Political Science at the University of Edinburgh, is the ESRC Strategic Advisor on Quantitative Methods Training*



## BIRTHS IN ENGLAND, WALES AND SCOTLAND 1962-2011

Source: Office of National Statistics, National Records Scotland





**PROFESSOR STEVE YEARLEY**  
 Director of the Genomics Forum (officially the ESRC Genomics Policy and Research Forum) at the University of Edinburgh

OPINION: PUBLIC SPENDING

# BONFIRE OF THE QUANGOS

*Professor Steve Yearley warns that politicians may regret abolishing the life sciences quangos when a tricky topic crops up*

**T**he central argument made over and over again by the current government is that we need to control public spending. And one of its very first initiatives for carrying this out was to reduce drastically the number of quangos - the so-called 'quasi-autonomous' bodies that advise government or do things on its behalf. They are largely paid for by government but are not part of ministries or the civil service.

An example that helped make the case for abolition was 'the Tote', an organisation invented decades ago to look after off-course betting on racehorses and which was still somehow hanging around on the government's books. The idea of cutting quangos clearly makes economic sense



**CLONED COWS WEREN'T A BIG DEAL BUT POLITICIANS MAY MISS THE QUANGOS WHEN THE NEXT BIG DEAL REALLY DOES APPEAR**

because there tends to be a ratchet effect; fresh circumstances or political necessities promote the formation of new ones faster than existing ones wither away. With no pruning, the number will steadily increase.

There was heated discussion about how much governments would in fact save since some of the things that quangos do will have to be done anyway - checking up on climate change, say - and if the government ends up doing them 'in house' that will not necessarily be



In the case of technical or scientific issues, there's a case for deciding things independently of what governments favour

cheaper than getting a quango to do it. But the government largely stood by its plans.

Genetics and associated biotech issues is one area where there had been rapid growth in quangos in the last 15 years or so. By 2010 the life sciences area was already well populated, with two authorities (agencies that actually perform governmental-type tasks such as deciding on whether innovative forms of stem-cell research should be allowed) and one advisory body whose job was to keep an eye on emerging issues.

## THE CASE FOR QUANGOS

Many in the British biosciences establishment looked on these institutions as a source of national pride, figuring that Britain had found a way of promoting responsible innovation in these tricky areas. But the plan remains to abolish all three bodies - the Human Genetics

Commission, the Human Tissue Authority and the Human Fertilisation and Embryology Authority (HFEA) during this Parliament. What is the likely impact of retiring these biomedical quangos?

Two sorts of reasons have been put forward to justify putting these biosciences bodies in the category of special cases. The first relates to the technical nature of life-sciences knowledge. A supposed advantage of quangos is that their (relative) autonomy allows them to agree on technical matters away from the clamour of political divisions. Just as one would not ideally get politicians to set a figure for the correct speed of light or the diameter of the sun, one would not really want political considerations to enter into the biosciences either. In the case of technical or scientific issues, where there is - in principle at least - a right or wrong answer, there's a case for deciding things independently of what governments favour.

## NATURAL EXPERIMENTS

# A CHANGING WORLD

*'Natural experiments' can help to meet future challenges in health, economics and the environment*

This argument makes good sense but it is not clear that it applies fully to issues in human genetics, as the most controversial topics in this domain are not purely technical but social and ethical as well. For example, the issue of whether scientists should be licensed to learn more about human stem cells by developing the early stages of human cells in cow or rabbit eggs – a major issue the HFEA had to take a stand on three years back – is only in part a technical one. The most contested aspects of this question are precisely to do with the ethics, the policy implications and the societal acceptability of allowing such a practice. These aspects seem as much the legitimate domain of politicians as of scientists.

### GOD AND THE BEDROOM

But this then leads directly to the second argument. Although many biomedical matters are very broad and not purely scientific, it is far from clear whether they are helpfully dealt with in terms of party politics. In the Westminster system most issues are voted on in terms of party allegiance and we roughly know what a Conservative, Liberal or Labour point of view would be. But political commentators note that there are some topics that do not easily fit this pattern: sometimes referred to as issues of 'God and the bedroom', there are matters (often about faith or reproduction) that don't readily map onto party ideologies or onto what's in manifestos.

Of course, Conservatives are generally more conservative even about biology and Liberals more liberal and so on, but parties are less well defined in their views about such issues than they are about private schools or the NHS. And it's in this sense that there are perils in taking these human biosciences issues back into the overtly party political realm.

Part of the peril is for the issues themselves. Under a politicised system, policies may be determined by political considerations rather than by the relatively open and transparent process followed by the genetics quangos. But there is also a potential peril for the politicians. Late in 2010 it emerged that meat that had entered the market in Britain had come from the offspring of 'cloned' US cows. We weren't eating the clones but their conventionally born offspring. At first nobody seemed really sure whether such animals could be legally sold into the food chain or whether there might be any special risks from eating clones' relatives.

When such a tricky topic crops up, a minister or politician is generally only too glad to have a quango to which they can refer the matter. Cloned cows weren't a big deal but politicians may miss the biosciences quangos when the next big deal really does appear. ■

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**OUR BEHAVIOURS ARE** constantly shaped by a changing world, whether it is in how we spend our money, what we eat, or how we travel around. If we can develop greater understanding of these influences, future interventions to improve health, wealth and wellbeing can be made more effective.

Events or interventions that may influence behaviour, are not under the control of researchers, and that are suitable for scientific study are known as 'natural experiments'. Examples include the after-effects of famine, clean air legislation, or changes to transport infrastructure that might affect whether people choose to walk or cycle instead of driving.

Researchers at the Medical Research Council Epidemiology Unit and UK Clinical Research Collaboration Centre for Diet and Activity Research (CEDAR) are looking at the last of these topics. Their natural experimental study, Commuting and Health in Cambridge ([www.cambridgecommutingstudy.org.uk](http://www.cambridgecommutingstudy.org.uk)), is funded by the National Institute for Health Research (NIHR) Public Health Research programme. The study focuses on the Cambridgeshire Guided Busway, which opened in August 2011 and is the longest of its kind in the world. Guided busways provide dedicated, reliable bus routes with less environmental impact than building new roads.

### TRAVELLING AND HEALTH CONCERNS

Dr David Ogilvie, principal investigator, says, "While the primary motivation for building the Busway was to reduce congestion rather than improve public health, we know that using public transport tends to involve some physical activity. In the first two months alone, 430,000 trips were made on the Busway, so the potential for a population-level effect on physical activity is worth investigating." To explore this, physical activity and GPS monitors, travel diaries, questionnaires, interviews and surveys and observations of Busway users are used.

CEDAR researchers are also part of a larger group of scientists involved in the iConnect study of the changes in travel, physical activity and carbon emissions related to Connect2, a National Lottery-funded project run by

sustainable transport charity Sustrans. Connect2 is creating new crossings, bridges and routes in locations across the UK to encourage local journeys on foot or by bike. The iConnect study is funded by the UK Engineering and Physical Sciences Research Council.

These two natural experimental studies are ongoing, but are already revealing insights. Adults who use active modes of travel report significantly higher total levels of physical activity. This confirms the importance of travel

as an opportunity to be active, and suggests that people who walk or cycle do not necessarily compensate by being less active at other times. iConnect has found some complex associations between physical activity, body mass index and carbon emissions. For example, while active travel can reduce emissions, leisure-time physical activity is associated with higher motorised travel

distance, therefore higher carbon emissions.

CEDAR's research also highlights the variety of modes of transport that are combined in a single journey – such as driving to a park-and-ride facility and switching to pedal power – and that commuters tend to reconsider travel options after moving home or workplace.

Both findings are important when considering how and when it might be possible to intervene to encourage walking and cycling.

Researchers are contributing to new methods and guidance in this field to help apply a natural experimental approach to evaluation more widely and rigorously. With austerity biting on the one hand and the government announcing infrastructural investments on the other, the physical and socio-economic landscape is ripe for more natural experimental studies. ■

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“USING PUBLIC TRANSPORT TENDS TO INVOLVE SOME PHYSICAL ACTIVITY”



THINKSTOCK

## 🔍 DATABASES

# The brain drain

*Privacy is not the only concern when considering the ethics of data sharing in biomedical science*

**PRIVACY HAS LONG BEEN** the focus of debates about how to use and disseminate data taken from human subjects during clinical research. But it is not the only relevant concern. Research by Dr Sabina Leonelli at Egenis, the ESRC Centre for Genomics in Society, suggests that the challenge of making data intelligible and useful for future research needs to be taken into account when considering the ethics of publicly accessible data repositories and databases that include clinical data from patients.

While making patients' data openly available raises concerns about the privacy of individual information, tackling those concerns involves more than challenging the meaning of 'informed consent': addressing privacy concerns in biomedical research involves understanding the ways in which data is to be disseminated and used to generate new results.

Efficient use comes from what the Royal Society calls 'intelligent openness' – the development of standards for data dissemination that make data both intelligible and assessable. Data is intelligible when it can be used as evidence for one or more claims, thus helping scientists to advance existing knowledge. Data is assessable when scientists can evaluate its quality and reliability as evidence, usually on the basis of its format, visualisation and extra information (metadata) also available in databases. Yet the resources and

regulatory apparatus for securing proper curation of data, and so its adequate dissemination and re-use, are far from being in place.

Making data intelligible and assessable requires labour, infrastructures and funding, as well as substantial changes to the institutional structures surrounding scientific research. While the funding to build reliable and stable biomedical databases is increasing, there is no appropriate business model to support the long-term sustainability of these structures, with national funders, industry, universities and publishing houses struggling to agree on their respective responsibilities in supporting data sharing.

Several other factors are important: free dissemination of data is not welcomed by the majority of researchers, who do not have the time or resources for sharing their data, and who often fear that premature data-sharing will damage their competitive

advantage over other research groups. There are intellectual property concerns too, especially when funding for research comes from industry or specific parts of government such as defence. There are no standards for what counts as evidence in different research contexts and geographical locations. And more work needs to be done on how to relate datasets collected at different times and with different technologies.

The social sciences and humanities have an important role to help scientific institutions and funders develop policies and

“**DATA IS INTELLIGIBLE WHEN IT CAN BE USED AS EVIDENCE FOR ONE OR MORE CLAIMS**”



infrastructures for the evaluation of data-sharing practices, particularly the collaborative activities that fuel data-intensive research methods. An improved understanding of how data can be made available in ways to maximise its usefulness for future research can also help tackle privacy concerns relating to sensitive data about individuals.

### IT'S GOOD TO SHARE

When it comes to sharing medical records, it is now generally agreed that providing 'informed consent' to individual patients is simply not possible, as neither patients nor researchers themselves can predict how the data could be used in the future.

Even the promise of anonymity is failing, as new statistical and computational methods

## 🔍 FOOD TECHNOLOGY

# SUPER BURGER

*The ethical and social issues of growing and eating in vitro meat*



**IN VITRO MEAT**, where muscle tissue is grown from cells in laboratories, to eat as food, is attracting global attention. The world's first laboratory-grown hamburger will be eaten about the time this article hits the newsstand.

Produced in Maastricht by Professor Mark Post and his team, this represents something radically new in our world. Dr Neil Stephens from the ESRC Centre for the Economic and Social Aspects of Genomics (Cesagen) at Cardiff University has been researching the ethical and social issues of

this technology, and what this innovation in stem cell science might mean for us in 2013.

We are not all about to be eating vitro meat ourselves. This burger cost around \$250,000 to make, the technology is at an early stage and scientists may never be able to scale the work to reach a marketable price point. They may never be able to make it look like meat as recognised today, or be able to make it without growing the cells on blood from foetal calves, as they do now – all of which are essential to whether we should ever want to eat in vitro meat.

### MAKING A DIFFERENCE

But in vitro meat will still make a difference in 2013 – we may not eat it, but we will talk about it and try to make sense of what it is, whether

Databases of clinical data from patients should be intelligible and useful



make it possible to retrieve the identity of individuals from large, aggregated datasets, as shown by genome-wide association studies. A more effective approach is the development of 'safe havens': data repositories that would give access to data only to researchers with appropriate credentials. This could potentially safeguard data from misuse, without hampering researchers' ability to extract new knowledge from them.

Whether this solution succeeds ultimately depends on the ability of researchers to work with data providers, including patients, to establish how data travels online, how it is best re-used and how data sharing is likely to affect, and hopefully improve, future medicine. ■

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we want it, and if it can deliver the benefits some scientists claim: it is slaughter-free meat; healthier and free from animal to human disease; meat that could be grown during space travel; and meat with much less environmental impact than today's whole-animal reared meat.

Raising the profile of the environmental impact of meat production in public and policy debates is perhaps the most immediate impact of the world's first in vitro meat burger. Food sustainability is often framed in terms of air miles and packaging; the in vitro burger may remind us that choices over what we eat, and how it is produced, are also key sustainability issues. ■

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## GENETICS

# CODE BREAKERS

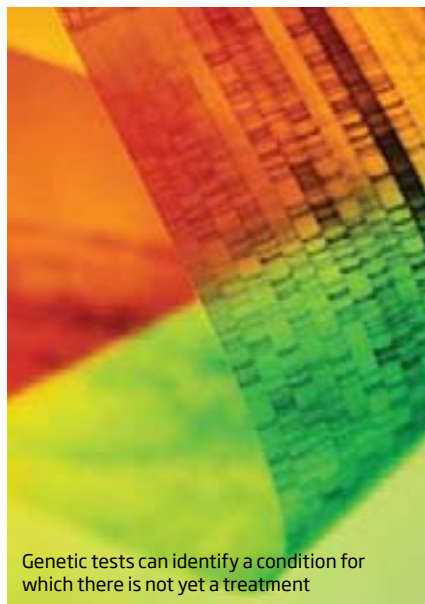
*How do clinicians explain and patients understand the results of genetic tests?*

### RECENT ADVANCES IN TECHNOLOGY

have greatly increased the ability of laboratory scientists to examine a person's entire DNA sequence (sequencing the genome) and detect differences that might result in disease or disability. Until recently, genetic tests were targeted at specific DNA sequences, but there are numerous potential advantages to using wider tests, as they may enable more diagnoses to be made and enhance patients' access to clinical screening and better management of their conditions. The information obtained may also increase the number of people who can be informed about a future risk for disease and for future offspring having a genetic condition.

The improvement in these technologies is reducing the costs and increasing the availability of such testing for clinical care. Genomic medicine continues to be incorporated into mainstream healthcare and such tests are increasingly ordered by medical specialists in oncology, cardiology and paediatrics. Genetic testing is becoming more common and at the same time techniques are becoming more complex.

In another development, specific tests to look at multiple sections of the genetic material



Genetic tests can identify a condition for which there is not yet a treatment

simultaneously can be used to diagnose the causes of developmental problems in children. For all of these tests, results tend to be complex, raising important questions about the challenges doctors face in interpreting and explaining this information, and what information patients want to know from their doctors.

Researchers Professor Heather Skirton and Leigh Jackson at the University of Plymouth (Faculty of Health, Education and Society), and Dr Susan Kelly and Dr Daniele Carrieri at the University of Exeter (the ESRC Centre for Genomics in Society, Egenis) have begun to explore these issues, looking at patients' attitudes. The researchers ran focus groups with potential patients in Exeter and Plymouth to find out what information patients want before and after having tests that can investigate all or a large body of the

“ PARTICIPANTS SHOWED A DEEP AWARENESS OF THE COMPLEXITY OF GENETIC INFORMATION

genetic material. Participants acknowledged that genetic tests can provide useful information about one's health; they can lead to diagnosis, intervention, treatment, lifestyle changes and can be used to plan ahead (including insurance schemes and financial planning).

But participants also showed a deep awareness and appreciation of the complexity of genetic/genomic information.

The possibility of receiving a positive test result for a condition for which there is no treatment or intervention available emerged as a very important theme and was one factor that made it difficult to have a clear view on the usefulness of genomic testing.

### A CLEARER UNDERSTANDING

Family relations, emotions, feelings, attitudes and preferences can change over time. For example, older people may be less interested in genome-wide tests as lifestyle changes may seem less relevant to them. Although some participants were sceptical about the usefulness of whole genome tests and about the value of uncertain information about disease predisposition and susceptibilities, many recognised that this type of test may make sense from an economic point of view.

From a public health standpoint, genomic tests could be offered as a more cost-effective method of population screening than tests that are currently available. The availability of a test appeared to be a factor that made it compelling; in other words, if a whole genome test is available, it has to be used. The researchers hope that their research findings can lead to the production of educational resources for both health professionals and members of the public, to aid in the understanding and interpretation of results generated by emerging genomic testing technologies. ■

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## INFANT NUTRITION

# A whole lotta bottle

*Bottle-fed babies often gain weight more rapidly than breastfed babies, putting them at a higher risk of childhood obesity*

**MORE THAN ONE IN FIVE** children are overweight or obese by the time they start school. Nutrition and growth during infancy can have long-term effects on appetite, eating behaviours and risks of obesity in later life. And bottle-fed babies often gain weight more rapidly than breastfed babies, putting them at a higher risk of childhood obesity. Researchers at the Medical Research Council Epidemiology Unit and the UK Clinical Research Collaboration Centre for Diet and Activity Research have been seeking to understand more about this phenomenon and test an intervention to reduce this risk to bottle-fed babies.

“Evidence still indicates that breastfeeding is the best way of ensuring optimal health for mother and baby,” says one of the lead investigators on the Baby Milk Study, Dr Raj Lakshman. “But while around eight out of ten mums start to breastfeed a baby, within six weeks nearly the same proportion are supplementing breastmilk with some bottle feeds.”

### HEALTHY OPTIONS

Despite this, relatively little research has looked at how to best protect the health of bottle-fed babies. So, Baby Milk Study researchers undertook two systematic reviews (methodical appraisals of published scientific evidence looking at a certain question or area).

The first looked at how parents made formula feeding decisions. It showed that mothers who bottle-fed their babies experienced negative emotions such as guilt, anger, worry, uncertainty and a sense of failure. Mothers reported receiving little information on bottle-feeding and so did not feel empowered to make decisions. Mistakes in preparation of bottle-feeds were also common.



Guideline amounts on formula milk packs tend to be too high

The second systematic review identified that improving the quality of advice given by healthcare providers was important to help parents follow infant feeding guidelines. It is also known that the guideline amounts printed on formula milk packs are based on 1985 recommendations from the World Health Organization and other international bodies; more recent recommendations from these same groups suggest that amounts do not need to be this high to provide babies optimum nutrition – but the labelling has yet to catch up.

### NEW FEEDING PROGRAMMES

Building on the systematic reviews, researchers worked with mothers and healthcare professionals to develop a feeding programme for families who use formula milk. The aim is to help them achieve a healthy pattern of growth and weight gain for the babies and the programme is being tested in a randomised controlled trial (RCT). RCTs are seen as the gold standard for medical and population health investigations, and are increasingly being applied across business, commerce, information technology, public policy and many other sectors. In RCTs, participants are randomly assigned to different groups: typically, one group receives an intervention and another (the control) does not. This random allocation of participants to different groups means that researchers can be sure that any differences in the groups at the end of the study are due to the intervention.

In the Baby Milk Study, the intervention group is given the newly-developed programme and the control group is given routine advice about formula-feeding and weaning, with the babies in both groups followed up during the first year of their lives. The results of the study will inform infant feeding guidelines in the UK and will help increase understanding of the links between infant feeding, behaviour, growth and future obesity risk. ■

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## REPRODUCTIVE TECHNOLOGY

# Managing the mutations

*How can it be made easier for patients, families and clinicians to navigate the complexities of mitochondrial genomics?*

**MITOCHONDRIA ARE SMALL** energy-producing structures contained in the cytoplasm of a cell. Mitochondrial disease results when these ‘batteries’ fail, affecting organs that require significant energy such as the heart, kidneys or brain. Mitochondria are inherited through the female line, meaning that the children of women with disease caused by mutations in mitochondrial DNA will inherit these mutations.

Scientists at the Wellcome Trust Centre for Mitochondrial Research in Newcastle have developed pioneering techniques offering the possibility of a future generation born without mitochondrial disease. Techniques of mitochondria donation involve removing the nucleus of an egg with faulty mitochondria (from a woman with mitochondrial disease)

and transferring it into an enucleated egg with healthy mitochondria (from a donor woman).

As mitochondrial disease can be a degenerative and sometimes fatal illness, with limited treatment and no cure, developments in reproductive technologies have been widely anticipated by patients and professionals. But these techniques have also been met with caution. As the DNA contained in donated mitochondria will be passed down to subsequent generations, a change in law is required before these ‘germline’ therapies can be offered to patients.

Two important reports will help the government make an informed decision. The Nuffield Council on Bioethics (2012) report concluded that these techniques were ethical, and the Human Fertilisation and Embryology



Get closer to your family to determine the risk of getting Type 2 diabetes

## DIABETES

# RUNNING IN THE FAMILY

*How do people with a family history of Type 2 diabetes feel about the risk of developing the condition?*

**ALTHOUGH PEOPLE WITH** a close relation with Type 2 diabetes are two to four times more likely to develop the condition themselves, many do not realise the importance of knowing their family history. A pilot study being carried out by Egenis, the ESRC Centre for Genomics in Society, is interviewing families to understand how different members think about having Type 2 diabetes in the family.

Type 2 diabetes rates have been increasing dramatically in recent years, with 2.35 million people diagnosed in Britain alone. Another half a million are estimated to go undiagnosed. Type 2 diabetes clusters in some families,

where more than one member of each generation has the condition and a family history of Type 2 diabetes (if a sibling, parent or child has the condition), means that people are much more likely to develop Type 2 themselves.

Those with an increased risk can take preventive steps by living a healthier lifestyle, losing weight or being screened regularly for Type 2 diabetes and 'prediabetes', which occurs before full diabetes. Identifying and working with families with increased risk to prevent Type 2 diabetes



**THOSE WITH AN INCREASED RISK CAN TAKE PREVENTIVE STEPS BY LIVING A HEALTHIER LIFESTYLE**

developing could, therefore, be a considerable public health opportunity. Given that Type 2 diabetes is associated with a significantly increased risk of heart attack and stroke, as well as other complications such as foot and eye problems and impotence, preventing it before it becomes full-blown is important, especially for those with known risk factors, including family history.

## FAMILY LIFESTYLES

But little is known about whether family members of those with Type 2 diabetes see themselves as 'at risk'. Health services also tend to focus on the individual patient rather than their family. To investigate these issues the pilot project, Understandings of Type 2 Diabetes in 'At Risk' Families, is being run by Egenis' Dr Hannah Farrimond, with additional funding from the Richard Benjamin Trust.

Members of family groups (centred around one person who has Type 2 diabetes) have been interviewed to gain an in-depth understanding of their 'representations' (concepts and practices) of Type 2 diabetes, inheritance and genetics. In some of these families, Type 2 diabetes has been very common, with parents, siblings and children all affected. In others, there is just one member with Type 2 diabetes. The research does not assume everyone in the same family will think alike or live the same lifestyle, but people are social beings and families do share important

values that may influence how they behave when confronted with being diagnosed or being 'at risk' of Type 2 diabetes.

In the longer term, this research will be used to inform clinical recommendations for family history interventions with 'at risk' families. Dr Farrimond also hopes it may draw greater attention to the potential of family history approaches for the disease's prevention. ■

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Authority (HFEA) is currently conducting a consultation seeking the views of the public.

## DESIGNER BABIES

The media interest about these techniques revolves around the role of mitochondrial DNA and the implications of donation. Questions have been asked as to whether the mitochondria donor should be seen as a 'third parent', whether mitochondria donation will change the identity of the child, and whether these techniques represent a slippery slope towards designer babies and human cloning.

Within this changing landscape of mitochondrial genomics Dr Rebecca Dimond, a Research Associate at the ESRC Centre for Economic and Social Aspects of Genomics

(Cesagen) at Cardiff University, has conducted one of the largest qualitative projects focusing on patient accounts of mitochondria disease.

The project, Mitochondrial Genomics: Challenges for Policy and Communication, was developed with Newcastle University and adds to the debate by highlighting how the complexity of mitochondrial genomics - including the expansive range of symptoms, variation in disease trajectory and uncertain reproductive risk - poses considerable challenges for patients, families and clinicians. Enhancing understanding of the patient experience is vital to ensure that patients are offered support when negotiating new reproductive technologies. ■

[www.genomicsnetwork.ac.uk/cesagen](http://www.genomicsnetwork.ac.uk/cesagen)



Scientists are breaking down the complexities of mitochondrial disease

## MEDICAL TECHNOLOGY

## Regulating the robot?

Implanted smart technologies can aid recovery but alter personality too

*The development of technologies implanted into the human body raises questions of perception and regulation*

**BIOLOGY, NANOSCIENCE** and information technologies are coming together with advances in cognitive science, miniaturisation and biocompatibility, to shrink devices that are worn or carried, and to create devices that are implanted and 'smarter'. Medical technologies like artificial joints and heart valves are now being joined by new technologies, such as automated insulin pumps, radio frequency identification implants, brain-computer interfaces, deep-brain stimulators and next-generation implanted micro-monitors/transmitters.

These Implanted Smart Technologies (ISTs) will be complex and controversial and have the potential to both augment and damage the health of the implantee. They also create new and profound dilemmas. For example, deep-brain stimulation can alter a patient's personality and challenge personal identity, thus raising questions about legal responsibility. Implanted sensors can improve human functioning, but strain social categories and relations, including human/human, human/machine and human/society relationships/divisions.

#### TIGHTER REGULATION REQUIRED

Despite these serious risks and questions, implanted devices are poorly regulated, as shown by the recent PIP breast implants scandal. Rather than being licensed (by the Medicines and Healthcare Products Regulatory Agency, for example) they are approved by 'notified bodies' such as local health authorities. The result is that devices are easily marketed and often implanted with little understanding of key technical issues, such as safety and efficacy, and almost no appreciation of the broader social

consequences. Given these failings of oversight, researchers Shawn Harmon and Gill Haddow at the ESRC Innogen Centre and the Mason Institute at the University of Edinburgh ([masoninstitute.org](http://masoninstitute.org)) are investigating the social and regulatory landscape of ISTs.

Conclusions from the initial phase of the research, additionally supported by the Arts and Humanities Research Council SCRIPT



**IMPLANTED SENSORS CAN IMPROVE HUMAN FUNCTIONING, BUT STRAIN SOCIAL RELATIONS**

them 'new' can be unhelpful or even dangerous – the perception of how radical a new technology is lessens over time. In addition, assessments are partial and incomplete and so attention must be paid to the methods for making decisions and the processes for shaping futures.

As the research moves into its next phase, the research team of lawyer, social scientist and artist will further explore the social tolerances of, and regulatory possibilities for, ISTs with a series of stakeholder interviews and focus groups. ■

[www.genomicsnetwork.ac.uk/innogen](http://www.genomicsnetwork.ac.uk/innogen)  
[www.law.ed.ac.uk/ahrc](http://www.law.ed.ac.uk/ahrc)

## NEWS IN BRIEF

#### ATTRACTION LINKED TO THE PILL

Women who used the birth control pill when they met their partner find themselves less attracted to their partners and less sexually satisfied having ceased use than women who were not taking the pill when they met. But while findings from the study at the University of Stirling indicate that women may, on average, be less satisfied with the sexual aspects of their relationship, they are more satisfied with non-sexual aspects. Overall, women who met their partner while on the pill had longer relationships – by two years on average – and were less likely to separate. Laboratory research prior to this study had shown that women using birth control pills show a weaker preference for masculine men – those with high testosterone levels and the corresponding physical hallmarks – than their non-pill-using counterparts.

[www.stir.ac.uk](http://www.stir.ac.uk)

#### RISKS OF FATIGUE

Fatigue, whether induced through sleep deprivation or mental exhaustion, is a widespread problem in a variety of industries such as manufacturing, transportation and the military. Researchers at London South Bank University tested more than 220 cadets from the University of London Officers' Training Corps to see if working in groups can help stave off the worst symptoms of fatigue such as poor decision-making. Researchers discovered that, when fatigued, groups performed better than individuals on a problem-solving task. A more novel finding concerns the effect of fatigue on risky behaviour. Based on a betting task, the study found that both individuals and groups engaged in riskier behaviour when fatigued, despite being able to differentiate between levels of risk involved in higher and lower risk bets.

[www.lsbu.ac.uk](http://www.lsbu.ac.uk)





MARC SUHRCKE

Professor in Public Health Economics at the University of East Anglia and UKCRC Centre for Diet and Activity Research (CEDAR)

OPINION: THE RECESSION

# IS AUSTERITY ALL BAD?

*Professor Marc Suhrcke takes a look at what past recessions might tell us about the possible impacts of the current economic troubles*

The global economic crisis has raised concerns in the public health community that death, illness and disability will increase across the globe, and that health systems will be compromised by increased demand for treatment and reduced budgets. But while evidence shows links between lower income, unemployment and poor health for individuals, history suggests that recession might actually improve health through changes in behaviour, reduced road traffic injuries and alcohol-related deaths. What are the lessons of this contradictory picture for policy and public health interventions?

In Britain, unemployment rose from just over five per cent in 2008 to over eight per cent by 2012. Research in Britain in the 1970s and 1980s showed that the unemployed had a

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**IN THE EARLY PERIODS OF THE CURRENT CRISIS, ROAD TRAFFIC FATALITIES FELL SUBSTANTIALLY**

mortality rate 20-25 per cent higher than average for people of the equivalent socio-economic group and a similar effect has been observed in other countries. The causes are likely to be connected with both physical and psychological health. One acute psychological impact is suicide, which consistently increases in recessions. The steady downward trend in suicide rates in European countries reversed following the start of the current crisis. Greece and Ireland saw suicides increase by 17 and 13 per cent respectively (2007-2008) and in Britain a recent study linked over 1,000 suicides (2008-2010) to the economic situation.

Can a recession lead to better eating habits and a healthier life?



But what might improve in a recession and why? Although unpicking the possible causes is difficult, in the early periods of the current crisis, road traffic fatalities fell substantially in many countries as people reduced the cost of motoring by driving less. In Spain and Ireland, road traffic deaths fell by more than 25 per cent between 2007 and 2009. People's health may also improve during a recession because of changes in lifestyle such as increased physical activity, a reduction in smoking and drinking, and a change to a cheaper, healthier diet. But before concluding that recessions could be good for our health, it's important to remember that aggregate data on health can hide the detailed story. People do not feel financial shock equally, with the more well-off remaining well protected compared to the poor. These differing impacts can create further inequalities over time, and there is a growing body of research that shows the inequality itself can cause a number of detrimental health and social outcomes across the population, from obesity to crime rates.

Time is important: suicide is an immediate impact, while positive and negative effects on health caused by changes in lifestyle can take years to appear, by which time many more social and economic changes will have taken effect. It is important to try to identify the links of the economic consequences of recession to specific behaviour changes, but research on this has been limited and the many influencing factors make it far from straightforward.

Given the clear effect of recession on suicide, how should the government respond

to protect the psychological health of the nation? Looking at just one policy area, it is often assumed that social welfare systems of the kind that we have in this country protect against the effects of economic downturn. While research shows that this is not universally true across all countries, the effects of financial crisis are particularly harmful for countries with the weakest social insurance systems, and social welfare policy can alleviate the adverse mental health effects of recessions. For example, a study of European data for 1970-2007 showed that investments in active labour market programmes – job centres, youth training schemes, employment subsidies, and so on – weakened the association between unemployment and the suicide rate.

Conversely, not investing in social support can have serious consequences in times of recession. In some of the countries worst affected by the ongoing crisis, austerity policies appear to be having adverse effects on health: Greece is experiencing significant rises in HIV, homicides, suicides, prostitution and heroin use. Britain is not in the same situation as Greece, but we should remember that balancing the books should not be at the expense of those already most at risk from the financial crisis.

## RECESSIONS AFFECT BEHAVIOUR

The challenges that Britain and the world face are not just economic; they concern health, the environment, sustainability and wellbeing, so there may be optimistic lessons to be learned about how recessions affect our behaviour. Given that economic downturns appear (on average) to encourage people in rich countries to improve their diet and physical activity, we should ask how we can nurture these behaviours in boom times as well as bust, and not just in the better-off sections of society. And if road traffic accidents are reduced during recessions, how can we build more sustainable and healthier forms of transport at the same time as achieving sustainable economic growth? Just as wartime rationing increased overall nutritional standards, a little bit of austerity might be a bit better for all of us. ■

[www.cedar.iph.cam.ac.uk](http://www.cedar.iph.cam.ac.uk)